Abbreviations

- EGI: European Grid Infrastructure
- EGI.eu: European Grid Initiative organisation
- EIRO: European International Research Organisation
- ESFRI: European Strategy Forum on Research Infrastructures
- HUC: Heavy User Community
- NGI: National Grid Infrastructure/Initiative
- RP: Resource infrastructure Provider
- SSC: Specialised Support Centre
- UMD: Unified Middleware Distribution
- VO: Virtual Organisation
- VRC: Virtual Research Community

EGI.eu Contacts

- Director
  - director@egi.eu
- Operations Team
  - operations@egi.eu
- User Community Support Team
  - ucst@egi.eu
- Strategy and Policy Team
  - policy@egi.eu
- Marketing and Communications Team
  - press@egi.eu
- Secretariat
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An Introduction to the European Grid Infrastructure

Background and Overview

Vision

To support the digital European Research Area through a pan-European research infrastructure based on an open federation of reliable services that provide uniform access to national computing, storage and data resources.

Mission

To connect researchers from all disciplines with the reliable and innovative ICT services they need to undertake their collaborative world-class and world-spanning research

Core Values	
Leadership	Openness
Reliability	Innovation

EGI

- European
  - Over 35 countries
- Grid
  - Secure sharing
- Infrastructure
  - Computers
  - Cloud
  - Data
  - Instruments
  - …. and others

EGI.eu

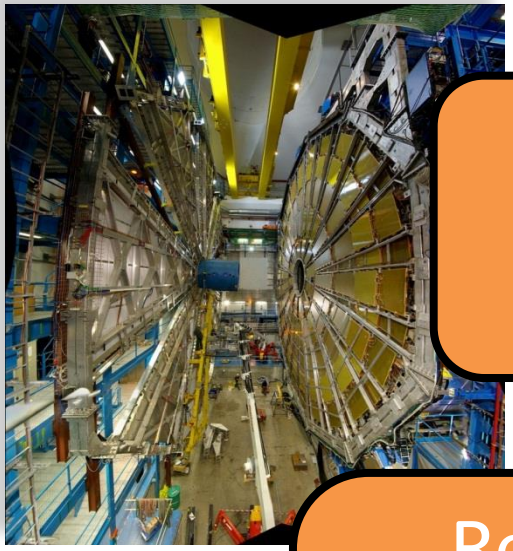
- Coordination for European Grid resources
  - Established February 8th 2010
  - Central policy & services needed to run a grid
  - Sustainable small coordinating organisation
- Based in Amsterdam
  - Coordinating core (~25 people) in Amsterdam
  - Technical services from partners (~20 people)

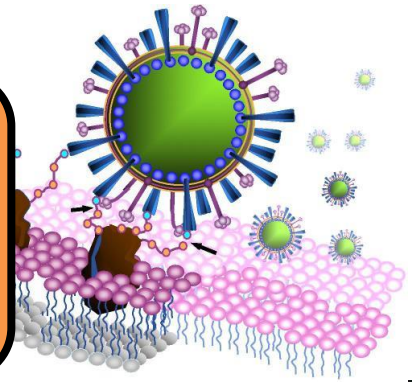
EGI and EGI.eu: Supported by the EGI-InSPIRE project

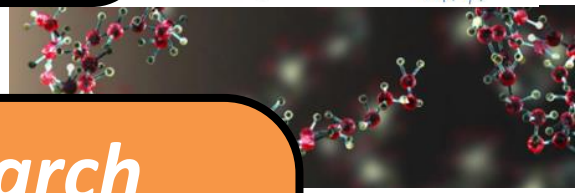
EGI.eu Governance

- EGI.eu established as non-profit foundation
- Governance & ownership by its participants
  - Participants:
    - European NGIs
  - Associated participants:
    - Organisations aligned with EGI.eu's objectives
- EGI Council contains all participants
  - Votes linked to fees

Research Communities







Extracting Knowledge from the Data Deluge

Requires a ***digital research infrastructure*** to ***share*** services and tools ***personalised*** to ***individual research communities***

High-Energy P

- Large Hadron World's larges accelerator
- Supports 8,00
- 1 billion CPU h last 12 months
- 15PB of data created annually

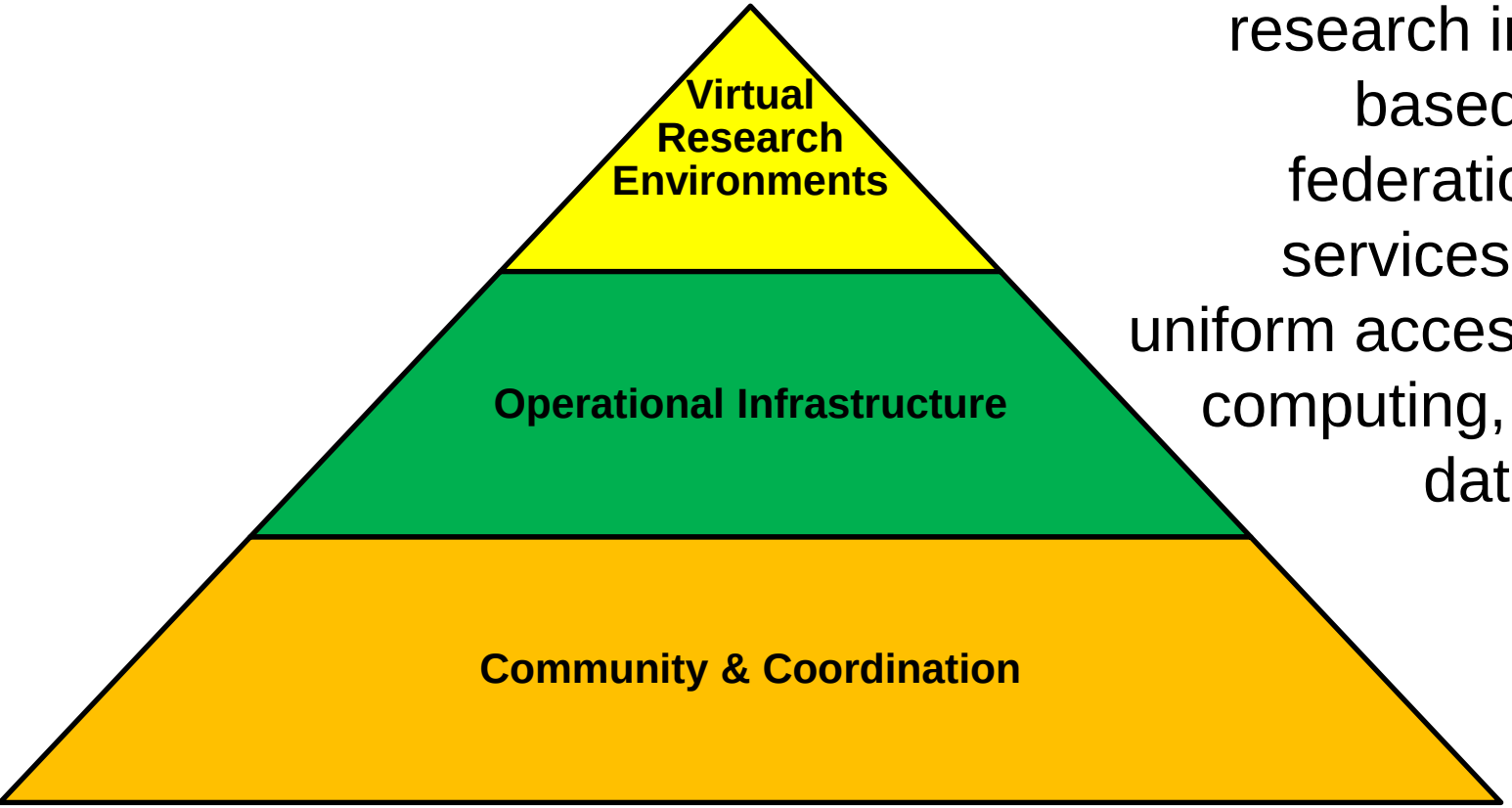
ology: provide

odeling: tools for AXS techniques

See: http://www.egi.eu/case-studies/

EGI's Vision for 2020

EGI 2020 Strategy:
http://go.egi.eu/EGI2020



To support the digital European Research Area through a pan-European research infrastructure based on an open federation of reliable services that provide uniform access to national computing, storage and data resources.

EGI-InSPIRE

Supported Activity and Achievements

EGI-InSPIRE Project

Integrated Sustainable Pan-European Infrastructure for Researchers in Europe

A 4 year project with €25M EC contribution

- Project cost €72M
- Total Effort ~€330M
- Effort: 9261PMs

Project Partners (50)

EGI.eu, 38 NGIs, 2 EIROs

Asia Pacific (9 partners)

Project Objectives

- A sustainable production infrastructure
  - With resource providers around the worldwide
  - With new technologies as they mature
- Support structured international research
  - Sustain current domain specific services
  - Attract new research communities (e.g. ESFRI)

Project Activities

- NA1: Project & Consortium Management
  - Project Office and Quality Assurance
- NA2: Community Engagement
  - Strategic and Policy Development
  - Marketing & Communication
  - Community Outreach
  - Technical Outreach to New Communities
  - NGI International Liaisons

Project Activities

- SA1: Operation of the production infrastructure
  - Infrastructure oversight and quality control
  - Operational security
  - Operational Tools, monitoring & accounting
  - Helpdesk & Support teams (NGI & centrally)
  - Validation and integration of new technology
- JRA1: Support for Operational Tools
  - Maintenance and Development
  - Support for new resources and their accounting

Project Activities

- SA2: Provisioning the Software Infrastructure
  - Managing external software delivery
  - Validation of delivered software
  - Software repository and support tools
- SA4: Accelerating EGI's Strategic Objectives
  - Mini-projects bringing innovation into production

EGI's Current Priorities

- Sustaining EGI's production infrastructure
  - Governance, financial and technical issues
  - Providing Core & Basic Operational Services
- Developing EGI's human networks
  - Providing training, material & travel support
- Engagement with research communities
  - Bring co-developed services into production
- Developing EGI's production infrastructure
  - Increasing scale, flexibility and scope

EGI's Human Networks

- Identifying the individuals in the Network
  - By both position and selection
- Communication within the Network
  - Broadcast material for consumption and/or relaying
  - Social networking and discussion forums
  - Webinars to support development & training
- Using the Network
  - Supporting EGI at meetings & events
  - Provide travel, registration & subsistence support

Exploiting our Expertise

- Human networks provide domain experts
  - Operations, User Support, Technology
  - Policy, Communications, Science Disciplines
- Used to tackle community issues
  - New capabilities, new applications, …
- Assemble into small focused teams
  - Virtual Teams: Unfunded investigative reports
  - Mini-Projects: Funded developments

VTs: Bring Experts Together

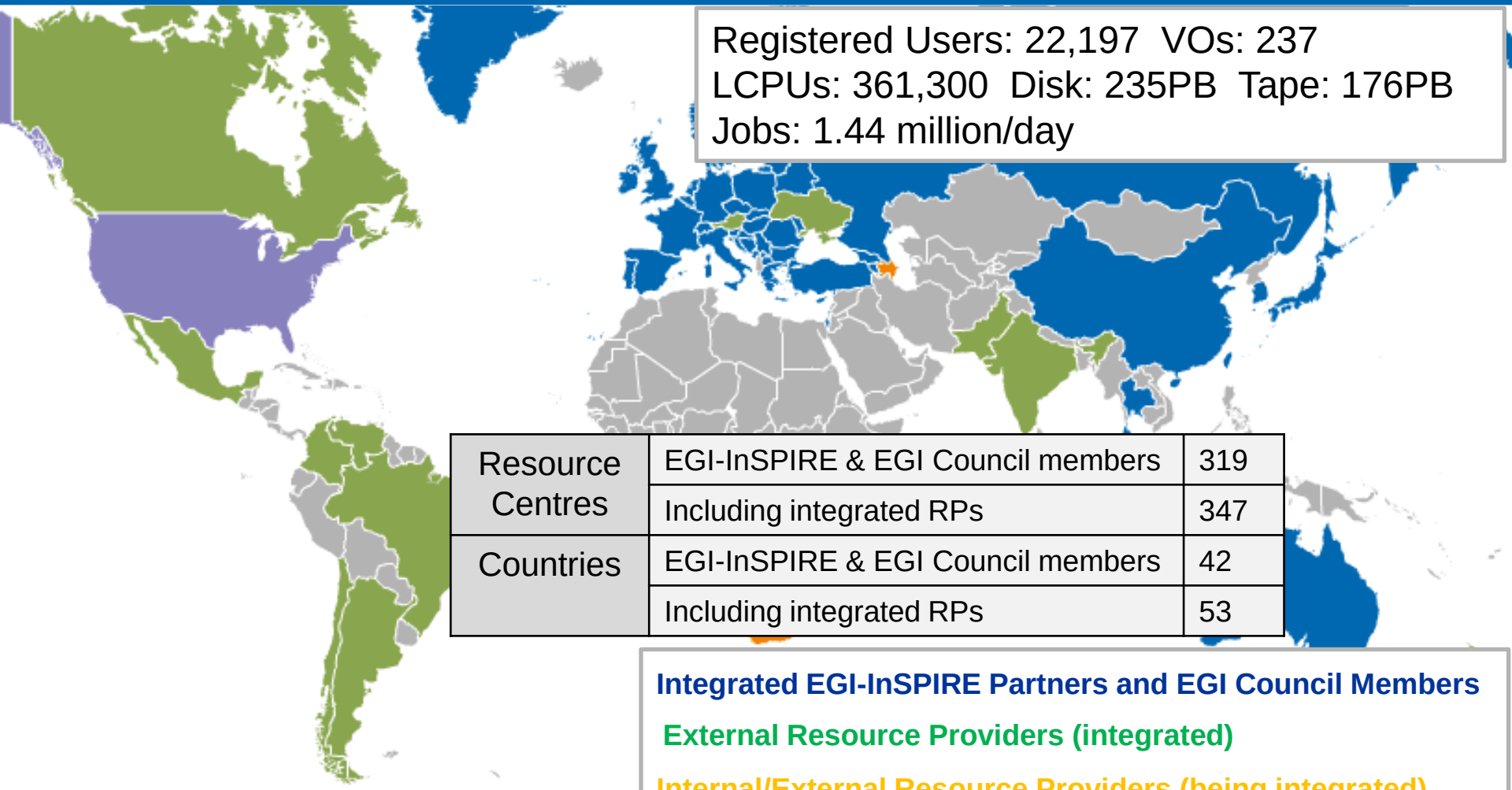
- Reports with recommendations
  - Scientific Gateway Primer
  - Scientific Discipline Classification
  - Scientific Publications Repository
- New Capabilities
  - GPGPU Requirements within EGI
  - Inter NGI Usage reporting
- New Communities
  - ELIXIR and EGI
  - Cherenkov Telescope Array

Funded Mini-Projects

- Virtual Research Environments
  - Massive Open Online Course Development
  - Evaluation of LifeRay Modules
- Building and Using Operational Cloud Infrastructure
  - OCCI support for arbitrary Cloud Management Frameworks
  - CDMI Support in Cloud Management Frameworks
  - Dynamic Deployment for OCCI Compliant Clouds
  - Automatic Deployment and Execution of Applications Using Clouds
  - Transforming Research Platforms to Exploit Cloud Capabilities
- Operational Tools
  - VO Administration Portal
  - A new approach to computing Availability and Reliability Reports
  - GOCDB Scoping Extensions and Management Interface
  - Automating applying for and allocating federated resources

Operational Infrastructure

Registered Users: 22,197 VOs: 237
LCPUs: 361,300 Disk: 235PB Tape: 176PB
Jobs: 1.44 million/day



Resource Centres	EGI-InSPIRE & EGI Council members	319
	Including integrated RPs	347
Countries	EGI-InSPIRE & EGI Council members	42
	Including integrated RPs	53

Integrated EGI-InSPIRE Partners and EGI Council Members

External Resource Providers (integrated)

Internal/External Resource Providers (being integrated)

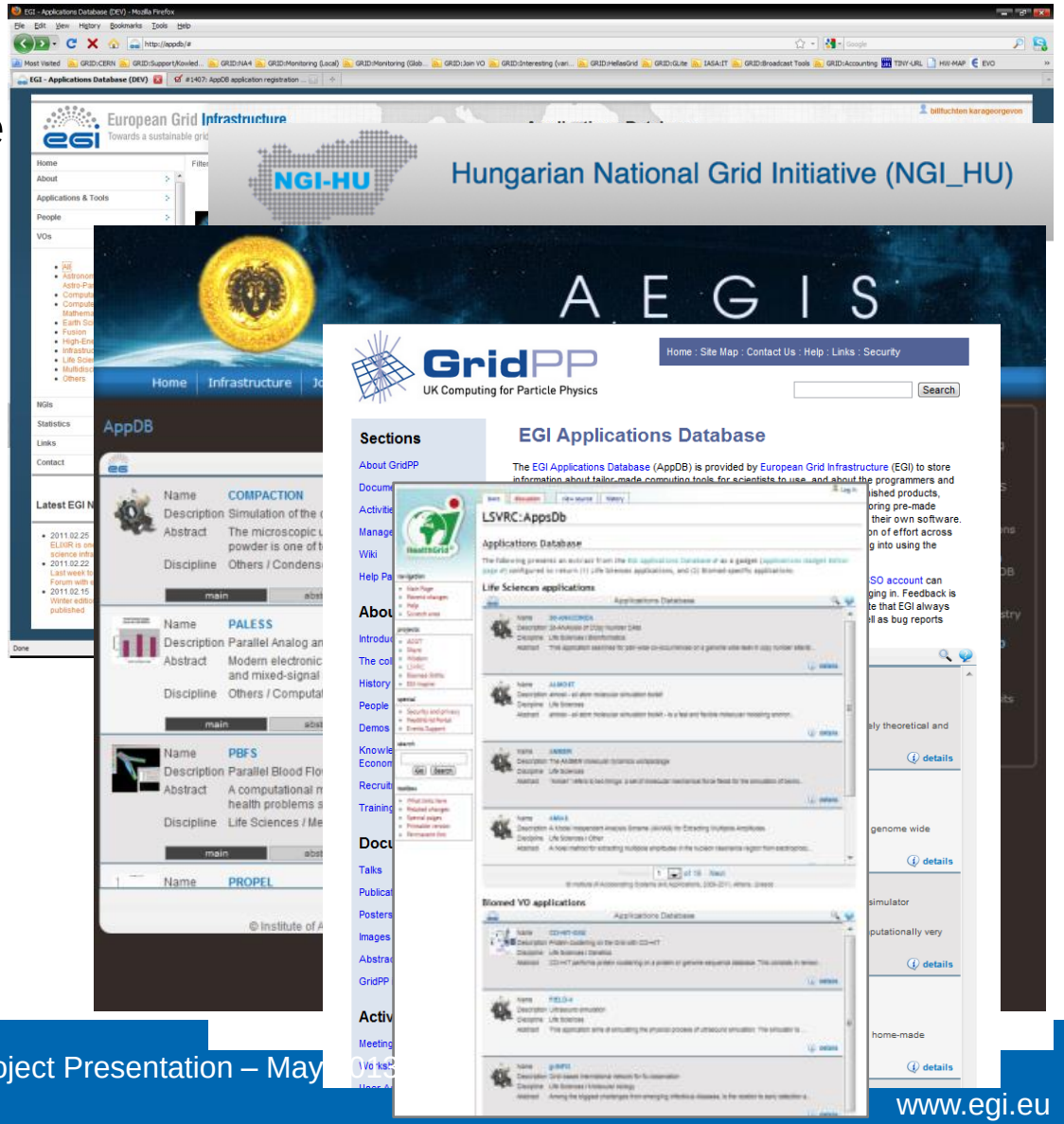
Peer Resource Providers

EGI Applications Database

Benefits:

- Gives recognition to reusable scientific applications, application developer tools, portals, workflows, etc.
- Gives recognition to application developers (people profiles)
- Access through web page AND web gadget
- Community features such as commenting, rateing, tag-based groupings

http://appdb.egi.eu

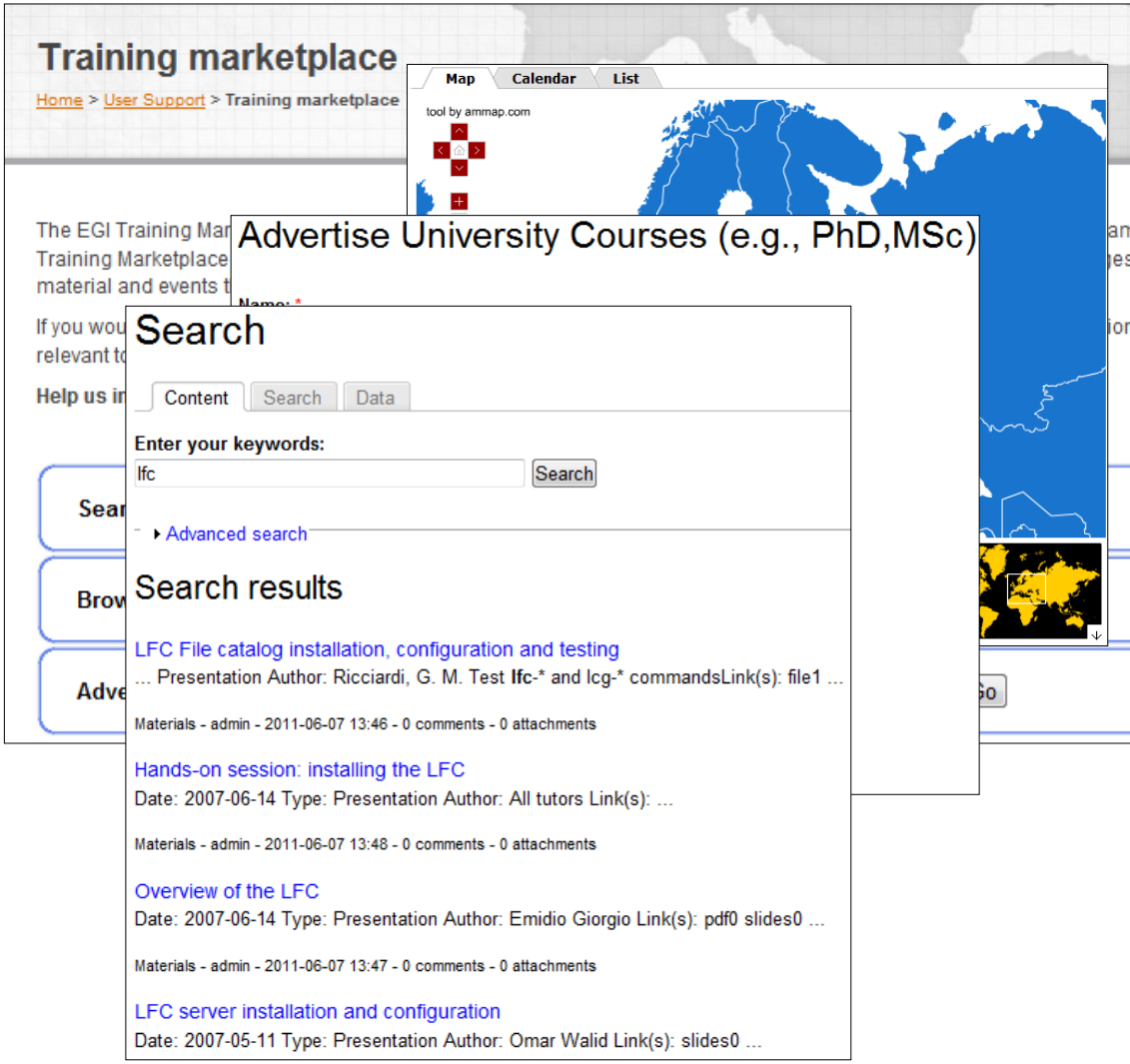


EGI Training Marketplace

Benefits:

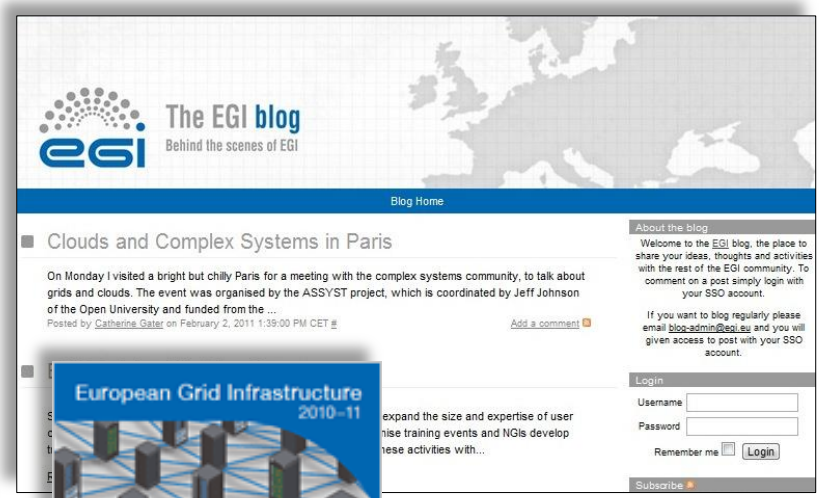
- Register & share
  - training events, expertise, services, materials, resources, online courses, university courses
- Browse and search items
- Community features such as commenting, rating
- Access through web page and web gadget

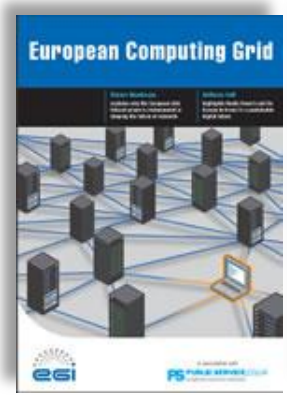
http://training.egi.eu

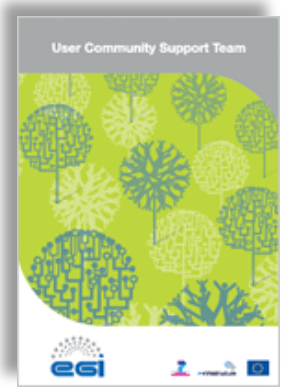


Communications

- Website
- Wiki
- Blogs
- Newsletters
- Letters
- Social Media
- Posters
- Brochures
- Book of abstracts







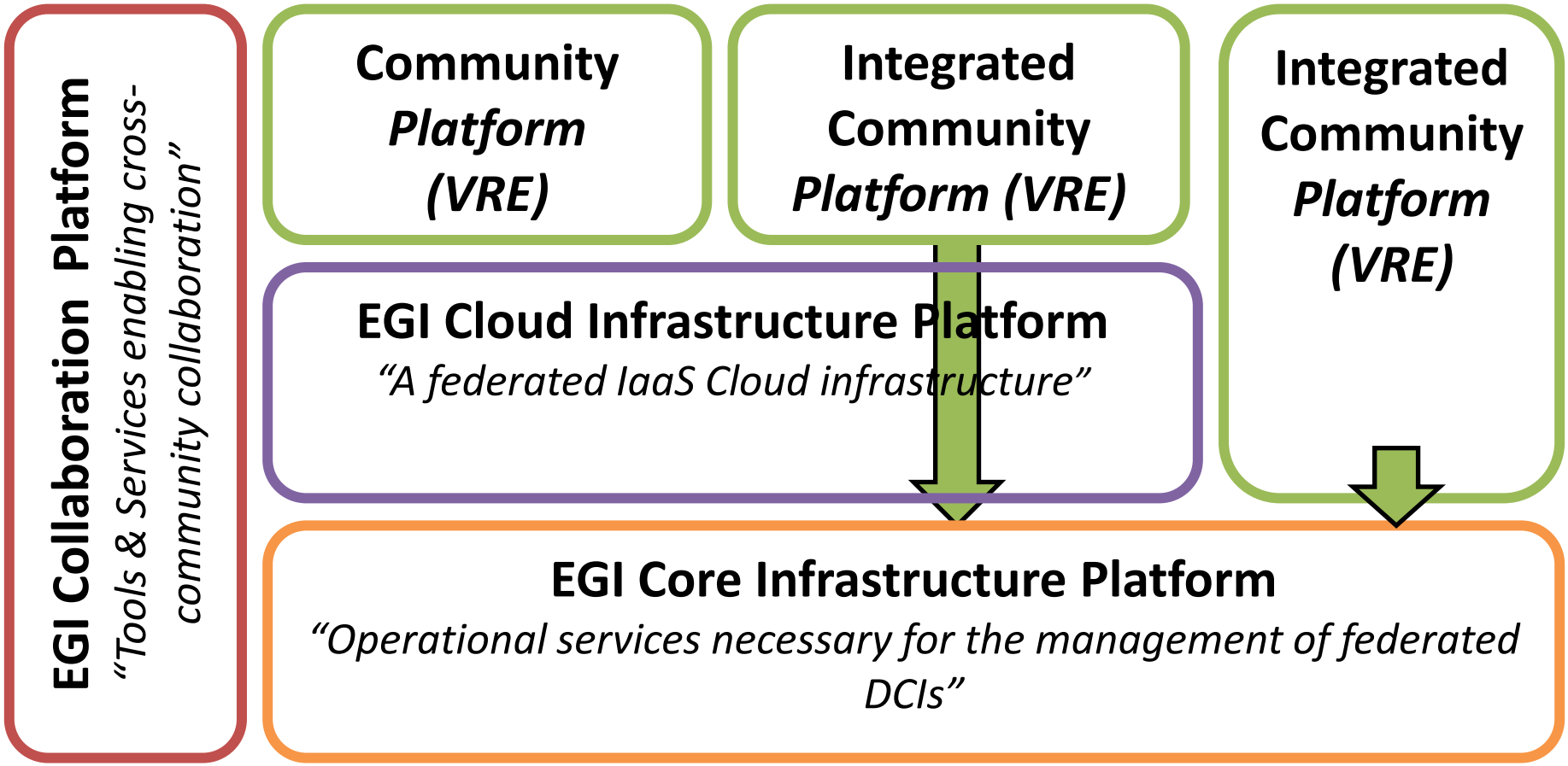
EGI's Platforms

The EGI Platform Model

- What is a platform?
  - “offers the developer an undertaking that code will run consistently”
  - Built upon a defined set of services/APIs/…
- EGI needs platforms to provide a focus:
  - What it offers (i.e. capability or solution)
  - Who it is offered too (i.e. consumer)
  - How it is delivered (i.e. service portfolio)

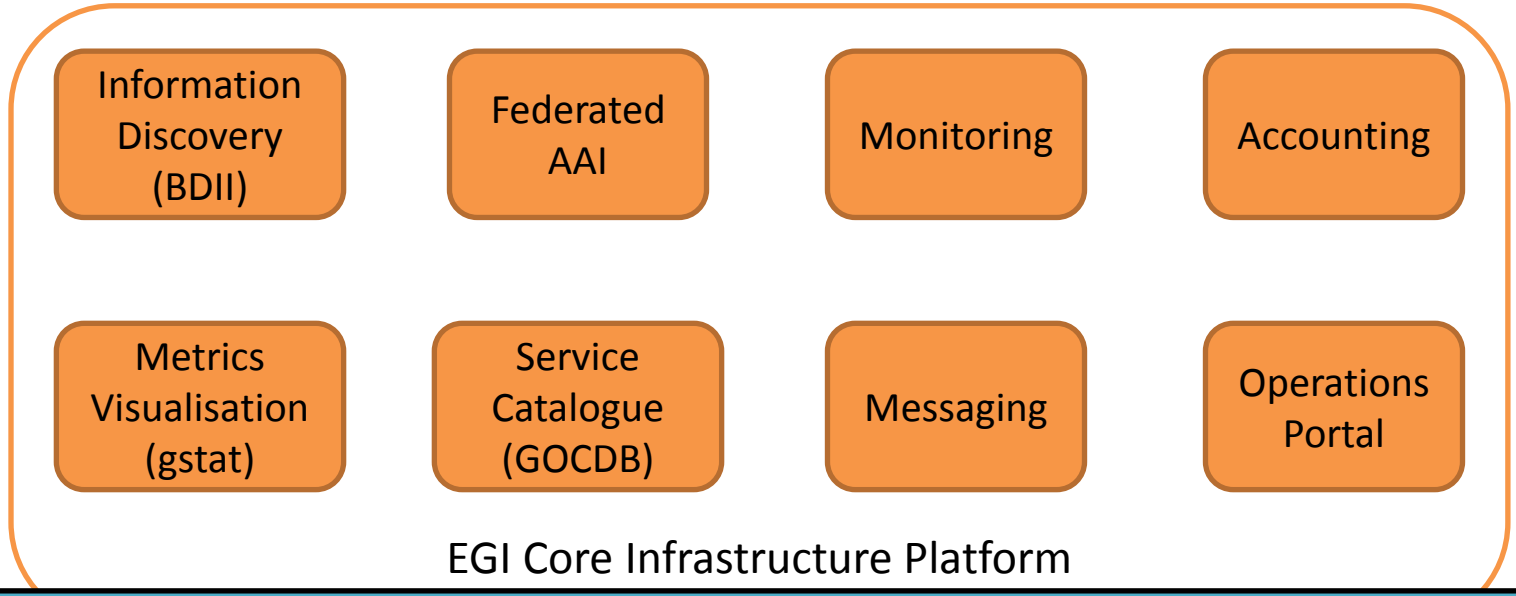
EGI's Platforms for H2020

ERA needs an open ecosystem of VREs & services



EGI's Core Infrastructure

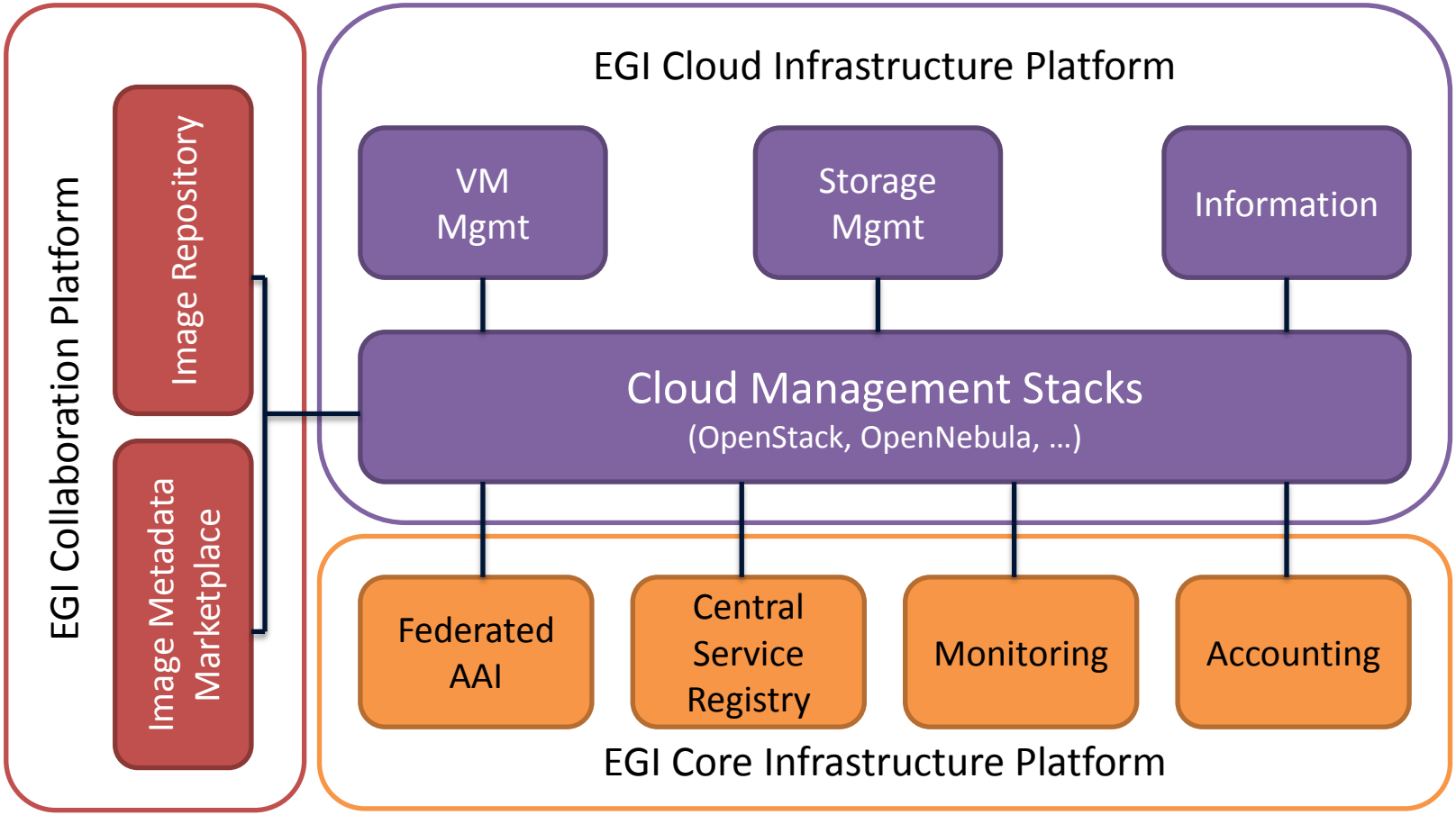
The services that federate and integrate the functional services deployed in the **production infrastructure**



For e-Infrastructures, Research Infrastructures & Community Platforms

EGI's Cloud Infrastructure

Enable an open ecosystem of services



Community Platforms (CPs)

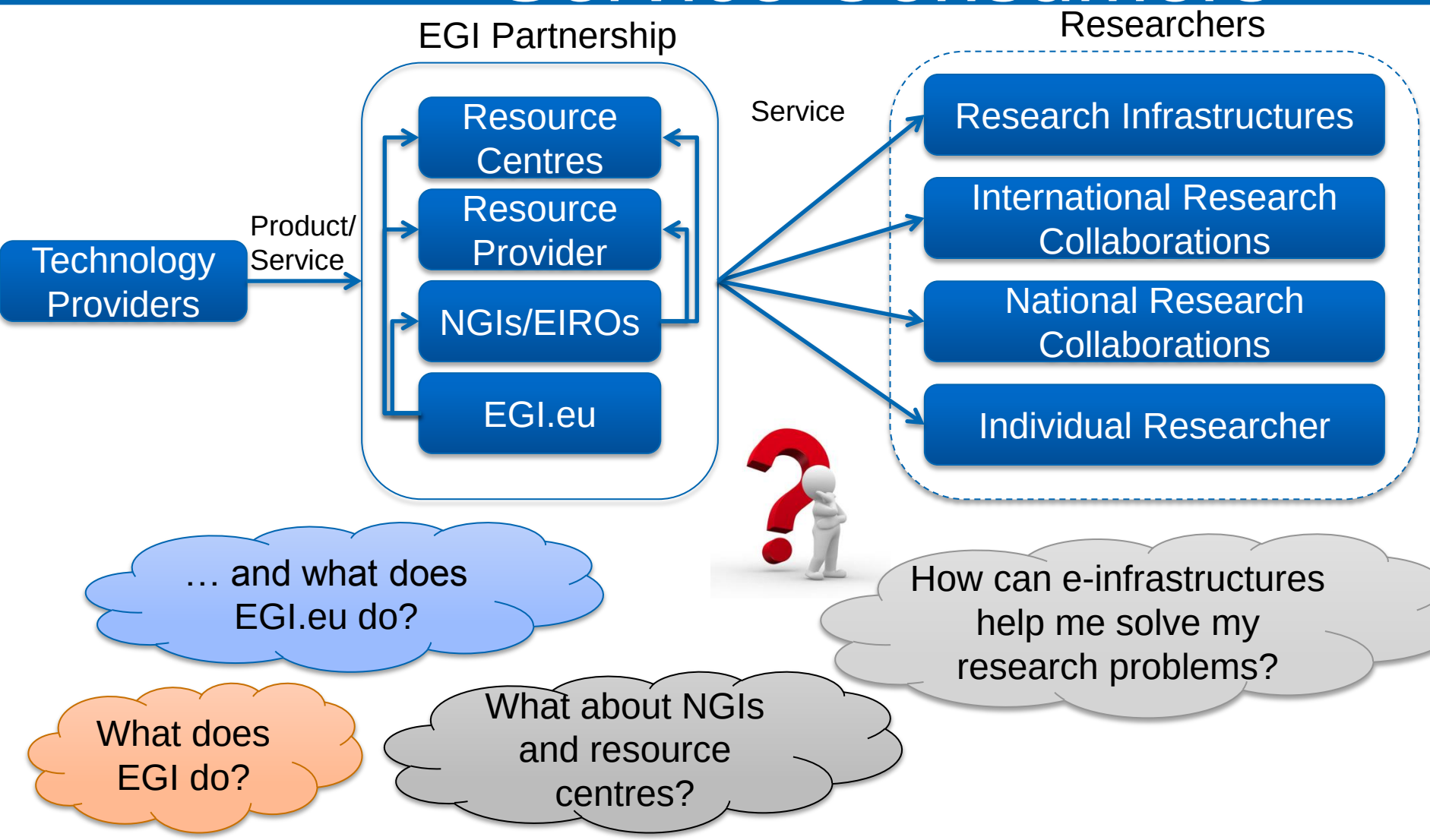
- Integrated with the Core Infrastructure
  - Deployed directly at cooperating sites
  - Limited number due to local effort required
  - Cloud Platform is a CP assembled by EGI
- Can use the Cloud Infrastructure
  - Deploy on any Cloud enabled site
  - Effort from the deployer and not the site
  - CPs assembled by anyone
  - May be integrated with the Core Infrastructure

EGI's Collaboration Platform

- Shared services for all communities
  - People/Social Services
  - Technical/Infrastructure Services
- Customisable VRE encompasses:
  - Services to access local resources
    - Community Platform deployed across a community
  - Services run for a single community
    - Community Platform with a few instances
  - Shared Services run for all communities
    - From the EGI Collaboration Platform

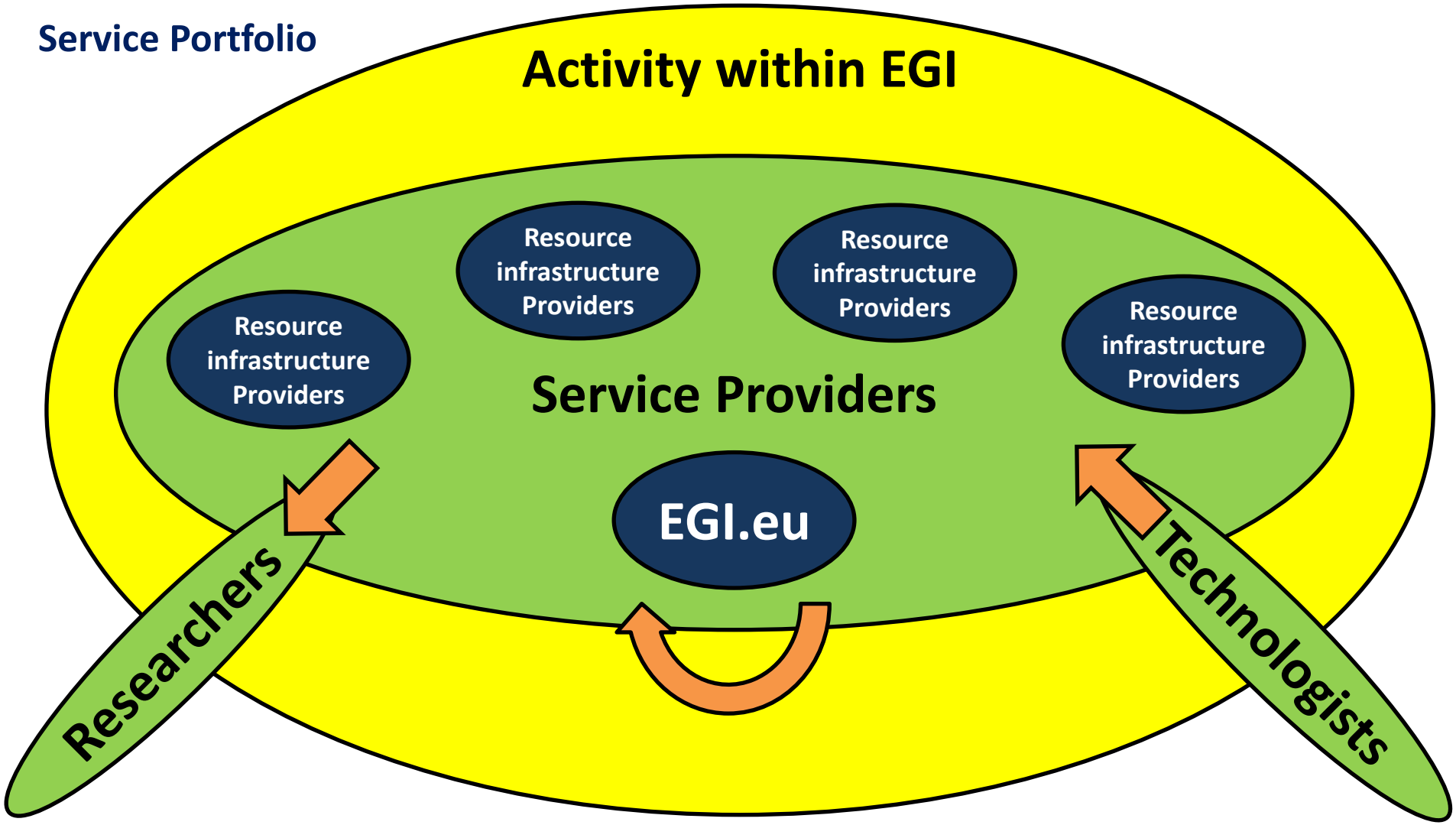
EGI's Services & Solutions Portfolios

Service Providers vs. Service Consumers

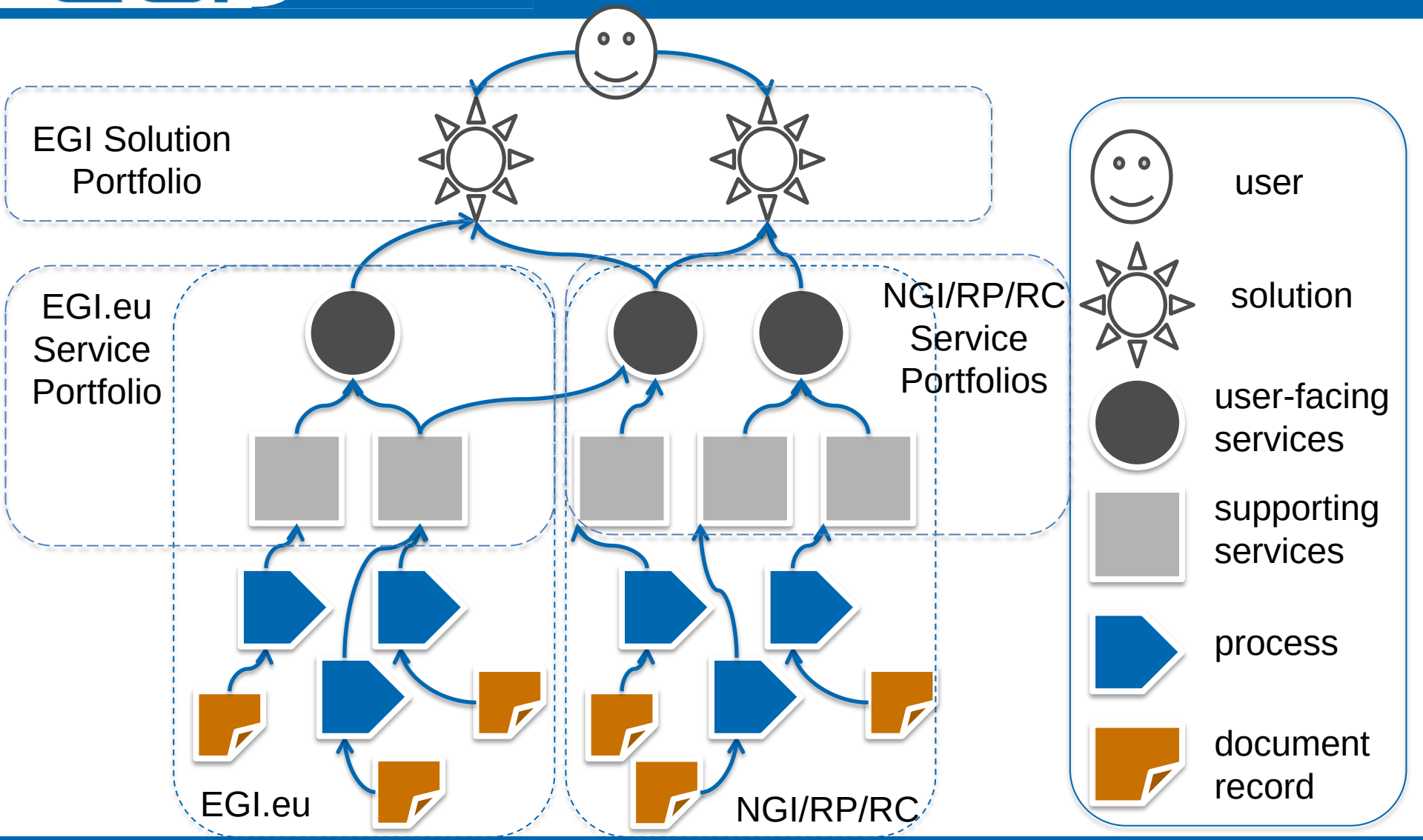


Sustaining EGI Services

Service Portfolio



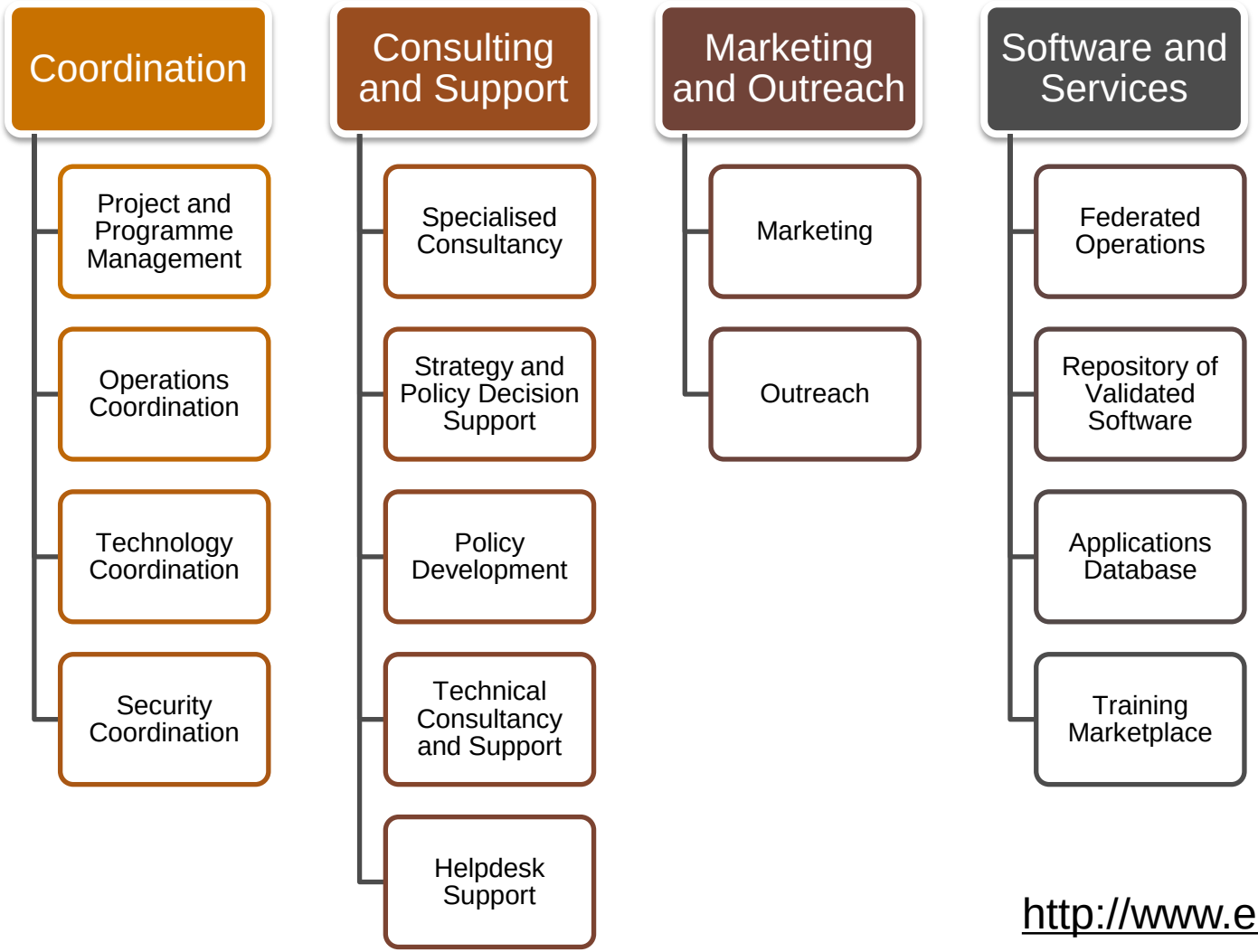
From Process to Solution



EGI Service Portfolio

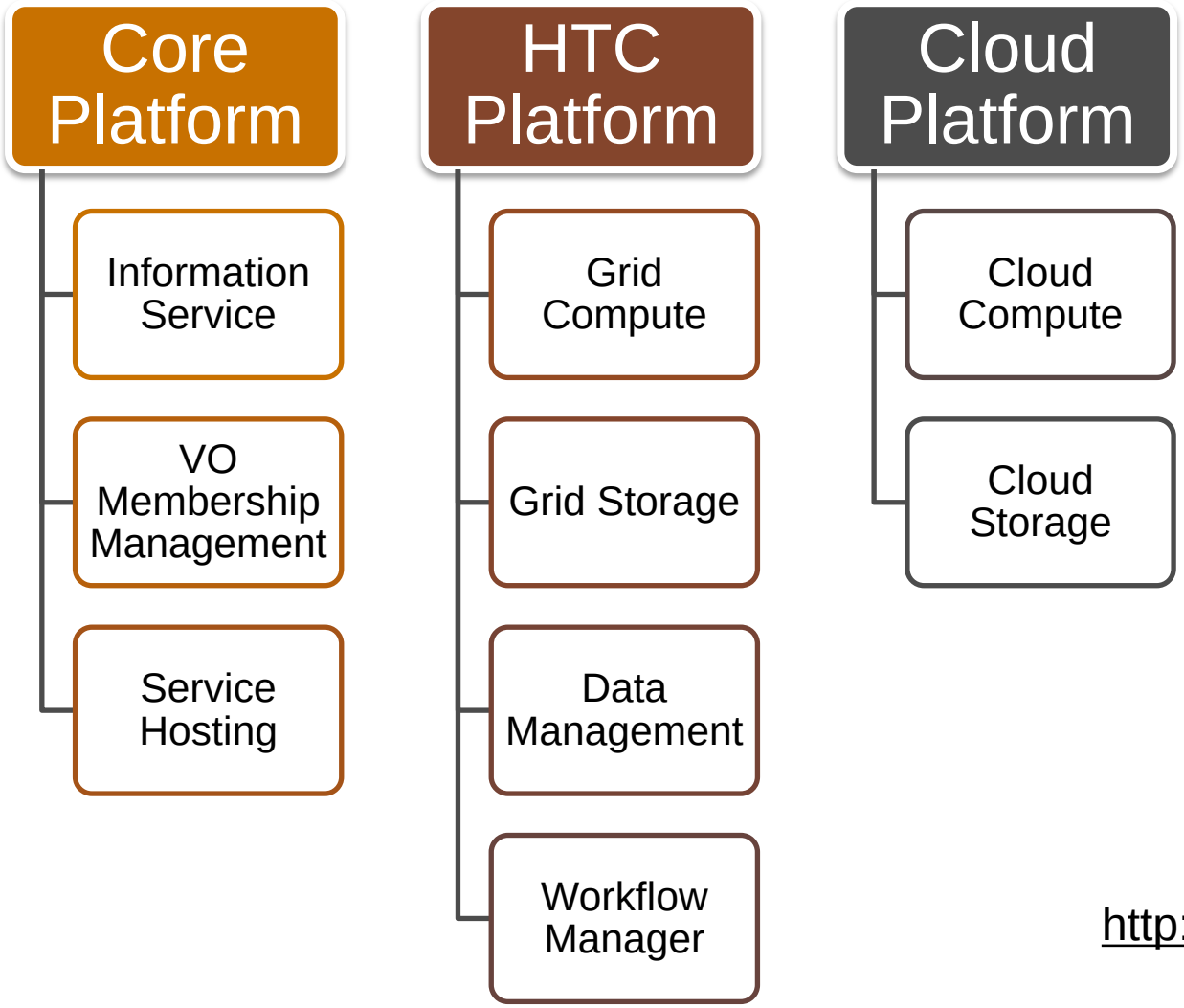
- EGI.eu Service Portfolio
  - Services provided ‘centrally’ for all
  - Operated by EGI.eu and partners
  - Technical & human coordination services
- Resource infrastructure Provider Portfolio
  - Technical & human coordination services
  - Ensures services from Resource Centres
  - Resource Centres provide EGI’s resources

EGI.eu Service Portfolio



http://www.egi.eu/services/

NGI/Resource Centre Service Portfolio



http://www.egi.eu/services/

work in progress

EGI Solutions Portfolio

Federated Infrastructure Operations

Target Groups, Problems, Pains

Target Groups	• Research Infrastructures • Resource infrastructure Providers
Need	• Services for the local operation of their own infrastructure • Want to participate in a federated service provision • Remote access by one or more research communities

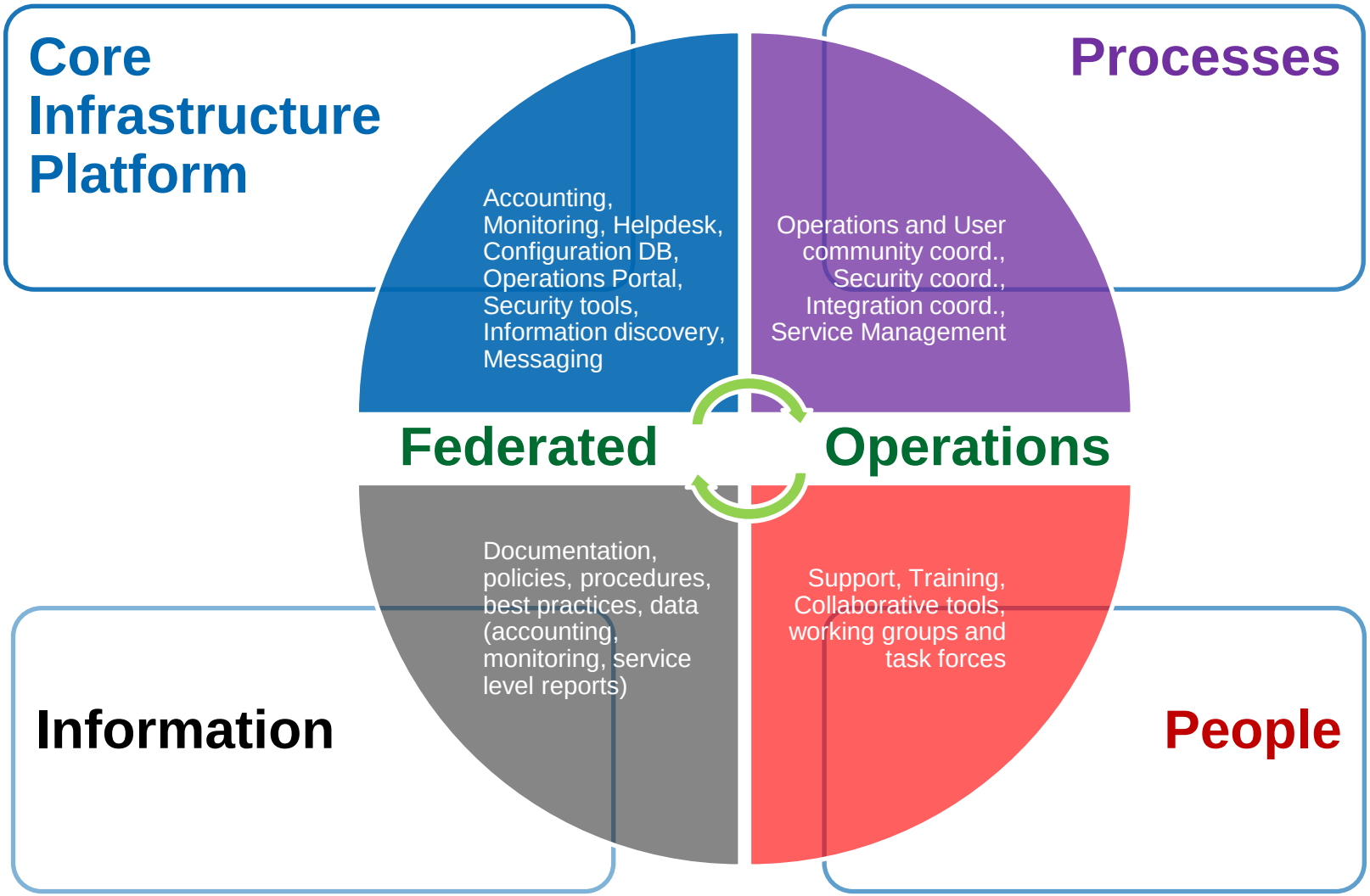
Problems	Pains
Monitoring, accounting, technical support solutions from individual providers are not integrated	Lack of interoperation and harmonization requires substantial coordination effort and duplication of services
Small resource providers do not have enough expertise and effort to increase the quality of their service delivery	Lack of expertise and resources

EGI Solution

Technologies, processes and people for standard operation of heterogeneous infrastructures from multiple independent resource providers with lightweight central coordination

EGI Services needed to build the solution	
EGI.eu	Operations Coordination, Technology Coordination, Security Coordination, Helpdesk Support, Technical consultancy and support, Federated operations
NGIs Resource Providers	Operations Coordination, Security Coordination, Helpdesk Support, Federated operations

Services for Federated Operations



Value Proposition

Enabling cost efficient operations in a federated environment while retaining responsibility of local operations

Problems	Pain Relievers
Monitoring, accounting, technical support solutions from individual providers are not integrated	Core Infrastructure Platform based on standards, common interfaces and protocols, communication, planning and coordination
Small resource providers do not have enough expertise and effort to increase the quality of their service delivery	Provide federated service management best practices, cost-effective sharing of services (support, processes, policies, activities), community expertise & re-use of tools/output from public funded projects

Strategic Impact & Sustainability

What is the strategic impact of providing this solution?

- EGI2020
  - Open uniform operation of a European scale infrastructure comprising locally deployed, domain specific services
  - Sharing of resources at local, national and European level
- EU2020
  - Enabling the European Research Area

How this solution can be sustained?

- Community funds: For operations, maintenance and infrastructure coordination
- Projects: For technical innovation
- In-kind contributions: Provide software consultancy

Federated High-Throughput Data Analysis

Target Groups, Problems, Pains

Target Groups	• Research Communities
Need	• Analyse or produce a large datasets through the execution of large ensembles of (hundreds to thousands) loosely coupled computational tasks possibly combined with parallel ones

Problems	Pains
Researchers may have access to local resources, but they are not integrated with national, regional or international resources	• Remote resources have different access interfaces • It requires substantial effort and skill to integrate and use them together for their science
Managing a huge amount of data within a collaboration is time consuming and prone to error	Lack of capabilities and resources to manage data in a collaborative and distributed environment
Researchers do not have access to enough local capacity for their needs	Lack of resources to undertake their science

EGI Solution

Pan-European federated high-throughput data analysis infrastructure composed of independent resource centres

EGI Services needed to build the solution	
EGI.eu	Operations coordination, technology coordination, security coordination, helpdesk support, technical consultancy and support, federated operations, repository of validated software
NGIs **Resource Providers** **Resource Centres**	Grid compute, grid storage, workflow management, VO membership management, information service, data management

Value Proposition

Easy access to shared computing and data services from independent resource providers where to provision owned resources or access unused ones in a uniform way and preventing single vendor lock-in while optimising utilisation

Problems	Pain Relievers
Researchers may have access to local resources, but they are not integrated with national, regional or international resources	• Open standards based and open source middleware for uniform interfaces to heterogeneous resources • Workflow management tools • Virtual Research Environments
Managing a huge amount of data within a collaboration is time consuming and prone to error	• Data management and transfer tools that support VO-based authentication and authorisation
Researchers do not have access to enough local capacity for their needs	• Opportunistic access to unused capacity in a shared infrastructure

Strategic Impact & Sustainability

What is the strategic impact of providing this solution?

- EGI2020
  - VREs: provides large scale high-throughput data analysis platform for research communities to build their own VREs upon
- EU2020
  - Pooling of resources together across Member States
  - Enabling the European Research Area

How this solution can be sustained?

- Coordination: Membership fees from resource providers
- Resources: Research community contribution or publicly-funded
- Software: In-kind contribution from technology providers or research communities, EC project funding for innovation

Federated Infrastructure as a Service Cloud

Target Groups, Problems, Pains

Target Groups	• Public and Private Sector Researchers with data analysis needs
Need	• Deploy domain-specific IT services to manage access to research data and its analysis

Problems	Pains
Researchers do not want to learn how to use generic e-infrastructures to do their science but want to use their personalised services deployed by people within their own community who they trust	In current HTC-based Grid, it is not possible to delegate deployment and management of user-level services to research communities
Some communities application design models are not compatible with current e-infrastructures	The design of the current infrastructure can limit the configuration of different applications and therefore the communities that can be supported
Applications are released as virtual machine images to simplify maintenance and deployment	Cannot use traditional HTC-based Grids and leverage public investments on e-Infrastructures

EGI Solution

Standards based federation of IaaS clouds: A set of independent cloud services presented to prospective users as a coherent single system utilising a common standards profile allowing multiple provider services and capacity bursting

EGI Services needed to build the solution	
EGI.eu	Operations coordination, technology coordination, security coordination, helpdesk support, technical consultancy and support, federated operations, repository of validated software
NGIs Resource Providers Resource Centres	Cloud compute, cloud storage, VO membership management, information service

Value Proposition

A single cloud system, providing resources targeted at the research community, able to scale to user requirements, and incorporating multiple different providers to give resilience and prevent single vendor lock-in

Problems	Pain Relievers
Researchers do not want to learn how to use generic e-infrastructures to do their science but want to use their personalised services deployed by people within their own community who they trust	• Clouds isolate everyday users from the underlying infrastructure • Allow community experts to provision and manage deployed resources
Some community's application design models are not compatible with current e-infrastructures	The underlying use of virtualisation allows flexibility in the configuration of deployed services across and within providers
Applications are released as virtual machine images to simplify maintenance and deployment; compute models different than HTC	• Provides a common cloud system where new and legacy applications deployed as virtual machines • Virtual machines can be easily provisioned by user communities

Strategic Impact & Sustainability

What is the strategic impact of providing this solution?

- EGI2020
  - Expands the resource provider to commercial of all sizes if they support open and recognized standards
  - Support broader communities beyond traditional users of distributed computing technologies
- EU2020
  - Pooling of resources together across Member States
  - Enabling the European Research Area
  - Support the single digital market and cloud strategy

How this solution can be sustained?

- Direct Charging: Providers add resources through the Federated Cloud making use of core services, thereby accessing new consumers markets
- User Project: Pay per use model for provisioning of service instances targeted to communities connected to their resources

Community Networks and Support

Target Groups, Problems, Pains

Target Groups	• National and International Research Collaborations
Need	• To find the best solution for their data-intensive compute requirements

Problems	Pains
User groups may potentially benefit from EGI, but are unaware of its existence	They are struggling with their work and would like to be informed/supported
EGI users span different countries and disciplines and are often unaware of each other's activities	Difficult to find suitable peers or reusable solutions
Difficult to find proper channels for expressing requirements in a multi-domain infrastructure	Lack of clarity on communication channels

EGI Solution

Establish and manage thematic open community networks

EGI services needed to build the solution	
EGI.eu	Technical Consultancy and Support, Marketing, Outreach, Application Database, Training Marketplace
NGIs **Resource Providers** **Resource Centres**	Marketing, Outreach

Value Proposition

Definitive, user-friendly and engaging support and information; establishing and building a network of contacts with those solving the same problems

Problems	Pain Relievers
User groups may potentially benefit from EGI, but are unaware of its existence	Champions program to spread knowledge through domain experts
EGI users span different countries and disciplines and are often unaware of each other's activities	Easy access to relevant scientific publications Community events to network with people working in related areas
Difficult to find proper channels for expressing requirements in a multi-domain infrastructure	Defined channels and procedures to gather and prioritise requirements in a transparent way

Strategic Impact & Sustainability

What is the strategic impact of providing this solution?

- EGI2020:
  - Community building and Coordination/NGI International Liaisons and Champions: build and strengthen a grassroots infrastructure for community engagement, technical outreach and communication.
  - Operations Infrastructure/Researchers and Champions: promote use cases of individual researchers and research communities accessing and analysing remote data, and community events where new requirements can be gathered.
  - Operations Infrastructure/NGI Operations and technical squads: sharing technical expertise.
  - Virtual Research Environments/Researchers and Champions: collect requirements and feedback from researchers through case studies, events and social media.
- EC2020: Contribution to skills development and the free-flow of knowledge; open access to research outputs

How this solution can be sustained?

- Community funding: Event organisation, Champions, Collaboration agreements, CRM
- Project funding: Materials, copywriting, web content, events attendance

Community-driven Innovation

Target Groups, Problems, Pains

Target Groups	• Research Collaborations and their individuals
Need	• Access the work of like minded specialists internationally • Innovate their digital research workflow

Problems	Pains
Researchers have difficulty in defining the technical requirements for solutions that will support their research	Ideas on how to innovate their work through EGI, but lacking the skills to implement them
Short term collaborations to solve complex problems need easy access to knowledge and supporting processes and collaboration tools	High set up cost for the short-term collaborations slow down innovation
Technical solutions developed in isolation divert effort from research	Waste of resource when minimal effort could re-use other solutions

EGI Solution

Provide an EGI focal point through whom international teams and projects can be formed with relevant experts in order to develop technical solutions to support research

EGI services needed to build the solution	
EGI.eu	• Project and Programme Management (Project Management expertise, Collaboration tools) • Technical Consultancy and Support (User Community Coordination, Requirements gathering and analysis, Coordination of application porting) • Outreach (Coordination of events, Champions support, Collaboration)
NGIs **Resource Providers** **Resource Centres**	Consultancy and Support

Value Proposition

Facilitating innovation through on-demand access to experts supported by management tools provided centrally

Problems	Pain Relievers
Researchers have difficulty in defining the technical requirements for solutions that will support their research	Channel for accessing experts that can adapt existing tools and applications to meet specific needs
Short term collaborations to solve complex problems need easy access to knowledge and supporting processes and collaboration tools	Centrally-provided collaboration tools and streamlined best practices on how to set up and manage virtual teams, access to knowledge base
Technical solutions developed in isolation divert effort from research	Existing solutions can be adapted/re-used for the community by the community

Strategic Impact & Sustainability

What is the strategic impact of providing this solution?

- EGI2020
  - Community and Coordination: Communities of researchers with shared needs emerge and solutions are relevant to larger groups (to enable more effective research)
  - Virtual Research Environments: Technical solutions support larger groups of researchers working in VREs.

How this solution can be sustained?

- Innovation Funding: Funding to support innovation across the human networks within virtual teams & mini-projects
- Coordination Funding: Provide the central support to facilitate productive short-term virtual teams or mini-projects

Researcher Profiles and EGI solutions

EGI Services for Research Communities

Use services

Services by our Community Networks

Create services

Facility for HTC data analysis

European-wide IaaS

Operate services

Identifying and tackling Community Issues

Federated Infrastructure Operations

Individual researchers

Research collaborations

Life Science Grid Community

wenmr

aginfra

VERCE

Research infrastructures

EISCAT 3D

WLCG Worldwide LHC Computing Grid

elixir Data for Life

CLARIN

...

ENVRI

CRISP The Cluster of Research Infrastructures for Synergies in Physics

DARIAH-EU

DASISH

Research infrastructure clusters

#1 Federated Infrastructure Operations for MAPPER

Community helpdesk

MAPPER

Users

EGI Helpdesk/GGUS

Specialized support

Technology provider

gLite

dCache.org

IDGF

ARC

UNICORE

Virtual Research Environment support

User Community

WLCG

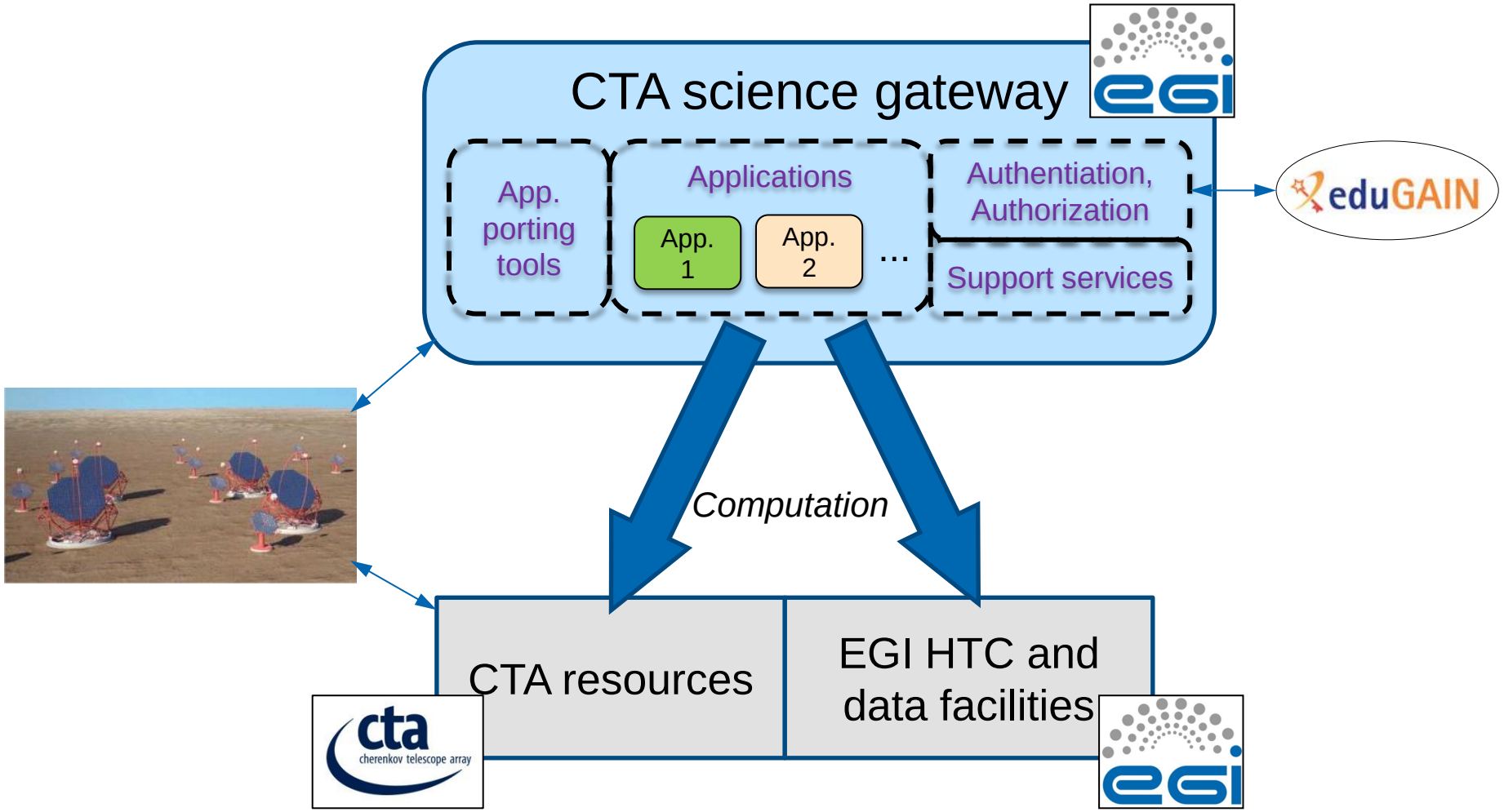
we-nmr

Life Science Grid Community

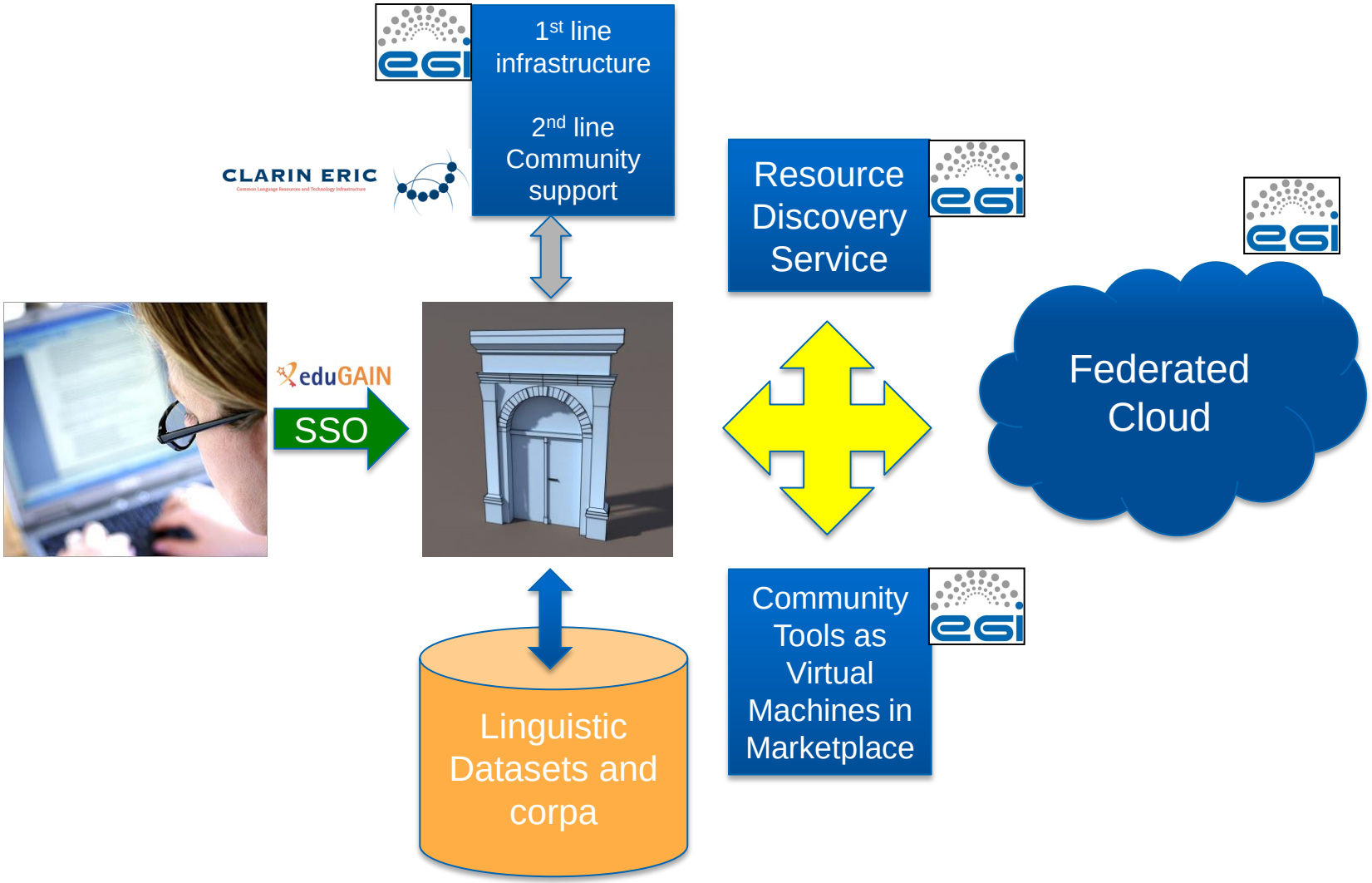
Operations support

Resource infrastructure Provider (NGIs)

#2 EU High Throughput Data Analysis for CTA



#3 EU Federated IaaS Cloud for CLARIN and BNCWeb



#4 Community Networks and Support The Champions Program

- Feedback to EGI on application and services for biophysicsts
  - AppDB, brochure
- Promote EGI at events
  - e.g. 9th European Biophysics Congress
- Contribution to the EGI Massive Open Online Course mini-project
- Liaison with Human Brain Project Flagship in Portugal

Afonso Duarte

EGI Champion
Biophysics and Structural Biology

aduarte@itqb.unl.pt | Afonso's research pages

Afonso has a degree and an MSc in Food Biochemistry, a PhD in membrane peptide Biophysics and is currently based at the Instituto de Tecnologia Química e Biológica (ITQB) in Portugal. He has participated in several EU research projects, both in Portugal and in The Netherlands where he worked on method development and on the structural characterization of proteins. Afonso was recently awarded with a Marie Curie Career Integration Grant.

My research

My goal is to understand the modus operandi of proteins involved in solute transport through cell membranes. Such transporters are involved in key cellular processes but the way transport takes place at atomic level is still unknown. At ITQB we use NMR spectroscopy combined with protein modelling to shed light in these processes.

Why is grid computing important for my research?

I use NMR spectroscopy and protein modelling in my research. Grid computing facilitates the access to high-end NMR analysis applications and molecular modeling tools that require powerful computational resources.

#5 Community-driven Innovation
Virtual Team Projects - Examples

Activity	Discipline
EGI-EUDAT-PRACE pilots	Earthquake and seismology (VERCE); Life sciences (VPH)
EISCAT_3D and EURO-ARGO study cases	Environmental sciences (ESFRI cluster)
EGI-DRIHM collaboration	Hydrometeorology
NGI-ELIXIR collaboration	Life sciences (ESFRI)
Technology study for CTA	Astrophysics (ESFRI)
Towards a CMMST VRC	Chemistry, Molecular & Material Sciences
Speech on the Grid	Speech processing
Biodiversity and Environment (B & E) Community	Biodiversity and Environmental sciences
Fire and Smoke simulation	Fire and smoke simulation
MPI in EGI	Multi-disciplinary
GPGPU in EGI	Multi-disciplinary

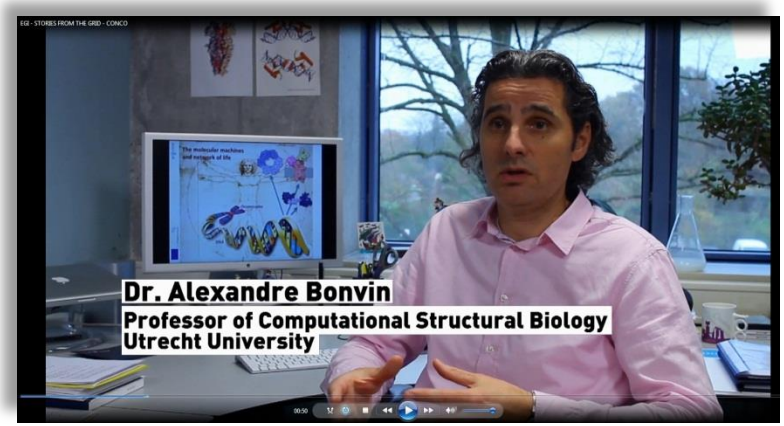
EGI's Supported Research Communities

Grid Use Cases

These case studies show some of the advantages of using the grid:

- allows world-wide multi-disciplinary collaboration;
- integrate distributed resources into a single whole;
- customised grid services to meet the unique demands of researchers;
- reliable service for computation, data transfer and storage of large data sets;
- reduced analysis time and analysis on-demand;
- scientifically useful results are generated more quickly;
- long term support;
- sharing sensitive data securely among a trusted community;
- allows member institutions to contribute computing power to the community;
- generate data-intensive stimulations in a shorter amount of time;
- reduce technical workload (by following grid standards), so scientists can concentrate more effort on the science

“Stories from the grid”

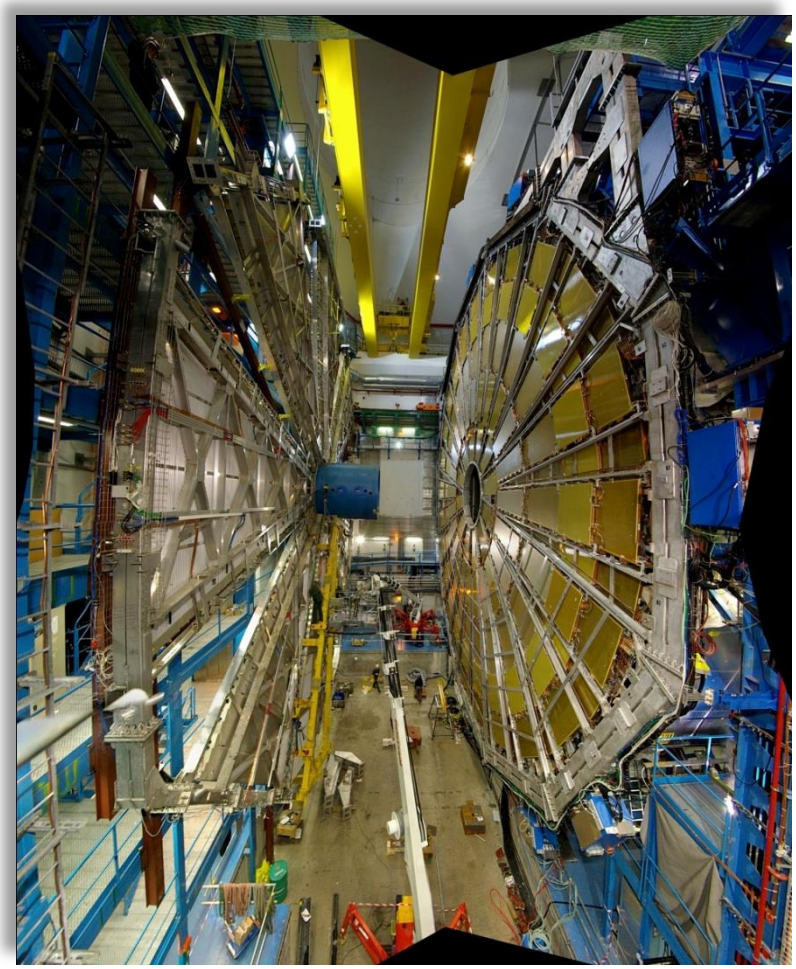


- Short videos on WeNMR, Lost Sounds Orchestra, Top Quark grid research
- http://www.youtube.com/playlist?list=PLBF22AA505DC625FE

- More case studies on the website at http://www.egi.eu/results/success_stories/

Use Case: Large Hadron Collider

- World's largest particle accelerator
- Supports 8,000 researchers
- 1 billion CPU hours in the last 12 months
- 15Pb of data created annually
  - Data 'parked' for later analysis

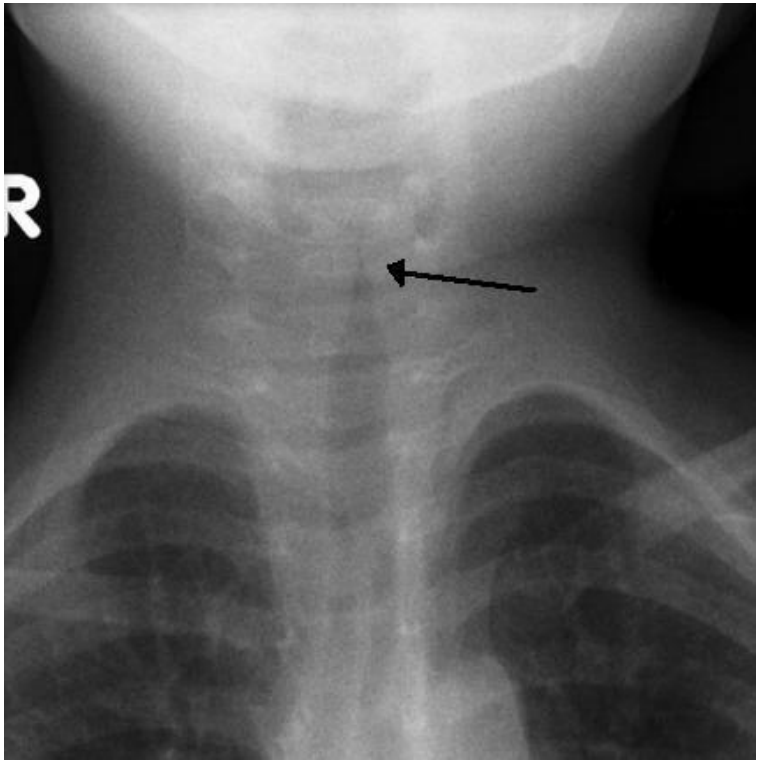


Use Case: Large Hadron Collider

Some advantages of using the grid:

- allows worldwide mass collaboration with thousands of physicists;
- customised grid services to meet the unique demands of the experiments;
- large data storage facility;
- physicists can access the data using their own computer locally.

Use Case: New viruses

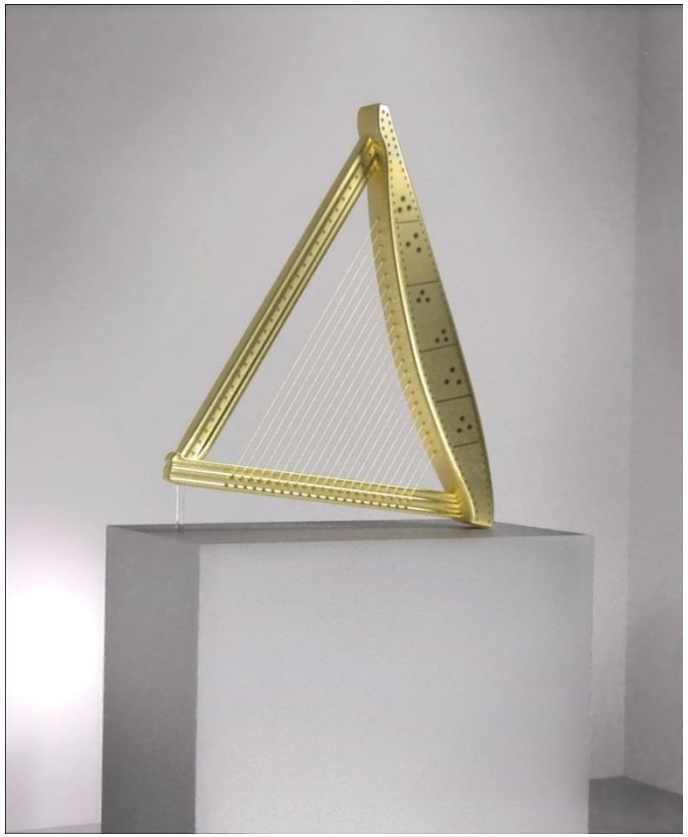


Many children suffer from respiratory diseases caused by unknown viruses

http://go.egi.eu/virus

- VIDISCA-454, new method to find new viruses from genetic material
- Runs on grid computing thanks to customised workflows, allowing researchers to save time.
- E.g. a test with 1444 samples produced 4,783,684 genetic sequences and was analysed in 14 hours. (Local server would need 17 days)
- The method was used to identify a new type of coronavirus
- Results published in Nature Medicine

Use Case: The epigonion

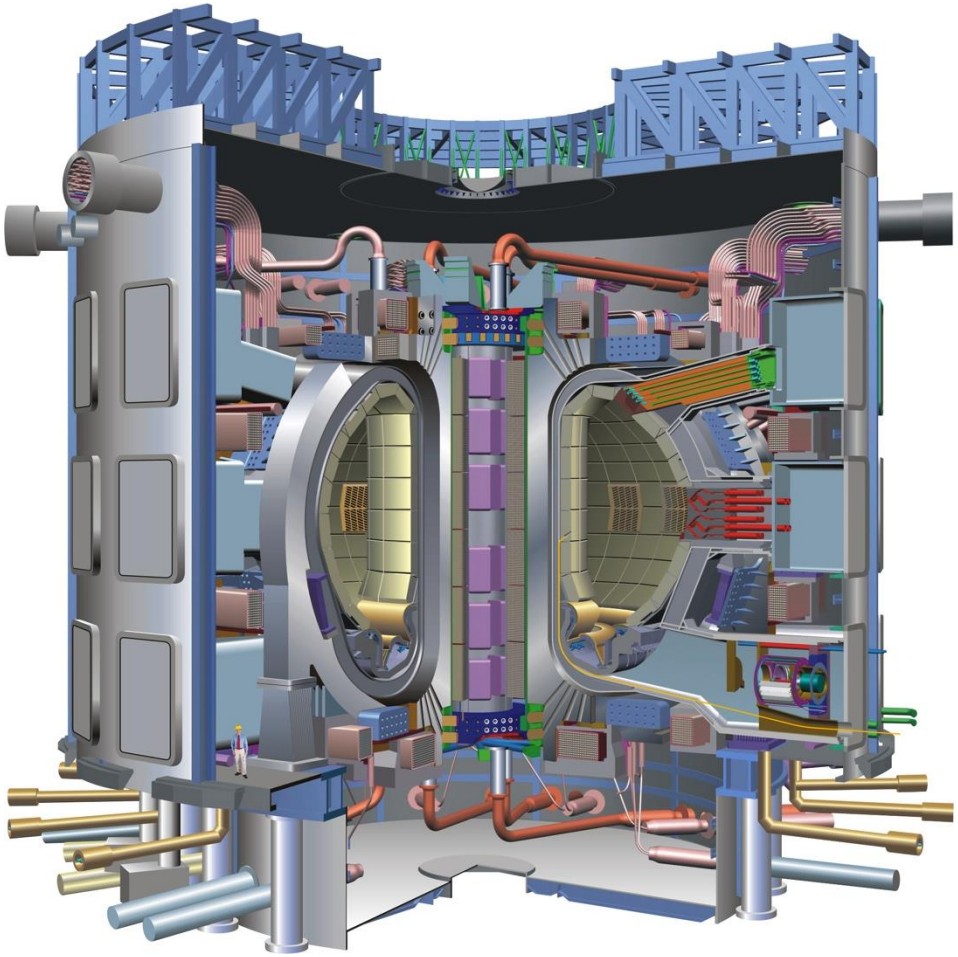


Stories from the Grid, episode 2
The Epigonion (video)
http://go.egi.eu/epigonion

- The epigonion was the guitar of Ancient Greece – how did it sound?
- Domenico Vincinanza recreated the sound of its 48 strings as digital files, using the grid-enabled ASTRA platform
- It took him just a few hours - in a single core he would need a month.
- The epigonion's sounds can now be downloaded and played by any musician using a simple keyboard.

Use Case: ITER

- Investigating viability of fusion as a power source
- Modelling and simulating the reactor
- Used 1 million CPU hours in the last 12 months



Use Case: ITER

Some advantages of using the grid:

- perform the intensive computations needed to test the feasibility of fusion power before building the reactor;
- open to future development: dedicated project ‘EUPHORIA’ was set up to further push the limits of existing state-of-the-art computing resources.

Use Case: DECIDE

- Diagnostic Enhancement of Confidence by an International Distributed Environment
- Diagnostic tools for the medical community
- Example: Their Statistical Parametric Mapping application can help doctors to diagnose Alzheimer's disease in its early stages and track the progress of the symptoms over time

Use Case: DECIDE

Some advantages of using the grid:

- a single European-wide master database of images stored on the grid for doctors to use;
- can set up diagnostic tools with a dedicated grid infrastructure;
- customisable: dedicated software to track progression of the disease over time;
- sharing medical data securely.

Use Case: Earthquakes

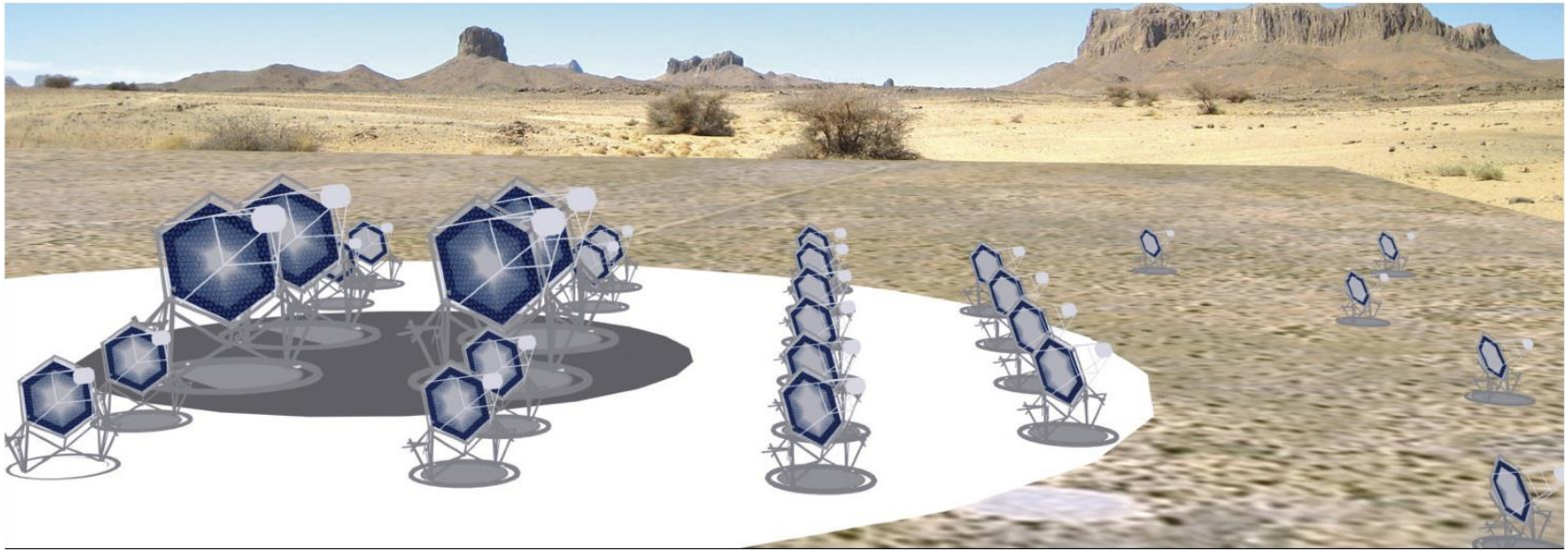
Earthquakes are not predictable, but their effects can be mitigated by modelling and planning

http://go.egi.eu/thess

- Earthquakes are caused by seismic waves that propagate as ripples on a pond
- By studying how seismic waves travel it's possible to predict how a site will respond to an earthquake
- The Finite-Difference (FD) method simulates wave propagation by solving differential equations
- But building one accurate model means solving millions of equations!
- Grid computing allows scientists to solve the equations in parallel, saving time and resources.
- The concept was applied in Thessaloniki, Greece.
- The model helps local authorities to prepare the regional response to earthquakes

Use Case: CTA

- The Cherenkov Telescope Array
- Future ground-based high energy gamma-ray instrument
- 132 institutes in 25 countries
- Using applications and grid technology provided by the European grid



Use Case: CTA

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