



European Middleware Initiative (EMI)

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Project Director

Outline

- What is EMI?
- EMI Vision and Objectives
- How does it work?
- Conclusions



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EMI Mission Statement

The European Middleware Initiative (EMI) project represents a close collaboration of the major European middleware providers - ARC, gLite, UNICORE and dCache - to establish a sustainable model to support, harmonise and evolve the grid middleware for deployment in EGI, PRACE and other distributed e-Infrastructures



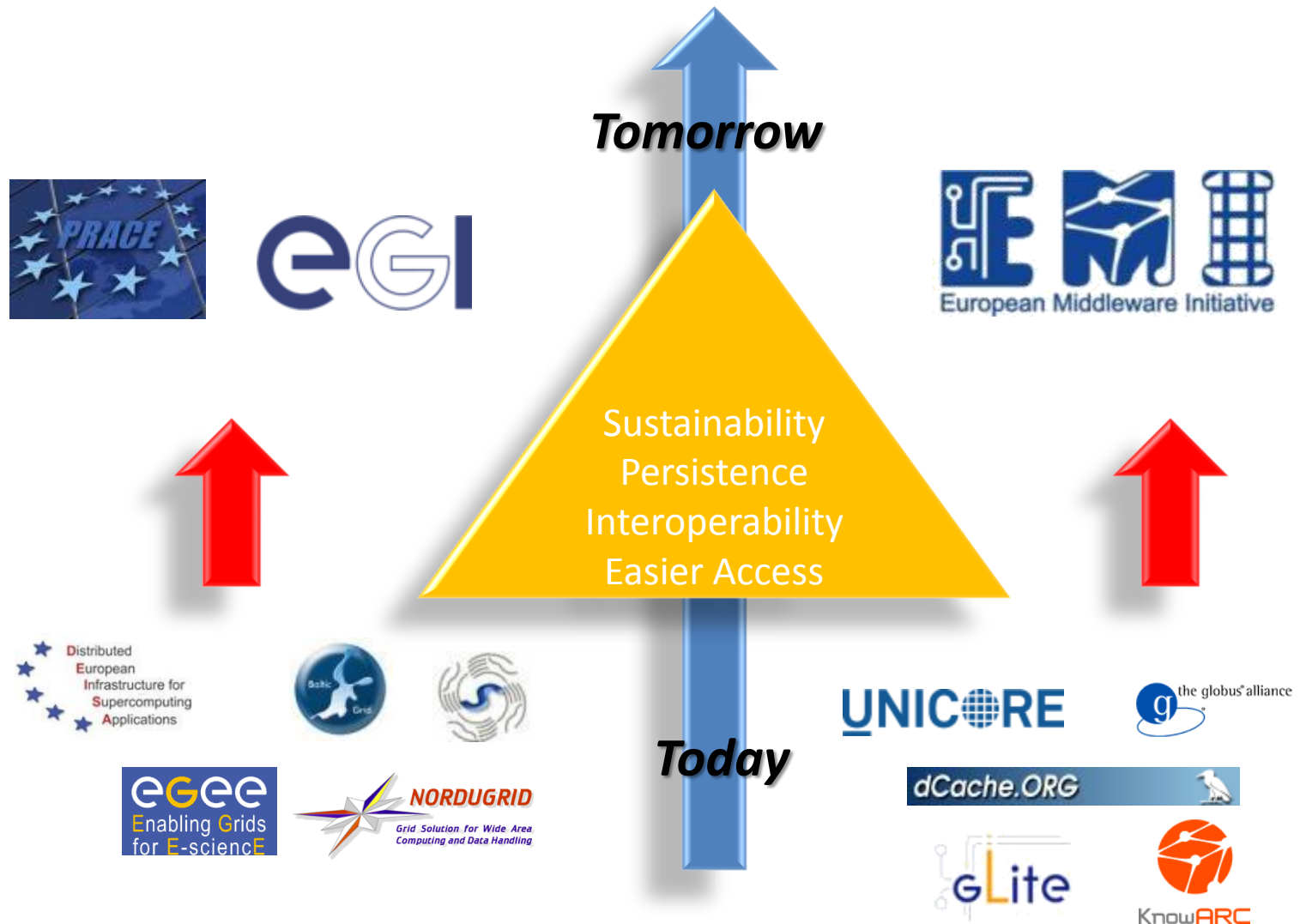
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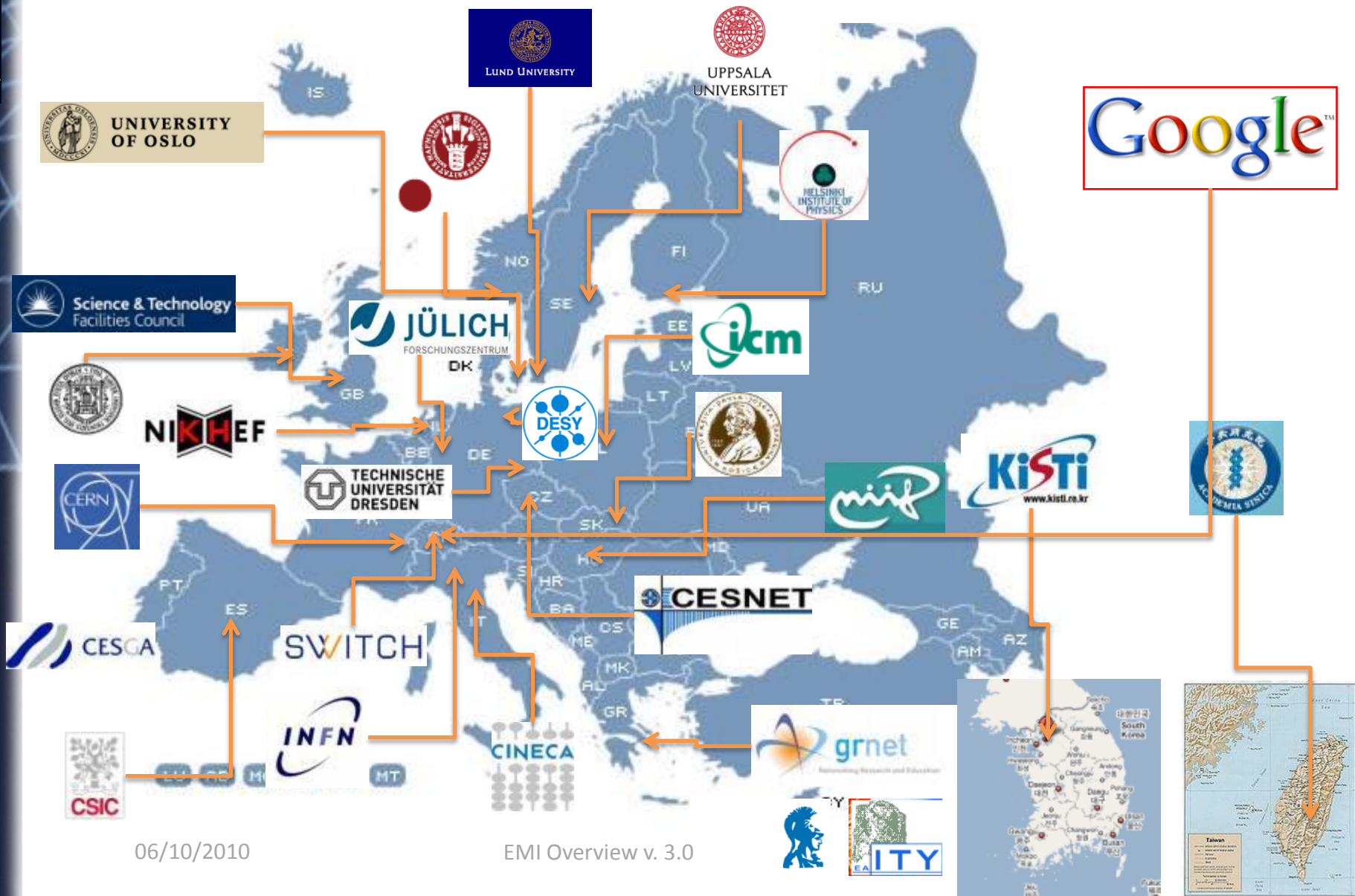
EMI Overview v. 3.0



A European Vision



Partners (26)



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Primary Objectives



Consolidate

Consolidate the existing middleware distribution simplifying services and components to make them more sustainable (including use of off-the-shelf and commercial components whenever possible)

Evolve

Evolve the middleware services/functionality following the requirement of infrastructure and communities, mainly focusing on operational, standardization and interoperability aspects

Support

Reactively and proactively maintain the middleware distribution to keep it in line with the growing infrastructure usage

Improved Usability

- One of the major complaints of research users about the middleware is about its limited “userfriendliness”
 - Deployment, configuration, service management, interoperability, security mechanisms, flexibility, etc.
- Unnecessary duplication of services and libraries must be avoided
- User requirements (ESFRI, VRCs)
 - EMI is requirement driven and will actively participate to the definition of user requirements with the major user communities and infrastructures
- Support the development of portals and domain-specific applications via clear APIs

Improved Security

- One of the most important and most difficult aspects of the middleware
 - **Usability**: existing certificate-based technologies are needed, but too complex to manage or use for the typical user or not easy to integrate in existing security contexts
 - **Reliability**: the increasing use of distributed computing and the handling of sensitive data require reliable and auditable security methods
 - **Interoperability**: the chosen methods must be common across all services and implementations

Standardization

- Very important to address a number of existing limitations
 - Interoperability, integration, extensibility and evolution, commercial usage
- All EMI services must:
 - Implement the relevant useful standards
 - Implement them in the same way
 - But, if no usable standard exists, EMI can propose solutions based on actual usage (de facto standards)
- EMI intends to be an active player in the standardization roadmap in collaboration with SIENA, the other DCI projects and the SDOs

Interoperability

- One of the major requirements of most user communities
 - Interoperability between different implementations of the same services or functionality (CE, Data, Info Systems)
 - Interoperability among HTC and HPC (MPI, security)
 - Interoperability between different infrastructures (EGI, WLCG, OSG, others)
- Also in this case, the widespread and formally correct adoption of standards is of primary importance

Integration with New Technologies

- Technology evolves continually
- Distributed computing middleware must capitalize on past achievements and learn from past lessons
- Using labels like Grids or Clouds can be misleading
- How can existing **stable**, **reliable** and **secure** services be made more **dynamic** and **efficient**?
- And again, standards can enable a smooth evolution to new technology

Integration with New Technologies

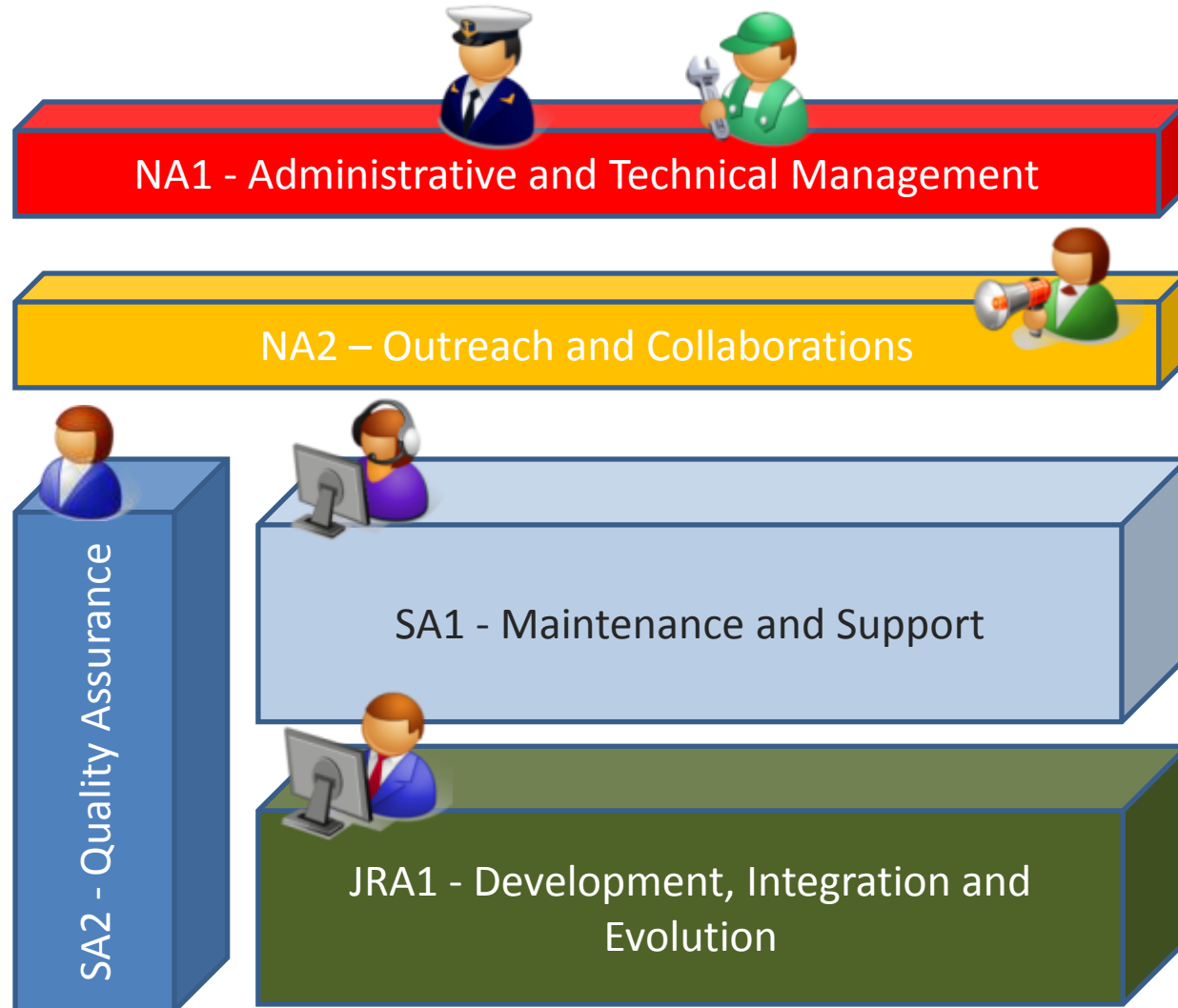
- Two of the main topics of interests are:
 - **Messaging**: there are a number of very practical use cases where Messaging can bring clear advantages (monitoring, accounting, distributed logging, service management, information systems, etc)
 - **Virtualization and clouds**: use of virtual machines can greatly simplify the issues of resource management, opening to more types of resource providers (including commercial), provide better independence of MW from OS management, make the whole distributed infrastructure more dynamic. But security, accounting, workflows are an issue. How to get the best of both worlds?

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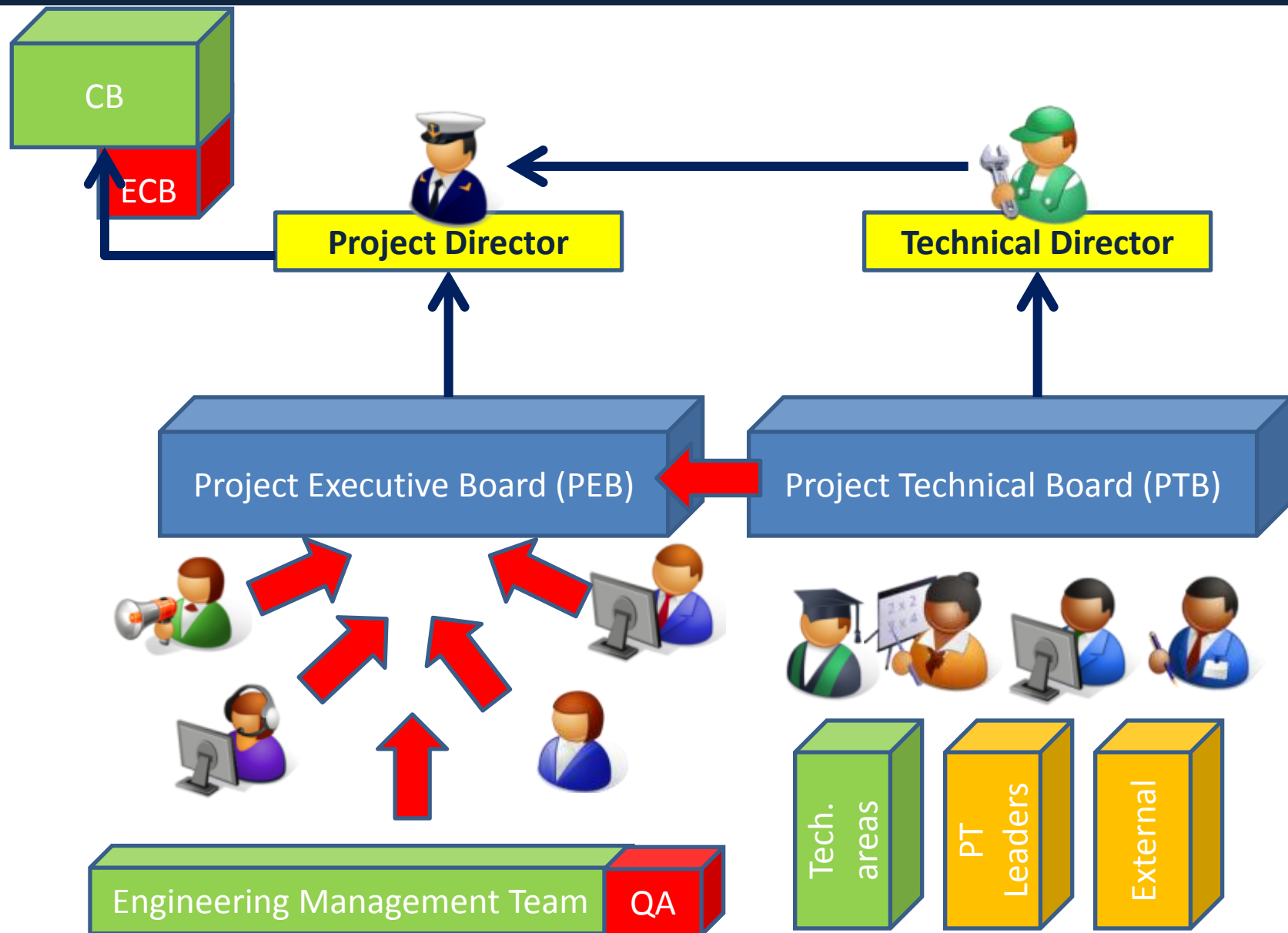
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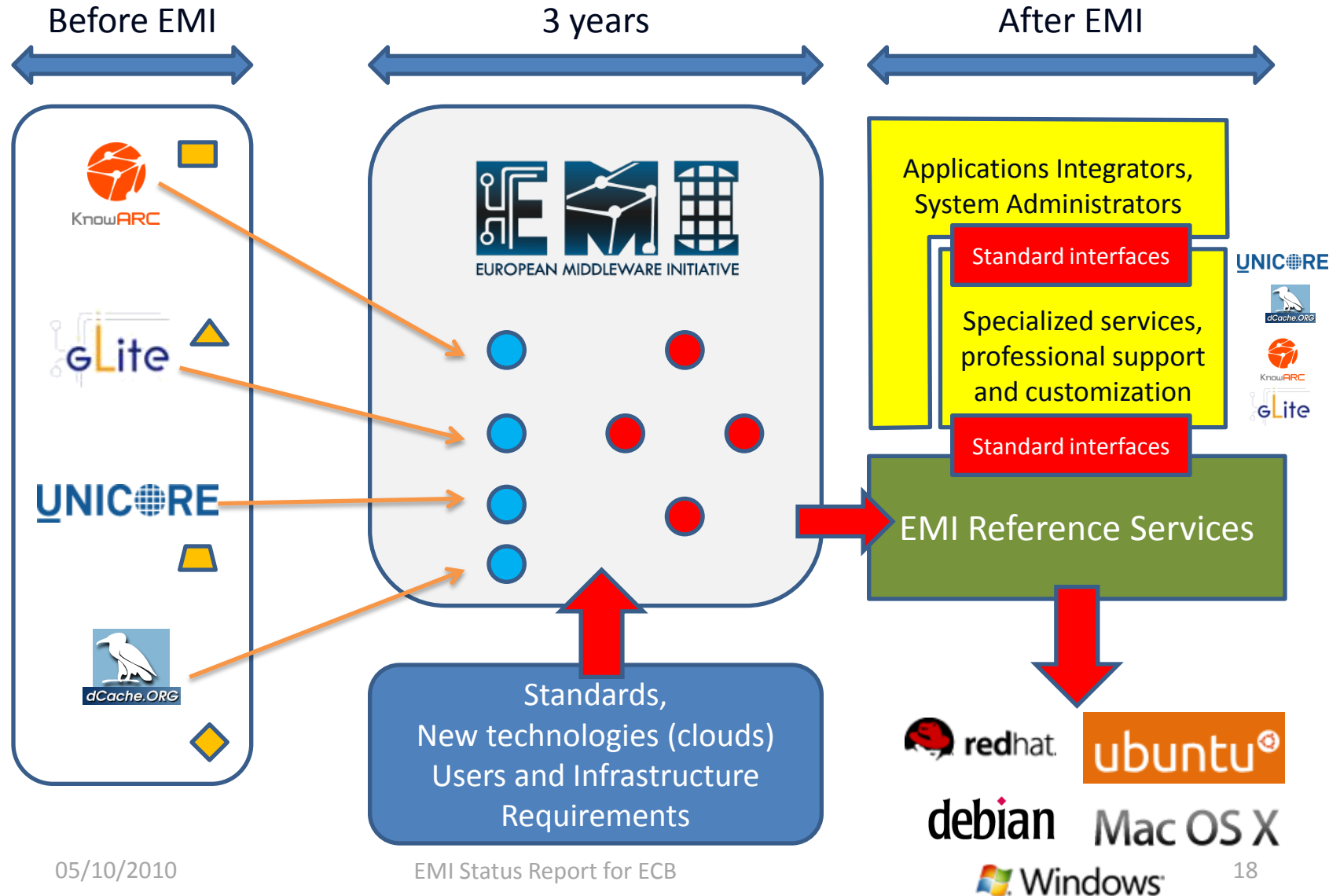
Project Structure



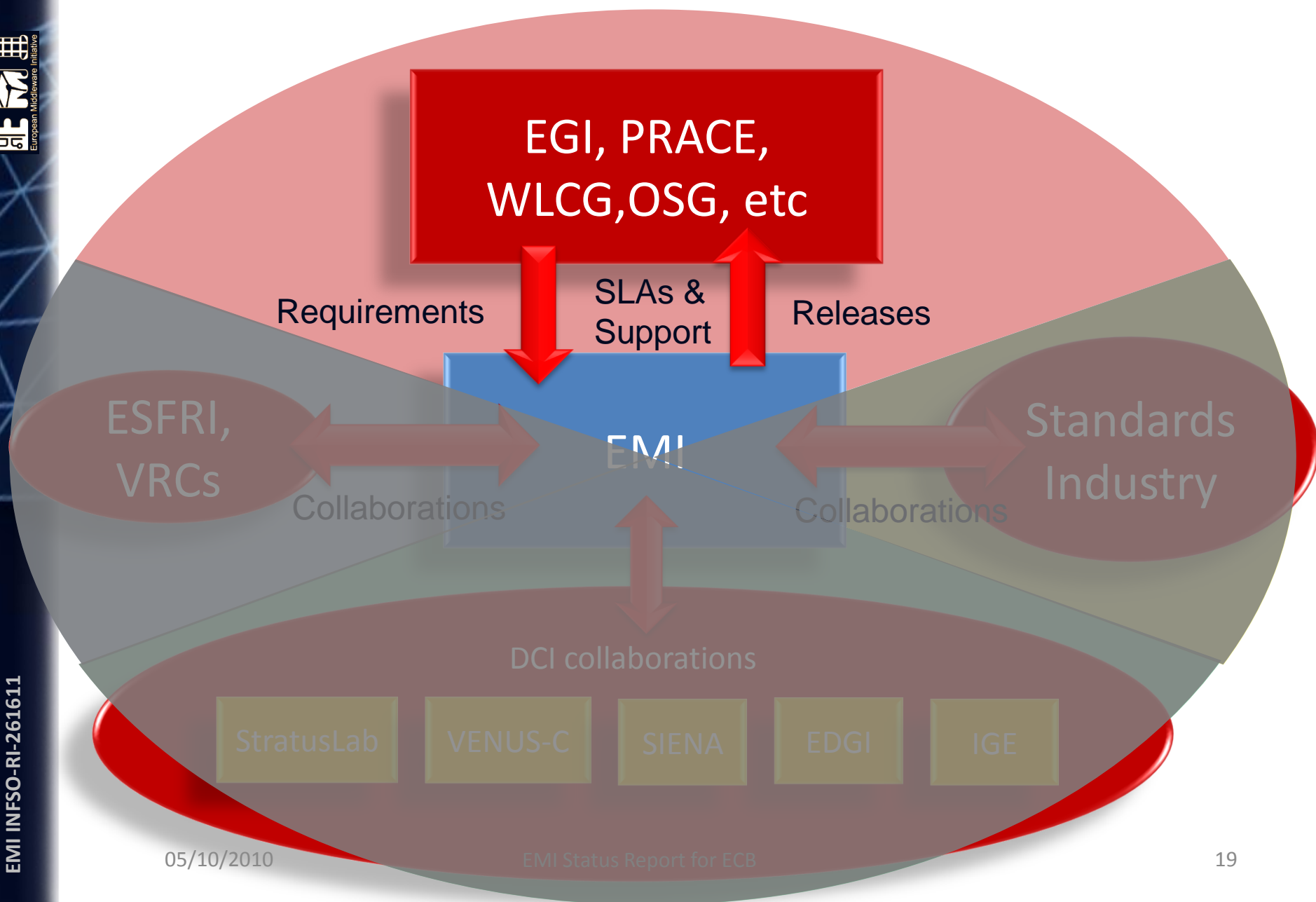
Project Execution



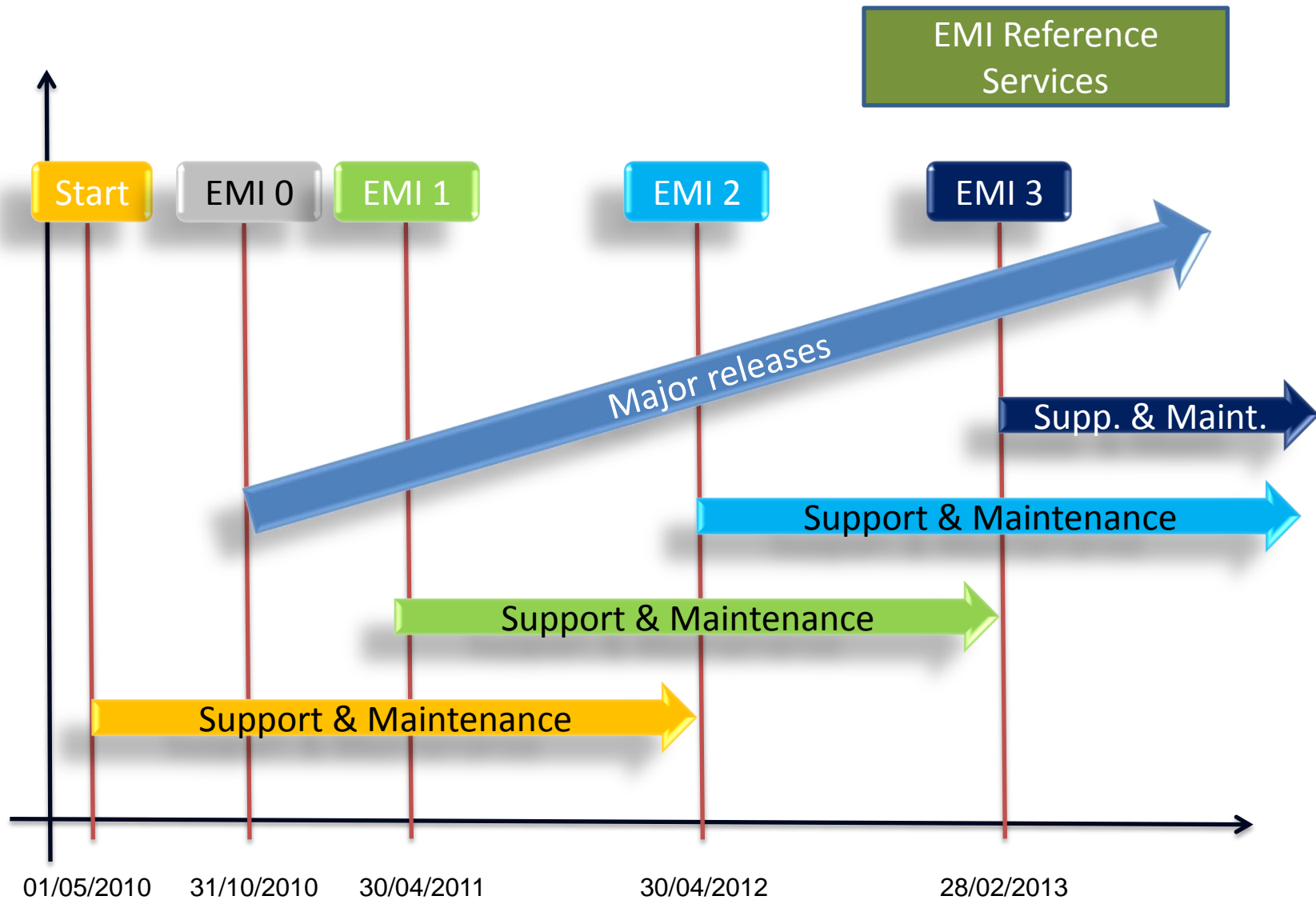
EMI Middleware Evolution



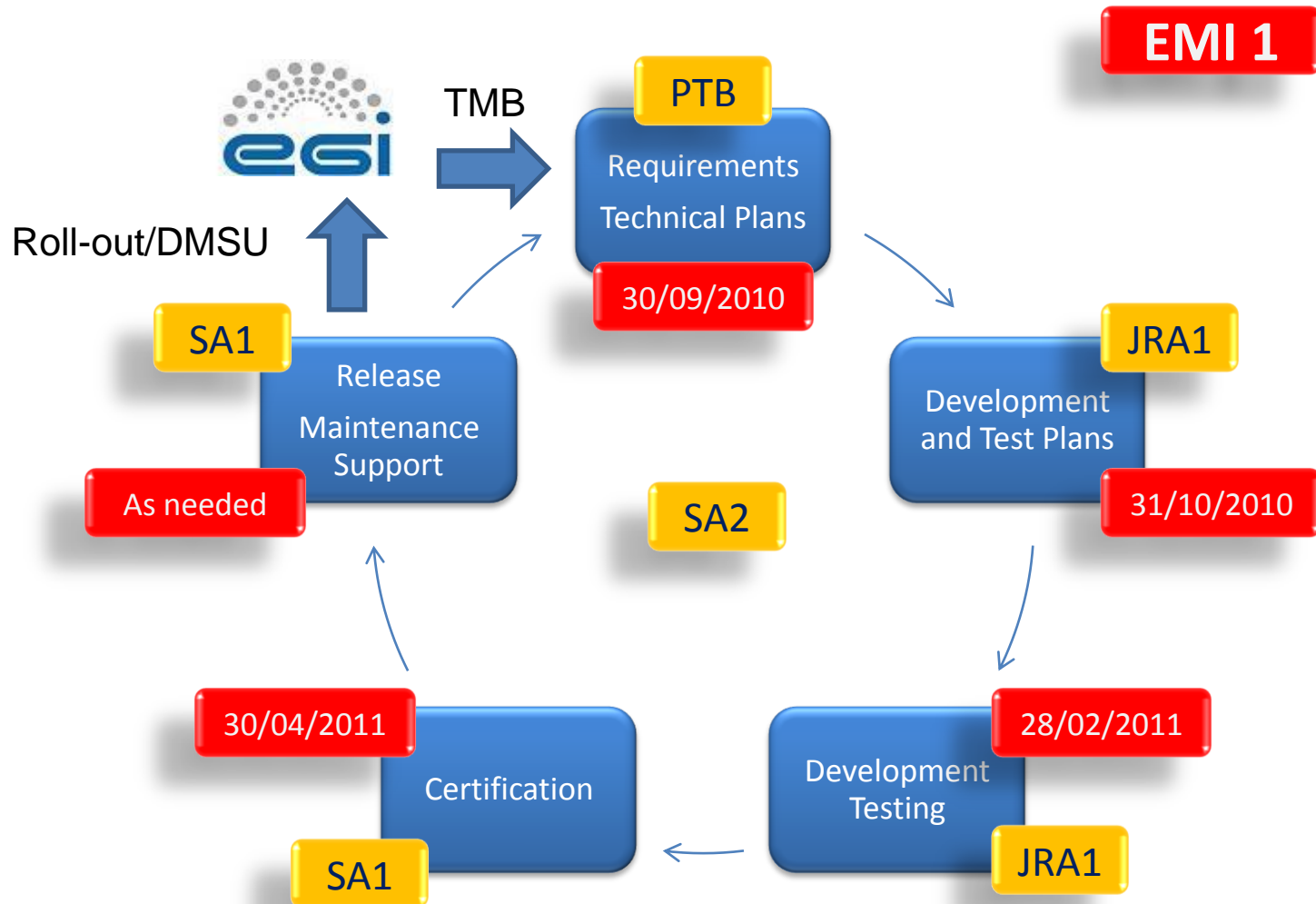
Collaborations



Release Plan



Release Cycle



Technical Areas

Compute Services

A-REX, UAS

AM, MPI, etc

Product Teams

Data Services

dCache, S

, LFC, FTS,

Dedicate teams of experts

Security Services

UNICORE
Admin,

S/VOMS-
Gridsite,

Fully responsible for development, maintenance and unit/system testing

Infrastructure Services

Logging
accounting,
support, in

ssaging,
tion/clouds
d providers

3rd-level Support via the GGUS application

Security Services

- Common Authentication Libraries for all EMI components, uniform authentication response from all components and removal of redundant authentication code/components
- Removal of old GSI from EMI components and installation to other O/S easier through use of standards-based code
- Common SAML profile and SAML assertions exchange throughout MW stack
- Adoption of SAML-enabled VOMS throughout
- Adoption of the Argus authorization system throughout
- Transparent AAI for users, usage of locally-based AAI systems, users can use more familiar credential interface, reduce/eliminate need for users to manage credentials.

Compute Services

- Define a unified specification for a generic Execution Service (EMI-ES) (existing standards are not usable and there is little possibility of extending and implementing them within the EMI lifetime)
- Provide a common framework for supporting MPI jobs
 - The many-core revolution (multi-core, many-core, GPUs etc.) deeply affects both HPC and HTC, effort activity to bridge HPC and HTC applications, which requires definition of fine-grained parameters
- Improve usability, maintainability and portability through a common set of APIs and user interfaces
- Comply to the unified EMI security model and use the EMI authorization service (Argus) throughout
 - This will allow central blacklisting, avoid inconsistent authorization decisions, ease deployment and maintenance
- Work on the integration of CEs with Virtualization Manager (OpenNebula, WNOD) using as much as possible some technology-independent abstraction layer
- Strategy for pilot jobs not clear, needs more discussion

Data Services

- Catalogue synchronization with direct interaction between FC and SE (possibly based on messaging)
- Extend FC to UNICORE
- Consolidation of SRM and move towards simplified SRM 2.2 specifications
- Replace Globus httpg with standard https (allows data access using https and WebDav)
- Standard data access through POSIX-compliant mountable file systems (NFS4.1, FUSE)
- Adoption of GLUE 2.0
- Integration with ARGUS
- Consolidation of clients and APIs
- Improved monitoring and accounting support (Nagios, messaging-based solutions)

Infrastructure Services

- Common GLUE 2.0-based Information System for all MW
- Common Registry Service for end-point location
- Generalization of messaging framework to cover more use cases (monitoring, accounting, service management, info systems, File Catalogue synchronization)
- Investigation of virtualization and cloud technology and integration in the standard grid stack
 - Worker nodes (OpenNebula, WNOD, others)
 - Dynamic service provision (ad-hoc instantiation) (StratusLab/OpenNebula, VENUS-C, Google, others)

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Conclusions

- EMI is a new reference in distributed computing middleware
- It brings together for the first time the expertise of the major European middleware providers
- EMI is very committed to provide a streamlined, standard set of services well integrated with the major OS and exploiting emerging technology as necessary



Thank you

EMI is partially funded by the European Commission under Grant Agreement INFOS-RI-261611