



Scientific Cloud Computing Infrastructure for Europe

Bob Jones,
IT department, CERN



Origin of the initiative

- Conceived by ESA as a prospective for providing cloud services to the space sector in Europe
- Presented to the IT working group of the EIROforum where other members (CERN, EMBL) joined
- Two workshops held during 2011
 - June: hosted by ESA in Frascati
 - October: hosted by EMBL in Heidelberg

EIROforum: CERN, EFDA-JET, EMBL, ESA, ESO, ESRF, European XFEL, ILL

Strategic Plan for a Scientific Cloud Computing infrastructure for Europe

- Establish a sustainable multi-tenant cloud computing infrastructure in Europe
- Initially based on the needs for the European Research Area & space agencies
- Based on commercial services from multiple IT industry providers
- Adhere to internationally recognised policies and quality standards
- Governance structure involving all stakeholders

CERN-OPEN-2011-036
08/08/2011



Contacts

Dr. Maryline Lengert
ESA - European Space Agency
Senior Advisor
Maryline.Lengert@esa.int
Tel +39 06 941 80430

Dr. Bob Jones
CERN – European Organization for Nuclear Research
IT department
Bob.Jones@cern.ch
Tel. +41 22 767 14 82

Copyright © 2011 by CERN and ESA. This work is made available under the terms of the Creative Commons Attribution-Non-Commercial-No Derivative Works 3.0 Unported license,
<http://creativecommons.org/licenses/by-nc-nd/3.0/>



A Collaboration Initiative

**European Commission
& relevant projects**

**User organisations
*Demand-side***

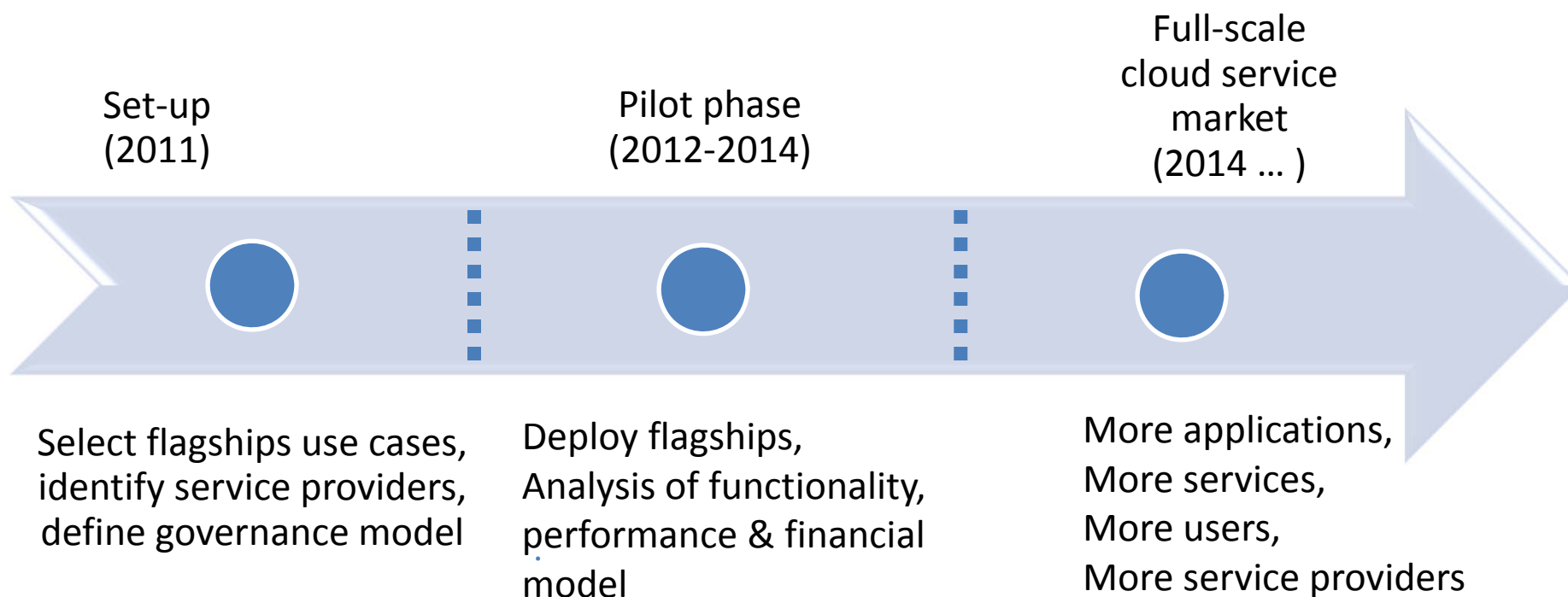
**European
Cloud Computing
Strategy**

**Commercial Service
Providers
*Supply-side***

Bringing together all the stakeholders to establish a public-private partnership

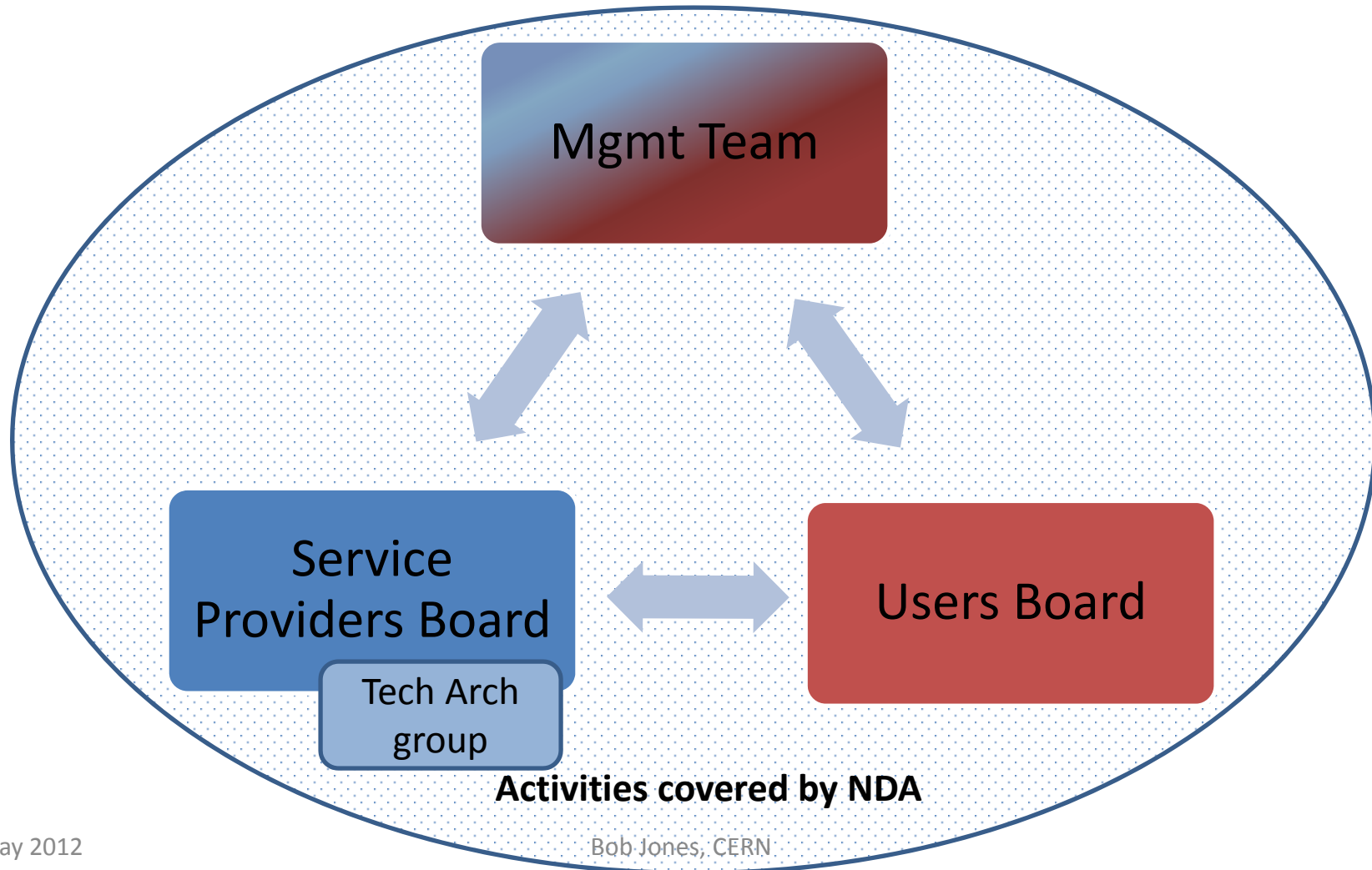


Timeline





Governance Model for Proof of Concept stage in the Pilot Phase





Consortium membership

- Consortium includes all participating supply-side and demand-side companies/organisations
 - Member status and adopter status
 - All sign a non-disclosure agreement
 - “interested parties” can also register
- Initial membership is defined
 - More members and adopters will be added following the Proof of Concept stage within the Pilot Phase (summer 2012)



Pilot Phase

- Through the pilot phase we expect to explore/push a series of perceived barriers to Cloud adoption:
 - **Security:** Unknown or low compliance and security standards
 - **Reliability:** Availability of service for business critical tasks
 - **Data privacy:** Moving sensitive data to the Cloud
 - **Scalability/Elasticity:** Will the Cloud scale-up to our needs
 - **Network performance:** Data transfer bottleneck; QoS
 - **Integration:** Hybrid systems with in-house/legacy systems
 - **Vendor lock-in:** Dependency on vendors once data & applications have been transferred to the Cloud
 - **Legal concerns:** Such as who has legal liability
 - **Transparency:** Clarity of conditions, terms and pricing



Service Procurement

- Assuming pilot phase proves successful, the provision of commercial Cloud services would need to be integrated into the ICT procurement process of the demand-side organisations
- For the initial flagships this implies:
 - Inter-governmental organisations
 - Jurisdiction (governing laws & arbitration), tax-free status, etc.
 - Return on Investment: preference for procurement from each organisation's member-states
 - Pool of commercial service providers that can respond to calls for tender
 - Cannot integrate procurement processes of all demand-side organisations but can converge:
 - Technical specifications & standards
 - Terms and conditions
- EC published Guide for the procurement of standards based ICT Elements of Good Practice (21 Dec 2011)



Flagship use cases

- **Proposed by demand-side user organisations addressing scientific challenges with societal impact**
 - High-profile applications that catch the public imagination and encourage others to use the services
 - Innovate in terms of functionality, performance, scope, business opportunities or impact
- **Sponsored by user organisations**
 - Must be prepared to contribute their own resources during the pilot phase to port application (manpower) and contribute to the cost of procuring required services from the supply-side (cash)
 - Must participate in a costing exercise where the total cost of deploying and operating the flagship application in-house can be compared to the cost of procuring the services via Helix Nebula
- **Want to propose a flagship?**
 - Send email to contact@helix-nebula.eu



Initial flagships use cases

- Call for proposals
 - Proposals received in format following template agreed by demand and supply side
 - Reviewed and analysed with cloud service suppliers
- Eligibility review of collected proposals (user-side) resulted in 3 recommended flagships
 - CERN: ATLAS High Energy Physics Cloud Use
 - EMBL: Genomic Assembly in the Cloud
 - ESA / CNES / DLR: SuperSites Exploitation Platform



Flagship use cases

| | ATLAS H.E.P. Cloud Use (CERN) | Genomic Assembly in the Cloud (EMBL) | SuperSites Exploitation Platform (ESA/CNES/DLR) |
|---|-------------------------------------|--|---|
| Scientific goal/society impact/photogenic | • | • | • |
| Scale of resources used | • | • | |
| Federation/Aggregation of datasets | | • | • |
| Long-term archiving of data | | | • |
| On-demand processing | • | • | • |
| Impact on community & benefits | • | • | • |
| Potential increase of users | • | • | • |
| Interoperability | • | • | • |
| Data security | • | • | • |
| Maturity | • | • | • |
| Access to license-controlled sw | | | • |



Flagship deployments

- Proof of Concept stage within the Pilot Phase started January 2012
- Each flagship is being deployed with several providers independently
- Sequence:
 - CERN-ATLAS (CloudSigma, T-Systems,...)
 - EMBL (T-Systems, CloudSigma,...)
 - ESA (Logica, ...)
- Expect to have completed initial proof of concept by summer 2012



Flagship use cases Participating Suppliers in Proof of Concept stage

Atos

CloudSigma

interoute
from the ground to the cloud

logica
be brilliant together

terraviva 20

sixsq

...T...Systems...

the
SERVER
LABS

the IT architects



Network connectivity

- Need to link the research community to the commercial data centres
- The pilot phase deployments of the flagship applications offer an opportunity to investigate ability of NRENS to offer access to commercial data centres

See related talk “The missing link between NREN and IaaS” by Paul Dekkers (SURFnet) Thursday 09:00 in Cloud Infrastructure session



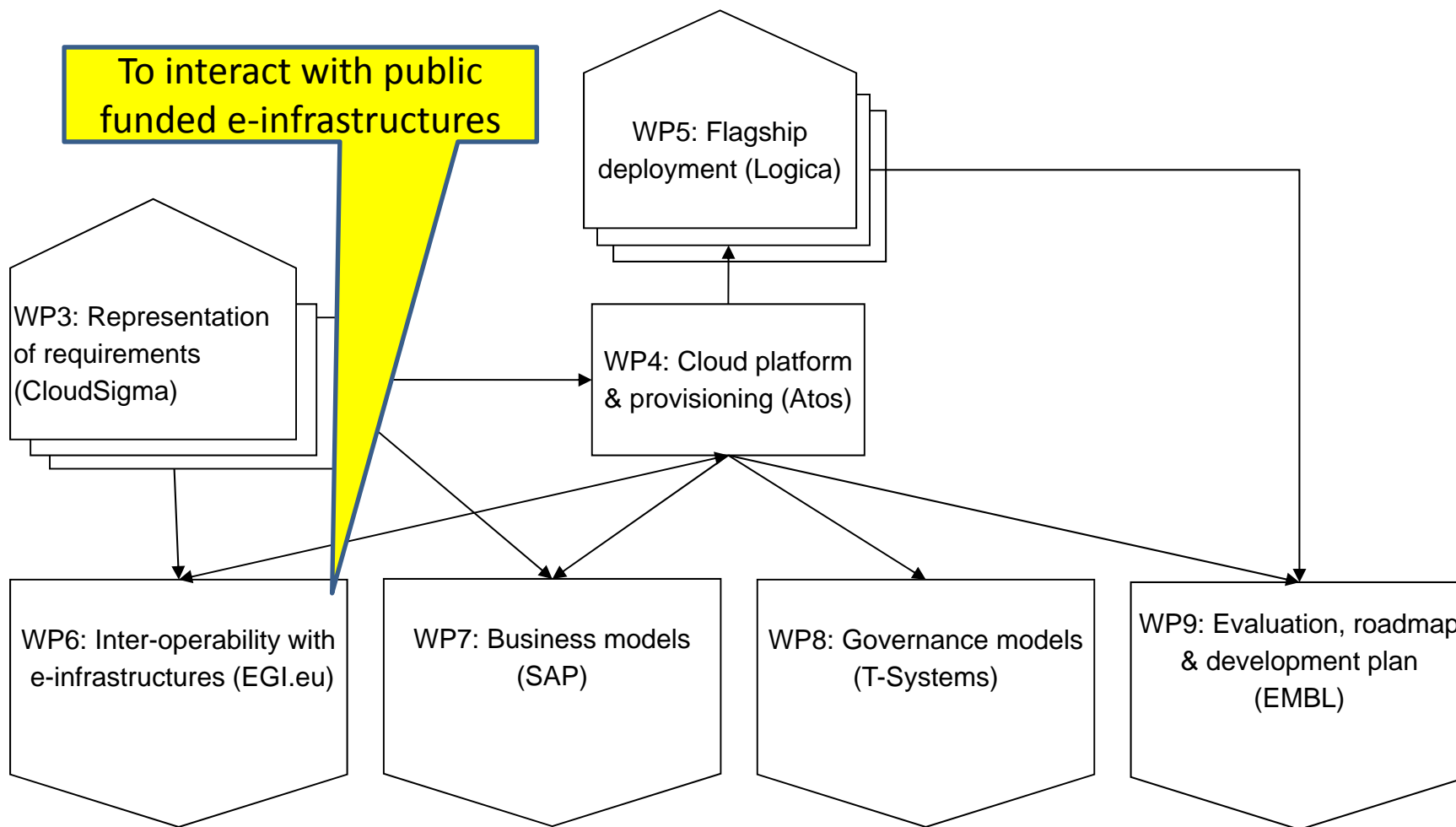
Helix Nebula EC project

Coordination action under call INFRA-2012-3.3

- Start-date 1st June 2012, duration 24 months
- Total budget ~3M€ (1.8M€ EC funding)

| no. | Organisation name | Short name | Country |
|-----------|--|------------|---------|
| 1 (coord) | European Organization for Nuclear Research | CERN | CH |
| 2 | STICHTING EUROPEAN GRID INITIATIVE | EGI.eu | NE |
| 3 | European Molecular Biology Laboratory | EMBL | DE |
| 4 | ATOS | Atos | NE |
| 5 | T-Systems International GMBH | T-Systems | DE |
| 6 | CLOUDSIGMA AG | CloudSigma | CH |
| 7 | SAP AG | SAP | DE |
| 8 | Logica Deutschland GmbH & Co KG | Logica | DE |
| 9 | CONSIGLIO NAZIONALE DELLE RICERCHE | CNR | IT |
| 10 | Cloud Security Alliance Europe | CSA | UK |

Helix Nebula EC project



WP1: Management (CERN)

WP2: Dissemination/Outreach (CSA)



Relevance of this work for the network community

e-IRG's reaction to the findings and recommendations of the report of the GÉANT Expert Group

Editor: Kees Neggers

Foreword

Through the successful development of GEANT, Europe has a good starting position, but now needs to adapt to a rapidly changing global environment through embracing the vision of the GÉANT 2020 end-to-end, inclusive commons as proposed by the GEANT Expert Group (GEG). To realize this vision, Europe needs to adapt the governance structures as advocated by the GEG. Furthermore, it will be essential to accelerate innovation activities through increased funding, diverse consortia, and dedicated project management, as recommended by the GEG.

The final FP7 call, to be issued this summer, is an excellent opportunity to prepare for the HORIZON 2020 period and stimulate the further development and innovation of the research network services needed for the coming generation of researchers. e-IRG offers to contribute as a broad stakeholder's platform for facilitating the implementation of the GEG report.

*Gudmund Høst
e-IRG Chair
March 2012*

http://www.e-irg.eu/images/stories/e-irgs_reaction_geg_a5.pdf

Helix Nebula provides:

Opportunity for network community to work with the research communities and commercial cloud service providers to deploy flagship applications and investigate how a public-private cloud serving the research community could exist.

A European cloud computing partnership: big science teams up with big business



Strategic Plan

- ▶ Establish multi-tenant, multi-provider cloud infrastructure
- ▶ Identify and adopt policies for trust, security and privacy
- ▶ Create governance structure
- ▶ Define funding schemes



To support the computing capacity needs for the ATLAS experiment

EMBL



Setting up a new service to simplify analysis of large genomes, for a deeper insight into evolution and biodiversity



To create an Earth Observation platform, focusing on earthquake and volcano research



Email: contact@helix-nebula.eu Twitter: [HelixNebulaSC](https://twitter.com/HelixNebulaSC) Facebook: [HelixNebula.TheScienceCloud](https://www.facebook.com/HelixNebula.TheScienceCloud)