Scientific Cloud Computing Infrastructure for Europe – Strategic Plan

Bob Jones,
IT department, CERN

Origin of the initiative

- Conceived by ESA as a prospective for providing cloud services to 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

Public Cloud Computing Policy Background

Conclusions from Report on public consultation on Cloud Computing published by the EC on 5 December 2011:

- The EU **legal framework** confuses and creates uncertainty

- Need for **clarification** on rights, responsibilities, data protection and liability, especially in cross-border situations

- **Guidelines** on good practice in contracting, model terms and conditions, service level agreements etc.

- The **public sector**, as cloud computing adopters, could set the requirements for standards in security, interoperability and data portability; thus, stimulating rapid deployment

- **International agreements** on certification, data protection and security are needed

- Improve Cloud Computing through **research and development**, notably integration of other distributed computing models

Strategic Plan for a Scientific Cloud Computing infrastructure for Europe

- **Set up a cloud computing infrastructure for European Research Area**
- **Identify and adopt policies for trust, security and privacy on a European-level**
- **Create a light-weight governance structure involving all stakeholders**
- **Define a short and medium term funding scheme**

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

http://cdsweb.cern.ch/record/1374172/files/CERN-OPEN-2011-036.pdf

Supply-side companies: Atos Origin, BT Services, Cap Gemini, CloudSigma, Interoute, Logica, Orange, SAP, Terradue, The ServerLabs, T-Systems, SixSq, Terradue, Thales, Telefonica, EGI.eu, OpenNebula, etc.

Timeline

Set-up
(2011)

Pilot phase
(2012-2014)

Full-scale
cloud service
market
(2014 ...)

Select flagships use cases,
identify service providers,
define governance model

Deploy flagships,
Analysis of functionality,
performance & financial
model

More applications,
More services,
More users,
More service providers
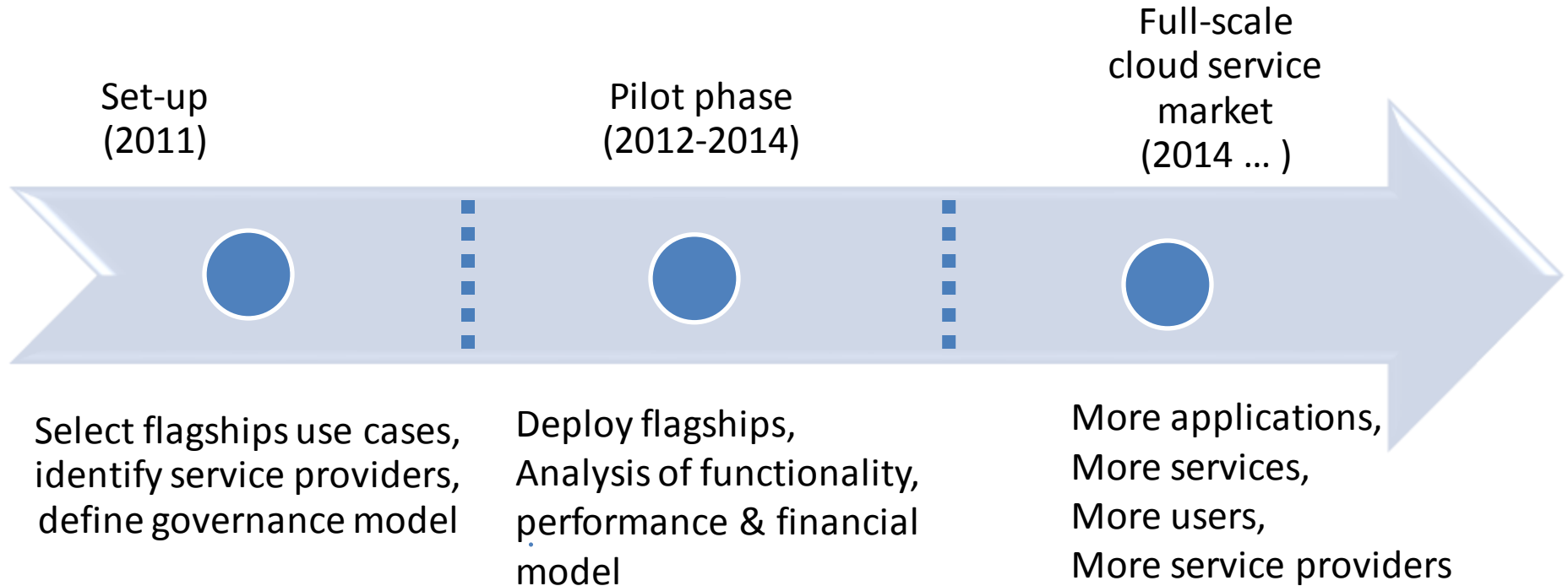
Governance Model for Proof of Concept stage in the Pilot Phase

Mgmt Team

Service Providers Board

Users Board

Activities covered by NDA
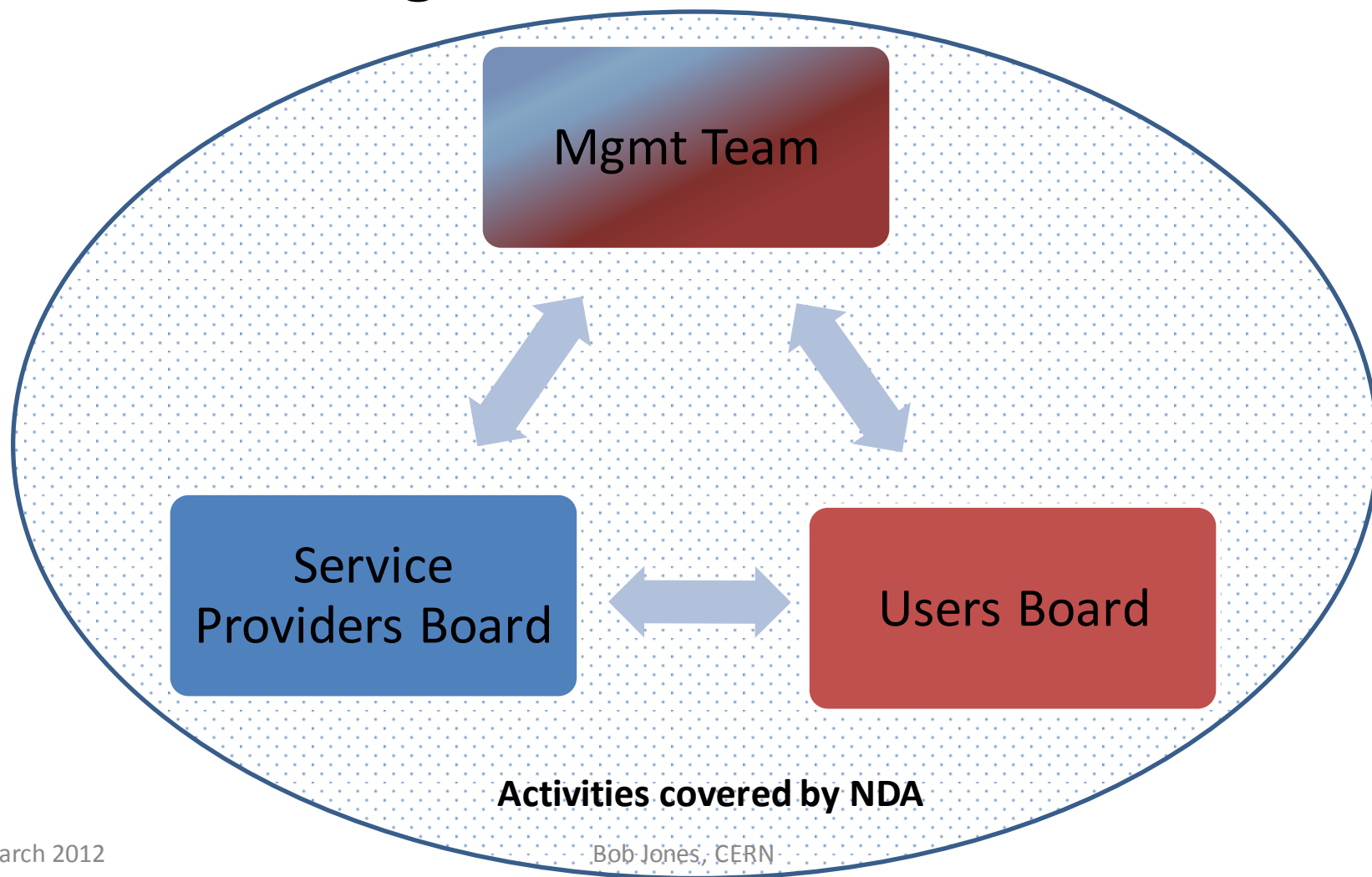
Consortium membership

- Consortium includes all participating supply-side and demand-side companies/organisations
  - Member status and adopter status
  - All sign a non-disclosure agreement

- 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 will be deployed with a series of providers independently

- Sequence:
  - CERN-ATLAS
  - EMBL
  - ESA

- Expect to have completed initial proof of concept by summer 2012

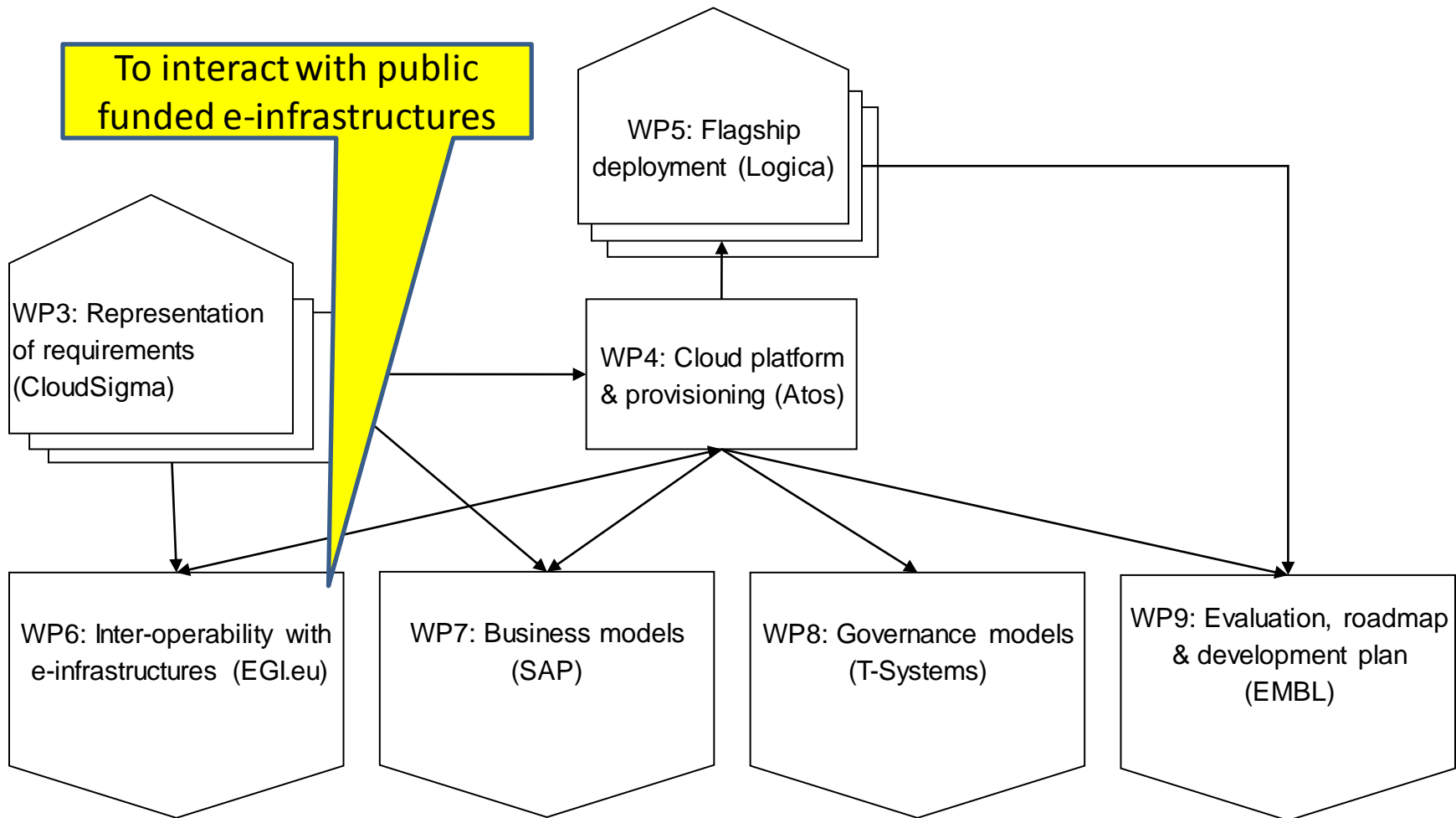# Flagship use cases
Participating Suppliers

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 proposal

To interact with public funded e-infrastructures

WP5: Flagship deployment (Logica)

WP3: Representation of requirements (CloudSigma)

WP4: Cloud platform & provisioning (Atos)

WP6: Inter-operability with e-infrastructures (EGI.eu)

WP7: Business models (SAP)

WP8: Governance models (T-Systems)

WP9: Evaluation, roadmap & development plan (EMBL)
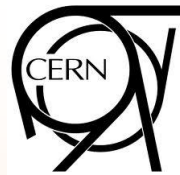
WP1: Management (CERN)

WP2: Dissemination/Outreach (CSA)

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

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   Facebook: HelixNebula.TheScienceCloud