Helix Nebula Science Cloud
Pre-Commercial Procurement pilot

9 March 2016

Bob Jones, CERN

The Helix Nebula Science Cloud public-private partnership

HELIX NEBULA THE SCIENCE CLOUD

Strategic Plan

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

CERN

To support the computing capacity needs for the LHC experiments

EMBL

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

esa

cnes

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

PIC port d'informació científica

To improve the speed and quality of research for finding surrogate biomarkers based on brain images

Further Users: cnrs, DESY, ECMWF, ESO, ESRF, INFN, ITER, Science & Technology Facilities Council, SCC, SURF SARA

Suppliers

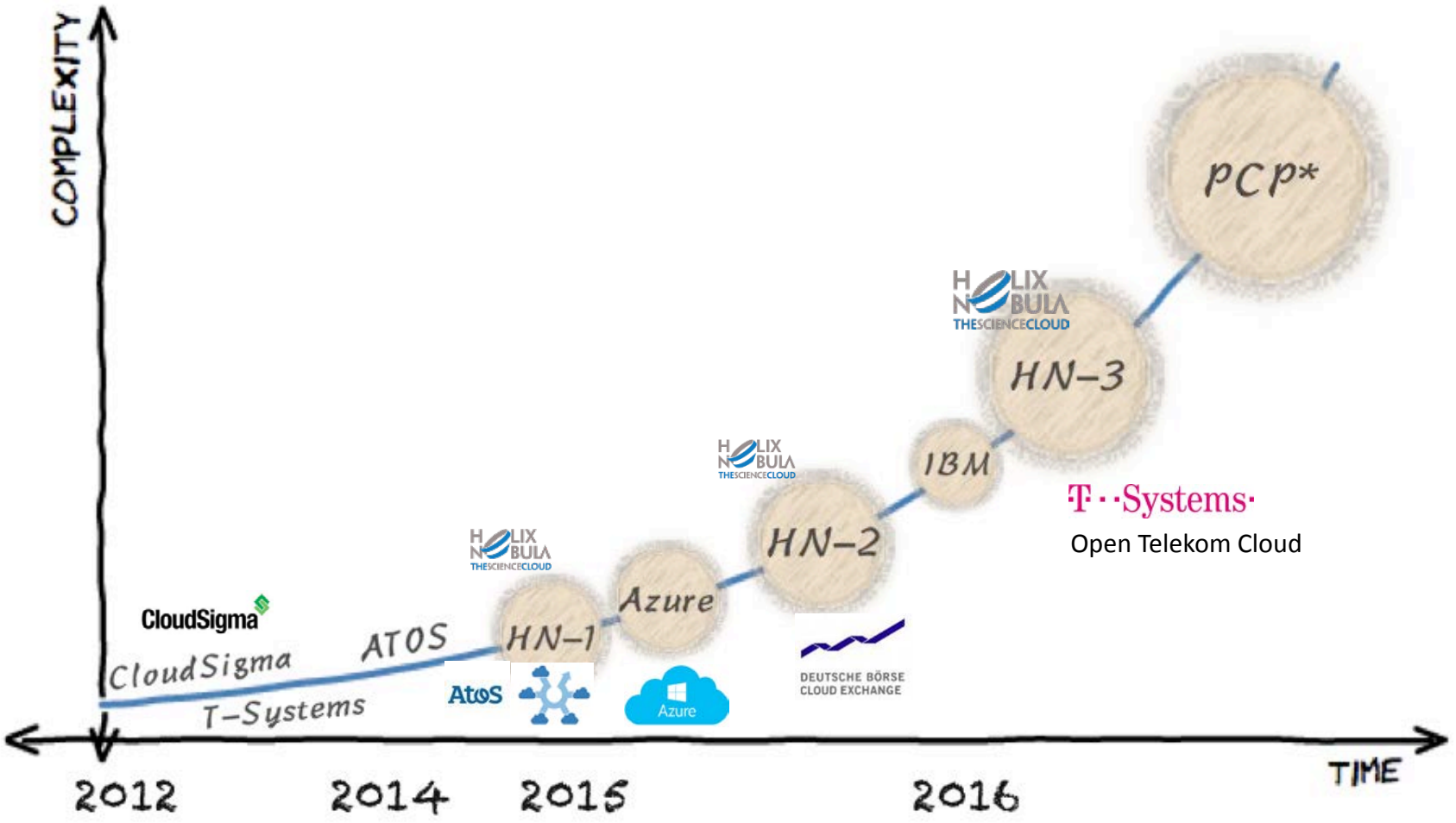
Atos, CLOUDEO, CloudSigma, Cloudwatt, CRS4, DataCentred, Deutsche Börse Cloud Exchange, egi, exoscale, GÉANT, INNOVO CLOUD, Prologue, sixsq, SWITCH, T-Systems, the SERVER LABS, the IT architects, ultimum technologies

Adopters

AWST, CSA cloud security alliance, deac IT outsourcing, Ifremer, MEMSET HOSTING, orange Business Services, RHEA, Strategic Blue, terradue 20, THALES, it Communicating ICT to Markets, vito vision on technology, VU Vrije Universiteit Amsterdam, Yandex

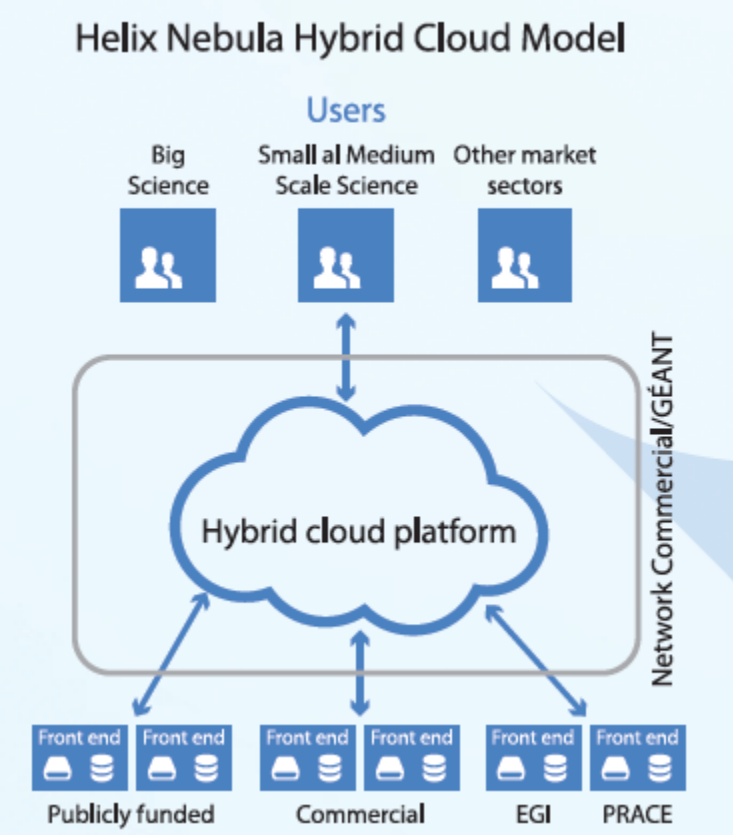
January 2016

Augmenting CERN's scientific computing programme with commercial cloud services

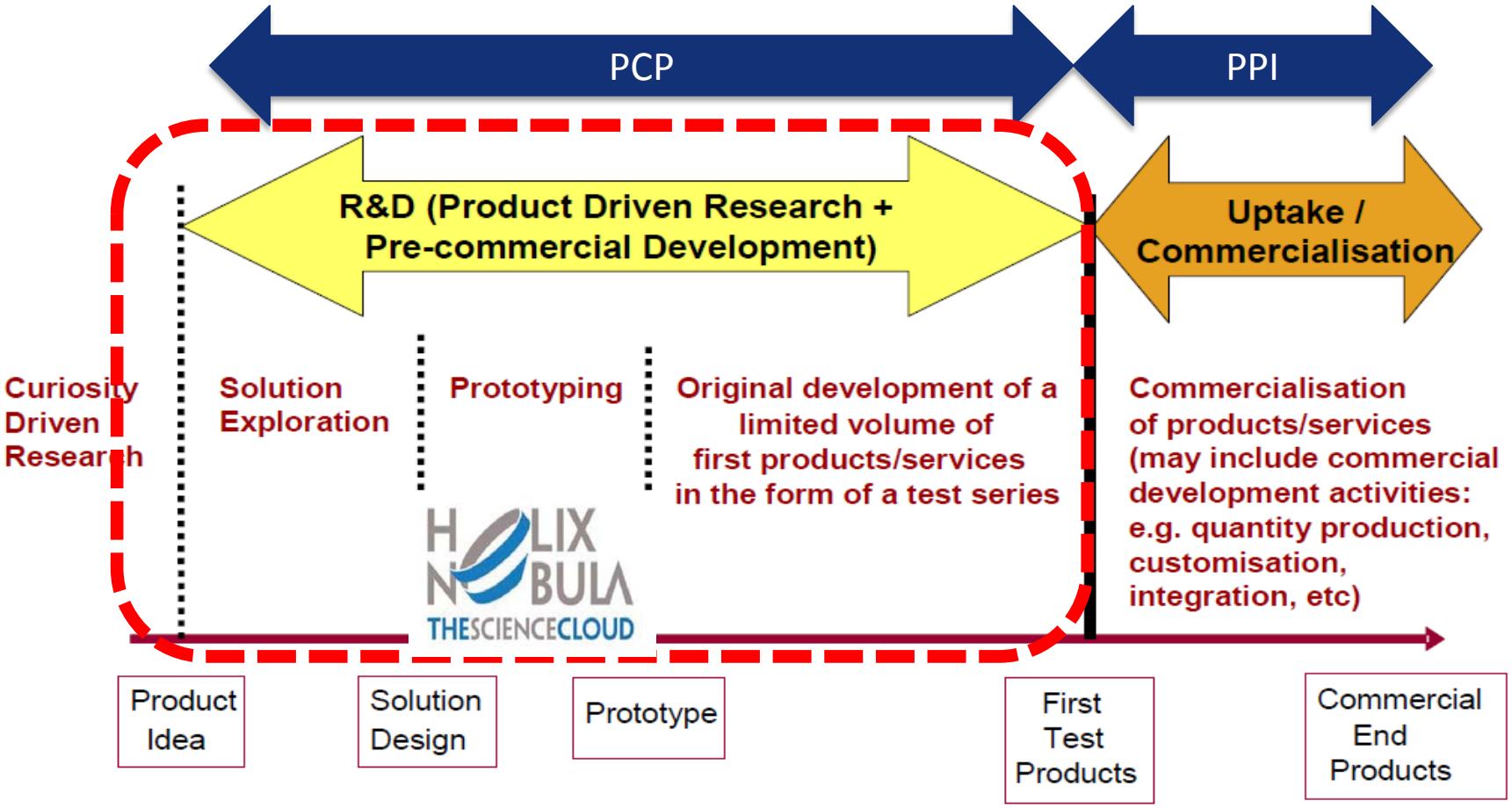


The Helix Nebula Initiative

The Helix Nebula initiative has brought together research organisations, data providers, publicly funded e-infrastructures and European commercial cloud service providers to develop a hybrid cloud model with procurement and governance approaches suitable for the dynamic cloud market



The preferred model for public research organisations is a hybrid cloud that combines in-house resources with public e-infrastructures and commercial cloud services



Typical Product Innovation Life Cycle

Why PCP?
Commercial IaaS exists but not certified, integrated with public e-infrastructures, offering std interfaces with suitable SLA and contractual terms & conditions.

PPI
Potential follow-on project if this PCP project is successful

HNSciCloud Joint Pre-Commercial Procurement

Procurers: CERN, CNRS, DESY, EMBL-EBI, ESRF, IFAE, INFN, KIT, SURFSara, STFC
Experts: Trust-IT & EGI.eu

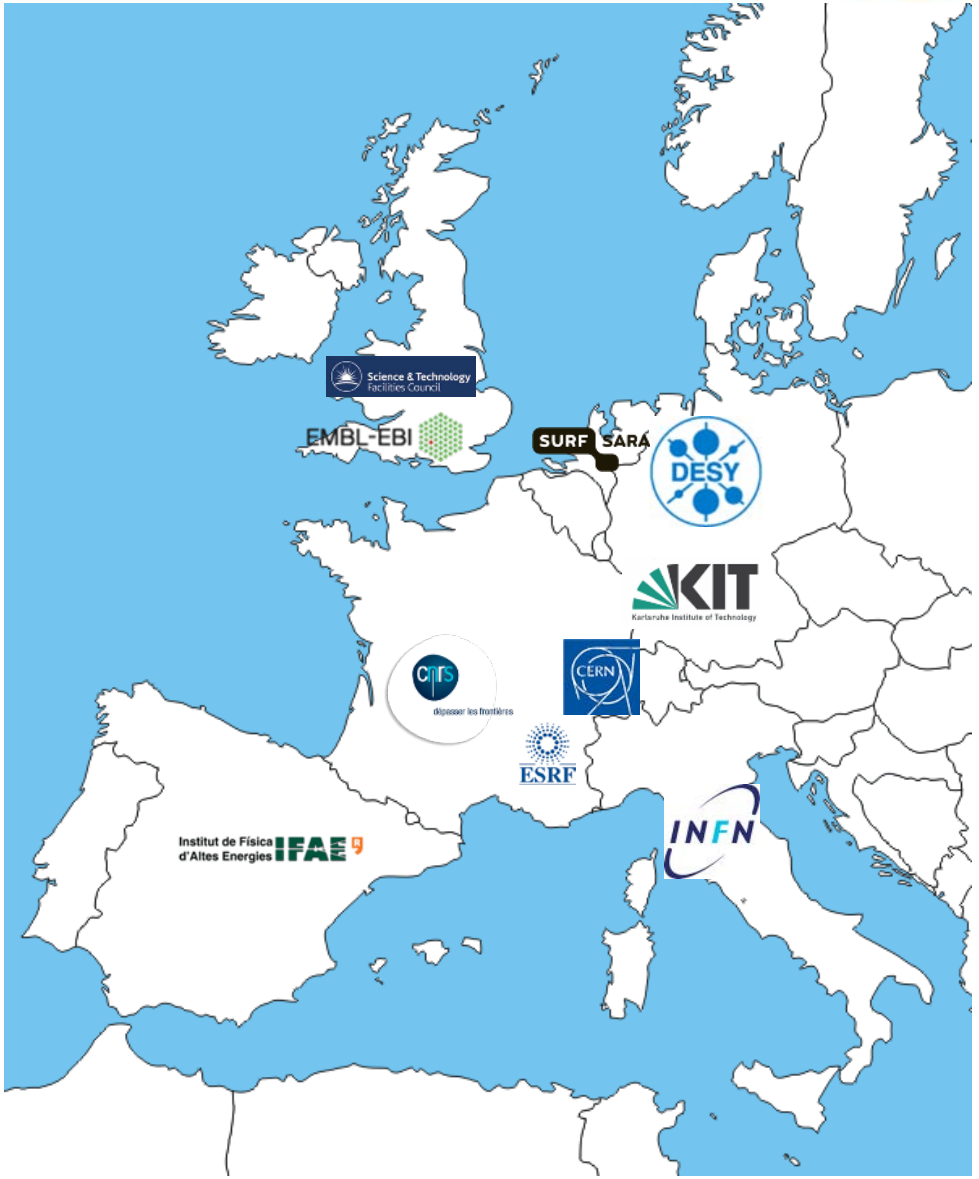
The group of procurers have committed
- >1.6M€ of procurement funds
- Manpower for testing/evaluation
- Use-cases with applications & data
- In-house IT resources

To procure innovative IaaS level cloud services integrated into a hybrid cloud model
- Commercial cloud services
- European e-Infrastructures

Services will be made available to end-users from many research communities

Co-funded via H2020 (Jan'16-Jun'18)
- Grant Agreement 687614

Total procurement commitment >5M€



What will be procured

A joint science cloud platform for the European research community

Combining services at the IaaS level into an environment supporting the full lifecycle of science workflows

The R&D services to be developed will need to be integrated with

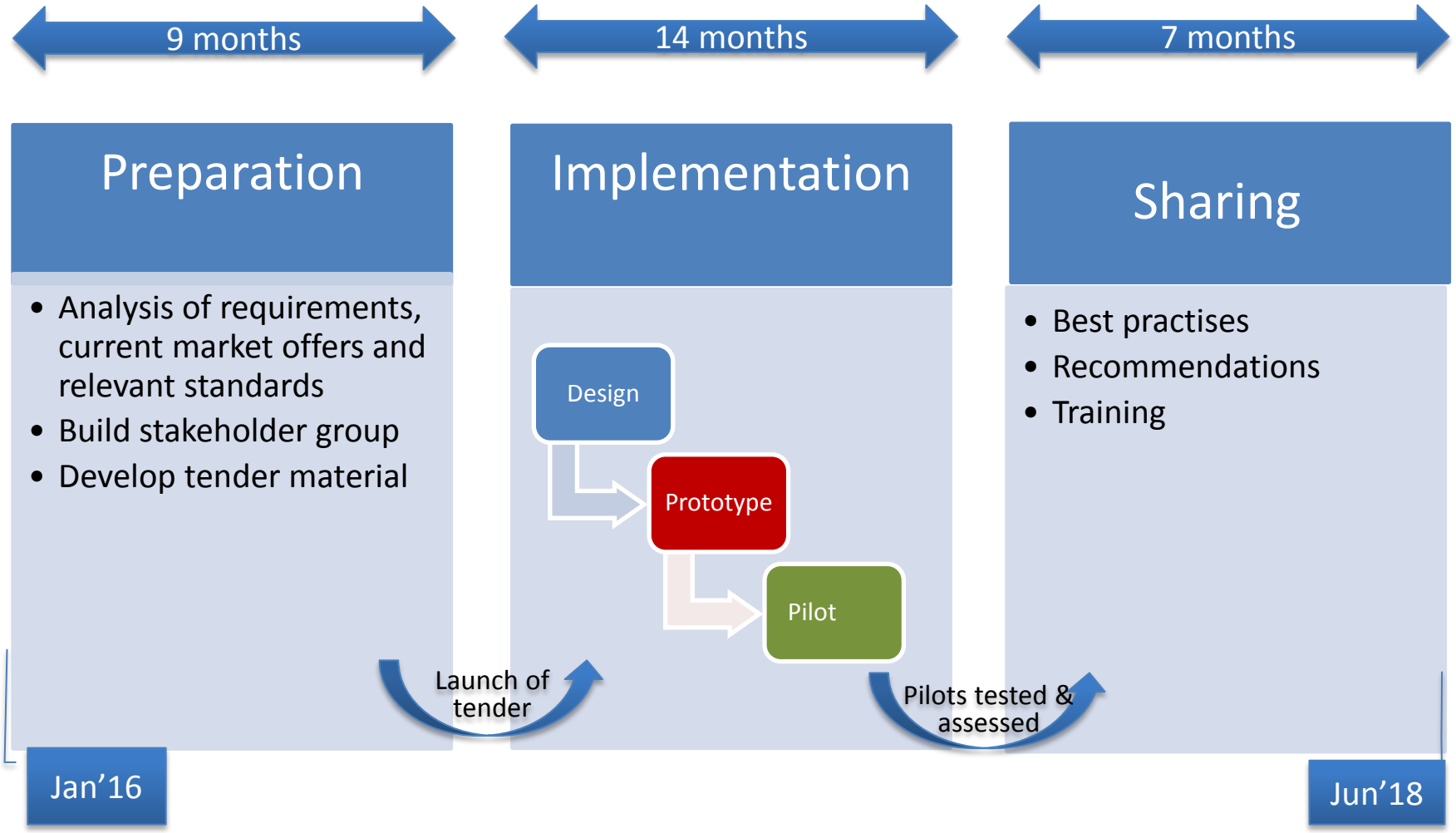
- Resources in data centres operated by the buyers group
- European-scale publicly funded e-Infrastructures

using open source solutions to build a hybrid platform on which a competitive marketplace of European cloud players can develop their own services for a wider range of users beyond research and science

Innovation through Federation

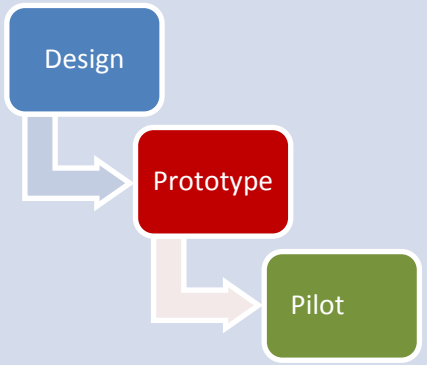
- The buyers group need a means to increase analysis capability & capacity offered to their users to keep pace with growth in scientific data that needs to be analysed
- The cloud platform must be available to end-users distributed around the world in an on-demand & elastic manner
- Provide cost-effective services exploiting capacity-style CPU cycles & online storage connected via high-speed networks that can execute a range of scientific workloads
- Federate with publicly funded e-Infrastructures based on open source solutions to build a hybrid platform on top of which a range of higher-level user specific services can be deployed
- Emphasis will be given to trusted cloud services using internationally recognised security standards supporting an open ecosystem federating multiple suppliers

HNSciCloud PCP project phases

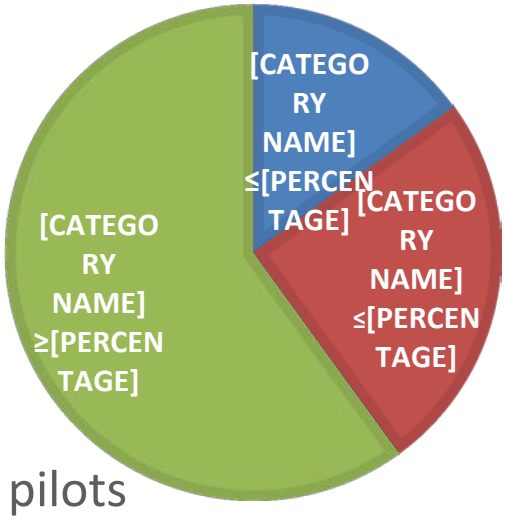


PCP project implementation phase

Implementation



- Solution design
  - ≥4 designs
  - ≤15% tender budget
- Prototype development
  - ≥3 prototypes
  - ≤25% tender budget
- Deployment of limited scale pilots
  - ≥2 pilot deployments
  - ≥60% tender budget



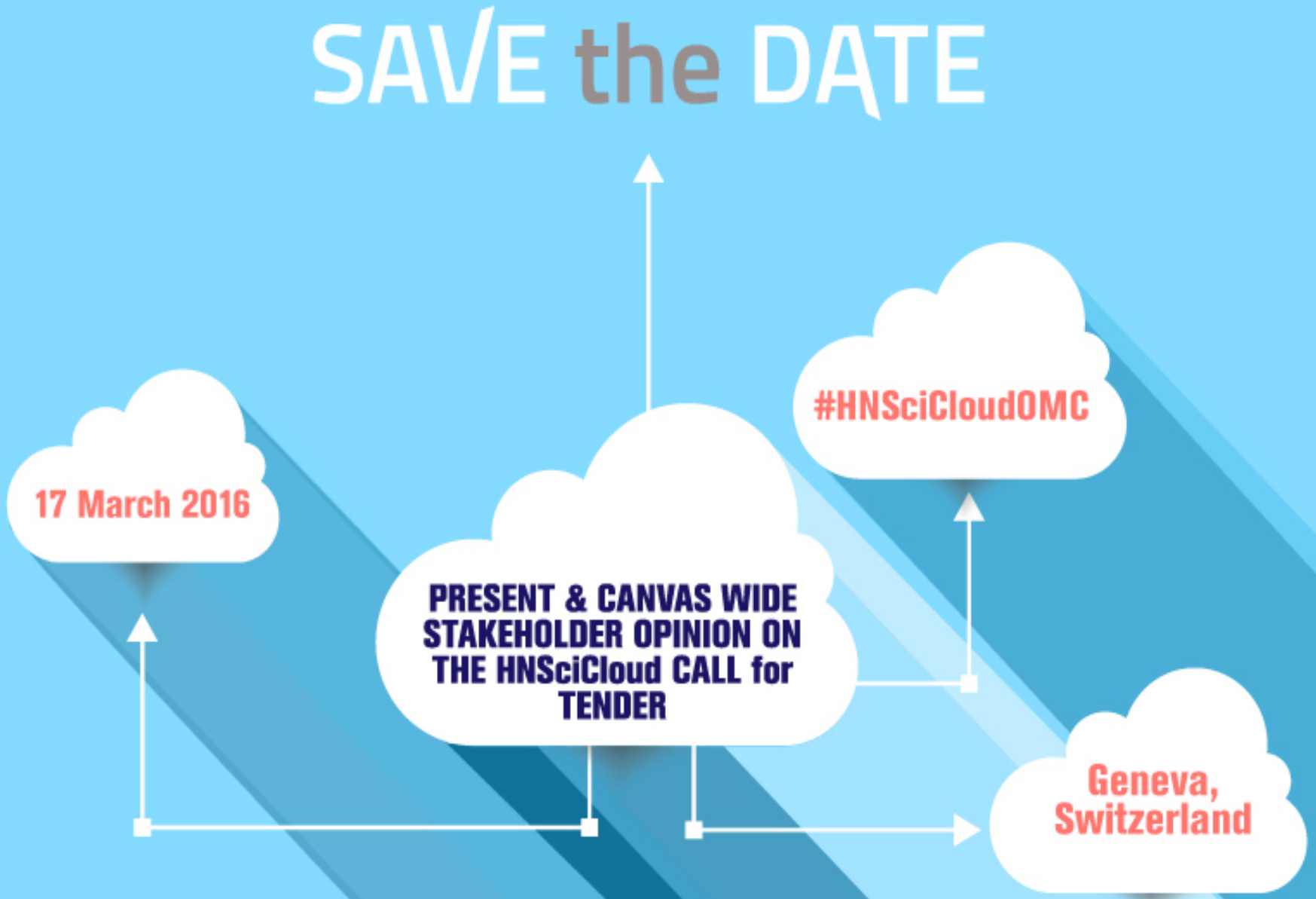
Foreseen allocation of PCP funds to each phase of implementation

Each phase is competitive.
Bids evaluated/tested against criteria published with tender.
Only contractors that successfully complete the previous phase can bid in the next phase.

Use Cases

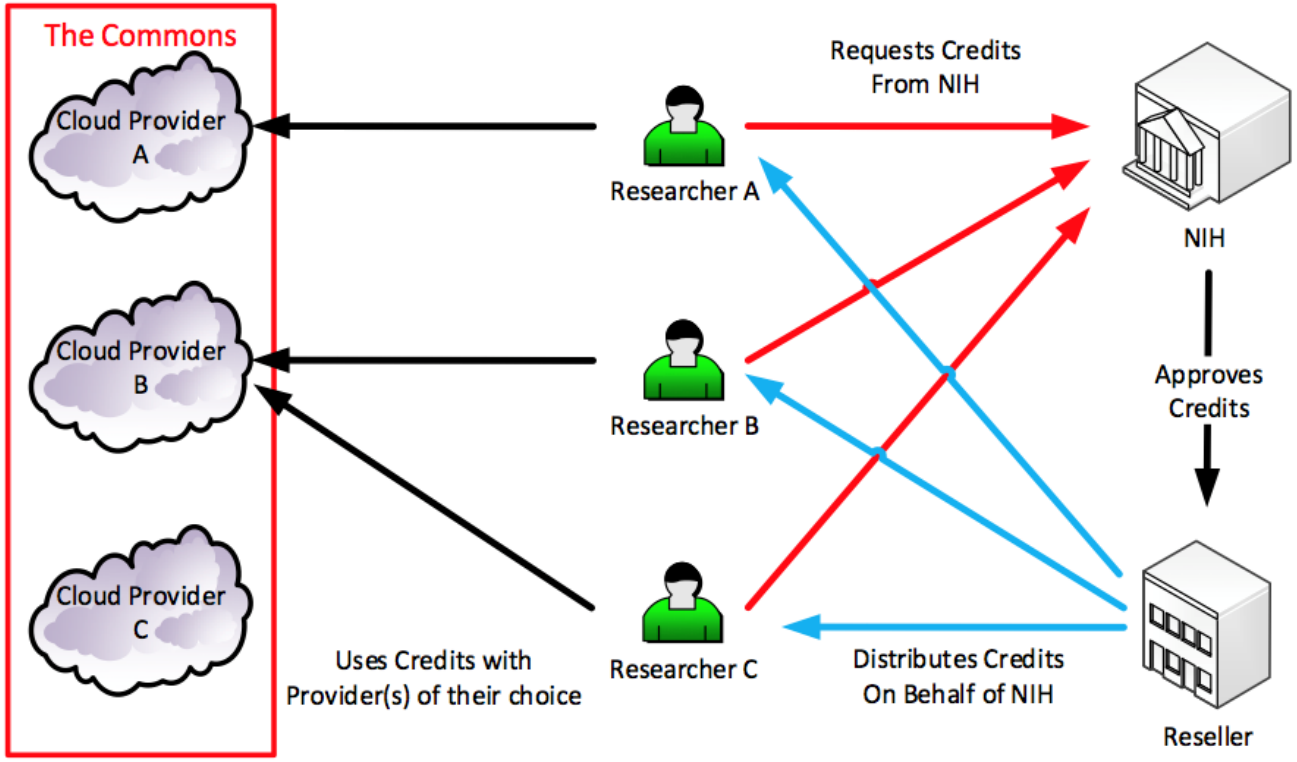
- High Energy Physics
  - LHC experiments via WLCG
  - Belle II
  - COMPASS
- Astronomy
  - CTA – Cherenkov Telescope Array
  - MAGIC
  - Pierre Auger Observatory
- Life Sciences
  - ELIXIR
  - Euro-BioImaging
  - Pan-Cancer
- Photon/Neutron science
  - PETRA III, 3DIX, OCEAN, OSIRIS
- Long tail of science
- Etc.

The procured services will be made available to end-users as *free at the point of use*
Suppliers will be paid according to metered-usage



HNSciCloud PCP Open Market Consultation

NIH Cloud Credits Pilot: A Business Model to Support the Use of Cloud Computing for the Commons (2016-2018)



For this pilot, the initial iteration of the *Commons* will be tested using a federation of public and private computing clouds, with the choice of cloud provider being made by each individual investigator who can select the best value for her/his individual research needs

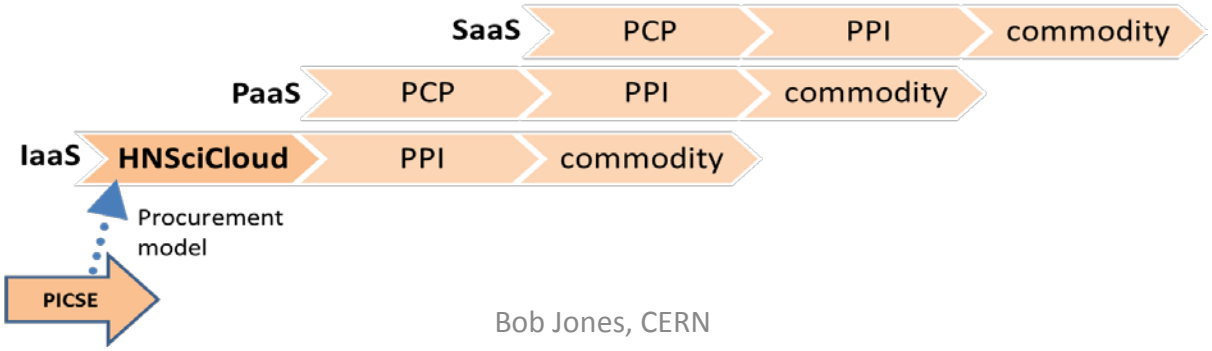
Advantages of this Model

- Supports simplified data sharing by driving science into publicly accessible computing environments that still provide for investigator level access control
- Scalable for the needs of the scientific community for the next 5 years
- Democratize access to data and computational tools
- Cost effective
  - Competitive marketplace for biomedical computing services
  - Reduces redundancy
  - Uses resources efficiently

George A. Komatsoulis, Ph.D.
National Center for Biotechnology Information
National Library of Medicine
National Institutes of Health
U.S. Department of Health and Human Services

Going Beyond HNSciCloud

- Deployment of a hybrid cloud implementation that can build on the investments made in the public and private sectors
- Engagement of the publicly funded research organisations in the uptake of cloud services
- The PCP/PPI approach contributes to the development of innovative services
  - PCP/PPI may be combined with other funding streams, such as regional investments including European Structural and Investment Funds (ESIF), to build capacity in member states
- The pay-for-usage approach can contribute to the sustainability of services by supporting their operational costs



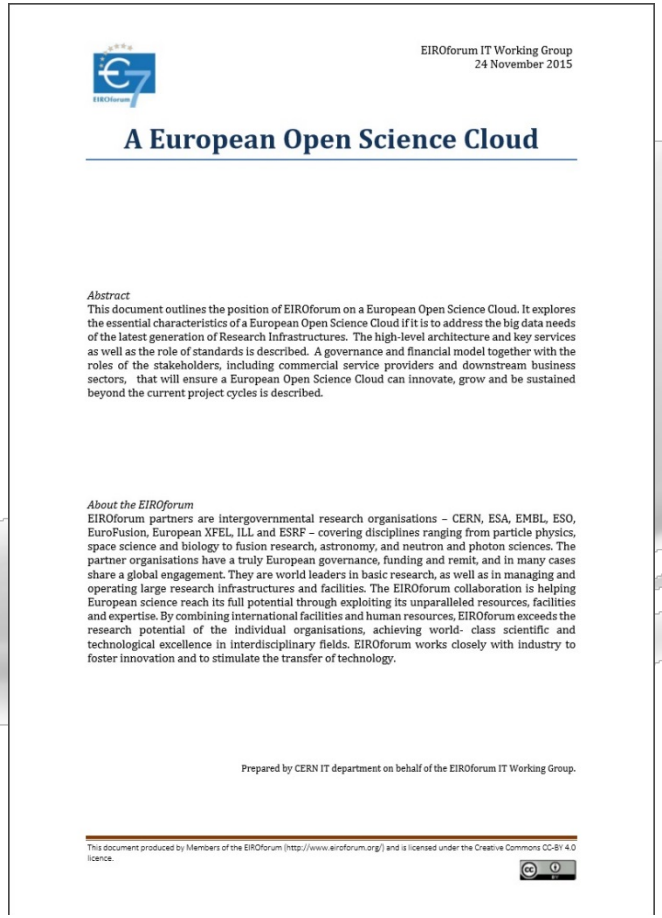
EIROforum position paper on the European Open Science Cloud

This position paper is a rallying call for adoption of a strategic approach

http://dx.doi.org/10.5281/zenodo.34264

November 2015, 26 pages

Endorsed by the Director Generals of all EIROforum members and accompanied by a statement of intent to enact this strategy



EIROforum IT Working Group
24 November 2015

A European Open Science Cloud

Abstract
This document outlines the position of EIROforum on a European Open Science Cloud. It explores the essential characteristics of a European Open Science Cloud if it is to address the big data needs of the latest generation of Research Infrastructures. The high-level architecture and key services as well as the role of standards is described. A governance and financial model together with the roles of the stakeholders, including commercial service providers and downstream business sectors, that will ensure a European Open Science Cloud can innovate, grow and be sustained beyond the current project cycles is described.

About the EIROforum
EIROforum partners are intergovernmental research organisations – CERN, ESA, EMBL, ESO, EuroFusion, European XFEL, ILL and ESRF – covering disciplines ranging from particle physics, space science and biology to fusion research, astronomy, and neutron and photon sciences. The partner organisations have a truly European governance, funding and remit, and in many cases share a global engagement. They are world leaders in basic research, as well as in managing and operating large research infrastructures and facilities. The EIROforum collaboration is helping European science reach its full potential through exploiting its unparalleled resources, facilities and expertise. By combining international facilities and human resources, EIROforum exceeds the research potential of the individual organisations, achieving world- class scientific and technological excellence in interdisciplinary fields. EIROforum works closely with industry to foster innovation and to stimulate the transfer of technology.

Prepared by CERN IT department on behalf of the EIROforum IT Working Group.

Closing remarks

- We expect commercial cloud services to play an increasing role in the computing models of Research Infrastructures
- A hybrid cloud model leverages the investments made in both the public and private sectors while ensuring trust and continuity
  - Mature technologies exist but integration, policy and governance requires careful attention
- Changes to the procurement process in the public research sector are necessary to benefit from a dynamic Digital Single Market
  - See PICSE call to action **http://www.picse.eu/**
- A pay-for-usage model can contribute to the sustainability of services by supporting their operational costs
- The PCP/PPI funding approach can be a means of developing and deploying innovative cloud services
  - HNSciCloud is the first in a possible series of EC co-funded projects