

# Helix Nebula The Science Cloud

CERN – 13 June 2014

Alberto Di MEGLIO on behalf of Bob Jones (CERN)



# Why do we need Helix Nebula?



**Paradigm shift** – scientific innovation dependent on large-scale data collection, processing and access enabling interdisciplinary science



**Vision 2030** - identifies the benefits and costs of accelerating the development of a fully functional e-infrastructure for scientific data

Realisation that no single provider could address all the needs of the European Research Area and that a simple customer-supplier model will be unable to support the full scientific lifecycle

# Strategic Plan for a Scientific Cloud Computing infrastructure for Europe

1.1

8<sup>th</sup> August 2011

- **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**



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# Timeline

2011

- Endorse the Common **Strategy**
- Agree on the **Partnership**
- Select **flagships** use cases
- Define **governance** model

2012-2013

- **Pilot** Phase
- **Deploy** flagships,
- **Analysis** of functionality, performance & financial model

2014 ...

Towards an **open market for Science**

# Long Term Goal

To create a multi-tenant '**Open Marketplace for Science**', where data, scientists, funding bodies, SMEs and downstream industry meet to work towards common interests

**An ecosystem to transform data into valuable information**

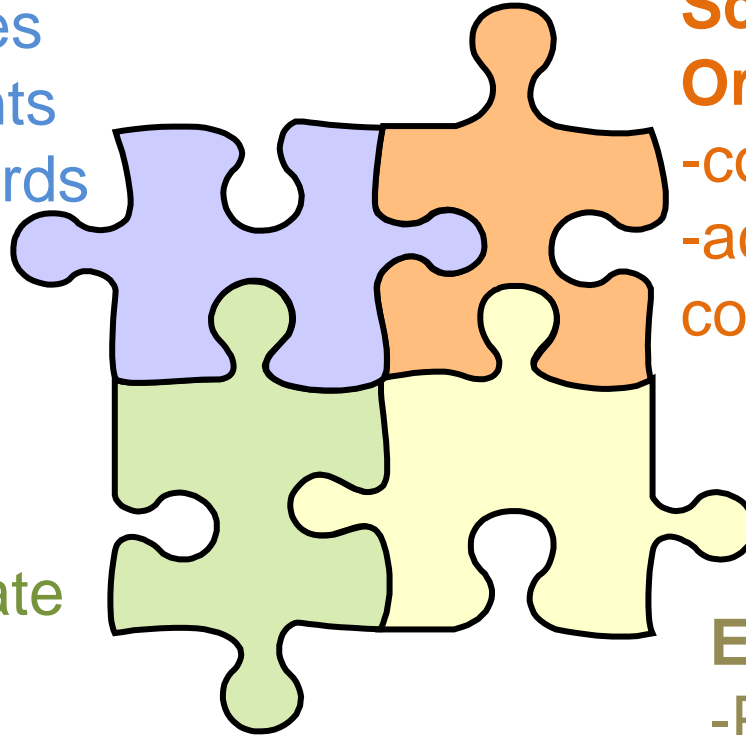
# Partnership – Who & How?

## IT Providers

- commit resources
- share investments
- agree on standards & interoperability

## SME's

Bring expertise & agility to innovate new services



## Scientific and Space Organizations

- commit resources
- access to data & user communities

EC supports with  
-Policy & Strategy

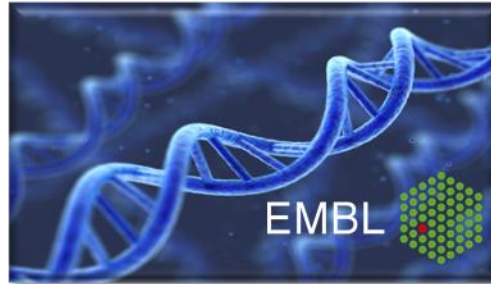
# Initial Flagship Use Cases

## ATLAS High Energy Physics Cloud Use



To support the computing capacity needs for the ATLAS experiment

## Genomic Assembly in the Cloud



A new service to simplify large scale genome analysis; for a deeper insight into evolution and biodiversity

## SuperSites Exploitation Platform



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

- Scientific challenges with societal impact
- Sponsored by user organisations
- Stretch what is possible with the cloud today



# 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			•



# May 2014: 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



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

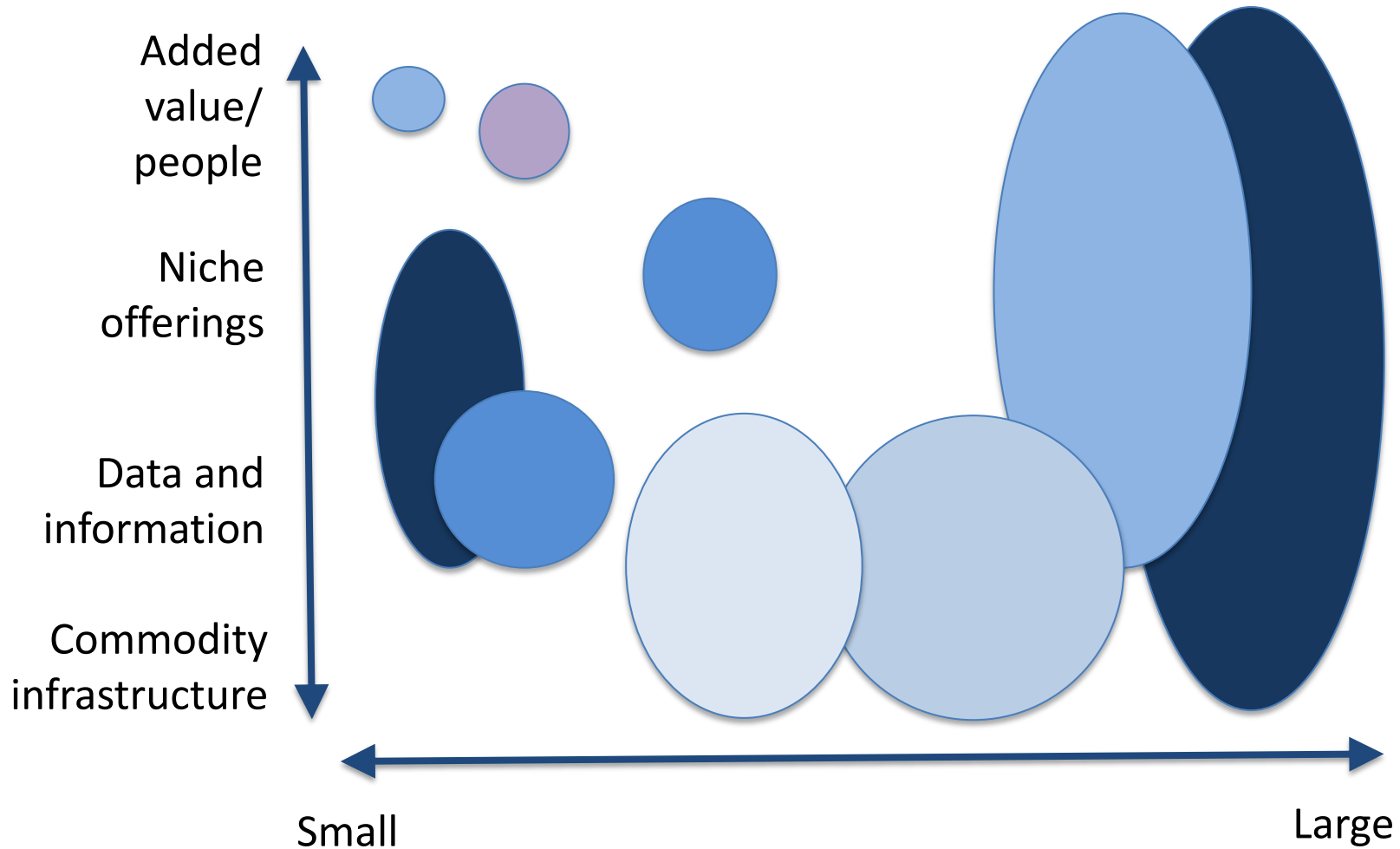
## Suppliers



## Adopters

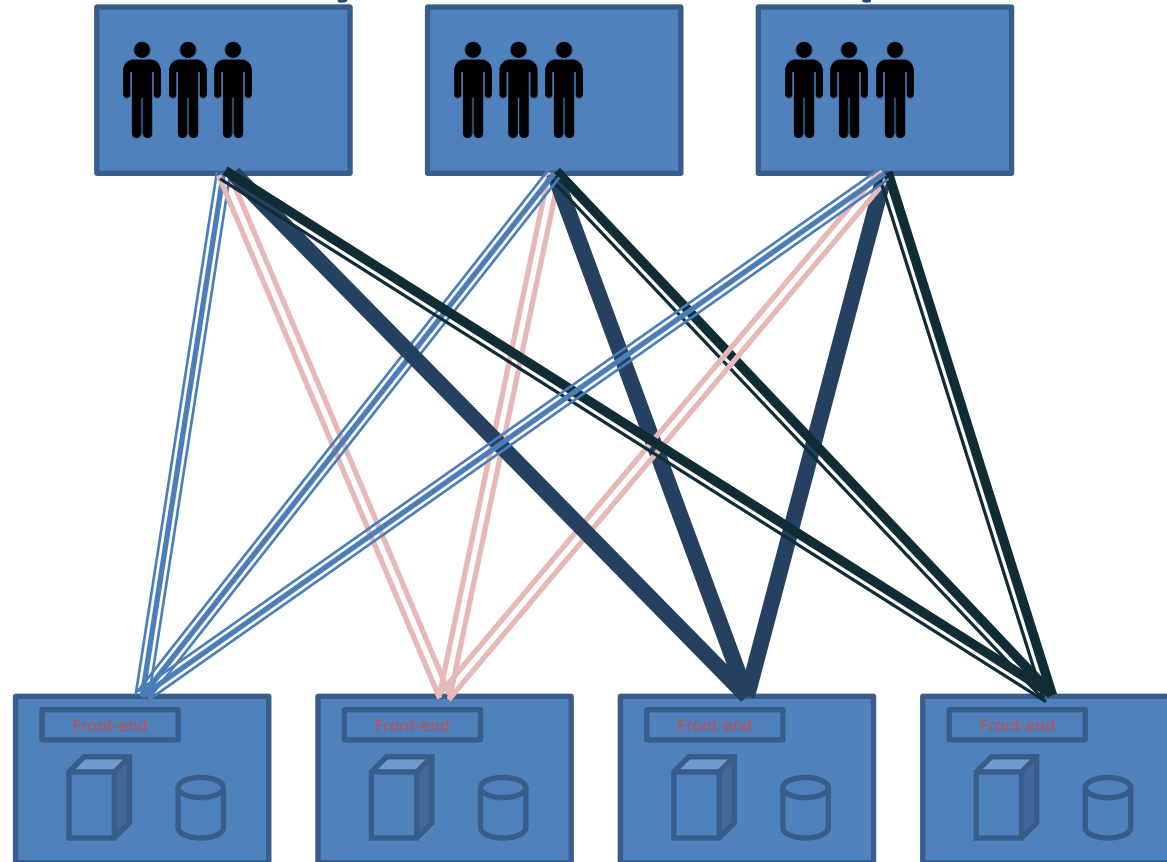


# There is a broad range of (competing) suppliers involved



# Many-to-many relationship matrix

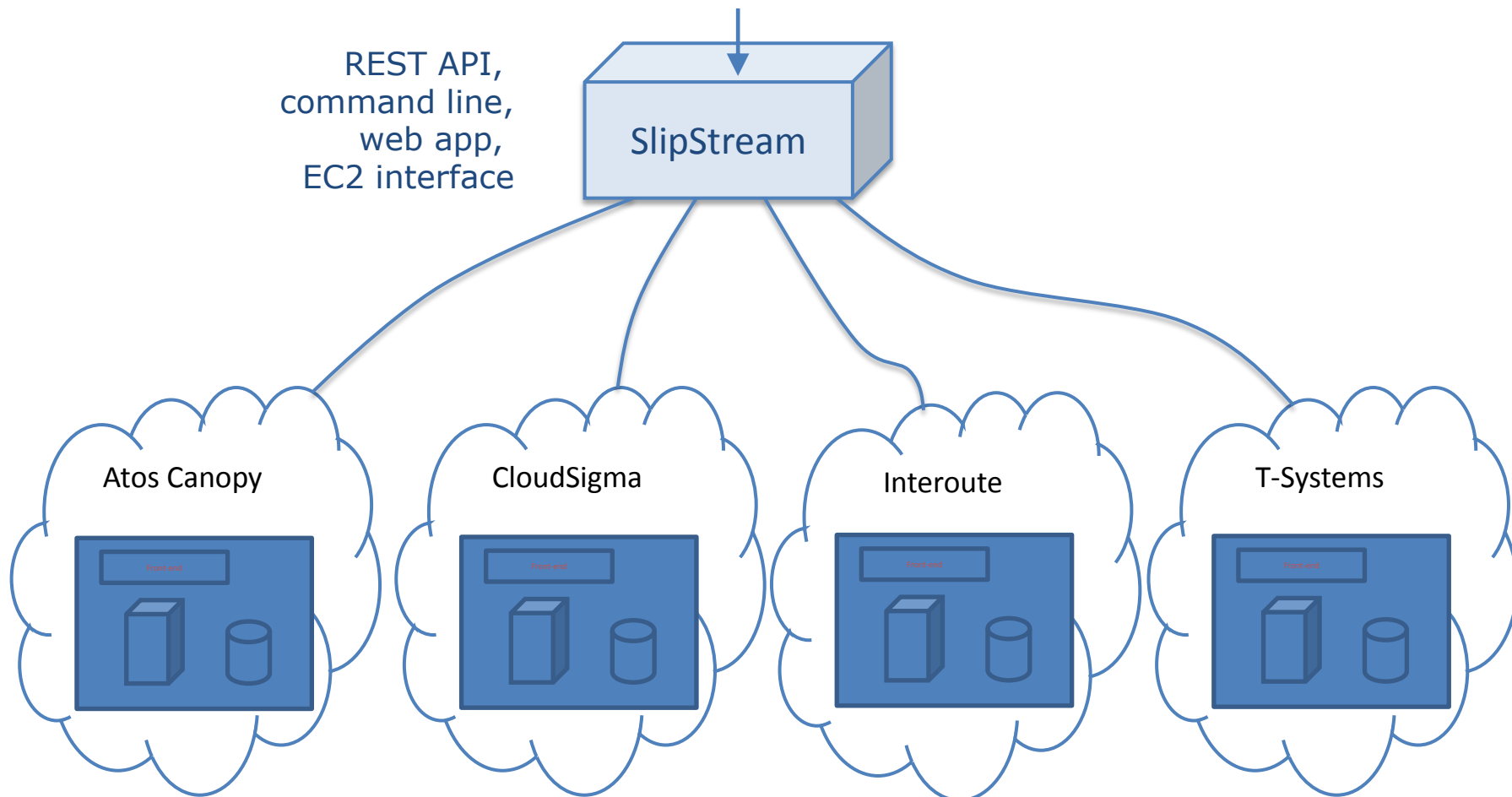
Customers,  
users



Suppliers,  
providers

- Each supplier has a working cloud service, but they are all different

# Helix Nebula Blue Box services



- They still are, but we have been working to make that irrelevant/transparent to users

# Helix Nebula Marketplace



- Builds upon the work undertaken as part of the EC funding project and overall initiative
- Support by European cloud providers and integration with existing e-Infrastructures, a hybrid cloud Computing Market Place and **open for new Cloud Providers**
- Trusted cloud services through **compliance with EU regulations and legislation**
- **Simplified procurement** process for multiple cloud services
- Offered to the global scientific community, for both publicly-funded and commercial Research and Technology Organizations, offering **large-scale and HPC-type deployments** from the start.
- A focus on **transparency and impartiality of the brokerage function**. Trust is important.



Atos

CloudSigma

CGI

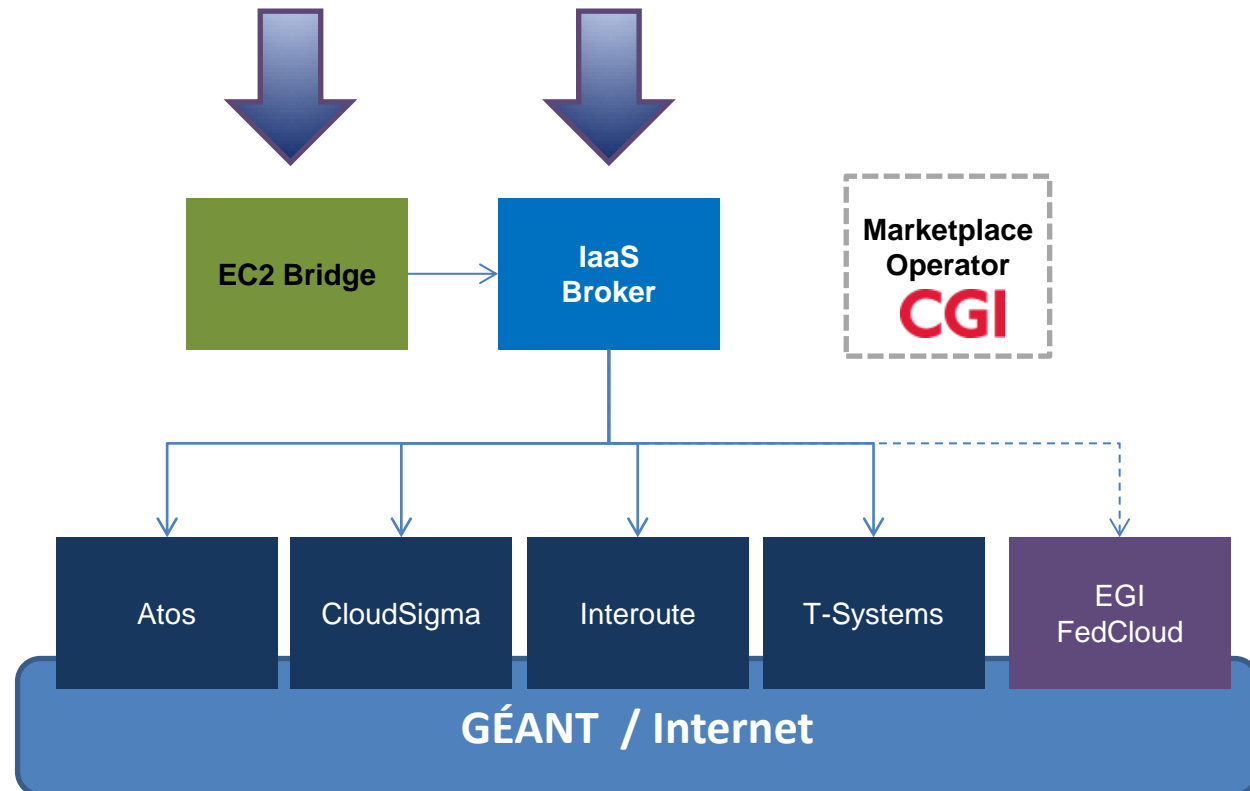


..T..Systems

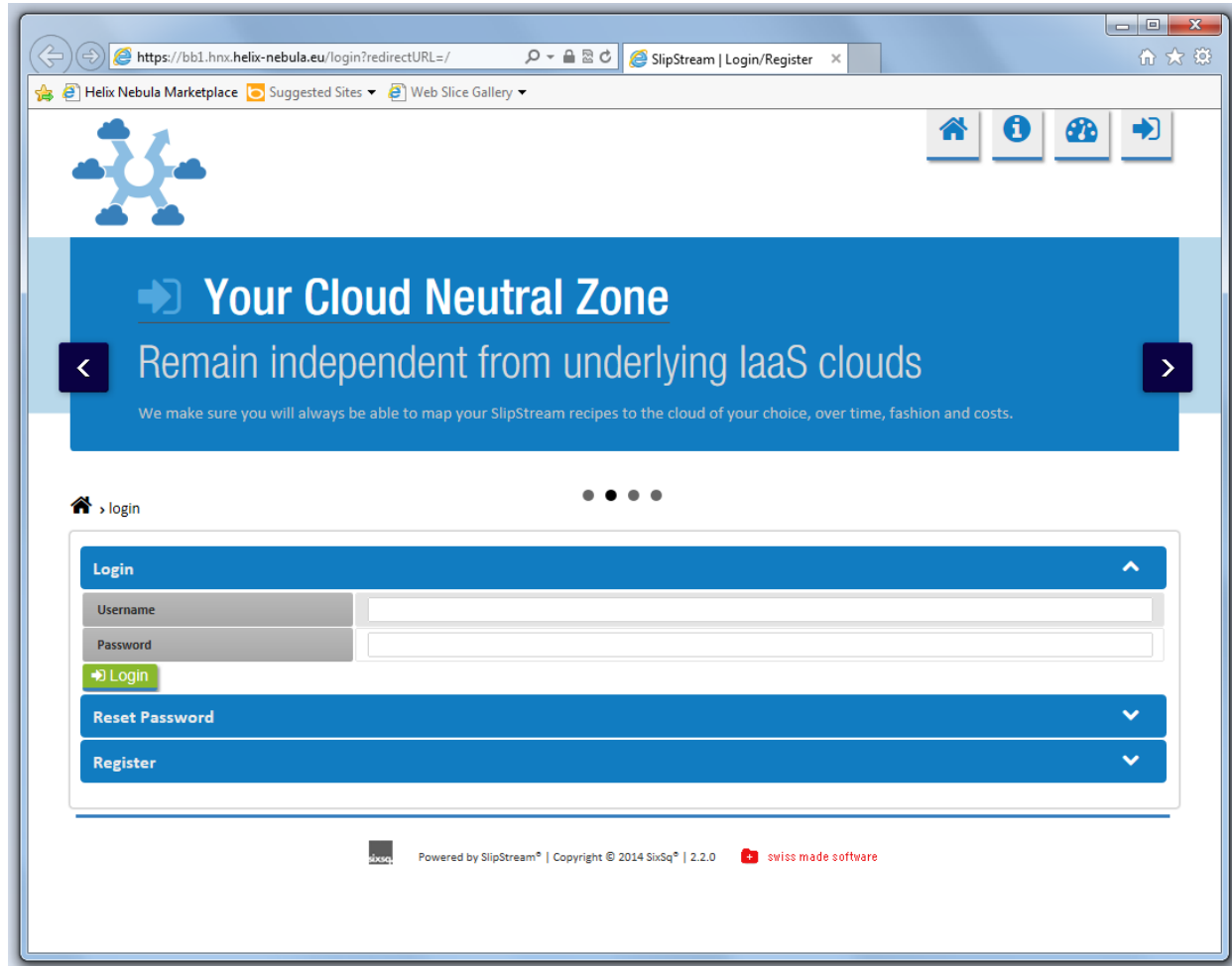


# HNX Platform

- Initial **four** commercial cloud providers integrated
- **Amazon EC2 Bridge** for compatibility with third party tools, such as StarCluster or any EC2-compatible tool
- Integration with the **EGI FedCloud** on our roadmap for 2014



# Brokerage Platform



The screenshot shows a web browser window with the URL <https://bb1.hnx.helix-nebula.eu/login?redirectURL=/>. The page features a navigation bar with the Helix Nebula Marketplace logo and a search bar. Below the navigation bar is a large blue banner with the text "Your Cloud Neutral Zone" and "Remain independent from underlying IaaS clouds". Below the banner is a login form with fields for "Username" and "Password", a "Login" button, and links for "Reset Password" and "Register". The footer contains the text "Powered by SlipStream® | Copyright © 2014 SixSq® | 2.2.0" and "swiss made software".

https://bb1.hnx.helix-nebula.eu/login?redirectURL=/

SlipStream | Login/Register

Helix Nebula Marketplace Suggested Sites Web Slice Gallery

**Your Cloud Neutral Zone**

Remain independent from underlying IaaS clouds

We make sure you will always be able to map your SlipStream recipes to the cloud of your choice, over time, fashion and costs.

login

**Login**

Username

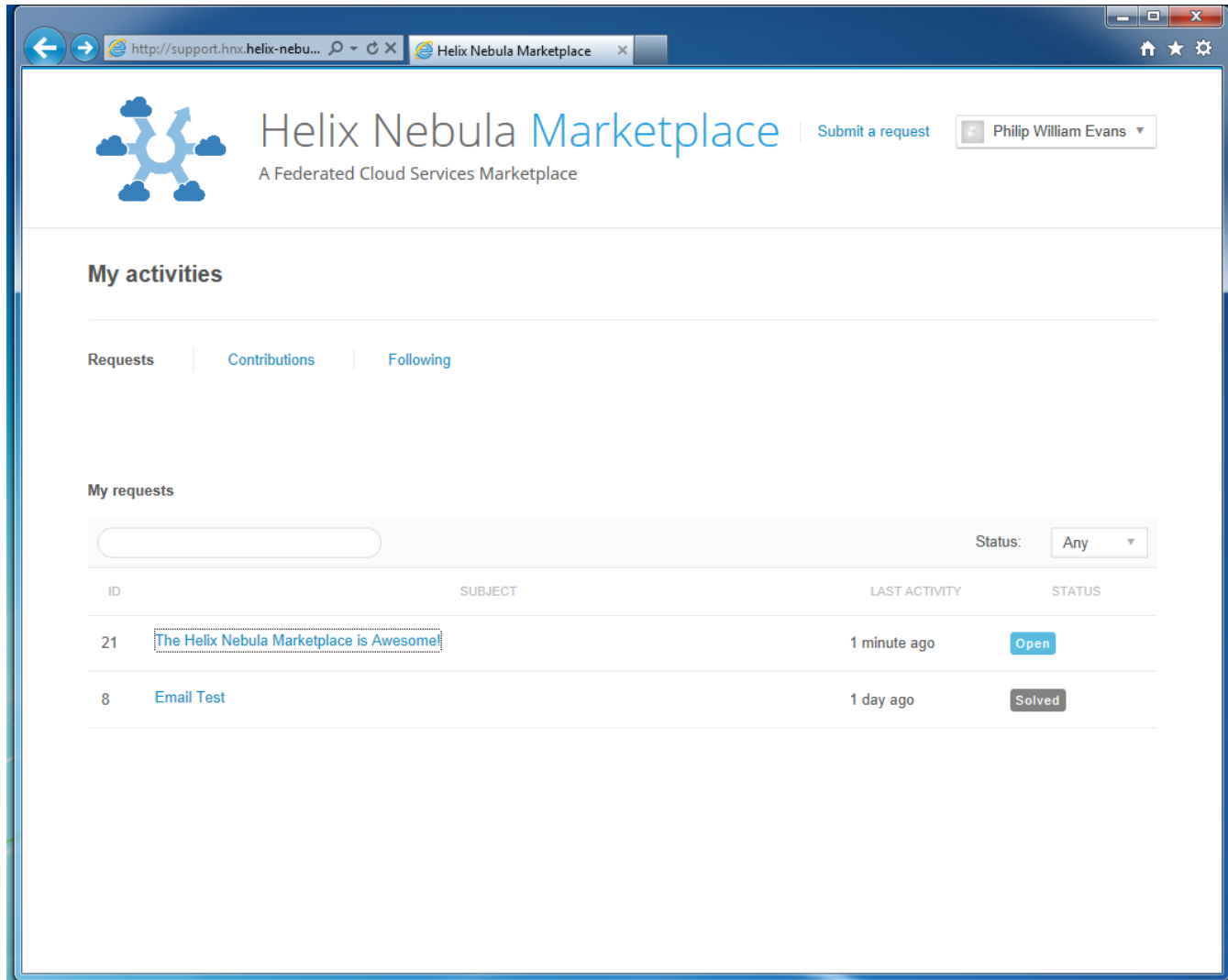
Password

**Login**

**Reset Password**

**Register**

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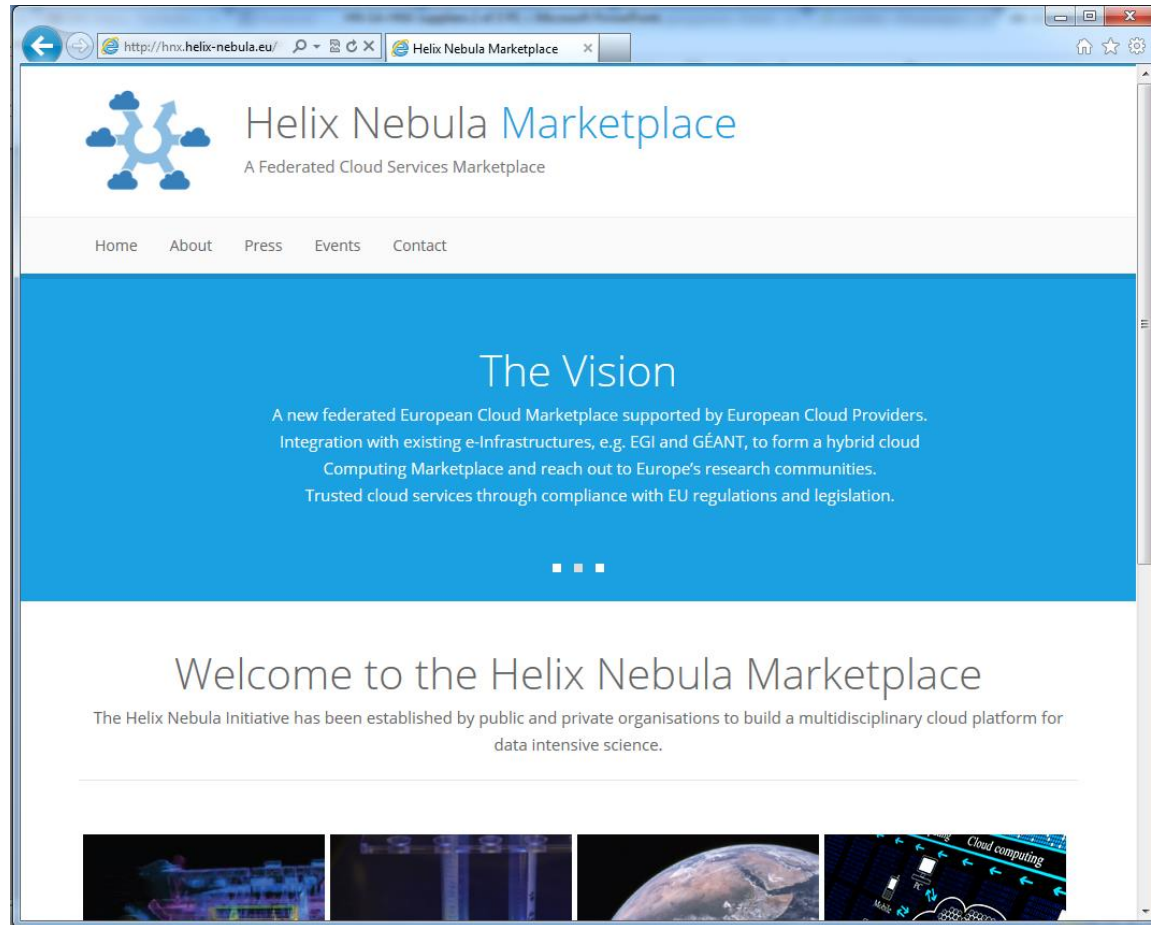
The screenshot shows a web browser window with the URL `http://support.hnx.helix-nebu...` and the page title "Helix Nebula Marketplace". The page header includes the marketplace logo, the name "Helix Nebula Marketplace", the tagline "A Federated Cloud Services Marketplace", a "Submit a request" button, and a user profile for "Philip William Evans".

The main content area is titled "My activities" and contains three tabs: "Requests", "Contributions", and "Following". Below the tabs is a section for "My requests" with a search input field and a "Status:" dropdown menu set to "Any".

ID	SUBJECT	LAST ACTIVITY	STATUS
21	<a href="#">The Helix Nebula Marketplace is Awesome!</a>	1 minute ago	<a href="#">Open</a>
8	<a href="#">Email Test</a>	1 day ago	<a href="#">Solved</a>



# <http://hnx.helix-nebula.eu>



The screenshot shows a web browser window displaying the Helix Nebula Marketplace website. The browser's address bar shows the URL <http://hnx.helix-nebula.eu/>. The website header features the Helix Nebula logo and the text "Helix Nebula Marketplace" and "A Federated Cloud Services Marketplace". A navigation menu includes "Home", "About", "Press", "Events", and "Contact". The main content area has a blue background with the heading "The Vision" and the following text: "A new federated European Cloud Marketplace supported by European Cloud Providers. Integration with existing e-Infrastructures, e.g. EGI and GÉANT, to form a hybrid cloud Computing Marketplace and reach out to Europe's research communities. Trusted cloud services through compliance with EU regulations and legislation." Below this is a "Welcome to the Helix Nebula Marketplace" section with the text: "The Helix Nebula Initiative has been established by public and private organisations to build a multidisciplinary cloud platform for data intensive science." At the bottom, there is a row of four small images: a network diagram, a server rack, a view of Earth from space, and a cloud computing diagram.