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Helix Nebula - the Science Cloud: a public-private partnership to build a multidisciplinary cloud platform for data intensive science

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The feasibility of using commercial cloud services for scientific research is of great interest to research organisations such as CERN, ESA and EMBL, to the suppliers of cloud-based services and to the national and European funding agencies. Through the Helix Nebula - the Science Cloud [1] initiative and with the support of the European Commission, these stakeholders are driving a two year pilot-phase during which procurement processes and governance issues for a framework of public/private partnership will be appraised. Three initial flagship use cases from high energy physics, molecular biology and earth-observation are being used to validate the approach, enable a cost-benefit analysis to be undertaken and prepare the next stage of the Science Cloud Strategic Plan [2] to be developed and approved.

The power of Helix Nebula lies in a shared set of services for initially 3 very different sciences each supporting a global community and thus building a common e-Science platform. Of particular relevance is the ESA sponsored flagship application SuperSites Exploitation Platform (SSEP [3]) that offers the global geo-hazard community a common platform for the correlation and processing of observation data for supersites monitoring. The US-NSF Earth Cube [4] and Ocean Observatory Initiative [5] (OOI) are taking a similar approach for data intensive science.

The work of Helix Nebula and its recent architecture model [6] has shown that is it technically feasible to allow publicly funded infrastructures, such as EGI [7] and GEANT [8], to interoperate with commercial cloud services. Such hybrid systems are in the interest of the existing users of publicly funded infrastructures and funding agencies because they will provide “freedom of choice” over the type of computing resources to be consumed and the manner in which they can be obtained.

But to offer such freedom-of choice across a spectrum of suppliers, various issues such as intellectual property, legal responsibility, service quality agreements and related issues need to be addressed. Investigating these issues is one of the goals of the Helix Nebula initiative.

The next generation of researchers will put aside the historical categorisation of research as a neatly defined set of disciplines and integrate the data from different sources and instruments into complex models that are as applicable to earth observation or biomedicine as they are to high-energy physics. This aggregation of datasets and development of new models will accelerate scientific development but will only be possible if the issues of data intensive science described above are addressed. The culture of science has the possibility to develop with the availability of Helix Nebula as a “Science Cloud” because:
• Large scale datasets from many disciplines will be accessible
• Scientists and others will be able to develop and contribute open source tools to expand the set of services available
• Collaboration of scientists will take place around the on-demand availability of data, tools and services
• Cross-domain research will advance at a faster pace due to the availability of a common platform.

References:
1 http://www.helix-nebula.eu/
2 http://cdsweb.cern.ch/record/1374172/files/CERN-OPEN-2011-036.pdf
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4 http://www.nsf.gov/geo/earthcube/
5 http://www.oceanobservatories.org/

6 http://cdsweb.cern.ch/record/1478364/files/HelixNebula-NOTE-2012-001.pdf
7 http://www.nsf.gov/geo/earthcube/
8 http://www.geant.net/