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CEMS: Building a Cloud-Based Infrastructure to Support Climate and Environmental Data Services

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CEMS, the facility for Climate and Environmental Monitoring from Space, is a new joint collaboration between academia and industry to bring together their collective expertise to support research into climate change and provide a catalyst for growth in related Earth Observation (EO) technologies and services in the commercial sector.

A recent major investment by the UK Space Agency has made possible the development of a dedicated facility at ISIC, the International Space Innovation Centre at Harwell in the UK. CEMS has a number of key elements: the provision of access to large-volume EO and climate datasets co-located with high performance computing facilities; a flexible infrastructure to support the needs of research projects in the academic community and new business opportunities for commercial companies. Expertise and tools for scientific data quality and integrity are another essential component, giving users confidence and transparency in its data, services and products.

Central to the development of this infrastructure is the utilisation of cloud-based technology: multi-tenancy and the dynamic provision of resources are key characteristics to exploit in order to support the range of organisations using the facilities and the varied use cases. The hosting of processing services and applications next to the data within the CEMS facility is another important capability. With the expected exponential increase in data volumes within the climate science and EO domains it is becoming increasingly impracticable for organisations to retrieve this data over networks and provide the necessary storage. Consider for example, the factor of o20 increase in data volumes expected for the ESA Sentinel missions over the equivalent Envisat instruments.

We explore the options for the provision of a hybrid community/private cloud looking at offerings from the commercial sector and developments in the Open Source community. Building on this virtualisation layer, a further core services tier will support and serve applications as part of a service oriented architecture. We consider the constituent services in this layer to support access to the data, data processing and the orchestration of workflows.