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A web service for service composition to aid geospatial modelers

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The identification of appropriate mechanisms for process reuse, chaining and composition is considered a key enabler for the effective uptake of a global Earth Observation infrastructure, currently pursued by the international geospatial research community.

In the Earth and Space Sciences, such a facility could primarily enable integrated and interoperable modeling, for what several approaches have been proposed and developed, over the last years. In fact, GEOSS is specifically tasked with the development of the so-called “Model Web”. At increasing levels of abstraction and generalization, the initial stove-pipe software tools have evolved to community-wide modeling frameworks, to Component-Based Architecture solution, and, more recently, started to embrace Service-Oriented Architectures technologies, such as the OGC WPS specification and the WS-* stack of W3C standards for service composition.

However, so far, the level of abstraction seems too low for implementing the Model Web vision, and far too complex technological aspects must still be addressed by both providers and users, resulting in limited usability and, eventually, difficult uptake.

As by the recent ICT trend of resource virtualization, it has been suggested that users in need of a particular processing capability, required by a given modeling workflow, may benefit from outsourcing the composition activities into an external first-class service, according to the Composition as a Service (CaaS) approach.
A CaaS system provides the necessary interoperability service framework for adaptation, reuse and complementation of existing processing resources (including models and geospatial services in general) in the form of executable workflows.

This work introduces the architecture of a CaaS system, as a distributed information system for creating, validating, editing, storing, publishing, and executing geospatial workflows.
This way, the users can be freed from the need of a composition infrastructure and alleviated from the technicalities of workflow definitions (type matching, identification of external services endpoints, binding issues, etc.) and focus on their intended application.

Moreover, the user may submit an incomplete workflow definition, and leverage CaaS recommendations (that may derive from an aggregated knowledge base of user feedback, underpinned by Web 2.0 technologies) to execute it. This is of particular interest for multidisciplinary scientific contexts, where different communities may benefit of each other knowledge through model chaining.

Indeed, the CaaS approach is presented as an attempt to combine the recent advances in service-oriented computing with collaborative research principles, and social network information in general. Arguably, it may be considered a fundamental capability of the Model Web.
The CaaS concept is being investigated in several application scenarios identified in the FP7 UncertWeb and EuroGEOSS projects.

Key aspects of the described CaaS solution are: it provides a standard WPS interface for invoking Business Processes and allows on the fly recursive compositions of Business Processes into other Composite Processes; it is designed according to the extended SOA (broker-based) and the System-of-Systems approach, to support the reuse and integration of existing resources, in compliance with the GEOSS Model Web architecture.

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