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Towards a Brokering Framework for Business Process Execution

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Advancing our knowledge of environmental phenomena and their interconnections requires an intensive use of environmental models. Due to the complexity of Earth system, the representation of complex environmental processes often requires the use of more than one model (often from different disciplines).

The Group on Earth Observation (GEO) launched the Model Web initiative to increase present accessibility and interoperability of environmental models, allowing their flexible composition into complex Business Processes (BPs). A few, basic principles are at the base of the Model Web concept (Nativi, et al.): (i) Open access, (ii) Minimal entry-barriers, (iii) Service-driven approach, and (iv) Scalability.

This work proposes an architectural solution, based on the Brokering approach for multidisciplinary interoperability, aiming to contribute to the Model Web vision. The Brokering approach is currently adopted in the new GEOSS Common Infrastructure (GCI) as was presented at the last GEO Plenary meeting in Istanbul, November 2011. We designed and prototyped a component called BP Broker. The high-level functionalities provided by the BP Broker are:

• Discover the needed model implementations in an open, distributed and heterogeneous environment;
• Check I/O consistency of BPs and provide suggestions for mismatches resolving:
• Publish the EBP as a standard model resource for re-use.
• Submit the compiled BP (EBP) to a WF-engine for execution.

A BP Broker has the following features:

• Support multiple abstract BP specifications;
• Support encoding in multiple WF-engine languages.

According to the Brokering principles, the designed system is flexible enough to support the use of multiple BP design (visual) tools, heterogeneous Web interfaces for model execution (e.g. OGC WPS, WSDL, etc.), and different Workflow engines.

The present implementation makes use of BPMN 2.0 notation for BP design and jBPM workflow engine for eBP execution; however, the strong decoupling which characterizes the design of the BP Broker easily allows supporting other technologies.

The main benefits of the proposed approach are: (i) no need for a composition infrastructure, (ii) alleviation from technicalities of workflow definitions, (iii) support of incomplete BPs, and (iv) the reuse of existing BPs as atomic processes. The BP Broker was designed and prototyped in the EC funded projects EuroGEOSS (http://www.eurogeoss.eu) and UncertWeb (http://www.uncertweb.org); the latter project provided also the use scenarios that were used to test the framework: the eHabitat scenario (calculation habitat similarity likelihood) and the FERA scenario (impact of climate change on land-use and crop yield). Three more scenarios are presently under development.

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References

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