Artifact-centric Service Interoperability in the Flanders Research Information Portal

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The Flemish Department of Economy, Science and Innovation (EWI) has started the Flanders Research Information Space programme (FRIS) in 2007 with the goal of transparent and automated flowing of research information via the construction of an information architecture. Doing so, the FRIS programme wants to accelerate the innovation value chain by (i) efficient and fast access to research information for all relevant stakeholders; (ii) offer improved customer services (e-government); and (iii) increase efficiency and effectiveness of the R&D policy. For FRIS to become sustainable, EWI has set the following critical requirements.

- *Data provenance and goverance* Data must be collected at the point of creation, i.e. in the operational processes of data providers (e.g., universities, funding bodies, etc.). For example, information on a research project can be found in the assessment process for a funding application. Collecting information at the operational process level offers major advantages. The data are accurate and up-to-date because they are being used in an operational process. Also, it is not necessary to establish a parallel data gathering process, so data providers are spared a lot of administrative work.
- *Scalability* FRIS, initially targeted at the Flemish region, is intended to be scaled out to a European context. The increase the potential of design and maintenance scalability, a service-oriented paradigm is chosen for the FRIS architecture.
- *Reusability* The FRIS service components must be maximally reusable. Therefore, the use of business semantics standards to describe data and services is required. E.g., as a member of EuroCRIS[3], EWI is participating in the further development and maintenance of the Common European Research Information Format standard (CERIF) standard. CERIF emerged from early pre-FP research projects including EXIRPTS and IDEAS. Today, substantial improvements have been implemented with the model, concerning in particular the introduction of a so-called Business Semantics Layer[4] that makes the model flexible and scalable for application in very heterogeneous environments. Moreover, EuroCRIS wants to push forward this standard as OMG standard by using OMG SBVR[5].
- *Long Tail Variability* Broadly, each nation state has a similar research process of: strategic planning; programme announcement; call for proposals; proposal evaluation and awarding; project result monitoring, project result exploitation. However,

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[3] a not-for-profit association aiming to be the internationally recognised point of reference for all matters relating to Current Research Information Systems (CRIS): http://www.eurocris.org

[4] http://deleenheer.wordpress.com/business-semantics-management/

[5] http://www.omg.org/spec/SBVR/1.0/

for each of these "commoditized" processes, every stakeholder has different expectations of the underlying services. Two processes may involve many repeatable activities. However, the effective implementation of a process to produce one particular service usually involves many variations of control flows and stakeholders. Moreover, different regional backgrounds of the respective stakeholders add up to the complexity. Hence, the mere static meaning (read: data semantics) of research data is not sufficient anymore. In order to provide a more complete (i.e. less ambiguous) interpretation of the data, data semantics has to be complemented by the "dynamic" semantics of the particular service context in which data was created or manipulated.

A combination of service development and a managed change process will achieve the strategic goals[6]. Artifact-Centric Service Interoperation (ACSI)[7] is a new research and development initiative funded by the EC that roots its business semantics-driven framework on two fundamental constructs, namely, *interoperation hub* and *business artifact*.

An interoperation hub serves as a virtual rendezvous for multiple services that are to work together towards a common goal. Domain-specific interoperation hubs such as the EasyChair conference submission management system or Salesforce.com have already shown the value of interoperation hubs; the research here will make it possible to easily create, launch, participate in, and maintain ACSI interoperation hubs in essentially any application domain. Similar to EasyChair, an ACSI interoperation hub will serve as the anchor for a collaboration environment, that is, an IT environment used to support large numbers of service collaborations that operate independently, but which focus on essentially equivalent common goals. Unlike orchestrators, an interoperation hub works well in the context of open service networks. These hubs are primarily reactive, serving as a kind of structured white board that participating services can refer to, that can be updated with information relevant to the group, that can assist the services by carrying out selected tasks, and that can notify services of key events.

The interoperation hubs used here will be structured around dynamic artifacts. These provide an holistic marriage of data and process, both treated as first-class citizens, as the basic building block for modeling, specifying, and implementing services and business processes. In the context of single enterprises, it has shown that the use of artifacts can lead to substantial cost savings in the design and deployment of business operations and processes, and can dramatically improve communication between stakeholders, especially in cases where they represent different "silos" of the enterprise or community. Artifacts can give an end-to-end view of how key conceptual business entities evolve as they move through the business operations, in many cases across two or more silos. As a result, artifacts can substantially simplify the management of "hand-off of data and processing between services and organizations. A key pillar of the ACSI research is to generalize the advantages of artifacts to the context of interoperation hubs and service collaborations.

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[6] A first realisation is the FRIS research portal (http://www.researchportal.be) to exhibit current research information on projects, researchers and organisations of the Flemish universities.

[7] http://acsi-project.eu/