8 Common Capabilities for Service Oriented Infrastructures – Grid and Cloud Computing

Theo Dimitrakos

8.1 Introduction

The mission of the BEinGRID project was to generate knowledge, technological improvements, business demonstrators and reference case studies to help companies and other organizations to establish effective routes to foster the adoption of Grid and Cloud Computing, which are often summarized under the term Service Oriented Infrastructures (SOI), and to stimulate research to help realize innovative business models using these technologies (for more details about the BEinGRID project see chapter 2). In terms of technology innovation, the BEinGRID team has analysed and classified the technical issues involved and the generic solutions developed by and for the Business Experiments (BE).

The technological advancements and innovations considered in the BEinGRID project have been categorized in thematic areas that were witnessed by BEs either significant challenges that inhibit widespread commercialization and adoption of the technology or where the anticipated impact of the innovation is particularly high. The technological innovation results were provided in different output formats: common technical requirements, common capabilities, design patterns, reference implementations, integration and validation scenarios as well as best practice guidelines.

This chapter presents the main common capabilities that capture the generic functionality that would need to be in place in order to address the identified technical and business requirements identified by the BEs. The required common capabilities have been categorized in the following thematic areas:

- Capabilities for Life-cycle management of Virtual Organizations help businesses establish secure, accountable and efficient collaborations sharing services, resources and information. These include innovations that enable the secure federation of autonomous administrative domains, and the composition of services hosted by different enterprises or in-cloud platforms.

- Trust & Security capabilities address areas where a perceived or actual lack of security appears to inhibit commercial adoption of SOI. These include solutions for brokering identities and entitlements across enterprises, managing access to shared resources, analyzing and reacting to security events in a distributed infrastructure, securing multi-tenancy hosting, and securing the management of...

1 In this chapter, the term Service Oriented Infrastructures (SOI) is used as a summarizing term for Grid and Cloud Computing.
in-cloud services and platforms. These innovations underpin capabilities offered in Virtual Organization Management and other categories.

- **Software License Management** capabilities are essential for enabling the adoption of Pay-As-You-Go (PAYG) and other emerging business models, and had so far been lacking in the majority of SOI technologies including Grid and Cloud computing.

- Innovations to improve the management of **Service Level Agreements** cover the whole range from improvements to open standard schemes for specifying agreements, to ensuring fine-grained monitoring of usage, performance and resource utilization.

- **Data Management** capabilities enable better storage, access, translation and integration of data. Innovations include capabilities for aggregating heterogeneous data sources in virtual data-stores and ensuring seamless access to heterogeneous geographically distributed data sources.

- Innovations in **Grid Portals** enable scalable solutions based on emerging Web2.0 technologies that provide an intuitive and generic instrumentation layer for managing user communities, complex processes and data in SOI.

In the remainder of this chapter, we provide an overview of the innovative technical capabilities identified and solutions produced, of the research challenges that were addressed, the commercial drivers that motivated the development of these solutions, and their anticipated business impact (i.e. their “innovation dividend”) based on the experience generated by the Business Experiments where these results have been validated.

### 8.2 Life-cycle management of virtual organizations

The following are often identified as the most significant recurring issues during the B2B collaboration life-cycle (Gridipedia 2009a):

1. The identification and selection of business partners (based on their reputation and the suitability of services that they offer) among an available pool of service providers or consumers.

2. The creation and management of a Circle-of-Trust among the selected partners.

The “VO Set-up” common capability offers a standards-based foundation for business solutions to these problems. This capability facilitates the identification and selection of business partners engaging in B2B collaborations, the creation of a distinct context for each of these collaborations, the creation and lifecycle management of a distinct Circle-of-Trust amongst the business partners involved in each collaboration, and the binding of each collaboration context with the corresponding Circle-of-Trust.

It is useful in typical B2B collaborative scenarios where participants (corporate users, services or resources) have to be identified and trust has to be established between them. A demand for including new participants can appear during the collaboration lifetime, and existing participants may be dropped. The security of