

# THE INCREASING ROLE OF SERVICE LEVEL AGREEMENTS IN B2B SYSTEMS

Philipp Masche, Paul Mckee, Bryce Mitchell

*Research & Venturing, British Telecommunications plc., Adastral Park, Martlesham Heath, Ipswich IP5 3RE, UK*

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Abstract: Service orientated architectures (SOA) will support a dynamic market in commodity services and enable business to drive down costs and respond faster and flexibly to changing markets. Virtualisation delivers similar benefits for the management of resources. If viable business models for the combination of these two technologies can be found, a true commodity grid can become reality. An essential principle of any viable business model will be to secure the flexibility for service providers to manage and provision services. The provider consumer relationship is encapsulated within a service level agreement (SLA). We propose that this SLA contains terms that only relate to business level objectives (BLO). Deployment and management details of a service are hidden by virtualisation in the provider's domain and therefore should not be expressed in the SLA. The SLA will become key to build confidence in the business relationship between provider and consumer and a differentiating factor between providers in a market place.

## 1 INTRODUCTION

The modern enterprise software industry is driven by a number of competing trends: cost reduction; faster application introduction; and faster reaction to changing markets. Monolithic applications are being replaced with modular Service Oriented Architectures (SOA) that can supply services on demand. The provision and consumption of services will become one of the key interactions between organisations. To enable rapid reactivity, resources and services need to be managed and provisioned in a dynamic and automated fashion. The management infrastructure is further complicated when services exist in different management domains.

To deal with this we rely on a management framework in which the confidence of the consumer is established through a contract with the provider of the service. Such contracts, commonly known as Service Level Agreements (SLA), set out the quality of service (QoS) and the terms and conditions that a consumer and provider of a service have agreed (Mitchell & Mckee 2005). The SLA also specifies how the service is priced and the compensation terms if the SLA is violated. In a service oriented computing landscape, every service needs to have a SLA.

Traditionally the QoS terms of a SLA focus on low-level technical attributes of the services. While technical minded service consumers understand the low-level aspects of a service, service consumers in general cannot be expected to understand this level of detail. They only need to know if the service meets their business needs, how to interact with the service and the terms the service is provided under. All of these terms need to be agreed and are therefore included in the SLA. The SLA must be expressed in terms much closer to the business than the technical requirements. At some point the terms of the SLA need to be mapped into the technical context of the service so that the service is provisioned and managed accordingly.

In this paper we discuss B2B service provisioning and argue that the service consumer should not have any visibility or control over the technical aspects of service provisioning and management. We highlight the value of excluding the technical aspects of a service from the SLA and why it is important to let the service provider assume responsibility for the mapping of the SLA into the technical context of service provisioning.

## 2 GRID SPECIFIC CHALLENGES

Although synergies between SOA and grids exist, major barriers to the use of these complementary technologies still remain. Perhaps one of the largest problems is finding viable business models for the use of resources and services in this new flexible architecture. SLAs for services could be the key mechanism to enable such viable business models (Mitchell & Mckee 2005). While traditional grids assume mutual cooperation between organisations, a commercially viable grid needs to be governed by SLAs to replace the assumption of cooperation. To be of use for commercial grids, SLAs need to address the needs of all stakeholders in the commercial relationship.

Another challenge in the commercial environment in having to cross organisational boundaries where the two parties may be competitors. This is a problem new to the grid and is neglected in many current grids. Competition influences what monitoring and management access a service consumer will get to a service. Hence, the structure of a SLA that addresses the needs of inter-organisational grid services will be different to that anticipated in the current grid community.

The Provider and consumer of a service need a mechanism to achieve a similar understanding of the meaning of the QoS terms contained in the SLA. Ontologies are increasingly proposed as a solution to this problem. We believe that a single ontology that covers all potential applications of SLAs will not exist any time soon, if ever. Domain specific ontologies exist in a number of industrial sectors such as banking and insurance. These ontologies are currently unlikely to converge and some of these are proprietary.

The field of semantics and ontologies is an area of great research activity. Whether there will be suitable ontologies for SLAs remains to be seen.

## 3 DIFFERENT VIEWS OF A SERVICE

There are two key motivations for a business to out-source service provision.

The benefit of using commodity services from another party is a reduction in cost due to the provider being able to take advantage of the economies of scale, and a reduction in the number of in house support staff required.

In the case of specialist services organisations benefit from access to services on an occasional basis that they could not afford to purchase under traditional business models. These new business models may include software as service or “pay-as-you-go” type pricing.

Both of these categories of services speed the development of new applications as resources are provisioned and deployed on demand by service providers.

In order for a service provider to deliver these benefits to the customer, he needs the flexibility to manage his resources to make improvements to efficiency and utilisation that give him a viable role in the value chain.

Such flexibility for the service provider is only achievable by reducing the technical detail that is exposed to the customer and their role in service management. Resource virtualisation creates a natural boundary between technical detail and service functionality. After all, the service provider is probably best placed to understand and manage the technical aspects of a service and the customer understands best the business context in which the service is being used.

When the operational aspects of the service are hidden by virtualisation, the business context in which a service operates will become the main source for requirements of the service. Therefore we propose that customers will look for services in terms of the business level objectives (BLO) they wish to fulfil.

Both the customer and the service provider have their own BLOs. The service provider’s BLOs include operating the service profitably. The customer’s BLOs were touched on earlier and may include cost reduction and responsiveness. Both the customer’s and the provider’s BLOs are commercially sensitive and are unlikely to be shared.

The common information that is shared between the two parties will be in the SLA. The SLA will be the binding contract that creates the business relationship. The BLOs of both service provider and customer will directly influence the content of the SLA.

Once the SLA has been agreed, it is the service provider’s task to see that the service is provisioned and managed according to the terms of the SLA.

The relationship and interactions between the customers and provider are firmly placed in the business space. The customer is not involved in these technical aspects of the service as the SLA provides the guarantees that should satisfy him.

In contrast to the customer, the service provider needs to understand the technical aspects of the service. In order to decide how to deploy provision and manage the service, the provider needs to consider two things: the terms of the SLA and his BLOs. From this he can derive the policies that are used to manage the service. These policies will form part of a policy-based management framework that uses event-condition-action type policies (Sacks et al 2003). Events originating from the service that need to be passed to the customer must cross the border between technical and business perspective at the service provider. To ensure that the customer understands the event, it must be placed into context. This context is encapsulated within the SLA and therefore events have to flow across the service provider's business space before they are passed on to the customer.

As all management activity of the service is hidden from the customer how can the customer be confident that the service provider is not violating the SLA terms? To answer this it is important to understand the SLA content.

A common error is too complex an SLA as discussed in (Twing 2005).

“Poorly structured SLAs can lead to interesting, problematic and unintended results. One common mistake is to create too many SLAs. This can dilute the effect of the critical few drivers that most affect the business.”

We therefore believe that the terms in a SLA need to be set in a business level language describing performance level guarantees that are directly linked to BLOs. Many of these will be perceivable by the customer during service consumption, but some may not. One way of solving this would mean to give the customer access to technical detail. We strongly believe that this should be avoided, as providers need to maintain the flexibility to provide services dynamically and efficiently utilise their infrastructure. Both of these are vital to ensure the provider has a viable business model. We believe that the customer needs to trust the service provider to be willing to enter a business relationship. Our proposed solution draws on existing industry practice of a rigorous auditing process.

By describing and offering services in business language it is easier to compare service functionality, especially for non-technical users. This comparability enables customers to “shop around” for best offers on similar services.

If the service consumer has the desire and technical understanding to set requirements against the

technical performance of the service, those requirements can be expressed in more technical terminology. However, the provider may impose extra conditions. As the provider has to give up some flexibility, it will cost more to provide the service. Secondly the provider might not provide an open view to the management information of his services but instead may filter the events passed on to the customer to maintain confidentiality. For example, the mere existence of an event may already disclose sensitive information to competitors.

SLAs will be used to manage the risk and expectations of both parties. They will become increasingly important if a market is to develop.

#### 4 CURRENT SLA SPECIFICATIONS

Within the GRID research community a number of efforts have been made to define the structure and content of SLAs. The two leading efforts within the web service community are WSLA (Ludwig 2003) and WS-Agreement (Global Grid Forum 2004). While each of the two incorporates some useful and necessary features of a SLA, neither of them expresses all that needs to be in a SLA.

Another interesting approach to create precise SLAs is SLAng (Lamanna et al 2003 & Skene et al 2004). A SLA in SLAng describes the two involved parties and the responsibilities of service consumer and provider. SLAng is designed for a specific scenario and contains fairly rich detail of the service and how it is run.

We believe the focus of a SLA needs to be the business objectives of the consumer.

The currently proposed SLA structures, WSLA, WS-Agreement and SLAng, are all too focused on the technical aspects of a service and do not attempt to cover the service's business aspects. We believe SLAs should also contain non-functional terms. These are important to build the business relationship with the customers and provide a differentiating factor between service providers.

The EU IST 6<sup>th</sup> Framework project NextGRID contains work in the area of SLAs. The current focus in NextGRID is on creating a representation of SLAs that contains both functional and non-functional terms.

## 5 CONCLUSIONS

The coming together of SOA and resource virtualisation can make the true commodity grid a reality. A remaining obstacle to this goal is the creation of viable business models for participants. SLAs could become the key mechanism to enable viable business models as they can replace the assumption of mutual cooperation that inhibits commercial adoption of grid.

Providing and managing services across organisational boundaries imposes some new confidentiality problems that are largely ignored in current grids.

For both, customer and service provider to exploit the benefits of outsourcing, the service provider needs to have flexibility in provisioning and management of his services.

We proposed to view the service from different perspectives that distinguish between the customer's and the service provider's view. The shared view is defined by the SLA and will principally contain business terms.

The service provider uses his business level objectives and the SLA to derive policies to provide and manage the service. Information to the customer about the service will flow in the form of events, which are placed into a business context before they are forwarded to the customer. This enables the customer to easily assess the business impact of any SLA violation, and thereby contributes to more realistic penalty agreements.

The structure and role of SLAs in a B2B system must allow for virtualisation of the providers resources. SLAs are only to be expressed in terms of BLOs. The SLA mechanism helps to manage the risks and expectations of both service provider and customer.

SLAs can enable comparison between services on business level and non-functional SLA terms and enhance the ability of service providers to differentiate their products.

Work under way within the NextGRID project is attempting to produce a mechanism that provides both a framework that builds confidence and allows providers to manage offers within a market place. It is hoped that this and other work in NextGRID will lead to an architecture that can support the viable business models for a commercial grid as identified in this paper.

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