DYNAMIC BUSINESS: AN OPPORTUNITY AND CHALLENGE FOR DYNAMIC WEB PROCESSES

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Abstract: Successful businesses adapt to changing market conditions and continually improve operations in order to deliver value to their customers, and earn a profit.   Such dynamic businesses require adaptable IT systems that support dynamic processes. Web Services provides a loosely coupled integration and coordinate mechanism that allows for dynamic processes, but by itself is insufficient.   By applying semantics and developing techniques for web-service discovery, composition, monitoring and recovery, our community aims to enable dynamic web processes.   Each of these aspects of dynamic web process lifecycle management has its own challenges and opportunity for significant impact. In this talk, I'll outline some of the key challenges and opportunities and describe some of the work that we at IBM Research are doing to address the challenges and incrementally take advantage of the opportunities to deliver value to IBM's customers.

Key words: Dynamic Business, Web-Services, WSDL-S, Web-Service Supply-Chain

1.   INTRODUCTION

Services comprise an ever increasing proportion of the world economy, and businesses are competing to efficiently deliver the services that their customers want. Unlike many physical products, with long design and manufacturing lead times, services by their nature tend to be more flexible and more responsive to changing demands of the marketplace.   For example, an insurance company can begin selling *identity-theft insurance*, soon after developing the concept, without the need to ramp up production. The ability to quickly develop and offer such services gives a business a

competitive advantage. IT consulting companies seek to enable rapid service delivery by creating the right business processes and IT infrastructure. IBM's *On Demand Business* and HP's *Adaptive Enterprise* are just two examples of such efforts.

The challenge for us in the technical community is how to evolve an IT infrastructure to meet the business needs and enable rapid deployment of new services. Web services are part of the answer. They provide a loosely coupled integration mechanism that is independent of the technology used for implementation. The web service standards are also progressing to support technical requirements, like security, privacy, non-repudiation and transaction integrity. But is this sufficient? I contend that in order to fully participate in the business process associated with the service life cycle, a web service needs to provide a rich set of meta-data to satisfy both functional and non-functional requirements. This is not to say that such meta-data will allow complete automation, but that such data is needed and it is best to associate it with the web service in a machine readable form rather than as text documents.

In the following sections, I outline some of the key challenges and observations for using semantics to enable dynamic web processes.

2.   SERVICE DELIVERY, NOT WEB SERVICE DELIVERY

It is important, but difficult for IT professionals to remember, that web services are a communications and coordination mechanism and, in most cases, not the means for delivering services. Amazon web services[1] provides methods for ordering books, checking the status of orders and providing payment information, but the content of the books is not delivered via web services. The flows of goods and money compliment the flow of information to enable delivery of a service. At the same time, web services are not sufficient to satisfy all communications and coordination needs. Out of band channels, such as email and telephone may be required to negotiate access and resolve problems. The meta-data for a web service needs to indicate how the service relates to the flow of money and goods and provide the email addresses and phone numbers needed for out of band communications.

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[1] http://www.amazon.com

3.   PROVIDE INCREMENTAL VALUE

Web services are being adopted because their loosely coupled integration provides value, even though the implementations and standards don't yet provide the full functionality that the WS standards efforts envision. To be successful, the semantic web-service community needs to provide the same kind of incremental value. The WSDL-S proposal [1] is one effort to provide such incremental value. It builds on the current industry specifications and provides a clean mechanism for providing relevant meta-data. Similar efforts are needed to enable semantic meta-data for processes and non-functional aspects of web services which are covered by BPEL4WS and WS-Policy specifications.

4.   BUSINESS PROCESSES FOR WEB SERVICES

The decision to use a service, provided through web services, is a business decision and not a technical decision. The process of identifying a service, negotiating access rights and performing due diligence is itself a business process. This process can be made more efficient if the web service infrastructure offers the kind of meta-data required by this process. For example, a service interface should provide a web service for requesting access the service that the web service interface enables. Such services would be crucial to speeding up the on-boarding of new suppliers and customers.

5.   THE WEB SERVICE SUPPLY CHAIN

The web service infrastructure functions as an IT supply chain, where the services provided by one business depend on the services offered by its suppliers. As in a conventional supply chain, the trading partners need to signal intent and capabilities on an on-going basis. Just as an auto-assembler needs to share its production schedule with its suppliers in order enable just in time delivery, a web service consumer needs to signal anticipated changes in demand for capacity. Similarly on the supplier side, an auto supplier would let the assembler know if parts were not available in sufficient quantities. A web service provider nearing capacity should signal its customers to enable them to deal with the shortage and reduced demand by shifting to other sources or delaying requests.

6.   WEB SERVICE INSTANCES VERSUS IMPLELEMTATIONS

Most discussions of a web service life cycle revolve around the deployment or the use of a service that is deployed as a single (logical) instance.   A web service infrastructure can also support the dynamic selection and deployment of software components that offer web services interfaces.   The meta-data about the component's web service interface and non-functional specifications are used to select the component. It provides a mechanism for large scale code reuse, even if the same service instances can't be reused.

7.   RIGHT LEVEL OF DESCRIPTION

Generating, maintaining and processing web-service meta-data entails costs, which can be justified by the value that the meta-data provides. But not all meta-data provides sufficient value to justify the associated cost.   For example, it might be desirable to encode a simple or simplified service level agreement as meta-data while the complete contract or license is only available in human readable form.

8.   REFERENCES

[1] Web Service Semantics - WSDL-S Technical Note; Version 1.0, April, 2005, Rama Akkiraju, Joel Farrell, John Miller, Meenakshi Nagarajan, Marc-Thomas Schmidt, Amit Sheth, Kunal Verma.