

**CHALLENGES WITH USING BPEL – REVISED MARCH 17, 2006**

**A WHITE PAPER**

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### EXECUTIVE SUMMARY

BPEL is a tool offering enterprises the ability to streamline and rethink existing business processes. However, like all tools, it has its challenges. This paper outlines for executives the potential challenges that need to be addressed when implementing BPEL.

The revised edition of this paper takes into account the work done by Anis Charfi and Mira Menzi of the Software Technology Group at the Darmstadt University of Technology and their recommendations on an extended BPEL framework for addressing BPEL properties relating to security, reliability and quality of service.

### INTRODUCTION

BPEL, the Business Process Execution Language, is a powerful protocol. It allows enterprises to streamline their business processes by using web services. Web services use XML and TCPIP. These two technologies offer the ability to avoid having to:

1. Code API's for communicating between different applications –XML provides the standardized communication.
2. Avoid the problems with the underlying operating system – TCPIP runs above the network operating system layer.

Web services also use protocols relating to the security of the communication and the XML documentation (WS-Security). This offers enterprises ways to standardize security in business processes.

BPEL with web services therefore offers enterprises a way to leverage their existing legacy applications without having to change them out of their business processes. This is a powerful tool.

However, while I have written several papers on the powerful advantages of BPEL, there are some challenges with using BPEL and other areas where an enterprise shouldn't use BPEL. These include:

- Orchestration versus Choreography
- Not all processes are web services
- Modularization and reuse in BPEL
- Not all processes should be converted to BPEL
- Security
- Operationalization

### ORCHESTRATION VERSUS CHOREOGRAPHY

BPEL coordinates web services actions. The industry word for this is “orchestration”. In business processes where the process is extremely complicated, with lots of different partners in the process and, much back and forth interaction, each requiring previous pieces of the business process to be completed and specific actions required if they’re not completed, BPEL on its own is not enough.

Business processes like this, commonly found in the financial services industry, need to be:

- Mapped out on a peer to peer basis
- Information type needs to be defined for each portion of the business process
  - Document type
  - Token
  - Locator
- Participant relationship defined
  - Role
  - Relationship
- Information driven collaboration defined
  - Channel
  - State
  - Activity
  - Rules
  - Behavioural interactions defined – Choreography

A protocol for doing this has been defined in W3C called Web Services Choreography Description Services (WS-CDL). Choreography is completely complimentary to orchestration provided by BPEL.

WS-CDL will likely be approved by the summer of 2006. Therefore, if your business processes are multiparty, with lots of critical interactions requiring specific state actions, you must use WS-CDL tools first before embarking on BPEL. By doing so, you can discover portions of the business process that may fail before you actually build out the BPEL infrastructure.

### **NOT ALL PROCESSES ARE WEB SERVICES**

BPEL uses web services. Therefore, for those applications that can use XML and be easily converted to web services, BPEL is excellent. BPEL is an orchestration language, not a programming language.

There are many portions of a business process where actions must be taken requiring Java or .net code to be used. Examples include:

- Business function logic
- Loop conditions
- Branching conditions
- Variable initialization
- And much more

IBM and BEA proposed an extension of BPEL for Java in March 2004. Their intention was to create standards for extensions to BPEL for programming in Java called “BPELJ”. In the next BPEL release by OASIS, BPEL 2.0 there is supposed to be coordination with BPELJ. However, this is not yet approved.

Therefore, the existing BPEL vendors have adopted their own interpretations of BPEL extensions. You may find there are incompatibilities between different vendor’s BPEL outputs. Therefore, when your enterprise is interacting with other BPEL processes designed by other enterprises, using different vendors, you could possibly run into problems with different BPEL extensions.

As a side note, since business processes often involve non-web service components, the choreography of this must also address the non-web service components. WS-CDL can also work with non-web service components.

### **MODULARIZATION AND REUSE IN BPEL**

In many business processes, there is a initiating process (parent process) that delegates to sub-processes (child process). Child processes are frequently modularized to foster reuse of the processes within large business processes.

Child processes are typically tightly coupled to the parent process. If a parent process is terminated, the child processes must be terminated too.

Within BPEL, there is no mechanism to establish the lifecycle dependency of parent and child processes. Therefore, it cannot be ensured that the sub-process, which is exposed as a web service, will be terminated if the parent process terminates.

Currently, different BPEL vendors have taken their own approach using customized extensions to address this problem. IBM and SAP submitted a white paper in September 2005 to OASIS recommending extensions for sub-processes “WS-BPEL Extension for Sub-Processes – BPEL-SPE”.

## Challenges With Using BPEL - Revised March 17, 2006

These recommendations, to the best of my knowledge, will not be included in BPEL 2.0. Therefore, it is likely it will take some time for them to be debated and approved. Caution should therefore be used when developing customized extensions in your business processes to address this challenge.

### SETTING PROPERTIES FOR SECURITY, RELIABILITY AND QUALITY OF SERVICE

Within BPEL there are three activities for web service interaction:

- <invoke>
- <reply>
- <receive>

Each of these activities results in message interactions between the web services. What is currently missing in BPEL is the ability to define properties for activities of the interactions relating to confidentiality, integrity, privacy, authentication, authorization, etc. BPEL specifically lacks a framework to address:

- Persistence
- Security
- Reliable Messaging
- Distributed Transactions

I reference readers to two excellent white papers and a poster produced during 2005 by Anis Charfi and Mira Menzi of the Software Technology Group at the Darmstadt University of Technology:

- [“An Aspect Based Container for BPEL”](#)
- [“Middleware Services for Web Service Compositions”](#)
- [“Using Aspects for Security Engineering of Web Service Compositions”](#)

In the papers, they propose that the BPEL framework be extended to include:

- Security service
- Process Container
- Deployment descriptor

### Security Service

The security service they propose is “a middleware web service that provides operations to secure the interactions of the BPEL process with its partners and clients. This service provides functionality that is used by the web service orchestration engine to authenticate, give integrity, prevent repudiation, or make BPEL activities confidential. The security service is based on WSS4J, an open-source implementation of the web service security standard WS Security.”

### **Process Container**

This component “wraps BPEL processes and transparently provides security support to them. The process container is implemented as a set of aspects that are specified in AO4BPEL, an aspect-oriented extension to BPEL offering more modularity and adaptability.”

### **Deployment Descriptor**

The deployment descriptor “specifies the security requirements of the process activities along with the certificate, keys, and other security-related artifacts.”

The authors use an example of a car manufacturer integrating its business processes via web services with a supplier and a bank. The example illustrates the current weakness of BPEL and presents the author’s solution to the problem.

I’m not aware of any formal submission to OASIS for this proposal.

### **NOT ALL BUSINESS PROCESSES SHOULD BE CONVERTED TO BPEL**

While the lure of leveraging legacy applications using BPEL is very strong, there must be a cost benefit calculation done for each business process. In some instances, where there will be many interactions with non-web service applications, and therefore lots of customized coding required, the business case may not justify the expense.

BPEL does not solve world hunger. It is a powerful tool able to offer enterprises new ways to streamline their business processes. However, it does not solve all business process problems.

### **SECURITY**

Converting your business process to web services is alluring. However, if not properly implemented, you may be opening up your enterprise to new forms of risk and/or attacks. In other white papers I’ve written, I have said that BPEL needs to be integrated into the IAM (Identity and Access Management) and DRM (Digital Rights Management) infrastructure in your enterprise.

You need to ensure that adequate security policies defined in the IAM are executed in WS-Security protocols and enforced at the enterprise enforcement points. Without doing this, you are creating new forms of enterprise risk with no mitigation!

### **OPERATIONALIZATION**

Deploying web services for business processes requires several components on the web services in order to effectively operationalize them:

1. Service level agreements
2. Operating level agreements
3. Monitoring on the web services
4. Well trained support staff to quickly deal with problems
5. Governance on change management to the BPEL process

These need to be well addressed in the early planning stages of the BPEL project. The actual web service can often be quickly deployed. However, putting in place the infrastructure to support it can be either overlooked and/or take much more time.

## Challenges With Using BPEL - Revised March 17, 2006

### CONCLUSION

Mid to large enterprises need to deploy WS-CDL in addition to WS-BPEL. They are both complimentary to each other and both are essential pieces for re-engineering business processes.

BPEL extension customization needs to be carefully thought out. It may bring you grief down the road if one vendor has done the customization differently than you have. Watch OASIS for new coordinating standards for BPELJ and for BPEL-SPE. Also begin to lobby OASIS for extensions to BPEL allowing for BPEL security, reliability and quality of service. Make sure your vendor is a participant in these discussions. Plan for changes to your BPEL code down the road as these new protocol standards emerge.

Don't try and "BPEL-ize" all your business processes. While it is applicable to many processes, there will be some where the business case does not cost justify it.

Get on top of the security piece. This needs the business unit owners to help define the risks with the IT and Security people translating this into security policies that are executed all the way through the enterprise.

Finally, also address the operationalization pieces of deploying web services. You don't want to create a beast that craters; costing the enterprise money, lawsuits and loss of face. Instead you want to create successful business processes and services, reducing costs and offering new secure ways of doing business.

Please refer to other papers addressing the benefits to specific enterprise roles and illustrative examples of BPEL:

- ["Six Reasons the COO Should Be Interested in BPEL, IAM and DRM"](#)
- ["Rethinking Corporate Counsel Business Processes – An Example"](#)
- ["Five Reasons Why Corporate Counsel Should Rethink Their Business Processes"](#)
- ["Saving Operating Dollars Using BPEL, IAM and DRM"](#)
- ["Rethinking HR Business Processes"](#)
- ["Five Reasons Why VP Sales Should Be Rethinking Their Business Processes"](#)
- ["VP Sales – Rethinking Business Process Examples"](#)

### ABOUT THE AUTHOR:

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