

Systems Integrator Use Case

2007 Comparative Assessment Methodology Process for BPEL

*Review of BPEL Tools Using a Requirements-Driven,
Capabilities-Based Technology Selection Process for Defense
Applications*

Project

Methodology for requirements-driven, capabilities-based technology acquisition.

Systems Integrator

Scientific Research Corporation (SRC)

Industry

Federal Government
Defense Application

Country

USA

Systems Integrator Profile

Scientific Research Corporation (SRC) is an advanced electronic engineering company that was founded in 1988 to provide innovative solutions to the U.S. Government, international markets, and private industry. SRC's business activities focus on a broad range of network, wireless communication, information, intelligence, and sensor systems. With corporate headquarters in Atlanta, Georgia, and engineering offices located across the U.S., SRC provides a full range of engineering, integration, testing, and support activities.

Project

Under contract with Space and Naval Warfare (SPAWAR) Systems Center Charleston (SSC-C), SRC developed a methodology for requirements-driven, capabilities-based technology acquisition. The methodology was developed in response to requirements from SSC-C, National Institute of Justice (NIJ), Department of Homeland Security (DHS), and the Critical Infrastructure Protection Center (CIPC), with the primary objective of insuring consistency and rigor in the technology acquisition lifecycle.

Based on the analysis, the CIPC chose Active Endpoints' ActiveBPEL® over Oracle® BPEL Process Manager, Parasoft® BPEL Maestro™, Microsoft® BizTalk® Server and BEA WebLogic® Server.

Methodology Benefits

- Repeatable process to identify, rank, select and evaluate tools, technologies and processes against agency-defined needs and requirements.
- Metrics to measure operational capabilities produced based on agency priorities.
- Framework for refining and validating product selection based on a structured process for identification, selection and evaluation designed to meet agency needs.
- Option to fine-tune the process to meet the needs of specific agencies, facilities and organizations.

1. Overview: Methodology for Technology Selection

As described below, the process uses the comparative assessment methodology (CAM) developed by SRC to assess tools, technologies, and processes for use by Federal, State and Local agencies. Figure 1 depicts the methodology and process flow, which has been applied across several programs at SSC-C with great success.

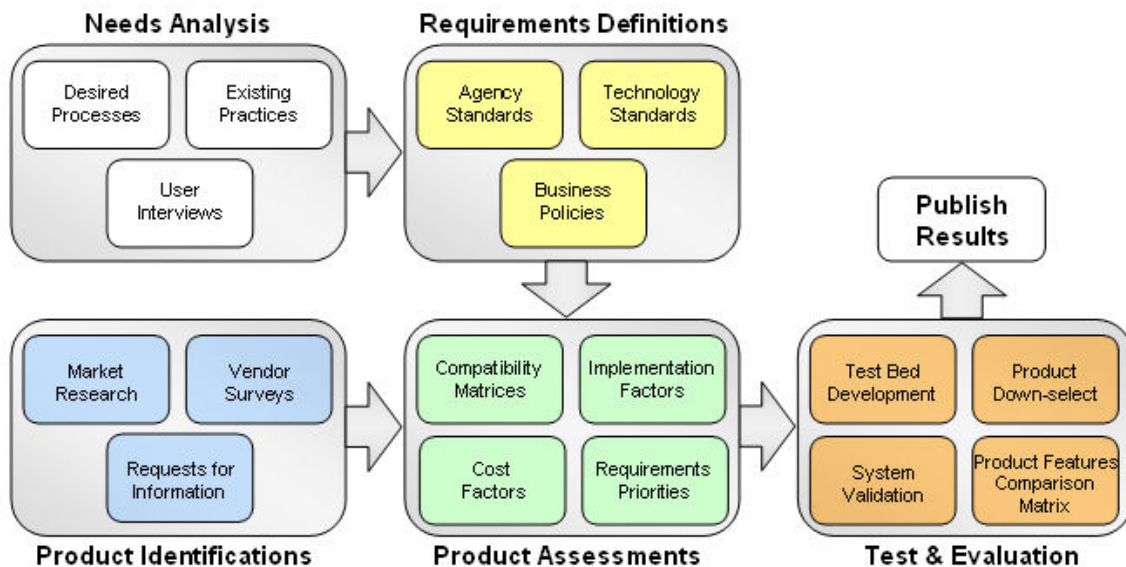


Figure 1 – Comparative Assessment Methodology

2. Critical Infrastructure Protection Center (CIPC) Case

2.1 BPEL-specific requirements for Web service orchestration

The CIPC case identified functional requirements and capabilities through a needs analysis with the South Carolina National Guard end-user community, a CIPC development team, and a System Security Engineering team. This analysis identified the need for Web service orchestration that included the following capabilities specific to the BPEL standard: (*note: partial list of functional requirements*)

- Orchestration must be standards based: BPEL
- BPEL design suite must have step debug capability
- BPEL design suite must support external Web service authentication
- BPEL engine must support the Global Justice XML Data Model (GJXDM) and National Information Exchange Model (NIEM)
- BPEL engine and designer must be platform and application server independent

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In addition to weighted analysis, some requirements may be considered “must-haves.” In the CIPC, must-haves included platform independence and use of the BPEL standard. Using the capability and requirements process, the CIPC team also conducted a market survey to identify Web service orchestration tools and technologies that met one or more of the identified elements. This included but was not limited to the following candidate products:

- Active Endpoints’ ActiveBPEL Designer and Enterprise Server
- Oracle BPEL Process Manager and JDeveloper
- Parasoft BPEL Maestro
- BEA WebLogic Business Workflow
- Microsoft BizTalk Server

Upon completion of the Functional Capabilities and Requirements related to BPEL, the needs assessment team developed the derived requirements list. This included features and requirements to be assessed against candidate technologies.

2.2 Use of methodology to review technology candidates

In order to begin the specific product evaluation process, the next step was creation of a feature comparison matrix to establish a binary measure (yes/no) of whether the technology supported the feature or requirements. Using a binary measure produces a rank ordering of the technologies, from which a subset may be selected for trial or demonstration. In the CIPC case, Oracle, Active Endpoints and Parasoft were selected for detailed internal assessment by the engineering and analysis team, while WebLogic and BizTalk were eliminated based on of the need for the BPEL standard and platform independence, respectively.

When the list of candidate technologies and relevant features and requirements is large, a ranking of the features and functions must be done. To accomplish this, the CAM uses the statistical pair-wise comparison technique to produce the feature and requirements weights (Figure 2). Then a simple product sum may be done to determine the weighted score of the products in a product comparison matrix or chart (Figures 3 and 4).

	Requirement1	Requirement 2	Requirement 3	Requirement 4	Requirement 5
Requirement1		0.2	0.2	0.2	0.2
Requirement 2	5		0.3	0.3	0.3
Requirement 3	5	3		1	1
Requirement 4	5	3	1		0.2
Requirement 5	5	3	1	5	
Weight	1	0.46	0.125	0.325	0.085

Figure 2 – Example Pairwise Comparison Weights

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	Feature 1		Feature 2			Sum
	Requirement 1	Requirement 2	Requirement 3	Requirement 4	Requirement 5	
Weight	1	0.46	0.125	0.325	0.085	
Product 1	X		X	X	X	1.535
Product 2		X				0.46
Product 3		X	X	X		0.91
Product 4	X	X	X		X	1.67

Figure 3 – Example Product Comparison Matrix (Weighted)

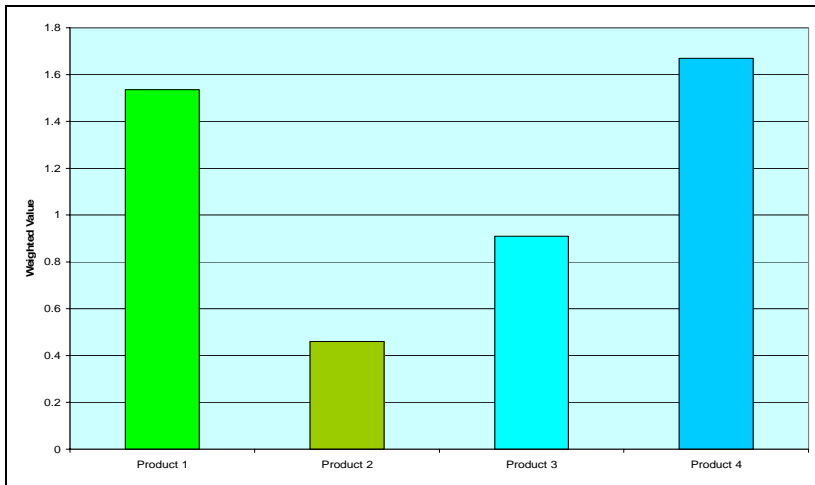


Figure 4 – Example Analysis Output: Product Comparison Chart

Finally, the CIPC conducted an assessment of top three BPEL compliant tools and technologies from the product comparison matrix using the features and requirements derived from the functional capabilities and requirements for the test cases. The test cases were then executed by the Development team for those features and requirements relevant to the BPEL Design, Test and Deployment Capability and by the System Administration Team for those features and requirement pertaining to the security and administration of the server components.

After completing the product assessments, results were tabulated. After tabulation, the final criterion applied was a total-cost-of-ownership calculation. For this, vendor cost models were combined with agency team estimates from for development and maintenance costs.

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These estimates were based on the CIPC BPEL and Services Based Architecture project plan and included the following:

- Work Breakdown Structure to estimate each resource cost over the project lifecycle.
- Vendor support and annual maintenance costs over time
- A reasonable margin for error in calculations.

2.3 Results of CAM: Selection of ActiveBPEL

Two products were eliminated early in the analysis. Because the CIPC's must-haves included platform independence and use of the BPEL standard, these requirements eliminated Microsoft's BizTalk and WebLogic's Business Workflow solutions. Based on detailed analysis of the remaining products, the CIPC chose Active Endpoints' ActiveBPEL Designer and Enterprise Server over the Oracle BPEL PM, and Parasoft BPEL Maestro for the BPEL implementation in the CIPC.

3. BPEL in DoD Applications

By following the BPEL standard, the choice of which BPEL engine to use should not affect interoperability of the orchestrated services or the reuse of the BPEL models or designs. As DoD moves toward Net Centricity and Services-Based and Service-Oriented Architectures (SOAs), the use of BPEL for composition and orchestration of those services will be increasingly important.

The question is often posed: "Why BPEL for Command, Control, Communication, Computers, Intelligence Surveillance and Reconnaissance (C4ISR) and net-centric applications," when BPEL is a business process or workflow execution language. As DoD moves toward the net-centric environment where content is discovered and delivered using Web services in a Services-Based, or Service-Oriented Architecture, the need to organize and orchestrate the collection of services into a composite application dictates a departure from traditional application development. The BPEL standard provides the necessary mechanisms by which Web services (both data services and graphical user interface (GUI) services) can be composed or orchestrated to deliver the right content within the context of the user's desired Common Operational Picture (COP).

The C4ISR information required by the soldier in the field is decidedly different from that of the Battalion or Brigade Commander, yet both are derived from the same federated data sources and services. As it does for business logic execution, BPEL provides a common, standards-based language by which content can be delivered in a net-centric environment based not only on the user's request, but based on the user's context or role. **Using BPEL helps achieve the ultimate goal of C4ISR: actionable intelligence based on the situation.**