

## ebXML and Federated Enterprise Reference Architecture (EFERA)

Goran Zugic, Chief Architect, ebXMLsoft Inc. • July 21, 2003

### Summary

Technology-driven business integration among organizations interested in doing business together faces many challenges. Some of the most critical include,

- Commonly accepted standard/approach for business collaborations
- Isolated proprietary local systems
- Lack of business processes and technology for integration with partners

A single standard or approach will not readily resolve these and other related issues. However, some standards and approaches are emerging that promise a better future for resolving technology-based challenges to effective business collaboration.

A sophisticated solution must address both simple and complex business collaboration scenarios. Such a solution has to be based on a reliable technology. Through the collaborative process, critical business data is transferred over the Internet and these transfers must be secured. Today's business platforms, especially UNIX in combination with J2EE, support reliable environments that have already been implemented in many industries. But the growth of collaboration poses a key issue: An effective solution must scale easily as volumes grow. Also, a solution must allow an organization of any size to participate in the business collaboration process.

The Federated Enterprise approach<sup>1</sup> with the ebXML standard (electronic business using eXtensible Markup Language)<sup>2</sup> provides a way to meet these challenges. The ebXML and the Federated Enterprise Reference Architecture (EFERA) approach and standard combination offers a sophisticated, reliable, secure, scalable, and flexible infrastructure for business collaboration.

### ebXML Powers Federated Enterprise Reference Architecture

ebXML combined with the powerful capability of Federated Enterprise Reference Architecture offers a framework for managing business collaboration across several autonomous organizations. The main EFERA components incorporate,

- Local business systems of participating organizations integrating their business logic, data, and communication with the outside world
- An open standard interoperability gateway
- *A Federation Server with Collaborative Event Handler, Agents, Collaborative Intelligence Engine, Portal, and Choreographer Tools*

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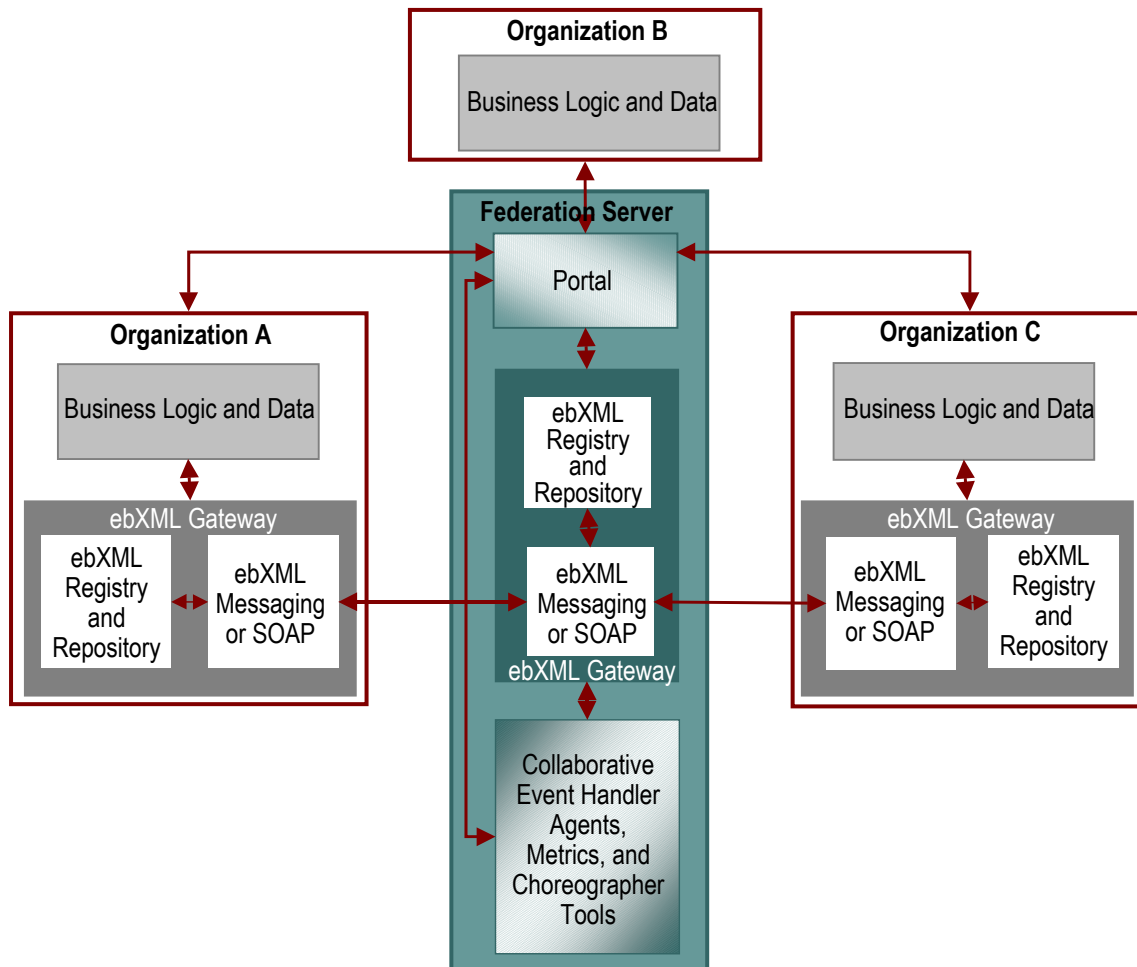
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Figure 1: EFERA



In EFERA, all participants implement and maintain their own IT systems. This approach protects current technology investments and enables participants to maximize the use of the technology and processes that reflect their particular business information.

Because of the autonomy of the participants, each needs a non-proprietary interoperability gateway. This gateway has to be based on an open standard that will enable a reliable and scalable registry, repository, and communications interface with the *Federation Server*. Each participant also needs a registry and repository to publish standard meta-data and business documents that relate to its internal data and processes. Beyond this, a messaging component is called for that will enable secure and reliable communication with a *Federation Server*.

ebXML, a modular suite of specifications, enables enterprises of all sizes to conduct business globally over the Internet. Development of the ebXML specifications is sponsored by OASIS and the United Nations Centre for Facilitation of Practices and Procedures for Administration, Commerce, and Transport (UN/CEFACT). According to a document<sup>3</sup> that presents details about ebXML adoption, more than fifty ebXML-related projects currently exist worldwide. Industry groups, sectors and government entities are deploying new ebXML-based collaborative applications that serve as benchmarks in global ebXML adoption.

ebXML's standard components – ebXML Registry and Repository<sup>4</sup> and ebXML Messaging<sup>5</sup> – represent an ideal candidate for an open standard that will support interoperability for the *ebXML Gateway*. When higher levels of security and reliability are not required, the ebXML Messaging component can be replaced with a SOAP-based component.

ebXML provides a standard method to:

- Publish business processes
- Exchange business messages
- Conduct business collaborations
- Communicate data in standard terms

ebXML with its modular set of specifications covers all key aspects of a business collaboration:

- Business semantics
- Collaboration terms and conditions
- Interoperability
- Security and privacy
- Reliability

The most important piece of the whole business collaboration puzzle is a standardized, reliable, secure method to reach information easily.

Two types of standardized business information are supported by the ebXML standard:

- Meta-data
- Business documents

Meta-data is stored in an ebXML Registry, which businesses can draw upon to publish and classify information about their products and services. Users also employ an ebXML Registry to search for potential partners. Business documents (UBL, xCBL, CPP, CPA,

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etc.), which define entities and processes, are stored in standard formats in an ebXML Repository. In addition to defining business entities, the XML documents also formalize their formats by UBL, xCBL, CPP, CPA, and other XML document-related standards. ebXML Messaging extends SOAP messaging by adding a layered framework that supports higher levels of security and reliability.

With regard to the interoperability gateway, the main question remains: *Can all participants afford an open standard interoperability gateway that will connect their internal systems to the outside world in a repeatable and scalable fashion?*

The answer depends on the number and the complexity of the participants' products and/or services. Obviously, a large organization will need a scalable, secure, and reliable gateway to enable the publishing of internal data and processes necessary for federated collaborations with potential partners. In such a case, the participating organization will use its locally maintained ebXML gateway. Otherwise, small organizations that cannot afford the gateway should be able to use a gateway either from the *Federation Server* provider or from another *ebXML Gateway* provider.

A *Federation Server* uses an open meta-schema to model collaborative events. Meta-schema models are stored in the *ebXML Registry and Repository*. Using ebXML as a standard for the *Federation Server Repository* guarantees full open interoperability for future integrations and extensions. It also minimizes vendor and platform dependencies. The *ebXML Registry and Repository* provides a sophisticated meta-data information model<sup>6</sup> with a repository extension that enables publish and search operations that cover stored business information.

A *Portal* enables a web-based user interface to the *Federation Server*. Participants can use it to publish and search for collaborative data, configure their collaborative processes, check the status of a collaboration, etc. A *Collaborative Event Handler* controls collaborative events and preserves their transition states and integrity. An *Agent-Based Framework* is used to configure event triggers and data exchange between the *Federation Server* and local *ebXML Gateways*.

A *Collaborative Metrics and Reporting Engine* logs the progress of collaborations and collects the information used for detailed collaboration analysis (overall system response, system errors, etc.). *Choreographer Tools* are used by *Federated Administrators* to manage collaborative business scenarios, meta-schema configurations, security, integrations with *ebXML Gateways*, etc.

## EFERA Collaborative Scenario

A federated collaborative scenario supported by EFERA proceeds along the following steps:

1. Each participant publishes the internal data required for business collaboration to an *ebXML Gateway's Registry and Repository*.

If an organization uses its own *ebXML Gateway*, internal data is published to the organization's own *ebXML Gateway*. The organization also registers its gateway in the *Federation Server's ebXML Gateway Registry*. The *ebXML Registry and Repository* supports a federated registry option that enables a registry and repository data search across many *ebXML Registries and Repositories*. Organizations A and C in Figure 1 (page 2) provide their own *ebXML Gateway*. All products and services of the participating organization are registered in this step. Their definitions are created using PDX (Product Definition eXchange) or another product definition standard and stored in the *ebXML Registry and Repository*.

If an organization does not use its own *ebXML Gateway* and if it does not need additional systems integrated with *ebXML Gateway*, it will publish its internal data to the *ebXML Gateway* supplied by the *Federation Server* provider or another provider with whom the *Federation Server* provider has an exclusive agreement. Organization B in Figure 1 uses *Federation Server Portal* to access its *ebXML Gateway* and other components that provide end-user interfaces.

When participants use their own *ebXML Gateways*, the *ebXML Gateway* of the *Federation Server* provider will communicate with the gateways of the participants through ebXML Messaging or SOAP Messaging. Both of those XML-based messaging standards are supported by the specification for the *ebXML Registry and Repository* standard. The *Federation Server* itself communicates with its *ebXML Gateway* either by ebXML Messaging, SOAP, or another internally supported communication layer.

2. The *Federation Server* hosts open meta-schema models for collaborative events. Any participant who wants to publish and/or subscribe to a set of collaborative events must understand the meta-schema design that will be used in a collaboration. In this step, a collaborative meta-schema is defined. A "publish and subscribe" protocol is also configured for each participant. Once the entity schema is exposed, *ebXML Gateways* can connect using ebXML Messaging or SOAP. The participants must also register themselves in the *Federation Server ebXML Registry and Repository*, which governs security, access rights, and some other basic profile maintenance-related requirements. As soon as this step is complete, the participants will be able to start using *Federation Server* services.

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3. The third step involves the adoption of a collaborative workflow. EFERA does not include any prescribed collaborative workflow. All participants need to publish a *Collaboration Protocol Profile (CPP)*,<sup>7</sup> which includes information about their proprietary data, the quality of the data, internal policies and security procedures, the use case to the potential partner they want to address, etc. Using a *Collaboration Protocol Agreement (CPA)*,<sup>8</sup> both parties will agree on the final form of the use case, and determine the data required for collaboration. Both *CPP* and *CPA* (that are specified by ebXML) will be stored in the *ebXML Registry and Repository*.

Once these three steps are completed, participating organizations will finalize a collaboration adoption plan that will define:

- The roles of all participants
- Event triggers
- Data exchange scenarios between *ebXML Gateways* and the *Federation Server*
- Feedback reports and change logs for collaboration

At this point the EFERA system is ready to serve all participants in previously defined collaborative business scenarios.

## Final Thoughts

EFERA offers a reliable, secure, scalable, and flexible solution for serving complex business collaborative scenarios in many industries. Based on solid technology platforms (UNIX, J2EE, etc.), it will provide an efficient system for business collaborations in years to come.

### ***About the Author***<sup>9</sup>

*Goran Zugic is a co-founder of ebXMLsoft (<http://www.ebxmlsoft.com>). He is a chief architect for the ebXMLsoft eBusiness integration software platform based on the ebXML standard and J2EE. He has more than 17 years of experience in architecture, design, and implementation of Internet applications, ERP applications, and large database management systems.*

# ebXML and Federated Enterprise Reference Architecture (EFERA)

July 18, 2003

- <sup>1</sup> See: *Federated Enterprise Offers a Breakthrough for Supply Chain Collaboration*, D.H. Brown Associates, Inc., February 2003.
- <sup>2</sup> See: *Technology Trends*, "ebXML and UBL – Filling the Holes in Web Services to Solve High-Value Business Collaboration Problems," D.H. Brown Associates, Inc., March 11, 2003; *How ebXML Will Transform the Software and Services Industry*, Jenz and Partner, 2002 (<http://www.jenzundpartner.de/Publications/ST/ST-EXTS/st-exts.htm>); David Longworth, *Loosely Coupled*, "Sending an Unmistakable Message," Procullux Media Ltd., 2003 (<http://www.looselycoupled.com/stories/2003/message-infr0528.html>).
- <sup>3</sup> See: *ebXML Adoption Update*, OASIS ebXML Awareness Team in collaboration with OASIS member organizations and UN/CEFACT partners, March 2003 ([http://www.ebxml.org/ebxml\\_jmt/documents/ebxml\\_adopt\\_march03.pdf](http://www.ebxml.org/ebxml_jmt/documents/ebxml_adopt_march03.pdf)).
- <sup>4</sup> See: *OASIS/ebXML Registry Information Model Specification*, OASIS/ebXML Registry Technical Committee, December 2001 (<http://www.oasis-open.org/committees/regrep/documents/2.5/specs/ebxml-2.5.pdf>); *OASIS/ebXML Registry Services Specification*, OASIS/ebXML Registry Technical Committee, December 2001 (<http://www.oasis-open.org/committees/regrep/documents/2.5/specs/ebrs-2.5.pdf>).
- <sup>5</sup> See: *Message Service Specification*, OASIS/ebXML Messaging Services Technical Committee, April 2002 (<http://www.ebxml.org/specs/ebMS2.pdf>).
- <sup>6</sup> See: *OASIS/ebXML Registry Information Model Specification*, OASIS/ebXML Registry Technical Committee, December 2001 (<http://www.oasis-open.org/committees/regrep/documents/2.5/specs/ebxml-2.5.pdf>); *OASIS/ebXML Registry Services Specification*, OASIS/ebXML Registry Technical Committee, December 2001 (<http://www.oasis-open.org/committees/regrep/documents/2.5/specs/ebrs-2.5.pdf>).
- <sup>7</sup> See: *Collaboration-Protocol Profile and Agreement Specification*, OASIS/ebXML Collaboration Protocol Profile and Agreement Technical Committee, September 2002 (<http://www.ebxml.org/specs/ebcpp-2.0.pdf>).
- <sup>8</sup> See: *Collaboration-Protocol Profile and Agreement Specification*, OASIS/ebXML Collaboration Protocol Profile and Agreement Technical Committee, September 2002 (<http://www.ebxml.org/specs/ebcpp-2.0.pdf>).
- <sup>9</sup> The author wishes to acknowledge the helpful comments made by Dragan Stojic on earlier drafts of this paper.

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