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**Technical Workshop
Implementing Trade Facilitation Tools to the Benefit of All**

Technology in the context of e-Business

By

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Summary

The goal of UN/CEFACT's Business Collaboration Framework (BCF) is to provide businesses with a solution to define their external information interchanges and related business activities (business collaborations) independent of the underlying implementation and infrastructure technology. Because the BCF is not depending on any specific implementation technology, it protects the investment of developing the Business Collaboration Models against future changes in the underlying infrastructure. This paper outlines how the BCF provides the basis for implementing brand-new infrastructures that were not known before the creation of the BCF such as Web Services.

Introduction

Over 25 years ago the idea was born to eliminate the use of paper documents for exchanging business data by linking computer systems together so that the data, normally on paper, could be sent from one system to the other. This concept became known as EDI, Electronic Data Interchange. The advantages are still valid today, no re-entering of data and therefore fewer errors, if any. No dependency on postal services, cost savings per transaction from \$75.00 to 50 cents, to mention just a few. However, looking at the statistics of who are currently utilizing EDI, one must wonder why it is not used by every business. Of the top 10,000 companies on the global scale (Fortune 1000 in the top 10 countries), almost everyone is using EDI, 98% to be exact. However, for the rest of the world only 5% are EDI users. In other words, millions of companies are still using faxes and paper documents. Why?

The answer is well known; start up cost. EDI saves a lot of money, over time. However, before that happens, companies must spend resources up front to identify their data requirements in order to map their in-house data to the EDI messages. This process is required for each new trading partner implementation, and for each EDI message with that partner. Thus, a very costly effort that only the Fortune 1000 companies in each country can afford.

In order to reduce the cost so that the implementation becomes transparent, one would have to agree to a single data requirement for a particular EDI message. This would allow software vendors to create an EDI application that would have a large enough market to reduce the cost for small and medium sized companies to be able to afford. This will never happen. So what would it take for software companies to build software that is not tailored for each of the different EDI message implementations but will be able to adopt to the different data requirements for a particular customer and their trading partners?

The success of any new way to exchange data among businesses depends not only on the adoption by the Fortune 1000 companies of standard agreements, but on their adoption by the rest of business through out the world, the other 25,000,000. In order for business of any size, anywhere, to benefit from the next generation of e-Business standards, those standards must contain all the information to allow software developers to create programs that can be purchased off-the-shelf (shrink-wrap-solutions). The question that now arises is, will the software industry deliver such "cheap" off-the-shelf shrink-wrapped solution?

UN/CEFACT's primary objective in finding the solution to the above problems was to focus on a new e-Business standards that would make e-Business technology widely available, non-obtrusive to the business process, and cost effective for all organizations of any size, anywhere. The requirements to make this objective a reality included:

- Production of well-defined, consistent standards for interoperability, i.e., reduces the number of ways of doing things;
- Utilization of off-the-shelf tools that are available for analysis and implementation;
- Separation of analysis from application design and programming;
- Availability of training and reference sources (i.e., take advantage of a mainstream methodology for new projects in industry);
- Provision for automatic generation of e-Business interactions; and
- Separation of data definition and format from the transport layer.

In looking towards the next generation of e-Business standards, it became clear that the best solution would be to separate the "how" from "what". Or more to the point, that Business Process and Information models would defining the "what" independent of the transport mechanism, the "how". This way, the same models can be used to move the information using EDI messages, distributed object technology or whatever new technology may surface, such as today's Web Services (Figure 1).

Implementing different Technologies

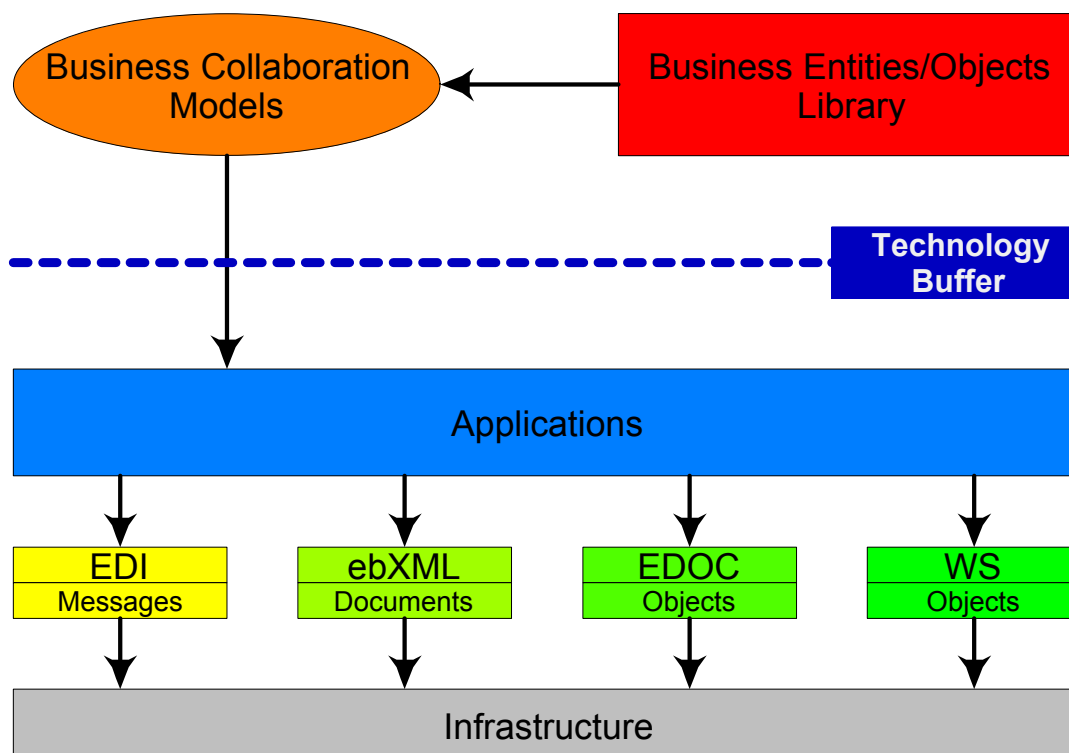


Figure 1 – Separating the “What” from the “How”

This line of thinking is consistent with the Open-edi approach (Figure 2) of looking at the world through two views, the Business Operational View (BOV) and Functional Service View (FSV). Where the BOV would utilize modeling and the FSV would be the technology used for transporting the information. This is often called developing technology-neutral models.

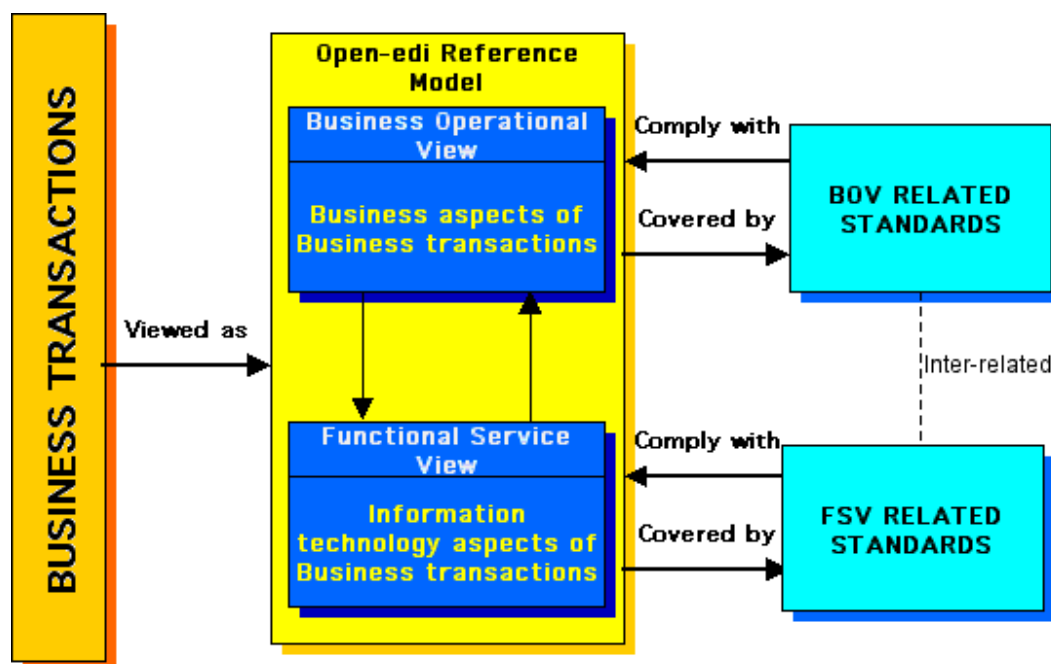


Figure 2 - Open-EDI Reference Model

Brief Introduction to the Business Collaboration Framework

The primary goal of the BCF is to capture the business knowledge that enables the development of low cost software components to help the small and medium size companies, and emerging economies engage in e-Business practices. By focusing on developing business process and information models in a technology-neutral manner, the BCF provides insurance against obsolescence by allowing recasting of the business scenarios into new technologies.

At the heart of the BCF is the UN/CEFACT Modeling Methodology (UMM). The UMM is an incremental business process and information model construction methodology that provides levels of specification granularity that are suitable for communicating the model to business practitioners, business application integrators and network application solution providers.

A commercial trading agreement is modeled as a business collaboration model according to the UMM Meta Model (the model that defines the UMM modeling language). The UMM Meta Model is defined as an extension of the UML Meta Model by extending the UML stereotype syntax and semantics with the syntax and semantics of the business collaboration domain.

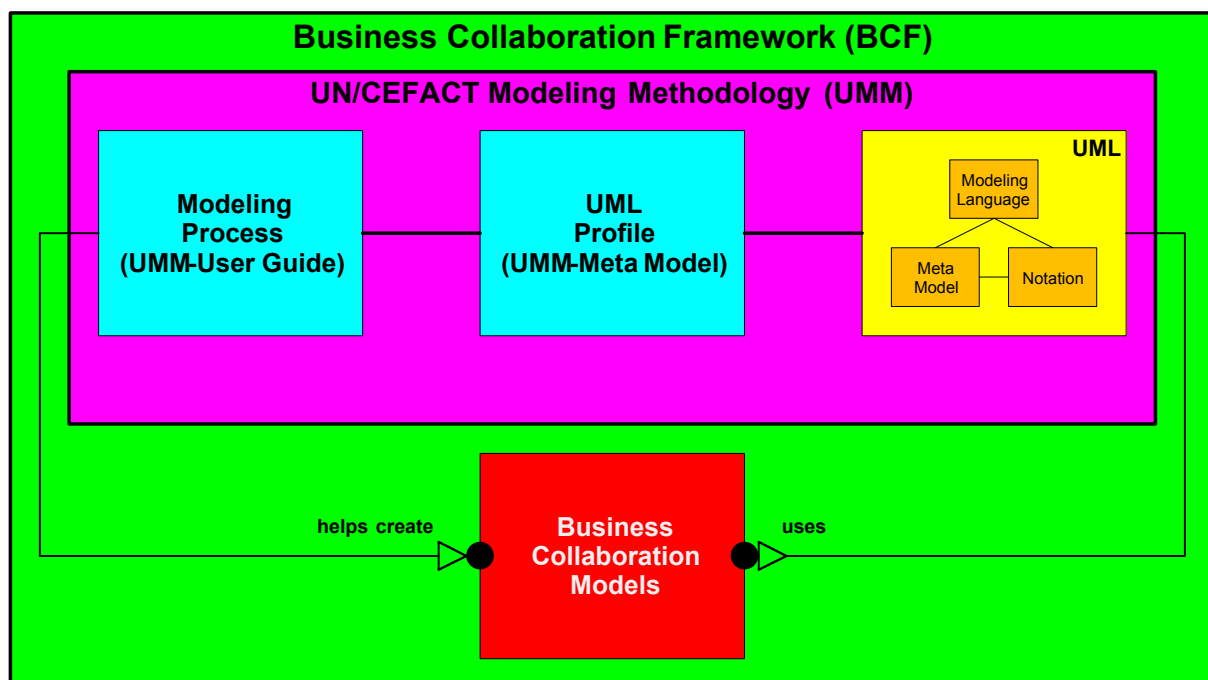


Figure 3 – Business Collaboration Framework Overview

Bottom Line – Ending up with Business Information Exchanges

Scope of engagement between partners

A business environment may be large and complex. Its understanding starts from information and documentation provided by business experts. Business experts provide a categorization and decomposition of the business environment into business areas, process areas, and business processes. Business processes are further decomposed into business process activities in order to understand how the stakeholders in this business environment view the discreet units of work done within their organization. Business process activities are either one-partner activities or multi-partner activities.

Business process activities that are multi-partner activities are by definition business collaboration activities. Business process activities that are collaborative extend outside the organization. Business collaboration activities define the scope for business requirements gathering and specification. Since the business environment includes identification of requirements placed by one-partner activities on multi-partner activities, the interaction of one-partner activities with multi-partner activities needs to

be taken into account as well. All of this takes place in the language of the business environment experts and stakeholders.

Business Requirements

A business collaboration activity is a predefined set of activities and/or processes of partners that is initiated by a partner to accomplish an explicitly shared business goal and terminated upon recognition of one of the agreed conclusions by all the involved partners. Business information is gathered for the purpose of specifying business collaboration activities in terms of goals, requirements, and constraints. These are then expressed in formal representations that can be understood and confirmed by the business environment experts. Business collaboration activities are specified by a business process analyst as use cases, requirements and business object flow graphs that define the choreography of atomic business processes, referred to as Business Transactions. The selection of a business collaboration pattern that fits the requirements of a business collaboration activity, if one is available, optimizes business process and information model reusability. However, in the absence of a suitable business collaboration pattern, the selection of pre-specified Business Transaction patterns simplifies and prescribes reusable components in a business collaboration activity.

Business requirements are expressed with reference to business information structures that are affected by a business collaboration activity, e.g., order information, customer information. Preconditions and postconditions of the atomic business processes and of the business collaboration itself are best expressed by states of affected business entities, e.g., customer information - pending and customer information - accepted. In support of this, business entities (BEs) must be understood as to the states in which they may exist and the permitted state transitions in one or more life cycles. Business requirements are also expressed in terms of events that trigger the state transitions of BEs and of the business collaboration, e.g., receipt of a Positive Registration Response triggers the transition of Customer Information from tendered to assigned.

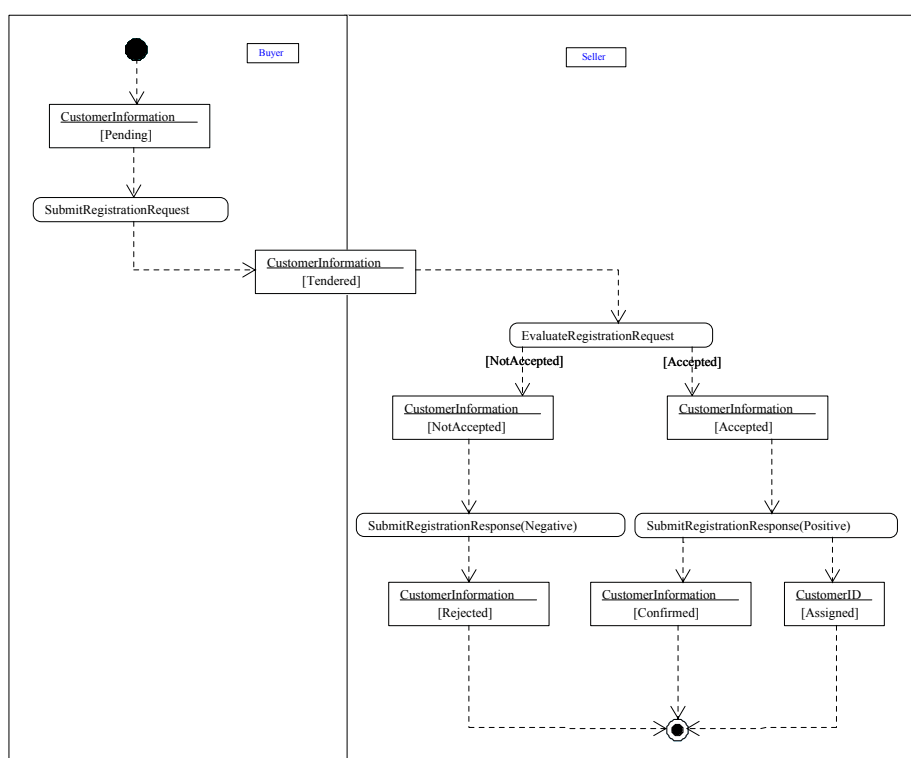


Figure 4 - Business Entity Life Cycle

Business Information Construction

Analysis of the business requirements specifications is required to define the contents of business information to be exchanged in a business collaboration. Business information that is exchanged must contain information needed to identify the BEs affected by a Business Transaction. In addition,

business information structures contain information content that satisfies the requirements for exchange of information required to be shared in the business collaboration. Shared information is generally the attributes of affected business objects (BOs) that must be shared in order to align the partners' views of those BOs.

In order to construct business information exchanges with standardized information items, reference is made to (BOs) in a registry as the primary source. If, in the business information modeling workflow, appropriate attributes of BOs cannot be found, new BOs must be defined. A resource for defining new BOs would be core components (CC) and business information entities (BIEs). The selection of BIEs, or the creation of BIEs when they cannot be found in the core component registry, makes use of the core component context categories and rules. (Context categories should already be identified in the requirements gathering step and can be checked off at this point to utilize the core component context rules.) As appropriate BIEs are selected or created, they are included as attributes in the newly defined BOs, which are registered for subsequent reuse. However, in the normal business information modeling workflow, BIEs would not be used directly to create Business Information structures, but would be used as needed to define BOs, which would then be used to create Business Information structures. These modeled Business Information structures would then become payloads by applying messaging technology specific syntax, e.g., XML, according to production rules.

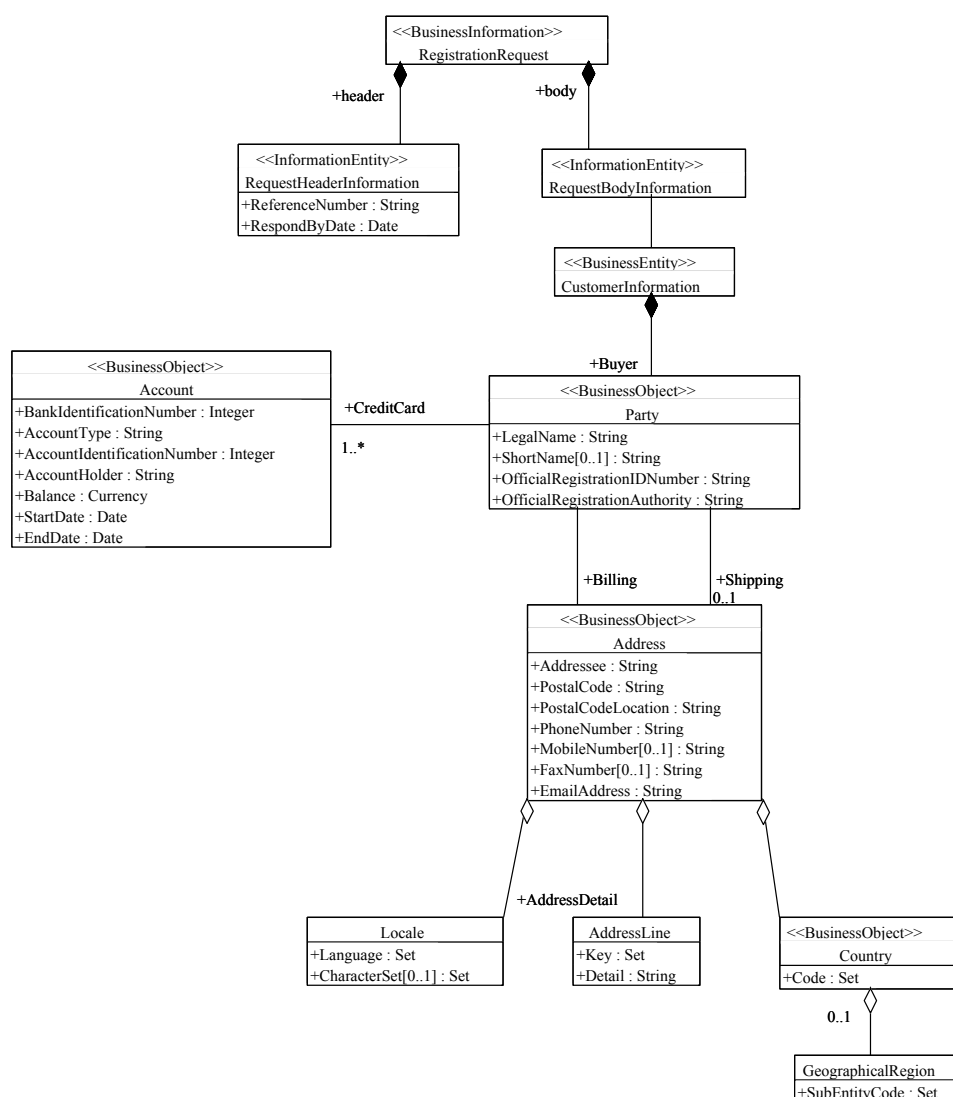


Figure 5 – Business Information Structure

The Business Collaboration Framework constitutes the new e-Business standard. This new standard is independent of the interchange data syntax, transport infrastructure, and server software and therefore

satisfy UN/CEFACT e-Business Vision for a "framework" that utilizes Business Process and Information Modeling, UML and UN/CEFACT's Modeling Methodology (UMM) in such a way that any industry group or standards body, including UN/CEFACT, can create models that identify every possible activity to achieve a specific business goal.

Business Collaboration models will be registered and stored in a global "virtual" repository. Users (trading partners - TP) will register "their" particular path/paths through the model (scenario(s)) so that others who want to engage with that TP can determine if they share at least one scenario. To ensure that the models not only follow the underlying UMM Meta Model but also are interoperable, the models will use reusable and most common objects (Business Objects/Business Entities) that will be used by the modelers as they document a particular business Collaboration. *However, the messaging format, packaging and routing and the meta-model for the repository are not defined by UN/CEFACT but by the underlying implementation and infrastructure technology.*

Business Collaboration Framework and Web Services

XML's Role in e-Business

From a business viewpoint, doing business electronically means having a ubiquitous Internet dial tone; a promise Web Services can fulfil. Because, from the software vendors view point, doing business electronically means setting up and operating Web Services. All the major IT vendors are rolling out road maps and new product sets that will 'enable your business'. However, the underlying technologies for today's World Wide Web (WWW) "TCP/IP, HTTP and HTML" are limited in their capacity to support what businesses actually need: to find each other; to buy/sell services from each other; to find potential markets; and to have all this in a seamless, straightforward, predictable e-world. The key is systems interoperability, both between businesses and, more importantly, within a business. This desire is not new, but what is, are the capabilities offered by new technologies based on XML.

Is XML enough for e-Business?

XML and e-Business is synonymous with Web Services. Therefore, one must look at Web Services to determine if it has what it takes to provide the full solution for e-Business. Many feel that Web Services have the potential to transform e-Business into a plug-and-play affair. Not only will Web Services simplify how businesses will interconnect, they will also enable businesses to find each other. One reason for the increased interest in Web Services is the promise of interoperability, in the same way that Web pages can be accessed from anywhere on the Internet. However, complex standards are needed to achieve true interoperability, not only at the messaging and transport layer, but also at the business (application) layer. The success of Web Services will depend on how easily businesses will be able to engage interoperability at all levels.

There are many efforts in standardizing Web Services, but none of them provide the required features for e-Business transactions. Web Service standards only address the infrastructure side. There is a need to provide standards for interoperability at the business layer. UN/CEFACT is addressing this aspect of standardization with its the "Business Collaboration Framework".

Web Services and Business Collaboration

There is a clear relation between the Web Services and the BCF. Most organizations are eager to jump onto the Web Services bandwagon but they also need to maintain standards to ensure inter-operability between their applications and their trading partners' applications. Organizations will take Web Services technologies like BPEL, WSDL, UDDI and SOAP and understand their application within the realm of other e-Business standard such as the BCF. Web Services technologies must be applied within the context of standards such as the BCF, or they will end up with simple, stateless Web Services, and not the complex and collaborative business transactions that organizations are longing for.

To achieve transaction integration doesn't automatically mean wholesale conversion to one specific technology. One needs to put a digital communication system through the whole business irrespective of who the software provider is and what the application are, so that the work flows and processes are

available across the business. It does however help if organizations stuck to one specific infrastructure technology.

It's time to look at available technologies in the total context, so that whether one is talking about development platforms, or about building next-generation natural language based speech interfaces, or using open web services to connect business partners, one must have a common theme in mind - to use the Internet, as a whole. What's needed to bring this vision to reality is a common vision shared by users (businesses) and software vendors.

Business to Business Integration

Two distinct trends will help to solve the platform plurality problem. First, there is a consensus that of the different technologies available for eCommerce development, companies should standardize on either J2EE (Java 2 Enterprise Edition) or Microsoft.NET - or even both. Secondly, Web Services, virtually removing the problem altogether since they are based on open standards - irrespective of Microsoft or Java - they will be a uniting theme around the enterprise.

This Web Service trend will also help business-to-business integration; and so too will XML. For years, organizations have been able to communicate electronically using e-mail, yet it seems incredible that without an expensive investment in traditional EDI, issuing an invoice usually entails printing and mailing a piece of paper.

This too will start to change because of another key standard in the adoption of Web Services – the BCF, which provides an open technology-neutral framework for interoperability at the Business Layer. Undoubtedly, such a fundamental cultural change away from paper to electronic transactions won't stand much chance of success without a champion.

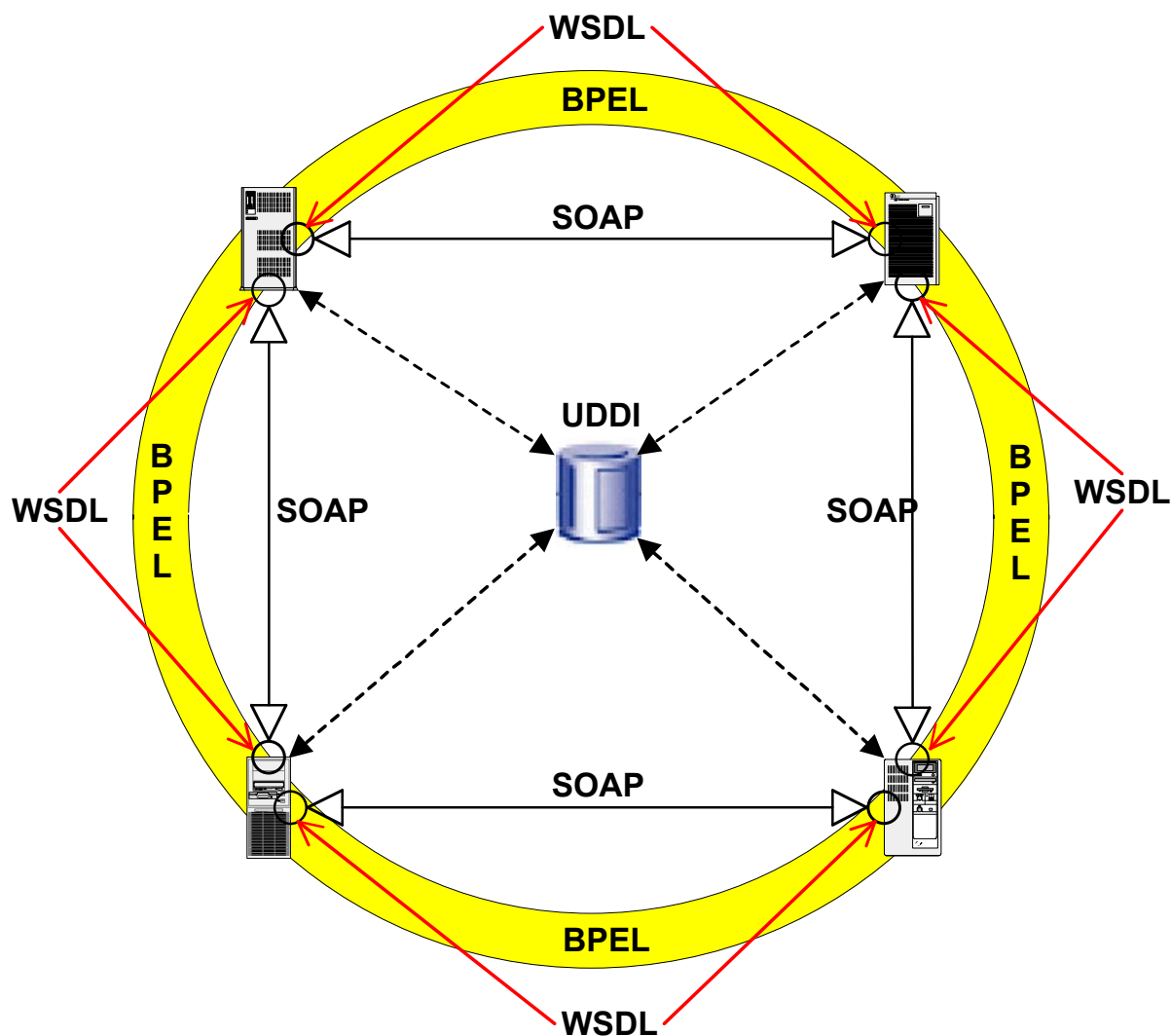


Figure 6 – Web Service Standards Overview

Conclusion

UN/CEFACT's vision for e-Business is to create a single global electronic marketplace where enterprises of any size and in any geographical location can meet and conduct business with each other through the exchange of relevant business information.

In order for enterprises to conduct electronic business with each other, they must first discover each other and the products and services they have to offer. They then must determine which business processes and documents are necessary to obtain those products and services. After that, they need to determine how the exchange of information will take place and then agree on contractual terms and conditions. Once all of this is accomplished, they can then exchange information and products/services according to these agreements.

To facilitate this, Web Services and the BCF provide an infrastructure for data communication interoperability, a semantic framework for commercial interoperability, and a mechanism that allows enterprises to find, establish a relationship, and conduct business with each other. Data communication interoperability is ensured by a standard message transport mechanism with a well-defined interface, packaging rules, and a predictable delivery model, as well as an interface to handle incoming and outgoing messages at either end.

Commercial interoperability is provided by means of specifications for defining business processes and core components and a context model for defining Business Information Structures. The BCF

recommends a methodology and provides a set of worksheets and guidelines for creating those models. A business library (catalog) of business process and information models promotes business efficiency by encouraging reuse of business processes or parts of predefined business processes.

In order for the actual conduct of business to take place, Web Services provides a shared repository where businesses can discover each other's business offering by means of partner profile information, a process for establishing an agreement to do business, and a shared repository for company profiles, business-process-specifications, and relevant business information structures.

Recommendation

Web Services and UN/CEFACT's Business Collaboration Framework will enable anyone, anywhere, to do electronic business with anyone else over the Internet. However, it is anticipated that compliance with and adoption of the various standards components will be incremental, over time. As the first step, UN/CEFACT through its Techniques and Methodologies Group (TMG) must establish a close working relationship with the Web Service standardization communities to work towards the same e-Business vision to ensure that both communities, the users and providers, are benefiting from their current separate efforts through a common and aligned goal and vision. Without such collaboration neither will achieve what they want and the end result being that instead of Business driving the technology, we end up with technology being forced on to Businesses.