

OOI Collaborative Processes and Agreements

Realizing Advantages of ebBP and CPP/A

By the ebBP and CPP/A Technical Committees

Contact: Dale Moberg, Axway

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The Electronic Business (eBusiness) eXtensible Markup Language (XML) [ebXML] set of specifications enable electronic trading relationships between business partners. The ebBP and CPP/A are key components of the original framework, and can be used together or separately to support collaborative processes and interactions in a diversified, distributed environment. The heterogeneous nature of eBusiness and collaborative transactions require a flexible infrastructure/framework that supports simple service calls and complex document exchange. Core integration patterns realize SOA benefits in a pragmatic iterative manner. Today, the original framework components including ebBP and CPP/A have evolved to integrate use of other specifications and emerging technologies as part of composable solutions focused on Service-Oriented Architecture. Five specifications achieved ISO 15000 status while ebBP v2.0.4 is under consideration to join the set in early 2008 while new versions of ebMS and CPP/A are available in OASIS.

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Introduction to Collaborating Processes and Agreements

Business processes and technical configuration are core functional assets defined for collaborative or integrated business approaches using Electronic Business (eBusiness) eXtensible Markup Language (XML) [ebXML] framework concepts. Either in combination or standalone, the specifications enable distributed interactions and electronic trading relationships between business partners, collaborating parties and entities while supporting the effective integration of new technologies. The heterogeneous nature of such transactions require a flexible infrastructure / framework that supports simple service calls and complex document exchange. Core integration patterns realize SOA benefits in a pragmatic iterative manner.

Collaboration Protocol Profile and Agreements (CPP/A)

The ebXML Collaboration Protocol Profile and Agreement provides a conduit between technical capabilities and partner or collaborating party expectations for business collaborations. The Profile contains technical capabilities of a collaborating party, business partner, or domain entity. The profile outlines the capabilities and preferences of protocol features and properties for specific roles in component services and activities used in processes. It also enables monitoring of sessions and verification of delivery channel features used in collaborative processes. The second set or Agreement contains data to configure shared aspects of business collaboration protocols. Building on the v2.0 OASIS Standard, the CPP/CPA v3 working draft includes:

- Extension framework for alternative messaging, business process, metadata (policies) and capabilities such as for ebBP
- Expanded transport capabilities for message exchange patterns
- Increased composability of multiple exposed services
- Improved Party identification

The Collaboration Protocol Profile and Agreement v2.0 was approved as an ISO standard 15000-01 by ISO/TC 154 in March 2004 after promotion to OASIS Standard. Alignment with ebMS v3.0, ebBP v2.0.4, and extensibility for many emerging technologies is progressing whereby a v3.0 specification will proceed.

ebBP - ebXML Business Process Specification Schema

The ebBP (ebXML Business Process Specification Schema) defines a standard language to configure systems for business collaboration execution between partners or collaborating parties. A business process definition, an ebBP definition, describes interoperable and modular business processes to:

- Support process design/description and mapping to and transformation from higher-level metamodels
- Enable collaboration monitoring, conformance and validation integrated into a governance structure
- Guide execution with core functional requirements for the technical configuration of base technology

The ebBP specifies the Business Transaction(s), choreography for using those in Business Collaborations (BC), and BC themselves. Business Signals are exchanged for technical state alignment between parties. Core capabilities include:

- Standard and extensible business transaction patterns
- Technical state alignment
- Business collaboration for two+ parties
- Composition for visibility and relationships: Allows third party visibility in a business transaction, when that process definition exists elsewhere.
- Enables use of hybrid, ebXML or Web Services
- Complex support for party/role definitions
- Improves linking constructs and transitions for process lifecycle
- Uses semantic information to specialize processes and documents

Collaborative Processes and Agreements for OOI

Much as the initial vision of ebBP and CPP/A, the Ocean Observatories Initiative (OOI) will enable and engage a widely distributed, highly interactive and diverse network. The OOI will realize an effective, adaptable infrastructure of regional, coastal and global assets and entities in the scientific, academic and educational domains. Imperative to the success of that OOI vision are:

- Engaging differing communities of assets (regional, global, coastal)
- Integrating human focused and oceanographic realms
- Augmenting infrastructure configurations to apply and leverage context, technology assets and environmental constraints
- Applying time distribution and expectations, while providing visibility to the lifecycle of operations, information and infrastructure components
- Managing, governing and controlling and aligning the infrastructure, processes, and configuration interfaces to adapt to changes over time and in an iterative manner

To tie OOI with these two core collaborative technologies in a pragmatic and practical manner, a brief introductory summary to these two technologies is provided.

OOI Core Elements with Collaborative Processes and Agreements

The OOI defines a conceptual architecture of widely distributed, interactive interplay of scientific, academic and technological assets across a heterogeneous operational and virtual ecosystem. A brief assessment is provided to map this architecture to the effective potential uses of ebBP and/or CPP/A. Given the rigor desired and operational value provided, it is important to note that substantive opportunities and options exist to use these technologies in the OOI context¹ to support:

- Services to task, coordinate and manage observatory resources and their interdependencies, consistent with the participants involved, such as to design and operate resource configurations, or to re-inject capability changes into the operational processes and interface constraints as they evolve
- Process repository with data and asset interactions with metadata
- Services for policy- and behavior-based reconfiguration of tasks and observational programs
- Extensible suite of access interfaces and data formats for interoperability with external communities and applications
- Semantic context services for the development, negotiation, and provisioning of services and their associated roles, processes, and interfaces to be employed by individuals groups, and communities
- Services to manage and govern collection of resources on behalf of a group, individual or domain of authority by leveraging a set(s) of collaboration agreements)
- Test and validation services to ensure conformity with the different operational requirements in the network
- Negotiations between participants for sharing of resources (for example, instruments, processes, and models). Agreements are captured and associated with all parties materially involved
- Support for common execution infrastructure and parameters for active or passive monitoring or controls of said execution services and applications

Technology Services and Capabilities (Questions 1)

For technical agreements and interfaces, the CPP describes the capabilities of an individual Party while a CPA details the capabilities that two Parties have agreed to use to perform particular Business Collaborations. These CPAs define the "information technology terms and conditions" that enable business documents to be electronically interchanged between Parties. CPAs define technical quality of service (QOS) parameters and level of service agreements governing collaborations defined within business process descriptions such as ebBP.

Software that can produce and consume CPP or CPA XML artifacts may have many functions. CPPs, CPA templates, and

¹ Consistent with ORION CI Section 2.2 and Exhibits 20.1-20.8

CPAs may be exchanged by agreement negotiation modules. Messaging agents may import CPAs to govern messaging configuration. Monitoring modules may import CPAs and use them to identify events as conforming or violating agreements. Process execution engines may check deployments against defined process configurations. CPAs may also be constructed with self-registration web server software (APIs or forms based) for the collaboration community of a given party.

The CPP/A may be guided by the standard and extensible business process definitions such as ebBP (ebBP definition) developed in design. The business or domain expectations of the collaborating parties are technically realized in a concrete manner through the business transaction characteristics, collaboration roles, and services and actions with their parameters of exchange in their context of use in the CPP/A.

Collaborative business processes in ebBP frame the expectations of the business partners or entities involved (Parties in CPP/A) for the technical configuration and interfaces that support those requirements in the CPP/A. The business quality of services characteristics at both the concrete and abstract levels are also realized from ebBP to the CPP/A (when used in tandem) through the interaction patterns, assurance (non-repudiation aspects, timing parameters, business signaling), document security, syntactic verification, and other characteristics.

Modular packages of ebBP process definitions can be developed and made available in a process library to be composed and/or aggregated for functional use, irrespective of the underlying technologies used. The ebBP supports the definition of simple to complex process activities whereby conditions, state transitions and semantic context can tailor those processes when composed. The roles that the parties play throughout these activities, the state of those processes and the activities, and the interactions themselves are housed in the ebBP definition, in addition to composable representations of a logical business document 'container.' Semantic context can be attached to those business document containers or business transactions. All of these aspects support optimal flexibility to a changing and diverse environment, where process activities (or atoms) may be anticipated although their composition and effective use may evolve and change.

In addition, a compatible relationship exists from higher level process metamodels to the ebBP definitions and are therefore supported by the CPP/A to allow for consistent and semantically capable checks and balances throughout the system lifecycle to support OOI goals as outlined in the previous sections. Core collaborative and choreography requirements supported in ebBP, and from the UMM that ebBP realizes, are integrated in the evolving Business Process Definition Metamodel that utilizes the UMM², UML³, BPMN or other proprietary representations⁴.

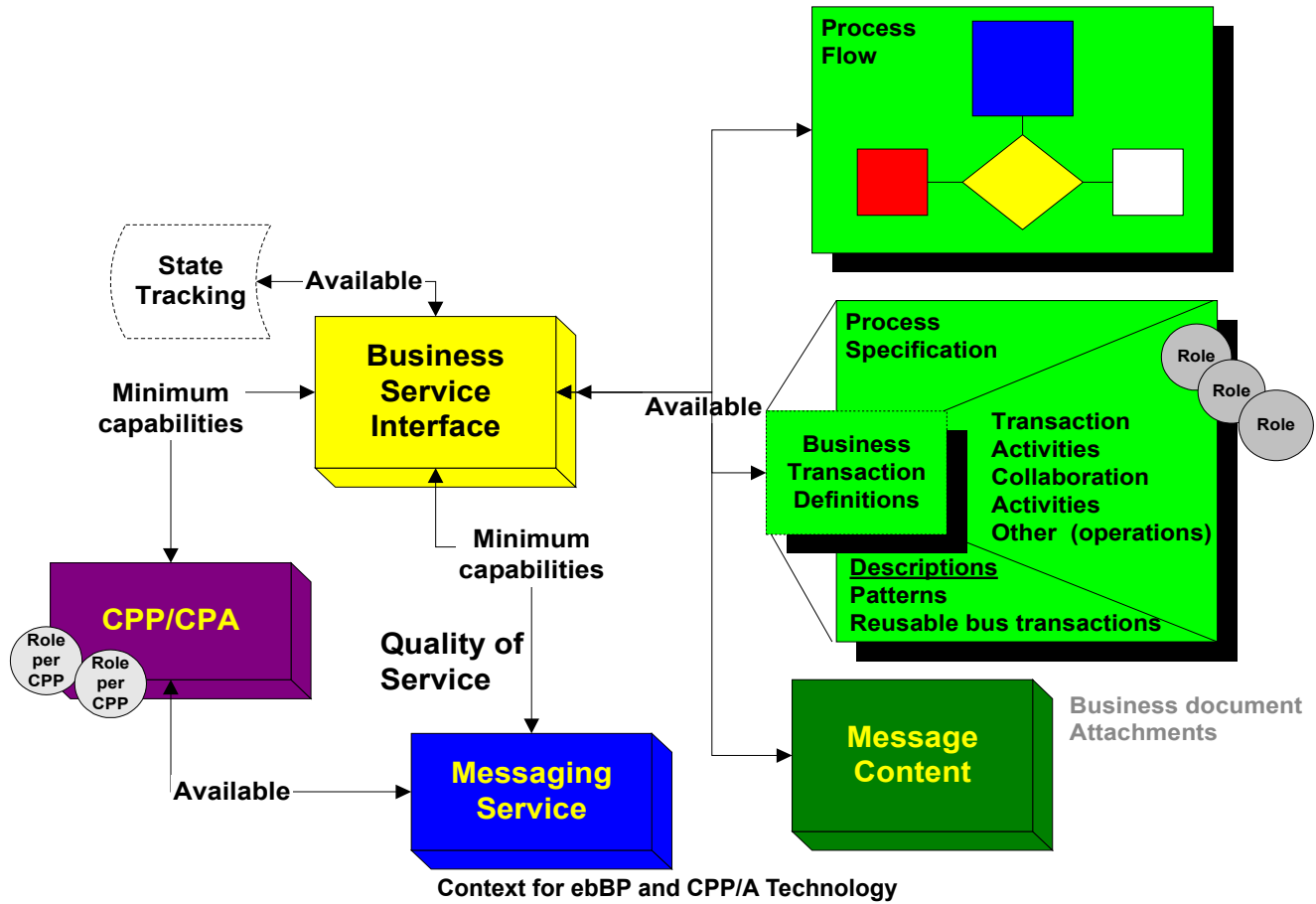
2 United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT)

3 Unified Modeling Language™ (UML) from OMG

4 BPDM, BPMN: BPDM submission: <http://www.omg.org/cgi-bin/doc?bmi/2006-09-07>, Interaction protocol: <http://portal.modeldriven.org> (for example, see: [/bpdhtml/...](http://bpdhtml/...)), BPMN OMG: <http://www.bpmn.org/>

Context of These Capabilities (Question 2)

As envisioned in the original architecture (as noted in Question 1), these two technologies support alignment yet separation of concerns of core functionality indicative of distributed, diverse and collaborative processes and agreements (see following figure).



Core Capabilities and Characteristics of the Technology (Question 3)

The ebBP realizes the core aspects of the UMM business transactions view in detail from the UMM R10 and is realized through later versions, including the UMM Foundation Module.⁵ The UMM Foundation that details the top-down view from domain to services (interactions and services). The use of BPDM entails the intermediary between the domain and requirements views through the transaction, and interaction and choreography (ebBP) and then again below into the interaction protocols and services defined as concretely realized in the CPP/A. Other than the logical business documents or attachments, the ebBP leaves construction of the information envelope (the actual core components that build the information in a model driven way) to the underlying technology. The figures that follow, which are consistent with representations used in the OOI overview, show:

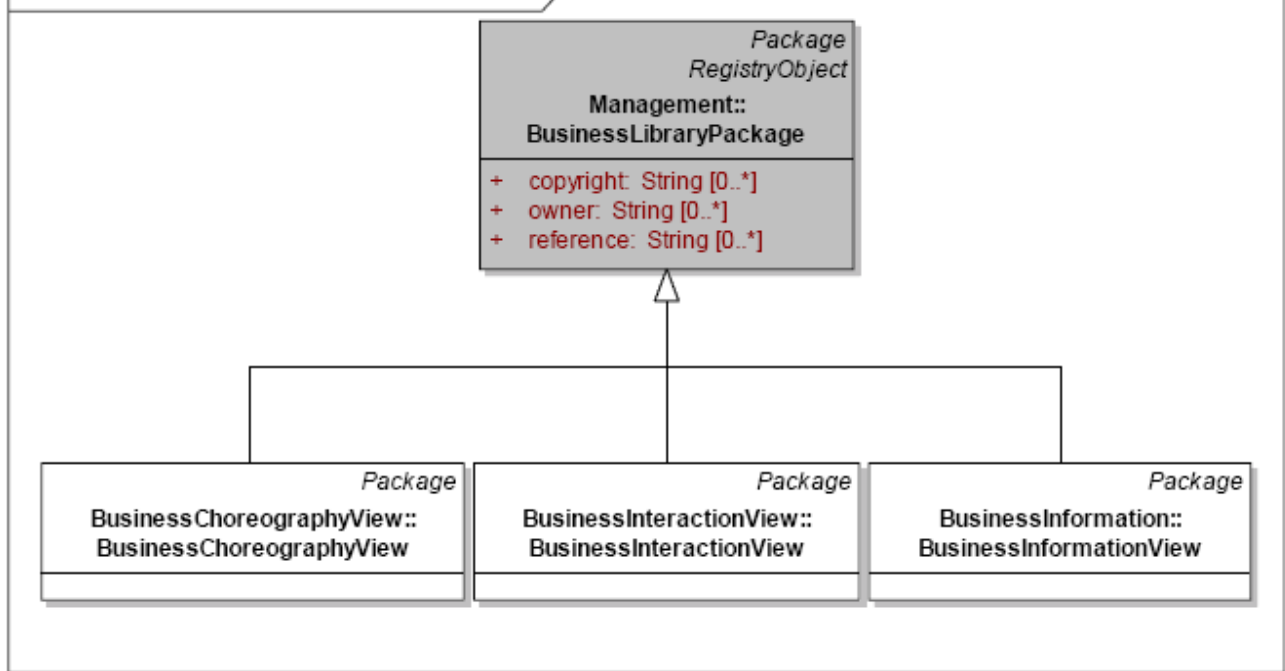
- Abstract views from the UMM that are consistent with ebBP concepts and integral to the corresponding work in BPDM
- Data model representations of CPP/A Party and Delivery Channel

⁵ UMM R12 Metamodel:

http://www.untmg.org/index.php?option=com_docman&task=docclick&Itemid=137&bid=21&limitstart=5&limit=5 UMM R10 (See Chapters 8-9):

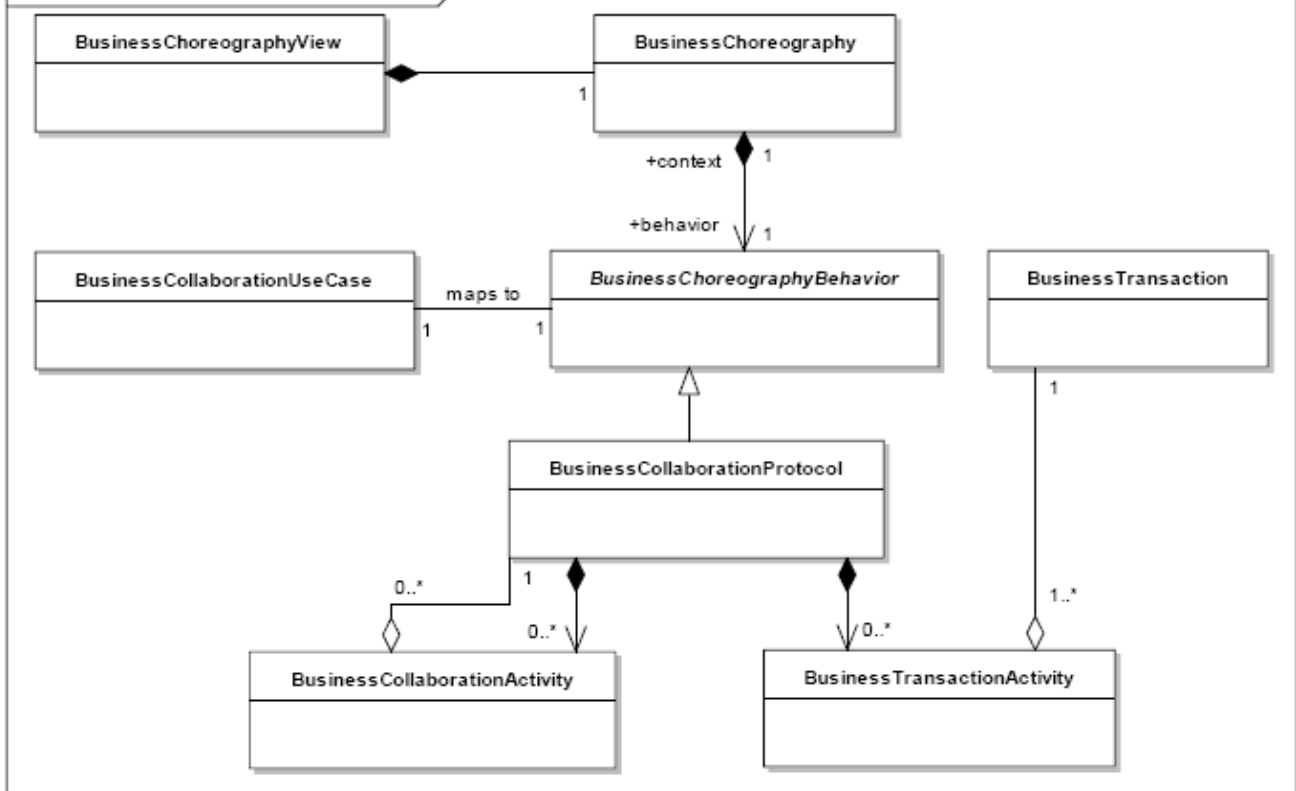
http://www.untmg.org/index.php?option=com_docman&task=docclick&Itemid=137&bid=21&limitstart=5&limit=5

cd BusinessTransactionView - Abstract Syntax



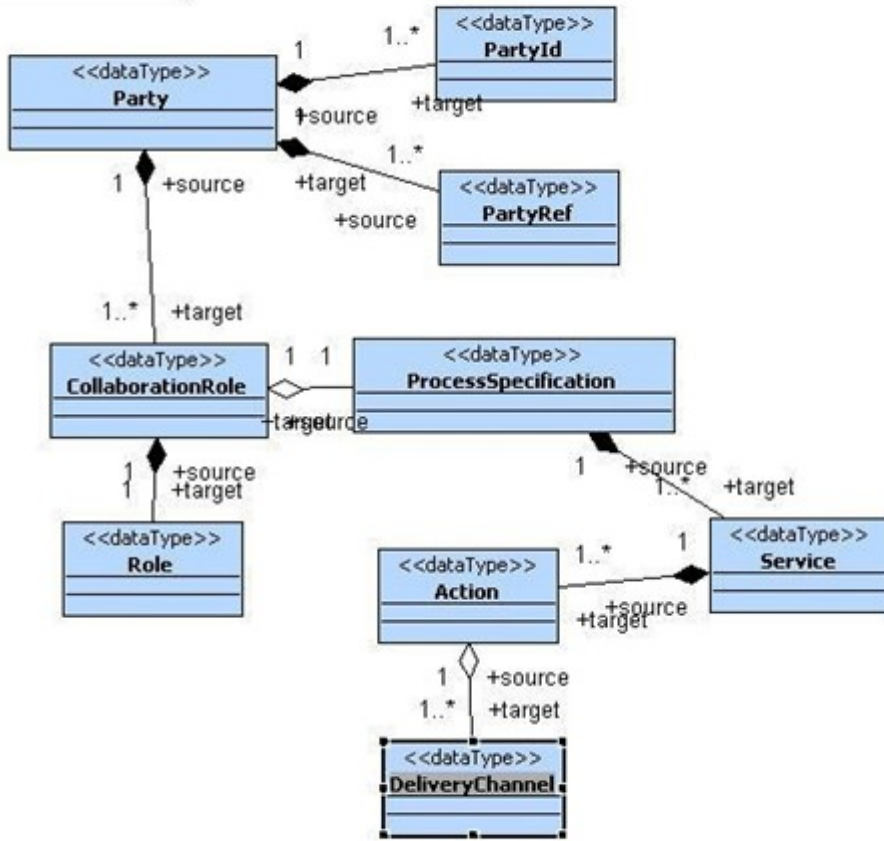
Business Transaction View, UMM Foundation, UN/CEFACT

cd BusinessChoreographyView - Conceptual



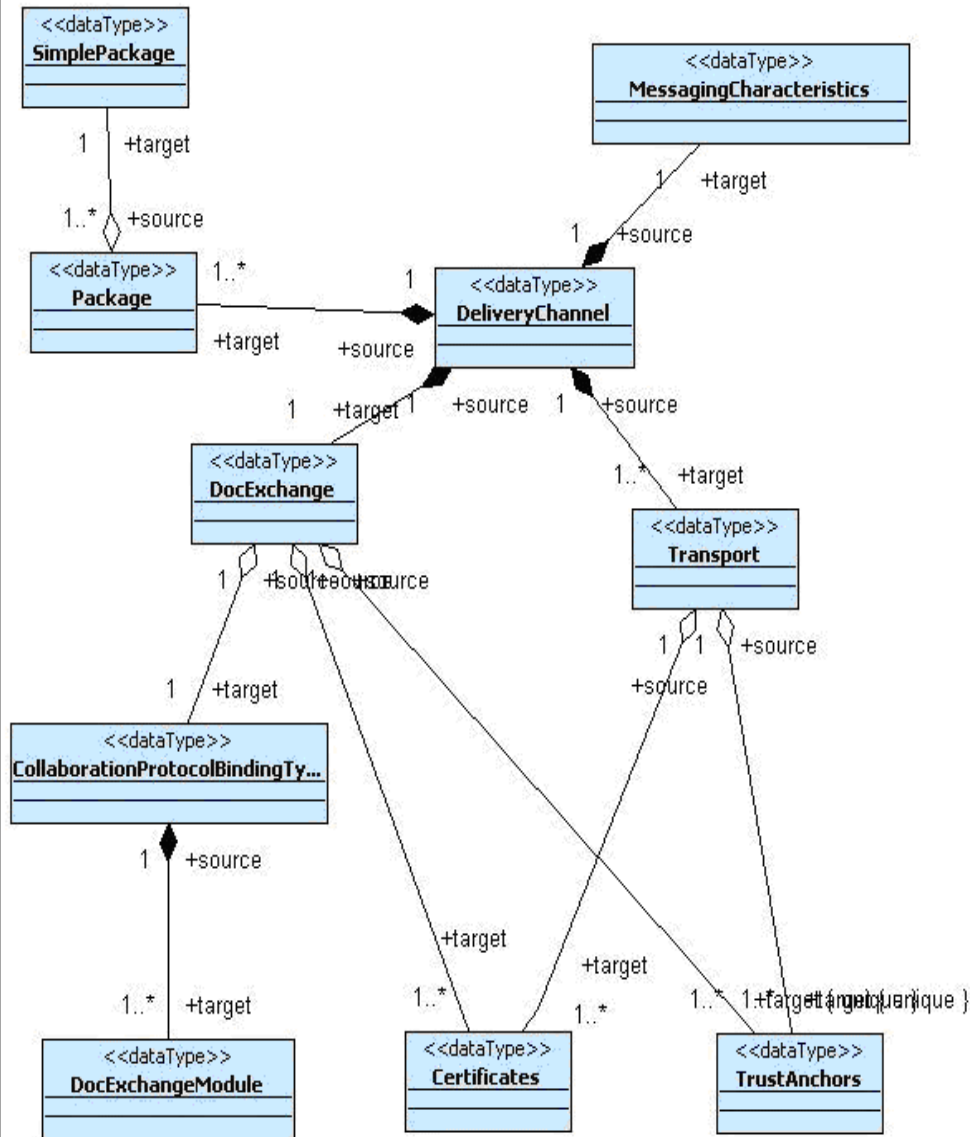
Business Choreography View, UMM Foundation, UN/CEFACT (conceptual)

package PartyInfo



Data Model for Party in CPP/A

package DeliveryChannel



Data Model for Delivery Channel in CPP/A

Interaction Protocols and the Technology (Question 4)

The CPPs can be exchanged by means of any business data exchange method. Special provisions exist for obtaining CPPs and CPA templates from the ebXML Registry and Repository UDDI tModels also exist for discovery of CPP and CPA templates. For ebBP, those processes definitions may be exchanged in the same manner or available/acquired via a process repository for use in design or subsequent compositions of complex process definitions using available XML tools. In other domains such as health care, these process and interface packages have been aligned via the use of ontologies whereby the semantic, syntactic and profiling aspects of the technology are associated, can be constrained for access, and understood based on the roles profiled for use.

In CPA negotiation processes, negotiation message sets have been described for WSDLs (Web Services Description Language) used, but are still in developmental stages for standardization. Web-based interfaces for selecting CPA templates and completing the CPA have also been used with considerable success in large communities (of more than 10,000 actors). These community registrations sites have considerable XSLT (Extensible Stylesheet Language Transformation) processing of CPA templates based on guidance offered by Negotiation Descriptor Documents or NDDs. An example of automated negotiation is shown in the following figure. Many opportunities to standardize interfaces and interactions exist to complement those specified in existing or emerging OASIS specifications. Significant open source software and independent software vendor experience exists in this area, in addition to community development to investigate the use of this technology.

The screenshot shows a web browser window titled "CPA negotiation - Mozilla Firebird". The main content area displays a message: "You received a new 'CPA COUNTER PENDING OFFER DOC' negotiation message. It is your turn according to the negotiation protocol." Below this, there is a section for selecting an option, with a button labeled "CPA Counter Offer Doc select and send message".

Below the selection area, there is a section titled "Here is the list of the current negotiable items." It contains two items:

- 1. State: ACCEPTED.** Final, accepted value is http://www.oasis-open.org/committees/ebxml-msg/schema/msg-header-2_0.xsd. The item is of type: element-text. See the history of negotiated values: no values yet.
- 2. State: Updated State** The item is of type: element-text. current, non-accepted value: http://www.my_domain.org/schemas/PIP3A4PurchaseOrderConfirmation.xsd. Do you want to accept? yes no . Update value to: . See the history of negotiated values: 1. http://www.my_domain.org/schemas/PIP3A4PurchaseOrderConfirmation.xsd

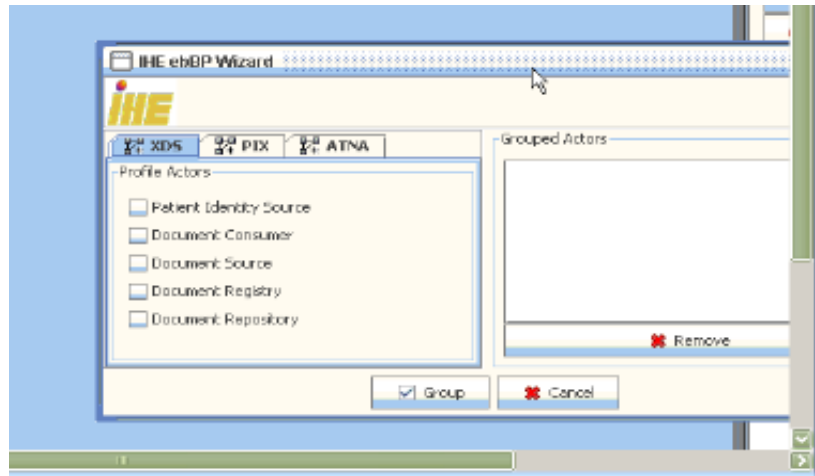
On the right side of the browser window, there is a panel titled "Automated Negotiation of Collaboration Protocol Agreement". It contains the following information:

- your party information:** Party Name: Company B, Party Id: 987654321, Current time: Tue Nov 25 11:27:16 WST 2003, Direct web access: [Updated here.](#)
- current state:** A state transition diagram showing the negotiation process. It starts with "START", leading to "Initial OFFER". From "Initial OFFER", it can go to "FINAL" or "Counter OFFER 1". "Counter OFFER 1" can lead to "Counter OFFER 2" (highlighted in red) or "FINAL". "Counter OFFER 2" can lead to "FINAL" or "FAILURE". "FINAL" can lead to "FINAL Init Responder" or "FINAL Init Initiator". "FINAL Init Responder" leads to "SUCCESS". "FINAL Init Initiator" leads to "SUCCESS".
- negotiation information:** CPA COUNTER OFFER 2 BTA. Current state: COUNTER OFFER 2. States of 2 negotiable items: CPA template: [view here](#), Conflict File(NDD): [view here](#), Negotiation CPA: [view here](#).
- negotiation:** No actions required yet. Please wait (in case you have auto-refresh enabled) or reload webpage.

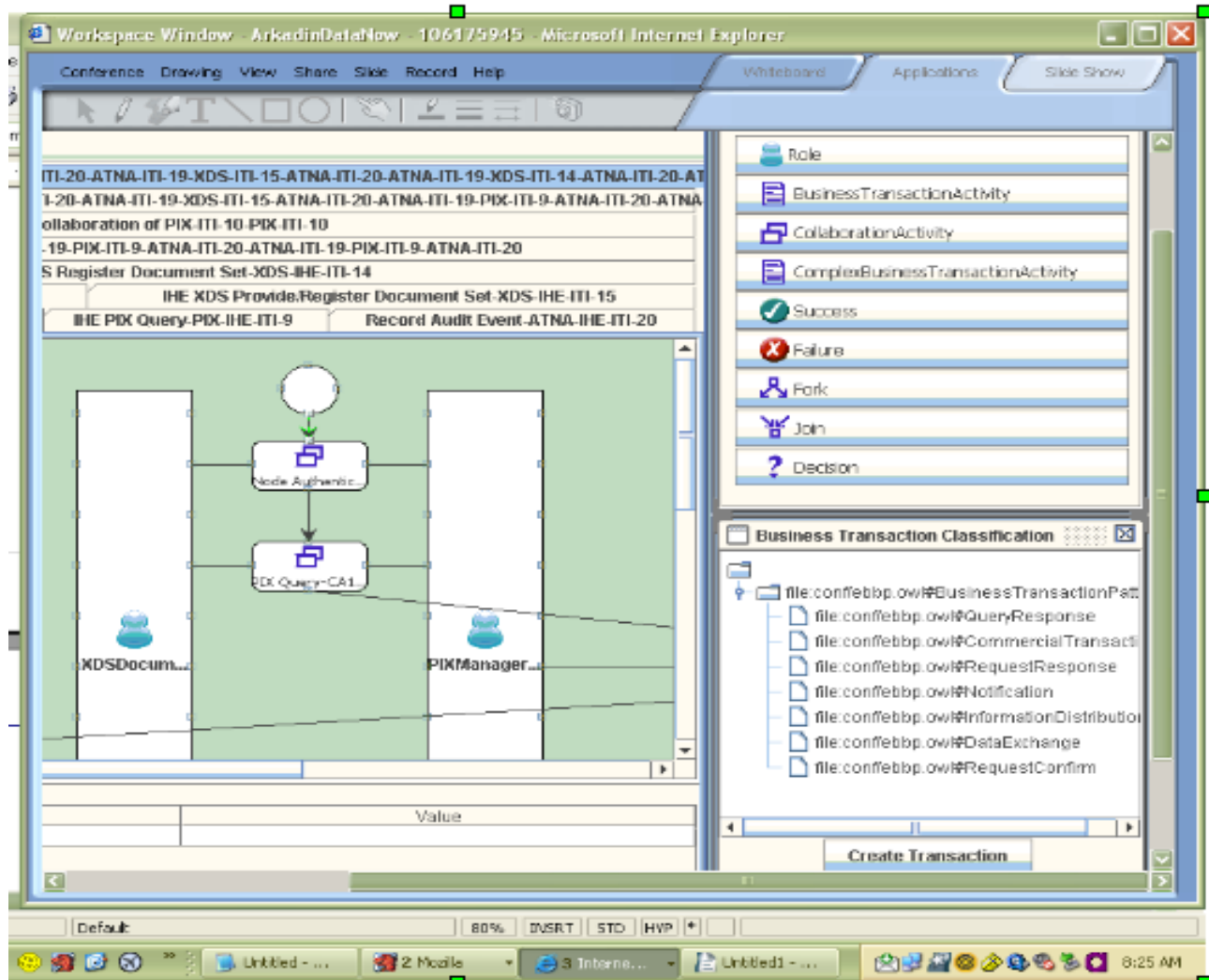
Automated Negotiation of CPA

Even if in early stages, similar efforts are under development for ebBP. With the substantive enhancements and functionality of ebBP v2.0.4, many opportunities exist. For example government experts in the United Kingdom and the Netherlands have effectively used the broad spectrum of ebBP – for modular process atoms that can be composed for use in a process library to enable a diverse community of small enterprises to a series of detailed and complex business collaborations for criminal justice. The ebBP allows the use of current and emerging underlying technologies, and explicitly supports abstract definition of operations to map business transactions to underlying web services operations using WSDL. Explicit concrete interfaces are realized in the CPP/A as guided by the expectations defined in ebBP to support a pluggable architecture (of messaging, security, access control and governance, and information components).

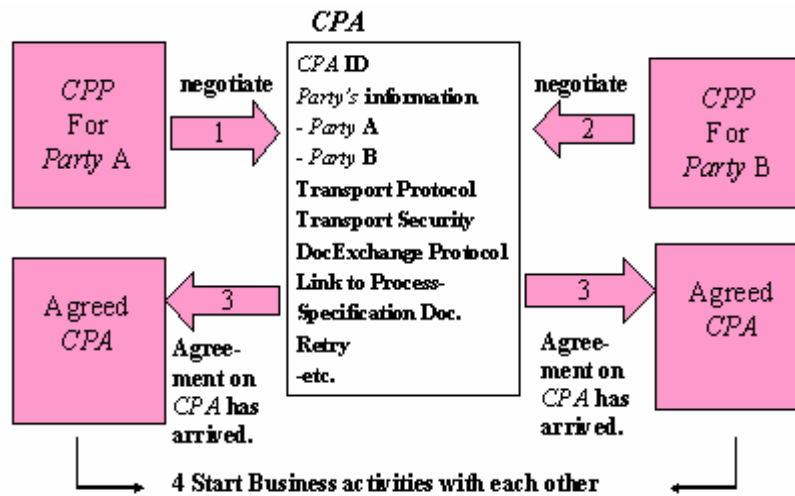
In business process design, often an interplay exists between human-enabled and automated processes. Therefore, ebBP also supports tailoring of logical business document construction using semantic context variables, document references to domain guidance and hooks to allow human intervention where exceptions can not be handled in an automated fashion. The underlying premise to these functions was allowing optimal flexibility to allow for iterative development and integration of changing requirements while recognizing the limitations of many existing communities. An example is provided in the following figures of an open source tool that supports use of ebBP v2.0.4 and associates ontological classes to business transactions using visual and scripting tools.



Integrated Health Enterprise (IHE) ebBP Wizard, METU⁶



The freebxmlbp Editor Tool, METU



Overview of CPP/A Transitions

For ebBP, state transitions mirror at an abstract level those generally found in the CPA. The state transitions are bounded by conditional expressions and semantic constraints or context (triggers and preconditions) and the composition of the transactions within collaborations. This is seen in different ways in following syntactic snippet, XML representation⁷, and as shown in Context for ebBP and CPPA Technology figure earlier in this document .

```

http://www.oasis-open.org/committees/download.ph...
<Specification name="CPA Offer Doc" nameID="CPA_Counter_Offer_Doc_Spec" type="schema" location="http://www.oasis-
open.org/groups/ebxml-cpa-negotiation/v2.0/documents/CPA_Counter_Offer_Doc.xsd"
targetNamespace="http://www.oasis-open.org/groups/ebxml-cpa-negotiation/v2.0" />
</BusinessDocument>
<!-- CPA Reject Offer Document -->
- <BusinessDocument name="CPA Reject Offer Doc" nameID="CPA_Reject_Offer_Doc">
  <Specification name="CPA Offer Doc" nameID="CPA_Reject_Offer_Doc_Spec" type="schema" location="http://www.oasis-
open.org/groups/ebxml-cpa-negotiation/v2.0/documents/CPA_Reject_Offer_Doc.xsd"
targetNamespace="http://www.oasis-open.org/groups/ebxml-cpa-negotiation/v2.0" />
</BusinessDocument>
<!-- CPA Document. This will probably come from the CPA specification -->
- <BusinessDocument name="CPA Final Doc" nameID="CPA_Final_Doc">
  <Specification name="CPA Offer Doc" nameID="CPA_Final_Doc_Spec" type="schema" location="http://www.oasis-
open.org/groups/ebxml-cpa-negotiation/v2.0/documents/CPA_Final_Doc.xsd" targetNamespace="http://www.oasis-
open.org/groups/ebxml-cpa-negotiation/v2.0" />
</BusinessDocument>
- <!--
  Response to final CPA Document. This will probably come from the CPA specification
  This is used when the CPA is not signed just to show acceptance or denial of final CPA
-->
- <BusinessDocument name="CPA Final Response Doc" nameID="CPA_Final_Response_Doc">
  <Specification name="CPA Offer Doc" nameID="CPA_Final_Response_Doc_Spec" type="schema" location="http://www.oasis-
open.org/groups/ebxml-cpa-negotiation/v2.0/documents/CPA_Final_Response_Doc.xsd"
targetNamespace="http://www.oasis-open.org/groups/ebxml-cpa-negotiation/v2.0" />
</BusinessDocument>
<!-- Response to final CPA Document which is signed and agreed to create a double signed CPA. Receiving party will
create a Signature over the signed CPA and send that. This will probably come from the CPA specification -->
  
```

Negotiation Working Example using ebBP

⁷ <http://www.oasis-open.org/committees/download.php/25625/negotiation-example-1.0-2.0.4.xml>

Deployment Architecture for These Capabilities (Question 6)

CPPs and CPAs are metadata about deployment architectures, and though there are several types of software components that can make use of the information contained in CPAs, the CPAs are not normally used to document the deployment architecture for software components using CPP/As. The initial draft of the CPPA Negotiation specification did provide metadata for CPA exchange and negotiation processes, but has been found too complex to deploy in practice. Distribution and exchange of CPA information can be direct, mediated by registries and repositories, or can be provided by services accessible to human or automated users.

The realization of the ebBP process guidance is found through the CPP/A (see above). In addition, the process definitions can serve to support validation of conformance of orchestrated enterprise execution processes. Those processes can be mapped to, and validated for conformance to OOI objectives as needed (such as prior to or during deployment, or over time in a disconnected manner to optimize evolving processes). Pre-deployment may involve conformance and interoperability checks, whereby post-deployment may entail live or deferred monitoring (re-injection as needed). In pre-deployment, scenario-based checks or testing could simulate the potential paths of the process definitions in construction. Also, in post-deployment, instance-level test could support the optimization of process definitions. Both are consistent with the testing options envisioned by NIST.⁸

Assumptions and Constraints for These Capabilities (Question 7)

The ebBP is independent of underlying technology, although it can be used with complementary emerging technologies such as WSDL and web services. The domain guidance provided in the process definitions may be associated with those components. The possible capabilities of the underlying infrastructure and services chosen may impact the capability to support business requirements defined by the involved parties. For example, specific constraints may apply to WSDL-based exchanges that may not exist for those implementations using specific messaging protocols such as ebXML Messaging Service (ebMS).

For examples, the correlation between the different operation invocations defined via Operational Mappings are implemented at run-time. The ebBP leaves open the specific use of any design-time correlation specification, and recommends the use of run-time correlation and endpoint references based on addressing mechanisms such as WS-Addressing. Correlation can provide additional functionality that could be desired where complex composed activities occur, and visibility of the parties and their activities must be managed.

If OOI makes use of newer protocols, it is recommended that the emerging CPPA v3 be used to support broader extensibility for both collaboration process notations as well as for DeliveryChannel components. Many examples of how to extend CPPA v3 are available in the working Committee Drafts that are available on request from the CPP/A Technical Committee in OASIS.

Standards or Specifications Relevant for These Capabilities (Question 8)

As the successor to v2.0 and earlier 1.x versions, the ebBP v2.0.4 significantly expanded the functionality of collaborative business processes, with substantive input from community domains in government, health care, transportation, automotive and others. With some minor revisions in functional mappings, the ebBP v2.0.4 can be effectively used with the emerging CPP/A v3. The ISO designation for the ebBP v2.0.4 OASIS Standard is anticipated by the calendar year end of 2007.

CPP/A v2 was intended to apply quite generally even though the approach to extensibility (using substitution groups) was ahead of available tools for processing schema at the time of its approval. The extension framework is therefore found in the emerging OASIS CPP/A v3. Extensions to process notations and collaboration protocols and OOI QOS parameters more effectively accomplished using this later version, CPP/A v3.

Other emerging technologies and existing ebXML components may also be used as desired with both CPP/A and ebBP – ebXML Registry / Repository (v3.x), and ebMS v2 and v3. These major versions are all OASIS Standards and/or ISO standards.

Potential Use Cases for These Capabilities in the OOI Context (Question 9)

Many use case associated with ebBP v2.04 can be found on the public web site (see References section). They span many communities and entail goals to achieve:

- Design view for collaborative processes
- Basis for activity monitoring
- Guidance for the technical contract and underlying infrastructure
- Relating logical documents and activities

8 National Institute of Standards and Technology (NIST)

Community and standards examples include:

- Role-based profiles to share electronic patient records
- Trading partner guidelines for business agreements and technical contracts
- Profiles spanning across (and within) domains for European eInvoicing and health care
- Marketplace use case examples
- Leverage common content, building blocks and secure, reliable infrastructure
- Choreographic control flow for gateway, supported by application integration components
- Monitoring of business quality of service contracts

A package of use cases for CPP/A v3 is available upon request. CPP/A v2 use cases are found on the public web site for RosettaNet processes over the ebMS version 2 collaboration protocol (see References section).

Requirements Met by These Capabilities (Question 10)

Given the broad spectrum of the standalone or combined use of ebBP to the OOI framework, the OOI team should provide some key areas of emphasis whereby OOI specific source and derived requirements can be mapped to ebBP and CPP/A. What is optimal is based on the focus, constraint, and rigor desired by OOI (consistent for example with recommendations in the first sections of this document and as defined throughout this initial summary.)

References

- ebBP TC: http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=ebxml-bp Note: The latest documents are posted here.
- CPP/CPA TC: http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=ebxml-cppa
- ISO/TS 15000:1:
<http://www.iso.org/iso/en/CatalogueDetailPage.CatalogueDetail?CSNUMBER=39972&ICS1=35&ICS2=40&ICS3=>

Collaborative Processes and Agreements for OOI