

**NextGen PIP® Architecture**

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## NextGen PIP® Architecture Goals

- Create the architecture and lightweight components to build simpler, more flexible PIPs
- Reduce the cost of implementation and development by
  - reducing ambiguity and inconsistencies
  - promoting reuse across PIP specifications
  - reducing optionality in business content of messages
  - introducing a design notation for documents
- Improve interoperability
  - define PIP specifications in machine-processable XML Schema to allow
    - automated checking
    - direct installation

## Current Issues

- Process Specs
  - Confusing, ambiguous, open to different interpretations
  - Not machine-processable
- Content Specs
  - Too much optionality, inconsistency, complexity
  - Conflicts between Message Guidelines and DTDs

## NextGen PIP® Approach

- PIP® process specs (choreography and message controls)
  - Use Business Process Specification Schema (BPSS)
- Re-architect business content
  - Standard re-usable PIP “components”
  - UML as a message design notation
- Define PIPs in machine-sensible XML Schema
  - Choreography and message controls in a BPSS-compliant document
  - Each business document defined by a schema

## NextGen PIP® Architecture Overview

- NextGen PIP Process Spec Overview
- NextGen PIP Business Document Spec Overview

## PIP® Process Specification

- Main difference:
  - RosettaNet's actual spec is machine-sensible XML
  - Uses ebXML's *Business Process Specification Schema* (BPSS) to capture PIP choreography & message exchange controls
- Specification Guide rewritten to make it easier to understand
  - tables gone
  - controls explained
- Semantic content essentially unchanged from current PIPs (i.e., BOV, FSV, etc.)

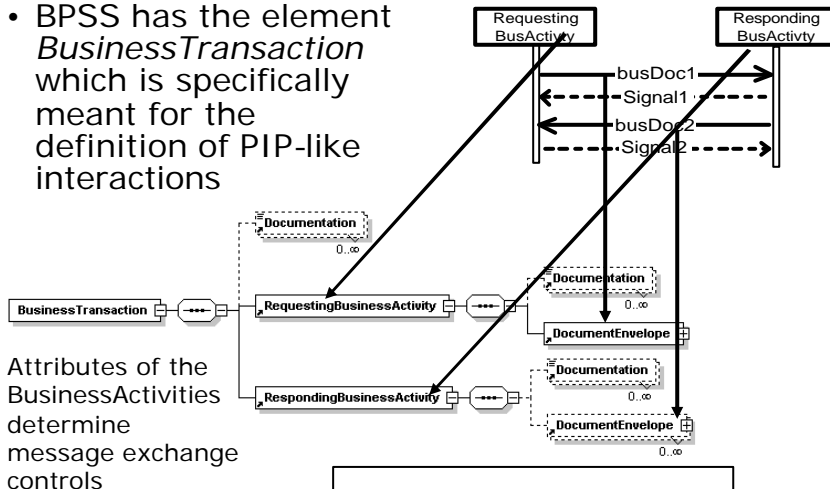
## Use of ebXML BPSS

- ebXML BPSS v1.02 is an emerging industry standard
  - For information on BPSS and other ebXML standards visit: <http://www.ebxml.org>
- Provides the semantics, elements, and properties necessary to define business collaborations in machine-sensible XML
- Allows PIP® specs to be “instantly installable” via applications that process the XML
- Specifying a PIP in BPSS has little/no impact on what PIP means
  - c.f. rewriting legacy software in a new programming language.



## Using BPSS to Define PIP<sup>®</sup> Process Specs

- BPSS has the element *BusinessTransaction* which is specifically meant for the definition of PIP-like interactions



Attributes of the BusinessActivities determine message exchange controls

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## PIP3C3 Expressed in BPSS

```
<?xml version="1.0" encoding="UTF-8"?>
<ProcessSpecification xmlns="http://www.ebxml.org/BusinessProcess" xmlns:xsi="http://www.w3.org/2000/10/XMLSchema-instance" xsi:schemaLocation="%SYSTEM /XMLPIPVALIDATION/ebBPSS.xsd" name="PIP3C3NotifyOfInvoice" uid="3C3" version="R01.00">
```

```
<BusinessDocument name="Invoice Notification" nameID="Pip3C3InvoiceNotification"
```

- XML document defines the PIP<sup>®</sup> choreography and message controls

- Not the Specification Guide (Word document)

```
<BusinessTransaction name="Invoice Receiver" nameID="InvoiceReceiver"/>
<BusinessTransactionActivity name="Notify Of Invoice" nameID="NotifyOfInvoice_BTA"
businessTransaction="Notify Of Invoice" businessTransactionIDRef="NotifyOfInvoice_BT" fromAuthorizedRole="Invoice Provider"
fromAuthorizedRoleIDRef="InvoiceProvider" toAuthorizedRole="Invoice Receiver" toAuthorizedRoleIDRef="InvoiceReceiver"
isLegallyBinding="true" timeToPerform="P0Y0M0DT2H0M0S" isConcurrent="false"/>
</BinaryCollaboration>
</ProcessSpecification>
```

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## PIP® Business Document Specification

- Major change from current PIP specification
- Single XML Schema defines document instead of Message Guidelines+DTD
- Specifications built out of reusable domain-specific packages which are documented separately

## NextGen Business Document Issues

- Optionality
- Inconsistencies
- Complexity

# NextGen Business Document Design Principles

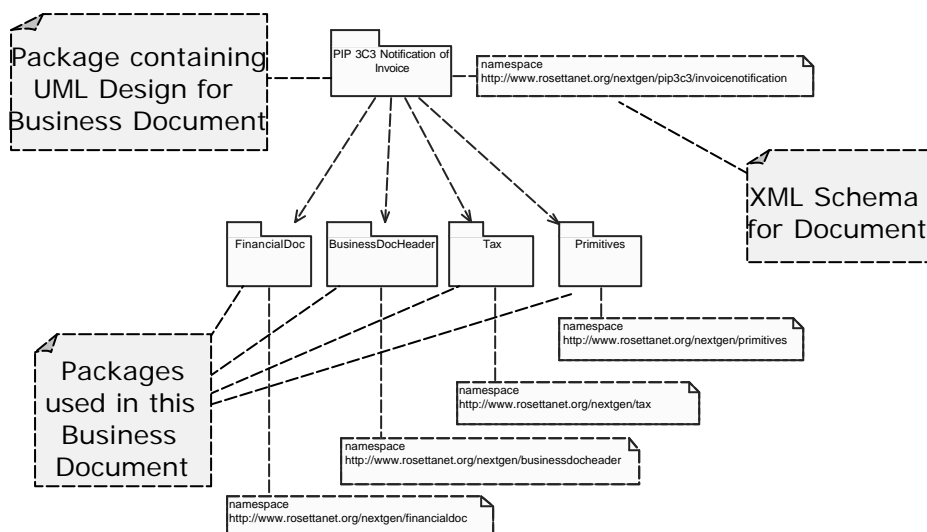
- Design in terms of small cohesive “core objects”
- Organize components into domain-specific reusable packages
- Build larger grained elements by composing them from core objects
- Capture the unique requirements of business scenarios by specializing elements
- The hierarchy of objects allows specialization in different directions
  - e.g. for PO - Shipping, Tax, Contract, Payment
- Use UML class diagrams to record design
- Generate XML from the UML

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# Reuse Structure of Business Document

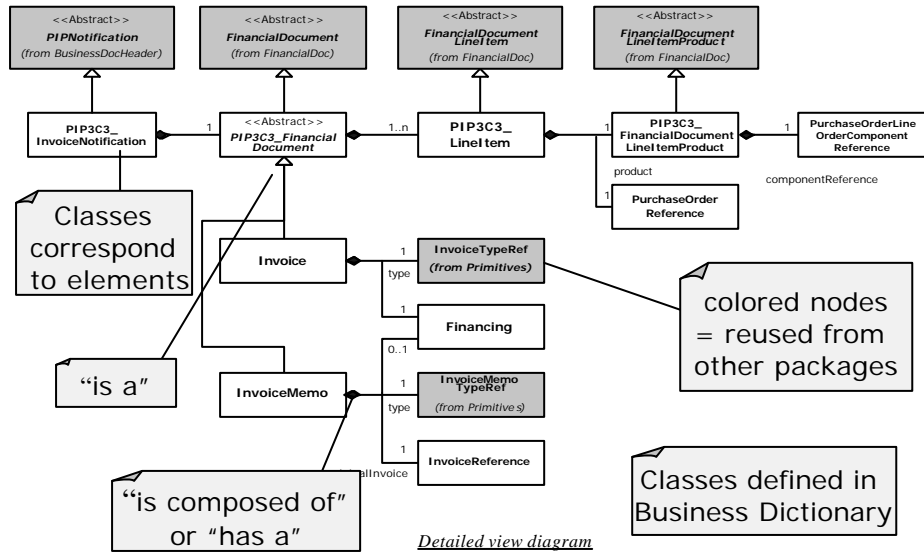


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# Structure of Business Document



# Document Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- edited with XML Spy v4.1 U (http://www.xmlspy.com) by David C. McGee (RosettaNet) -->
<xs:schema targetNamespace="http://www.rosettanet.org/nextgen/PIP3C3_InvoiceNotification"
xmlns:financialdoc="http://www.rosettanet.org/nextgen/financialdoc"
xmlns:businessdocheader="http://www.rosettanet.org/nextgen/businessdocheader"
xmlns:tax="http://www.rosettanet.org/nextgen/tax"
xmlns:primitives="http://www.rosettanet.org/nextgen/primitives"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:attribu
<xs
<xs
schem
<xs
schem
<xs
schem
...
<xs
```

- It is the XML Schema alone that defines the business document.
- The UML documents the design.
- UML generates the XML Schema.

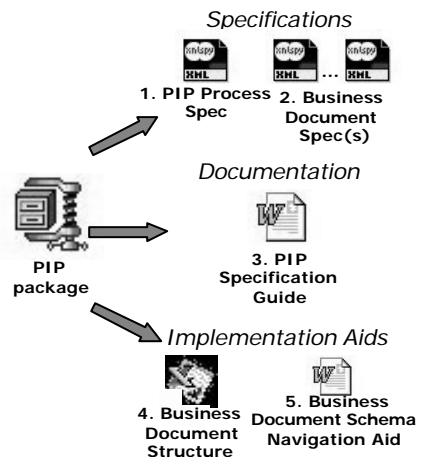
```
</xs:annotation>
<xs:sequence>
<xs:element name="purchaseOrderIdentifier" type="primitives:ProprietaryDocumentIdentifier"/>
</xs:sequence>
</xs:complexType>
</xs:schema>
```

# NextGen PIP® Package

- Package Overview
- Spec Guide Overview
- Implementation Aids

## NextGen PIP® Package Overview

- 1. PIP Process spec** – BPSS XML document
- 2. Business Document Spec(s)** – XML Schema for each PIP Document
- 3. PIP Specification Guide** – single human readable document covering the PIP process and all the PIP business documents
  - uses UML as a design notation
  - includes an example XML document for each Business Document
- 4. Business Document Structure** a spreadsheet that uses hierarchies similar to current Message Guidelines
- 5. Business Document Schema Navigation Aid**
  - XML Spy Schema report document for each Business Document





## Mapping RosettaNet Parameters to BPSS

- RosettaNet and BPSS have slightly different message exchange parameters
- The Spec Guide includes a table that defines the mapping from RosettaNet to BPSS
- This is mainly for solution providers and others configuring gateways

RosettaNet PIP FSV Parameter	ebXML BPSS Parameter
Included in Time To Perform	Does not exist in BPSS. Formal workaround in RosettaNet Process Spec: to be determined
is Authorization Required	ISAuthorizationRequired (in Requesting/Responding Business Activity)
is Non-repudiation Required	ISNonRepudiationRequired (in Requesting/Responding Business Activity)
is Secure Transport Required	ISAuthenticated ISConfidential ISTamperProof (in DocumentEnvelope)
...	...

## Additional PIP® Implementation Aids

- Pointed to by the PIP Specification Guide
  - Business Document Structure (spreadsheet view)
  - Business Document Schema Navigation Aid

# Sample: Business Document Structure

	A	B	C	D	E	F	G	H
1								
2	PIP3C3							InvoiceNotification
3	1	PIPMessage	thisDocumentGenerationDateTime	:	DateTimeStamp			
4	1	PIPMessage	thisDocumentIdentifier	:	ProprietaryDocumentIdentifier			
5	1	PIPMessage	fromRole	:	PartnerRoleDescription			
6	1	PartnerRoleDescription	globalPartnerRoleClassificationCode	:	PartnerRoleClassificationDefinitionRef			
7	1	PartnerRoleDescription	contactInformation	:	ContactInformation			
8	0..1	ContactInformation	contactName	:	FreeFormText			
9	0..1	ContactInformation	eMailAddress	:	String			
10	0..1	ContactInformation	facsimilieNumber	:	CommunicationNumber			
11	0..1	ContactInformation	telephoneNumber	:	CommunicationNumber			
12	1	PartnerRoleDescription	partnerDescription	:	PartnerDescription			
13	0..1	PartnerDescription	globalPartnerClassificationCode	:	PartnerClassificationDefinitionRef			
14	1	PartnerDescription	businessDescription	:	BusinessDescription			
15	0..1	BusinessDescription	globalSupplyChainCode	:	SupplyChainDefinitionRef			
16	1	BusinessDescription	businessIdentification	:	BusinessIdentification			
17	0..1	BusinessIdentification	globalBusinessIdentifier	:	GlobalBusinessIdentifier			
18	0..n	BusinessIdentification	partnerBusinessIdentification	:	PartnerBusinessIdentification			
19	1	PartnerBusinessIdentification	proprietaryBusinessIdentifier	:	ProprietaryBusinessIdentifier			
20	1	PartnerBusinessIdentification	proprietaryDomainCode	:	ProprietaryDomainCode			
21	0..1	PartnerBusinessIdentification	proprietaryCodeAuthority	:	ProprietaryCodeAuthority			
22	1	PIPMessage	toRole	:	PartnerRoleDescription			
39	1	PIP3C3_InvoiceNotification	financialDocument	:	PIP3C3_FinancialDocument (Choice: Invoice, InvoiceMemo)			
40	1	PIP3C3_InvoiceNotification	financialDocument	:	Invoice			
41	1	FinancialDocument	globalPaymentTermsCode	:	PaymentTermsDefinition			
42	1	FinancialDocument	isLockBoxUsed	:	AffirmationIndicator			
43	1	FinancialDocument	isRebill	:	AffirmationIndicator			
44	1	FinancialDocument	debitTransaction	:	AffirmationIndicator			
45	1	FinancialDocument	financialDocumentIdentifier	:	ProprietaryDocumentIdentifier			
46	1	FinancialDocument	billTo	:	FinancialDocumentAccount			
49	0..1	FinancialDocument	soldTo	:	FinancialDocumentAccount			
52	0..1	FinancialDocument	transferTo	:	FinancialDocumentAccount			
55	1	FinancialDocument	remitTo	:	FinancialDocumentAccount			
58	0..1	FinancialDocument	remitToTax	:	TaxSummary			
59	0..1	FinancialDocument	soldToTax	:	TaxSummary			
60	0..1	FinancialDocument	totalAmount	:	FinancialAmount			

## Business Document Structure

- Purpose: show a hierarchical view of the business document
- Similar to the current PIP Message Guideline
- Shows element name, element type, and cardinality
- Provided as a spreadsheet, with the ability to expand and collapse complex elements
- Can be used as an aid by the PIP implementers
  - to create documentation needed for mapping PIP Business Documents to their backend systems
  - in creating agreements with trading partners on element usage

# Sample: Business Document Schema Navigation Aid

namespace	http://www.rosettanet.org/nextgen/PIP3C3_InvoiceNotification
type	extension of <a href="#">businessdocheader:PIPNofification</a>
children	<a href="#">thisDocumentGenerationDateTime</a> <a href="#">thisDocumentIdentifier</a> <a href="#">toRole</a> <a href="#">fromRole</a> <a href="#">Invoice</a> <a href="#">InvoiceMemo</a>
annotation	...documentation   A message wrapper for the PIP3C3 message
source	<pre>&lt;xs:element name="PIP3C3_InvoiceNotification"&gt;   &lt;xs:annotation&gt;     &lt;xs:documentation&gt;A message wrapper for the PIP3C3 message&lt;/xs:documentation&gt;   &lt;/xs:annotation&gt;   &lt;xs:complexType&gt;     &lt;xs:complexContent&gt;       &lt;xs:extension base="businessdocheader:PIPNofification"&gt;         &lt;xs:choice&gt;           &lt;xs:element name="Invoice" type="Invoice"/&gt;           &lt;xs:element name="InvoiceMemo" type="InvoiceMemo"/&gt;         &lt;/xs:choice&gt;       &lt;/xs:extension&gt;     &lt;/xs:complexContent&gt;   &lt;/xs:complexType&gt; &lt;/xs:element&gt;</pre>

# Business Document Schema Navigation Aid

- Purpose: provide a structured way for reading the XML Schema
- Generated from the XML Schema documents
- Provided as a Microsoft Word document
- Includes diagrams of each complexType element showing all the sub-elements of the complex element
- Hyperlinking is used to provide quick access to more details about an element type

## Conclusion

- Benefits of NextGen PIP® Architecture
- Issues
- BPSS Status
- Beyond NextGen ...

## Advantages of NextGen Business Documents

- Ease of Comprehension:
  - UML shows how a business document is constructed in terms of basic and reusable components
  - Implementers and designers no longer have to think of documents “field by field”
  - Where necessary, UML constraints capture additional business knowledge
- Enhanced Correctness
  - Through reuse of tried & tested core components
  - XML can be generated from the UML design with little or no handcrafting
  - XML Schema allow tighter document definitions thus eliminating many documents which are semantic “junk”
- Reduced optionality
  - Specialization factors out optionality and leads to subclasses with mainly mandatory fields

## Advantages of NextGen Process Specs

- BPSS Process Specs are “instantly installable” without manual intervention
- BPSS can support all existing PIP<sup>®</sup> specs with little or no change
- BPSS can support long-lived multi-party collaborations between trading partners
- BPSS is an industry standard being maintained and developed by UN/CEFACT and hence likely to be supported by solution providers
- Well suited for specifying PIPs and requires only a short learning curve
  - A validation exercise with RosettaNet solution providers showed that it took less than one week for three solution providers to modify their software to be able to install BPSS PIP specs

## Issues with NextGen Business Document

- NextGen PIP<sup>®</sup>s are not backwards compatible with existing PIPs
  - Existing PIPs will have to be republished
  - Reason: NextGen componentized schemas are not direct translations of existing DTDs + Message Guidelines
- New technology risk
  - XML Schemas are a new standard, thus possible lack of familiarity with schema amongst trading partners and solution providers
  - Learning curve
- Use of UML may prove a problem for some business-oriented members of RosettaNet community

## Beyond NextGen

- NextGen is just the first step in tackling key issues with today's PIP® specs
- Future issues include evolving the PIP architecture to handle
  - Trading partner agreements
  - Extra-large XML documents
  - Information-sharing PIPs
  - Long-lived business processes
- A future driver for the PIP architecture work will be the RosettaNet Partner Registry for enabling
  - dynamic discovery of trading partners
  - instant connection and business process interoperability

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- Visit NextGen Foundational Program Website at:  
[www.rosettanet.org](http://www.rosettanet.org), "Programs," "NextGen Architecture"

