Business Process Integration Methodology

A study of RosettaNet

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Abstract

This paper applies the Business Process Integration Methodology to the specifications put forth by the RosettaNet. Both Methodology and specifications deal with problems that arise when integrating processes. New principles for managing companies is stressing a shift from functional orientation towards a process oriented organization, focusing on activities that add value to the customer. The advent of Internet has put forth new suggestion on how to perform inter-organizational work between companies, like the RosettaNet. RosettaNet is a set of recommendation that an organization can use to enable their applications to participate in the electronic commerce in the electronic component and information technology industry. RosettaNet defines every aspect of doing business electronically. To implement the process integrations put forth by the RosettaNet, the need for suitable methodological support is demanded. The purpose of this paper is to test if one such methodology, Business Process Integration Methodology, can align the recommendation given out by the RosettaNet. Business Process Integration Methodology is a methodology, which support the development lifecycle. Business Process Integration Methodology defines modeling objects, modeling rules, actors/roles, different phases and analysis methods. RosettaNet is a joint effort in the electronic component and information technology-industry that comprises the whole supply chain. RosettaNet define application integration scenarios, which utilizes the Internet as a carrier of information between partners. RosettaNet provide methodology for creating eBusiness scenarios, partner interface processes, dictionaries and implementation framework. The integration effort between ACME Inc. and Xenitec HB is described utilizing the Business Design and Modeling Phase of the Business Process Integration Methodology applied to the Product Review process from RosettaNet. Analyzing the work performed of integrating the two companies processes lead to the conclusion that the analyzed phase of Business Process Integration Methodology, i.e. Business Design and Modeling is well suited for handling the Business Operation View in the Partner Interface Process specification put forth by the RosettaNet. Business Process Integration Methodology lack a requirement phase that could give developers guidance identifying the most relevant issues. RosettaNet does not discuss the problems when it comes to aligning the legacy systems towards the specified scenarios.

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1 Introduction

Organizations and their IT-support have been organized around the business functions and therefore IT-support has focused on the problems specific for the function. Typical business functions are purchase, manufacturing and marketing. The issues specific for the function is well penetrated. This is a vertical approach.

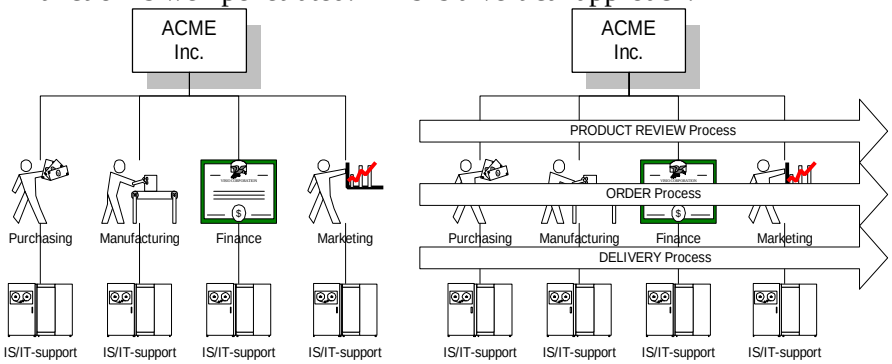


Figure 1 Function oriented structure, versus Process oriented organization.

Several new management principles are stressing a shift from functional approach towards process-oriented approach, for creating value to the customer[1]. A process oriented approach means that you are focusing on the value adding activities in the organization. A business process span several functions in a company. This is a horizontal approach. On top of this a shift towards inter-organizational cooperation is taking place in several industries, exemplified by virtual enterprises and supply chains. The horizontal approach give rise to application and process integration issues that need to be resolved, when old legacy system needs to cooperate in a way that they weren't originally constructed for. For instance, process control systems need to be fed with control information and to forward data to higher-level systems such as enterprise resource planning systems. There are presently two major technologies for accomplishing the integration between applications and processes: Message brokers and business process brokers.

Message brokers implements loose coupling between applications. Typical message broker functions are: communication connectors for transporting messages; format connectors for describing different message types, such as EDI Edifact and XML; technology connectors for connecting to different applications that are implemented using different technologies, e.g. different database management systems and programming languages; message routing for redirecting message flows; message format conversions for transforming messages between different formats[2].

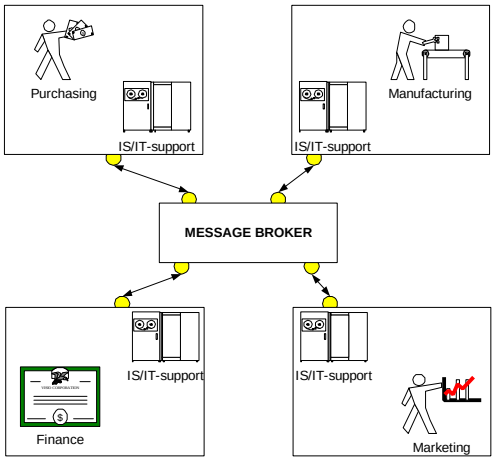


Figure 2 Message broker

Business process brokers, gives the ability to transfer content between business-processes acting as sender and receiver. A business process broker provides a higher level of abstraction than a message broker. They provide the ability to define integration requirements through workflow and business process models. A business process broker will provide functions for synchronizing events into one business transaction, handling parallel business transactions, mixing email (person to person) and application (machine to machine) messages in one business transaction.

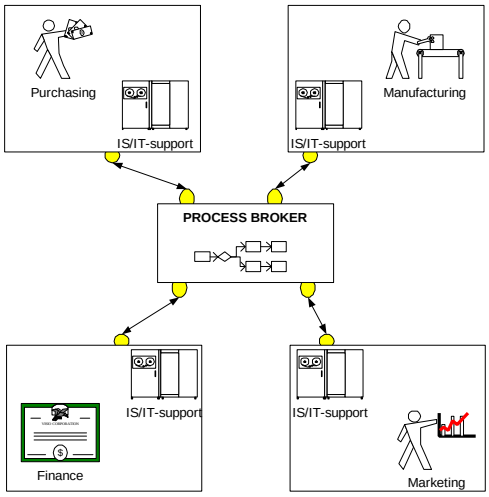


Figure 3 Process broker

The higher level of abstraction also opens up the support for graphical notations that are possible to interpret by a larger audience, preferably business people, but also opens up for a more a higher level of design of IT-systems supporting the business processes. The need for methodology to support the design process of IT-systems applies for process brokers as well as any other tool. There are several methodologies that give support to business process modeling. This paper is going to investigate the analytical capability of Business Process Integration Methodology[3] on a process integration case between two organizations.

For years business transactions has been exchanged electronically between organization using format standards like Edifact, ANSI X12 and more. This is called EDI, electronic data interchange, and it means the exchange of structured (according to a standard) messages, that are machine interpretable, and also sent electronically, without the intervention of human being. The EDI standards define formats on a transaction level. In different industries, for instance the automotive industry, recommendations are given out to help organization implement this inter-organizational cooperation, by specifying communication protocols, best practices of business transaction, interpretations of business transactions and more. The driving forces are to reduce lead times, reduce the capital employed, more accurate information. With the advent of internet the orientation towards process orientation and the ever increasing demand for reduced lead times, reduced capital employed and accurate information, new concepts like "BizTalk", "Open buying on the Internet", "RosettaNet" and more, have been put forth for handling the integration between organizations. These concepts for integration aim at leveraging the benefits of the Internet with the benefits of modern management and principles for EDI.

RosettaNet[a] is an organization in the electronic component and information technology industry, which aim at creating business scenario specifications that encompass all aspects of a business relationship. The saving potential is enormous if the supply chain in the electronic component industry can be more efficient. As a counterweight to the EDI industry RosettaNet[4] suggest the use of Internet as a transporter of the business transaction, instead of using expensive protocols and private networks like value added networks or X.25 and more. Also embracing new format technologies like XML instead of Edifact or ANSI X.12; lightweight transportation protocols like HTTP; addressing security issues with SSL and more.

This paper is going to use a business scenario specification given out by the RosettaNet, which defines the activities that exists between two inter-organizational processes in the electronic component and information technology industry.

Methodologies for support of developing IT-system that can leverage inter-organizational cooperation as well as organizations standardizing interoperability business scenarios are demanded for. This paper investigates if one chosen methodology can leverage such standardized business scenario specifications like the RosettaNet.

[a] Rosetta Stone, is a basalt slab inscribed by priests of PTOLEMY V in hieroglyphic, demotic, and Greek. Found (1799) by troops of NAPOLEON I near the city of Rosetta, N Egypt, it is now in the British Museum. The stone provided J.F. CHAMPOLLION and other scholars with the key to translating Egyptian hieroglyphics.

1.1 Used term

The following terms is defined because they are central terms in this paper. To aid the understanding of the following descriptions on Business Process Integration Methodology and the RosettaNet an elaborated description is provided, early in this paper.

Business Process Integration Methodology, Methodology for aiding the process of implementing business process integrations in and between organizations.

BPI, Business Process Integration, a modeling object representing the process between two or more roles defined by Business Process Integration Methodology.

BIA, Business Integration Application, a modeling object representing a discrete unit of work between one or more roles that can be used as a building block in a BPI.

Business Modeling Language is a part of Business Process Integration Methodology. Business Modeling Language consists of graphical modeling objects and a scripting notation that are used to express integration models.

PIP Partner Interface Process, discrete unit of work that is performed between two partners. Defined by the RosettaNet

1.2 Purpose

The purpose of this paper is to test the following hypothesis:

Business Process Integration Methodology is suitable for handling those recommendations and guidelines, published by the RosettaNet, describing, on a business level as well as on a technology level, how to integrate applications over the Internet in the electronic components and information technology industry.

1.3 Method

To investigate if Business Process Integration Methodology is a feasible way of leveraging RosettaNet specifications, an implementation of a RosettaNet scenario need to be performed. RosettaNet is a new phenomena on the market and so is Business Process Integration, this add up to that there are no real world implementation using these two concepts in conjunction with each other. To be able to perform the hypothesis test, a constructed “real world” case is provided, see section 3.3 below. The case is simplified to not confuse the reader with irrelevant details, to keep the focus on applying the Business Process Integration Methodology on the RosettaNet specifications. The implementation follows the information-needed method for creating the Business Process Integration, moulding the information from the requirements phase and the RosettaNet specifications.

Some people could argue using a made up case, as self-fulfilling the purpose of this paper. The methodology test is performed strictly on the RosettaNet specifications. The purpose of the case is to put clothes on the theories and make it less abstract.

The selection of RosettaNet PIP1B1 was made because it addresses one of the fundamental prerequisites when doing eBusiness, secure the supply of valid item data. Also this process covers all aspects of working with RosettaNet specifications. Hence PIP1B1 Manage Product Information Subscription was selected.

1.4 Scope of limitations

The investigation of Business Process Integration Methodology, as a feasible methodology to realize recommendations put forth by the RosettaNet; demarcate itself to analyze the business scenarios, Business Operational View, that RosettaNet specify. These scenarios are called Partner Interface Processes. RosettaNet specify scenarios on a business level and a technical level. The hypothesis test will concentrate on the phase Business Design and Modeling. Business Model Language is a graphical notation and also a part of Business Process Integration Methodology, and is used to express business process integration models. Defining information structures to realize the message exchanged in the analyzed scenario, is deferred. Business Process Integration Methodology place weight on actors/roles participating throughout the lifecycle, thus contributing to the successful completion of application integration projects. This paper does not elaborate on this, i.e. the benefits with identifying actors/roles. RosettaNet publish several papers describing eCommerce scenarios, for the purpose of this paper one representative scenario is selected. Nor are technical issues surrounding the physical transportation and protocols used to send and receive information over the Internet regarded.

1.5 Outline

Section 2 Business Process Integration Methodology and RosettaNet explained, will elaborate on the theories that are used later in section 3 Implementing Product Review process.

Section 3 Implementing Product Review process describes the efforts performed in order to integrate two inter-organizational processes with each other.

Section 4 Analysis and conclusion, analyze the steps performed in section 3.3 Implementing Product Review and describe the outcome of the hypothesis test related to the problem.

2 Business Process Integration Methodology and RosettaNet explained

This chapter provides the theoretical platform for the continued work with the hypothesis test. First the Business Process Integration Methodology will be described, explaining the different phases in the methodology. After that the RosettaNet will be explained, describing shortly what this phenomenon is, and also how the specification given out is structured, i.e. on a level applicable for this paper.

2.1 What is Business Process Integration Methodology

Business Process Integration Methodology[3] is developed for assisting organization creating and operating business process integrations. The methodology defines:

- Participants
- Phases
- Analysis methods

To express the models needed in the business design, technical design and operations phase a modeling language is described, Business Modeling Language[3] or BML. Before walking through the methodology Business Modeling Language is explained. Business Process Integration Methodology does not define the requirements phase.

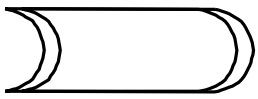
2.1.1 Business Modeling Language

Business Modeling Language consists of graphical modeling objects and a scripting notation, which are used to construct the BPI (business process integration) and BIA (business integration application) logical models.

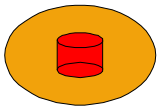
2.1.1.1 BPI Modeling Objects

There are five modeling objects:

A *BIA* (business integration application) is an operative sub-system of a BPI. A BIA contains the logic for describing how integration and processing takes place.



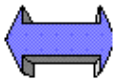
A *BPI* (business process integration) is an operational system that implements integration between business processes. A BPI consists of “sub”-BPIs and BIAs.



A *business application* is a software program that adds business value to a business process.

A *business user* is an *actor* who interfaces with a BIA through one of the following *BIA modeling object*s:

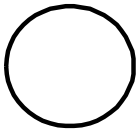
- Send message
- SendReceive
- ReceiveSend



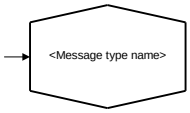
An *interface* is some type of information exchange between a *BPI/BIA* and a *business applicatio*n, *business user* or another BPI/BIA. An interface can also be a *format* or some connector types.

2.1.1.2 BIA Modeling Objects

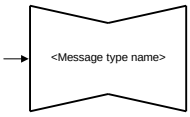
BIA modeling objects are used to construct the BIA logical model. There are ten BIA modeling objects:



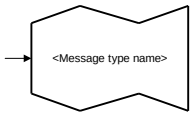
A *Wait for Event* object represents an instance of the BIA waiting for something to occur. These can be events in the form of incoming messages, or the expiration of a timer. Depending on the message that is received, different paths in the BIA processing can be taken.



The *Send Message* object represents the sending of some kind of information, in the form of a message, to a role (system or individual). In theory this could be any type of message. To give some examples, an EDI (Electronic Data Interchange) message, a fax, pager message, SMS (Short Message Service) message, or e-mail message.



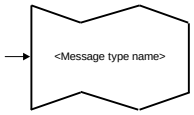
A *Receive Message* object represents the receiving of a message. In theory the message can be of any type, i.e. an EDI message, receipt of notifications via fax, pager messages, SMS messages, or e-mail messages could all be modeled using this object.



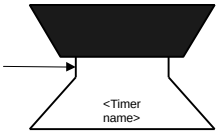
A *SendReceive* object represents the:

1. Sending of message to a role (an API, application, system, or individual)

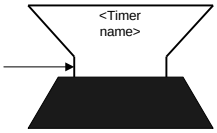
2. Waiting for a response.



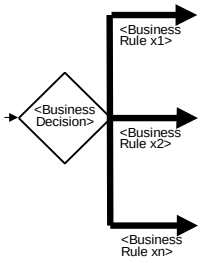
A *ReceiveSend* object represents the receiving of, processing of, and response to, a message from a role (system or individual). In theory the incoming and outgoing messages can be of any type. To give some examples, EDI messages, fax messages, pager messages, SMS messages, or e-mail messages could all be modeled using this object.



A *Start Timer* object represents the starting of a timer. A Start Timer is used to model the time perspective relating to manual interventions and delays in a business process.

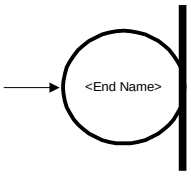


An *Expire Timer* object represents the receiving of the event that a timer has expired. Every Expire Timer object must have a corresponding Start Timer object of the same name. This is modeled using a Wait for Event between the two timers objects.



An *Automated Business Decision* object will dynamically change the flow of a BIA instance depending on the outcome of business rules. This object is used to model a business decision. Depending on the result of the decision, different paths in the BIA processing will be taken.

An *Automated Business Activity* object performs a number of predefined operations on a BIA data instance.



An *End* object is used to indicate that the execution of the BIA instance stops at this point.

2.1.1.3 BML Script

BML script is used to define additional functionality inside an object in a BIA.

2.1.2 Participants

The following *actors* participate in developing and running business process integrations:

Business Manager
The Business Manager provides the Business Designer with the business problem and identifies any *observables* and *business parameters* that need to be monitored, or changed during operation of the BPI/BIA. Once the BPI/BIA has been developed and deployed, the Business Manager monitors, or changes, business parameters in running BPIs/BIAs to optimize the overall business performance.

Business Modeler
The Business Designer models the business process integration in Process Manager.

Business Operator
The Business Operator evaluates the running BPIs/BIAs, making any necessary modifications, modifying business parameters, and bringing BPIs/BIAs in and out of production.

Business User
Business Users send information to, or receive information from, a running BPI/BIA.

System Programmer/System Operator
The System Programmer, or System Operator, configures the process broker, configures communications, and monitors and analyzes system performance metrics.

Technical Designer
The Technical Designer writes Process Manager scripts, configures the process broker, and designs advanced mappings.

2.1.3 Phases

There are three phases in developing business process integration:

- Business design and modeling
- Technical design and implementation
- Operations

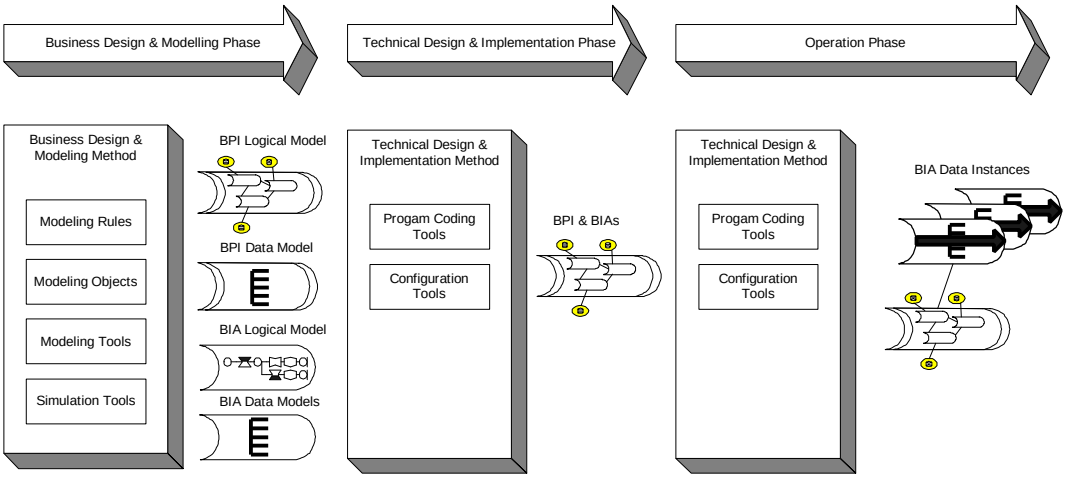


Figure 4, Business Process Integration Methodology phases

2.1.3.1 Business Design & Modeling Phase

In this phase the focus is on the business process issues. Typically a Business Manager and a Business Modeler work together. The Business Modeler produces the:

- BPI data model
- BIA logical model
- BIA data model
- Organizations
- Roles
- Message types

When developing a BIA logical model some key objectives for the Business Modeler are to, remove human decision if possible, include automated decisions where possible, include automated filtering and inform the business user, include detection's of expected events that do not occur and inform the business user.

2.1.3.2 Technical Design & Implementation Phase

In this phase the Technical Designer performs the rest of the work that the Business Modeler does not have the technical skills for to complete a BPI/BIA design, such as developing any Java code for BML scripts, or configuring supporting middleware.

2.1.3.3 Operations Phase

In this phase the BPI/BIA runs in production. During production the Business Manager can monitor any observables and make modifications to business parameters that affect the running of BIA instances. Business users receive and provide input to BIA instances as they run. Business Operators manage exceptions and monitor BIA instances that are running.

2.1.4 Analysis Methods

There are many analysis methods available for you to choose from. You could, for example, choose a top-down analysis method, or a bottom-up method. Below is the information-needed method provided?

Information Needed Methodology

The *information-needed* method is a bottom-up analysis method. Its purpose is to create a BPI/BIA that helps a Business User to receive information faster and more accurately, enabling them to make more qualified decisions. This type of BPI/BIA is particularly effective when there are multiple information sources.

The method has the following steps:

1. Identify business users in the organization who do not receive the information that they require, or that do not receive it in a timely fashion.

2. Identify the source of the required information - whether it is an application or a person.

3. Make an initial analysis and identify the most efficient place for the business process integration.

4. Identify the unique information for any single instance of this information - this will be the key for the BIA.

5. Design the messages that contain the information that is required by the business users.

6. Develop a BIA logical model.

7. Develop a BIA data model.

8. Develop Business Model Language scripts for any automated decisions.

9. Reiterate these steps until the BIA is ready to be deployed.

2.2 What is the RosettaNet

RosettaNet is an organization in the electronic component and information technology industry that have joined forces to address the need for more accurate information throughout the supply chain. RosettaNet is suggesting the use of Internet and related technologies to achieve informational transparency in the supply chain. RosettaNet are providing specifications that encompass all aspects of an automated business relationship. Figure 5 specifies the different levels that RosettaNet addresses.

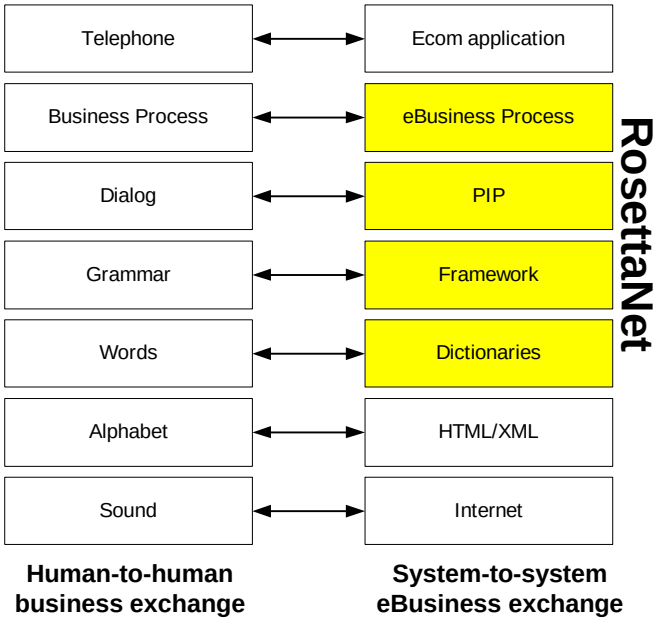


Figure 5 Manual versus automatic business process

A comparison is made between RosettaNet specifications that define the machine-to-machine business relationship and a human-to-human business relationship. In place today are the legacy systems, enterprise resource planning system, and more. These application need to be completed with a RosettaNet business interface to be able to participating in this supply chain wide eBusiness Process. The eBusiness Process comprises a set of PIPs (Partner Interface Process). The PIPs are built on terms derived from dictionaries and frameworks applying certain processes.

RosettaNet comprises several foundational projects, as a part of these; two dictionaries are being developed to provide a common basis of properties, which are demanded by the PIPs. The first is a technical dictionary containing technical specifications for all product categories, and the second is a business dictionary comprising partner properties (attributes which is used to describe supply chain partner companies) and business transaction properties. These two dictionaries paired with RosettaNet implementation framework, form the basis for every RosettaNet Partner Interface Process.

The purpose with every PIP is to enable every developer with a common base of business and data models and documents to implement the RosettaNet electronic business interface. Every PIP includes:
- XML[b]-document based on the implementation framework DTDs[c], which specifies the PIPs services, transactions, messages which includes dictionary properties
- Class and sequence diagrams in UML[d]
- Validation tools
- Implementation guide

2.2.1 RosettaNet Partner Interface Process

A PIP depicts the activities, decisions and Partner Role interactions that fulfill a business transaction between two partners in the supply chain. Each partner participating in the partner interface process must fulfill the obligations specified in a PIP. If any partner fails to perform a service as specified in the PIP implementation guide then the business transaction is null and void.

PIP Specifications[5] include three major sections. These three specifications represent three different levels of abstractions. For the purpose of this paper the BOV will be further investigated.

- Business Operational View (BOV), describe the business goal that the Partner Interface Process is supposed to achieve.
- Functional Service View (FSV), describe the transaction dialog.
- Implementation Framework View (IFV), include message guidelines and protocols for communications between software components.

For a sub-process to become a PIP it needs to fulfill certain criteria:

- Have a measurable business outcome or output;
- Not contain proprietary business processes;
- Preferably contain more than one role interaction; and
- Be a discrete unit of work that can be attached and built into other PIPs to achieve a larger business outcome.

2.2.2 RosettaNet PIP Blueprint components

RosettaNet blueprints contains the following sections:

- Business process definition
- PIP purpose

[b] XML, Extended Markup Language, a simple and yet powerful subset of SGML (Standardized Generalized Markup Language).
[c] DTD, Document Type Definition, used to describe (meta data) XML-files and also to validate them.
[d] UML, Unified Modeling Language, a language for capturing knowledge (semantics) about a subject and expressing knowledge (syntax) regarding the subject.

- PIP business process flow diagram (figure)
- PIP start state
- PIP end state
- Partner role description (table)
- Business activity descriptions (table)
- Business activity performance controls (table)
- PIP business documents diagrams (table)[e]
- Business data entities[e]
- Business data entity security[e]

2.2.2.1 Business process definition

This section defines the business process as well as some of the supply chain issues surrounding this process. The purpose of this section is to provide PIP context for the RosettaNet member who evaluates a PIP blueprint but is not familiar with the associated business processes within the supply chain.

2.2.2.2 PIP purpose

This section simply describes the business reasons for implementing this PIP.

2.2.2.3 PIP business process flow diagram (figure)

The PIP business flow diagram illustrates the e-Business activities and business documents that are exchanged, it does not illustrate communication level activities, e.g. acknowledgement of receipt etc…

A PIP begins as the start state is confirmed and a business document is sent to a partner. The partner confirms the receipt and sends a confirmation business document to the partner who originated the transaction. The transaction either succeeds, must be retried, or fails. A success state is achieved when the transaction is processed. Retrying a process would be required when, for example, a non-receipt of confirmation, system failure, or other problematic event occurs. An example of a failure is an incomplete transaction even after retrying.

Notation for the diagram is the Unified Modeling Language (UML).

Solid vertical lines define regions of the diagram called swim lanes. Within a single swim lane are the activities performed by the trading partner role. The name of the role is indicated at the top of each swim lane.

[e] Not in scope for this paper.

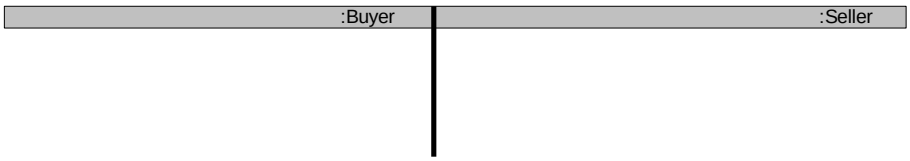


Figure 6 Swim lane

A rectangle with rounded sides represents either a business activity or a receiving activity. An activity type in angle brackets is also present to indicate what type of business transaction is about to be performed.

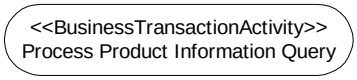


Figure 7 Business activity

There are four types of business activities.

<<BusinessTransactionActivity>>, has an input document as well as an output document. The receipt or transmission of business data within a business transaction activity triggers business processes within the organization. Examples are invoices, purchase orders and delivery notes.

<<QueryResponseActivity>>, has an output business document as well as an input business document. Involves the use of interactive systems, such as catalog and inventory services, where an immediate response is required. This business activity has a performance timeout for the responding business document, meaning the response must be received by the initiating business activity within a certain time frame.

<<InformationDistributionActivity>>, has a sending Business Document but no responding business document. The activity is for distribution of information, (e.g., price catalogs or technical data), which will be read and may be updated as well as retained by the recipient company. This business activity does not have a performance timeout because a responding business document is not utilized in the Information Distribution Activity.

<<NotificationActivity>>, has an output document but does not have an input business document. This business activity is used for notification only, such as canceling a purchase order.

A rectangle with straight sides represents a business document.

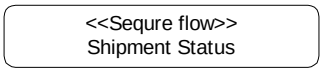


Figure 8 Business document

A business document always connects the activities of two different partner roles across two swim lanes. A business document labeled with <<Secure Flow>> indicates that point-to-point security for the partner role interaction is used. The content is protected against unauthorized disclosure or modification and the role activities are protected against unauthorized access.

The circles marked START, END, and FAILED indicate the start and successful or unsuccessful end of a business process flow diagram

Figure 9 Start, end and fail state

The arrows between the activities are called “triggers” because they trigger the next activity in the process

Bracketed text on an arrow is called a “guard” and indicates a condition of the activity. For example, [FAILED] means that the activity connected to an arrow has failed.

A diamond with multiple arrows extending from it is called a “decision box”. The arrows direct the process along different paths based on the answer to a question.

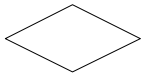


Figure 10 Decision box

The decision box is diamond shaped and a question is stated next to the box that requires a decision to be made. The process flows in different directions based on the answer to the question. The decision box will be often used on a diagram that contains different business activities based on an initial question. The possible answers to this question will shown as “guards” (bracketed words) on arrows pointed away from the decision box.

2.2.2.4 PIP start state

The PIPs start state condition need to be in place before executing a PIP. The PIP start state condition would be one of the answers to the question asked (a question always belongs to a decision box).

2.2.2.5 PIP end state

The PIPs end state condition need to be in place after executing a PIP. The PIP end state condition would be one of the answers to the question asked

2.2.2.6 Partner role description (table)

The partner role descriptions table lists and describes the partner roles participating and performing activities in a PIP. The role types, which perform the PIP interactions, are indicated for these partner roles. The column headings are listed below and described.

Role Name, the name of the role that participates in the business process and performs activities.

Role Description, a general description of the role in terms of what type of activities it does.

Role Type, can be an employee, an organizational role or a functional role. An organizational role means that an organization performs the activities in an e-Business process. An employee does not perform

activities. For either business or legal reasons an employee role is used only when an employee can perform these activities. A functional role can either be an employee role or an organizational role.

2.2.2.7 Business activity descriptions (table)

The business activity descriptions table lists information about the business activities performed by the partner role and the condition related to the activities in the PIP. The table column headings are listed below.

Role Name, the name of the role that performs the business activity.

Activity Name, the name of a business activity performed by the associated role.

Activity Description, a description of the business activity and what it does.

Pre-Conditions, are constraints that must be satisfied before the business activity can be performed.

Post-Conditions, are constraints that must be satisfied after the performance of the business activity.

2.2.2.8 Business activity performance controls (table)

The business activity performance controls table details the security, audit and process controls that are required to protect content against unauthorized access. The audit controls are required to check the integrity of the business process. The table column headings are listed below.

Role Name, the role name of the role performing the business activity.

Activity Name, the name of the business activity to which the security controls is to be applied.

Non-Repudiation of Receipt Required, if required then the business activity must store the receipt for a mutually agreed to period of time. This control prevents a responding partner role from later denying that they received a business document.

Time to Acknowledge Receipt, the time within which a partner role that initiates a role interaction must receive acknowledgement that a business document is received by a responding partner role. A receipt business signal can only be returned if the business document is syntactically correct and structured valid.

Time to Acknowledge Acceptance, the time within which a partner role that initiates a role interaction must receive acknowledgement that a business document is accepted by a responding partner role. A non substantive acceptance business signal or substantive acknowledgement business document must only be returned if the business document is valid with respect to the receiving partner role’s business rules.

Time to Perform, the time within which the initiating activity must be successfully performed.

Retry Count, the total number of times that the listed activity is retried in addition to the initial attempt to perform (i.e. one initial attempt plus three retries equals a total of four attempts to perform). An activity is retried when the activity times out based on the longest timeout specified. Only when the timeout parameter has expired does the entire process roll back to the originating business activity. If an error occurs then the activity ends.

Is Authorization Required? Partner roles performing activities that interact with this business activity require authorization to be performed. An authorization exception is signaled if a role is not authorized to initiate this business activity. Authorization for a business activity can be specified at an employee or organizational level.

Non-Repudiation of Origin and Content? If non-repudiation of origin and content is required then the corresponding

3 Implementing Product Review process

This chapter describes the implementation of the Product Review process that is a RosettaNet process between two business entities. The purpose of implementing this process is to provide a business entity seeking product information from another business entity distributing product information.

3.1 A Supply Chain Set Up

This section describes the business case and defines which process to implement the Business Process Integration Methodology logic on. The business case is not real; it's made up for the purpose of this hypothesis test. The analysis focuses on the Business Design & Modeling phase utilizing Business Model Language to express the logical models that align the RosettaNet specifications. The test case exists to make the analysis less abstract and hopefully more understandable.

ACME Inc. a company with a long tradition in the electronic component industry, has come to the conclusion that to be able to keep up with ever increasing demand for shortening lead times, decided to increase the level of integration. Today they are exchanging EDI orders and order response with several of their major suppliers. One of many identified problems today is the rate of introduction of new products and getting hold of the correct product description to make it possible to order the product. After doing a survey on what means they could use to achieve shorter lead times and correct product information, they settled with a new concept created by the joint effort of the electronic component industry and the information technology industry, called the RosettaNet. Since ACME Inc. already had a working relationship exchanging EDI messages; they approached their most strategic supplier, Xenitec HB, with the proposition of introducing a new, more far going way of integrating their companies.

A project team started with identifying the processes between the two partners and came up with suggestion on how the both companies had to change their current applications to align current processes with those suggested by the RosettaNet. Furthermore they presented a working order of implementing the eProcesses defined by the RosettaNet.

The first Project was to implement the eBusiness process "Product Review". The purpose of "Project Review" is to enable the exchange of product information to create a common base of understanding, e.g. possibility to exchange product data, exchange of a product catalogue, exchange Partner information etc…

3.1.1 Applying the Product Review Process

RosettaNet defines six major processes, Product Review, Product Introduction, Order Management, Inventory Management, Marketing

Information Management and Service and Support. Each of these major processes can be broken down in to smaller discrete processes. These sub-processes are defined in the partner interface processes, the PIPs.

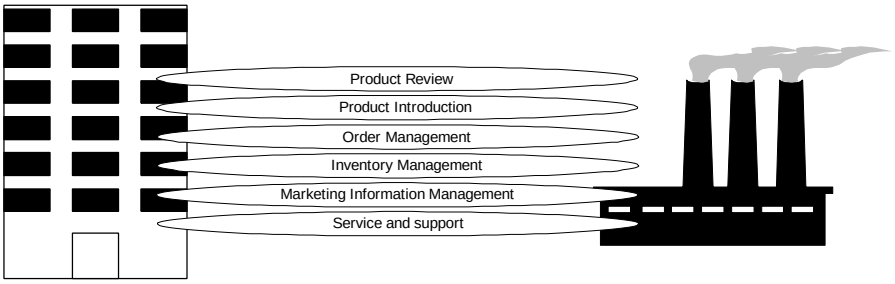


Figure 11 Identified processes between ACME Inc. and Xenitec HB

Also in the case of ACME Inc. and Xenitec HB, the same processes exist as defined above. The logical order of approach, were first Product Review, second the Product introduction and third Order Management, the others were deferred for later implementation.

The Product Review process contains the PIP, Manage Product Information Subscription, which lays the groundwork for the organizations to exchange data that are going to be used in other processes like the Production Introduction and Order Management process.

This means that ACME Inc. will act as Product Information Subscriber and Xenitec HB as Product Information Distributor and thus laying the groundwork for adding, changing and canceling subscriptions for Product information.

3.2 Manage Product Information Subscription

To be able to let ACME Inc. retrieve and have Xenitec HB send product information to each other there have to be system developed for subscribing on information distributions. ACME that whishes to subscribe on information uses a RosettaNet PIP, called Manage Product Information Subscriptions[6]. There are three different subscription messages that ACME Inc can send Xenitec HB, these are create, change and cancel subscription. Below, the process for creating, changing and cancel the subscriptions is depicted. ACME Inc is acting as Product Information Subscriber and Xenitec HB is acting as Product Information Distributor.

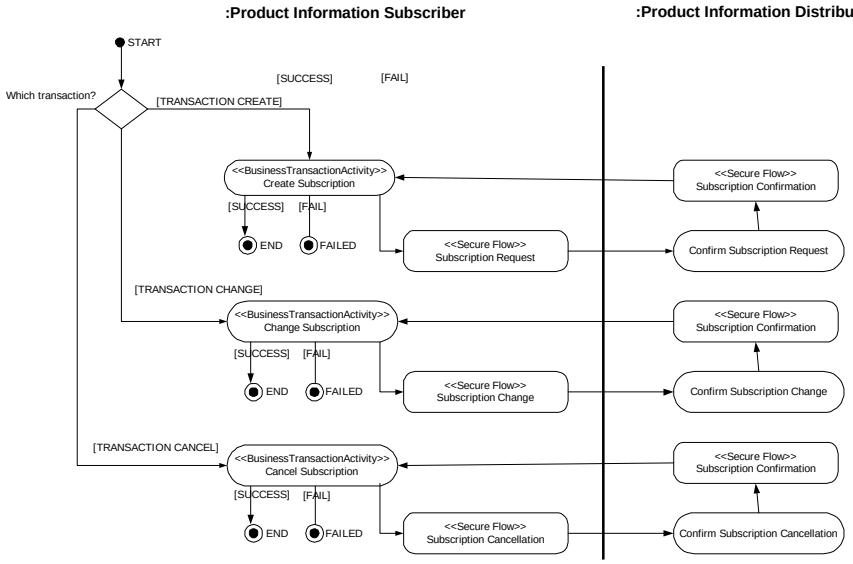


Figure 12 Manage Product Information Subscriptions[f]

3.2.1 PIP Start State

To be able to start the process several conditions has to be met. Either a subscription exists or needs to be created. The transaction property [TRANSACTION] must equal either create, change or cancel.

3.2.2 PIP End States

A process can end in two ways it is either a success or a failure. For the successful ending of a subscription for product information creation, change or cancellation, either of the end conditions is met. They are "Subscription Exits", "Subscription Changed" or "Subscription Canceled". A subscription transaction fails if one of the following conditions is met, the "Notification of Failure" PIP has been executed, (this is a RosettaNet convention or the subscription does not exist or

[f] PIP1B1: Manage Product Information Subscriptions, Release 1.0 14 November 1999, Published by RosettaNet (1999), URL: http://www.rosettanet.org/, Figure 3-1: Manage Product Information Subscriptions

subscription change has not occurred or the subscription has not been canceled.

3.2.3 Partner Role Descriptions

The table below describes which roles that perform activities in this PIP.

Role Name	Role Description	Role Type
Product Information Subscriber	The business partner that subscribes to product information from other business partners.	Functional
Product Information Distributor	The business partner that distributes product information to subscribers.	Organizational

Table 1 Partner Role Description[g]

3.2.4 Business Process Activity Controls

The table below describes the interaction contract between roles performing business activities in this PIP.

Role Name	Activity Name	Activity Description	Pre-Conditions	Post Conditions
Product Information Subscriber	Create Subscription	Activity creates a subscription for product information.	Subscription expression, distribution format and notification address is provided.	Confirmation is received
Product Information Subscriber	Change Subscription	Activity changes a subscription for product information.	Subscription is provided	Confirmation is received
Product Information Subscriber	Cancel Subscription	Activity cancels a subscription for product information.	Subscription is provided	Confirmation is received

Table 2 Business Activity Descriptions[h]

The table below details the security, audit and process controls relating to activities performed in the PIP.

[g] PIP1B1: Manage Product Information Subscriptions, Release 1.0 14 November 1999, Published by RosettaNet (1999), URL: http://www.rosettanet.org/, Table 3-1.
[h] PIP1B1: Manage Product Information Subscriptions, Release 1.0 14 November 1999, Published by RosettaNet (1999), URL: http://www.rosettanet.org/, Table 3-2.

Role Name	Activity Name	Acknowl. of receipt		Time to Acknowledge Acceptance	Time to perform	Retry Count	Is Authorization Required?	Non-Repudiation of Origin and Content?
		Non-Repudiation Required?	Time to Acknowledge					
Product Information Subscriber	Create Subscription	Y	2hr	N/A	24hr	3	Y	Y
Product Information Subscriber	Change Subscription	Y	2hr	N/A	24hr	3	Y	Y
Product Information Subscriber	Cancel Subscription	Y	2hr	N/A	24hr	3	Y	Y
Product Information Subscriber	Create Subscription	Y	2hr	N/A	24hr	3	Y	Y

Table 3 Business Activity Performance Controls[i]

[i] PIP1B1: Manage Product Information Subscriptions, Release 1.0 14 November 1999, Published by RosettaNet (1999), URL: http://www.rosettanet.org/, Table 3-3.

3.2.5 PIP Business Information

3.2.5.1 PIP Business Documents

The table below contains the business documents[j] that are exchanged by roles performing activities in this business scenario and also a description of them.

Business Document	Description
Subscription Request	A request to create a subscription for product information distribution.
Subscription Cancellation	Cancellation of an existing subscription.
Subscription Change	Change of an existing subscription.
Subscription Confirmation	Confirms the creation, change, or cancellation of a subscription.

Table 4 PIP Business Documents[k]

3.2.5.2 Business Data Entities

The business data entities[l] that make up the contents of the exchanged documents are not described, it is out scope of this paper.

3.2.5.3 Business Data Entity Security

There are no security controls specified for this process.

[j] The Business Documents can be downloaded from the RosettaNet Business Document Repository using the Uniform Resource Locator (URL): http://www.commercedesk.com/RosettaNetRepository

[k] PIP1B1: Manage Product Information Subscriptions, Release 1.0 14 November 1999, Published by RosettaNet (1999), URL: http://www.rosettanet.org/, Table 3-4.

[l] The business data entities, fundamental business data entities, and global identifying properties can be found in the RosettaNet Business Dictionary using the URL: http://apps.rosettanet.org/TechSheets/TSCompilations.nsf/ITTDcompilations?OpenView

3.3 Implementing Product Review

This section will apply Business Model Language modeling techniques to the RosettaNet PIP.

Using the Information Needed analysis method in Business Process Integration Methodology, as described in section 2.1.4, the relationships between ACME Inc and Xenitec HB will be defined. The analysis is performed from ACMEs perspective. Due to the fact that many of the steps in the method are not necessary to perform the hypothesis test, they are treated rather lucidly. But note that these steps are vital in an application integration project.

3.3.1 Identify business users

Procurement is a function within ACME, which bases their procurements on the net requirements calculation that is performed once every night, by the MPR (Material and Product Requirements) System. The challenge for procurements is to get hold of product information and update the internal system with the rapid change on product information, for example new revision of an I/O-card which generate a need to update the product information internally with the new revision, so that the latest or the needed version can be procured. The procurement function, at ACME Inc. has a procurement system for handling the different tasks connected to purchasing. The name of the system is “ProcSy” and it will act the role as Product Information subscriber.

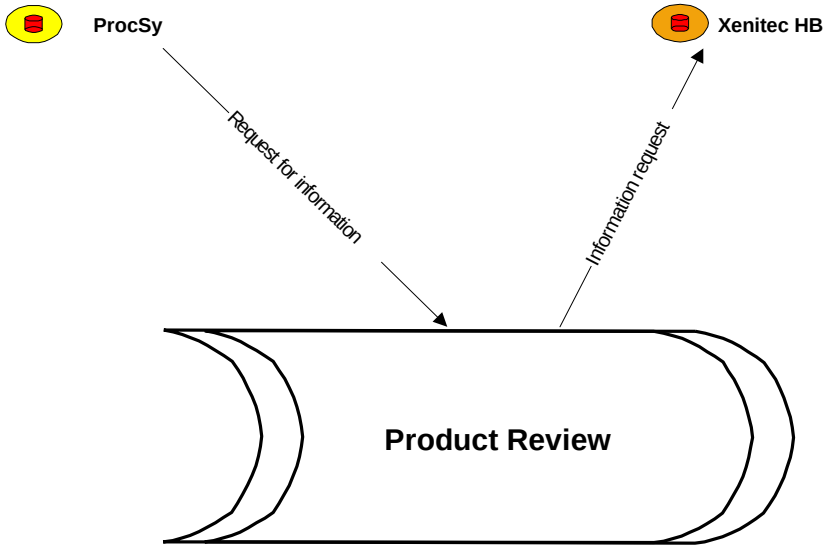


Figure 13 Initial overview of product review process

The figure is an example of how to depict initial requirements. This is produced early in the project and can be further refined.

3.3.2 Identify source of information

The same problem arises at Xenitec HB, every time a product is changed; the Market function needs to inform every customer (and potential customer)

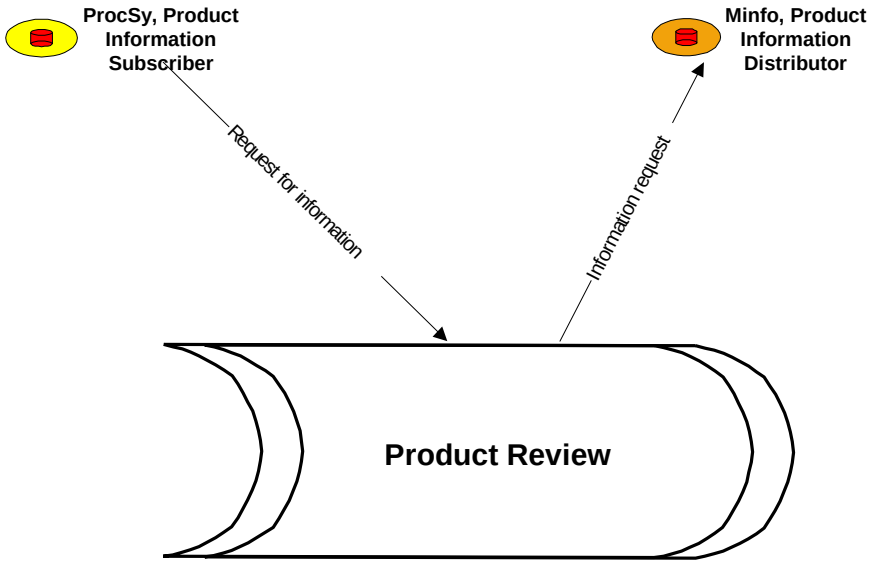


Figure 14 Refined product review process

that a new revision of product “this” has got a new and more efficient processor and that the prize is lowered $1.2 and that the new revision now has an index “–a” added after the product number, but that the old version is still available identified by the old product number.

The process of creating a new revision of a product involves several functions inside Xenitec HB. When all aspects are gathered and the product is ready for production, marketing communicates to their customers all the new features of the product. To be able to do this, all the market related information about the product is put into the marketing system, i.e. article number to make it possible to order, pricing information, etc… Marketing is responsible for the system that is referred to as “Minfo”. Minfo is going to act as Product Information Distributor.

3.3.3 Identify placement of integration

This is an integration between two different companies. In order to implement all the suggested processes put forth by the RosettaNet, one has to analyze where a suitable starting point would be. In this case the process to implement is already set, namely the “Product Review” process. The continued analyze has also identified the systems that should interact with each other. Technically the transactions are to be exchanged utilizing the Internet as a carrier. One technical point of integration could be to leverage the EDI-platforms with Internet.

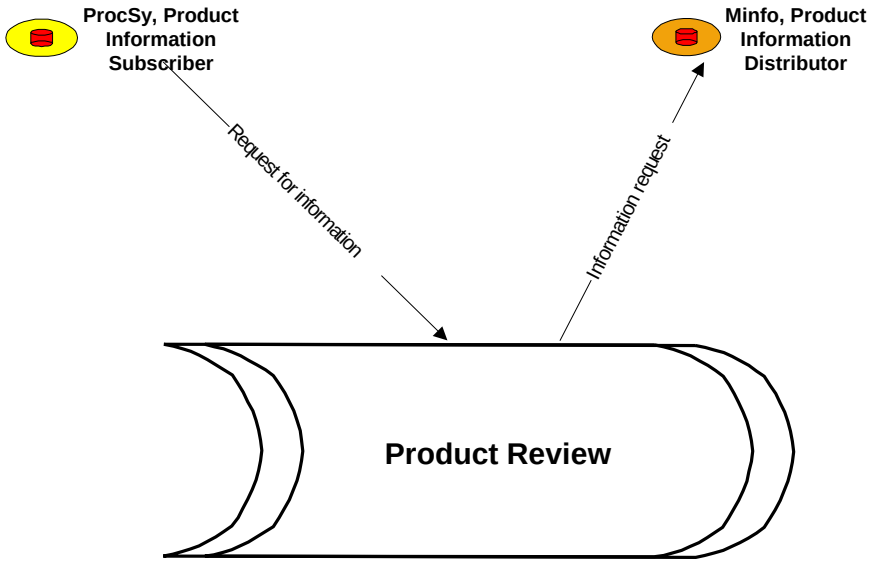


Figure 15 Integration points

On a Business level the integration point emerges between two applications, i.e. “ProcSy” and “ Minfo”, in the two companies.

3.3.4 Identify unique information

In ACME Inc. the system “ProcSy” contains contact information describing the suppliers. This functionality had to be augmented with the possibility to keep track on how product information was collected. For every type of message that is sent to a supplier, which creates, changes or deletes subscriptions for product information, a track record is kept. The record comprises information regarding type of subscription, subscription request number, and log identity from the EDI platform to be able to cross-reference the information from the application towards the transaction communicated to the supplier.

3.3.5 Design messages

The proposed process to be implemented consists of four different message types. Three of these message types, describes information that stem from the internal system, i.e. “ProcSy”. It’s information regarding the subscription of product information, i.e. create, change and cancel subscription. The fourth message stem from the supplier and is a confirmation of the received message.

RosettaNet defines the message types that are transported between the two different companies. However the originating information must be retrieved from the applications “ProcSy” and “Minfo”. The process of aligning the standard messages so that the contents can be passed to the application is referred to as mapping.

3.3.6 Develop a BIA logical model

3.3.6.1 BPI Product Review Process

To model the scenario described in the RosettaNet PIP1B1: Manage Product Information Subscriptions the roles and actors identified earlier are used as input for this first graph. The purpose of this first graph is to set the context of collaborating actors/roles and identify all the interfaces between them.

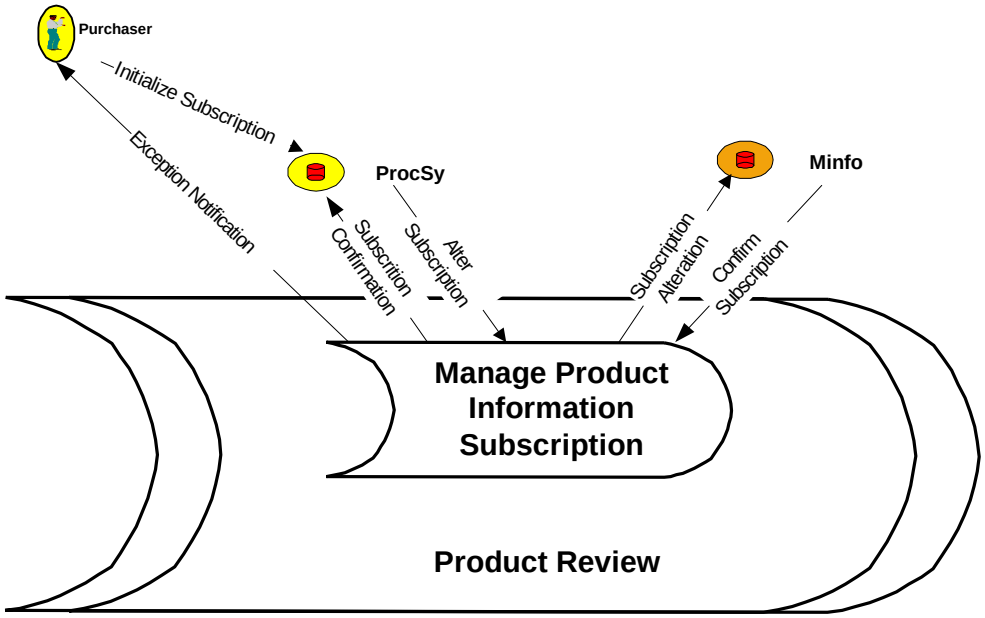


Figure 16 BPI - Product Review

In the BPI-graph there are 6 interfaces and three actors/roles identified. The purchaser is the role/actor who is responsible for initializing the “Manage Product Information Subscription” process. The purchaser interacts directly with procurement system and trigger business logic for producing a subscription transaction, or changing a subscription or canceling one. Either which way he chooses the “alter subscription” interface acts as intermediary between the application and the process broker. The process broker is initialized and instanciates the “Manage Product Information Subscription” process. “Subscription Alteration” interface act as intermediary between the process broker instance and the actor/role “Minfo” at Xenitec HB, who receives a message containing either subscription create, change or cancel. Minfo validates the received information and with the help of “Confirm Subscription” interface, acting as the intermediary between Minfo and the process broker instance, sends back a confirmation. The process broker instance receives the information and use the “Subscription Confirm-

interface", acting as an intermediary between the process broker instance and Minfo. After the conclusion the process broker instance is finished. If something goes wrong in the process, the initiating role/actor gets notified by the process broker instance, using the "Exceptions Notification" interface, acting as an intermediary between the process broker instance and the actor/role

3.3.6.2 BIA Alter Subscription

The purpose of the graph is to create the sequence of activities, describing the logic between roles and at the same time show the dependencies of time. The consequence of not conforming to time restrictions, generate exceptions to the proper instance, and the complete transaction is null and void.

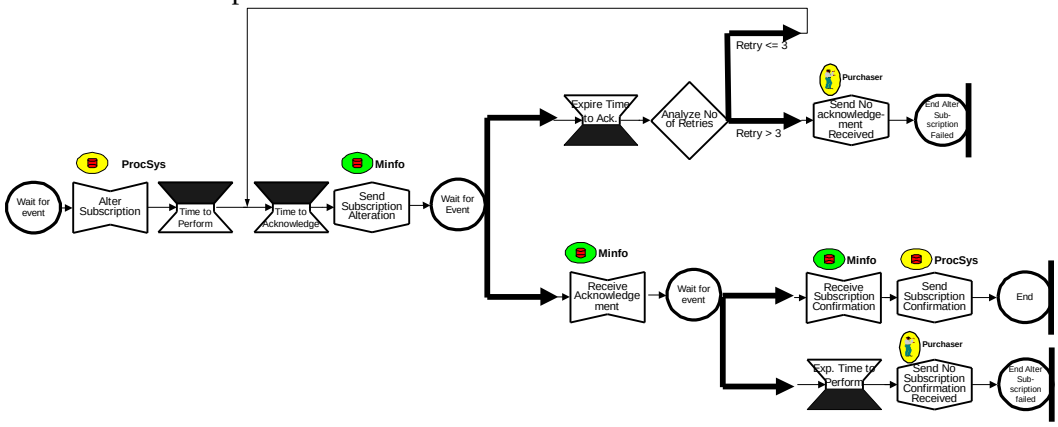


Figure 17 BIA Alter Subscription

The Initialize Subscription is implicit and not shown in this graph. When the BIA instance receives the "Alter Subscription" message from ProcSy two timers are triggered. The first trigger keeps track of the over all time to perform this process. The over all time to perform this process is 24 hours. The second timer keeps track of time elapsed before the acknowledgement for the subscription alteration is returned from Minfo. To acknowledge the transaction, the time is 2 hours. After "Subscription Alteration" has been sent, the BIA instance waits for an event to occur. There are two possible events that can occur. Either the time to acknowledge timer expires, or the acknowledgement stating the received message was received, syntactically correct and valid. If the timer expires then it triggers the automated business decision to checks how many times the "Subscription Alteration" message has failed. If it has failed more than 3 times, then the message "No Acknowledgement Received" gets sent to the initializing role, i.e. the purchaser. If it has failed less than or equal to 3 times then the "Subscription Alteration" message gets sent again and the timer "Time To Acknowledge" is reset to 2 hours. If the acknowledgement is received that means that the "Subscription Alteration" was syntactically correct and structured valid. After the reception of the acknowledgement the BIA instance waits for the next event to occur. Either the "Time To Perform" timer expires or the "Subscription

Confirmation" is received. If the timer expires, then the initializing role receives the "No Subscription Confirmation" message and the BIA instance ends, resulting in that nothing has been achieved. To accomplish a subscription alteration, the process has to start all over, i.e. the purchaser must initialize the request in the ProcSy system again. If the messages "Subscription Confirmation" is received then the subscription process is accomplished and the BIA instance ends.

3.3.7 Develop a BIA data model

Creating a data model is out of scope for this paper. Basically it's about creating a data structure that holds all the business parameters, constants, documents and common variables, for use in the executing program.

3.3.8 Develop Business Model Language scripts

Creating a Business Model Language scripts is out of scope for this paper. For instance creating scripts for the automated decisions in the BIA model. In this context the "Analyze Number of Retries" would have to be programmed.

4 Analysis and conclusion

The purpose of this section is to review the Product Review Process implementation against theories put forth in chapter 2 and find out if the hypothesis put forth in chapter 1 can be verified. The review will follow relevant parts of the used information-needed method.

4.1 Analysis

The information-needed method is a bottom-up method. The purpose of the method is to create a business-process-integration and a business-integration-application. The work is built upon the initial definitions work and the Business Operational View of the RosettaNet specification.

4.1.1 Identify business users

The information for this step is deducted from the initial definition work performed by the integration team, scrutinizing the organizations need for information. The method used for performing this work is interviews of business managers and domain experts. To depict informational relationships between applications and roles, a business process integration model is used.

Actors/roles are central to both Business Process Integration Methodology as well as RosettaNet. The identified users fit well in with roles defined in the RosettaNet, PIP, Partner Role Descriptions table, i.e. “Product Information Subscriber” and “Product Information Distributor”. The Product Information Subscriber is of type functional and can be performed by either a person or an organization. The Product Information Subscriber is of type organizational, and is depicted as such in the Figure 13 Initial overview of product review process. There is a fit between this step in the method and the RosettaNet specification.

4.1.2 Identify source of required information

Definition work, i.e. interviews with domain experts, also identifies the source of information needed. The business process integration model is further refined to reflect the increased knowledge of the problem domain. In this case the source of the required information is identified, i.e. Minfo at Xenitec HB.

The RosettaNet, defines several processes, this particular process, i.e. “Process Review”, describes a method for implementing a structure to create, change and cancel subscription amongst a community of cooperating business in the supply chain of the electronic component- and information technology-industry. This process addresses the needs encountered between the two companies.

4.1.3 Identify place for integration

The business process integration model that is used for creating an overview of all the relevant interfaces and roles in the system, points to suitable integration points on a business level.

RosettaNet is proposing the use of Internet as the carrier of all information transactions. Business Process Integration Methodology is not dependent on the technical issues with transporting the information and thus poses no problem in that respect. Every interface has a set of properties on a technical level that need to be addressed. Some interfaces are tables in a database. Other interfaces could be files in a directory.

4.1.4 Design messages needed by business users

RosettaNet defines all the message types that are to be transmitted between the participating actors/roles. For the purpose of this paper, this is out of scope. This does not mean that this is an unimportant step, quite the contrary this process will show if there really is application support for all the information pieces needed.

4.1.5 Develop a business integration application logical model

The creation of a business integration logical model is a work that starts with developing a business process integration model that captures all interfaces and roles that participate in the process. With these interfaces and roles the business process integration logical model can be broken down into several business integration application logical models. A business integration application logical model defines the flow of events that the information has to pass through to fulfill its purpose, also time taken into account. RosettaNet's business operational view specification contains all the information needed to create well-formed business process integration and business integration application logical models.

The RosettaNet's manage product information subscription; see Figure 12, and Business Process Definition together with the PIP purpose is used on a business level to identify the interfaces and roles to create the business process integration. To create the business integration application logical model, the emphasis lays on the PIP Business Flow Diagram and the table Business Activity Performance Controls. The information needed to create the business level logic in Business Model Language is condensed and well suited as it focuses on roles, activities and time, which is the building blocks of a business integration application.

4.2 Conclusion

The purpose of this paper was to conclude if Business Process Integration Methodology is a feasible methodology to handle the specification put forth by the RosettaNet. This paper has focused on looking at the expressive nature of Business Process Integration Methodology namely the Business Modeling Language and also following the steps of the information-needed approach that is an integral part of the methodology.

Performing the work on the test case leads to the conclusion that the modeling part of the analytical phase of Business Process Integration Methodology is well suited for handling the "Partner Interface Process" descriptions given out by the RosettaNet.

Hence the hypothesis is true.

The two phenomena that have been developed mutually exclusive from each other show great similarity regarding what is considered to be central building blocks, roles/actors, activities, and time. The reasons for emerging are disparate. The reason for Business Process Integration Methodology to emerge comes from a shift from simple integration using message brokers to a more complicated form of integration were complete processes in the organization needs to modeled. Thus leveraging modern management theory, which stress process orientation before functional orientation. The reason for RosettaNet to emerge comes from the need to cut back lead times, reduce capital employed, increase accuracy in predictions shorten the time from order to delivery. To achieve this a more developed inter-organization cooperation is needed. Building its assumption on work already achieved in the EDI industry and adding a farther going concept of how to integrate, taking every aspect of doing business into account. From their ways of looking at things they both ended up with theories identifying the central building blocks.

Business Process Integration Methodology needs to elaborate more on a requirement phase to be a more complete methodology. This is part that is lacking in the methodology today. Developers are in need of guidance to perform the requirements work. Not only for themselves but also for developing common practice within the organization.

RosettaNet describes scenarios to integrate processes with each other. Nothing is mentioned about the work that emerges when the companies try to leverage their legacy systems to fit the described RosettaNet processes. This is work can have far going consequences on legacy systems and standardized enterprise resource systems. Problems that can arise are, finding the right competence to do the actual changes, knowledge about the consequences when changing a system, organizational impact of a change.

5 References

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