ADAPTING ROSETTANET STANDARD FOR LOGISTICS MANAGEMENT INFORMATION SYSTEM

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ADAPTING ROSETTANET STANDARD FOR LOGISTICS MANAGEMENT INFORMATION SYSTEM

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ABSTRACT

In the RTAF (Royal Thai Air Force), deployment operations define the movement from home bases to final destinations by using aircraft. Awareness of fuel consumption must be available all the time because there are unexpected conditions. The stakeholders consist of the internal units and the external supplier. For the communication between different systems, standard data exchange was generated to decrease an information gap between systems. RosettaNet is a choice for use as it encompasses the business processes and documents.

This thesis explains the methodology of adapting the RosettaNet standard for Logistics Management Information System (LMIS) in the case of a fuel management system. First, mapping between PIPs and LMIS was done and then a data exchange framework was designed under the following headings: business process analysis, by using a swimlane diagram; business process reengineering; business processes mapping with the appropriate PIPs; and design of the business documents based on XML schema. The results demonstrate the architecture of data exchange for the fuel management and format documents based on XML schema.

The conclusion of this thesis is to propose the procedure for adapting RosettaNet in the fuel management of LMIS. Adding approval authority and the shortage quantity of elements are necessary because it is a regulation of the military. Furthermore, the utilization of the elements on PIPs are as follows: PIP3B2 9.49%, PIP4A2 26.36%, PIP4B2 15.15% and PIP4C1 9.62%. These percentages identify the usage of data in order to analyze primarily the electronics documents.

KEY WORDS: LMIS / RosettaNet / Fuel management / Deployment operation / Data exchange

156 pages

การประยุกต์ใช้มาตรฐานการเชื่อมโยงข้อมูลในระบบสารสนเทศเพื่อการจัดการการส่งกำลังบำรุง
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บทคัดย่อ

ในกองทัพอากาศ การเคลื่อนย้ายหน่วย (deployment) หมายถึง การเคลื่อนย้ายหน่วยจากที่ตั้งปกติไปสู่ที่ตั้งที่ได้รับมอบหมายโดยใช้อากาศยานในการลำเลียง สิ่งที่ควรคำนึงถึงเป็นอย่างยิ่งคือความต้องการน้ำมันเชื้อเพลิงต้องพร้อมอยู่ตลอดเวลา ผู้ที่เกี่ยวข้องกับการบริหารเชื้อเพลิงประกอบด้วยหน่วยงานทางทหารเองและผู้จัดหาเชื้อเพลิงที่เป็นหน่วยงานภายนอก ดังนั้นเนื่องจากระบบที่แตกต่างส่งผลให้เกิดช่องว่างในการติดต่อสื่อสารระหว่างกันทำให้จำเป็นต้องมีการสร้างมาตรฐานการเชื่อมโยงข้อมูล งานวิจัยนี้เป็นการอธิบายวิธีการในการปรับใช้ RosettaNet สำหรับระบบสารสนเทศเพื่อการจัดการการส่งกำลังบำรุงซึ่งมุ่งเน้นในส่วนของระบบบริหารเชื้อเพลิงโดยนำเสนอโครงสร้างการแลกเปลี่ยนข้อมูลตามมาตรฐาน RosettaNet โดยมีขั้นตอนต่อไปนี้ การวิเคราะห์กระบวนการทางธุรกิจโดยใช้แผนภาพ swimlane, การปรับรื้อกระบวนการทางธุรกิจ, เลือกกระบวนการที่สามารถแทนที่ด้วย PIP และการออกแบบเอกสารในรูปแบบของ XML schema ผลของการศึกษาวิจัยได้โครงสร้างการแลกเปลี่ยนข้อมูลและรูปแบบเอกสารที่ใช้ในระบบบริหารเชื้อเพลิง บทสรุปของงานวิจัยคือการนำเสนอขั้นตอนในการปรับใช้ RosettaNet สำหรับระบบบริหารเชื้อเพลิงการเพิ่มเติมในส่วนของผู้มีอำนาจในการลงนามและปริมาณการขาดส่งของเชื้อเพลิงเป็นสิ่งจำเป็นเพราะเป็นข้อกำหนดที่ระบุไว้ในส่วนของทหาร นอกเหนือจากนี้การใช้งาน elements ในแต่ละ PIP มีดังนี้ PIP3B2 9.49%, PIP4A2 26.36%, PIP4B2 15.15%, และ PIP4C1 9.62% สำหรับค่าที่ระบุนี้เป็นสิ่งที่แสดงถึงข้อมูลที่ถูกใช้งานจริงในแต่ละ PIP เพื่อใช้เป็นการวิเคราะห์เบื้องต้นสำหรับการสร้างเอกสารอิเล็กทรอนิกส์ต่อไป

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CHAPTER I
INTRODUCTION

This chapter will present the background and problem statement on Logistics Management Information System (LMIS). In addition, the objectives and scope of work will be discussed.

1.1 Background and problem statement

Currently, regional threats and the increase in global terrorist activity influence to challenge the peace and stability of all countries. Disasters are additional demands for rapid assistance under unexpected condition. Thus, military strategy and structure of logistics systems are reconsidered (Yildirim et al., 2007). In military logistics, an important operation is the deployment that involves the movement of military units from home bases to final destinations by using aircraft. Mission requirements and the time available to accomplish the mission are primarily planned under the crisis or contingency condition (Deployment and redeployment operations, 2004). For the effective deployment operation in the Air Force, fuel needs to be managed. The stakeholders for supported fuel consist of wing and fuel depots are the air force units, whereas the Petroleum Authority of Thailand (PTT) is an external supplier as shown in figure 1.1. Therefore, the data exchange cannot be used efficiently because of the information gap between systems. For example, fuel consumption is necessary information for data exchange between fuel depot and PTT in order to support an aircraft.

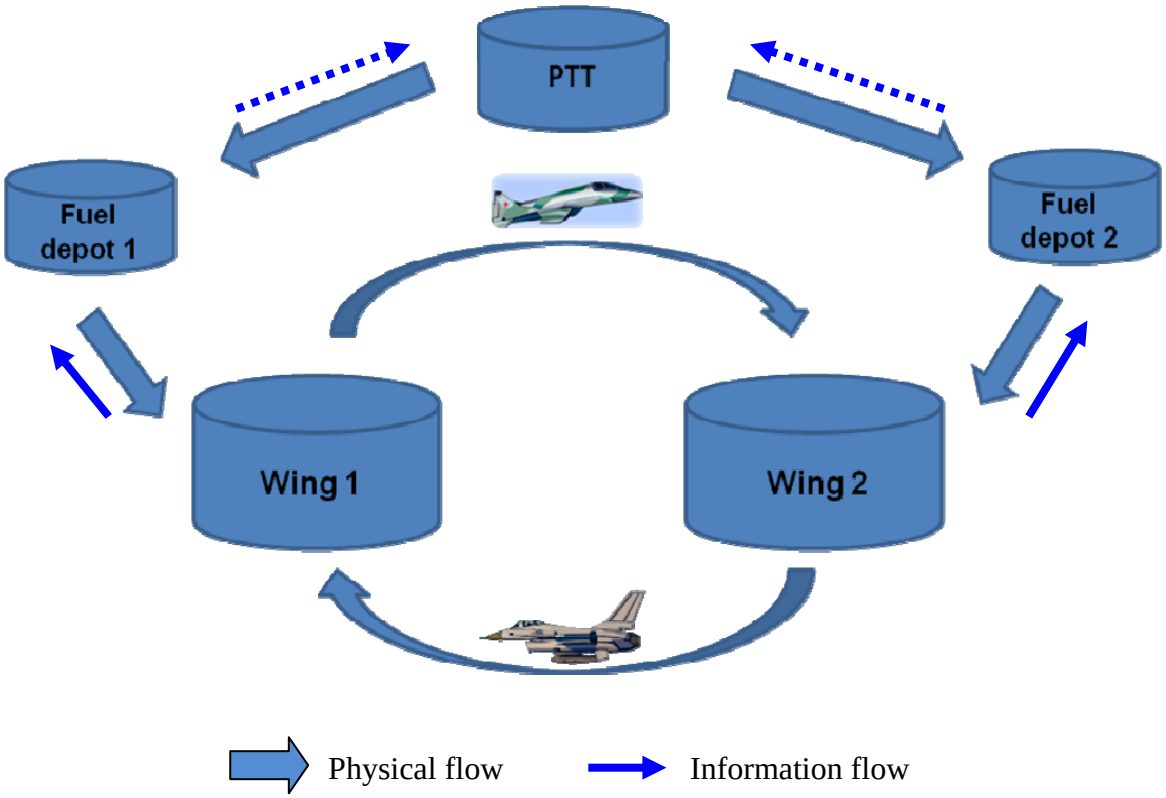

Figure 1.1 The stakeholders for air deployment

The Royal Thai Air Force (RTAF) has implemented the data exchange framework in order to run the essential elements in the military. The framework is Logistics Management Information System (LMIS) that consists of: procurement, inventory, status**,** service, maintenance, and real estate as shown in figure 1.2. The inventory cluster consists of 12 subsystems as shown in figure 1.3: Cataloging system, Depot Automated Inventory Management System (DAIMS), DAIMS financial management system, Requirement system, Freight tracking system, Fuel management system, CAD/PAD management system, AMMO management system, Automated Inventory Management System (AIMS), AIMS financial management system, Supply management system, and MRS&MRL system.

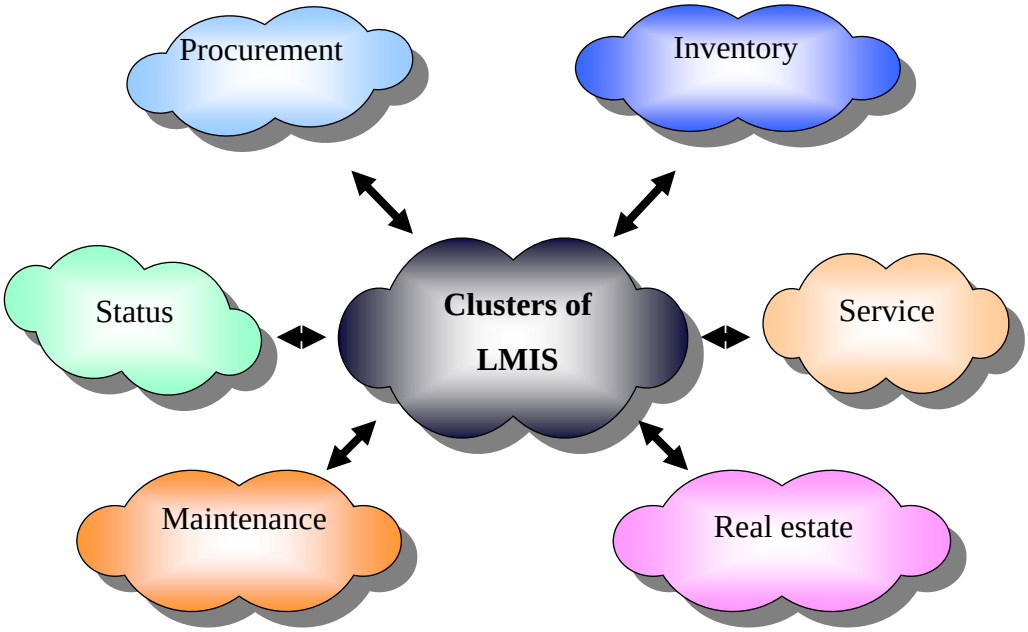

Figure 1.2 Clusters of LMIS

Source: http://www.logist.rtaf.mi.th

Figure 1.3 Subsystems of inventory cluster

The data exchange framework generated by LMIS can be used to interchange for internal units, but the requirements of transaction essential communicate with external supplier. The standard data exchange is the way to share information between stakeholders. Recently, the Hard Disk Drive (HDD) industry needs to respond rapidly, but the components are several parts. The communication between supplier and hard disk markers must be accurate and flexible, so the standard data exchange can be used to apply in supplying part. RosettaNet is one of standard that consists of three parts (www.rosettanet.org): The dictionary defines a common property in the part of Partner Interface Process (PIP) and provides a common vocabulary for conducting e-business; RNIF (RosettaNet Implement Framework) is the specific protocol for information interchange between trading partners; PIP (Partner Interface Process) defines a standard document and involved business processes for data exchange between trading partners.

The purpose of this research represents an adapting RosettaNet for fuel management system. Data collection of case study are discussed and then propose a RosettaNet data exchange framework under the following headings: business process analysis using a swimlane diagram, business process reengineering, mapping business processes related Partner Interface Process (PIP), and the design of business documents based on XML schema. Finally, we also discuss the feasibility and awareness for adapting RosettaNet for fuel management system, as well.

1.2 Objectives

1.2.1 To identify the procedure of adapting RosettaNet standard for fuel management system in LMIS.

1.2.2 To propose analytical framework of adapting RosettaNet standard for fuel management system in LMIS.

1.3 Scope of work

1.3.1 This research focuses on applying RosettaNet framework for fuel management system in LMIS.

1.3.2 This research concentrates on two clusters: Order Management and Inventory Management.

CHAPTER II
BACKGROUND THEORY AND LITERATURE REVIEW

This chapter will be the background theory and literature review for this research. In addition, related literature was analyzed in the last of chapter.

2.1 Background theory

In this section, the background theory will be described. It is composed of four parts. They are as follows: military logistics, BPR (business process reengineering), B2B (business-to-business) framework and data exchange technology.

2.1.1 Military logistics

Col.Prof Wlodzimierz Miszalski (1998) referred to NATO Logistics Handbook and found the following: Logistics is the science of planning, assuring the movement and providing service to the military forces. In addition, it has the responsibility of planning and executing movement as well as maintaining the forces at a high level capacity of combat. Lt.Jr. Ta Dorel Badea (2006) discussed about the term of logistics from Antoine Jomini as “Logistics includes the means and the arrangements that are used to apply tactics and strategies. The strategy is the one that decides where an action should be implemented; logistics brings the troops to the respective point”. Furthermore, he recognized mission involving the military logistics handling the: projecting, developing, purchasing, storing, transporting, distributing, evacuating, and controlling the materials; human transporting; purchasing or building, maintaining, assigning and exploiting facilities; insuring medical and health services.

This military logistics represents situations in the war. For example, during the operations of the terrestrial forces in the Iraq war, an armored division of the USA consumed: 5,000 tons of ammunition, approximately 2.1 million liters of fuel, more than 1.1 million liters of water and 80,000 servings of food daily. All these

needs of supplies have been and are still fulfilled by definite logistics structures. While, business logistics is being discussed for the activity between stakeholders in upstream to downstream and focuses on outcome profitable.

In the summary, military logistics focuses on supporting for the operational utilization in the military forces (deployed troops, armament, fuel, etc.). For this research, the author separates military logistics into 2 sections as shown in figure 2.1

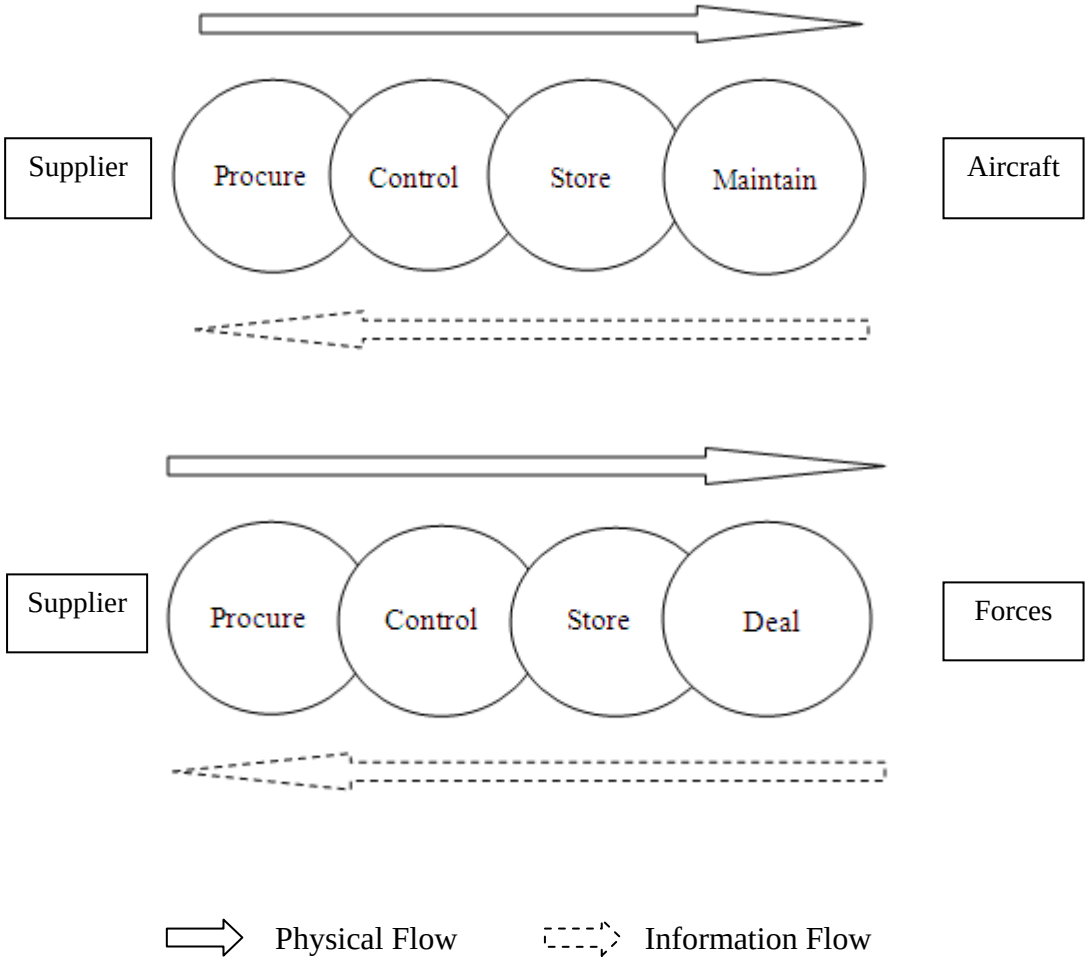

Figure 2.1 Activities in military logistics

Figure 2.1 demonstrates the activities in military logistics that separates into 2 sections: The first section focuses on the maintenance. The activities are namely: procurement, control, storage, and maintenance; and the second one are described based on the logistics thus, activities were identified as procurement, control, storage, and dealing. Furthermore, the customers in the area of military mean forces or aircraft rely on the demand from troops. Although the activities on supply chain are different, the information flow is accurate and agile.

2.1.2 BPR (business process reengineering)

Peter O'Neill and Amrik S. Sohal (1999) reviewed about BPR. In this definition section, they referred to Hammer and Champy, 1993 as "The fundamental rethinking and radical redesigning of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed". Talwar, 1993 just highlighted on the rethinking, restructuring and streamlining of the business structure, processes, methods of working, management system and external relationships through which value were created and delivered. Petrozzo and Stepper, 1994 discussed that BPR was related to the concurrent redesigning of processes, organizations, and their supporting information system to achieve radical improvement in time, cost, quality, and customers' regard for the company's products and services. In addition, Lowenthal, 1994 described the fundamental rethinking and redesigning of operating processes and organizational structure, the emphasis is the organization's core competencies, to achieve dramatic improvements in organizational performance, as BPR's essential components.

BPR is the way to achieve a smart business. It is the method of diagnosing the problems and redesigning by proper tools. This paper presented by Peter O'Neill and Amrik S. Sohal (1999) cite to Hammer and Champy, 1993 discusses the need for reengineering as: customers who can now be very diverse, segmented, and are expectant of consultation; the competition that has intensified to meet the needs of customers in every niche; and the change that has become pervasive, persistent, faster and in some markets a pre-requisite. Thus, BPR is not only tools but also strategically implements business processes within the organization. In addition, the research from

Champy, 1995 represents the adoption of BPR within companies in the area of North American and Europe recognizing. More than 70 percent of the American companies and 75 percent of the European companies responding were already engaged in one or more reengineering scheme, so BPR is significant for horizontal processes (order fulfillment, new product development, etc.) and the vertical function (traditional hierarchical organization) (Peter O'Neill and Amrik S. Sohal, 1999).

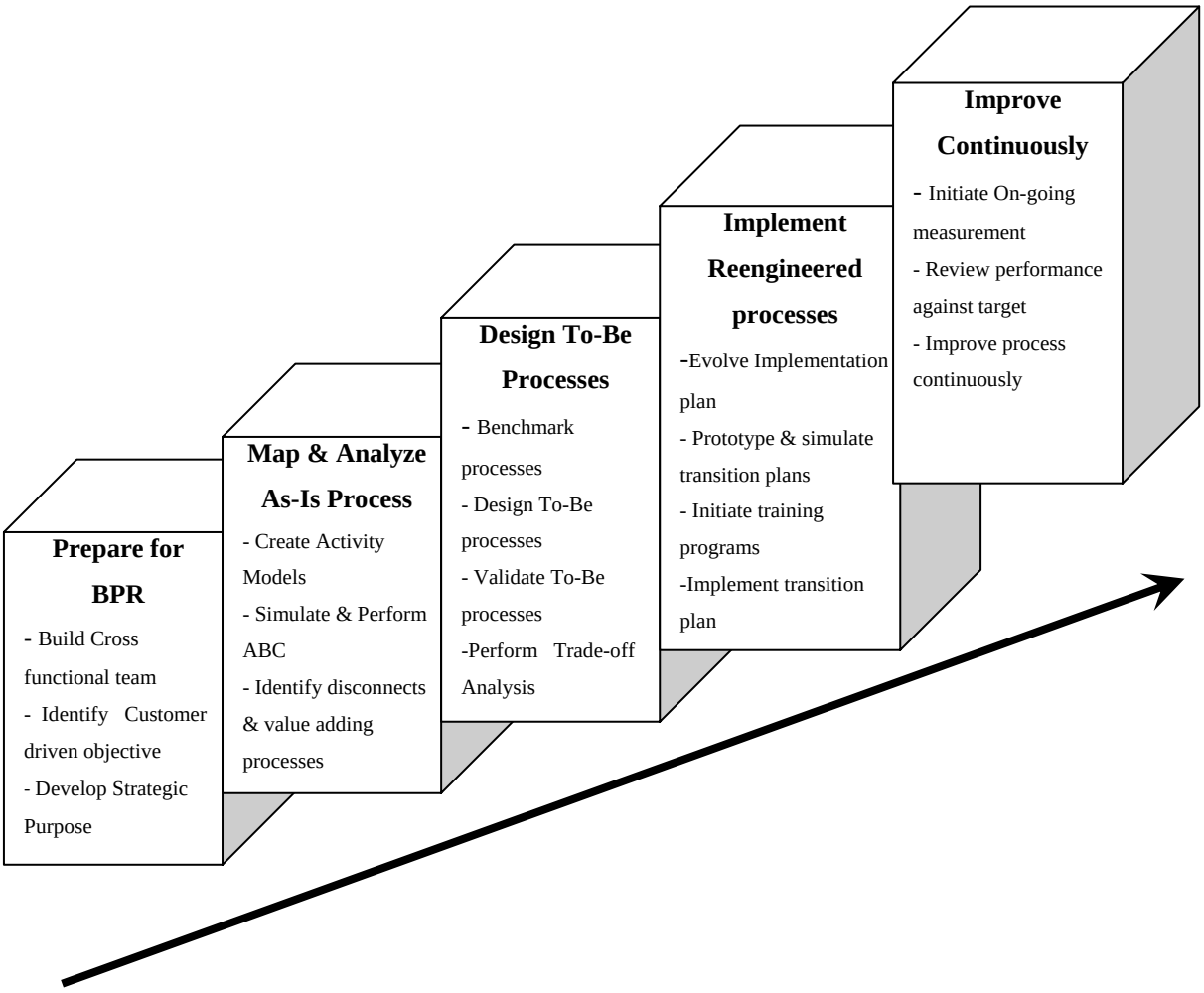

Figure 2.2 A Consolidated Methodology for BPR

Source: Subramanian Muthu et al., 1999

BPR is not the individual work, but we have to do it over the work process which affects divisions in the organization. Thus, the encouragement from the administrator is a factor to be successful. It makes not only the control and decision covers all processes but also understand the organization's overall image. We see that the IT system and BPR interrelate with each other. In applying the IT system, we should take into account the business process redesign support for achieving the goal such as reducing the complication of information by keeping in the database system those which all divisions can access from only one place.

In this research, we apply the principle of BPR to study the current business process by analyzing the parts of activities in the organization to find the problem concerning the duplication of work or taking too much time to work. We focus on linking up information with each other and adopt the RosettaNet standard technology which is interested in not only exchanging information but also the process that occurs in military supply chain between the partnerships. This will make the information transfer accurate, quick, and flexible. We use BPR in the step of analyzing how the original business process is, specifying the process which the problem occurs and mapping the part of an information link-up standard which is in As-Is process. Then, we redesign the process in the type of the document structure that is used for exchanging information between organizations in order to obtain the coherent information and be able to apply it quickly and efficiently. This step is in To-Be process which is for acquiring the archetype of standard connecting to each other.

2.1.3 B2B (business-to-business) framework

Juho Tikkala (2004) defined B2B framework is methodology for data interchange between two companies or more. J.-M. Nurmilaakso et al. (2006) discussed the purpose of B2B framework was a platform for information sharing between companies. The important information that collaborated on them was ERP (enterprise resource planning), CRM (customer relationship management), SCM (supply chain management) and PDM (product data management). For the communication among different systems, the standard data exchange was generated to decrease information gap between systems. We attempt to generate the standard data exchange in order to integrate collaborative information. The e-business frameworks identify three issues for interchange of standardized data (J.-M. Nurmilaakso, 2007):

-Business document issues describe a vocabulary of terms that can be used in the data structures and elements of these documents.

-Business process issues identify the activity and action for the exchange of documents in business processes between trading partners.

-Messaging issues define the procedure for transportation, packing and security over the Internet in order to exchange of business documents in the business processes.

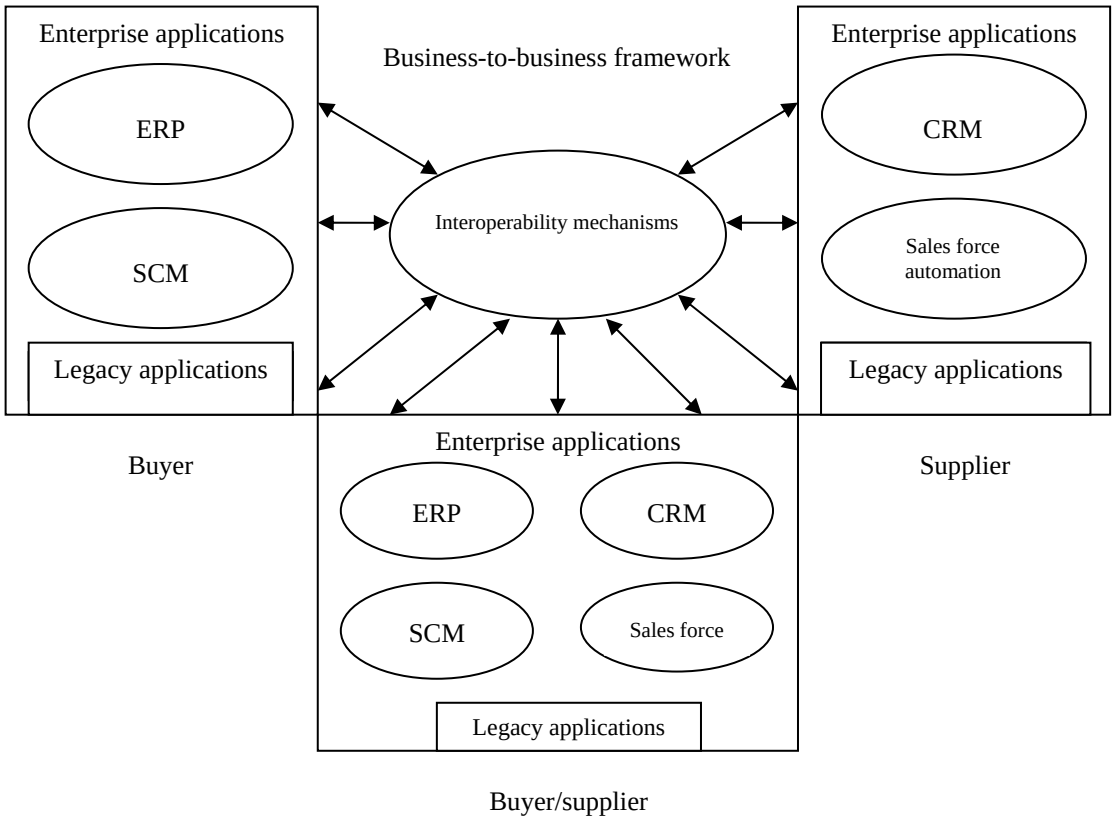

Figure 2.3 The role of frameworks in B2B transactions

Source: Shim et al., 2000

2.1.4 Data exchange technology

2.1.4.1 Electronic Data Interchange (EDI)

Don Lim and Prashant C. Palvia (2001**)** referred to Crum et al., 1998 he defined EDI as "the direct computer-to-computer communication of inter-company and intra-company business documents in a machine-readable standard format". EDI is standard for interchange business documents between firms. It is developed by United Nation Standard Messages Directory for Electronic Data Interchange for Administration, Commerce and Transport (EDIFACT). The transaction is through a specific network called VAN (Value Added Network**)**. Although EDI is classified as a business-to-business (B2B) transaction, it has several constraints for trading partner and small and medium-sized enterprises. For example fixed system, high investment for set up, and consulting specialists due to traditional transactions. Besides, internet technology is a flexible network for public process, so the B2B transactions adjust properly relating to business processes within organization.

2.1.4.2 Electronic Business Extensible Markup Language (ebXML)

The standard ebXML (http://www.ebxml.org/) was developed by UN/CEFACT (United Nations Center for Trade Facilitation and Electronic Business) and OASIS (Organization for the Advancement of Structured Information Standard) in late 1999. ebXML tried to generate global electronic market analogous rules. Furthermore, They were schemed for three basic concepts: furnish an infrastructure that ensures data communication interoperability; furnish a semantics framework that ensures commercial interoperability; and furnish a mechanism that allows enterprises to find each other, agree to become trading partners, and conduct business with each other (http://www.ebxml.org/white_papers/whitepaper.htm).

According to Patil S. and Newcommer E. (2003) discussed the architecture of ebXML focusing on five major pieces that support these outlines: business processes; messaging; partnership profile and agreement; business registry; and core component. They are as shown in figure 2.3

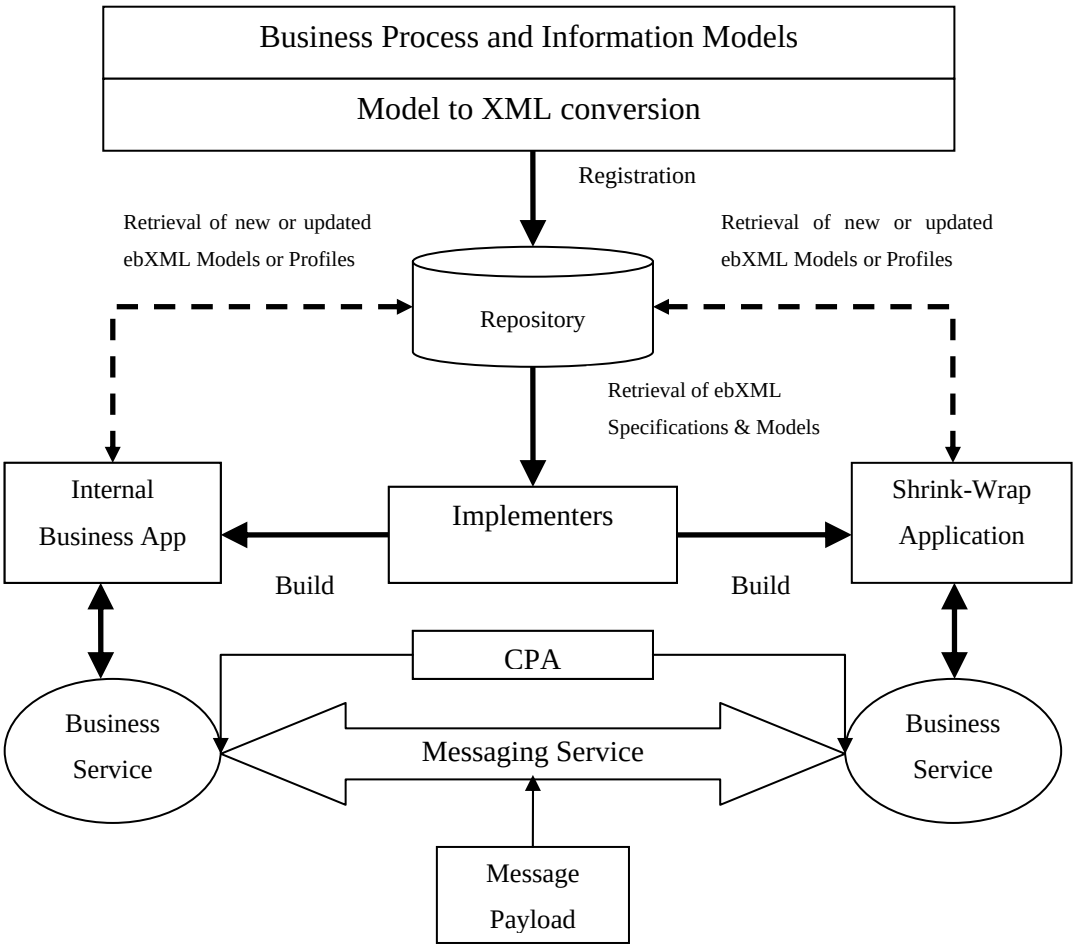

Figure 2.4 ebXML Technical Architecture

Source: http://www.ebxml.org/white_papers/whitepaper.htm

2.1.4.3 RosettaNet

RosettaNet is a non-profit consortium founded by HP, IBM, Intel and Ingram Micro in 1998 (http://www.rosettanet.org/). RosettaNet is developed to execute the public process based on business processes among buyers and sellers in supply chain. The standard focuses on the XML-based message interchange format that the language is flexible and is a support for Internet. It is therefore an answer for automatic data exchange between trading partner. Especially, the small medium enterprises (SME), they are able to collaborate with major corporations for B2B interchange. The frameworks of RosettaNet standard are as follows (http://www.rosettanet.org/):

- Dictionary: The dictionary defines a common property in the part of Partner Interface Process (PIP). This dictionary provides a common vocabulary for conducting e-business due to companies 'uniquely defined terminology. In addition, the dictionary defines the business properties, business data entities, fundamental business data entities in PIP message guidelines, and mission of driving collaborative development of e-business standards and services.

- RNIF (RosettaNet Implement Framework): RNIF is the specific protocol for information interchange between trading partners. It provides the packaging, routing, transporting of RosettaNet PIP message, and business signals based on XML. Furthermore, it provides development guidelines for generating software application component that simplify the operation of Partner Interface Process (PIP).

- PIP (Partner Interface Process): PIP defines a standard document and involved business processes for data exchange between trading partners. The document designed by XML-base message. PIP classify 8 clusters as shown in Table 2.1

Table 2.1: Partner Interface Process (PIP) Classifications

Cluster 0: RosettaNet Support
A.Administrative
Cluster 1: Partner, Product, and Service Review
A.Partner Review
B.Product and Service Review
Cluster 2: Product Information
A.Preparation for Distribution
B.Product Change Notification
C.Product Design Information
Cluster 3: Order Management
A.Quote and Order Entry
B.Transportation and Distribution
C.Returns and Finance
D.Product Configuration
Cluster 4: Inventory Management
A.Collaborative Forecasting
B.Inventory Allocation
C.Inventory Reporting
D.Inventory Replenishment
E.Sales Reporting
F.Price Protection
Cluster 5: Marketing Information Management
A.Lead Opportunity Management
B.Marketing Campaign Management
C.Design Win Management
D.Ship from Stock and Debit
Cluster 6: Service and Support
A.Provide and Administer Warranties, Service Packages, and Contract Services
B.Provide and Administer Asset Management
C.Technical Support and Service Management

Table 2.1 (cont.)

Cluster 7: Manufacturing
A.Design Transfer
B.Management Manufacturing Work Orders and Work-in-Process
C.Distribute Manufacturing Information

Amendment from William Behrman, 2002

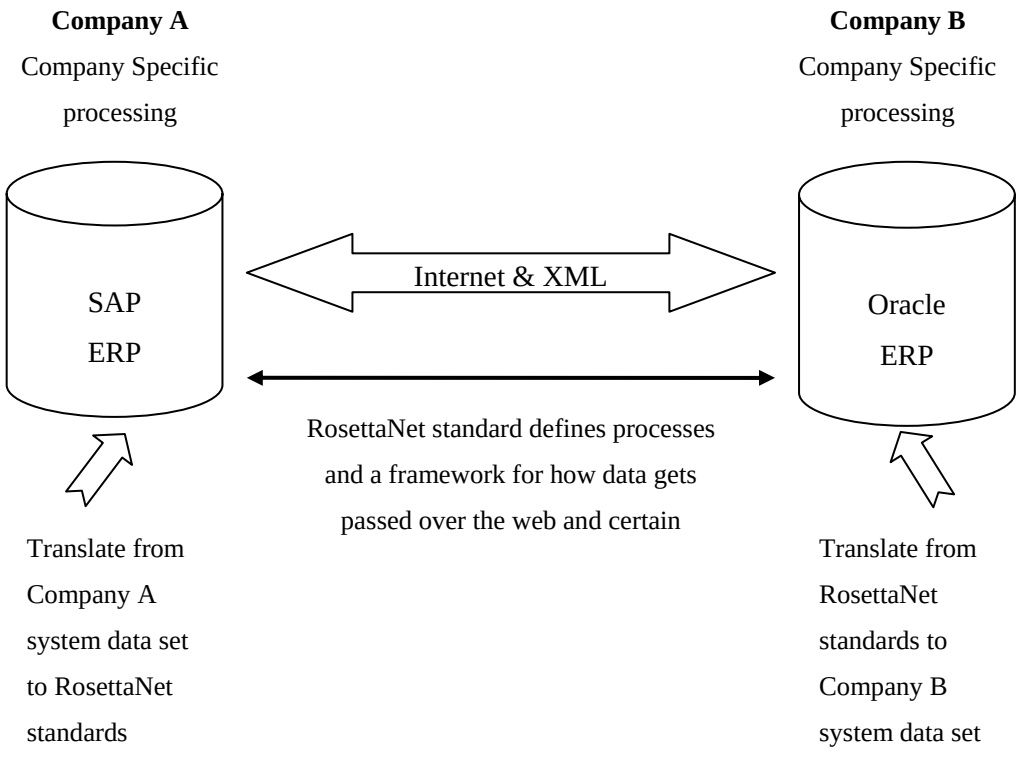

Figure 2.5 B2B transaction base on RosettaNet standard

Source: http://www.rosettanet.org/

For the research, the author analyzed the data exchange technology in each section and summarized the characteristic for suitable selection in this B2B transaction. Comparison EDI vs. ebXML vs. RosettaNet as shown in Table 2.2

Table 2.2: Characteristics of data exchange

Topic	EDI	ebXML	RosettaNet
Platform	-EDIFACT standard	-XML defines general standard, not specific to any business (J.-M. Nurmilaakso, 2007)	-XML also specific standard for IT and electronic components (Shim et al., 2000)
B2B framework	-focus on data exchange consists of three steps: convert the actual data, transmit data and translate to actual data (Shim et al., 2000)	-focus on data exchange and business process, depend on authorized company for CPP and CPA with trading partner (Juho Tikkala, 2004)	-focus on data exchange and business process, PIPs identify e-document clear due to designed by XML schema (Juho Tikkala, 2004)
Network	-VAN (Value added network)	-internet over SOAP messaging framework (Juho Tikkala, 2004)	-internet over HTTP messaging framework (Juho Tikkala, 2004)
Scope of work	-regional area of work due to expensive investment (Shim et al., 2000)	-global area for transaction due to standard framework (Juho Tikkala, 2004)	-no global area due to must agree between companies (Juho Tikkala, 2004)
Characteristic of message in business document	-translate data format for utilize internal process (Shim et al., 2000)	-PIP define business documents and business processes (Juho Tikkala, 2004)	- Guidelines general message in business document (Juho Tikkala, 2004)

2.2 Related literature review

In this section, we classify related into two parts: BPR and BPM, and applying RosettaNet standard in case study. In each part, we will begin with the summary table and then describe in each paper.

2.2.1 BPR and BPM

In this part, we classified 2 categories as follow: The first, redesigned by eliminate non-value-added activities; and the second one redesigned by IT solution. According to Ryan K.L. Ko et al. (2009) discussing the difference of BPR, they distributed the definition of BPR based on the IT solution as BPM (Business Process Management). Thus, the classification of redesign by eliminating non-value-added activities is BPR. BPM is called for a principle analysis supporting the technology IT in business process. The summary table as shown in Table 2.3

Table 2.3: Summary of BPR and BPM

Author(s)	Category	Focus on	Methodology	Conclusions
David Ben-Arieh and Li Qian, 2003 (2.2.1.1)	BPR	Using ABC to evaluate the cost of the design and development activity for machined parts.	Implement method of ABC follow as: identify cost center; analyze indirect costs and calculate cost-driver rate; assign resource to each cost center and determine cost center driver rate; identify activities; analyze each activity and find the cost for each activity; and find activity cost-driver rate.	The conclusion represents the factors that cause the cost, assisting to manage these activities.
J. Gingele et al., 2002 (2.2.1.2)	BPR	Modeling by IDEF9000 in an order processes and allows the modeling of activities, functional relationships and data.	Model the as-is fulfill order processes using IDEF0 and design an improved to-be fulfill order process base on ISO9001 quality management system.	Develop and tested a modeling technique use for identify an activity and flow controlled by ISO9001.

Table 2.3 (cont.)

Author(s)	Category	Focus on	Methodology	Conclusions
Paul Grefen et al., 2006 (2.2.1.3)	BPM	Analyze web service support for the dynamic process outsourcing paradigm.	Express model of dynamic business process outsourcing and analyze the requirement for business paradigm, discuss web service technology for implementation in this paper, and map the requirement onto the web service platform, after that discuss shortcoming and suggest future development.	Identify the number of classes for dynamic business process outsourcing as: business process model; transaction model; and brokering, negotiation and contract.
Automating with RosettaNet by intel, 2004 (2.2.1.4)	BPM	Implement the manual process onto the automatic process in the area of order-to-payment.	Analyze order-to-payment processing activities involve manual process, eliminate manual process by PIPs, and evaluate value-added in these processes.	B2B transaction between trading partner base on RosettaNet platform in order-to-payment processes

Table 2.3 (cont.)

Author(s)	Category	Focus on	Methodology	Conclusions
Soung-Hie Kim and Ki-Jin Jang, 2002 (2.2.1.5)	BPR	Harmonize information flow for activities, and to minimize errors and the unplanned evolution of activities in BPR project.	Generate model framework by IDEF0 techniques, and describe a set of method for matrix form and an example of an analysis model in supporting the BPR process.	The methodology applied in manufacturing enterprise and application with IDEF0 tools for required data collection.
Brane Kalpic and Peter Bernus, 2002 (2.2.1.6)	BPR	Reengineering the product development process and design a reference model of the development process reused in subsequent development project.	Analyze and design AS-IS model and re-design of the functional process model for product development process.	The reference models of business processes use for process design, process reengineering management and execution.
Natasa Vujica Herzog et al., 2009 (2.2.1.7)	BPR	Linkages between manufacturing strategy, benchmarking, performance measurement, and business process reengineering.	Survey research consist 73 medium and large-sized Slovenian manufacturing companies, Hypothesis test, and analyze result.	The need for driven BPR approach and the positive impact of performance measurement on BPR performance.

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2.2.1.1 David Ben-Arieh and Li Qian (2003) discussed for manufacturing wanting a shorter market life span of products that focuses on the design and development phase of the product life cycle, so it has caused to analyze the cost of the design and development phase accurately. The authors use ABC to evaluate the cost of the design and development activity for machined parts which is shown on a sample part in a controlled manufacturing facility.

2.2.1.2 J. Gingele et al. (2002) focused on $IDEF_{9000}$ (modeling technique) for the view of a Fulfill Order Process including the modeling of activities, functional relationships, and data. $IDEF_{9000}$ is described the method and application in a case study. This result has given the new knowledge needed about how to model a Fulfill Order Process from a systematic perspective.

2.2.1.3 Paul Grefen et al. (2006**)** described the outsourcing of business processes that are important for an organization to be effective, efficient and flexible. The research analyzes Web Service supporting for the dynamic process outsourcing model and designs the framework requirement supporting for the cross-organizational business process and mechanism for contracting. The conclusion suggests an approach to fill these gaps based on a business process support application layer implemented on Web Service technology.

2.2.1.4 Automating with RosettaNet by Intel (2004**)** redesigned the business process from the manual process to the automated process. This case study focuses on the transaction between Intel Semiconductor (IT) into World Peace Group (WPG) .The methodology as follow: analyze process by work flow tool, attempt to get rid of manual process; propose automatic process by Partner Interface Process (PIP); and evaluate the value added in this business process.

2.2.1.5 Soung-Hie Kim and Ki-Jin Jang (2002) represented the summary of both a manufacturing enterprise modeling and a quality performance analysis used to show a number of successful business process re-engineering (BPR) effects. The authors propose the framework supporting the analysis of activities and information flows in the area of manufacturing application in BPR. Furthermore, this research suggests the adoption of techniques and IDEF0 tools used to implement the modeling and performance capabilities. The modeling fulfill in designing the product of a television manufacturing company.

2.2.1.6 Brane Kalpic and Peter Bernus (2002) demonstrated the methodology about the power of enterprise modeling to improve the process of new product development. The authors emphasize a tool that allows the capturing, externalization, formalization, and structuring of knowledge about business process. In addition, this paper describes how the reference model of business process for support in project-or process design and the process re-engineering based on the AS-IS process for analyzing and defining on the TO-BE process.

2.2.1.7 Natasa Vujica Herzog et al. (2009) illustrated this research for the linkage between manufacturing strategy, benchmarking, performance measurement and business process reengineering. The methodology of research used to survey in 73 mediums and large-sized Slovenian manufacturing companies within the mechanical, electro-mechanical and electronic industries. This result supports the need for a strategically-driven BPR approach and the optimistic impact of performance measurement on BPR performance.

2.2.1.8 Gregory Mentzas et al. (2001) discussed for the workflow management system and technologies become the important tool for simplifying tasks within the process management context. For this paper, the authors represent the ways workflow technology for facilitating the implementation of the process management, the selection of alternative workflow techniques in modeling business processes and provide the characteristics guidance for the managers, and the similarities and difference of the several workflow modeling designs.

2.2.1.9 N.K. Kwak and Chang W. Lee (2002) proposed an application of multicriteria mathematical programming (MCMP) as an assist to strategic planning for the business process infrastructure development in an organization. The MCMP model focuses on the goal levels that are identified and prioritized for the analytic hierarchy process. The result for apply the MCMP model as strengthen the strategic planning of the organization’s business process infrastructure development and operation planning setting in this the activities on business process.

2.2.1.10 Minder Chen et al. (2007) discussed BPM that is the core element of the C-Commerce solution for the complex process coordination. Traditional BPM solution has the very limited support for the interoperability. Thus, this problem is solved by web service technology. Web service supports the

transaction between difference software applications over internet protocol. This research proposes an architecture for web service enabled BPM in C-Commerce and why web service can improve business process coordination. In summary, BPM system enabled by web services, it reinforces the development of more adjustable and dynamic C-Commerce.

2.2.2 Apply RosettaNet standard in case study

In this part, we classify RosettaNet standard in various case study, it focuses on Partner Interface Process (PIP) that involves the business process. In addition, we require reflecting the suitable PIP used to each process and guideline for implement in the area of interoperability between trading partners. The summary of apply RosettaNet standard in case study as shown in Table 2.4

Table 2.4: Summary of RosettaNet standard in case study

Author(s)	Case study	Focus on PIP	Finding	Conclusions
Bang-Ning Hwang et al., 2008 (2.2.2.1)	Semiconductor manufacturing	3D8 (WIP), 7B5/7B6 (Work Order and Work Order Acknowledge)	Used how and why question to analyze e-supply chain management system focus on implementation process between TSMC and ASE	The e-supply chain project encompasses the scope of engineering and logistics collaboration among TSMC and ASE.
J. Gialelis et al., 2006 (2.2.2.2)	Replenishment planning process for food industry	4B3 (Notification of Consumption), 4A5 (Notification of Forecast Reply), 3A1 (Request Quote), 3A4 (Request Purchase Order), 3A5 (Query Order Status), 4D1 (Notification of Material Release)	Apply RosettaNet in combination with Web Services, and Workflow Management System for the execution of the Continuous Replenishment Planning process.	The methodology for the implementation of collaborative B2B e-commerce base on platform in the area of public business process.

Table 2.4 (cont.)

Author(s)	Case study	Focus on PIP	Finding	Conclusions
Minsoo Kim and Dongsoo Kim, 2007 (2.2.2.3)	e-logistics VMI and 3PL (Demander Centric VMI)	4A3,4C1, 4A5, 3B2, 4B2, 4D1, 3B2, 4B2,3C7, and 3C6	Design and implement a RosettaNet-based e-logistics that generate and manage multiple PIPs to automate logistics process.	The RosettaNet adaptor for managing and controlling business process by applying the e-logistics system.
Y. Aklouf et al., 2005 (2.2.2.4)	Product Life Cycle Management	2A9 (Query Technical Product Information)	Provide a mechanism for supporting an exchange between companies base on to answer as: HOW; ON; WHAT; WHO	Technology B2B e-commerce for developing RosettaNet PIPs with PLIB dictionary base on classical layered
Yu-Hui Tao et al., 2004 (2.2.2.5)	Manufacturing Execution System (MES)	3A4 (Request Purchase Order), 3B2 (Notify of Advance Shipment), 3B8 (Notify of Shipment Receipt), 3C3 (Notify of Invoice), 3C4 (Process Payment)	Implement process model for integrating extensible Markup Language (XML) and XML develops to data exchange standard of RosettaNet.	The RosettaNet components are used to illustrate how additional elements in the analysis and design phase by comparison.

Table 2.4 (cont.)

Author(s)	Case study	Focus on PIP	Finding	Conclusions
Yong Gu Ji et al., 2006 (2.2.2.6)	e-logistics VMI and 3PL	4E1,4C1,3A4,3B2, 4B2,4D1,3C7,3C6 (Supplier Centric VMI) 4A3,4C1,4A5,3B2,4B2, 4D1,3C7,3C7 (Customer Centric VMI)	Analyze business process between VMI and 3PL, mapping PIP in the process, and generate in the e-logistics application	The system developed by a Korean PCB manufacturing company and e-logistics program enable in a production mode with a global mobile phone manufacturing firm.

2.2.2.1 Bang-Ning Hwang et al. (2008) discussed about the collaboration among Taiwan Semiconductor Manufacturing Company (TSMC) and Advanced Semiconductor Engineering Inc. (ASE) based on RosettaNet. The authors attempt to represent how two leading companies join forces affecting to increase the area of cost, quality, responsiveness, and customer orientation.

2.2.2.2 J. Gialelis et al. (2006) explained the importance of the interoperability for e-commerce. They proposed RosettaNet for the B2B transaction due to the XML is flexible and wide. This paper represents RosettaNet in the combination with Web Services and Workflow Management System for controlling the Continuous Replenishment Planning process.

2.2.2.3 Minsoo Kim and Dongsoo Kim (2007) discussed the electronic logistics program for applying in RosettaNet framework and PIP is a business process standard that specifies the unit task of a business activity among trading partner. For this research, the authors generate and implement a RosettaNet-based e-logistics system that operates and manages multiple PIPs to automate the logistics process focusing VMI and 3PL.

2.2.2.4 Y. Aklouf et al. (2005) discussed the proposal of each PIP that is to provide a common business/data framework to implement RosettaNet eBusiness Interfaces. This paper describes PIP2A9 as: behavioral; electrical; physical; and other characteristics of products. Furthermore, showing a model providing a mechanism for supporting an interchange between companies focuses on an answer as: HOW; ON WHAT; and WHO.

2.2.2.5 Yu-Hui Tao et al. (2004) described the implementation process model for integrating XML into enterprise applications. RosettaNet is adopted with the model from Manufacturing Execution System (MES). The authors represent the core sub-process of defining DTD and producing XML documents and demonstrate how additional elements in the analysis-and-design phase by comparisons.

2.2.2.6 Yong Gu Ji et al. (2006) Introduced to connect the RosettaNet B2B system to the BPM system. The results are already applied to e-logistics programs of a Korean company and run completely in production mode.

2.3 Analysis of literature

RosettaNet is a standard business process and document for the B2B integration. It almost uses in the area of hi-technology such as semiconductor, IT, electronics, and Hard Disk Drive (HDD). Bang-Ning Hwang et al. (2008) discussed case study between Taiwan Semiconductor Manufacturing Company (TSMC) and Advanced Semiconductor Engineering Inc. (ASE) for sharing information about engineering and logistics. The authors propose a collaborative model for data exchange framework in the semiconductor value chain. J. Gialelis et al. (2006) described a methodology for implementing the continuous replenishment planning process based on RosettaNet implementation framework in order to interchange between the manufacturing enterprise and the retail enterprise. Minsoo Kim and Dongsoo Kim (2007) designed and implemented the e-logistics system based on the RosettaNet standard in order to connect between VMI and 3PL. These processes interact through demander centric VMI with 3PL and mapping PIPs in order management and inventory management clusters. Y. Aklouf et al. (2005) adopted PIP2A9 (Query Technical Product Information) for product life cycle management in order to access product technical information within stakeholders in the supply chain. Yu-Hui Tao et al. (2004) proposed a model for enterprise applications based on eXtensible Markup Language (XML) in order to integrate manufacturing execution system (MES), enterprise resources planning (ERP), and product data management (PDM). The authors select the RosettaNet standard for sharing information between trading partners due to apply in semiconductor manufacturers. Yong Gu Ji et al. (2006) proposed a method to construct a system for integrating VMI and TPL via RosettaNet. The authors define and implement the mapping between PIP and BPM process. Furthermore, these processes focus on supplier and consumer centric VMI with TPL in order to generate automated system for the data exchange.

Business process reengineering (BPR) is the way for adapting RosettaNet in military. Subramanian Muthu et al. (1999) proposed a consolidated methodology for BPR in order to analyze business process for the modification. The methodology includes the five activities: Prepare for reengineering, Map and analyze AS-IS process, Design TO-BE process, Implement reengineered process and Improve continuously. The important activities are AS-IS process and TO-BE process for BPR. AS-IS process indicated the traditional process that is shown by tools such as IDEF, swimlane, work flow, etc. TO-BE process proposes new processes that implement in order to reduce the unnecessary process and increase the value added in an organization.

In summary, deployment operations are an example that represents military logistics. The military action is the deployment that moves from the home base to the destination base using the different transportation (Yildirim et al., 2009). Mission requirements and the time available to accomplish the mission directly affect the executions in the operational area (Deployment and redeployment operations, 2004). Furthermore, deployment operations are operated under a crisis situation, so data exchange must be real time. RosettaNet standard is a choice for sharing information between stakeholders. It completely fulfills interaction for supported units such as supplier, agencies, and control units. Deployment planning under contingency needs accurate information in order to encompass both requirements and the time available to achieve the mission. Including, Business process reengineering (BPR) is the method that determine data exchange framework in military.

CHAPTER III
RESEARCH METHODOLOGY

This chapter is about the research methodology from the beginning to the end of doing this research.

3.1 Steps of Research methodology

3.1.1 Information Accumulation

This step is to accumulate information that is relevant to the information system in order to select the working system of LMIS for applying the standard data exchange technology as RosettaNet. For this research, the fuel management system is selected for a study case in applying RosettaNet which is the concerned process and corresponds to the activity of the business process by accumulating both business process and business document.

3.1.2 Study related theory and literature

This step is to study the theory and literature review that is related to the main idea. This step will help us to analyze the method for this research. In addition, the literature is the way to solve the problem in this research.

3.1.3 Mapping between PIP and LMIS

This step is to analyze Partner Interface Process (PIP) that is related to Logistics Management Information System (LMIS). LMIS consists of 26 systems, this step mapping between PIP and LMIS.

3.1.4 Design data exchange framework in case study

This step is to analyze and design the framework for the data exchange in the fuel management system that is case study in this research. The ways are following:

3.1.4.1 Business process analysis

This step is to take the accumulated information to design the business chart by swimlane. This chart shows the cooperating process completely such as which part each division operates, steps of the cooperating process operation. Swimlane is the diagram showing the type of transferring information and the activity analysis which is redundant for finding the cause to solve problems.

3.1.4.2 Business process re-engineering

After designing the diagram using swimlane, the next step is to do the business process re-engineering. In As-Is process, we will obtain the current work process and analyze the redundant work between divisions or the work that takes too long time. After that, we propose the way to figure out the type or information that connects via the electronic document.

3.1.4.3 Mapping the business process by PIP

In this step, we take to map out between the business processes of standard RosettaNet and related PIP. These PIPs change the manual process to the automated process.

3.1.4.4 Design the business document based on XML schema

We design the document framework by identifying the required data element of the XML Schema and matching with the standard PIPs. This can substitute for the original document of the manual process.

3.2 Research Time

Table 3.1: Demonstrate research time

Activities	Month							
	2	4	6	8	10	12	14	16
1. Data collection	■	■						
2. Study related theory and literature	■	■						
3. Mapping between PIP and LMIS			■	■	■			
4. Design data exchange framework			■	■	■	■	■	■

CHAPTER IV
CASE STUDY ON INFORMATION GATHERING

This chapter separates five parts: First, overview of LMIS and fuel management are discussed; second, mapping LMIS with PIP in order to identify PIP involving the fuel management system; third, business processes are analyzed by swimlane diagram tool in the fuel management system; fourth, reengineering processes focus on redundant or manual processes; the last one, design business document based on XML schema.

4.1 Overview of LMIS and fuel management

4.1.1 Logistic Management Information System (LMIS)

LMIS is a system encompassing a maintenance section and a logistics section. It establishes for the substitution of the traditional system and supports the logistics information system within RTAF. The framework of LMIS consists of:

4.1.1.1 Cataloging System

The system for being used in number inventories location specification in the occupy of the division, can fix inventories list new number following: air force regulations, control the detail of list inventories important data such as name , the division counts , price , inventories kind and use the data that record to make list inventories within the catalog.

4.1.1.2 Depot Automated Inventory Management System

The system is used for administration and controlling the data about the inventories of each depot. It is a program for the inventories controlling in the depot level. This controls inventories getting from the arrangement seeking by both of the way that procures within the local purchase, and the way that procures

from directly the foreign countries or DP (Direct Purchase), and the way that procures of foreign military or FMS (Foreign Military Sales). An account controls the inventories, the saving heals, distribution, sale, giving requirement information, account controls, report, and recording chronicle works that separate each inventory are made by the arrangement. The statistics, all data calculation, and others are made by the arrangement.

4.1.1.3 DAIMS Financial Management System

This system is used for recording and controlling that using the budget of the depot level. It is the system that controls the inventories cost from receiving, distribution, taking, and returning. It can record and control the financial amount in case of being at the Foreign Military Sales (FMS). Furthermore, it is able to control the financial budget amount in every level.

4.1.1.4 Requirement System

It is a work system that used for collect the list that user division in each depot needs, but the depot can't support to pay and the inventories list that comes from the requirement in the accumulation and in case of the division sends the inventories to repair but they are excessive from the capability of the big storehouse. It must be sent to repair outside by making a list inventories that the account to be required to purchase or hire, repair, and build for managing the delivery of the institute procurements of the division.

4.1.1.5 FMS Procurement System

It is the system is used for recording the inventories list purchased by means of FMS or in case of sending to the foreign countries to repair. It is recorded from the beginning of sending until receiving the inventories by linking up data and status. The system links are managed by Ministry of The United States of America Defense (DOD).

4.1.1.6 LP/DP Procurement System

It is the system that is used for the arrangement buys to procure the inventories and hiring to repair the inventories by the way of the locality (Local Purchase: LP) and by the way of the foreign countries (Direct Purchase: DP) by receiving the list account advertising to the want in the arrangement buys from an

institute and manage to follow the arrangement step until the depot receives the inventories and pays money to the transmitter.

4.1.1.7 Freight Tracking System

It is a work system that is used for tracking the inventories status that does make the arrangement seek and send to repair by the way of FMS that is sent to repair by the system of Ministry of The United States of America Defense (DAASC : DEFENSE AUTOMATIC ADDRESSING SYSTEM CENTER). It will inform the status routine inventories. All these steps are administration of federation way such as bringing information, distribution, the arrangement seeking from the producer company in the federation country, freight forwarder come to Thailand by giving information about date, transportation way, flight to send at Thailand.

4.1.1.8 Fuel Management System

It is the system that is used for the fuel supervision. It collects the wastage of using fuel in each kind. The arrangement does making an account will be wanted or purchased yearly and make the plan of taking fuel from a company, the Petroleum Authority of Thailand Limited. By managing of an account about fuel, taking fuel, checking quality, distribution, accumulation, and following the period of time.

4.1.1.9 CAD/PAD Management System

It is the system that is used for the control inventories list that is applied to the sacrifices of an aircraft system which is pilot seat (Ejection Seat). It is the system that must be correct and accurate. It can record the detail about the list of the sacrifice of an aircraft system. It will record from setting up information until take-off or change.

4.1.1.10 AMMO Management System

It is the system that is used for recording and checking the history of a weapon and the equipment, bullet, both of explosive on the ground and air part by the supervision since taking, the arrangement does makes an account control the inventories, bringing, and distribution until sale.

4.1.1.11 Automated Inventory Management System

It is the work system that is used for the administration and control base storehouse inventories which are the middle storehouse levels of all air bases. It is used in the administration and control inventories in the occupation including inventories got by means of arrangement buys within the locality. The arrangement does makes an account control the inventories, the saving heals, distribution, sale, giving requirement information by something, bringing base storehouse flies, and the account control. The arrangement does make the statistics and the others by linking up the data with every institute in the system. It can do the inventories supervision in the storehouse division level (Supply Point). The arrangement does making the rate collections, the distribution collections, the distribution payback, bringing inventories outside the rate collections, taking, and returning, moreover, still can show the status and check the data, the inventories in the user level, and the location in the responsibility of base storehouse.

4.1.1.12 AIMS Financial Management System

It is the system that is used for recording and controlling the budget of the base storehouse level (middle storehouse level). It controls inventories from cost, bringing, distribution, taking, returning, the business pays, separating the cost of the inventories, the inventories repairs be circulated, and the consumed inventories. It can show the financial amount that is received, the financial amount that is used to pay and the financial amount remaining. It can record and control the financial amount in bringing inventories up to big storehouse higher.

4.1.1.13 LP Procurement System

It is the system that is used for controlling the arrangement buys of the inventories and hiring the repair of the inventories by means of purchasing or hiring the repair of the locality (Local Purchase: LP) within the air base level. By receiving list from the base storehouse and manage to follow the arrangement step until the base storehouse receives the inventories and pays to the transmitter.

4.1.1.14 Supply Management System

It is the system that is used for controlling the inventories list in the responsibility. It can bring the inventories straightly to a middle storehouse level and make an account control inventories, sale, and distribution by collecting the list from the user division.

4.1.1.15 Real Estate Management System

It is the system that is used for controlling airport data, the real estate and immovable property in the location that is the responsibility of the air force.

4.1.1.16 Logistics Data Online Service

It is the system that is used for recording, modifying the correcting the data about the policy, regulations, the order, the handbook, the principle, the permanent practice, advice, information, and other data that is necessary.

4.1.1.17 Maintenance Data Collection & Analysis System

It is the system that is used for recording information about the repairing aircraft and every utensil for repairing in the squadron level, repairing in the middle level, and repairing in the factory level.

4.1.1.18 Serialized Parts and Events Tracking System

It is the system that is used for the tracking aircraft usability and the components digest, at control the useful life, for example, TIME CHANGED ITEM, PERIODIC INSPECTION, WARRANTY ITEM, SIGNIFICANT ITEM, by having the data received from the system, for example, the chronicle taking off to change each equipment, the structure of an aircraft and the components, the useful life that is used already, and the remainder of each equipment, the experience on each day of each aircraft, the list guarantees repairing of a motor and the components, fixed period of guaranteeing time, the guarantee repairing, and the schedule checks following the period of time of each aircraft.

4.1.1.19 Calibration Maintenance System

It is the work system that is used for tracking repairing. The equipment is used to support the aviation, and repair aircraft and utensils.

4.1.1.20 TCTO Management System

It is the work system that is used for the tracking and administration technique document to manage, correct, modify, and check all faults that happened, in order to improve the safe level and completion.

4.1.1.21 Maintenance Status Tracking System

It is the system for controlling the status of weapon system that air force has to keep using in the government service, by recording, modifying, and correcting the data detail, and the repairing detail of a weapon which is separated to each system.

4.1.1.22 Armament Status System

It is the system for controlling the status of weapon system that air force has to keep using in the government service, by recording, modifying, and correcting the data detail, and the repairing detail of a weapon which is separated to each system.

4.1.1.23 Chronicle Repairs and Utensils for possession System

It is the system that is used for controlling the utensils and the chronicle repairs of air force.

4.1.1.24 MRS&MRL System

It is the system that is used for making the plan of repairs (Master Repair Schedule: MRS), by collecting the data from the user division level until the depot level for making the requirement inventories account in repairing (Material Requirement List: MRL) and using in the arrangement buys in order to use the budget efficiently.

4.1.1.25 Aircraft Status System

It is the system used for controlling the aircraft status system and a motor that is packed to be usable at the squadron within air force. The data used in this system will compose of the capacity detail, the rate approvals, and the packing rate of each airplane that is like the same as every division, sending the repairs data of an aircraft and a motor, matters for the objection that happens, the detail in matters for editing the objection, and picking the chronicle of repairing an aircraft and a motor. These will help give cause the immediate high-level superior, be used for planning

military operations efficiently and can be able to be used in laying plans to allocate the budget for the arrangement of seeking spare parts that can be reserved.

4.1.1.26 Material Status System

It is the system that is used for controlling the important vehicle material (except aircraft) that is composed of utensils for the ground, airport, and the facilities, bullets, explosive, ground fuel, and air parts, the motor vehicle is armor-clad, radar. Knowing about the readiness status and the statistics will help to improve the effectiveness of aircraft operations.

4.1.2 Fuel Management

The administration of fuel in air force is assigned to the fuel division, Directorate of Aeronautical Engineering which is responsible for the justice and orderly. Fuel division will be divided into 4 departments in order to control fuel in RTAF. Fuel division can be divided as follows:

4.1.2.1 fuel depot department 1

- fuel depot section 1, Donmuang, Wing 6
- fuel depot section 2, Kokkatium,Wing 2
- fuel depot section 3, Kampangsan, pilot school

4.1.2.2 fuel depot department 2

- fuel depot section 1, Nakorn Rajsima,Wing 1
- fuel depot section 2, Ubol,Wing 21
- fuel depot section 3, Udon,Wing 23

4.1.2.3 fuel depot department 3

- fuel depot section 1 , Takhli,Wing 4
- fuel depot section 2 , Phitsanulok,Wing 46
- fuel depot section 3 , Chiangmai,Wing 41

4.1.2.4 fuel depot department 4

- fuel depot section 1, Phrachub,Wing 5
- fuel depot section 2, Surat Thani,Wing 7
- fuel depot section 3, Hatyai,Wing 56

Thus, the administration of fuel such as requirement information of user division, data shuffle about fuel between fuel depot section in provincial with in the center or even by the fuel depot section with a company (Petroleum Authority of Thailand Limited) has to get the actual data of the requirement in order to make an aircraft ready and the military duty efficiently.

Figure 4.1 Location of fuel storehouse each region

Source: http://www.ptd.dae.mi.th/

4.2 Mapping between PIP and LMIS

In this section, we classify PIP for mapping LMIS due to help us for the basic selection system in the LMIS generated by PIP. The classifications refer to RosettaNet eProcurement Standards (www.rosettanet.org/pipdirectory) that involve the procurement and inventory cluster in LMIS. The result of mapping generates five systems as: Foreign Military Sale Procurement (FMS), Local Procurement (LP), Direct Procurement (DP), Freight forwarder, and Fuel management. Fuel management in case study relates four PIPs as: PIP4C1 DistributeInventoryReport, PIP4A2 NotifyofEmbeddedReleaseForecast, PIP4B2 NotifyOfShipmentReceipt, and PIP3B2 NotifyofAdvanceShipment.

Table 4.1: Mapping between PIP and LMIS

System	LM001	LM002	LM003	LM004	LM005	LM006	LM007	LM008	LM009	LM010	LM011	LM012	LM013	LM014	LM015	LM016	LM017	LM018	LM019	LM020	LM021	LM022	LM023	LM024	LM025	LM026
PIP3A1					✓	✓							✓													
PIP3A2																										
PIP3A3																										
PIP3A4					✓	✓							✓													
PIP3A5																										
PIP3A6					✓	✓							✓													
PIP3A7					✓	✓							✓													
PIP3A8					✓	✓							✓													
PIP3A9					✓	✓							✓													
PIP3A10																										
PIP3A11																										
PIP3A12																										
PIP3A13																										
PIP3A14																										
PIP3B1																										
PIP3B2					✓	✓	✓	✓					✓													
PIP3B3																										
PIP3B4																										
PIP3B5																										
PIP3B6																										
PIP3B11							✓																			
PIP3B12							✓																			
PIP3B13							✓																			
PIP3B14																										
PIP3B18					✓	✓	✓						✓													
PIP3C1																										
PIP3C2																										
PIP3C3					✓	✓							✓													
PIP3C4					✓	✓							✓													
PIP3C5																										
PIP3C6					✓	✓							✓													
PIP3C7							✓																			
PIP3D8																										
PIP3D9																										
PIP4A1																										
PIP4A2								✓																		
PIP4A3																										
PIP4A4																										
PIP4A5																										
PIP4A6																										
PIP4B2					✓	✓	✓	✓					✓													
PIP4B3																										
PIP4C1								✓																		
PIP4D1																										
PIP4E1																										
PIP4E2																										

4.3 Business process analysis

In this section, we analyze the business process in the fuel management by swimlane tool because we recognize the transaction between control units. In addition, it is used to apply Partner Interface Process (PIP) for the automatic process. The AS-IS process as shown in figure 4.2(a-b) and 4.3(a-b). The processes involve the distribution and receiving in the fuel management.

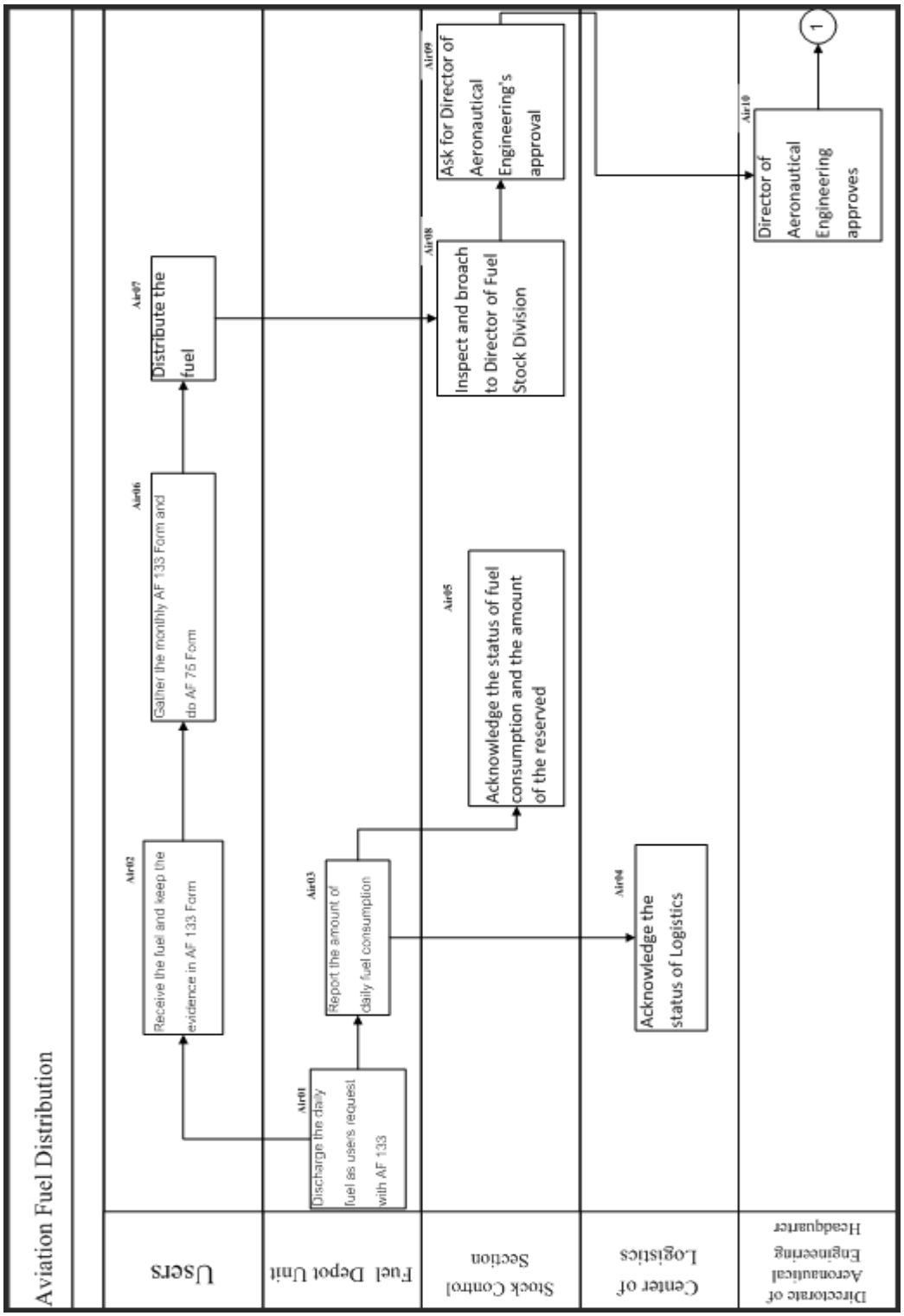

Figure 4.2 (a) Aviation Fuel Distribution process

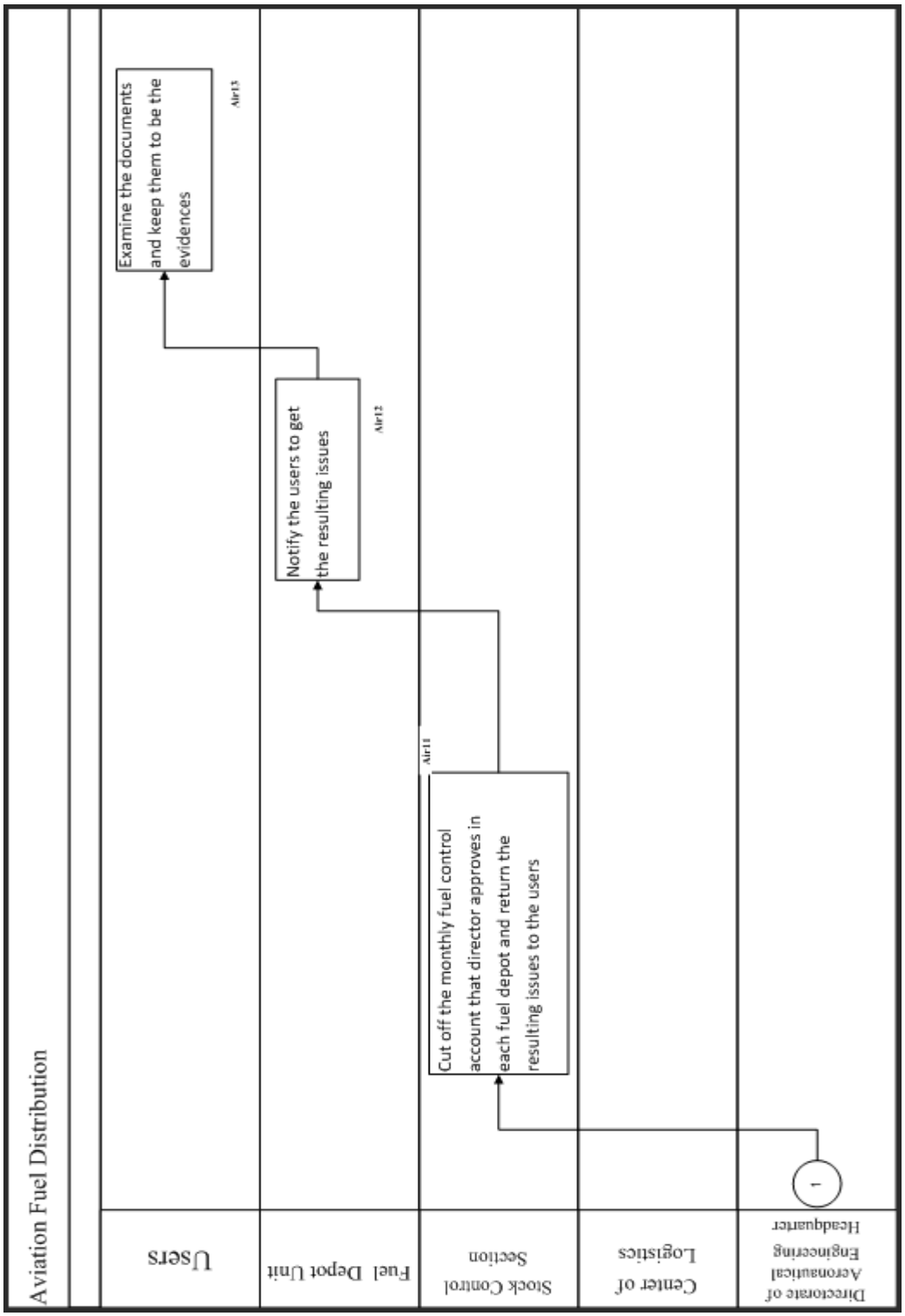

Figure 4.2 (b) Aviation Fuel Distribution process

Table 4.2: Description of activities in Aviation Fuel Distribution

No.	Name	Stakeholder	Connect to	Description
Air01	Discharge the daily fuel as the users request.	Fuel Depot Unit	Air02	> Refuel to the users and record in AF 133 Form.
Air02	Receive the fuel and record in AF 133 Form.	Users	Air06	> Receive the fuel by refueling vehicles.
Air03	Report the amount of the daily consumption.	Fuel Depot Unit	Air04,05	> Report the amount of the daily consumption by radio and fax before 7 o'clock.
Air04	Acknowledge the status of Logistics.	Center of Logistics		> The information of all statuses of Logistics in Royal Thai Air Force.
Air05	Acknowledge the status of fuel consumption.	Stock Control Section		> Gather the consumption rate of each depot and do the report every Thursday.
Air06	Gather AF 133 Form every month and do AF 75 Form	Users	Air07	> Information that is related to the aviation fuel consumption request of users.
Air07	Disburse the fuel.	Users	Air08	> Report the aviation fuel consumption request of users..
Air08	Inspect and broach to Director of Fuel Stock Division.	Stock Control Section	Air09	> Present the report from the users via the fine.
Air09	Ask for Director of Aeronautical Engineering's approval.	Stock Control Section	Air10	> Type the letter to ask for Director of Aeronautical Engineering's approval.
Air10	Director of Aeronautical Engineering approves.	DAE Headquarter	=REF!	> Director of Aeronautical Engineering signs for the approval.
Air11	Cut off the monthly fuel control account in each fuel depot.	Stock Control Section	Air12	>Cut off the aviation fuel consumption account for the users
Air12	Notify the users to get the resulting issues.	Fuel Depot Unit	Air13	> The document of fuel consumption request report that Director of Aeronautical Engineering has already approved.
Air13	Examine the documents and keep them to be the evidences	Users		> Do the advanced fuel disbursement before reporting the aviation fuel consumption request.

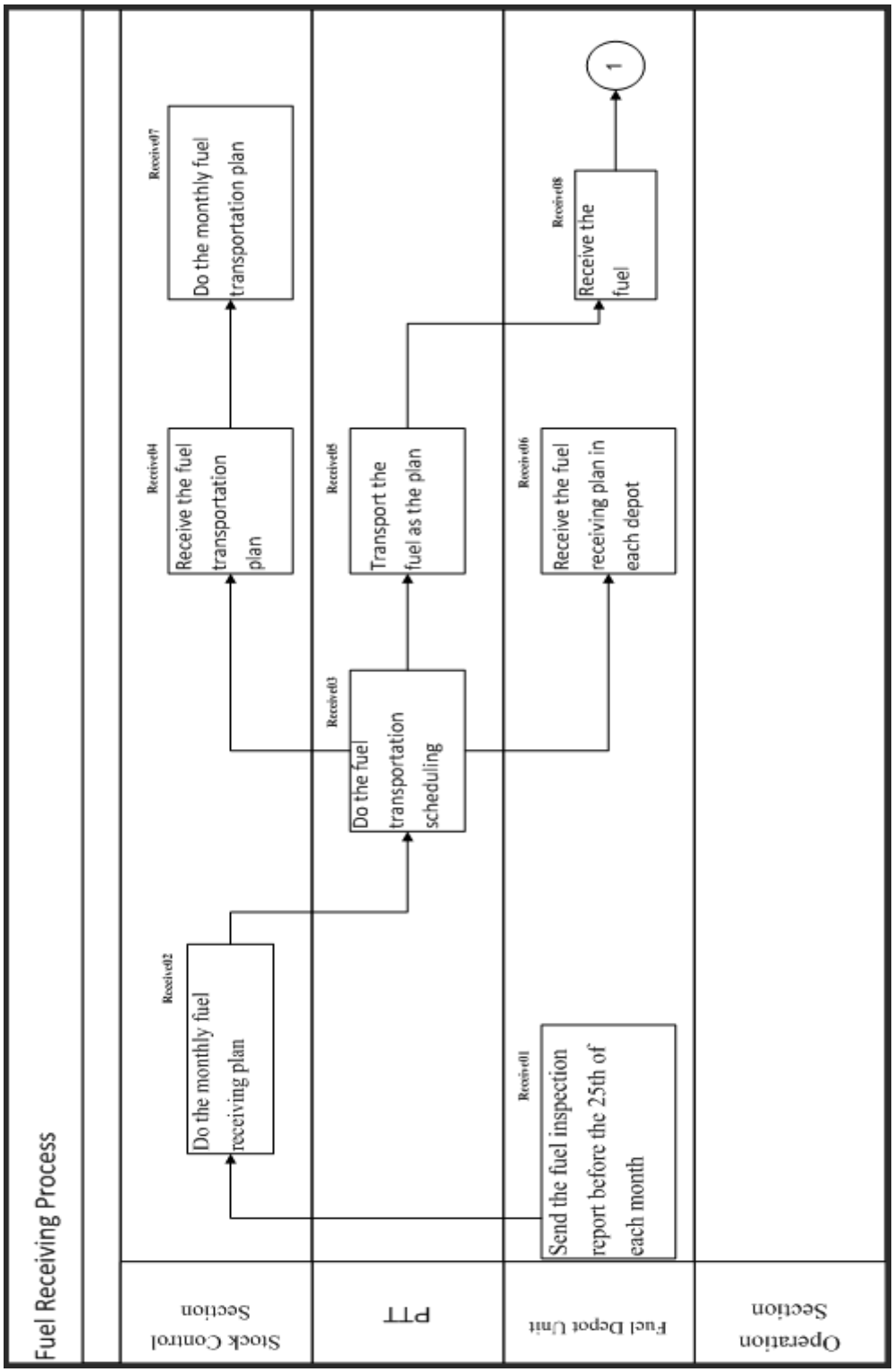

Figure 4.3 (a) Fuel Receiving process

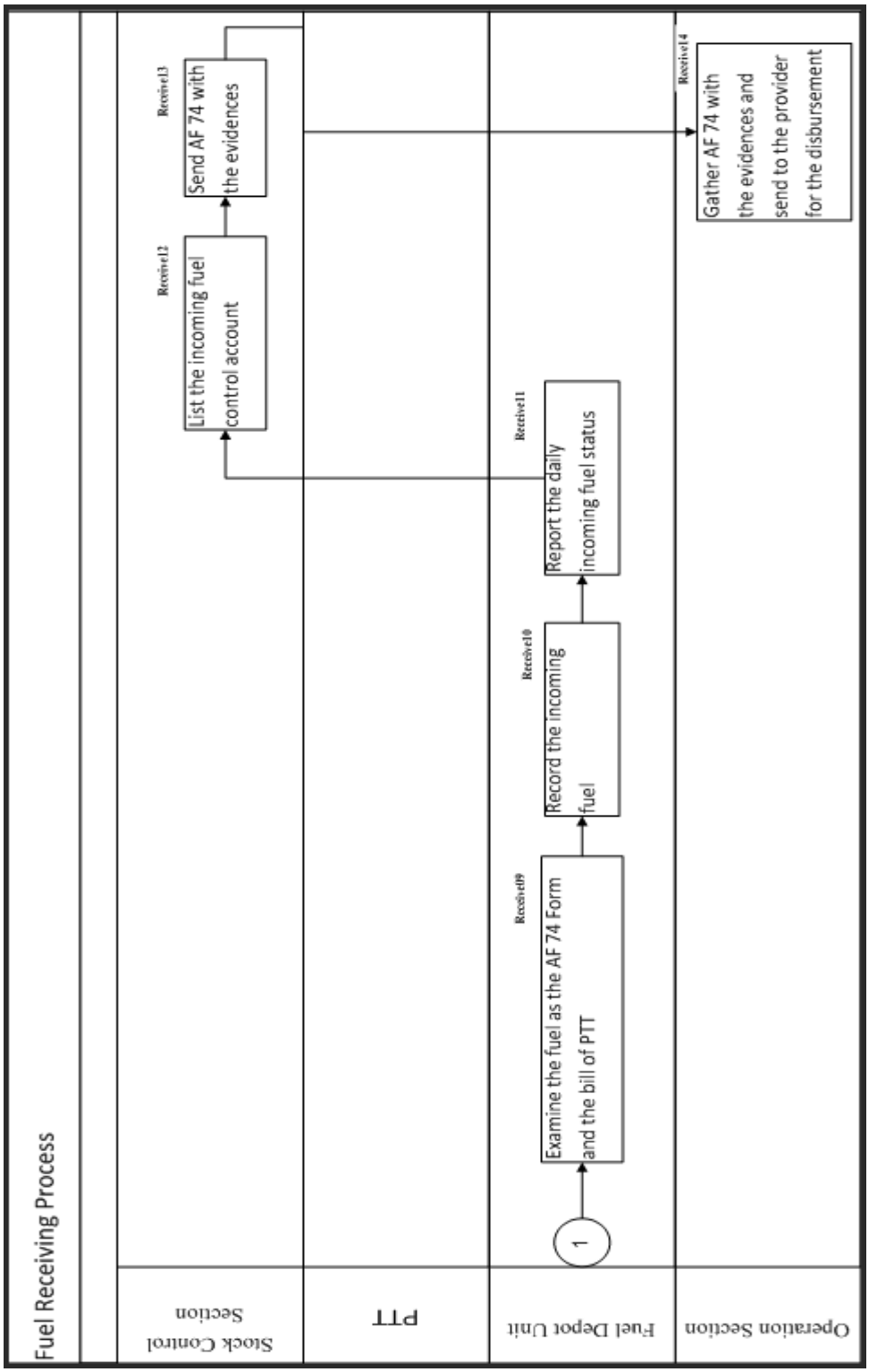

Figure 4.3 (b) Fuel Receiving process

Table 4.3: Description of activities in Receive Aviation Fuel

No.	Name	Stakeholder	Connect to	Description
Receive01	Send the fuel inspection report.	Fuel Depot Unit	Receive02	> Send the fuel inspection report as กพด.๒๑.23-1 before the 25th of each month.
Receive02	Do the monthly fuel receiving plan.	Stock Control Section	Receive03	> Gather the fuel request in each depot and the appropriate time for the transportation.
Receive03	Do the fuel transportation table.	PTT	Re 04,05,06	> Design the management of transportation by specifying time and the amount of transportation in each depot.
Receive04	Receive the fuel transportation plan.	Stock Control Section		> Acknowledge the fuel transportation plan and time for the operation in each depot.
Receive05	Transport the fuel as the plan.	PTT	Receive07	> Manage the refueling vehicles as the amounth of monthly fuel
Receive06	Receive the fuel transportation plan in each depot .	Fuel Depot Unit		> Receive the fuel transportation plan and the content in the specified time.
Receive07	Do the monthly fuel transportation plan.	Stock Control Section		> Gather and keep the monthly fuel transportation plan.
Receive08	Receive the fuel.	Fuel Depot Unit	=REF!	> Receive the fuel as the time and amount that are specified in each depot"
Receive09	Examine the fuel as the AF 74 Form.	Fuel Depot Unit	Receive10	> Examine the fuel as the AF 74 Form to coincide with the bill of each purchase order.
Receive10	Record the incoming fuel.	Fuel Depot Unit	Receive11	> Record in กพด.๒๑.23-1 Form.
Receive11	Report the status of monthly receiving fuel.	Fuel Depot Unit	Receive12	> Report as กพด.๒๑.23-1 Form.
Receive12	List the incoming fuel control account.	Stock Control Section	Receive13	> Improve the fuel status in each fuel depot.
Receive13	Send AF 74 with the bill.	Stock Control Section	Receive14	> Inspect AF 74 Form with the bill.
Receive14	Gather AF 74 with the evidences and send for the disbursem	Operation Section		> Do the report with AF 74 Form and the bill and send them to the provider.

4.4 Re-engineering process by Partner Interface Process (PIP)

For AS-IS process, we analyze the manual process and then we adjust it the automated process by PIPs. The methodology refers to applying RosettaNet for case study of order-to-payment by Intel (An Intel case study of order-to-payment automation in the Asia Pacific region, 2004). For example, Request Purchase Order (PO) process between WPG-buyer and Intel-seller as shown in Figure 4.4.

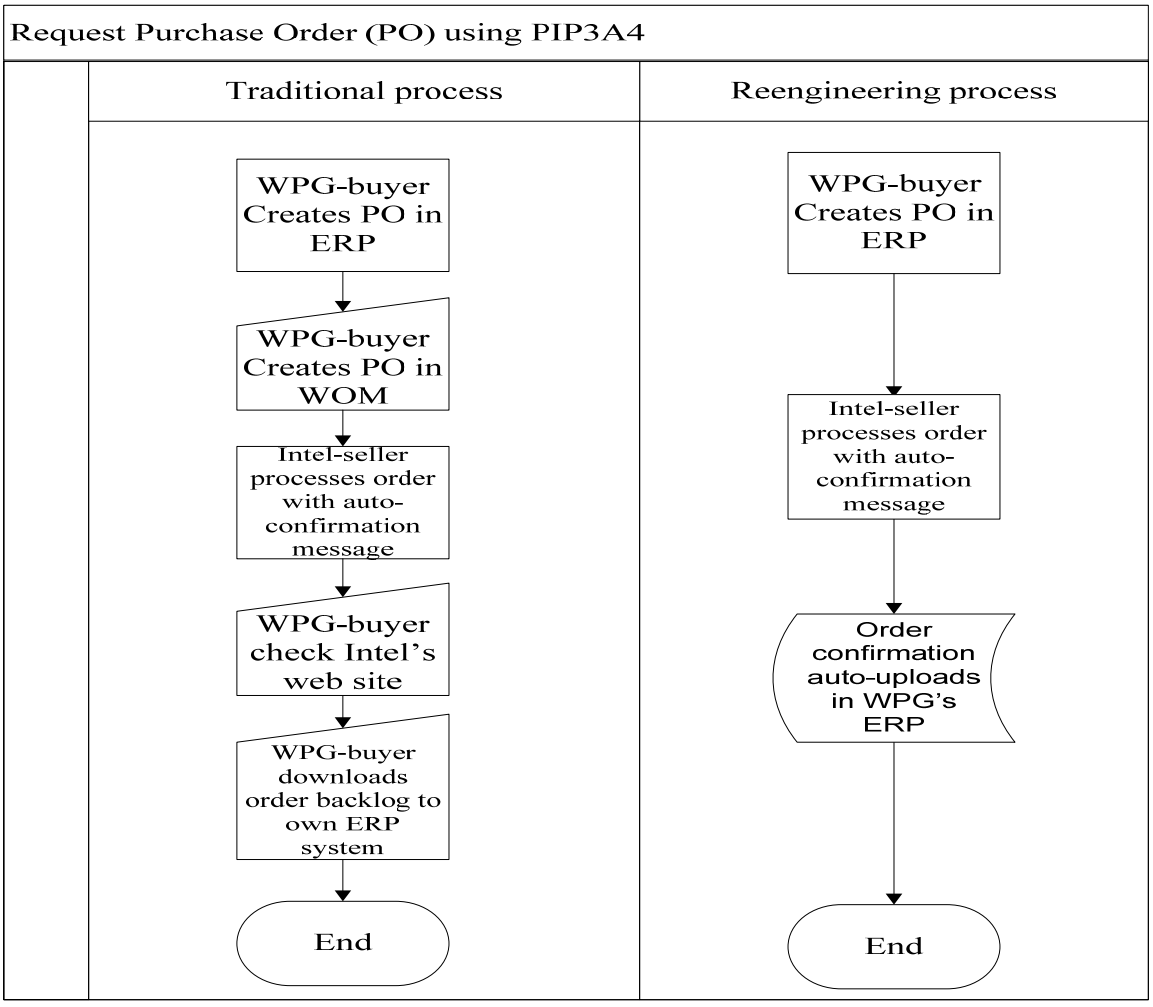

Figure 4.4 Comparison traditional process and reengineering process by PIP

Source: An Intel case study of order-to-payment automation in the Asia Pacific, 2004

4.5 Design business document based on XML schema

RosettaNet is a standard that focuses on business process, so the adoption that is appropriate PIPs identifies data in the document for sharing information between trading partners. The format document based on XML schema can be used to interchange information via Internet. It is the choice for globalization supply chain in business-to-business (B2B) integration.

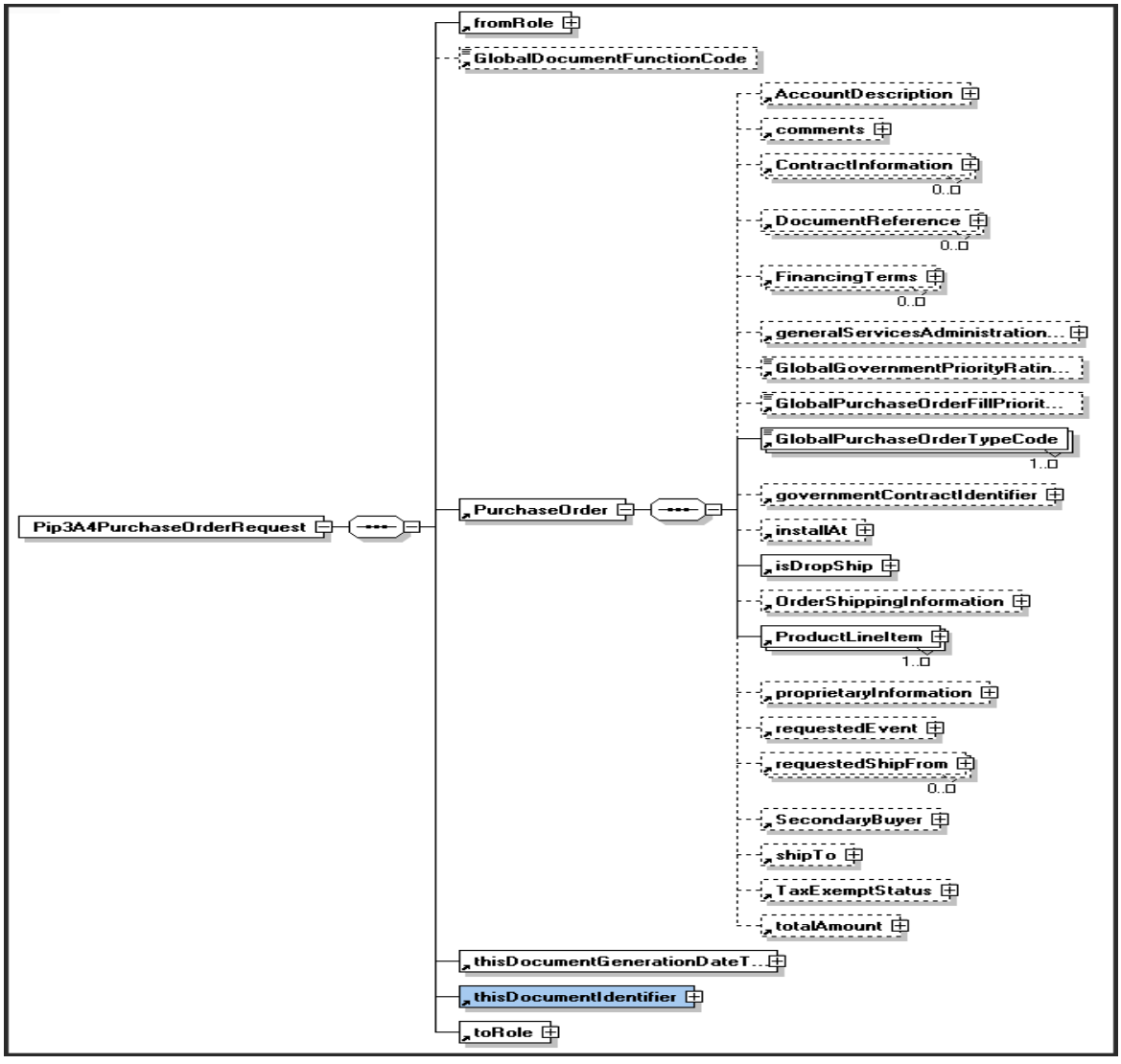

Figure 4.5 Characteristic of XML schema in PIP3A4

CHAPTER V
RESULTS

This chapter presents results of the study divided into 2 parts: design the data exchange framework and design documents based on XML schema, including dividing level of elements in related PIPs.

5.1 Design data exchange framework

In this part, the method consists of: business process reengineering by appropriate PIPs and architecture of data exchange for fuel management.

5.1.1 Business process reengineering by PIP4C1

Inventory report process in the fuel management is the communication between the fuel depot and the fuel control section. It notifies the fuel consumption for supporting an aircraft in the responsible depot. The locations of these depots are established in the region of Thailand based on wing, but the fuel control section is the center. Awareness of the fuel consumption must be available all the time, so we propose the new process for the fuel report that can be used to manage fuel in the RTAF.

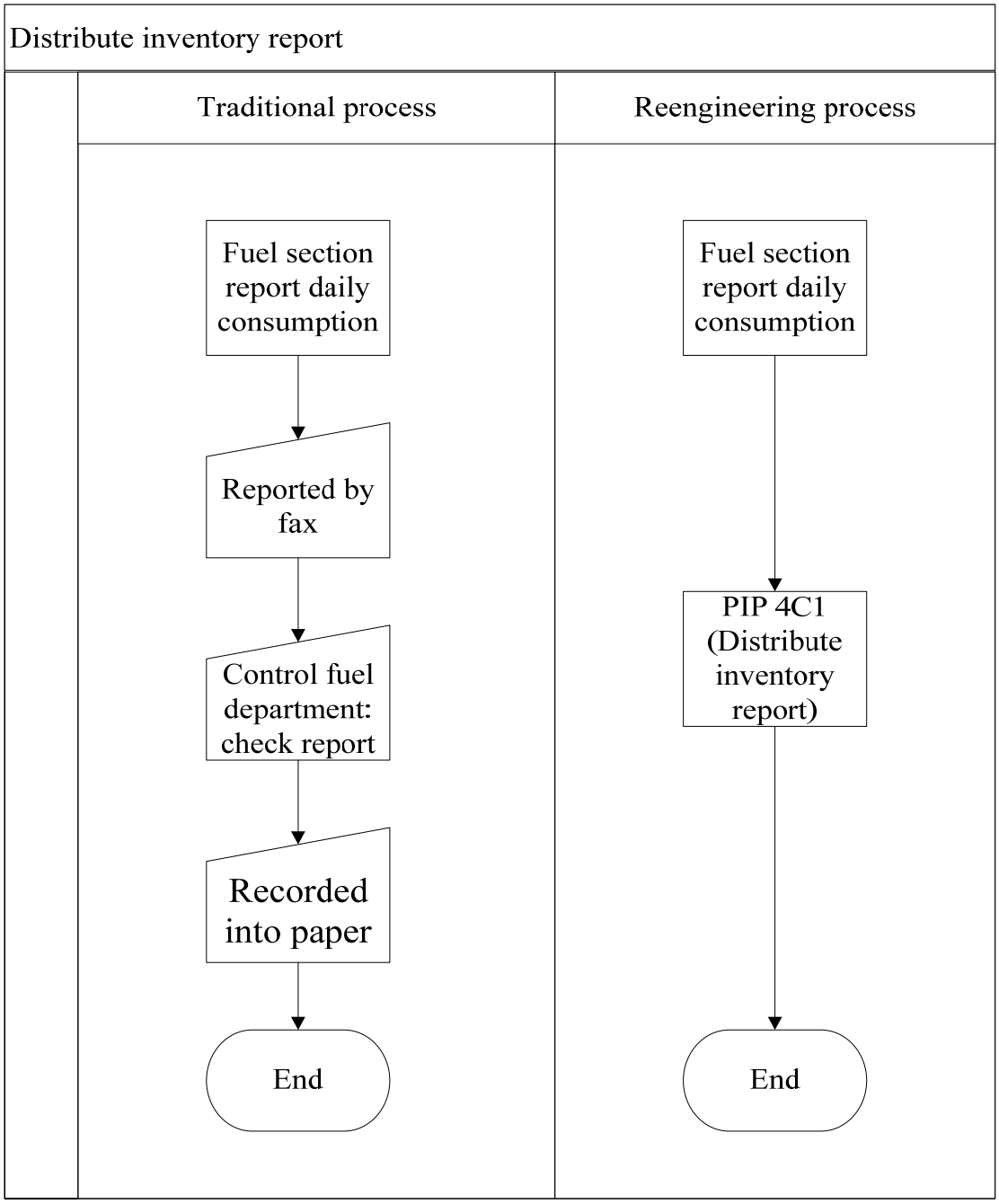

Figure 5.1 Comparison between traditional process and reengineering process by PIP4C1

Figure 5.1 shows the comparison between the traditional process and the new process replaced with PIP. We found that PIP process could effectively reduce the existing manual process e.g. handling report by fax, checking received data to ensure correctness before recording, and finally recording data in the paper form. According to the study, we could adjust 3 manual processes by replacing with PIP4C1. The manual process took rather long implementation time. Thus, replacing with PIP that was an automatic system could contribute to the process and time reduction of manual type resulting in efficient data exchange as shown in figure 5.2.

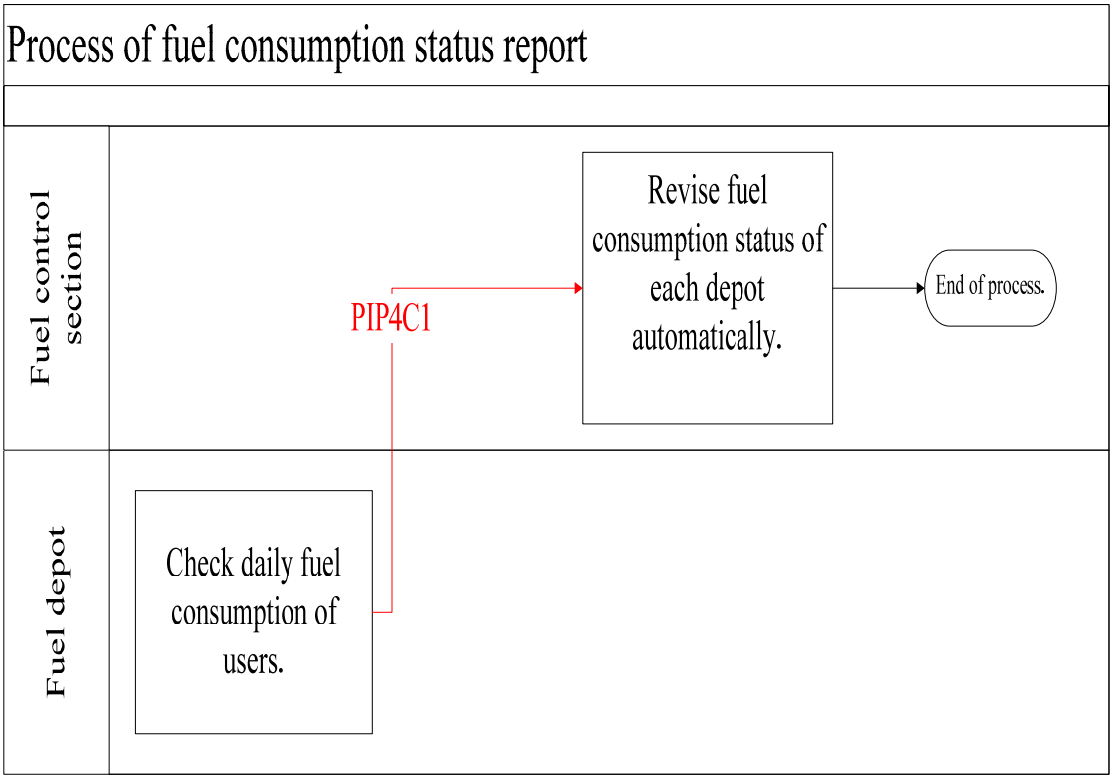

Figure 5.2 New processes replaced with PIP4C1

5.1.2 Business process reengineering by PIP4A2

Presently, the fuel demand forecast of Royal Thai Air Force and PTT Public Company Limited is estimated from demands of each depot that might be inaccurate. In addition, there was not any mutual forecast as the fuel consumption of each depot that could not be estimated accurately as a result of acquired data from the only estimated usage, so the purchasing order might not fulfill the actual demand. According to the primary data collection, although fuel consumption data of each depot was available, but the data came from the sent fax of each depot followed by issuing weekly report possibly leading to inaccurate data. Besides, the forecast was only the summary of monthly fuel demand in each depot and used internally without any sharing of data. Sometimes there might be other unplanned missions, so demands of each depot might be uncertain and caused the order quantity not to fulfill actual demand. Therefore, the researcher utilized PIP4A2 involving the forecast of the collaborative fuel consumption in order to ensure the efficient fuel management in accordance with the allocated budget. Figure 5.3 demonstrated the collaborative forecast process by PIP4A2

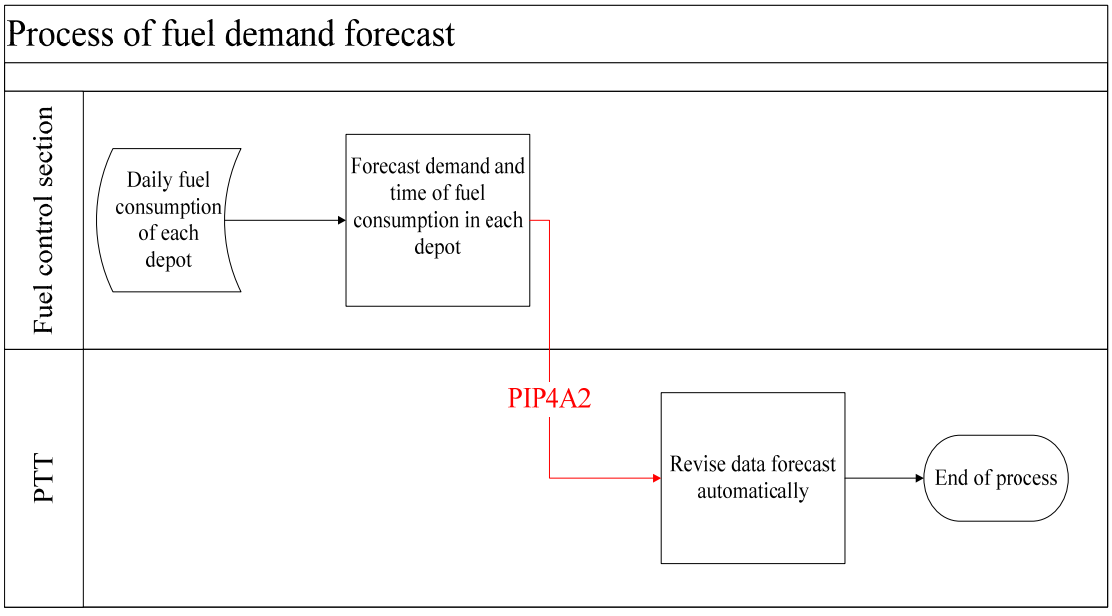

Figure 5.3 Collaborative forecast processes by PIP4A2

5.1.3 Business process reengineering by PIP3B2

Notification of shipment process between PTT and fuel control section can be used to report the status of fuel. It is important information for transportation of fuel because of the contact outsource.

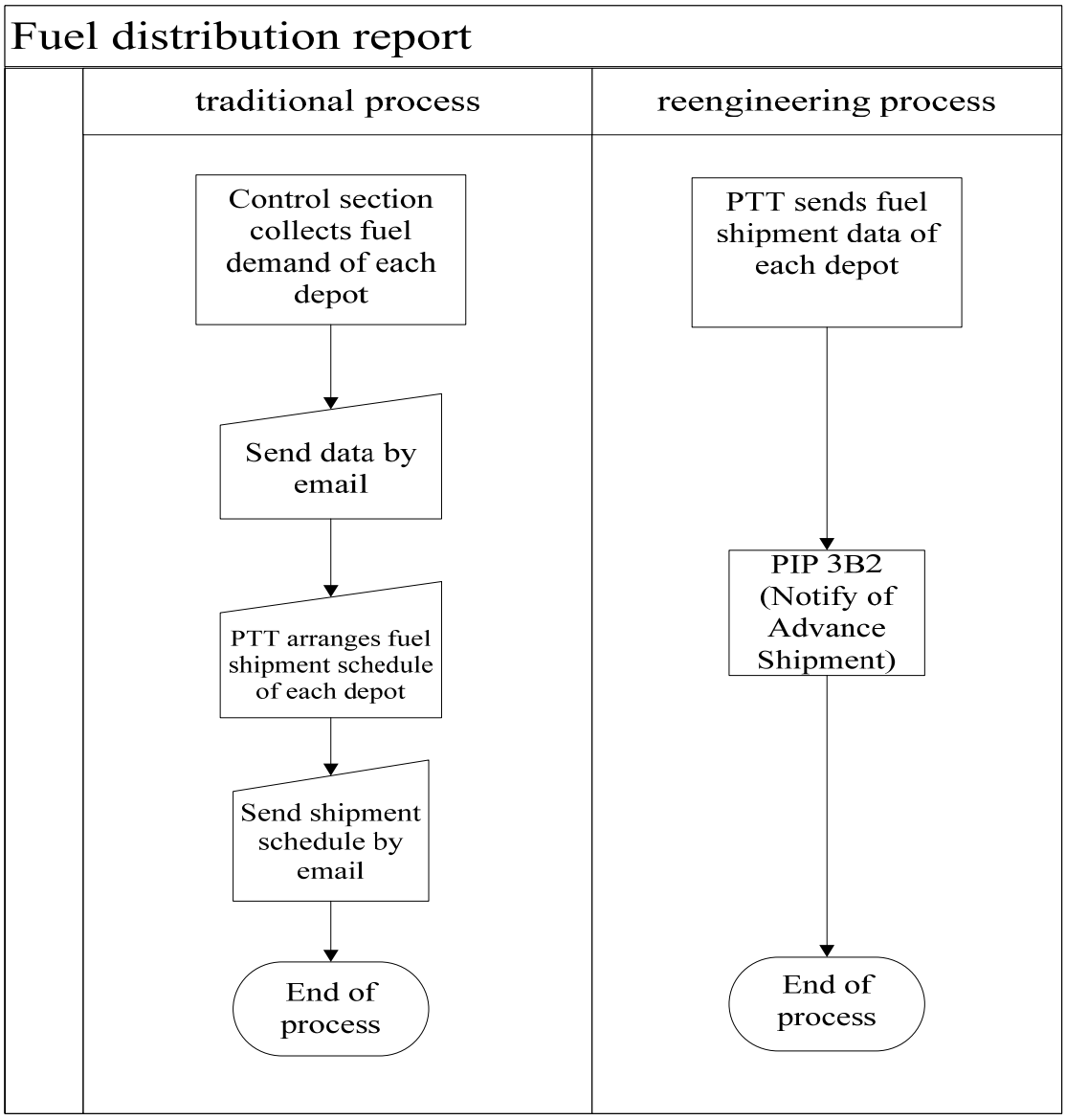

Figure 5.4 Comparison between traditional process and reengineering process by PIP3B2

Figure 5.4 indicated that traditional process was manual and duplicate as a result of email sending and receiving. Data security was not adequate possibly leading to the secret data disclosure and all processes were manual. Therefore, the researcher chose to replace the traditional process with PIP3B2 for notifying the fuel status shipment operated by PTT. Fuel demand could be acquired from the mutual forecast that contributed to the reduced process of email sending and receiving as well as the secret data protection. The new process replaced the old one with PIP3B2 that required the collaborative forecast for the efficient use. The new process was demonstrated in Figure 5.5.

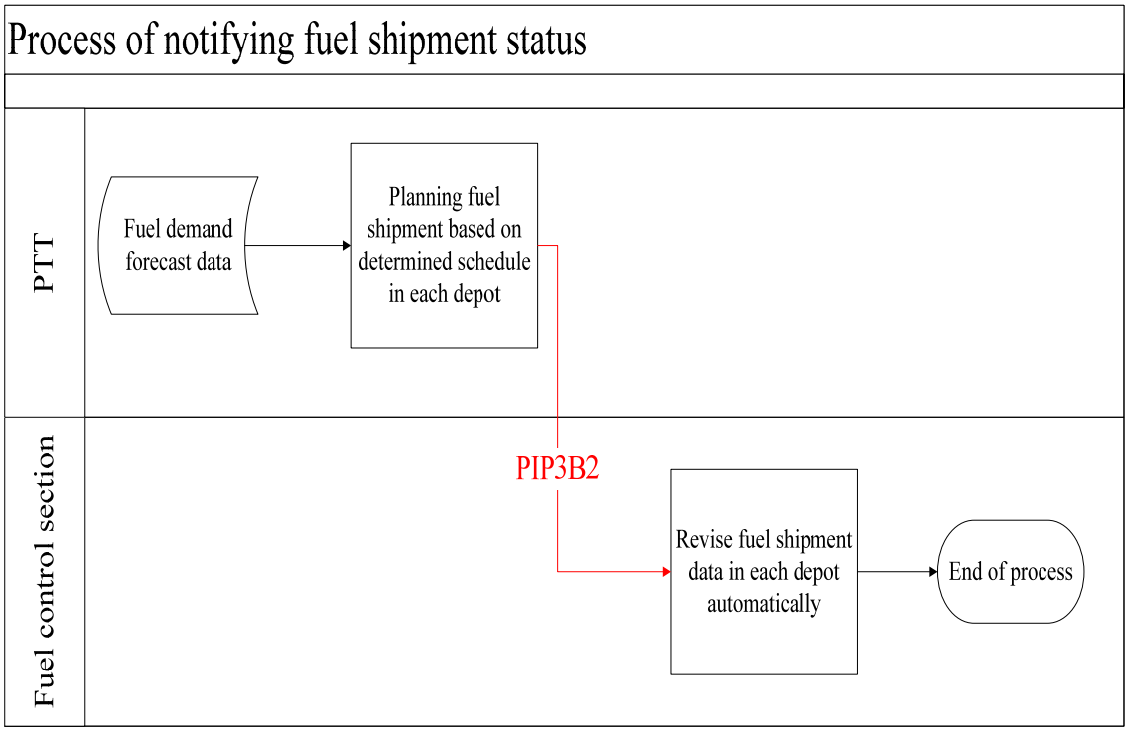

Figure 5.5 New processes by PIP3B2

5.1.4 Business process reengineering by PIP4B2

Fuel shipment response process had not been available. According to the primary study, it was found that the documents of Royal Thai Air Force were used for fuel acceptance based on quality criteria but not for notifying the received quantity of fuel in each depot to PTT. Therefore, the researcher proposed PIP4B2 involving response process after receiving fuel that provided data for handling the inventory control of both Royal Thai Air Force and PTT resulting in the mutual efficient fuel management. Received fuel response process was shown in Figure 5.6.

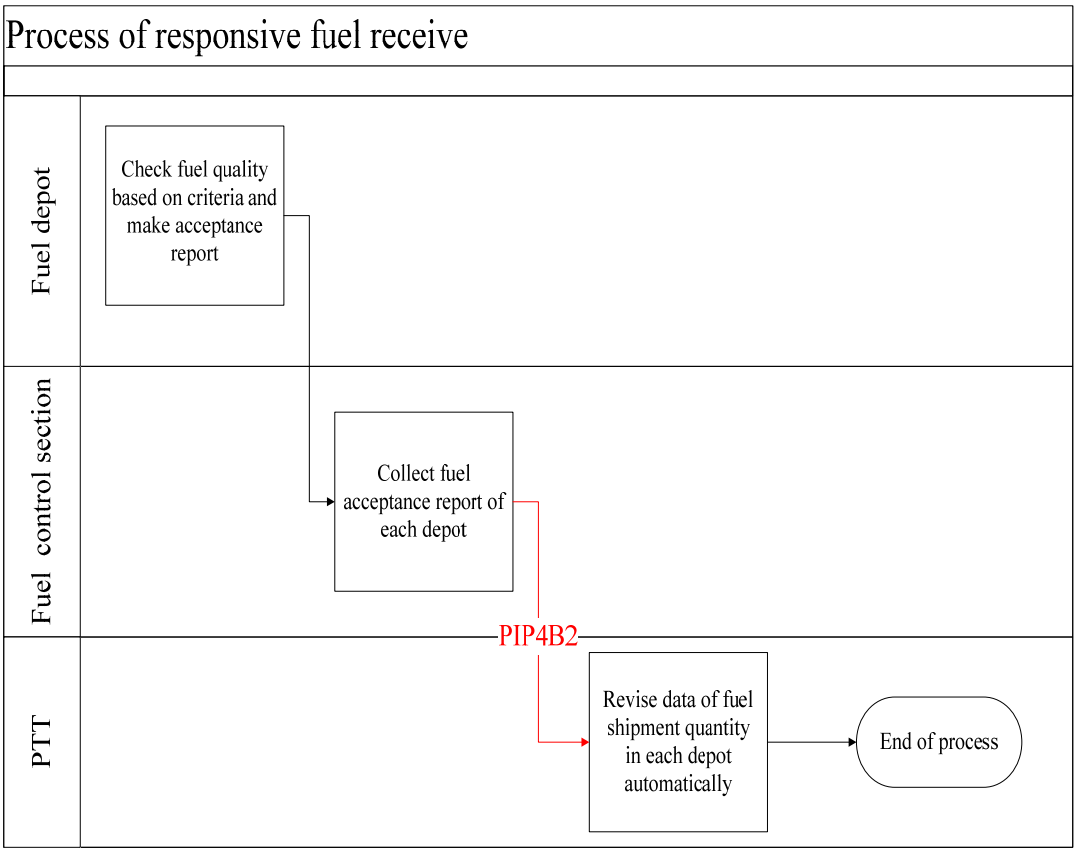

Figure 5.6 Fuel shipment response process by PIP4B2

Summarily, all processes replaced with PIP were significant and essential for the fuel management system because all transmitted data were consequent and interrelated. The data exchange via PIP enabled us to receive updated data and adjust planning timely for the most efficient fuel management with a limited budget. Thus, the fuel demand had to be related to the allocated budget. However, the fuel reserve in each depot had to be sufficient for fulfilling mission of the armed forces.

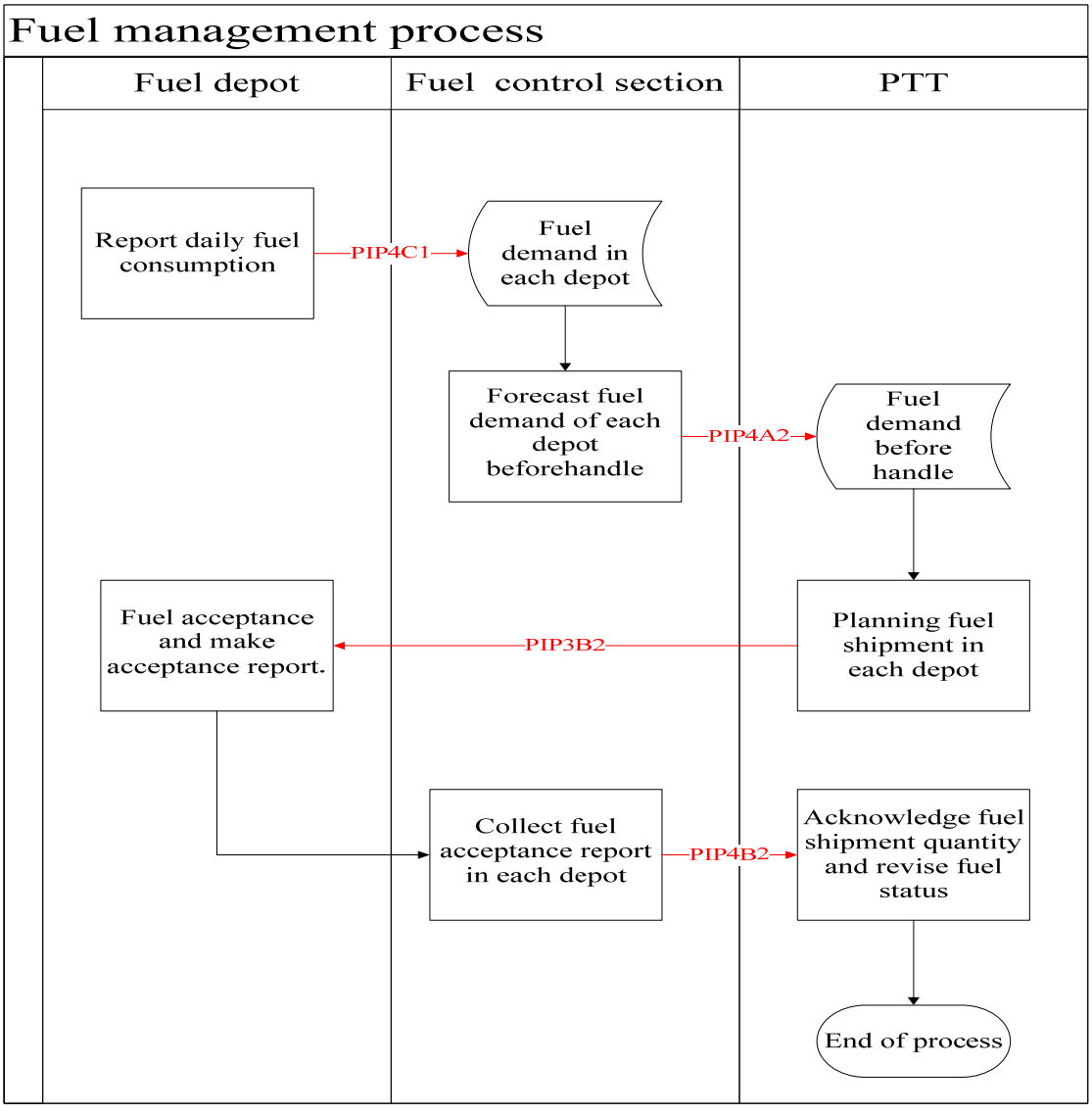

Figure 5.7 Overall fuel management process replaced with PIP

5.1.5 Architecture of data exchange for fuel management

In this section, we identify the appropriated PIPs for various activities in fuel management. We adopt PIP4C1 for distributing the inventory report from the fuel depot to the fuel control section, PIP4A2 for the inventory forecast between the fuel control section and PTT, PIP3B2 for the notification of shipment from PTT, and PIP4B2 for the responsiveness of receptive shipment.

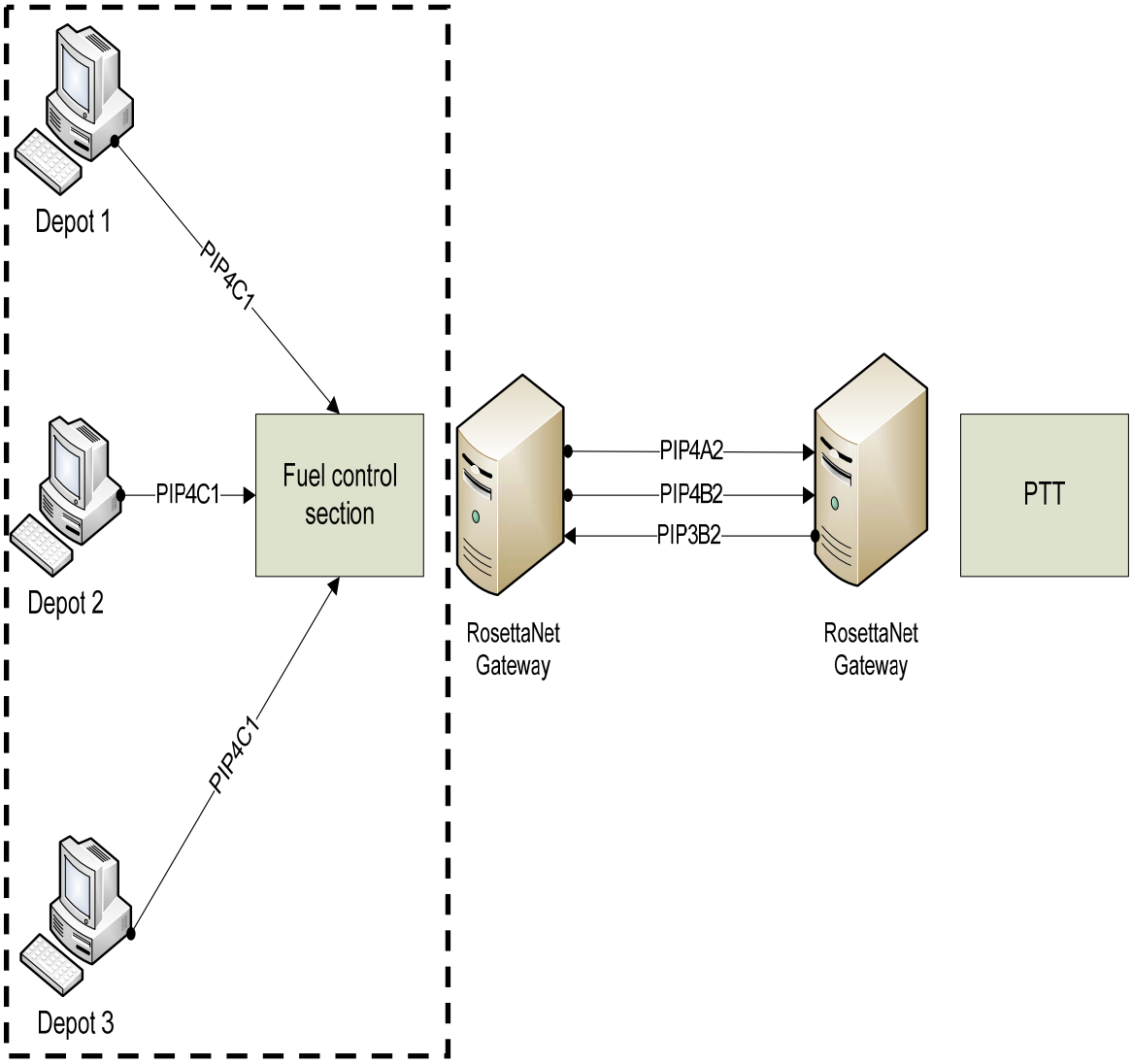

Figure 5.8 Architecture of data exchange for fuel management

From Figure 5.8, there were 3 parties relevant to fuel management: 2 sections of Royal Thai Air Force including Fuel Division responsible for controlling and managing the overall fuel located in central region, and fuel depot located in local region that supported aviation fuel demands of each aviation division, and an external organization, PTT Public Company Limited, responsible for supplying fuel in order to fulfill fuel demands. It was very necessary that the local fuel depot had to send data of the fuel consumption in each depot to Fuel Division in the central region in order to provide fuel for each depot sufficiently and properly with an allocated budget. Therefore, the researcher submitted PIP4C1, a daily fuel consumption status report, to the central region. Responsible sections included Fuel Inventory Control Section, Fuel Inventory Division, and Directorate of Aeronautical Engineering. The acquired data would be utilized for mutually forecasting fuel demands. This process applied PIP4A2 to send and receive data for planning fuel procurement of PTT Public Company Limited. After sending fuel demand forecast of each depot, PTT would be able to plan the fuel shipment in accordance with the required quantity and schedule by PIP3B2. When finishing fuel shipment for each depot, the response would be sent via PIP4B2, so PTT acknowledged the shipped quantity and handled their inventory account accurately.

The part that was highlighted can be used to identify a framework for sharing information in an internal system. Although the objective of RosettaNet is the generated Business-to-Business (B2B) framework, the communication between fuel depot and fuel control section are able to apply for the harmonious organization. The internal system in fuel management can not be incompletely operated, so RosettaNet can be used to guild information for designing documents involving the business process based on PIPs. We propose the framework for the contact to control units in the RTAF. We adopt PIP4C1 for designing the document in order to report the status of the fuel consumption in each depot. The detail of the document can be used to attach with the webpage in each wing. Web application is the way to share information between control units.

5.2 Design documents based on XML schema

In this section, we represent the format document based on XML schema for the RTAF. RosettaNet can be used to direct the detail of information in these documents because of define the business processes between partners in supply chain. We analyze these elements in each PIPs in order to apply for the proper partner in the other area. It is separated into six parts that are called the primary elements.

Table 5.1: Primary elements in each PIPs

Primary elements			
PIP3B2	PIP4A2	PIP4B2	PIP4C1
AdvancedShipment Notification	✕	✕	✕
✕	Embedded ReleaseForecast	✕	✕
fromRole. PartnerRoleDescription	fromRole, PartnerRoleDescription	fromRole. PartnerRoleDescription	fromRole. PartnerRoleDescription
GlobalDocument FunctionCode	GlobalDocument FunctionCode	GlobalDocument FunctionCode	GlobalDocument FunctionCode
✕	✕	ShipmentReceipt InformationResource	✕
✕	✕	✕	InventoryReport
thisDocument GenerationDateTime. DateTimeStamp	thisDocument GenerationDateTime. DateTimeStamp	thisDocument GenerationDateTime. DateTimeStamp	thisDocument GenerationDateTime. DateTimeStamp
thisDocument Identifier. ProprietaryDocument Identifier	thisDocument Identifier. ProprietaryDocument Identifier	thisDocument Identifier. ProprietaryDocument Identifier	thisDocumentIdentifier. ProprietaryDocument Identifier
toRole, PartnerRoleDescription	toRole, PartnerRoleDescription	toRole, PartnerRoleDescription	toRole, PartnerRoleDescription

According to data in the primary element, we classify into three parts (RNIF, 2001): communication parties (From-To) content, activity content, and standard communication content.

-Communication parties (From-To) content: identifying the detail trading partners that are the sender and receiver in supply chain.

-Activity content: identifying actions interacting in the business process between partners.

-Standard communication content: identifying standard data that can be used for the global interoperability framework.

Table 5.2: Classification of primary elements in each PIPs

communication parties (From-To) content	activity content	standard communication content
- fromRole. PartnerRoleDescription - toRole, PartnerRoleDescription	- AdvancedShipmentNotification - EmbeddedReleaseForecast - ShipmentReceip InformationResource - InventoryReport	- GlobalDocumentFunctionCode - thisDocument GenerationDateTime.DateTimeStamp - thisDocumentIdentifier. ProprietaryDocumentIdentifier

Communication parties (From-To) content is a common in each PIP. It can be used to describe the characteristic of partners. The detail of elements in this part consists of contactInformation, GlobalPartnerRoleClassificationCode, and PartnerDescription (www.rosettanet.org). The subfield in this element refers to the standard in RosettaNet, but subfield in contactInformation can be used to apply in the military field. We introduce the contactInformation for the identification of business because it is the general field for the communication between trading partners.

Activity content describes characteristics of the action and information interacting between trading partners. We classify into five parts: who, when, how many, what, and reference. The classification is a guideline for proper consideration design documents based on RosettaNet.

Table 5.3: Classification of activity content

Classification of activity content				
who	when	how many	what	reference
Identify partner or company involve business for supply chain	Identify date and time for communication between trading partners	Identify a quantity that deliver or receive for trading partners	Identify characteristics of information about action and activity	Identify specific information for standard data exchange

From Table 5.3 is preliminary for analyzing documents. The components of the interoperability framework consist of: the business document, business processes, and messaging. RosettaNet is the standard data exchange that defines both documents and business processes, so identifying business processes between partners is able to generate related documents. The analysis of documents in the activity content can be used to implement electronics-documents for sharing information based on business processes. The classification of activity content is the way to improve the paper-based-document to the electronics-based-document.

Since the documents that involve the fuel management are communications in the domestic area, the standard communication content part is not necessary for sharing information. We use both communication parties (From-To) content and activity content is to be the guideline for design documents.

Table 5.4: Key elements selection in fuel management

Primary elements			
PIP3B2	PIP4A2	PIP4B2	PIP4C1
AdvancedShipment Notification	Embedded ReleaseForecast	fromRole. PartnerRoleDescription	fromRole. PartnerRoleDescription
fromRole. PartnerRoleDescription	fromRole, PartnerRoleDescription	ShipmentReceipt InformationResource	InventoryReport
toRole, PartnerRoleDescription	toRole, PartnerRoleDescription	toRole, PartnerRoleDescription	toRole, PartnerRoleDescription

In summary, the components of these documents in each PIP consist of six elements that are called the primary elements. Adoption of primary elements should consider the nature of business. The main content for designing documents is the communication parties content and the activity content due to general parts for identifying the description of partners or parties and interaction between partners. Furthermore, the optional content is the standard communication content because it requires a member of RosettaNet for the communication in the specific industry cluster or updated information for global supply chain. We analyze the activity content that describes five parts: who, when, how many, what, and reference. The reference part is optional element when you register a member of RosettaNet, whereas the general element for applying in the other business is who, when, how many, and what. Moreover, when the part identifies date and time based on Coordinated Universal Time (UTC), therefore we introduce an element for sharing information in global supply chain.

5.2.1 Document based on PIP3B2

In this section, we analyze the document both communication parties (From-To) content and the activity content. The result is the document based on XML schema can be used to communicate between PTT and the fuel depot.

5.2.1.1 Analyze communication parties (From-To) content

We compare information in the traditional document with an element in communication parties (From-To) content. The document represents the sender and receiver message. In this PIP3B2, the sender is PTT and the receiver is the fuel control section.

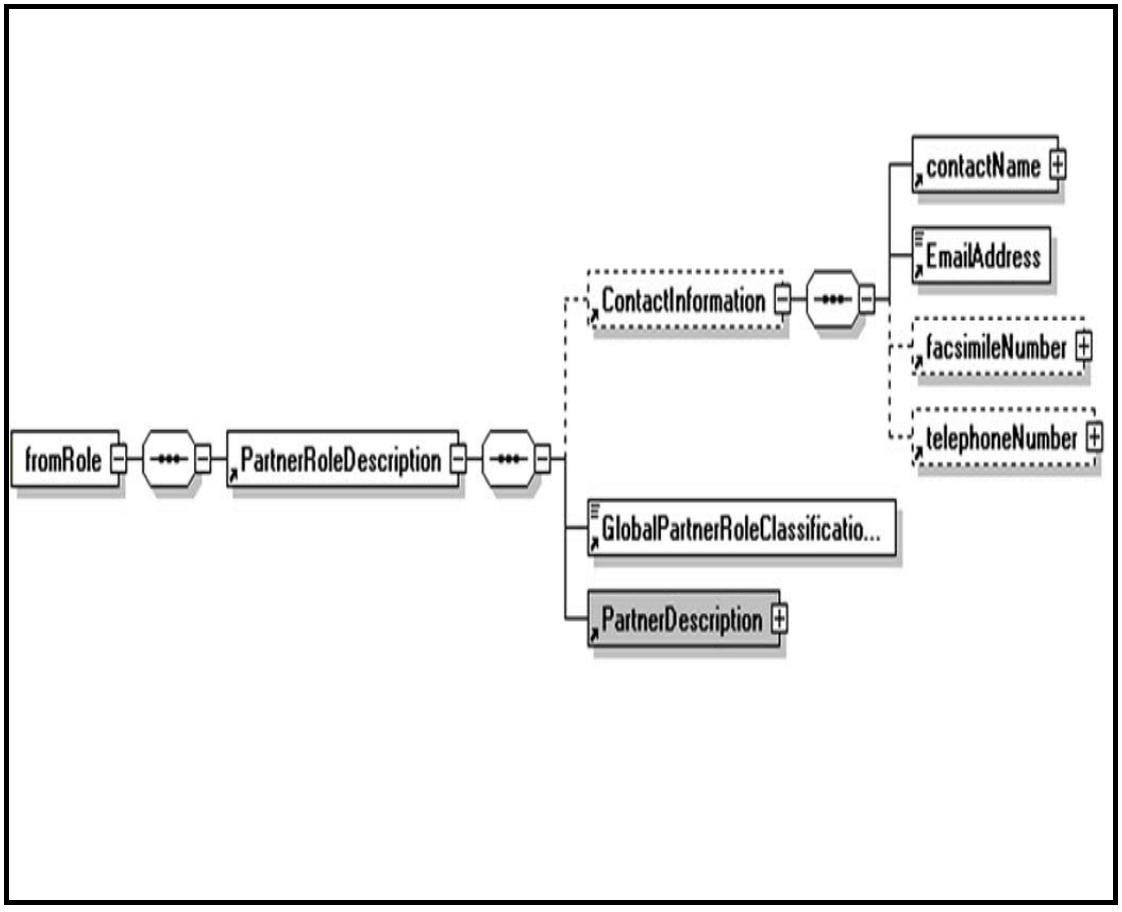

Figure 5.9 Characteristics of elements in communication parties (From) content PIP3B2

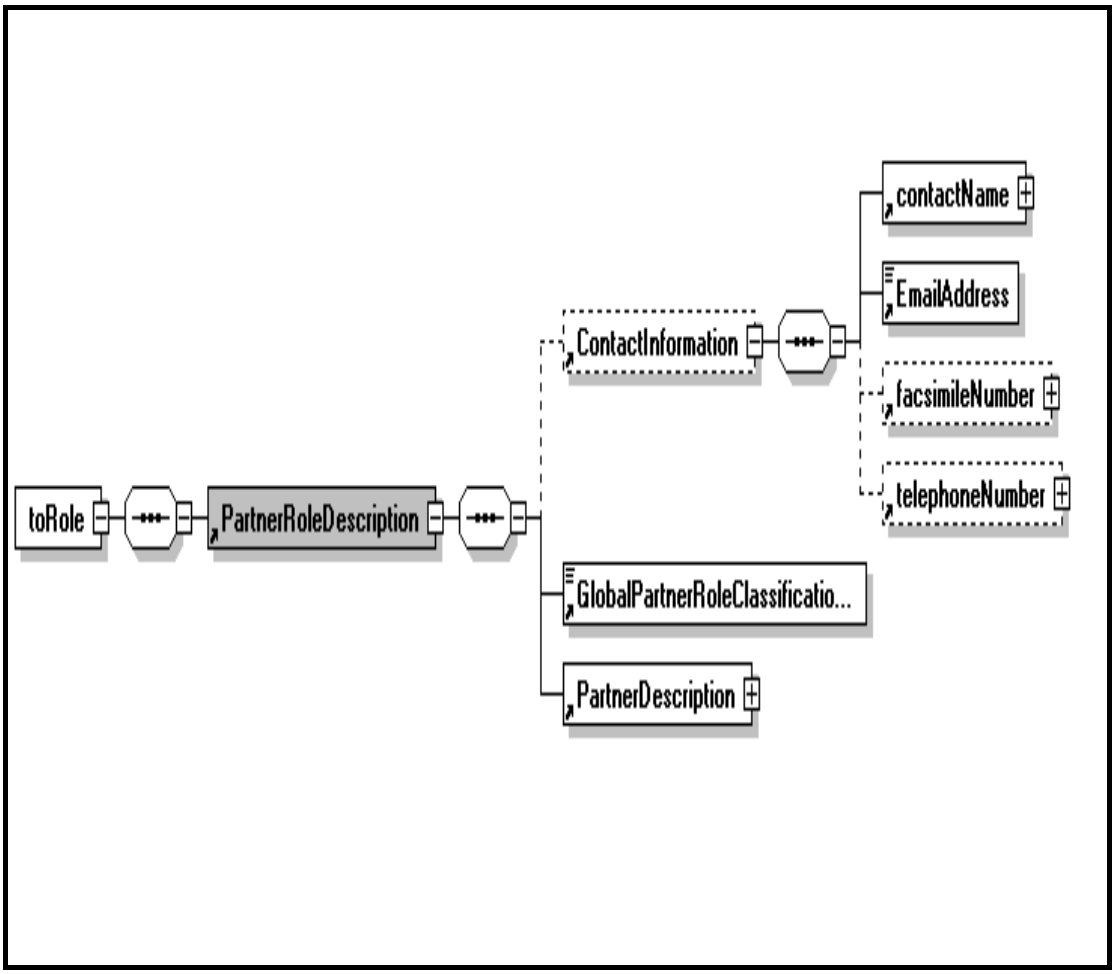

Figure 5.10 Characteristics of elements in communication parties (To) content PIP3B2

Table 5.5: Analysis of elements for sender PIP3B2

Element	Level	Required	Remark
fromRole.PartnerRoleDescription	primary	✓	PTT
ContactInformation	1	✓	header
contactName.FreeFormText	2	✓	coordinating person
EmailAddress	2	✓	recommend
facsimileNumber.CommunicationsNumber	2	✕	
telephoneNumber.CommunicationsNumber	2	✓	recommend
GlobalPartnerRoleClassificationCode	1	✕	
PartnerDescription	1	✕	
BusinessDescription	2	✕	
GlobalBusinessIdentifier	3	✕	
GlobalSupplyChainCode	3	✕	
GlobalPartnerClassificationCode	2	✕	

Table 5.6: Analysis of elements for receiver PIP3B2

Element	Level	Required	Remark
toRole.PartnerRoleDescription	primary	✓	fuel control section
ContactInformation	1	✓	header
contactName.FreeFormText	2	✓	coordinating person
EmailAddress	2	✓	recommend
facsimileNumber.CommunicationsNumber	2	✕	
telephoneNumber.CommunicationsNumber	2	✓	recommend
GlobalPartnerRoleClassificationCode	1	✕	
PartnerDescription	1	✕	
BusinessDescription	2	✕	
GlobalBusinessIdentifier	3	✕	
GlobalSupplyChainCode	3	✕	
GlobalPartnerClassificationCode	2	✕	

5.2.1.2 Analyze activity content

We analyze an element for applying in document. In addition, we advise an element that can be used to execute for stakeholders in supply chain, therefore PIP3B2 defines a partner involving the transportation and distribution processes.

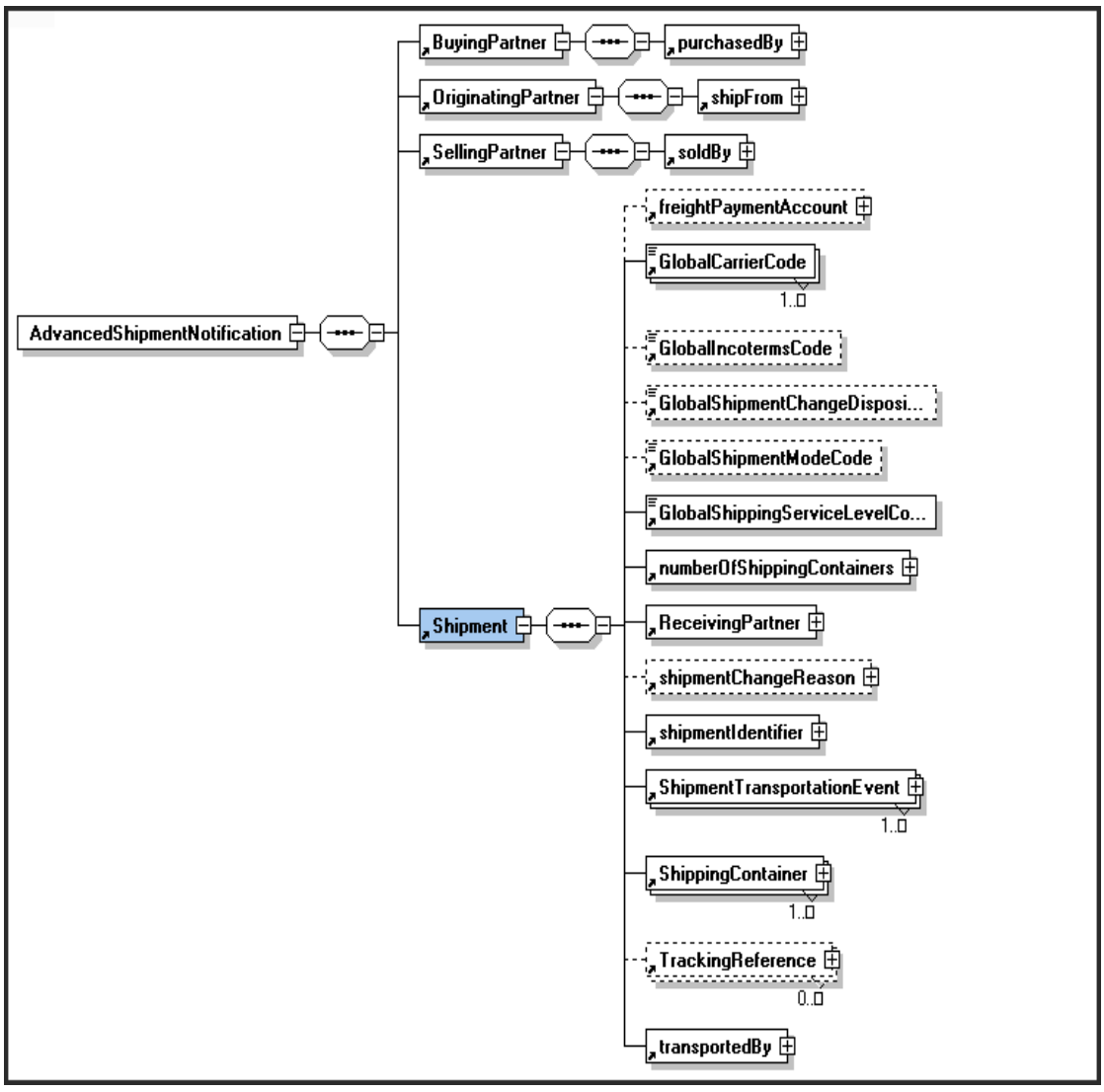

Figure 5.11 Characteristics of elements in activity content PIP3B2

In the activity content, we introduce three elements for the third party logistics (3PL) because it identifies the partner related to the shipment in supply chain. Notification of owner can be used to track and trace goods that move from a point to another point in supply chain. Furthermore, it is used to identify all of trading partners involved the transportation and distribution. In case of return or missing, we are able to know responsible partners and then claim about the deliver shipment.

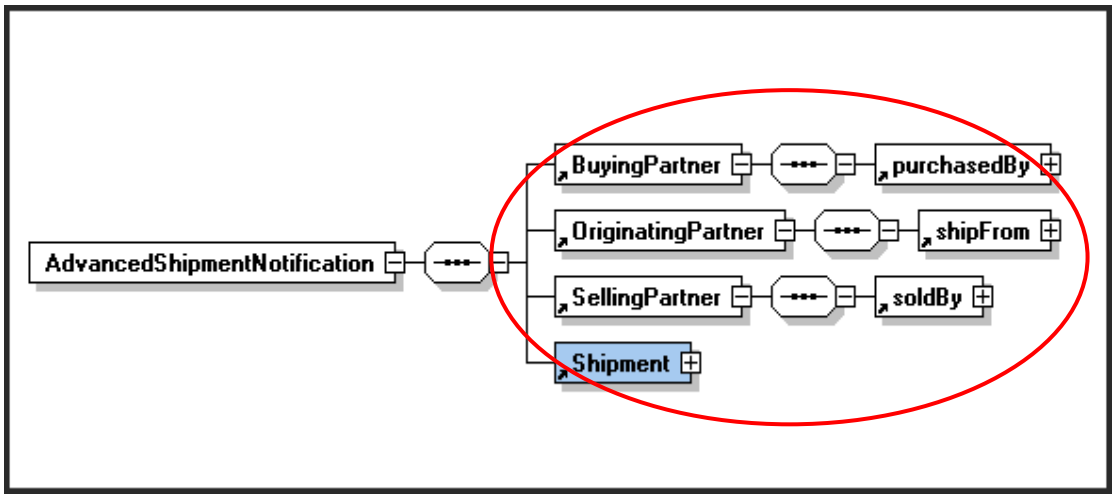

Figure 5.12 Elements related third party logistics (3PL)

Table 5.7: Analysis of elements for activity content PIP3B2

Element	Level	Required	Remark
Shipment	primary	✓	aircraft fuel
freightPaymentAccount.AccountNumber	1	✕	
GlobalCarrierCode	1	✕	
GlobalIncotermsCode	1	✕	
GlobalShipmentChangeDispositionCode	1	✕	
GlobalShipmentModeCode	1	✕	
GlobalShippingServiceLevelCode	1	✕	
numberOfShippingContainers.CountableAmount	1	✕	
ReceivingPartner	1	✓	header
shipTo.PartnerDescription	2	✓	subheader 1
BusinessDescription	3	✓	subheader 2
businessName.FreeFormText	4	✓	RTAF
GlobalBusinessIdentifier	4	✕	
PartnerBusinessIdentification	4	✕	
ProprietaryBusinessIdentifier	5	✕	
ProprietaryDomainIdentifier	5	✕	
ProprietaryIdentifierAuthority	5	✕	
ContactInformation	3	✕	
contactName.FreeFormText	4	✕	
EmailAddress	4	✕	
facsimileNumber.CommunicationsNumber	4	✕	
telephoneNumber.CommunicationsNumber	4	✕	
GlobalPartnerClassificationCode	3	✕	
PhysicalLocation	3	✕	
GlobalLocationIdentifier	4	✕	
PartnerLocationIdentification	4	✕	
ProprietaryDomainIdentifier	5	✕	
ProprietaryIdentifierAuthority	5	✕	
PhysicalAddress	4	✕	

Element	Level	Required	Remark
addressLine1.FreeFormText	5	✕	
addressLine2.FreeFormText	5	✕	
addressLine3.FreeFormText	5	✕	
cityName.FreeFormText	5	✕	
GlobalCountryCode	5	✕	
NationalPostalCode	5	✕	
postOfficeBoxIdentifier.FreeFormText	5	✕	
regionName.FreeFormText	5	✕	
shipmentChangeReason.FreeFormText	1	✕	
shipmentIdentifier.ProprietaryReferenceIdentifier	1	✕	
ShipmentTransportationEvent	1	✕	
DateStamp	2	✕	
GlobalShipDateCode	2	✕	
ShippingContainer	1	✕	
GlobalPackageTypeCode	2	✕	
LinearPhysicalDimension	2	✕	
GlobalPhysicalUnitOfMeasureCode	3	✕	
HeightDimension	3	✕	
LengthDimension	3	✕	
WidthDimension	3	✕	
MassPhysicalDimension	2	✕	
Volume	3	✕	
GlobalPhysicalUnitOfMeasureCode	4	✕	
Mass	4	✕	
Weight	3	✕	
GlobalPhysicalUnitOfMeasureCode	4	✕	
Mass	4	✕	
numberOfShippingContainers.CountableAmount	2	✕	
shippingContainerIdentifier.ProprietarySerialIdentifier	2	✕	
ShippingContainerItem	2	✓	header

Element	Level	Required	Remark
DocumentSubLineLotShipReference	3	✕	
GlobalDocumentReferenceTypeCode	4	✕	
LineNumber	4	✕	
LotShipReference	4	✕	
expiryDate.DateStamp	5	✕	
LotIdentification	5	✕	
primaryLotIdentifier.ProprietaryReferenceIdentifier	6	✕	
secondaryLotIdentifier.ProprietaryReferenceIdentifier	6	✕	
LotQuantity	5	✕	
GlobalLotQuantityClassificationCode	6	✕	
GlobalProductUnitOfMeasureCode	6	✕	
ProductQuantity	6	✕	
manufacturingDateCode.ProprietaryReferenceIdentifier	5	✕	
ProprietaryDocumentIdentifier	4	✕	
requestedQuantity.ProductQuantity	4	✕	
shippedLotQuantity.ProductQuantity	4	✕	
subLineNumber.LineNumber	4	✕	
ExportLicense	3	✕	
NationalExportControlClassificationCode	4	✕	
GlobalProductUnitOfMeasureCode	3	✕	
HazardousMaterialDescription	3	✕	
NationalHazardousMaterialUnitedNationsClassificationCode	4	✕	
isContainsHazardousMaterial.AffirmationIndicator	3	✕	
ManufacturerProfile	3	✕	
countryOfOrigin.GlobalCountryCode	4	✕	
manufactureDate.DateStamp	4	✕	
productSerialIdentifier.ProprietarySerialIdentifier	4	✕	
NationalHarmonizedTariffScheduleCode	3	✕	
numberOfItemPackages.CountableAmount	3	✕	
ProductIdentification	3	✕	

Element	Level	Required	Remark
GlobalProductIdentifier	4	✕	
PartnerProductIdentification	4	✕	
GlobalPartnerClassificationCode	5	✕	
ProprietaryProductIdentifier	5	✕	
revisionIdentifier.FreeFormText	5	✕	
shippedQuantity.ProductQuantity	3	✓	liter
shippingContainerItemIdentifier.ProprietarySerialIdentifier	3	✕	
traceIdentifier.ProprietaryLotIdentifier	3	✕	
SubContainer	2	✕	
(ShippingContainer)	3	✕	
TrackingReference	2	✕	
GlobalTrackingReferenceTypeCode	3	✕	
ProprietaryShipmentTrackingIdentifier	3	✕	
TrackingReference	1	✕	
GlobalTrackingReferenceTypeCode	2	✕	
ProprietaryShipmentTrackingIdentifier	2	✕	
transportedBy.PartnerDescription	1	✓	shipment provider
BusinessDescription	2	✓	header
businessName.FreeFormText	3	✓	recommend
GlobalBusinessIdentifier	3	✕	
PartnerBusinessIdentification	3	✕	
ProprietaryBusinessIdentifier	4	✕	
ProprietaryDomainIdentifier	4	✕	
ProprietaryIdentifierAuthority	4	✕	
ContactInformation	2	✓	header
contactName.FreeFormText	3	✓	coordinating person
EmailAddress	3	✓	recommend
facsimileNumber.CommunicationsNumber	3	✕	

Element	Level	Required	Remark
telephoneNumber.CommunicationsNumber	3	✓	recommend
GlobalPartnerClassificationCode	2	✕	
PhysicalLocation	2	✕	
GlobalLocationIdentifier	3	✕	
PartnerLocationIdentification	3	✕	
ProprietaryDomainIdentifier	4	✕	
ProprietaryIdentifierAuthority	4	✕	
ProprietaryLocationIdentifier	4	✕	
PhysicalAddress	3	✕	
addressLine1.FreeFormText	4	✕	
addressLine2.FreeFormText	4	✕	
addressLine3.FreeFormText	4	✕	
cityName.FreeFormText	4	✕	
GlobalCountryCode	4	✕	
NationalPostalCode	4	✕	
postOfficeBoxIdentifier.FreeFormText	4	✕	
regionName.FreeFormText	4	✕	

Elements in the activity content PIP3B2 mostly describe a shipment via the container between international distribution by plane or ship. The stakeholders in the transportation and distribution are several partners such as freight forwarder, transportation provider, distributor, etc. In this PIP, RosettaNet attempts to design a document that encompasses trading partners in supply chain. It reduces a bottle neck and information flow. In addition, information in PIP3B2 focuses on global supply chain due to generate an element for supporting partners in the area of the world.

In the RTAF, fuel management requires PIP3B2 in this business process because of contacting an external supplier. Goods are fuel that controls special temperature in order to maintain the quality of fuel. The delivery of fuel for PTT sustains in the area of Thailand, so identifying international information is unnecessary for the fuel management. We propose a document that can be used to contact between PTT and the fuel control section. These processes involve the fuel transportation in the perspective military field.

The document notifies the status of the shipment between PTT and the fuel control section as shown in Figure 5.14. The nature of procurement based on some budget. Perhaps, the quantity of the purchase order may be uncertain, so the inventory in the fuel depot is not stable. The quantity of the delivery may be over fulfilling, so it needs to be stocked in PTT. We advise to add a Shortage Quantity element for identifying the quantity of the fuel shortage in order to use for the collaborative forecast in the fuel management.

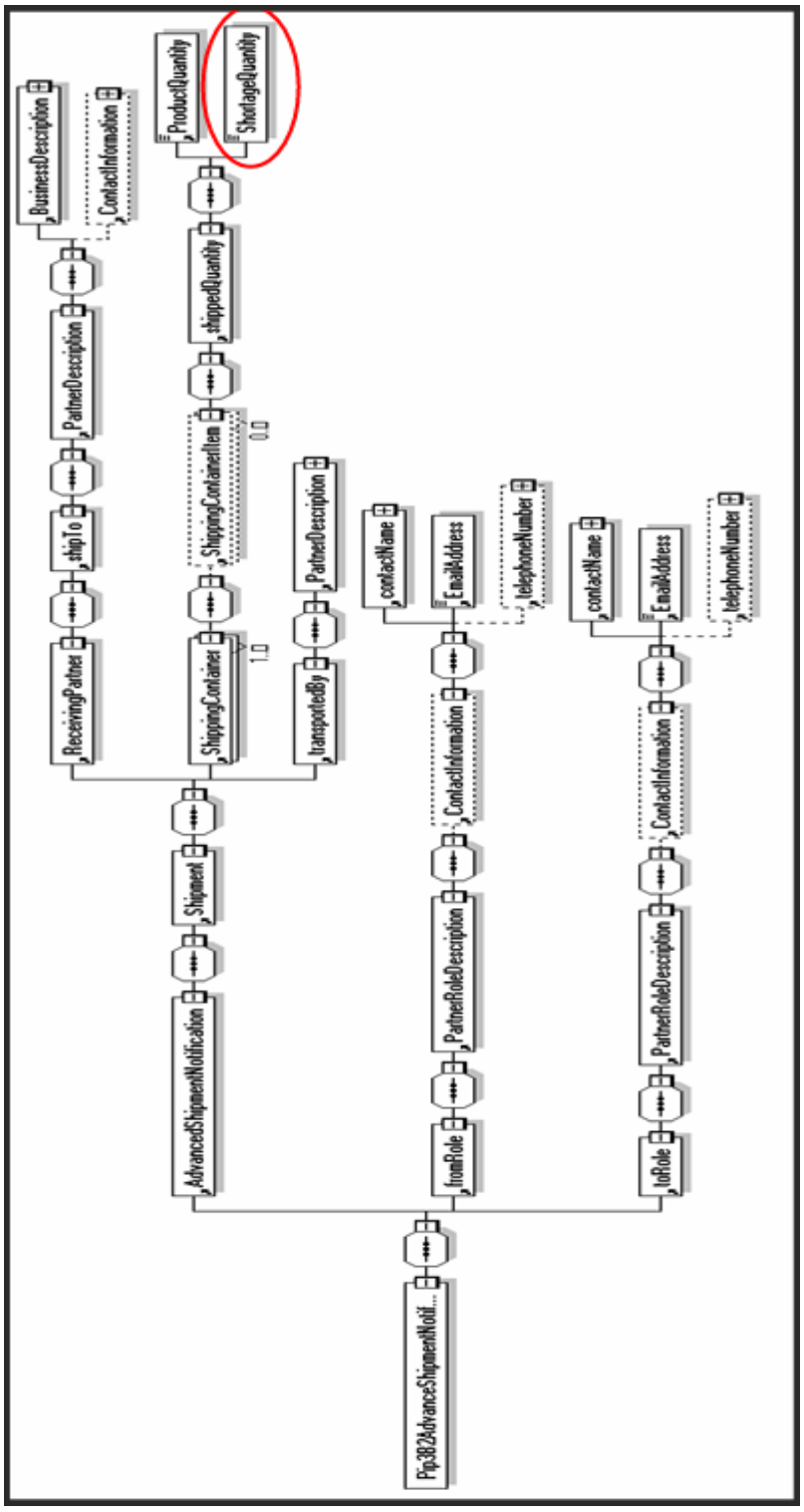

Figure 5.13 Format document PIP3B2 based on XML schema

5.2.2 Document based on PIP4A2

In this section, we analyze the document for both communication parties (From-To) content and activity content. The result is the document based on XML schema that can be used to communicate between the fuel control section and PTT.

5.2.2.1 Analyze communication parties (From-To) content

We compare information in the traditional document with an element in the communication parties (From-To) content. The document represents the sender and receiver message. In this PIP4A2, the sender is the fuel control section and the receiver is PTT.

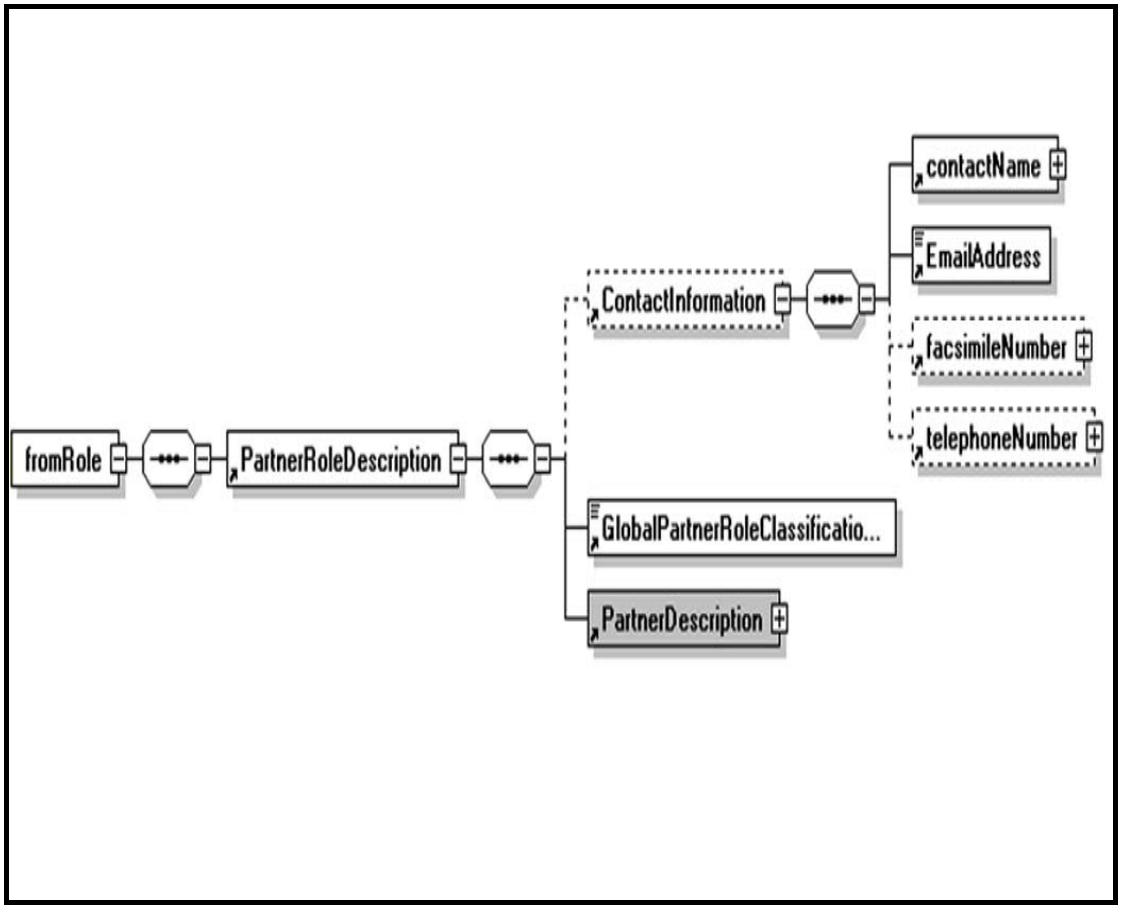

Figure 5.14 Characteristics of elements in communication parties (From) content PIP4A2

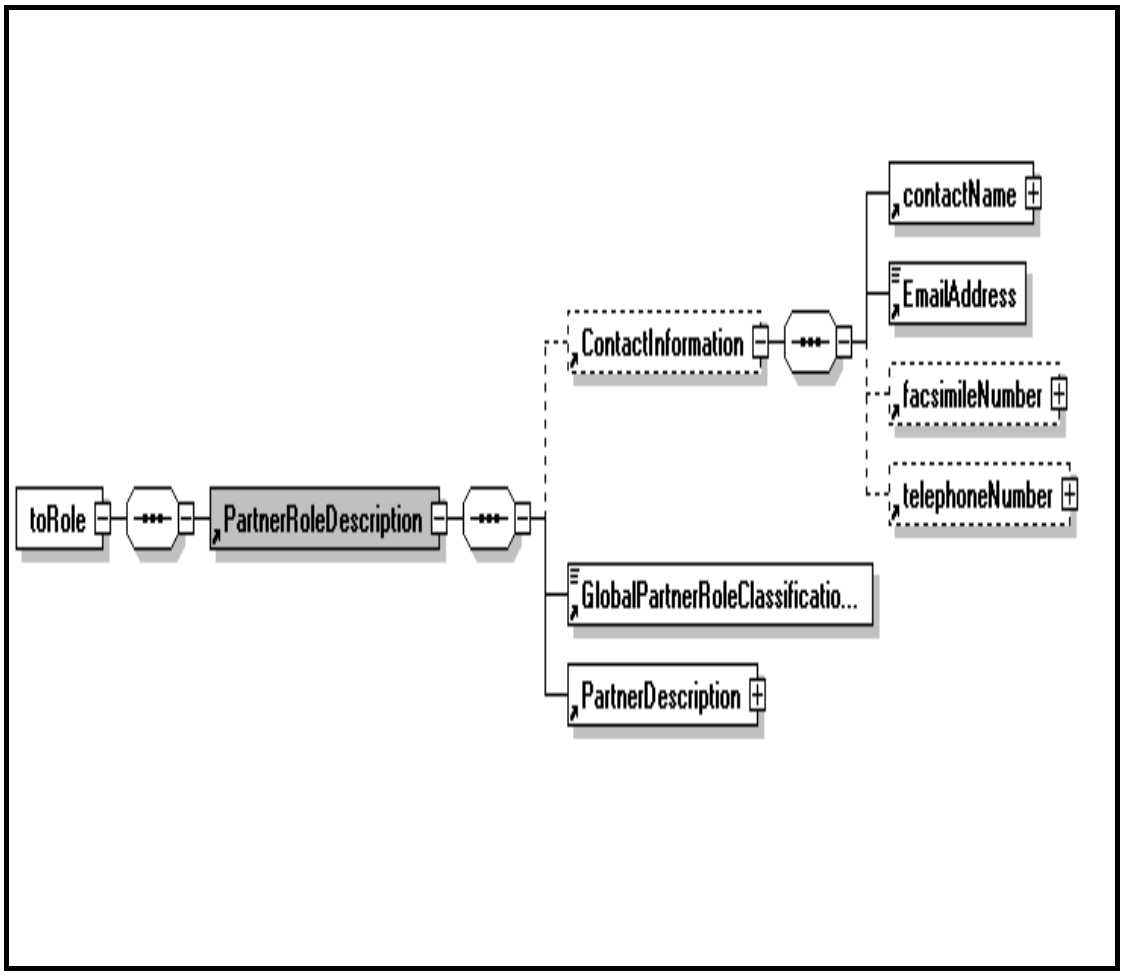

Figure 5.15 Characteristics of elements in communication parties (To) content PIP4A2

Table 5.8: Analysis of elements for sender PIP4A2

Element	Level	Required	Remark
fromRole.PartnerRoleDescription	primary	✓	fuel control section
ContactInformation	1	✓	header
contactName.FreeFormText	2	✓	coordinating person
EmailAddress	2	✓	recommend
facsimileNumber.CommunicationsNumber	2	✕	
telephoneNumber.CommunicationsNumber	2	✓	recommend
GlobalPartnerRoleClassificationCode	1	✕	
PartnerDescription	1	✕	
BusinessDescription	2	✕	
GlobalBusinessIdentifier	3	✕	
GlobalSupplyChainCode	3	✕	
GlobalPartnerClassificationCode	2	✕	

Table 5.9: Analysis of elements for receiver PIP4A2

Element	Level	Required	Remark
toRole.PartnerRoleDescription	primary	✓	PTT
ContactInformation	1	✓	header
contactName.FreeFormText	2	✓	coordinating person
EmailAddress	2	✓	recommend
facsimileNumber.CommunicationsNumber	2	✕	
telephoneNumber.CommunicationsNumber	2	✓	recommend
GlobalPartnerRoleClassificationCode	1	✕	
PartnerDescription	1	✕	
BusinessDescription	2	✕	
GlobalBusinessIdentifier	3	✕	
GlobalSupplyChainCode	3	✕	
GlobalPartnerClassificationCode	2	✕	

5.2.2.2 Analyze activity content

We analyze an element for applying in the document. In addition, we advise a featured element that can be used to execute for forecast processes in supply chain. Therefore, PIP4A2 defines a partner involving collaborative forecast processes.

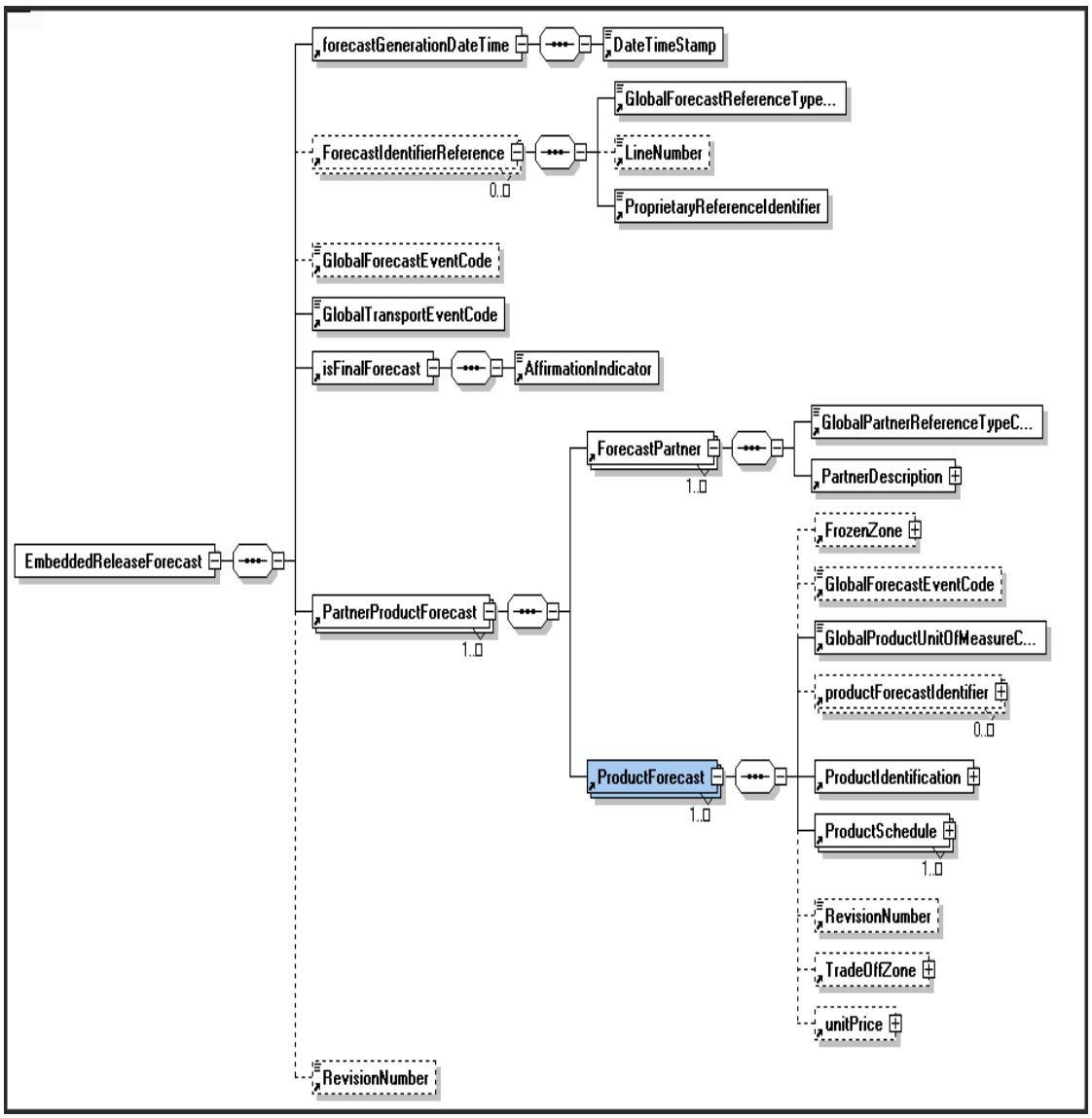

Figure 5.16 Characteristics of elements in activity content PIP4A2

In activity content, we introduce three elements that describe the characteristic of the forecast. It notifies particular information that encompasses forecasting. Three elements consist of: FrozenZone, ProductSchedule, and TradeOffZone. FrozenZone identifies the date period that confirms based on the agreement before the forecast release. ProductSchedule describes the detail of the schedule such as date period, forecast classification, and forecast quantity information. TradeOffZone identifies the date period that is a partial financial debt for product based on the agreement. According to the discussion, you should survey the collaborative forecast because information in this part may be used to generate a document related the forecast process.

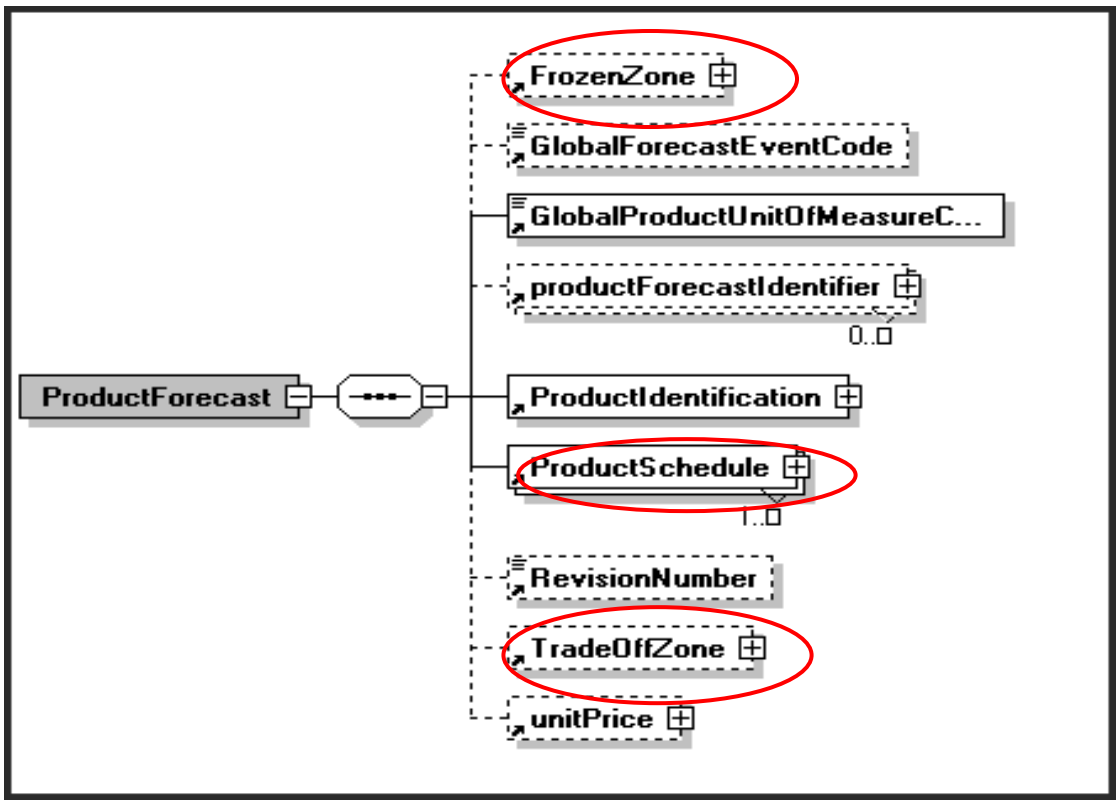

Figure 5.17 Specific elements for collaborative forecast

Table 5.10: Analysis of elements for activity content PIP4A2

Element	Level	Required	Remark
EmbeddedReleaseForecast	primary	✓	fuel demand
forecastGenerationDateTime.DateTimeStamp	1	✕	
ForecastIdentifierReference	1	✕	
GlobalForecastReferenceTypeCode	2	✕	
LineNumber	2	✕	
ProprietaryReferenceIdentifier	2	✕	
GlobalForecastEventCode	1	✕	
GlobalTransportEventCode	1	✕	
isFinalForecast.AffirmationIndicator	1	✕	
PartnerProductForecast	1	✓	header
ForecastPartner	2	✓	subheader 1
GlobalPartnerReferenceTypeCode	3	✕	
PartnerDescription	3	✓	subheader 2
BusinessDescription	4	✓	subheader 3
businessName.FreeFormText	5	✓	RTAF
businessWebSite.UniformResourceLocator	5	✓	http://www.ptd.dae.mi.th
GlobalBusinessIdentifier	5	✕	
PartnerBusinessIdentification	5	✕	
ProprietaryBusinessIdentifier	6	✕	
ProprietaryDomainIdentifier	6	✕	
ProprietaryIdentifierAuthority	6	✕	
ContactInformation	4	✓	header
contactName.FreeFormText	5	✓	coordinating person
EmailAddress	5	✓	recommend
facsimileNumber.CommunicationsNumber	5	✕	
telephoneNumber.CommunicationsNumber	5	✓	recommend
GlobalPartnerClassificationCode	4	✕	

Element	Level	Required	Remark
PhysicalLocation	4	✕	
GlobalLocationIdentifier	5	✕	
PartnerLocationIdentification	5	✕	
ProprietaryDomainIdentifier	6	✕	
ProprietaryIdentifierAuthority	6	✕	
ProprietaryLocationIdentifier	6	✕	
PhysicalAddress	5	✕	
addressLine1.FreeFormText	6	✕	
addressLine2.FreeFormText	6	✕	
addressLine3.FreeFormText	6	✕	
cityName.FreeFormText	6	✕	
GlobalCountryCode	6	✕	
GlobalLocationIdentifier	6	✕	
NationalPostalCode	6	✕	
postOfficeBoxIdentifier.FreeFormText	6	✕	
regionName.FreeFormText	6	✕	
ProductForecast	2	✓	aircraft fuel
FrozenZone	3	✕	
DatePeriod	4	✕	
beginDate.DateStamp	5	✕	
endDate.DateStamp	5	✕	
GlobalForecastEventCode	3	✕	
GlobalProductUnitOfMeasureCode	3	✕	
productForecastIdentifier.ForecastIdentifierReference	3	✕	
GlobalForecastReferenceTypeCode	4	✕	
LineNumber	4	✕	
ProprietaryReferenceIdentifier	4	✕	
ProductIdentification	3	✕	
GlobalProductIdentifier	4	✕	
PartnerProductIdentification	4	✕	

Element	Level	Required	Remark
GlobalPartnerClassificationCode	5	✕	
ProprietaryProductIdentifier	5	✕	
revisionIdentifier.FreeFormText	5	✕	
ProductSchedule	3	✓	
ForecastProductSchedule	4	✓	monthly
ForecastPeriod	5	✓	header
DatePeriod	6	✓	subheader
beginDate.DateStamp	7	✓	start
endDate.DateStamp	7	✓	end
GlobalForecastIntervalCode	6	✕	
isShipmentAuthorizationExists.AffirmationIndicator	5	✕	
ProductQuantity	5	✓	fuel demand
scheduleProductForecastIdentifier. ForecastIdentifierReference	5	✕	
GlobalForecastReferenceTypeCode	6	✕	
LineNumber	6	✕	
ProprietaryReferenceIdentifier	6	✕	
OrderForecastQuantityTypeCode	4	✕	
RevisionNumber	3	✕	
TradeOffZone	3	✕	
DatePeriod	4	✕	
beginDate.DateStamp	5	✕	
endDate.DateStamp	5	✕	
unitPrice.FinancialAmount	3	✕	
RevisionNumber	1	✕	

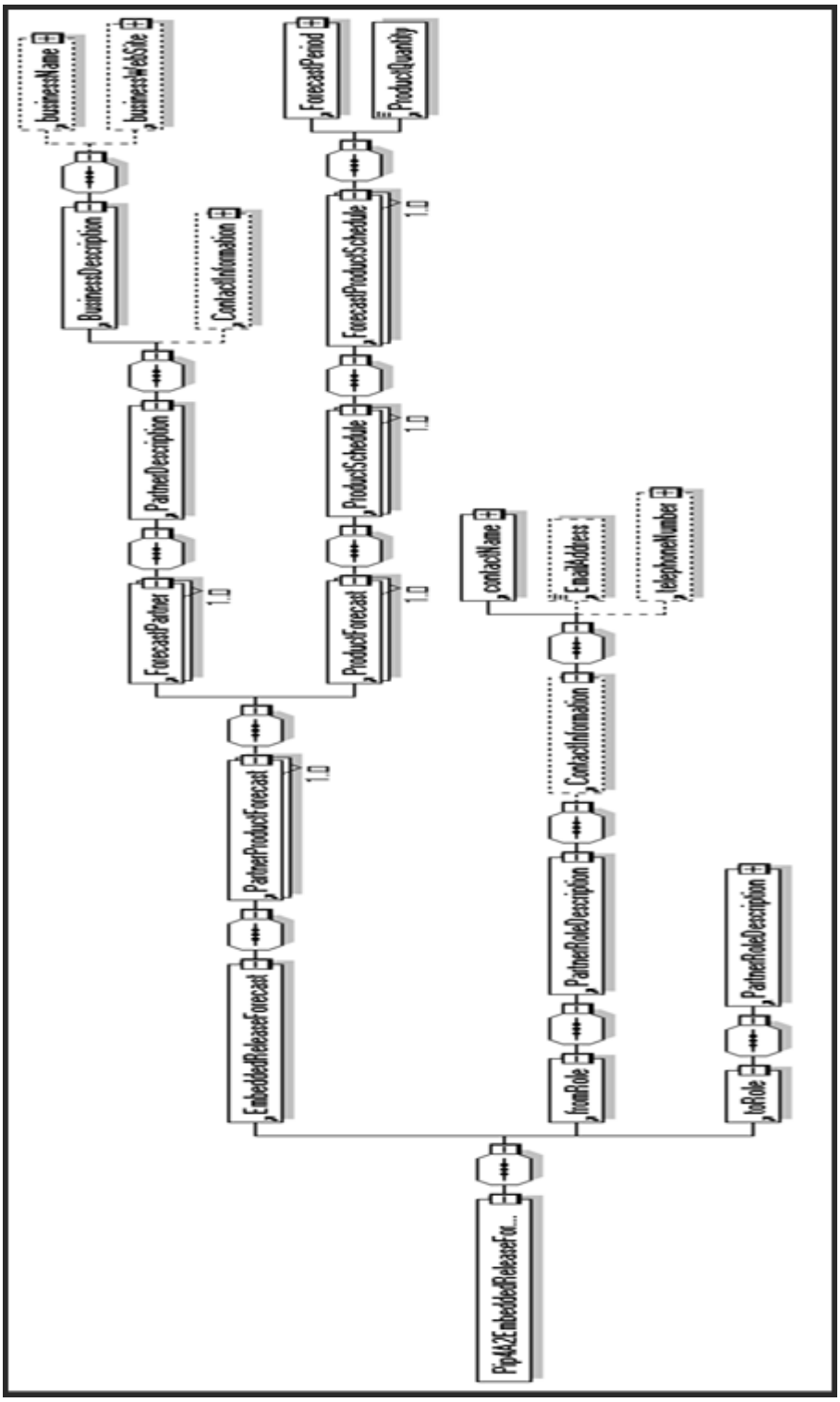

Figure 5.18 Format document PIP4A2 based on XML schema

5.2.3 Document based on PIP4B2

In this section, we analyze the document for both communication parties (From-To) content and the activity content. The result is the document based on XML schema can be used to communicate between the fuel control section and PTT for fuel receipt.

5.2.3.1 Analyze communication parties (From-To) content

We compare information in the traditional document with an element in the communication parties (From-To) content. The document represents the sender and receiver message. In this PIP4B2, the sender is the fuel control section and the receiver is PTT.

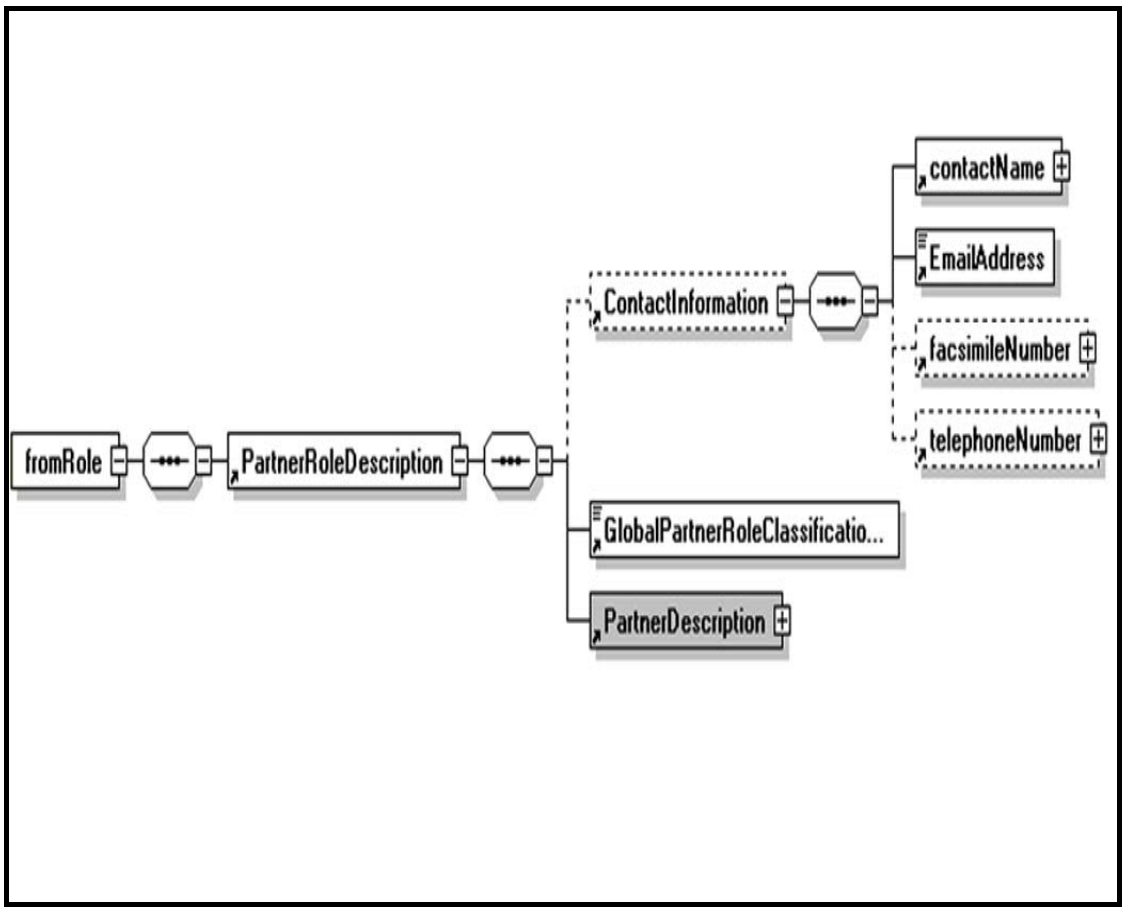

Figure 5.19 Characteristics of elements in communication parties (From) content PIP4B2

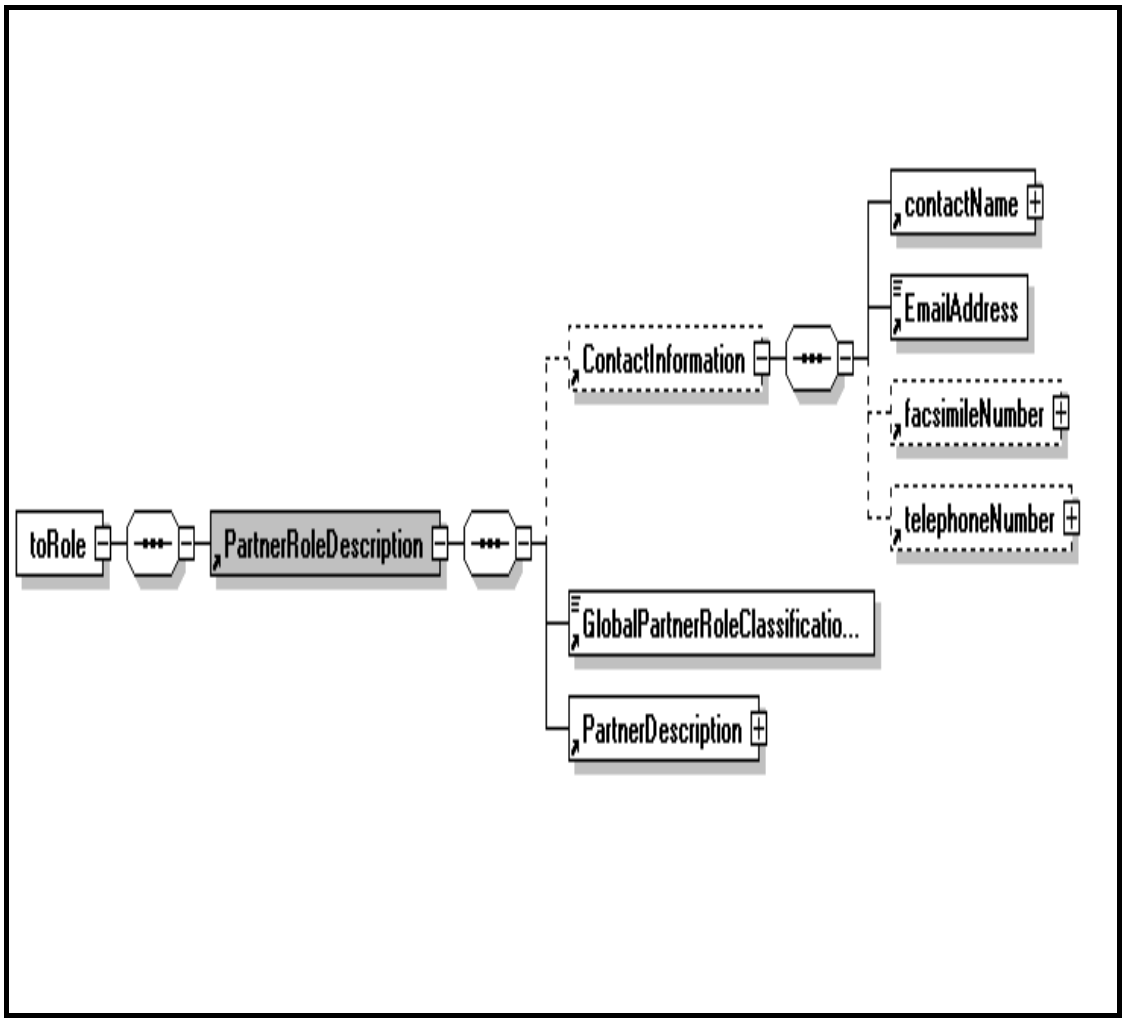

Figure 5.20 Characteristics of elements in communication parties (To) content PIP4B2

Table 5.11: Analysis of elements for sender PIP4B2

Element	Level	Required	Remark
fromRole.PartnerRoleDescription	primary	✓	fuel control section
ContactInformation	1	✓	header
contactName.FreeFormText	2	✓	coordinating person
EmailAddress	2	✓	recommend
facsimileNumber.CommunicationsNumber	2	✕	
telephoneNumber.CommunicationsNumber	2	✓	recommend
GlobalPartnerRoleClassificationCode	1	✕	
PartnerDescription	1	✕	
BusinessDescription	2	✕	
GlobalBusinessIdentifier	3	✕	
GlobalSupplyChainCode	3	✕	
GlobalPartnerClassificationCode	2	✕	

Table 5.12: Analysis of elements for receiver PIP4B2

Element	Level	Required	Remark
toRole.PartnerRoleDescription	primary	✓	PTT
ContactInformation	1	✓	header
contactName.FreeFormText	2	✓	coordinating person
EmailAddress	2	✓	recommend
facsimileNumber.CommunicationsNumber	2	✕	
telephoneNumber.CommunicationsNumber	2	✓	recommend
GlobalPartnerRoleClassificationCode	1	✕	
PartnerDescription	1	✕	
BusinessDescription	2	✕	
GlobalBusinessIdentifier	3	✕	
GlobalSupplyChainCode	3	✕	
GlobalPartnerClassificationCode	2	✕	

5.2.2.2 Analyze activity content

We analyze an element for applying in the document. In addition, we advise a featured element that can be used to execute for the responsive shipment receiving processes in supply chain. Therefore, PIP4B2 defines acceptant information for consignee when you receive shipment.

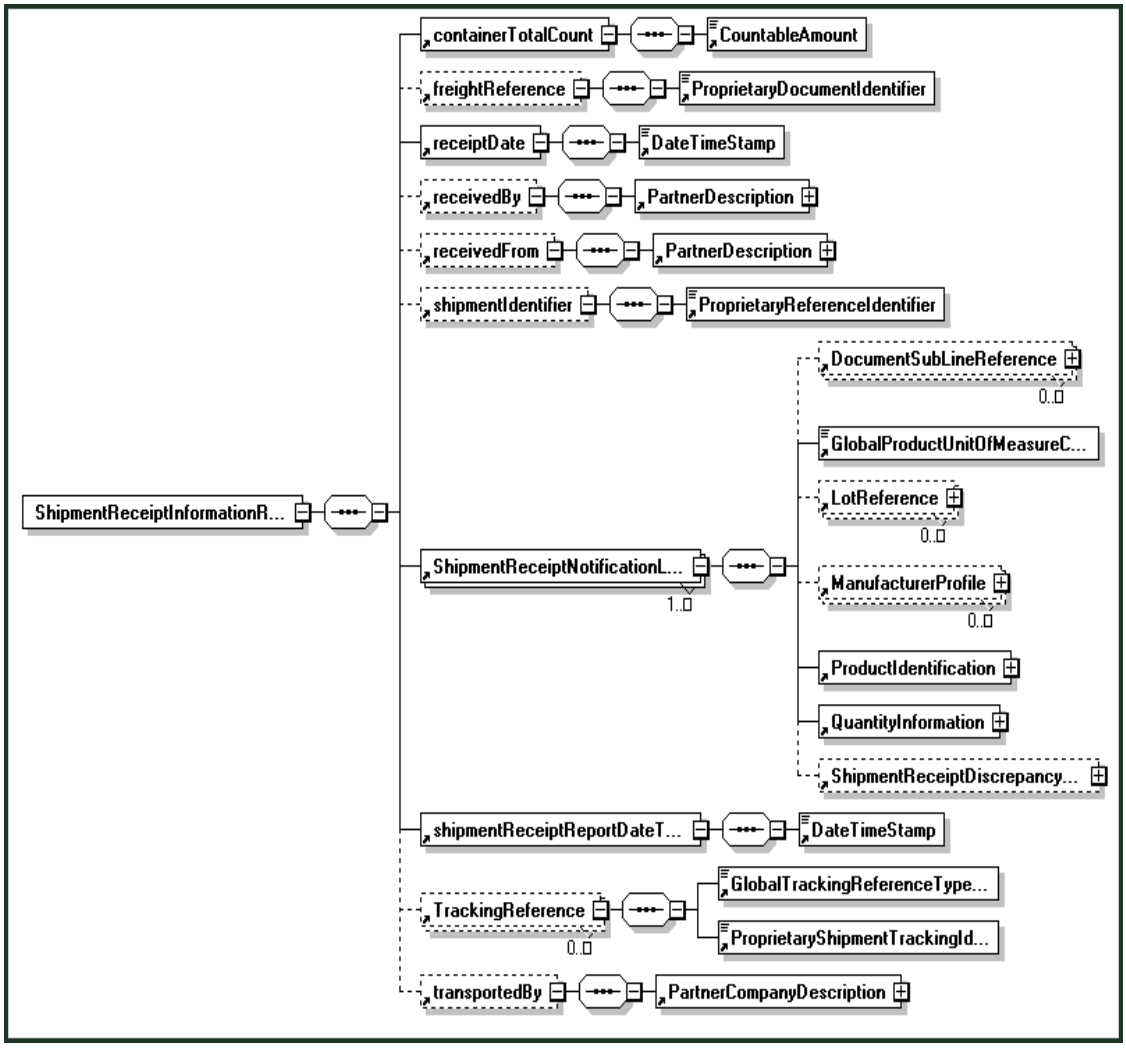

Figure 5.21 Characteristics of elements in activity content PIP4B2

In the activity content, we observe a partial element in PIP4B2 involving the element in PIP3B2 due to identify information for the shipment information user to consignee. PIP3B2 can be used to apply for the third party logistics (3PL), so partners define as the shipper and receiver that identify the general party. Nevertheless, PIP4B2 describes confirmative information for consignee. We recommend using both PIP3B2 and PIP4B2 for sharing information about the status of transportation between the third party logistics (3PL) and consignee. Shipment information user in the business process is a company that hires 3PL.

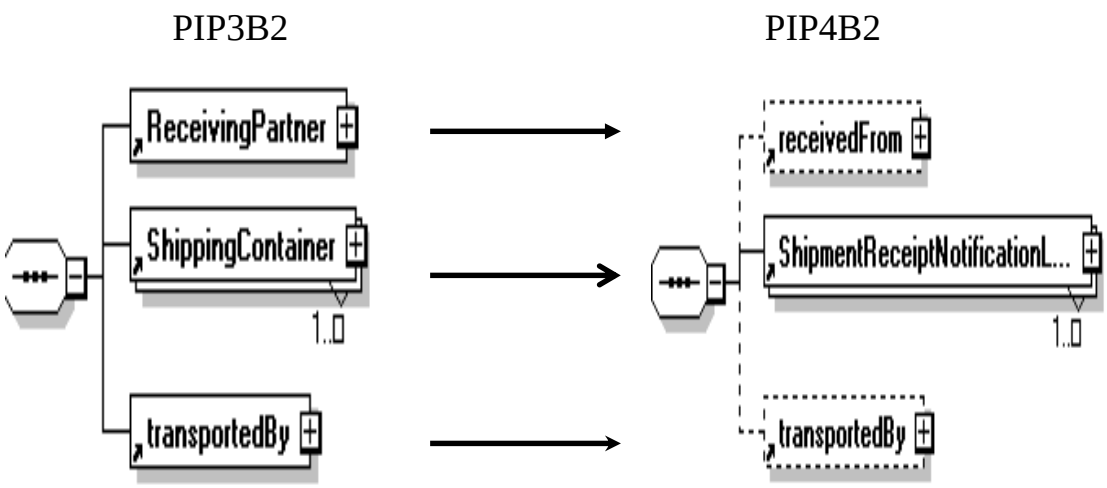

Figure 5.22 Comparison related element between PIP3B2 and PIP4B2

Table 5.13: Analysis of elements for activity content PIP4B2

Element	Level	Required	Remark
ShipmentReceiptInformationResource	primary	✓	fuel control section
containerTotalCount.CountableAmount	1	✕	
freightReference.ProprietaryDocumentIdentifier	1	✕	
receiptDate.DateTimeStamp	1	✓	date of receive
receivedBy.PartnerDescription	1	✓	approval authority
BusinessDescription	2	✕	
businessName.FreeFormText	3	✕	
GlobalBusinessIdentifier	3	✕	
PartnerBusinessIdentification	3	✕	
ProprietaryBusinessIdentifier	4	✕	
ProprietaryDomainIdentifier	4	✕	
ProprietaryIdentifierAuthority	4	✕	
ContactInformation	2	✕	
contactName.FreeFormText	3	✕	
EmailAddress	3	✕	
facsimileNumber.CommunicationsNumber	3	✕	
telephoneNumber.CommunicationsNumber	3	✕	
GlobalPartnerClassificationCode	2	✕	
PhysicalLocation	2	✕	
GlobalLocationIdentifier	3	✕	
PartnerLocationIdentification	3	✕	
ProprietaryDomainIdentifier	4	✕	
ProprietaryIdentifierAuthority	4	✕	
ProprietaryLocationIdentifier	4	✕	
PhysicalAddress	3	✕	
addressLine1.FreeFormText	4	✕	
addressLine2.FreeFormText	4	✕	

Element	Level	Required	Remark
addressLine3.FreeFormText	4	✕	
cityName.FreeFormText	4	✕	
GlobalCountryCode	4	✕	
NationalPostalCode	4	✕	
postOfficeBoxIdentifier.FreeFormText	4	✕	
regionName.FreeFormText	4	✕	
receivedFrom.PartnerDescription	1	✕	
BusinessDescription	2	✕	
businessName.FreeFormText	3	✕	
GlobalBusinessIdentifier	3	✕	
PartnerBusinessIdentification	3	✕	
ProprietaryBusinessIdentifier	4	✕	
ProprietaryDomainIdentifier	4	✕	
ProprietaryIdentifierAuthority	4	✕	
ContactInformation	2	✕	
contactName.FreeFormText	3	✕	
EmailAddress	3	✕	
facsimileNumber.CommunicationsNumber	3	✕	
telephoneNumber.CommunicationsNumber	3	✕	
GlobalPartnerClassificationCode	2	✕	
PhysicalLocation	2	✕	
GlobalLocationIdentifier	3	✕	
PartnerLocationIdentification	3	✕	
ProprietaryDomainIdentifier	4	✕	
ProprietaryIdentifierAuthority	4	✕	
ProprietaryLocationIdentifier	4	✕	
PhysicalAddress	3	✕	
addressLine1.FreeFormText	4	✕	
addressLine2.FreeFormText	4	✕	
addressLine3.FreeFormText	4	✕	

Element	Level	Required	Remark
cityName.FreeFormText	4	✕	
GlobalCountryCode	4	✕	
NationalPostalCode	4	✕	
postOfficeBoxIdentifier.FreeFormText	4	✕	
regionName.FreeFormText	4	✕	
shipmentIdentifier.ProprietaryReferenceIdentifier	1	✕	
ShipmentReceiptNotificationLineItem	1	✓	header
DocumentSubLineReference	2	✕	
GlobalDocumentReferenceTypeCode	3	✕	
LineNumber	3	✕	
ProprietaryDocumentIdentifier	3	✕	
subLineNumber.LineNumber	3	✕	
subLineSchedule.DateStamp	3	✕	
GlobalProductUnitOfMeasureCode	2	✕	
LotReference	2	✕	
expiryDate.DateStamp	3	✕	
GlobalLotDiscrepancyReasonCode	3	✕	
receivedLot.ProprietaryLotIdentifier	3	✕	
receivedLotQuantity.ProductQuantity	3	✕	
ManufacturerProfile	2	✕	
countryOfOrigin.GlobalCountryCode	3	✕	
manufactureDate.DateStamp	3	✕	
receivedProductSerialNumber.ProprietarySerialIdentifier	3	✕	
ProductIdentification	2	✕	
GlobalProductIdentifier	3	✕	
PartnerProductIdentification	3	✕	
GlobalPartnerClassificationCode	4	✕	
ProprietaryProductIdentifier	4	✕	
revisionIdentifier.FreeFormText	4	✕	
QuantityInformation	2	✓	header

Element	Level	Required	Remark
acceptedQuantity.ProductQuantity	3	✓	acceptedquantity
receivedQuantity.ProductQuantity	3	✓	receivedquantity
ShipmentReceiptDiscrepancyInformation	2	✕	
GlobalReceivingDiscrepancyCode	3	✕	
GlobalReceivingDiscrepancyReasonCode	3	✕	
shipmentReceiptReportDateTime.DateTimeStamp	1	✕	
TrackingReference	1	✕	
GlobalTrackingReferenceTypeCode	2	✕	
ProprietaryShipmentTrackingIdentifier	2	✕	
transportedBy.PartnerCompanyDescription	1	✓	transportation provider
BusinessDescription	2	✓	header
businessName.FreeFormText	3	✓	name of party
GlobalBusinessIdentifier	3	✕	
PartnerBusinessIdentification	3	✕	
ProprietaryBusinessIdentifier	4	✕	
ProprietaryDomainIdentifier	4	✕	
ProprietaryIdentifierAuthority	4	✕	
GlobalPartnerClassificationCode	2	✕	

Element in PIP4B2 describes a detail of the responsiveness for the shipment receipt. In the transportation and distribution, information about track and trace are important data for stakeholders in supply chain. We discuss the suitable PIP that can be used for tracking in order to contact between partners. In this PIP4B2, it is necessary for the shipment receipts because of representing status of the shipment. It is important information for the notification of the shipment.

The document notifies the status of the shipment receipt between the fuel control section and PTT as shown in Figure 5.24. In the RTAF, the delivery of fuel need to inspect from the responsible person, so it requires the signature for the authority in the organization. We advise to add an approval authority element for acceptance shipment receipt from PTT.

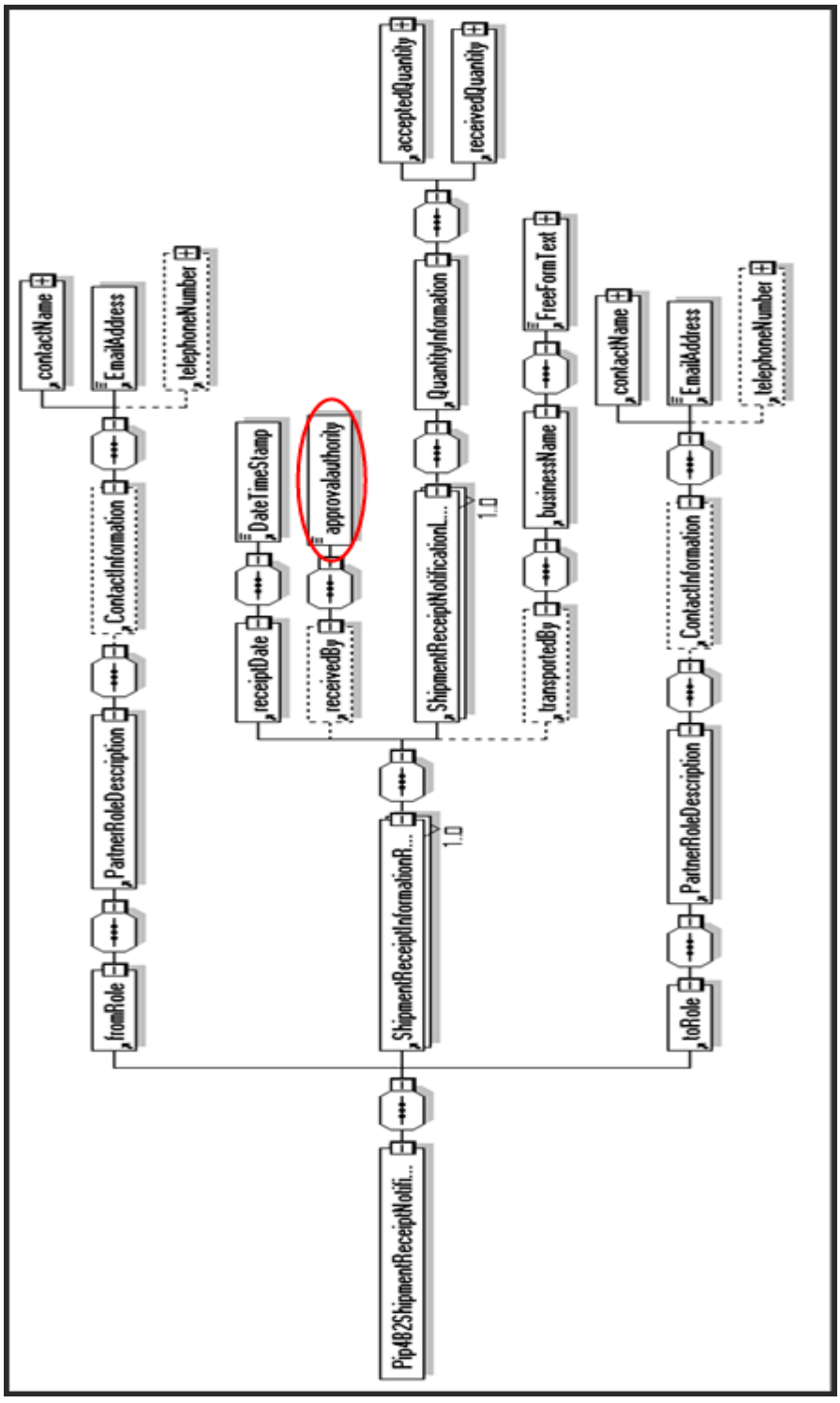

Figure 5.23 Format document PIP4B2 based on XML schema

5.2.4 Document based on PIP4C1

In this section, we analyze the document for both communication parties (From-To) content and the activity content. The result is the document based on XML schema can be used to communicate between the fuel depot and the fuel control section for the inventory report.

5.2.4.1 Analyze communication parties (From-To) content

We compare information in traditional document with an element in the communication parties (From-To) content. The document represents the sender and receiver message. In this PIP4C1, the sender is the fuel depot and the receiver is the fuel control section.

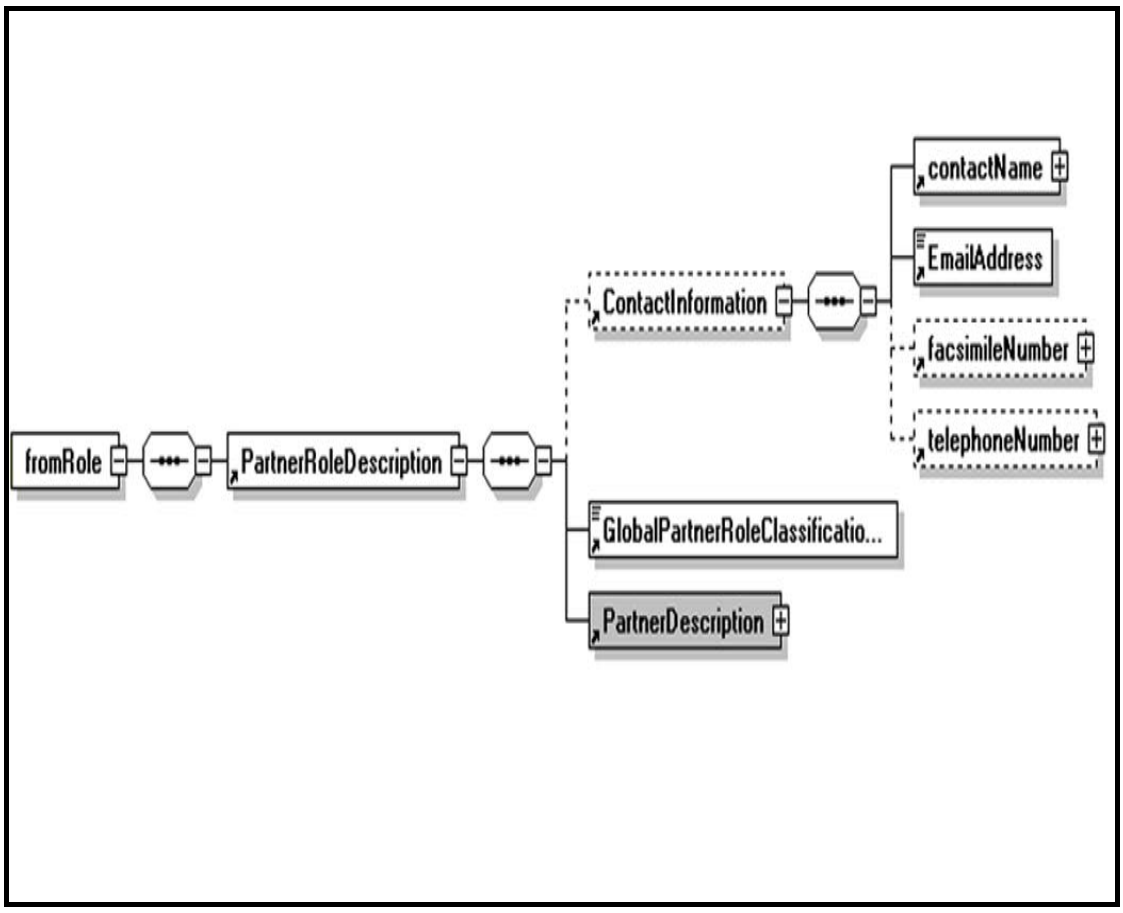

Figure 5.24 Characteristics of elements in communication parties (From) content PIP4C1

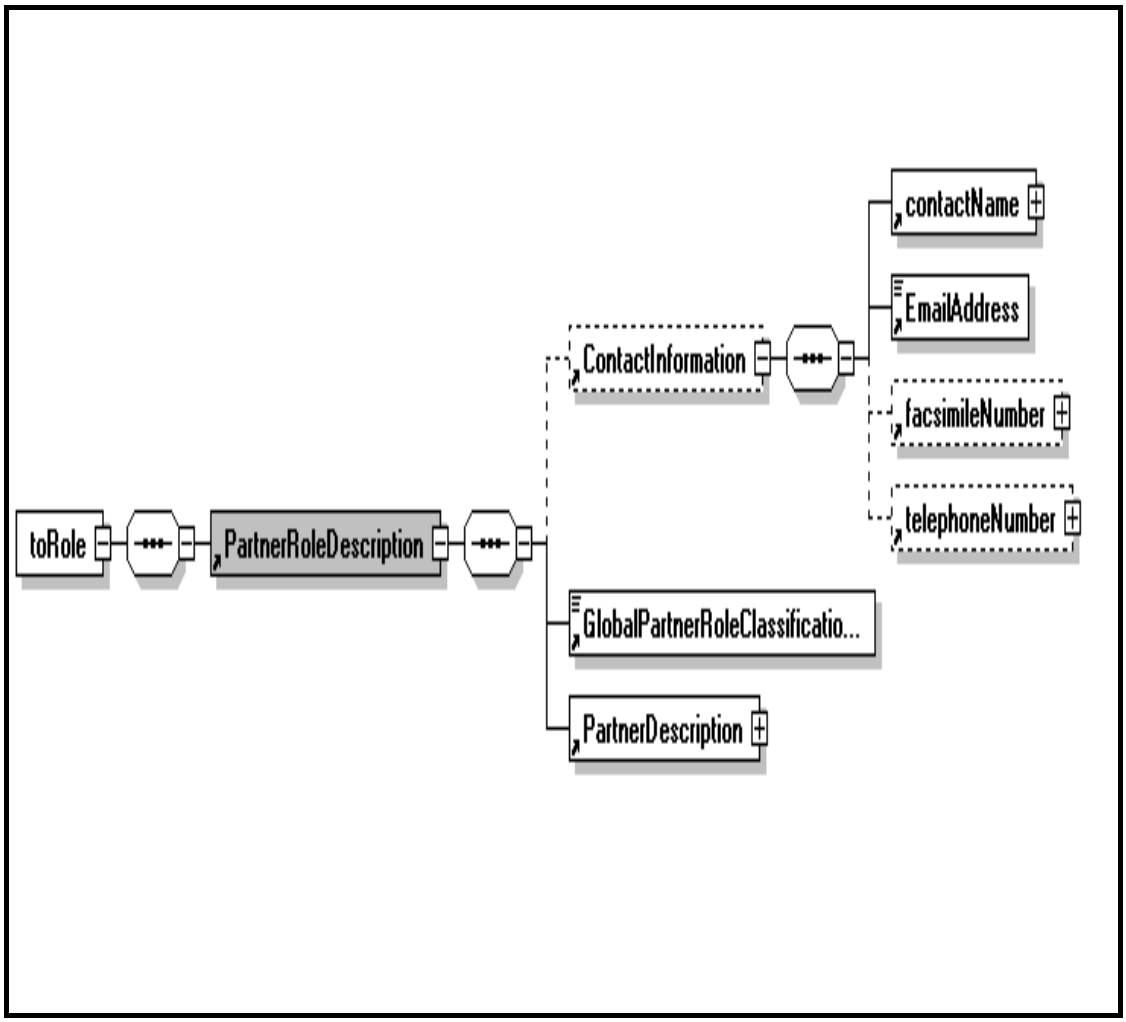

Figure 5.25 Characteristics of elements in communication parties (To) content PIP4C

Table 5.14: Analysis of elements for sender PIP4C1

Element	Level	Required	Remark
fromRole.PartnerRoleDescription	primary	✓	fuel depot
ContactInformation	1	✓	header
contactName.FreeFormText	2	✓	coordinating person
EmailAddress	2	✓	recommend
facsimileNumber.CommunicationsNumber	2	✕	
telephoneNumber.CommunicationsNumber	2	✓	recommend
GlobalPartnerRoleClassificationCode	1	✕	
PartnerDescription	1	✕	
BusinessDescription	2	✕	
GlobalBusinessIdentifier	3	✕	
GlobalSupplyChainCode	3	✕	
GlobalPartnerClassificationCode	2	✕	

Table 5.15: Analysis of elements for receiver PIP4C1

Element	Level	Required	Remark
toRole.PartnerRoleDescription	primary	✓	fuel control section
ContactInformation	1	✓	header
contactName.FreeFormText	2	✓	coordinating person
EmailAddress	2	✓	recommend
facsimileNumber.CommunicationsNumber	2	✕	
telephoneNumber.CommunicationsNumber	2	✓	recommend
GlobalPartnerRoleClassificationCode	1	✕	
PartnerDescription	1	✕	
BusinessDescription	2	✕	
GlobalBusinessIdentifier	3	✕	
GlobalSupplyChainCode	3	✕	
GlobalPartnerClassificationCode	2	✕	

5.2.4.2 Analyze activity content

We analyze an element for applying in the document. In addition, we advise a featured element that can be used to execute for inventory report processes in supply chain. Therefore, PIP4C1 defines the status of the inventory in each depot in order to forecast the fuel consumption in period time.

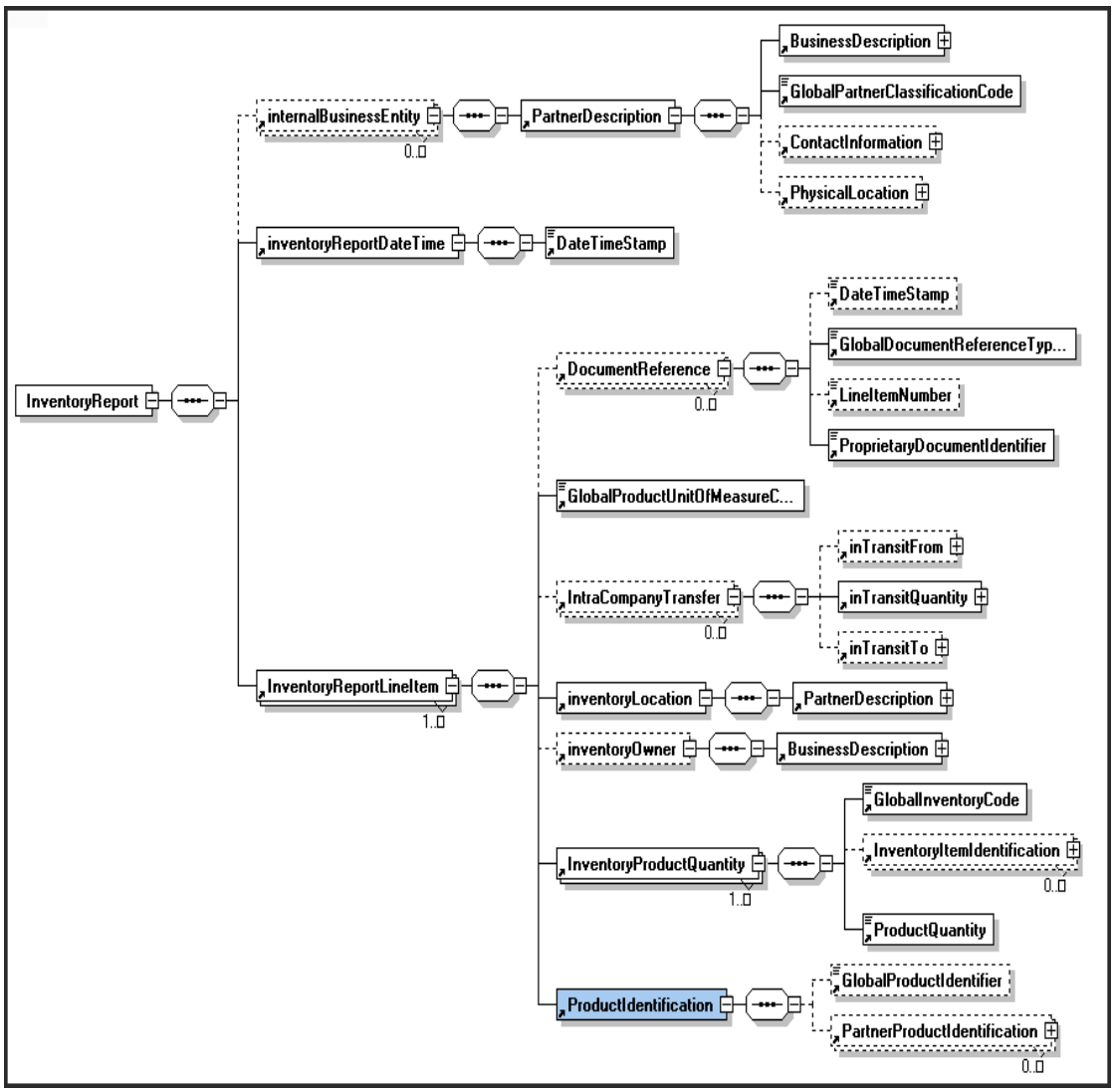

Figure 5.26 Characteristics of elements in activity content PIP4C1

In the activity content, we introduce two elements that describe the characteristic of the inventory report. It notifies particular information that encompasses stakeholders involving the inventory. Two elements consist of: IntraCompanyTransfer and InventoryProductQuantity. IntraCompanyTransfer identifies the movement of the inventory in the production line or the outsource subcontract. InventoryProductQuantity describes the detail of a product in the inventory for several products such as manufacturing date, serial number, and country of origin. According to discussion, you ought to analyze characteristics of the organization for the notification of the inventory because of being able to adopt elements that are related to the inventory report in the fuel management.

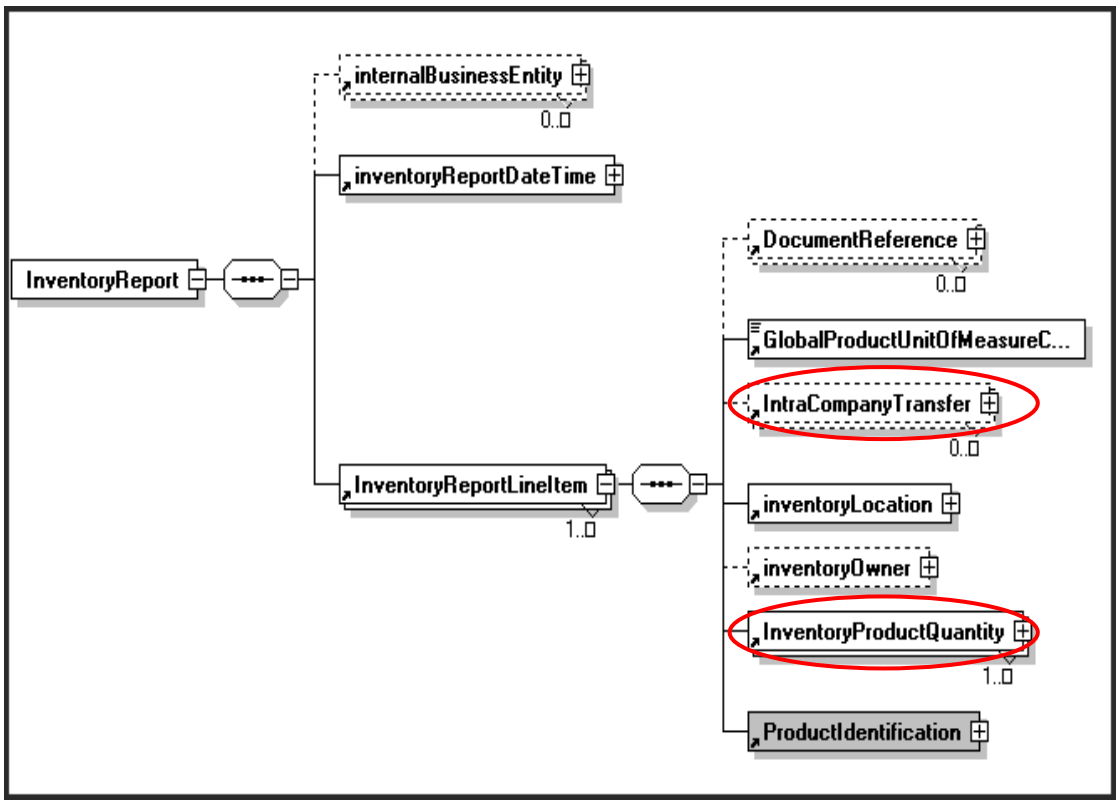

Figure 5.27 Elements define characteristics of inventory report

Table 5.16: Analysis of elements for activity content PIP4C1

Element	Level	Required	Remark
InventoryReport	primary	✓	fuel consumption
internalBusinessEntity.PartnerDescription	1	✕	
BusinessDescription	2	✕	
businessName.FreeFormText	3	✕	
GlobalBusinessIdentifier	3	✕	
PartnerBusinessIdentification	3	✕	
ProprietaryBusinessIdentifier	4	✕	
ProprietaryDomainIdentifier	4	✕	
ProprietaryIdentifierAuthority	4	✕	
GlobalPartnerClassificationCode	2	✕	
inventoryReportDateTime.DateTimeStamp	1	✓	daily report
InventoryReportLineItem	1	✓	header
DocumentReference	2	✕	
DateTimeStamp	3	✕	
GlobalDocumentReferenceTypeCode	3	✕	
LineItemNumber	3	✕	
ProprietaryDocumentIdentifier	3	✕	
GlobalProductUnitOfMeasureCode	2	✕	
IntraCompanyTransfer	2	✕	
inTransitFrom.PartnerDescription	3	✕	
BusinessDescription	4	✕	
businessName.FreeFormText	5	✕	
GlobalBusinessIdentifier	5	✕	
PartnerBusinessIdentification	5	✕	
ProprietaryBusinessIdentifier	6	✕	
ProprietaryDomainIdentifier	6	✕	
ProprietaryIdentifierAuthority	6	✕	
ContactInformation	4	✕	
contactName.FreeFormText	5	✕	

Element	Level	Required	Remark
EmailAddress	5	✕	
facsimileNumber.CommunicationsNumber	5	✕	
telephoneNumber.CommunicationsNumber	5	✕	
GlobalPartnerClassificationCode	4	✕	
PhysicalLocation	4	✕	
GlobalLocationIdentifier	5	✕	
PartnerLocationIdentification	5	✕	
ProprietaryDomainIdentifier	6	✕	
ProprietaryIdentifierAuthority	6	✕	
ProprietaryLocationIdentifier	6	✕	
PhysicalAddress	5	✕	
addressLine1.FreeFormText	6	✕	
addressLine2.FreeFormText	6	✕	
addressLine3.FreeFormText	6	✕	
cityName.FreeFormText	6	✕	
GlobalCountryCode	6	✕	
NationalPostalCode	6	✕	
postOfficeBoxIdentifier.FreeFormText	6	✕	
regionName.FreeFormText	6	✕	
inTransitQuantity.ProductQuantity	3	✕	
inTransitTo.PartnerDescription	3	✕	
BusinessDescription	4	✕	
businessName.FreeFormText	5	✕	
GlobalBusinessIdentifier	5	✕	
PartnerBusinessIdentification	5	✕	
ProprietaryBusinessIdentifier	6	✕	
ProprietaryDomainIdentifier	6	✕	
ProprietaryIdentifierAuthority	6	✕	
ContactInformation	4	✕	
contactName.FreeFormText	5	✕	

Element	Level	Required	Remark
EmailAddress	5	✕	
facsimileNumber.CommunicationsNumber	5	✕	
telephoneNumber.CommunicationsNumber	5	✕	
GlobalPartnerClassificationCode	4	✕	
PhysicalLocation	4	✕	
GlobalLocationIdentifier	5	✕	
PartnerLocationIdentification	5	✕	
ProprietaryDomainIdentifier	6	✕	
ProprietaryIdentifierAuthority	6	✕	
ProprietaryLocationIdentifier	6	✕	
PhysicalAddress	5	✕	
addressLine1.FreeFormText	6	✕	
addressLine2.FreeFormText	6	✕	
addressLine3.FreeFormText	6	✕	
cityName.FreeFormText	6	✕	
GlobalCountryCode	6	✕	
NationalPostalCode	6	✕	
postOfficeBoxIdentifier.FreeFormText	6	✕	
regionName.FreeFormText	6	✕	
inventoryLocation.PartnerDescription	2	✕	
BusinessDescription	3	✕	
businessName.FreeFormText	4	✕	
GlobalBusinessIdentifier	4	✕	
PartnerBusinessIdentification	4	✕	
ProprietaryBusinessIdentifier	5	✕	
ProprietaryDomainIdentifier	5	✕	
ProprietaryIdentifierAuthority	5	✕	
ContactInformation	3	✕	
contactName.FreeFormText	4	✕	
EmailAddress	4	✕	

Element	Level	Required	Remark
facsimileNumber.CommunicationsNumber	4	✕	
telephoneNumber.CommunicationsNumber	4	✕	
GlobalPartnerClassificationCode	3	✕	
PhysicalLocation	3	✕	
GlobalLocationIdentifier	4	✕	
PartnerLocationIdentification	4	✕	
ProprietaryDomainIdentifier	5	✕	
ProprietaryIdentifierAuthority	5	✕	
ProprietaryLocationIdentifier	5	✕	
PhysicalAddress	4	✕	
addressLine1.FreeFormText	5	✕	
addressLine2.FreeFormText	5	✕	
addressLine3.FreeFormText	5	✕	
cityName.FreeFormText	5	✕	
GlobalCountryCode	5	✕	
NationalPostalCode	5	✕	
postOfficeBoxIdentifier.FreeFormText	5	✕	
regionName.FreeFormText	5	✕	
inventoryOwner.BusinessDescription	2	✕	
businessName.FreeFormText	3	✕	
GlobalBusinessIdentifier	3	✕	
PartnerBusinessIdentification	3	✕	
ProprietaryBusinessIdentifier	4	✕	
ProprietaryDomainIdentifier	4	✕	
ProprietaryIdentifierAuthority	4	✕	
InventoryProductQuantity	2	✓	sum of fuel consumption
GlobalInventoryCode	3	✕	
InventoryItemIdentification	3	✕	
countryOfOrigin.GlobalCountryCode	4	✕	
manufactureDate.DateTimeStamp	4	✕	

Element	Level	Required	Remark
ProprietaryLotIdentifier	4	✕	
SerialNumberIdentification	4	✕	
ProprietarySerialIdentifier	5	✕	
ProductQuantity	3	✓	liter
ProductIdentification	2	✕	
GlobalProductIdentifier	3	✕	
PartnerProductIdentification	3	✕	
GlobalPartnerClassificationCode	4	✕	
ProprietaryProductIdentifier	4	✕	
revisionIdentifier.FreeFormText	4	✕	

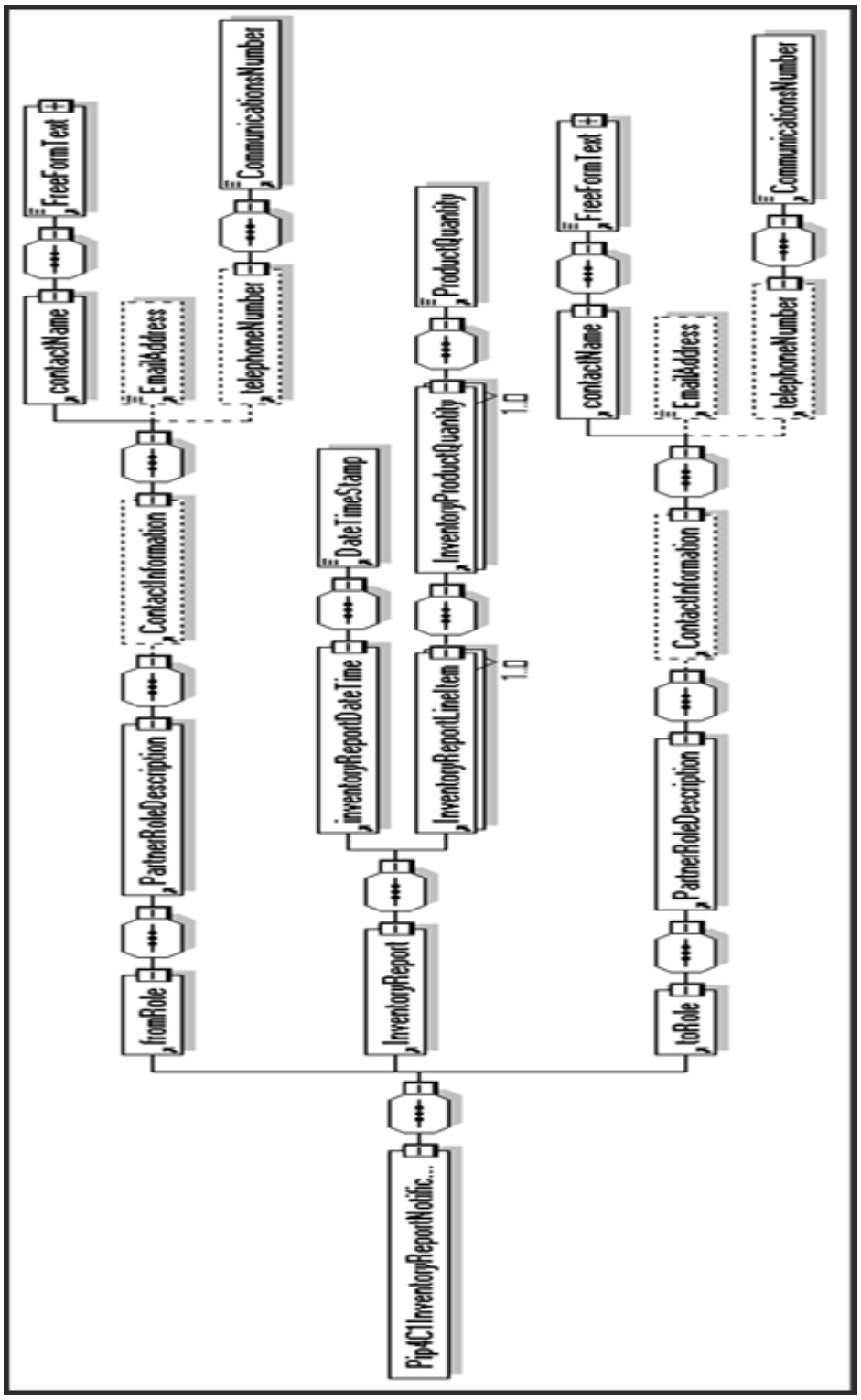

Figure 5.28 Format document PIP4C1based on XML schema

CHAPTER VI
DISCUSSION AND CONCLUSION

This chapter describes contribution from a research though discussion and conclusion. In addition, the opportunity of research was discussed for adapting in the other field.

6.1 Discussion

Subsystems of LMIS consists of 26 subsystem, but we will consider only 5 subsystems as following: FMS Procurement system (LM05), LP/DP Procurement system (LM06), freight tracking system (LM07), fuel management system (LM08), LP Procurement system (LM13) as shown in table 4.1. Adoption of five subsystems involves the communication between internal units and external supplier. In contrast, a partial subsystem interacts between related units in the RTAF. For the effective deployment operations using an aircraft, the fuel management system is the first priority for choosing.

There are four main processes in fuel management consists of: fuel consumption reporting, fuel acceptance reporting, fuel receiving planning, and transportation planning. Fuel consumption report and fuel acceptance report communicate within units, but fuel receiving planning and transportation planning interchange between internal units and external supplier. According to investigate, fuel consumption is the first priority, so it is the important information for reporting between units. However, the traditional process updates data every weekend via human. Thus, data collect may be incorrect that influence directly in the other processes. Information linkage can not be entire in order to encompass all of related transaction. The author proposes the added process in order to fulfill the data exchange. The collaborative forecast process is the best answer because it helps in

better manage all of fuel. Furthermore, fuel acceptance report should send to the external supplier in order to identify an inventory level. The data exchange framework is improved by PIPs in RosettaNet in order to response rapidly under the deployment operations planning.

According to study, we found two PIPs that can be used to apply in these processes are PIP3B2NotifyofAdvanceShipment and PIP4B2NotifyofShipment Receipt. Responsiveness between sender and receiver is a reason for selecting these PIPs. In addition, we propose the essential elements in order to utilize properly in fuel management. It is additional information for choosing appropriate PIPs.

PIP4A2 for collaborative forecast should consider specific elements in order to direct an agreement between partners. According to discuss, three elements in PIP4A2 are important for forecast process because it is a key element in collaborative forecast. In military logistics, fuel management in LMIS must concern TradeOffZone element due to interchange between stakeholders that involve a credit transaction.

PIP4C1 for inventory report must study the additional elements about inventory information. In military logistics, fuel management in LMIS focuses on InventoryProductQuantity element because it identifies classification of fuel that can be used to support an aircraft in the RTAF.

Both PIP3B2 and PIP4B2 are adapted in case of outsource delivery due to represent status shipment delivery in supply chain. In military logistics, fuel management in LMIS involves fuel distribution and fuel acceptance. PIP3B2 are selected in order to identify status of fuel distribution from PTT to fuel control section. PIP4B2 can be used to confirm status when fuel control section receives fuel. Furthermore, Elements in PIP3B2 can be used to describe originating party, so it is easy for traceability when fuel is low quality.

According to study, elements in each PIP are several, while the selection of elements is tiny. The ratio among usage and total elements is following: PIP3B2 9.49%, PIP4A2 26.36%, PIP4B2 15.15% and PIP4C1 9.61%. The usage elements consist of: actual elements, header elements, and recommend elements as shown in table 6.1. The objectives of standard can be used to guide a method for sharing information. For example, purchase order process contains activity and action for trading partners. The elements for adapting can be used to generate partial data in the actual documents. The important data is header of elements, whereas the other data is able to design documents based on the requirements or agreement with partners.

Table 6.1: The percent of each group in PIP3B2, PIP4A2, PIP4B2, and PIP4C1

Group of required elements	PIP3B2	PIP4A2	PIP4B2	PIP4C1
actual elements header elements	17 6.72	23 20.91	16 12.12	11 7.05
recommend elements	7 2.77	6 5.45	4 3.03	4 2.56
unnecessary elements	229 90.51	81 73.64	112 84.85	141 90.39
total elements %	253 100	110 100	132 100	156 100

6.2 Conclusion and Future research

This research proposes the procedure that generate framework by using RosettaNet standard in case of fuel management. First, analyze business processes that interact between sections; second, identify manual or redundant processes in order to adjust automated processes; third, mapping PIPs in these processes; and finally, design business documents based on XML schema. In addition, the author found the structure of XML schema. It is the primary elements that consist of three parts: communication parties (From-To) content define a detail of partner that send and receive information, activity content describe action and activity in each PIPs, and standard communication content identify information for global supply chain.

According to analyze, utilizing the elements in these contents as shown in table 6.2. The elements are utilized in communication parties (From-To) content is equal 3.95% in all of PIPs. The components of elements recognize mostly a detail of partners, so adding the actual data based on XML schema in each PIP is similar. A name of sender and receiver are changed due to describe status of partners. For example, the sender in PIP3B2 is PTT, but the receiver in PIP4B2 is PTT. Choosing the elements in communication parties (From-To) content should consider the role of partners that interact between them. Besides, adopting the elements in activity content focuses on PIP4A2 that represent 17.27%. The structure of XML schema in PIP4A2 defines a level of element as level 7, so the usage of elements is the most in these PIPs.

Table 6.2: The percent of usage elements in each content

Classification of content	PIP3B2	PIP4A2	PIP4B2	PIP4C1
communication parties (From-To) content	10 3.95	10 3.95	10 3.95	10 3.95
activity content	14 5.53	19 17.27	10 3.95	5 3.21
standard communication content	229 90.51	81 73.64	112 84.85	141 90.38
total elements %	253 100	110 100	132 100	156 100

Awareness for adapting RosettaNet in fuel management system should be adjustable elements. The authorization influences in military, so the acceptance of document need to approve by authority due to involve a regulation. Besides, fuel receiving process is modified by PIP4B2 must add an approval authority due to accept the unique document. The characteristic of purchase order in military is purchasing lot size, but the distribution is delivery lot size. Fuel consumption in each depot may be uncertain. Thus, fuel distribution process is modified by PIP3B2 have to add a shortage quantity because it identifies status of volume delivery.

For future research, the author recommends the procedure for adapting RosettaNet standard in Government to Business (G2B). The characteristics of business processes are similar with fuel management system in LMIS. In addition, the temperature interacts with loss of fuel need to additional study because it affects directly the volume of fuel. Although an adapting RoettaNet in fuel management communicates only supplier, the standard can be used to apply in several suppliers. In Hard Disk Drive (HDD) industry, RosettaNet was utilized by supplier and hard disk makers due to assemble various parts. Thus, the aircraft maintenance can be used to study because an aircraft in the RTAF is different types. The spare parts for supporting are several assemblies, so the data exchange framework challenge for adapting RosettaNet. The nature of aircraft maintenance is similar HDD industry which involves the supplying part. Nevertheless, an aircraft is the maximum spare parts. It is necessary for applying in the aircraft maintenance because of a new knowledge for improving in the future research direction.

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APPENDICES

APPENDIX A

BUSINESS PROCESS ANALYSIS (AS-IS PROCESS)

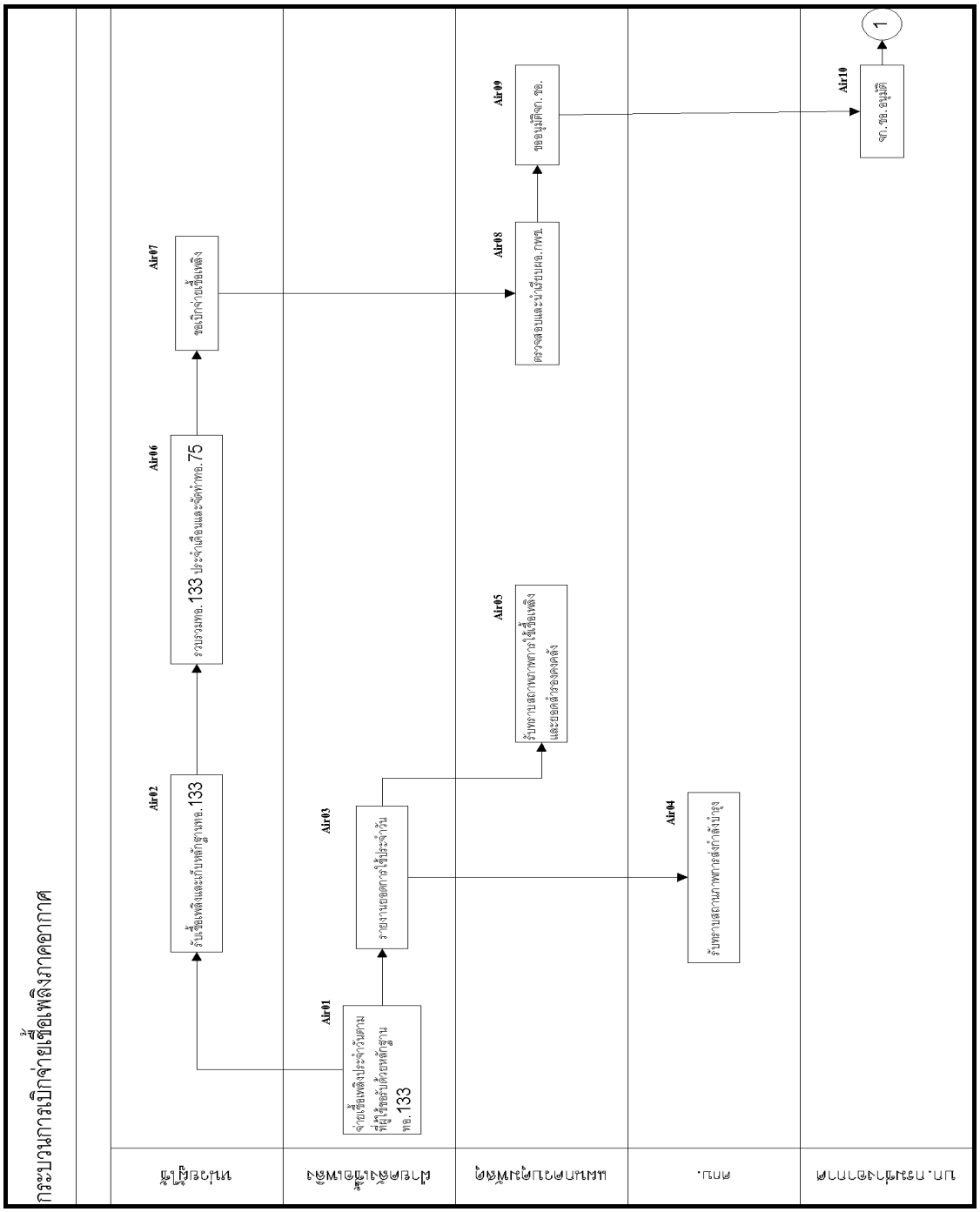

Figure A1 (a) Aviation Fuel Distribution process (THAI)

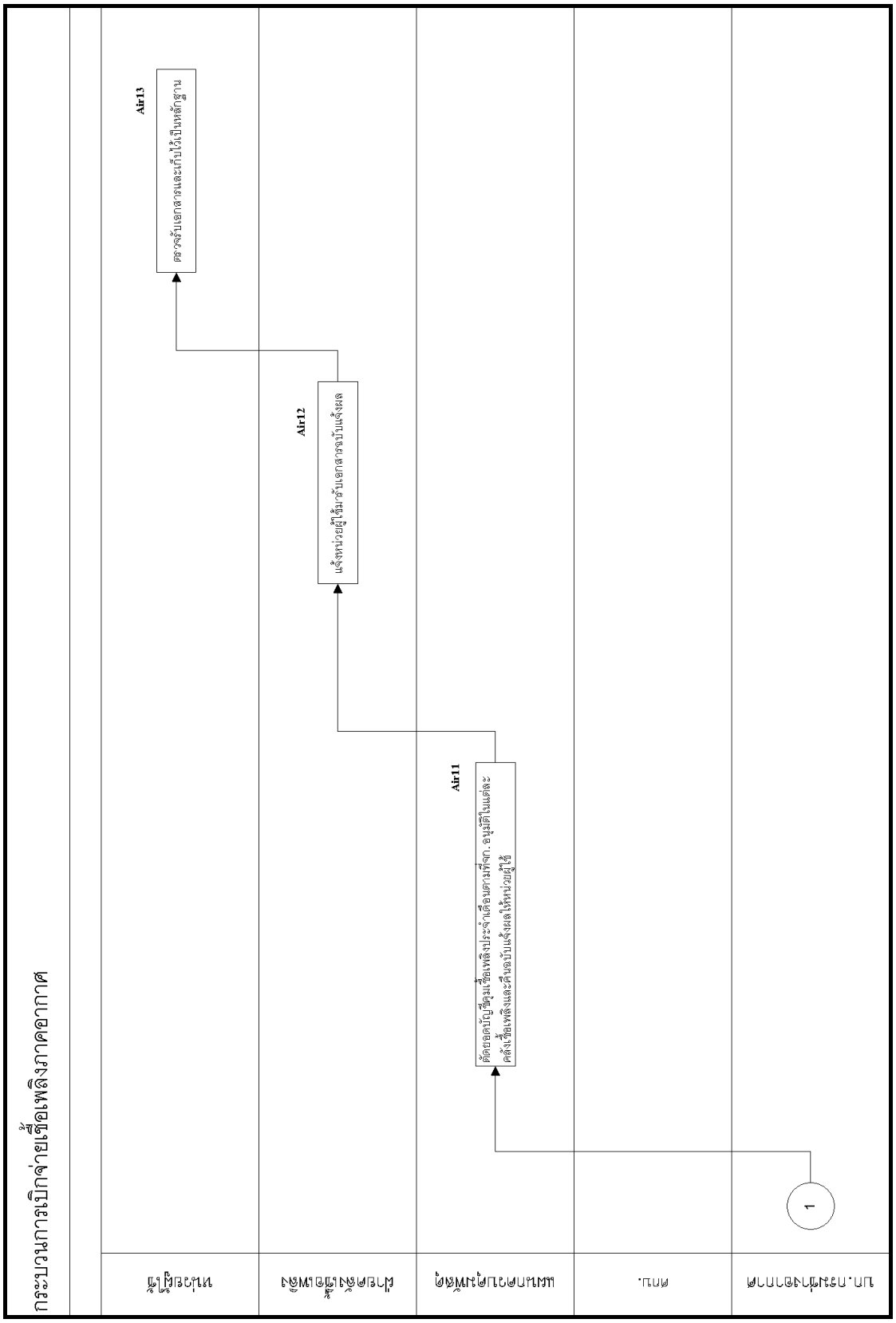

Figure A2 (b) Aviation Fuel Distribution process (THAI)

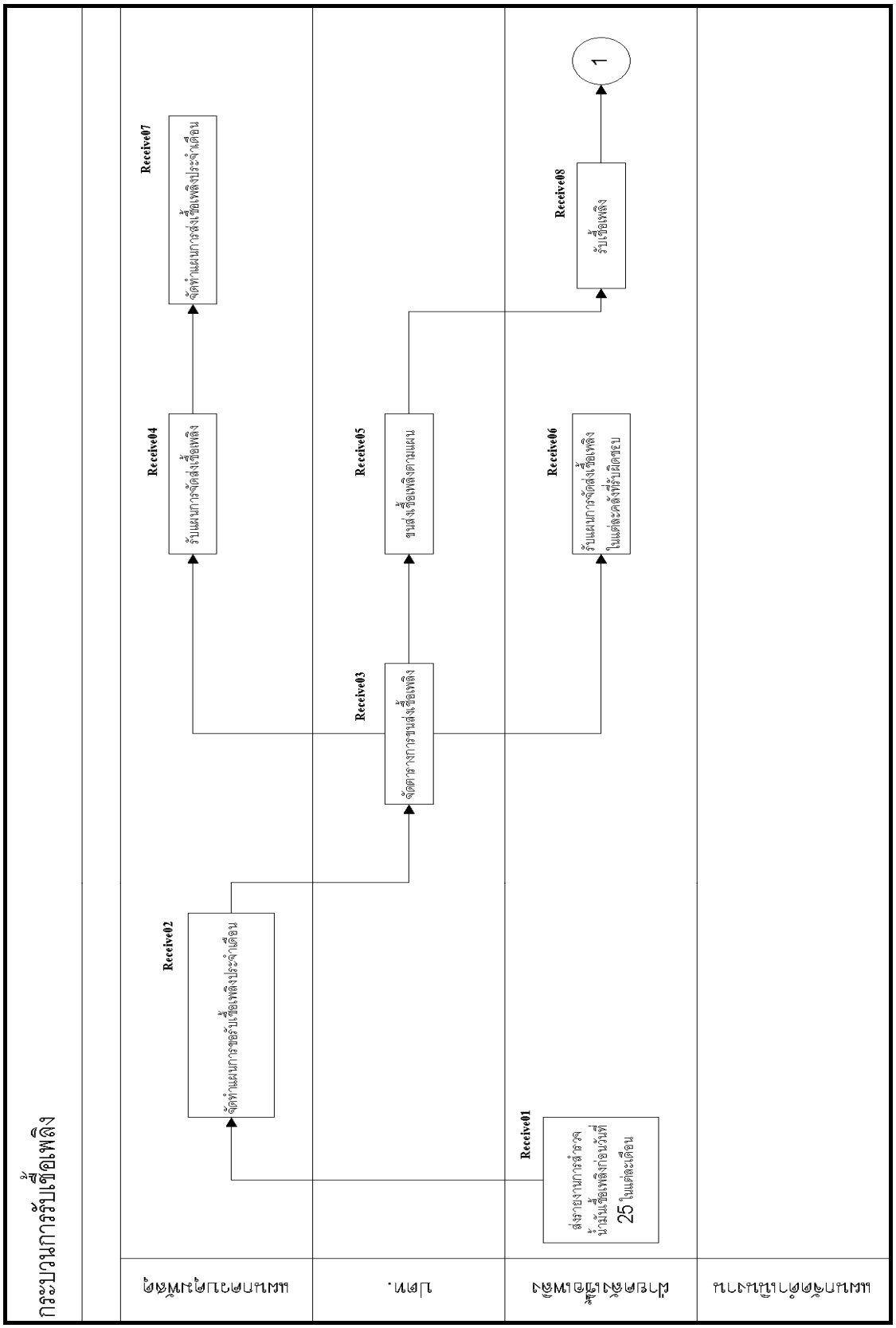

Figure A3 (a) Fuel receiving process (THAI)

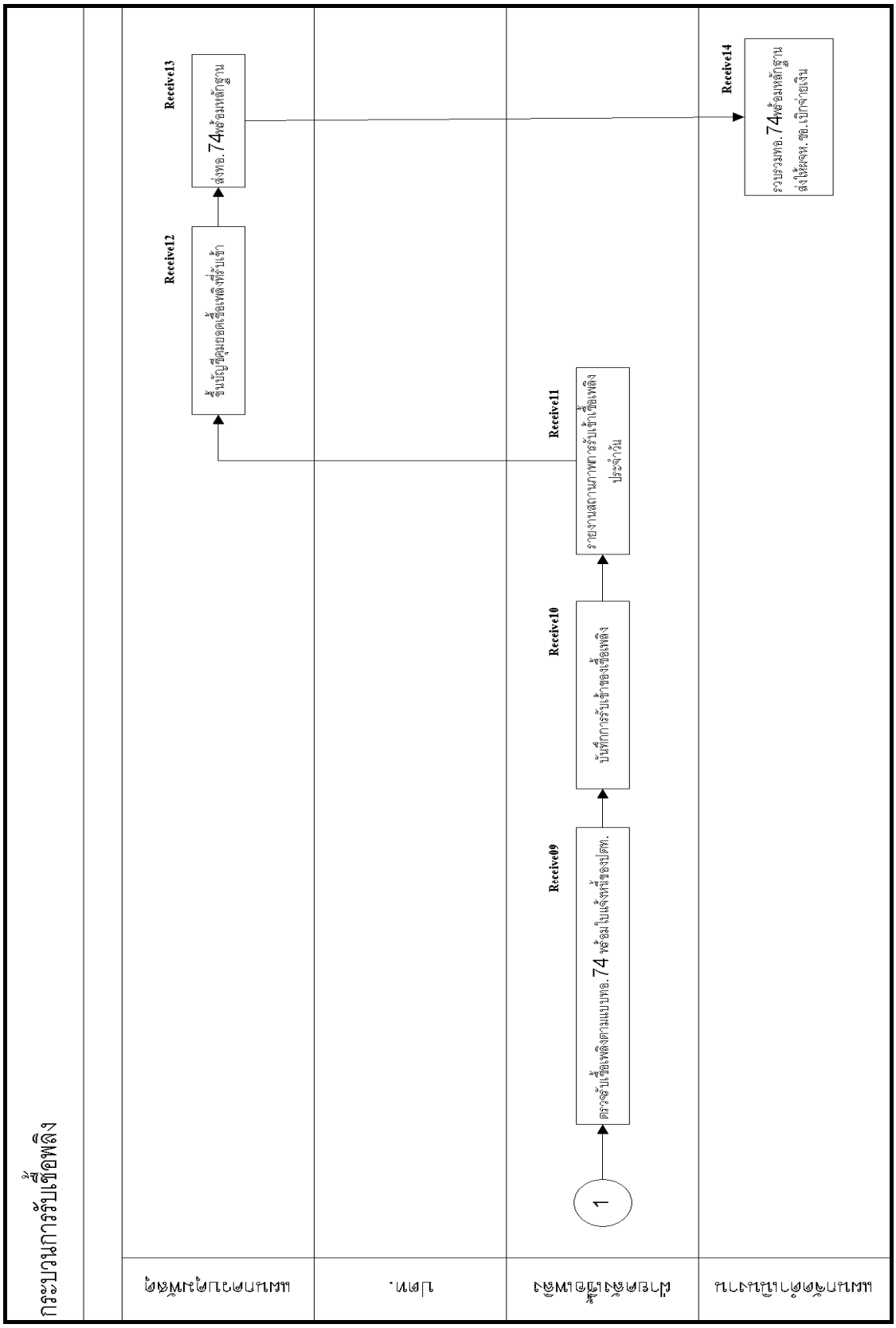

Figure A4 (b) Fuel receiving process (THAI)

APPENDIX B

BUSINESS PROCESS DIAGRAM IN EACH PIP

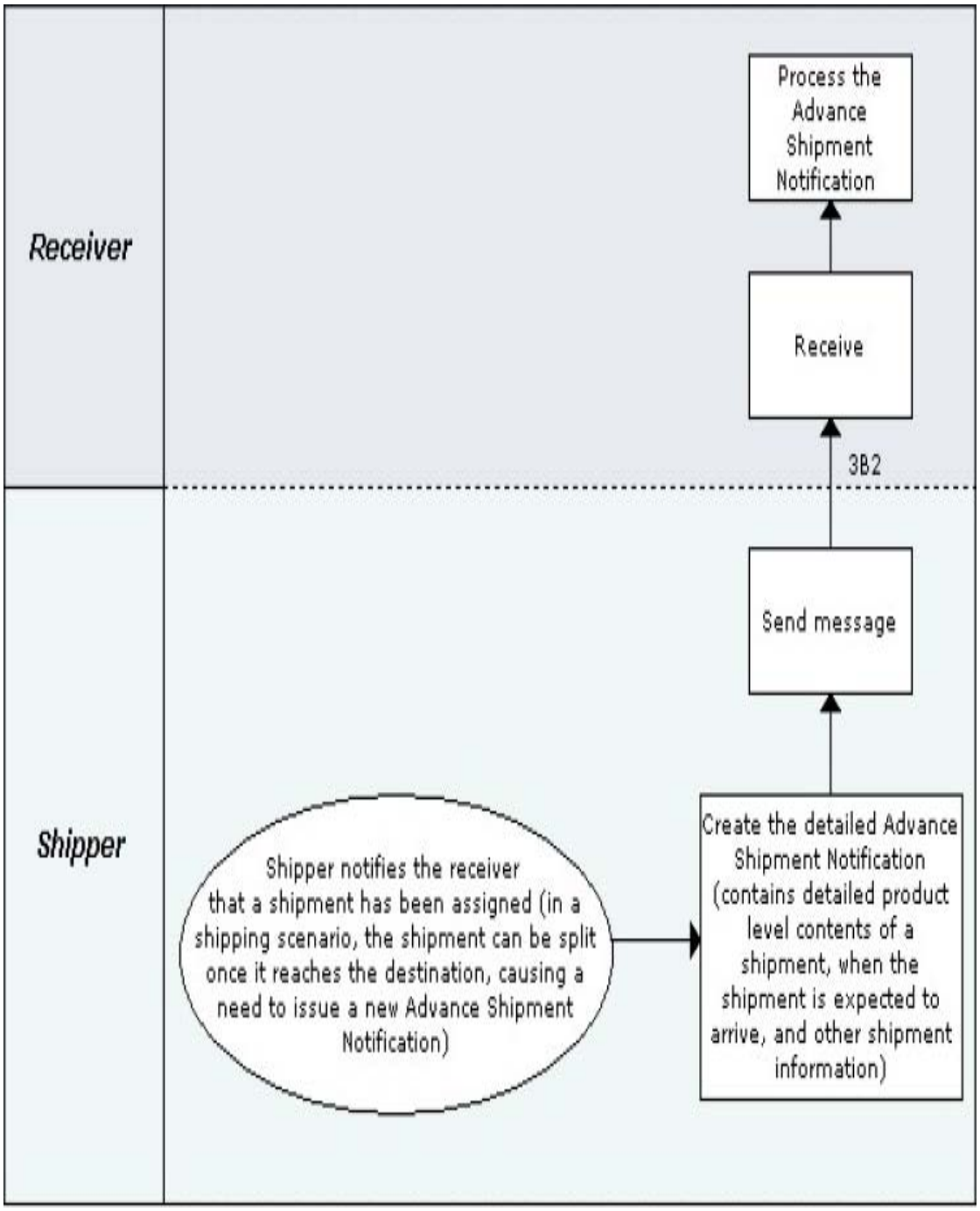

Figure B1 Business process diagram in PIP3B2
Source: http://www.rosettanet.org

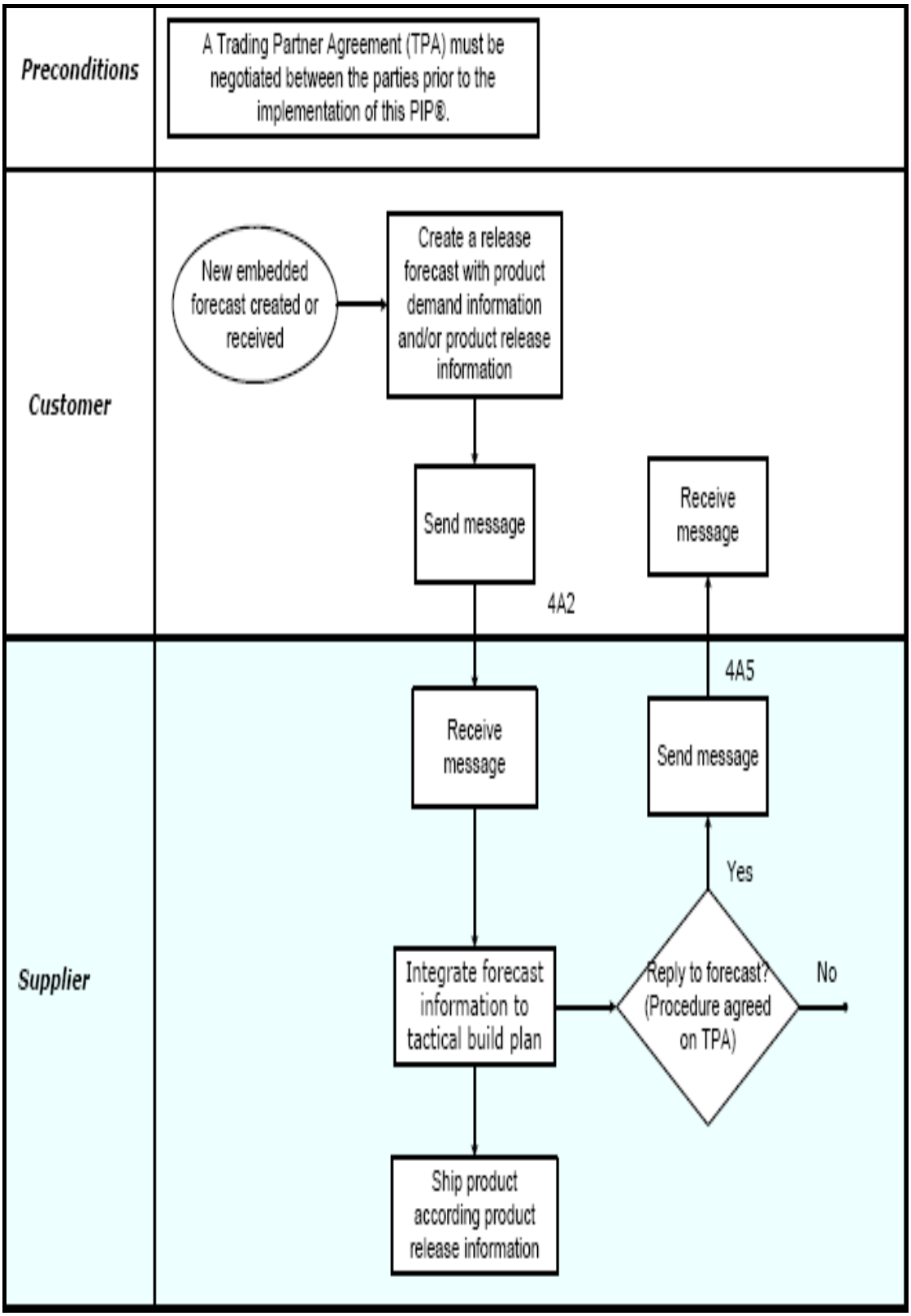

Figure B2 Business process diagram in PIP4A2
Source: http://www.rosettanet.org

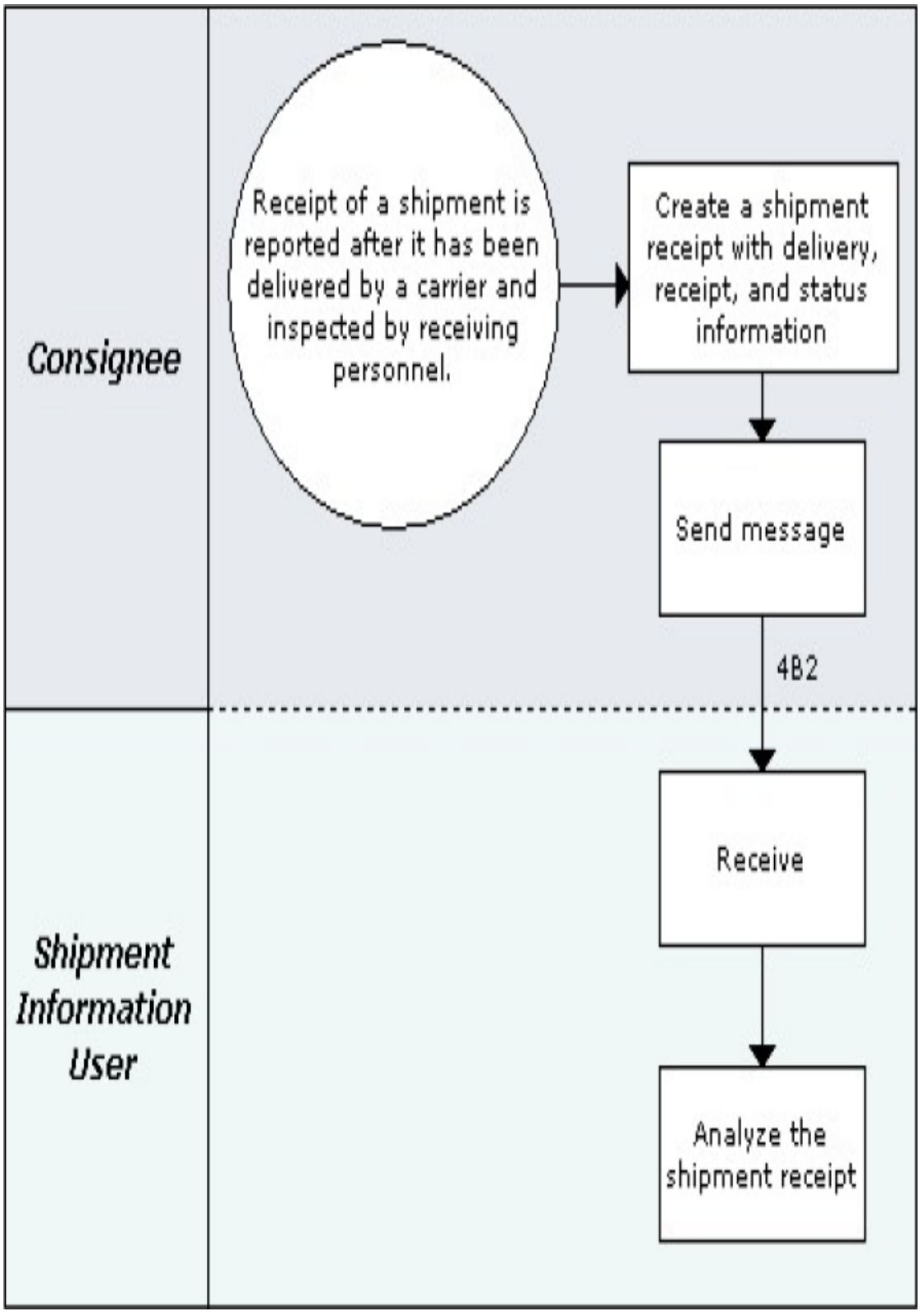

Figure B3 Business process diagram in PIP4B2
Source: http://www.rosettanet.org

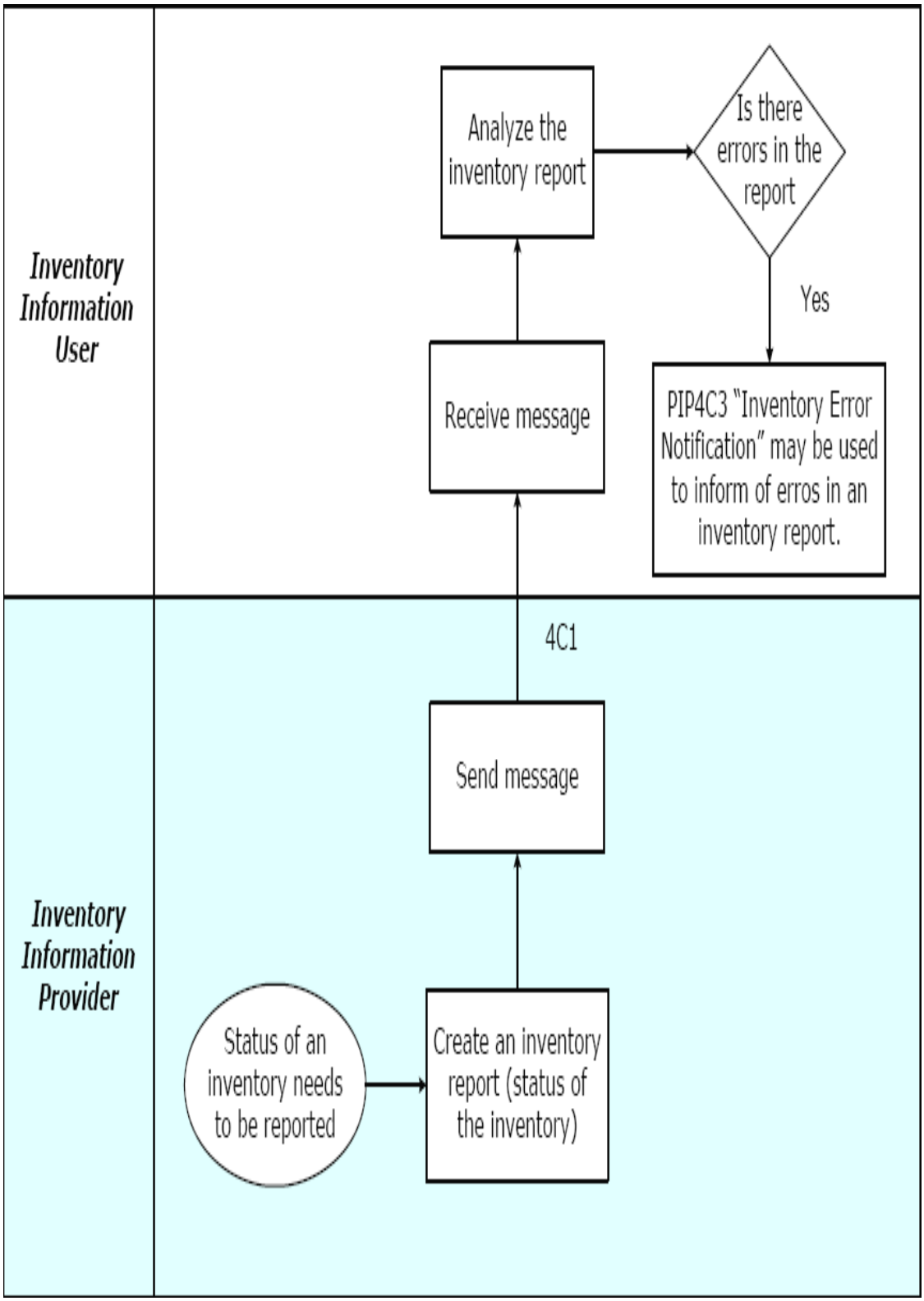

Figure B4 Business process diagram in PIP4C1
Source: http://www.rosettanet.org

APPENDIX C
DICTIONARY

Table C1: Definition of vocabulary in communication parties (From) content (www.rosettanet.org)

Element	Description
fromRole.PartnerRoleDescription	The role initiating a business document exchange. The collection of business properties that describe a business partners' role in a partner interface process.
ContactInformation	**Constraint:** At least one occurance of "EmailAddress" or "telephoneNumber" is required
contactName.FreeFormText	Name of the contact person(s) within the organization. Unformatted text.
EmailAddress	Electronic mail address.
facsimileNumber.CommunicationsNumber	The numerical schema designed to achieve contact via facsimile.The electro-technical communication number
telephoneNumber.CommunicationsNumber	The numerical schema designed to achieve contact via telephone. The electro-technical communication number
GlobalPartnerRoleClassificationCode	**Constraint:** Only GlobalPartnerRoleClassificationCode equal to Inventory Information Provider is allowed.
PartnerDescription	The collection of business properties that describe a business partners' identity and their function in a supply chain.
BusinessDescription	**Constraint:** At least one business identifier must be provided: "businessName", "GlobalBusinessIdentifier" or at least one entity in "PartnerBusinessIdentification".
GlobalBusinessIdentifier	A unique business identifier. The DUNS number is specified by RosettaNet.
GlobalSupplyChainCode	Specific information based on reference.
GlobalPartnerClassificationCode	Specific information based on reference.

Table C2: Definition of vocabulary in communication parties (To) content (www.rosettanet.org)

Element	Description
toRole.PartnerRoleDescription	The role receiving the document in a business document exchange. The collection of business properties that describe a business partners' role in a partner interface process.
ContactInformation	**Constraint:** At least one occurance of "EmailAddress" or "telephoneNumber" is required.
contactName.FreeFormText	Name of the contact person(s) within the organization. Unformatted text.
EmailAddress	Electronic mail address.
facsimileNumber.CommunicationsNumber	The numerical schema designed to achieve contact via facsimile.The electro-technical communication number
telephoneNumber.CommunicationsNumber	The numerical schema designed to achieve contact via telephone. The electro-technical communication number
GlobalPartnerRoleClassificationCode	**Constraint:** Only GlobalPartnerRoleClassificationCode equal to Inventory Information Provider is allowed.
PartnerDescription	The collection of business properties that describe a business partners' identity and their function in a supply chain.
BusinessDescription	**Constraint:** At least one business identifier must be provided: "businessName", "GlobalBusinessIdentifier" or at least one entity in "PartnerBusinessIdentification".
GlobalBusinessIdentifier	A unique business identifier. The DUNS number is specified by RosettaNet.
GlobalSupplyChainCode	Specific information based on reference.
GlobalPartnerClassificationCode	Specific information based on reference.

Table C3: Definition of vocabulary in activity content PIP3B2 (www.rosettanet.org)

Element	Description
Shipment	The collection of business properties that describe a consignment tendered for transportation from one point to another.
freightPaymentAccount.AccountNumber	The account number with the shipping carrier of the party paying the carrier fees for the shipment. Identification number of an account.
GlobalCarrierCode	SCAC codes to be used.
GlobalIncotermsCode	Specific information based on reference.
GlobalShipmentChangeDispositionCode	Specific information based on reference.
GlobalShipmentModeCode	Specific information based on reference.
GlobalShippingServiceLevelCode	Specific information based on reference.
numberOfShippingContainers.CountableAmount	A numeric expression of the number of outer containers for product shipping. Dimensionless magnitude, e.g. number of products
ReceivingPartner	The collection of business properties used to identify the business partner accepting delivery of a shipment or transaction.
shipTo.PartnerDescription	The partner and/or location to which the product must be delivered. The collection of business properties that describe a business partners' identity, their contact information, where they are physically located and their function in a supply chain.
BusinessDescription	**Constraint:** At least one business identifier must be provided: "businessName", "GlobalBusinessIdentifier" or at least one entity in "PartnerBusinessIdentification".
businessName.FreeFormText	The name of a business entity. Unformatted text.
GlobalBusinessIdentifier	A unique business identifier. The DUNS number is specified by RosettaNet.
PartnerBusinessIdentification	The collection of business properties that allow for the proprietary identification of a business entity.
ProprietaryBusinessIdentifier	A unique business identifier assigned and administered by a private authority.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.

Element	Description
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
ContactInformation	**Constraint:** At least one occurance of "EmailAddress" or "telephoneNumber" is required.
contactName.FreeFormText	Name of the contact person(s) within the organization. Unformatted text.
EmailAddress	Electronic mail address.
facsimileNumber.CommunicationsNumber	The numerical schema designed to achieve contact via facsimile. The electro-technical communication number
telephoneNumber.CommunicationsNumber	The numerical schema designed to achieve contact via telephone. The electro-technical communication number
GlobalPartnerClassificationCode	Specific information based on reference.
PhysicalLocation	**Constraint:** At least one occurance of "GlobalLocation Identifier", "PartnerLocation Identifier" or "PhysicalAddress" is required.
GlobalLocationIdentifier	Location uniquely identified by the DUNS +4 number.
PartnerLocationIdentification	The collection of business properties that allow for the proprietary identification of a business location.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
ProprietaryLocationIdentifier	A unique location identifier assigned and administered by a private authority.
PhysicalAddress	**Constraint:** At least one associated element under "PhysicalAddress " is required if "GlobalLocationIdentifier" or "PartnerLocationIdentifier" is not provided.
addressLine1.FreeFormText	The first line of a physical address. Unformatted text.
addressLine2.FreeFormText	The second line of a physical address. Unformatted text.
addressLine3.FreeFormText	The third line of a physical address. Unformatted text.
cityName.FreeFormText	The name of a city. Unformatted text.
GlobalCountryCode	Specific information based on reference.

Element	Description
NationalPostalCode	Code identifying geographic location as specified by a national postal code.
postOfficeBoxIdentifier.FreeFormText	The proprietary identity of a physical address, located at a post office, designed solely to accept and receive mail. Unformatted text.
regionName.FreeFormText	The name of a state or province within a country. Unformatted text.
shipmentChangeReason.FreeFormText	Team must provide valid definition. Should be changed from Free Form Text to a code list. Unformatted text.
shipmentIdentifier.ProprietaryReferenceIdentifier	Reference identifier assigned by the partner originating a shipment to uniquely identify the shipment. A unique reference identifier for goods, services or business documents.
ShipmentTransportationEvent	The collection of business properties that describe the occurrence of the public conveyance of a shipment of goods.
DateStamp	The "Z" following the day identifier (DD) is used to indicate Coordinated Universal Time. Informal format: YYYYMMDDZ
GlobalShipDateCode	Specific information based on reference.
ShippingContainer	The collection of business properties that describe the nature and contents of a shipping unit.
GlobalPackageTypeCode	Specific information based on reference.
LinearPhysicalDimension	The physical dimension of an object having only one dimension.
GlobalPhysicalUnitOfMeasureCode	The physical dimension of unit of mass used for measuring the masses of weights, volumes etc.
HeightDimension	Vertical dimension of an object when object in the upright position.
LengthDimension	Largest horizontal dimension of an object measured when the object in the upright position.
WidthDimension	Shorter measurement of the two horizontal dimensions measured with object in the upright position.
MassPhysicalDimension	The physical dimension of unit of mass used for measuring the masses of weights, volumes etc.
Volume	The amount of space occupied by a three-dimensional object or region of space, expressed in cubic units.
GlobalPhysicalUnitOfMeasureCode	Specific information based on reference.
Mass	The unit of mass used for measuring the masses.
Weight	A measure of the heaviness of object.

Element	Description
GlobalPhysicalUnitOfMeasureCode	Specific information based on reference.
Mass	The unit of mass used for measuring the masses.
numberOfShippingContainers.CountableAmount	A numeric expression of the number of outer containers for product shipping. Dimensionless magnitude, e.g. number of products.
shippingContainerIdentifier.ProprietarySerialIdentifier	Unique identifier that represents a shipping container. Normally a UCC structured identifier. Also known as a "license plate".Unique serial identifier assigned to the product.
ShippingContainerItem	The collection of business properties that describe the nature and contents of the good contained within shipping unit.
DocumentSubLineLotShipReference	Reference to document(s) this shipment is being sent against (i.e. Purchase Order)
GlobalDocumentReferenceTypeCode	Specific information based on reference.
LineNumber	Number of the line in the document.
LotShipReference	Reference to specific lot information (i.e. quanity, lot identifiers) contained in this shipment.
expiryDate.DateStamp	The date that a contractual agreement expires. This representation is immediately followed by a "Z" to indicate Coordinated Universal Time. Informal format: YYYYMMDDThhmmss
LotIdentification	The collection of business properties that identify a lot.
primaryLotIdentifier.ProprietaryReferenceIdentifier	The collection of business properties that identify a main lot identifier. A unique reference identifier for goods, services or business documents.
secondaryLotIdentifier.ProprietaryReferenceIdentifier	The collection of business properties that identify an additional lot identifier. A unique reference identifier for goods, services or business documents.
LotQuantity	The collection of business properties that describe the quantity of items in a lot.
GlobalLotQuantityClassificationCode	Specific information based on reference.
GlobalProductUnitOfMeasureCode	Specific information based on reference.
ProductQuantity	A quantity specifying the number of product units.
manufacturingDateCode.ProprietaryReferenceIdentifier	The unique identifier assigned to a product by a manufacturer to distinguish individual manufacturing periods.

Element	Description
	A unique reference identifier for goods, services or business documents.
ProprietaryDocumentIdentifier	Unique identifier, i.e. a numeric value or alphanumeric value, for a business document.
requestedQuantity.ProductQuantity	The quantity of product requested. A quantity specifying the number of product units
shippedLotQuantity.ProductQuantity	A quantity of product shipped of a specific manufacturing lot within a shipping container. A quantity specifying the number of product units
subLineNumber.LineNumber	Number of the subline in the document, associated with a given line number. Number of the line in the document.
ExportLicense	The collection of business properties that describe an export license number.
NationalExportControlClassificationCode	Specific information based on reference.
GlobalProductUnitOfMeasureCode	Specific information based on reference.
HazardousMaterialDescription	**Constraint:** If 'isContainsHazardousMaterial' is equal to 'Yes", then "Hazardous Materials" is mandatory.
NationalHazardousMaterialUnitedNationsClassificationCode	Code classifying hazardous material products
isContainsHazardousMaterial.AffirmationIndicator	Indicates whether the product contains hazardous material. Used to indicate "Yes", "No" statements.
ManufacturerProfile	The collection of business properties that describe a manufacturer's product.
countryOfOrigin.GlobalCountryCode	Country where product originates. Specific information based on reference.
manufactureDate.DateStamp	The date the product was manufactured. This representation is immediately followed by a "Z" to indicate Coordinated Universal Time. Informal format: YYYYMMDDThhmmss
productSerialIdentifier.ProprietarySerialIdentifier	Serial number(s) of a product. A unique reference identifier for goods, services or business documents.
NationalHarmonizedTariffScheduleCode	Code identifying product classification for international shipping.
numberOfItemPackages.CountableAmount	A numeric expression of the number of item packages within a container. Dimensionless magnitude, e.g. number of products.
ProductIdentification	**Constraint:** One instance of either "GlobalProductIdentifier" or "PartnerProductIdentification" is mandatory.

Element	Description
GlobalProductIdentifier	Global unique product identifier. RosettaNet has adopted the Global Trade Identification Number (GTIN).
PartnerProductIdentification	The collection of business properties that describe proprietary part information.
GlobalPartnerClassificationCode	Specific information based on reference.
ProprietaryProductIdentifier	An internal identifier used to identify a product.
revisionIdentifier.FreeFormText	Free form text that identifies a revision to a proprietary serial number. Unformatted text.
shippedQuantity.ProductQuantity	Quantity of product shipped. A quantity specifying the number of product units.
shippingContainerItemIdentifier.ProprietarySerialIdentifier	The idenitifer used to denote the lowest unit in a shipment, i.e., a package within a box. Unique serial identifier assigned to the product.
traceIdentifier.ProprietaryLotIdentifier	Free form text for a non-serial lot identifier. A unique identifier representing the manufacturing lot of a Global Product Identifier.
SubContainer	The collection of business properties that describe the nature and contents of inner containers (packages) contained within an outer shipping unit.
(ShippingContainer)	The collection of business properties that describe the nature and contents of a shipping unit.
TrackingReference	The collection of business properties that describe information about tracing shipments during the transportation process.
GlobalTrackingReferenceTypeCode	Specific information based on reference.
ProprietaryShipmentTrackingIdentifier	Proprietary unique identifier for tracking product shipments.
transportedBy.PartnerDescription	The party responsible for either carrying or forwarding the product. The collection of business properties that describe a business partners' identity, their contact information, where they are physically located and their function in a supply chain.
BusinessDescription	**Constraint:** At least one business identifier must be provided: "businessName", "GlobalBusinessIdentifier" or at least one entity in "PartnerBusinessIdentification".
businessName.FreeFormText	The name of a business entity. Unformatted text.

Element	Description
GlobalBusinessIdentifier	A unique business identifier. The DUNS number is specified by RosettaNet.
Element	Description
PartnerBusinessIdentification	The collection of business properties that allow for the proprietary identification of a business entity.
ProprietaryBusinessIdentifier	A unique business identifier assigned and administered by a private authority.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
ContactInformation	**Constraint:** At least one occurance of "EmailAddress" or "telephoneNumber" is required.
contactName.FreeFormText	Name of the contact person(s) within the organization. Unformatted text.
EmailAddress	Electronic mail address.
facsimileNumber.CommunicationsNumber	The numerical schema designed to achieve contact via facsimile. The electro-technical communication number
telephoneNumber.CommunicationsNumber	The numerical schema designed to achieve contact via telephone. The electro-technical communication number
GlobalPartnerClassificationCode	Specific information based on reference.
PhysicalLocation	**Constraint:** At least one occurance of "GlobalLocation Identifier", "PartnerLocation Identifier" or "PhysicalAddress" is required.
GlobalLocationIdentifier	Location uniquely identified by the DUNS +4 number.
PartnerLocationIdentification	The collection of business properties that allow for the proprietary identification of a business location.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
ProprietaryLocationIdentifier	A unique location identifier assigned and administered by a private authority.

Element	Description
PhysicalAddress	**Constraint:** At least one associated element under "PhysicalAddress " is required if "GlobalLocationIdentifier" or "PartnerLocationIdentifier" is not provided.
addressLine1.FreeFormText	The first line of a physical address. Unformatted text.
addressLine2.FreeFormText	The second line of a physical address. Unformatted text.
addressLine3.FreeFormText	The third line of a physical address. Unformatted text.
cityName.FreeFormText	The name of a city. Unformatted text.
GlobalCountryCode	Specific information based on reference.
NationalPostalCode	Code identifying geographic location as specified by a national postal code.
postOfficeBoxIdentifier.FreeFormText	The proprietary identity of a physical address, located at a post office, designed solely to accept and receive mail. Unformatted text.
regionName.FreeFormText	The name of a state or province within a country. Unformatted text.

Table C4: Definition of vocabulary in activity content PIP4A2 (www.rosettanet.org)

Element	Description
EmbeddedReleaseForecast	The collection of business properties that describe future demand requirements information by product, for specific time periods, that can be used for build purposes with ship authorization trigger information.
forecastGenerationDateTime.DateTimeStamp	The date-time stamp indicating when the forecast was generated This representation is immediately followed by a "Z" to indicate Coordinated Universal Time. Informal format: YYYYMMDDThhmmss
ForecastIdentifierReference	The collection of business properties that describe the various types of proprietary reference identifiers for forecast information.
GlobalForecastReferenceTypeCode	Specific information based on reference.
LineNumber	Number of the line in the document.
ProprietaryReferenceIdentifier	A unique reference identifier for goods, services or business documents.
GlobalForecastEventCode	Specific information based on reference.
GlobalTransportEventCode	Specific information based on reference.
isFinalForecast.AffirmationIndicator	Indicates whether the business document is final. When a forecast is

Element	Description
	final it is considered "constrained" forecast data that is "actionable" by the forecast recipient. Used to indicate "Yes", "No" statements.
PartnerProductForecast	The collection of business properties that describe forecast and customer information for a product.
ForecastPartner	The collection of business properties that describe the partner types for a forecast.
GlobalPartnerReferenceTypeCode	Specific information based on reference.
PartnerDescription	The collection of business properties that describe a business partners' identity, their contact information, where they are physically located and their function in a supply chain.
BusinessDescription	**Constraint:** At least one business identifier must be provided: "businessName", "GlobalBusinessIdentifier" or at least one entity in "PartnerBusinessIdentification".
businessName.FreeFormText	The name of a business entity. Unformatted text.
businessWebSite.UniformResourceLocator	The home page of a business's web site. A network address location for a network resource.
GlobalBusinessIdentifier	A unique business identifier. The DUNS number is specified by RosettaNet.
PartnerBusinessIdentification	The collection of business properties that allow for the proprietary identification of a business entity.
ProprietaryBusinessIdentifier	A unique business identifier assigned and administered by a private authority.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
ContactInformation	**Constraint:** At least one occurance of "EmailAddress" or "telephoneNumber" is required.
contactName.FreeFormText	Name of the contact person(s) within the organization. Unformatted text.
EmailAddress	Electronic mail address.
facsimileNumber.CommunicationsNumber	The numerical schema designed to achieve contact via facsimile. The electro-technical communication number

Element	Description
telephoneNumber.CommunicationsNumber	The numerical schema designed to achieve contact via telephone. The electro-technical communication number
GlobalPartnerClassificationCode	Specific information based on reference.
PhysicalLocation	**Constraint:** At least one occurance of "GlobalLocation Identifier", "PartnerLocation Identifier" or "PhysicalAddress" is required.
GlobalLocationIdentifier	Location uniquely identified by the DUNS +4 number.
PartnerLocationIdentification	The collection of business properties that allow for the proprietary identification of a business location.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
ProprietaryLocationIdentifier	A unique location identifier assigned and administered by a private authority.
PhysicalAddress	**Constraint:** At least one associated element under "PhysicalAddress " is required if "GlobalLocationIdentifier" or "PartnerLocationIdentifier" is not provided.
addressLine1.FreeFormText	The first line of a physical address. Unformatted text.
addressLine2.FreeFormText	The second line of a physical address. Unformatted text.
addressLine3.FreeFormText	The third line of a physical address. Unformatted text.
cityName.FreeFormText	The name of a city. Unformatted text.
GlobalCountryCode	Specific information based on reference.
GlobalLocationIdentifier	Location uniquely identified by the DUNS +4 number.
NationalPostalCode	Code identifying geographic location as specified by a national postal code
postOfficeBoxIdentifier.FreeFormText	The proprietary identity of a physical address, located at a post office, designed solely to accept and receive mail. Unformatted text.
regionName.FreeFormText	The name of a state or province within a country. Unformatted text.
ProductForecast	The collection of business properties that describe forecast information for a product.
FrozenZone	**Constraint:** At least one occurrence of FrozenZone or isShipment

Element	Description
	AuthorizationExists of "Yes" is mandatory **User Notes:** Entries in isShipment AuthorizationExists.Affirmation Indicator of "Yes" override entries at FrozenZone
DatePeriod	The collection of business properties that specify the number of days by a start and end date stamp.
beginDate.DateStamp	The start date of a date period. The "Z" following the day identifier (DD) is used to indicate Coordinated Universal Time. Informal format: YYYYMMDDZ
endDate.DateStamp	The end date of a date period. The "Z" following the day identifier (DD) is used to indicate Coordinated Universal Time. Informal format: YYYYMMDDZ
GlobalForecastEventCode	Specific information based on reference.
GlobalProductUnitOfMeasureCode	Specific information based on reference.
productForecastIdentifier.ForecastIdentifierReference	The unique identifier that represents a forecast for a product. The collection of business properties that describe the various types of proprietary reference identifiers for forecast information
GlobalForecastReferenceTypeCode	Specific information based on reference.
LineNumber	Number of the line in the document.
ProprietaryReferenceIdentifier	A unique reference identifier for goods, services or business documents.
ProductIdentification	The collection of business properties that describe proprietary and global identifier information regarding a product.
GlobalProductIdentifier	Global unique product identifier. RosettaNet has adopted the Global Trade Identification Number (GTIN).
PartnerProductIdentification	The collection of business properties that describe proprietary part information.
GlobalPartnerClassificationCode	Specific information based on reference.
ProprietaryProductIdentifier	An internal identifier used to identify a product.
revisionIdentifier.FreeFormText	Free form text that identifies a revision to a proprietary serial number. Unformatted text.
ProductSchedule	The collection of business properties that describe forecast type, forecast date period and forecast quantity information.
ForecastProductSchedule	The collection of business properties

Element	Description
	that describe quantity during a specific period for a particular product.
ForecastPeriod	The collection of business properties that describe periodicity as determined by the forecasting partner agreement.
DatePeriod	The collection of business properties that specify the number of days by a start and end date stamp.
beginDate.DateStamp	The start date of a date period. The "Z" following the day identifier (DD) is used to indicate Coordinated Universal Time. Informal format: YYYYMMDDZ
endDate.DateStamp	The end date of a date period. The "Z" following the day identifier (DD) is used to indicate Coordinated Universal Time. Informal format: YYYYMMDDZ
GlobalForecastIntervalCode	Specific information based on reference.
isShipmentAuthorizationExists.AffirmationIndicator	**Constraint:** At least one occurrence of FrozenZone or isShipmentAuthorizationExists of "Yes" is mandatory **User Notes:** Entries in isShipmentAuthorizationExists. AffirmationIndicator of "Yes" override entries at FrozenZone Used to indicate "Yes", "No" statements.
ProductQuantity	A quantity specifying the number of product units.
scheduleProductForecastIdentifier.ForecastIdentifierReference	The unique identifiers that reference documents in a Forecast. The collection of business properties that describe the various types of proprietary reference identifiers for forecast information.
GlobalForecastReferenceTypeCode	Specific information based on reference.
LineNumber	Number of the line in the document.
ProprietaryReferenceIdentifier	A unique reference identifier for goods, services or business documents.
OrderForecastQuantityTypeCode	Specific information based on reference.
RevisionNumber	**User Notes:** Use '00' when the forecast is issued for the first time
TradeOffZone	The date period for a forecast in which there is a partial financial liability for product based on the TPA. Also known as the liability horizon.
DatePeriod	The collection of business properties that specify the number of days by a start and end date stamp.
beginDate.DateStamp	The start date of a date period.

Element	Description
	The "Z" following the day identifier (DD) is used to indicate Coordinated Universal Time. Informal format: YYYYMMDDZ
endDate.DateStamp	The end date of a date period. The "Z" following the day identifier (DD) is used to indicate Coordinated Universal Time. Informal format: YYYYMMDDZ
unitPrice.FinancialAmount	Agreed upon sale price for each unit ordered. The collection of business properties that describe the monetary amount defined by a specified currency.
RevisionNumber	**User Notes:** Use '00' when the forecast is issued for the first time.

Table C5: Definition of vocabulary in activity content PIP4B2 (www.rosettanet.org)

Element	Description
ShipmentReceiptInformationResource	The collection of business properties that describe the receiving status of shipments received by consignee.
containerTotalCount.CountableAmount	Indicates the total number of containers in the shipment that belong to this shipping order. This is usually the total number of packed cartons. Dimensionless magnitude, e.g. number of products.
freightReference.ProprietaryDocumentIdentifier	A reference identifier for the shipment, such as the Bill Of Loading. Unique identifier, i.e. a numeric value or alphanumeric value, for a business document.
receiptDate.DateTimeStamp	The date a product or service is received. This representation is immediately followed by a "Z" to indicate Coordinated Universal Time. Informal format: YYYYMMDDThhmmss
receivedBy.PartnerDescription	The party who has received a product shipment. The collection of business properties that describe a business partners' identity, their contact information, where they are physically located and their function in a supply chain.
BusinessDescription	**Constraint:** At least one business identifier must be provided: "businessName", "GlobalBusinessIdentifier" or at least one entity in "PartnerBusinessIdentification".
businessName.FreeFormText	The name of a business entity. Unformatted text.
GlobalBusinessIdentifier	A unique business identifier. The DUNS number is specified by RosettaNet.
PartnerBusinessIdentification	The collection of business properties that allow for the proprietary identification of a

Element	Description
	business entity.
ProprietaryBusinessIdentifier	A unique business identifier assigned and administered by a private authority.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
ContactInformation	**Constraint:** At least one occurance of "EmailAddress" or "telephoneNumber" is required.
contactName.FreeFormText	Name of the contact person(s) within the organization. Unformatted text.
EmailAddress	Electronic mail address.
facsimileNumber.CommunicationsNumber	The numerical schema designed to achieve contact via facsimile. The electro-technical communication number
telephoneNumber.CommunicationsNumber	The numerical schema designed to achieve contact via telephone. The electro-technical communication number
GlobalPartnerClassificationCode	Specific information based on reference.
PhysicalLocation	**Constraint:** At least one occurance of "GlobalLocation Identifier", "PartnerLocation Identifier" or "PhysicalAddress" is required.
GlobalLocationIdentifier	Location uniquely identified by the DUNS +4 number.
PartnerLocationIdentification	The collection of business properties that allow for the proprietary identification of a business location.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
ProprietaryLocationIdentifier	A unique location identifier assigned and administered by a private authority.
PhysicalAddress	**Constraint:** At least one associated element under "PhysicalAddress " is required if "GlobalLocationIdentifier" or "PartnerLocationIdentifier" is not provided.
addressLine1.FreeFormText	The first line of a physical address. Unformatted text.
addressLine2.FreeFormText	The second line of a physical address. Unformatted text.
addressLine3.FreeFormText	The third line of a physical address. Unformatted text.
cityName.FreeFormText	The name of a city. Unformatted text.
GlobalCountryCode	Specific information based on reference.
NationalPostalCode	Code identifying geographic location as specified by a national postal code.

Element	Description
postOfficeBoxIdentifier.FreeFormText	The proprietary identity of a physical address, located at a post office, designed solely to accept and receive mail. Unformatted text.
regionName.FreeFormText	The name of a state or province within a country. Unformatted text.
receivedFrom.PartnerDescription	The partner and/or location from where the product was shipped. The collection of business properties that describe a business partners' identity, their contact information, where they are physically located and their function in a supply chain.
BusinessDescription	**Constraint:** At least one business identifier must be provided: "businessName", "GlobalBusinessIdentifier" or at least one entity in "PartnerBusinessIdentification".
businessName.FreeFormText	The name of a business entity. Unformatted text.
GlobalBusinessIdentifier	A unique business identifier. The DUNS number is specified by RosettaNet.
PartnerBusinessIdentification	The collection of business properties that allow for the proprietary identification of a business entity.
ProprietaryBusinessIdentifier	A unique business identifier assigned and administered by a private authority.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
ContactInformation	**Constraint:** At least one occurance of "EmailAddress" or "telephoneNumber" is required.
contactName.FreeFormText	Name of the contact person(s) within the organization. Unformatted text.
EmailAddress	Electronic mail address.
facsimileNumber.CommunicationsNumber	The numerical schema designed to achieve contact via facsimile. The electro-technical communication number
telephoneNumber.CommunicationsNumber	The numerical schema designed to achieve contact via telephone. The electro-technical communication number
GlobalPartnerClassificationCode	Specific information based on reference.
PhysicalLocation	**Constraint:** At least one occurance of "GlobalLocation Identifier", "PartnerLocation Identifier" or "PhysicalAddress" is required.
GlobalLocationIdentifier	Location uniquely identified by the DUNS +4 number.
PartnerLocationIdentification	The collection of business properties that allow for the proprietary identification of a business location.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an

Element	Description
	organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
ProprietaryLocationIdentifier	A unique location identifier assigned and administered by a private authority.
PhysicalAddress	**Constraint:** At least one associated element under "PhysicalAddress " is required if "GlobalLocationIdentifier" or "PartnerLocationIdentifier" is not provided.
addressLine1.FreeFormText	The first line of a physical address. Unformatted text.
addressLine2.FreeFormText	The second line of a physical address. Unformatted text.
addressLine3.FreeFormText	The third line of a physical address. Unformatted text.
cityName.FreeFormText	The name of a city. Unformatted text.
GlobalCountryCode	Specific information based on reference.
NationalPostalCode	Code identifying geographic location as specified by a national postal code.
postOfficeBoxIdentifier.FreeFormText	The proprietary identity of a physical address, located at a post office, designed solely to accept and receive mail. Unformatted text.
regionName.FreeFormText	The name of a state or province within a country. Unformatted text.
shipmentIdentifier.ProprietaryReferenceIdentifier	Reference identifier assigned by the partner originating a shipment to uniquely identify the shipment. A unique reference identifier for goods, services or business documents.
ShipmentReceiptNotificationLineItem	The collection of business properties that describe a shipment receipt notification entry.
DocumentSubLineReference	The collection of business properties that allows the description of multiple proprietary documents and applicable line number or subline number references.
GlobalDocumentReferenceTypeCode	Specific information based on reference.
LineNumber	Number of the line in the document.
ProprietaryDocumentIdentifier	A unique business identifier assigned and administered by a private authority.
subLineNumber.LineNumber	Number of the subline in the document, associated with a given line number. Number of the line in the document.
subLineSchedule.DateStamp	Number of the schedule within the subline in the document, associated with a given line number. The "Z" following the day identifier (DD) is used to indicate Coordinated Universal Time. Informal format: YYYYMMDDZ
GlobalProductUnitOfMeasureCode	Specific information based on reference.
LotReference	The collection of business properties that describe a manufacturing lot tendered for

Element	Description
	shipping.
expiryDate.DateStamp	The date that a contractual agreement expires. The "Z" following the day identifier (DD) is used to indicate Coordinated Universal Time. Informal format: YYYYMMDDZ
GlobalLotDiscrepancyReasonCode	Specific information based on reference.
receivedLot.ProprietaryLotIdentifier	The identifier of a manufacturing lot from which a quantity of product was received. A unique identifier representing the manufacturing lot of a Global Product Identifier.
receivedLotQuantity.ProductQuantity	A quantity of product received from a specific manufacturing lot. A quantity specifying the number of product units.
ManufacturerProfile	**Constraint:** If Manufacturer Profile is present, at least one of countryOf Origin, manufacture Date or receivedProductSerialNumber must be provided.
countryOfOrigin.GlobalCountryCode	Country where product originates. Specific information based on reference.
manufactureDate.DateStamp	The date the product was manufactured. The "Z" following the day identifier (DD) is used to indicate Coordinated Universal Time. Informal format: YYYYMMDDZ
receivedProductSerialNumber.ProprietarySerialIdentifier	The serial number of the specific product that was received. Unique serial identifier assigned to the product.
ProductIdentification	**Constraint:** One instance of either "GlobalProduct Identifier" or "PartnerProductIdentification" is mandatory.
GlobalProductIdentifier	Global unique product identifier. RosettaNet has adopted the Global Trade Identification Number (GTIN).
PartnerProductIdentification	The collection of business properties that describe proprietary part information.
GlobalPartnerClassificationCode	Specific information based on reference.
ProprietaryProductIdentifier	An internal identifier used to identify a product.
revisionIdentifier.FreeFormText	Free form text that identifies a revision to a proprietary serial number. Unformatted text.
QuantityInformation	The collection of business properties that describes information regarding the quantity of the product shipped.
acceptedQuantity.ProductQuantity	The quantity of units accepted upon receipt of a shipment. A quantity specifying the number of product units.
receivedQuantity.ProductQuantity	The product quantity received. A quantity specifying the number of product units.
ShipmentReceiptDiscrepancyInformation	**Constraint:** Shipment Receipt Discrepancy Information is mandatory if accepted Quantity is less than received Quantity.
GlobalReceivingDiscrepancyCode	Specific information based on reference.
GlobalReceivingDiscrepancyReasonCode	Specific information based on reference.

Element	Description
shipmentReceiptReportDateTime.DateTimeStamp	The date-time when the shipment receiving report was generated. This representation is immediately followed by a "Z" to indicate Coordinated Universal Time. Informal format: YYYYMMDDThhmmss
TrackingReference	The collection of business properties that describe information about tracing shipments during the transportation process.
GlobalTrackingReferenceTypeCode	Specific information based on reference.
ProprietaryShipmentTrackingIdentifier	Proprietary unique identifier for tracking product shipments.
transportedBy.PartnerCompanyDescription	The party responsible for either carrying or forwarding the product. The collection of business properties that describe a business partners' identity and their function in a supply chain.
BusinessDescription	**Constraint:** At least one business identifier must be provided: "businessName", "GlobalBusinessIdentifier" or at least one entity in "PartnerBusinessIdentification".
businessName.FreeFormText	The name of a business entity. Unformatted text.
GlobalBusinessIdentifier	A unique business identifier. The DUNS number is specified by RosettaNet.
PartnerBusinessIdentification	The collection of business properties that allow for the proprietary identification of a business entity.
ProprietaryBusinessIdentifier	A unique business identifier assigned and administered by a private authority.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
GlobalPartnerClassificationCode	Specific information based on reference.

Table C6: Definition of vocabulary in activity content PIP4C1 (www.rosettanet.org)

Element	Description
InventoryReport	The collection of business properties that describe a product in inventory at a specific point in time.
internalBusinessEntity.PartnerDescription	Identifies proprietary divisions, planning units, organizations, warehouses, or any other grouping that would cause different contacts or different planning and procurement information. Used to distinguish between multiple divisions. The collection of business properties that describe a business partners' identity and their function in a supply chain.
BusinessDescription	**Constraint:** At least one business identifier must be provided: "businessName", "GlobalBusinessIdentifier" or at least one entity in "PartnerBusinessIdentification".
businessName.FreeFormText	The name of a business entity. Unformatted text.

Element	Description
GlobalBusinessIdentifier	A unique business identifier. The DUNS number is specified by RosettaNet.
PartnerBusinessIdentification	The collection of business properties that describe a product entry on an inventory report.
ProprietaryBusinessIdentifier	A unique business identifier assigned and administered by a private authority.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
GlobalPartnerClassificationCode	Specific information based on reference.
inventoryReportDateTime.DateTimeStamp	The date and time stamp for which inventory information is captured for reporting. This representation is immediately followed by a "Z" to indicate Coordinated Universal Time. Informal format: YYYYMMDDThhmmss
InventoryReportLineItem	The collection of business properties that describe a product entry on an inventory report.
DocumentReference	The collection of business properties that allows the description of multiple proprietary documents.
DateTimeStamp	This representation is immediately followed by a "Z" to indicate Coordinated Universal Time. Informal format: YYYYMMDDThhmmss.
GlobalDocumentReferenceTypeCode	Specific information based on reference.
LineItemNumber	Reference to an item by the number of the line in the document.
ProprietaryDocumentIdentifier	Unique identifier, i.e. a numeric value or alphanumeric value, for a business document.
GlobalProductUnitOfMeasureCode	Specific information based on reference.
IntraCompanyTransfer	The collection of business properties that describes a quantity of product stock in transit within a partner.
inTransitFrom.PartnerDescription	The party sending the product quantity in a product location transfer. The collection of business properties that describe a business partners' identity and their function in a supply chain.
BusinessDescription	**Constraint:** At least one business identifier must be provided: "businessName", "GlobalBusinessIdentifier" or at least one entity in "PartnerBusinessIdentification".
businessName.FreeFormText	The name of a business entity. Unformatted text.
GlobalBusinessIdentifier	A unique business identifier. The DUNS number is specified by RosettaNet.
PartnerBusinessIdentification	The collection of business properties that allow for the proprietary identification of a business entity.
ProprietaryBusinessIdentifier	A unique business identifier assigned and administered by a private authority.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
ContactInformation	**Constraint:** At least one occurance of "EmailAddress" or "telephoneNumber" is required.

Element	Description
contactName.FreeFormText	Name of the contact person(s) within the organization. Unformatted text.
EmailAddress	Electronic mail address.
facsimileNumber.CommunicationsNumber	The numerical schema designed to achieve contact via facsimile. The electro-technical communication number
telephoneNumber.CommunicationsNumber	The numerical schema designed to achieve contact via telephone. The electro-technical communication number
GlobalPartnerClassificationCode	Specific information based on reference.
PhysicalLocation	**Constraint:** At least one occurance of "GlobalLocationIdentifier", "PartnerLocationIdentifier" or "PhysicalAddress" is required.
GlobalLocationIdentifier	Location uniquely identified by the DUNS +4 number.
PartnerLocationIdentification	The collection of business properties that allow for the proprietary identification of a business location.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
ProprietaryLocationIdentifier	A unique location identifier assigned and administered by a private authority.
PhysicalAddress	**Constraint:** At least one associated element under "PhysicalAddress " is required if "GlobalLocationIdentifier" or "PartnerLocationIdentifier" is not provided.
addressLine1.FreeFormText	The first line of a physical address. Unformatted text.
addressLine2.FreeFormText	The second line of a physical address. Unformatted text.
addressLine3.FreeFormText	The third line of a physical address. Unformatted text.
cityName.FreeFormText	The name of a city. Unformatted text.
GlobalCountryCode	Specific information based on reference.
NationalPostalCode	Code identifying geographic location as specified by a national postal code.
postOfficeBoxIdentifier.FreeFormText	The proprietary identity of a physical address, located at a post office, designed solely to accept and receive mail. Unformatted text.
regionName.FreeFormText	The name of a state or province within a country. Unformatted text.
inTransitQuantity.ProductQuantity	The product quantity of stock that is in-transit between parties. A quantity specifying the number of product units.
inTransitTo.PartnerDescription	The party receiving the product quantity in a product location transfer. The collection of business properties that describe a business partners' identity and their function in a supply chain.
BusinessDescription	**Constraint:** At least one business identifier must be provided: "businessName", "GlobalBusinessIdentifier" or at least one entity in "PartnerBusinessIdentification".
businessName.FreeFormText	The name of a business entity. Unformatted text.
GlobalBusinessIdentifier	A unique business identifier. The DUNS number is specified by RosettaNet.
PartnerBusinessIdentification	The collection of business properties that allow for the proprietary identification of a business entity.
ProprietaryBusinessIdentifier	A unique business identifier assigned and administered by a private authority.

Element	Description
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
ContactInformation	**Constraint:** At least one occurance of "EmailAddress" or "telephoneNumber" is required.
contactName.FreeFormText	Name of the contact person(s) within the organization. Unformatted text.
EmailAddress	Electronic mail address.
facsimileNumber.CommunicationsNumber	The numerical schema designed to achieve contact via facsimile. The electro-technical communication number
telephoneNumber.CommunicationsNumber	The numerical schema designed to achieve contact via telephone. The electro-technical communication number
GlobalPartnerClassificationCode	Specific information based on reference.
PhysicalLocation	**Constraint:** At least one occurance of "GlobalLocationIdentifier", "PartnerLocationIdentifier" or "PhysicalAddress" is required.
GlobalLocationIdentifier	Location uniquely identified by the DUNS +4 number.
PartnerLocationIdentification	The collection of business properties that allow for the proprietary identification of a business location.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
ProprietaryLocationIdentifier	A unique location identifier assigned and administered by a private authority.
PhysicalAddress	**Constraint:** At least one associated element under "PhysicalAddress " is required if "GlobalLocationIdentifier" or "PartnerLocationIdentifier" is not provided.
addressLine1.FreeFormText	The first line of a physical address. Unformatted text.
addressLine2.FreeFormText	The second line of a physical address. Unformatted text.
addressLine3.FreeFormText	The third line of a physical address. Unformatted text.
cityName.FreeFormText	The name of a city. Unformatted text.
GlobalCountryCode	Specific information based on reference.
NationalPostalCode	Code identifying geographic location as specified by a national postal code.
postOfficeBoxIdentifier.FreeFormText	The proprietary identity of a physical address, located at a post office, designed solely to accept and receive mail. Unformatted text.
regionName.FreeFormText	The name of a state or province within a country. Unformatted text.
inventoryLocation.PartnerDescription	The party where the inventory product entry is located. The collection of business properties that describe a business partners' identity and their function in a supply chain.
BusinessDescription	**Constraint:** At least one business identifier must be provided: "businessName", "GlobalBusinessIdentifier" or at least one entity in "PartnerBusinessIdentification".
businessName.FreeFormText	The name of a business entity. Unformatted text.

Element	Description
GlobalBusinessIdentifier	A unique business identifier. The DUNS number is specified by RosettaNet.
PartnerBusinessIdentification	The collection of business properties that allow for the proprietary identification of a business entity.
ProprietaryBusinessIdentifier	A unique business identifier assigned and administered by a private authority.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
ContactInformation	**Constraint:** At least one occurance of "EmailAddress" or "telephoneNumber" is required.
contactName.FreeFormText	Name of the contact person(s) within the organization. Unformatted text.
EmailAddress	Electronic mail address.
facsimileNumber.CommunicationsNumber	The numerical schema designed to achieve contact via facsimile. The electro-technical communication number
telephoneNumber.CommunicationsNumber	The numerical schema designed to achieve contact via telephone. The electro-technical communication number
GlobalPartnerClassificationCode	Specific information based on reference.
PhysicalLocation	**Constraint:** At least one occurance of "GlobalLocation Identifier", "PartnerLocation Identifier" or "PhysicalAddress" is required.
GlobalLocationIdentifier	Location uniquely identified by the DUNS +4 number.
PartnerLocationIdentification	The collection of business properties that allow for the proprietary identification of a business location.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
ProprietaryLocationIdentifier	A unique location identifier assigned and administered by a private authority.
PhysicalAddress	**Constraint:** At least one associated element under "PhysicalAddress " is required if "GlobalLocationIdentifier" or "PartnerLocationIdentifier" is not provided.
addressLine1.FreeFormText	The first line of a physical address. Unformatted text.
addressLine2.FreeFormText	The second line of a physical address. Unformatted text.
addressLine3.FreeFormText	The third line of a physical address. Unformatted text.
cityName.FreeFormText	The name of a city. Unformatted text.
GlobalCountryCode	Specific information based on reference.
NationalPostalCode	Code identifying geographic location as specified by a national postal code.
postOfficeBoxIdentifier.FreeFormText	The proprietary identity of a physical address, located at a post office, designed solely to accept and receive mail. Unformatted text.
regionName.FreeFormText	The name of a state or province within a country. Unformatted text.
inventoryOwner.BusinessDescription	**Constraint:** At least one business identifier must be provided: "businessName","GlobalBusinessIdentifier" or

Element	Description
	at least one entity in "PartnerBusinessIdentification".
businessName.FreeFormText	The name of a business entity. Unformatted text.
GlobalBusinessIdentifier	A unique business identifier. The DUNS number is specified by RosettaNet.
PartnerBusinessIdentification	The collection of business properties that allow for the proprietary identification of a business entity.
ProprietaryBusinessIdentifier	A unique business identifier assigned and administered by a private authority.
ProprietaryDomainIdentifier	A descriptor that is used to categorize an organization or business entity that is in the Proprietary Business Identifier.
ProprietaryIdentifierAuthority	A unique name that identifies an organization or business entity that is responsible for managing one or more lists of identifiers.
InventoryProductQuantity	The collection of business properties that describe the various types of product quantity held in inventory.
GlobalInventoryCode	Specific information based on reference.
InventoryItemIdentification	**Constraint:** At least one occurrence of countryOfOrigin, ProprietaryLotIdentifier, manufactureDate, or SerialNumberIdentification is mandatory. The total number of InventoryItemIdentification occurences must equal the ProductQuantity.
countryOfOrigin.GlobalCountryCode	Country where product originates. Specific information based on reference.
manufactureDate.DateTimeStamp	The date the product was manufactured. This representation is immediately followed by a "Z" to indicate Coordinated Universal Time. Informal format: YYYYMMDDThhmmss
ProprietaryLotIdentifier	A unique identifier representing the manufacturing lot of a Global Product Identifier.
SerialNumberIdentification	The collection of business properties that describe a collection of non-sequential serial numbers.
ProprietarySerialIdentifier	Unique serial identifier assigned to the product.
ProductQuantity	A quantity specifying the number of product units.
ProductIdentification	**Constraint:** One instance of either "Global Product Identifier" or "Partner Product Identification" is mandatory.
GlobalProductIdentifier	Global unique product identifier. RosettaNet has adopted the Global Trade Identification Number (GTIN).
PartnerProductIdentification	The collection of business properties that describe proprietary part information.
GlobalPartnerClassificationCode	Specific information based on reference.
ProprietaryProductIdentifier	An internal identifier used to identify a product.
revisionIdentifier.FreeFormText	Free form text that identifies a revision to a proprietary serial number. Unformatted text.

BIOGRAPHY

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