Cross System Data flow in b2b System Integration:

A case study: customer to Nokia Siemens Networks Purchase Order Data Flow

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It is attempted in this thesis to shed light on the industry wide practice of b2b System Integration and the various issues arising out of it. There are many varieties of ERP system available in the market, and each company has chosen the system that they use, and the customization of the system based of meticulous study of their system requirements and feasibility.

This thesis is a product development theses with a cross system data map of a Purchase Order arriving at the case company, Nokia Siemens Networks, document as a product, preceded by the discussion on of cross-system b2b data flow.

In a scenario, where two companies having different ERP systems have trade or business transactions between them, the issue of system integration arises.

In the first part of this thesis, the concept of system integration is discussed to give an overview of what it is, why is it needed and the processes and steps involved.

The second part of the theses is a product development / case study part. Nokia Siemens Network is a leading network equipment manufacturer in global scale. It has business transactions with business enterprises that use various ranges of different ERP systems with different set-ups and customizations. So it is essential for case company to understand and intercept the customer ERP system messages arriving to its system as (such as purchase order) according to their own ERP point of view.

It is quite common that there are different data fields in two different organizational ERPs that hold exactly same data. So there is a need of a mapping document, which links data fields in customer ERP and case company ERP containing the same data.

Keywords
ERP System integration, Cross system, data mapping, Rosettanet, b2b

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Glossary of terms in alphabetical order

ANSI	American National Standard Institute
AS1	Application Statement 1
AS2	Application Statement 2
ASC	Accredited Standards Committee
B2B	Business to Business
BAPI	Business Application Programming Interface
BPEL	Business Process Execution Language
CCE	Common Commerce Engine
CRM	Customer Relationship Management
cXML	Commerce XML
ebXML	Electronic Business using XML
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
HRMS	Human Resource Management System
IDOC	Intermediate Document
NAIP	NSN Application Integration Platform
NOLS	NSN Online Service Portal
NSN	Nokia Siemens Networks
PIP	Partner Interface Process
PO	Purchase Order
RFQ	Request For Quotation
SCM	Supply Chain Management
SQL	Structured Query Language
UBL	Universal Business Language
UN/EDIFACT	United Nations/Electronic Data Interchange For Administration, Commerce and Transport
VAN	Value Added Network
xCBL	XML Common Business Language
XML	ExTensible Markup Language
MDN	Message Disposition Notification

1 Introduction

In today's technologically driven business environment, most of the enterprises whether big or small, are actively using different kinds of ERP systems for their various business processes and transactions. The area of ERP system deployment can be related to product development and planning, sales process, purchase process, human resources management and so forth. ERP systems give a clear advantage to its users to integrate various functions and activities within the organization.

This has resulted in massive popularity of ERP systems, which in turn has resulted in an array of ERP solutions available in the market.

Some are designed to better suit the needs of huge corporations, some are better tailored for medium scale organizations, while some for small scale enterprises. Each business enterprise chooses its ERP system based on their individual needs, requirements, suitability and various other factors. Additionally, each organization is configuring their ERP system for optimized handling of various processes like management of large deliveries, internal orders and international operations. As in the case company, there are solutions which are used to overcome the differences in process issues between business to business. This effectively means that many organizations in the market have deployed various different ERP solutions, And these differences in ERP systems in various organizations directly means that there is a potential problem of system to system communication when those organizations have trading relations and want to use electronic data transmission from system to system in order to reduce time and eliminate paper ordering and invoicing procedures.

This whole scenario has led to an emergence of a protocol which is commonly known as b2b (business to business) system integration. B2b system integration means integrating two ERP system which belong to two organizations (usually with customer and vendor relationship but also includes bank and business and Logistics Service providers) to facilitate direct electronic transmission of messages and documents like Purchase Order, and invoices.

But just like we discussed earlier, because there are different system in different organizations, there was a need for a standard for the documents and messages that go through different systems. Some organizations, despite having their own message doc-

ument format, deploy an intermediary system which converts the message into a standard format before sending to the receiving party via internet. The receiving party also usually has a similar system which receives the message in standard format and converts into their own internal format.

1.1 Objective

The thesis is written with an objective of developing a mapping document for the use of internal ERP team of an organization. ERP systems receive documents, messages and data which originate in a different system outside of the home environment. The messages are converted into a standard format before being transmitted to the receiving party. Despite all this, it is impossible to rule out the possibility that the same piece of information could be contained in a totally differently named data field in different systems. This usually creates confusion on the part of the system users in the receiving party regarding where a particular piece of information should be entered in their system. So the need of a protocol mapping document, which makes a protocol link between the different fields between different systems, holding the same piece of information arises. Creating such a document and following a Purchase Order originating in a customer company and arriving at Nokia Siemens Networks and going through various stages in Case Company before finally reaching the SAP system is one of the objectives of this thesis. Another objective this thesis will fulfill is to write a literature about b2b system integration in general. The literature will touch on topics of b2b system integration platforms, technologies and commonly used practices.

1.2 Outline

The thesis is made up of two sections. The first one contains the technical specification and the literature research in the field of cross system data flow and the second part contains the development process of the mapping document. The appendix consists of xml documents from different stages of the document flow, and the mapping document produced. The appendix contains confidential information, so it is compiled separately.

1.3 Scope

The area of system integration and b2b integration could easily take a vertical trend and outpace the scope of this literature. To keep things within the boundaries, a limitation has been set to this thesis. The scope of this thesis is to follow the data flow in b2b environment, particularly of a Purchase Order originating in one organization's (customer's) ERP system and reaches the vendors (Nokia Siemens Networks) ERP system via the Electronic Data Interchange intermediaries. The concrete result of the thesis will be:

- A literature on highlighting overview b2b ERP system integration.
- An e-commerce data mapping document
- A visual map of the e-commerce data mapping

The e-commerce data mapping document will be for Purchase orders arriving at the case company SAP via an intermediary system that belongs to the case company.

1.4 Methodology

The thesis is done in 2 parts. The first part contains the research literature about ERP in general, b2b system integration and related platforms. For the first part of the thesis, a combination of theoretical and empirical research is done on the subject matter and is applied towards the report content. Information is acquired from various publications, and prior researches on the field as well as internal documents in the case company. A lack of published books in the subject matter created a difficult situation of focusing of prior research works on the subject matter, but ample online sources and also internal documents available in the case company compensated for this lack. The second part of the thesis (from section 4 onwards) is based on case study research of the systems and technologies in the case company. The appendix of the thesis contains the documents created for the case company.

2 B2b System Integration

2.1 ERP

ERP which is an acronym for *Enterprise Resource Planning* is a term for an organization wide system that centralizes the IT functions of the different units/departments of the Enterprise. In the old times, different units of a company performing various tasks used to have their own software and tools, and moving data and information from one unit to another within the same company was a massive and challenging task. Moreover, it was cumbersome to enter the same information into many different applications throughout the company. This also let to the high probability of data inconsistency as it was not possible to know which unit had updated a single piece of data in their system rendering it inconsistent with the data in other units.

Besides these, it was also very difficult and time consuming to exchange documents and messages between the different units of an organization. These difficulties were hindering the smooth operations and growth of organizations whether they were manufacturing houses or trading houses. All of these problems were creating a strong demand for one system that could handle all the different functions within an organization. These systems went on to be known as Enterprise Resource Planning System, ERP.

ERP systems are integrated software system that allows central storing, sharing, and analysis of Enterprise wise information. But since different departments and units within one enterprise can have totally different operations and functions, these ERPs have different modules which can deal with these various different functions of different units of an organization. But all these functional modules are under the umbrella of a single enterprise wide system and have similar information storing format so the information are portable within different units.

This advantage of having ERP made them popular and many of the organizations adopted ERP systems instead of having different applications for different jobs in various organizational units. ERPs integrated functions within an organization.

As discussed earlier, there are various suppliers of commercial ERPs. The biggest and the most popular ones are discussed in brief. [1]

2.1.1 SAP R/3

SAP R/3 is a very popular ERP system developed by SAP AG founded in 1972 in the small German town of Walldorf. SAP R/3 is the flagship product of the company. The word SAP is an acronym for *Systems, Applications and Products in Data Processing.* After the introduction of SAP R/3, the company has steadily grown to become the leading vendor of ERP solutions.

SAP R/3 is the continuation and the natural evolution of the company's previous system "R/2" which was mainly based on mainframe deployment. With the passage of time and the increase in demand as well as the changing trend and prices in hardware, SAP introduced R/3 to cover a wider variety of hardware and platforms. The R/3 is designed to provide real time access and input to the system. The letter "R" in the system name was meant to represent Real time. SAP R/3 has the following features:

- Application Link Enable (ALE)Technology
- Integration with standard PC applications like Microsoft Excel, Microsoft Word.
- Enhanced Graphical User interface

[2]

2.1.2 Oracle e-Business suite

Oracle e-business suite, also known as Application/Apps or EB-Suite is a collection of ERP, CRM (Customer Relationship Management), and SCM (Supply Chain Management) applications. The system is a collection of application either built by Oracle or acquired by Oracle over time. The system is built around the core of the Oracle Relational Database Management Systems technology. The E-business suite contains several product lines. The main ones are:

- Oracle CRM
- Oracle Financials
- Oracle HRMS
- Oracle Mobile Supply Chain Applications
- Oracle Order Management

- Oracle Procurement

- Oracle Project Portfolio Management

- Oracle Quotes

- Oracle Transportation Management

- Oracle Warehouse Management System

- Oracle Inventory

- Oracle Enterprise Asset Management

Oracle e-business suite is another of the most popular ERP systems deployed in the industry.

[3]

2.1.3 **OpenPro ERP**

OpenPro ERP is developed by OpenPro, a commercial open source software company. Like the other products in the company's portfolio, OpenPro ERP is also Open Source software, which according to the company's claim, make is quicker and cheaper to deploy and gives quicker Return on Investment. OpenPro is a web-based ERP solution and designed for small and medium sized companies. For larger companies, there is a variant of the system known as OpenPro Enterprise ERP.

OpenPro, being built on open architecture, supports a wide variety of industry hardware and operating systems including PC and Mainframe Systems. Besides the hardware, it also supports the most popular SQL databases: MySQL, MSSQL, DB2, and Oracle.

[4]

OpenPro has the following modules:

- Finance

- Supply Chain Distribution

- Manufacturing

- Customer Relationship Management

OpenPro is also compatible with software products like Microsoft Excel and PDF for the purpose of exporting data.

[4]

2.2 B2B

With the problem of information flow and standardization of documents solved within an organization's premises, a new problem slowly started to emerge.

Different companies had adopted ERPs from a range of vendors and customized the ERP system to suit to their needs. It meant in practice that different organizations were streamlining their business processes within their organizations using totally different ERP systems. This created problems when the companies wanted to have the same ease of flow of information not only within their own enterprise, but also with their business partners and trading customers and vendors. It was certainly not possible for all the vendors and customers to come to an agreement to utilize the same ERP system as two parties having trade relationships can be in totally unrelated businesses. To solve this problem, a concept of b2b system integration emerged. B2b is acronym for *business to business*. It is the concept, technology and the standard that allows and facilitates the flow of data and documents from one organization's ERP to another. For example, a purchase order created in a customer organization can reach the vendor's ERP and an Invoice created in a vendor's organization can reach a customers' ERP.

[5]

2.2.1 System integration

System integration refers to, bringing together two different systems to one common platform. In organizations using Enterprise Resource Planning systems, the exchange of information is crucial for business process continuation and success. The exchange of goods and/or services and revenue in return is preceded by important information exchanges. That information can be listed as Purchase Order, order confirmation, invoices etc. Even though this process of has been crucial part of business for a long time, only recently with the increasing use of Information Technology in business processes, they have been being done electronically. And particularly, after the deployment of ERP systems, the need of system integration has raised significantly. This can be attributed to the fact that not all business organizations are using the same ERP solution. Also different make and models have different structures and data handling prac-

tices. But when the need arises of sending a document created in one organization's ERP system and sending it electronically to another organization's ERP, then the difference in the two systems makes it important to have a process of system integration which is referred to as b2b system integration.

The integration of two systems can be of varying degree. In some system integration, the information flow is from system to human, who are intermediary between systems. While in some cases the information flows seamlessly between systems with minimal of no human interference.

[6]

2.3   Why b2b System Integration?

There are several factors that advocate the need to have b2b system integration. The need to have a smooth movement of information from organization to organization can be considered to be the major one. Besides that, we can list the major requirements/benefits of having b2b system integration as:

- Need of real-time data flow between systems
- Streamlined business process
- Increased organizational efficiency
- Maintaining information integrity across multiple systems.
- Ease of development and maintenance

One important point to be noted is that the biggest value of B2B is not in itself, but in the fact that often B2B acts as a catalyst to define and develop better processes. [7] [8] [9 p. 132]

2.4   B2b system integration standards

There are various standards that can be followed to perform b2b information exchange process. The organizations choose the standard based on their requirement and also of their client/vendor/customer's system. Some of the major ones are listed with a brief introduction:

2.4.1 **EDI**

EDI, an acronym for *Electronic Data Interchange*, which is a common name for ANSI EDIfact, is a b2b system integration standard. It is structured transmission of data between organizations by electronic means. It is used to transmit data directly from one system to another or from one computer to another. EDI is comparable to email but substantially different from it. The comparable terms between an EDI document and email are the fact that they are transmitted electronically. But they differ because email allows free format texts to be transmitted electronically between individuals or organizations whereas EDI messages have to have a standard format being transmitted from a sender to a receiver.

The two parties participating in a message or data exchange are called parties in EDI standard.

EDI has some essential elements which can be listed as:

- Electronic Transmission
- Use of structured and formatted messages based on agreed standards
- Fast delivery

EDI electronically replicates the traditional paper based messaging between trading organizations. The data send in messaging format may include Purchase Orders, sales orders invoices, shipment notice and so forth.

The messages are generally transmitted from system to system without human interference. Human interference and handling is intended only for error correction and for special situations. For example, legal requirements do not allow changing or altering the invoices created in SAP in other systems.

The transmission of EDI documents have shifted from non-internet based connections and protocols, to internet based owns, but the original EDI document standards have not changed. The transmission of EDI can be done on a variety of technologies depending on the agreement between the sending and the receiving parties. Most commonly FTP, email, HTTP, AS1 and AS2 are used.

As stated earlier, EDI document electronically replicate traditional paper documents being exchanged between trading organizations, they essentially contain the same information. EDI documents, depending on what message the EDI contains, they could be categorized as any of the following:

- RFQ (request for Quotation)
- Purchase Order
- Purchase Order Acknowledgement
- Shipping Notice
- Receiving Advice
- Invoice

The list is not complete, but it is intended to show the different kind of messages that an EDI document could fall under.

Because of massive popularity, EDI users have, over time, developed many different standards for the documents. Among them, the major ones are:

- UN/EDIFACT –United Nations recommended standard and predominant outside Northern America.
- ANSI ASC X12 – United States standard used in North America
- TRADACOMS – A standard used in the retail business in United Kingdom, now defunct
- ODETTE – an EDI document standard used within the European Automotive Industry.

The different EDI standards state the required information, the optional information and the structure for particular type of document. [9] [10] [7] [11 s. 7]

2.4.2 **VAN**

VAN is an acronym for *Value Added Networks* which are third party intermediate organizations that facilitate the transmissions of e-commerce data between two trading organizations.

VANs job is standard and uniform because of the standardization practices. VANs were essential for e-commerce data communication and the exchange of EDI transactions and documents before the emergence and popularity of World Wide Web and the internet, as there were less possibilities of exchanging data directly among organizations due to lack of standards and technology.

But in the recent time, due to the easy availability of World Wide Web and internet standards and technology, companies have gradually replaced the services of VANs

with the use of internet standards, data transmissions and architecture. This trend has forced the VANs to align with the changing times and focus on other services to ensure their existence. A typical VAN in modern time provides focused services on EDI translations, encryption, secure email and management reporting and other extra specialized services to their clients/customer companies. [10 s. 1] [11 s. 12]

2.4.3 AS1

AS1 as well as AS2 are used to transport EDI data. AS1 is acronym for *Application Statement 1*. In practice it is a set of specifications about the transmission of data in a secure and reliable manner over the common internet. The desired reliability and security is achieved by employing encryption. Some features of AS1 are listed for the purpose of giving a short insight:

- Files send as attachments
- option of signing messages but not mandatory
- option of encryption but not mandatory
- options of asking a MDN (Message Disposition Notification)
    - MDN request can reply either of the following
        - success
        - failed

As common with most types of secure file transfers, parties participating in AS1 file transfers typically need to exchange SSL certificates and specific names of trading partners before the actual transfer of documents akin take place. [12]

2.4.4 AS2

AS2 is the acronym for *Application Statement 2*. It is a more advanced form of AS1 that was just discussed above. In AS2, alongside encryption, digital certificates are also employed for added security. AS2 has most of the features similar to AS1, with additional options for the reply of MDN requests if made. They are

- AS2 w/sync: Return synchronous , means the MDN can be returned to the sender of AS2 message via the same HTTP connection used to send the original message

11

- AS2 w/Async: Return Asynchronous means the return of MDN over different HTTP connection at a later time. This MDN delivery type is chosen if there are large files to be transferred or if the trading partners connection is comparatively slower.
- AS2 w/NO: this option means the receiver of the message chose not to return MDN.[13]

2.4.5 **XML**

XML is acronym form *Extensible Markup Language*. It is a set of rules for encoding documents in machine readable form. EDI documents own standards for data transmission based on XML. This facilitates data and messages transmission in a more easily readable and understandable language for the machines. The most common EDI XML standards are listed with a brief introduction: [14]

2.4.6 **cXML**

cXML or *Commerce XML* is a protocol created with the intention of communication of business documents between procurement applications, e-commerce hubs and suppliers. cXML provides XML schemas for business transaction giving the programs easy possibility of validating the received documents without knowing the format of the documents beforehand.

The current protocol of cXML supports documents for the following

- Setup (company profiles, transactions details)
- original PO
- Change PO
- Delete PO
- Responses to all the above messages

[15]

[16]

```
            <Identity>bigadmin@marketplace.org</Identity>
        </Credential>
    – <Credential domain="AribaNetworkUserId">
            <Identity>admin@acme.com</Identity>
        </Credential>
    </From>
– <To>
    + <Credential domain="DUNS">
    </To>
– <Sender>
    – <!--
            This document has passed through Ariba CSN to the
                        supplier.
        -->
    – <Credential domain="AribaNetworkUserId">
            <Identity>sysadmin@ariba.com</Identity>
            <SharedSecret>abracadabra</SharedSecret>
        </Credential>
        <UserAgent>Ariba CSN 33</UserAgent>
    </Sender>
    </Header>
– <Request deploymentMode="test">
    – <OrderRequest>
        – <OrderRequestHeader orderID="DO1234" orderDate="2000-10-12T18:41:29-08:00" type="new" orderType="regular">
            – <Total>
                    <Money currency="USD">187.60</Money>
                </Total>
            – <ShipTo>
                – <Address>
                        <Name xml:lang="en">Acme</Name>
                    – <PostalAddress name="default">
                            <DeliverTo>Joe Smith</DeliverTo>
                            <DeliverTo>Mailstop M-543</DeliverTo>
                            <Street>123 Anystreet</Street>
                            <City>Sunnyvale</City>
                            <State>CA</State>
                            <PostalCode>90489</PostalCode>
                            <Country isoCountryCode="US">United States</Country>
                        </PostalAddress>
                    </Address>
                </ShipTo>
            – <BillTo>
                – <Address>
                        <Name xml:lang="en">Acme</Name>
                    – <PostalAddress name="default">
                            <Street>123 Anystreet</Street>
                            <City>Sunnyvale</City>
                            <State>CA</State>
                            <PostalCode>90489</PostalCode>
                            <Country isoCountryCode="US">United States</Country>
                        </PostalAddress>
                    </Address>
                </BillTo>
Done
```

Figure 1 a sample Order Request cXML document

2.4.7   **xCBL**

xCBL or XML CBL is the modern version of the original CBL (Common Business Library).CBL was developed by VEO systems as a set of building block with common semantics and syntax to ensure Interoperability among XML applications. CBL consists of information models for generic business concepts including the business description primitives like:

- company

- services

- products

And business forms like:

- catalogs
- Purchase orders
- invoices

(17)

xCBL is based on CBL. xCBL document framework allows the creation of strong, reusable XML documents for global trading. It is a common desire in all of EDI document standards to facilitate easy e-commerce by facilitating standard document flow from business to business. xCBL was also created with the same purpose and it covers a section of the EDI market. [18]

[19]

```xml
<!--      SAMPLE DOCUMENT, NO REAL CUSTOMER DATA      -->

<!DOCTYPE AuctionCreate SYSTEM 'AuctionCreate.dtd'>

<AuctionCreate>
    <AuctionCreateHeader>
        <AuctionCreatePurpose>
            <Purpose>
                <PurposeCoded>Original</PurposeCoded>
            </Purpose>
        </AuctionCreatePurpose>
        <AuctionCreateIssueDate>20001214T10:52:00</AuctionCreateIssueDate>
        <AuctionCreateID>AUCT-78999</AuctionCreateID>
        <FowardAuctionIndicator>true</FowardAuctionIndicator>
        <AuctionValidityDates>
            <ValidityDates>
                <StartDate>20001215T09:00:00</StartDate>
                <EndDate>20010115T09:00:00</EndDate>
            </ValidityDates>
        </AuctionValidityDates>
        <DecisionDate>20010117T09:00:00</DecisionDate>
        <RulesProfile>
            <BidRuleCoded>EnglishForward</BidRuleCoded>
            <WinRuleCoded>HighestBidWins</WinRuleCoded>
        </RulesProfile>
        <AuctionParticipants>
            <InitiatingParty>
                <Party>
                    <PartyID>
                        <Identifier>
                            <Agency>
                                <AgencyCoded>Other</AgencyCoded>
                            </Agency>
                            <Ident>ABB-1010</Ident>
                        </Identifier>
                    </PartyID>
                    <NameAddress>
                        <Name1>ABB Cornerstone Company</Name1>
                        <Street>45 Terrance Blvd.</Street>
                        <Floor>7th</Floor>
                        <Department>Auction Department</Department>
                        <PostalCode>96660</PostalCode>
                        <City>Angelville</City>
                        <Region>
                            <RegionCoded>USCA</RegionCoded>
                        </Region>
                        <Country>
                            <CountryCoded>US</CountryCoded>
                        </Country>
                    </NameAddress>
                    <CorrespondenceLanguage>
                        <Language>
                            <LanguageCoded>en</LanguageCoded>
                        </Language>
                    </CorrespondenceLanguage>
                </Party>
            </InitiatingParty>
            <ListOfAuctionPartners>
                <AuctionPartners>
                    <PartyID>
                        <Identifier>
```

Figure 2 an example of an xCBL document

14

2.4.8 **ebXML**

ebXML or *Electronic Businesses using XML* is another XML standard EDI documentation. It is sponsored by united Nations/CEFACT. It is acronym for Electronic Business using eXtensible markup language. It is a modular suite of specifications that enables enterprises to conduct business over the internet, regardless of their size or geographical location. It was started in 1999 as a United Nations initiative. ebXML has the following features:

- open XML-based standard
- single global electronic market

[20]

2.4.9 **UBL**

UBL is acronym for *Universal Business Language* which is another XML standard for formatting business documents for electronic commerce between parties. It is a library of standard electronic XML business documents. It was developed with the participation of various industry data standard organizations and is maintained by the OASIS committee. UBL, like all other XML based standards of EDI has set of standards and format for various documents that need to be interchanged between trading organizations; in an electronic form. The most common used UBL XML documents are:

- Order
- Simple Order Response
- Detailed Order Response
- order Change
- Order Cancellation
- Dispatch Advice
- Receipt Advice
- Invoice

[21]

2.4.10 **Rosettanet**

Rosettanet is a XML based standard for exchanging information between systems which was developed by a consortium of industries with the same name. The consortium that developed the Rosettanet standard includes makers of computers, consumer and electronics, semiconductors as well as major telecommunications and logistics companies. There are about 500 member organizations in Rosettanet consortium. Rosettanet Standard is an xml based document format which defines the message guidelines and interfaces for business processes.

An overview of information flow from system to system using Rosettanet standard is given in the following diagram:

[9 p. 6]
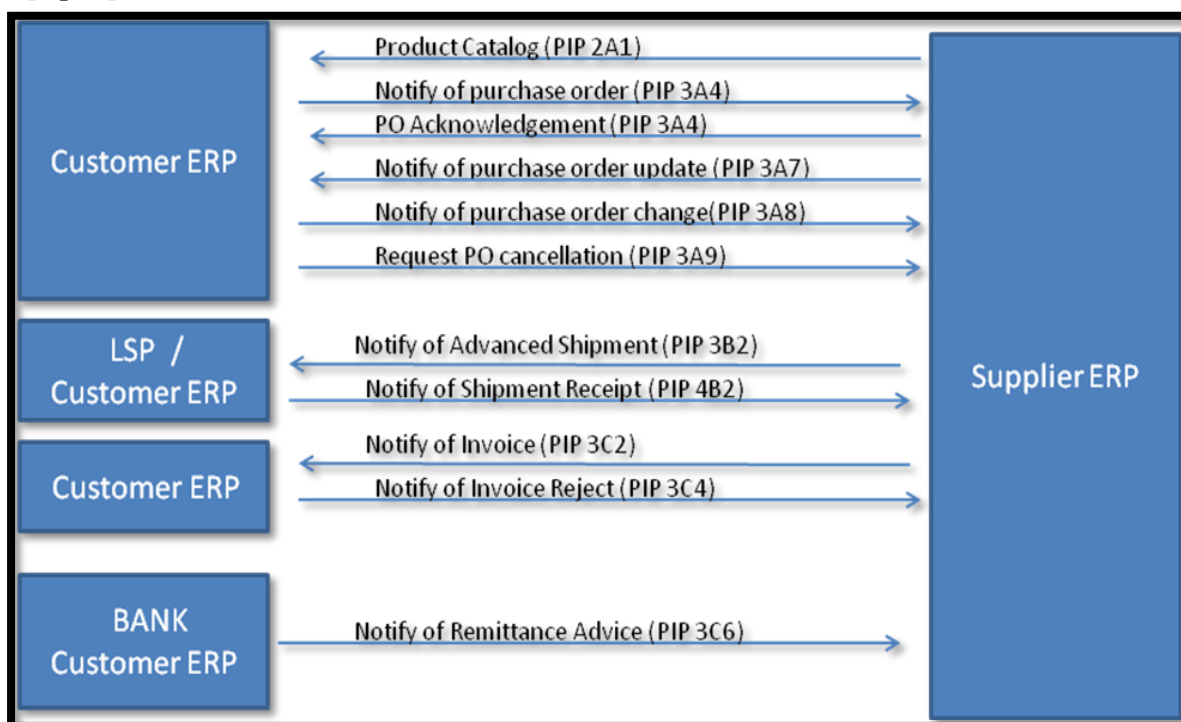
Figure 3 an overview of b2b message flow between customer and supplier in Rosettanet standard

Rosettanet uses PIP document format to send and receive messages. PIP or Partner Interface Processes are a Rosettanet standard which defines business processes between trading partners. They are system to system based XML dialogues. PIP messages have a special numbering system to identify the type of message and the document flow direction. The above motioned figure gives and illustrated the following type of PIP massages along with the direction of their flow:

- 2A1: Product catalog | from supplier to customer

- 3A4: A purchase Order | from customer to supplier

- 3A4: Purchase Order Acknowledgement | from supplier to customer

- 3A7 notify of PO update |from customer to supplier

- 3A8 Purchase Order change | from customer to supplier

- 3B2 notify of advanced shipment | supplier to customer

- 4B2 notify of shipment receipt | customer to supplier

- 3C2 notify of invoice | supplier to customer

- 3C4 notify of invoice reject | customer to supplier

- 3C6 notify of remittance advice | customer to supplier

It is clearly seen that in some cases, two different documents flowing in opposite direction could have the same document type code. [22] [9 p. 6] [23]

2.5   B2b system integration platforms

Organizations have the need to integrate their ERPs to external systems. And the process of integrating a system to another requires a technical platform which provides the communication protocols and the documentation standards.

There are various platforms available to integrate a company's ERP system to an external system. As it is evident from the discussions in previous sections, companies and organizations using ERP systems for business functions and processes generally need to integrate their business processes to either their Customer's or vendor's ERP systems. Since the vendors and customers might most probably be using a differently built ERP that the organization's own, there is a need for an intermediate system which can help and facilitate those two system connect and communicate with each other.   Such an intermediate system which facilitates such functionalities is called a b2b system integration platform.

There are many choices for organizations when deciding to choose an integration platform. The choice usually depends on the company's own ERP system and the partner's ERP system that the company is planning to integrate its system. In this section, two of the most popular integration platforms will be briefly discussed.

2.5.1 Microsoft BizTalk

BizTalk is an integration platform from the software giant Microsoft. It is an integration server designed to provide services like Enterprise Application Integration, Business Process Automation, business to business communication, and business activity monitor. Companies are enabled by BizTalk for the integration and management of business processes for exchanging of documents like purchase orders and invoices between separate applications within an organizations as well as with outer systems. The development of services for BizTalk is done on Microsoft system development environment: Microsoft Visual Studio. It gives the users the ability of transforming document type from one to another by creating transformation maps. For example a XML document can be converted to IDocs which is understood by SAP. This allows integration of SAP system to various other systems. Messages inside BizTalk are done in XML standard. According to the official page of the product on Microsoft website, BizTalk has the following features:

- Use Of Adapters to connect business applications, databases and other technologies
- Business Activity Monitoring
- Unified Administrative console for monitoring deployments and operations of solutions
- Built in EDI functionality supporting EDIFACT
- Support for Rosettanet standard
- Easy integration with other Microsoft products like Microsoft Dynamics CRM, SQL server and SharePoint

[24]

2.5.2 SAP Business Connector

Also known as SAP BC, is an integration Services provided by SAP as a middleware for their product R/3. It runs on WebMethods technology and is primarily used for integration of SAP systems with non-SAP systems. SAP BC uses the internet as a communication platform and XML/HTML as data formats. This allows integration of a wide variety of systems and architecture to SAP.

With the use of this system SAP internal documents like Idoc and BAPI can be quickly converted to XML for sending to external systems while XML documents arriving from external systems can also be quickly converted to SAP document formats of Idoc and BAPI.

SAP BC works by providing an XML layer on top of R/3 so that other application do not need to understand the internal documentation format and standard of R/3 system. This also facilitates in easy and real-time integration of supplier and/or vendor systems and data into the organization's SAP system. The deployment of SAP BC is also relatively quicker than other systems integration platforms as it take only days to implement due to the reuse of existing infrastructure and knowhow. This also makes the deployment relatively cheaper.

Following general features are found in SAP BC:

- Complete R/3 integration
- Web Automation
- XML enabling of SAP solutions
- Flexible and extensible architecture
- comprehensive internet security
- Enhanced development support

[25]

3   B2b data flow: General overview

As discussed in previous sections, there are a variety of standards and platforms to perform b2b electronic commerce. Each organization is choosing the system, platform and standards based on their and their trading partner's business requirements. Regardless of what platform or standard two organizations choose to perform the e-commerce transactions among themselves, the basic core procedure of the process is more or less similar. The following scenario gives a general overview of b2b e-commerce procedure and document exchange based on Rosettanet.
[26]
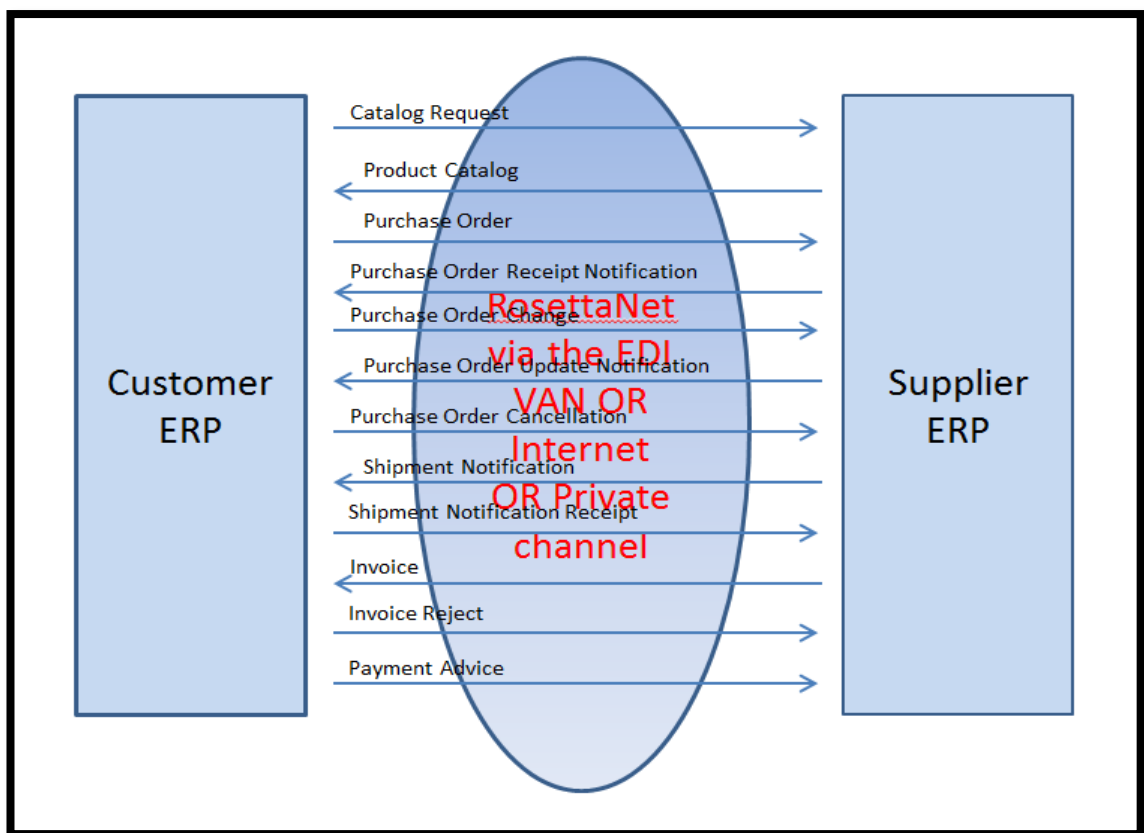
Figure 4 a general overview of messages flow between systems in system integration

The figure above gives a very good overall picture of b2b e commerce document exchanges. In practice, different organizations use different document formats and different types of transmission modes. To add to that, some trading organizations exchange all of the documents outlined in the above figure, some might exchange even more type of documents where as some exchange most of the documents outlined in the above figure. But we can generalize the process and documents involved accord-

ing to the figure. It should also be noted that the transmission of some documents are optional. That effectively means there is a possibility of such documents being transmitted, but it does not necessarily happen and some documents are transmitted only in special circumstances. But most of the documents are standard requirements for a successful e-commerce transaction. In the next section, we will see the proprietary systems and standards used in the case company and the process mentioned in Figure 4 in in the case company scenario.

But before that, let's have a look at two examples of b2b data flow in the following industries.

3.1 Example B2B scenario

Before moving into the real life scenario being implemented in the case company, it is useful to look into a b2b case in general. In section 3 and Figure 4, we looked at the messages flow between a supplier and customer ERP systems via Internet or private connection and using the Rosettanet messaging standard.

To make a clearer case, let's try to look at the customer and supplier case more closely. [27]
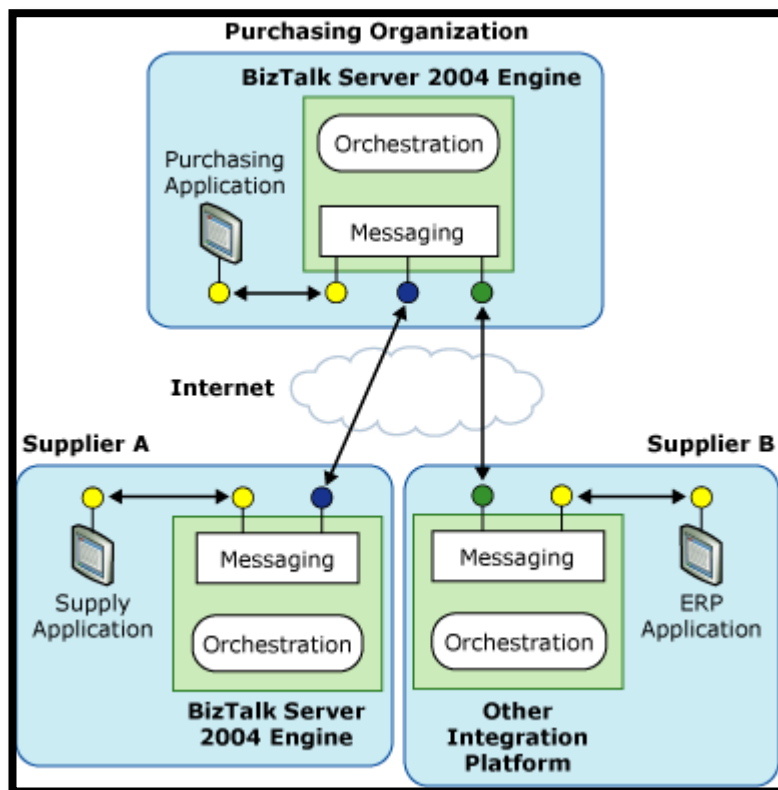
Figure 5 an example b2b scenario of a customer ERP being integrated to 2 suppliers: one uses the same ERP system and the other using a different type

The figure demonstrates how a b2b e-commerce works in between an organization and its trading partner. In case the trading partner happens to use the same system Integration platform as the organization, then the message flow is smooth and less message and format conversion is required while in case the trading partner is using a different integration platform, then the messaging and format have to be converted into to the receiver party's standards.

In the case shown in the figure, supplier A is using the same integration platform as the purchasing organization (BizTalk 2004). This allows the purchasing party's integration platform (BizTalk 2004) to have indirect access to Supplier A's supply application. Whereas in case of Supplier B: Even though the business process used in and by supplier B is same as any other supplier to the purchasing organization, due to having different integration platforms, the integration platform of the supplier B connects to the purchasing organizations integrated platform using an intermediate system like Web service. To have consistency in the business process, the Integration platform of the purchasing organization (BizTalk 2004) exports BPEL (Business Process Execution Language) definition of the business process to the receiving party's integration platform, this then executes its business process according to it.

[27]

3.2   Web Service

Web service, also known as application services, is the services made available by a business's web servers. The target audience is usually web-users and other applications connected to the web. The organizations that provide web service are known as application service providers. The services provided could be as big as the EDI and b2b data transfer services as well as small items like furnishing of stock quote or checking of auction bids for items.

Some of web services are available through centralized servers while some are available through peer-to-peer connection, reducing the need to connect to a server. Some services provided by web service can directly communicate with other services with the exchange of data and procedure with the help of middleware systems.

[28]

3.3   BPEL

BPEL is acronym for *Business Process Execution Language*. It is a standard formed by a consortium consisting of BEA systems, IBM, and Microsoft. BPEL provides an orchestration engine describing the process of internal or external information exchanges.

It is a XML based workflow definition language allowing organizations to describe internal or external business processes connected via web services. These definitions can be exported to trading partners to streamline the business processes.
[29]

3.4   An example case in Retail business

In this example case, we will have a look at a b2b data and document flow in the retail business scenario. The example is derived from the b2b document flow and business process of Coles Supermarkets Australia.

The b2b document flow can be summarized in the following diagram:
[30 s. 4]
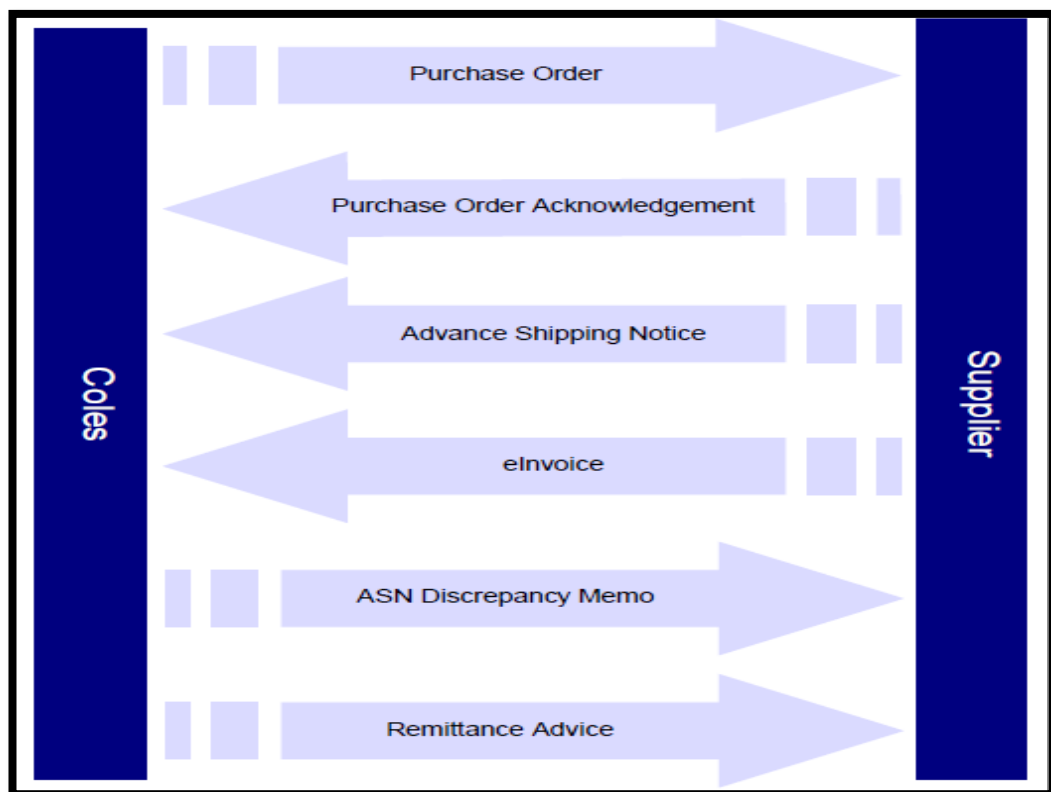
Figure 6: Electronic data flow in Coles PO to Cash

The document messages and the process can be described briefly as:

- Purchase Order (PO)

  The ordering system in use at Coles creates the orders and sends to its distribution centers. The orders are generally created on a regular basis: weekly, bi-weekly or monthly, however the possibility of creating orders as and when required also exists. The purchase order created in Cole's system contains the following information:

  - Sender EDI address
  - Receiver EDI address
  - Purchase Order Number
  - Date of Order
  - Delivery Date
  - Deliver to Location
  - Coles Vendor number
  - Global Trade Item Number
  - Order Quantity
  - Promotion date (where applicable)
  - Order Totals

  Cole system expects the suppliers to frequently check their electronic mailbox to ensure timely receipt of all orders sent. Additionally, in case of an erroneous PO received, the suppliers should immediately communicate with the Coles e-commerce support team and establish a resolution.

- Purchase Order Acknowledgement (POA)

  In Coles B2B procedure, a Purchase Order Acknowledgement is required from the suppliers on the day the PO is received. The POA is required by Coles ordering system to determine the one of following

  - PO can be fulfilled as it is
  - PO can be partially fulfilled OR
  - PO cannot be fulfilled

The Coles system either accepts or rejects the POA based on the compliance of the POA with the business rules defined in the Coles ordering system.

Accepted POA fulfilling PO partially will cause the figures in Coles ordering system change to match that of the POA. This also helps the Coles ordering system to determine more accurate quantities, prices, and delivery times for future order from that particular supplier.

In case of PAO being rejected, the supplier is contacted to resolve the issue with the PAO.

- Advanced Shipping Notice (ASN)

  ASN is an electronic document informing Coles about the delivery of items to fulfill a PO. It is required by Coles that the ASN arrives before the PO items are physically delivered. Coles have regulations that the ASN should accurately detail the items shipped. To ensure this, Coles requires the suppliers system to have the ability to interface the contents of its PO to the suppliers picking system. Similar to the POA, Coles' system can either accept or reject the ASN as well.

  The ASN is accepted if it matches the PO without any exception, and the process can move forward to delivery and payment.

  In the following cases, the ASN fails and is rejected:
  - Missing or Invalid PO number
  - Missing or Invalid delivery location
  - Missing vendor number

- ASN Discrepancy Memo (ADM)

  In case of a mismatch between accepted ASN and the actual delivered goods, an ADM is issued to the supplier. The generation of ADM is done within 24 hours of goods receipt and is sent to the supplier advising of an ADM. The actual ADM is viewable online by the supplier in a partner portal in Coles system.

- eInvoice (eI)

Electronic invoice (eI) is the invoice for PO from Coles. The provision of eI has eliminated the practice of the suppliers sending a paper invoice with the deliveries. Although being a simple concept, there is a rule that requires the eI to mirror a paper invoice in terms of information it provides. The suppliers should follow those rules and guidelines while developing solutions around creating and sending eIs. Similar to the previous documents used in Coles b2b, the eI also needs to be valid. The following criteria are required from an eI for it to be valid:

- an eI should relate to only 1 ASN
- an eI should relate to only 1 PO
- the eI should contain the ASN number
- the item quantity must me greater than zero
- the item quantities must match the item quantities in ASN

- Remittance Advice (RA)

  The Remittance Advice can be in either email or EDI format. The RA details all elements of supplier's remittances like invoices, rebate claims and settlement discounts.

[30 ss. 4-13]

4 Proprietary Systems in Case Company

Besides the above mentioned general public standards, practices and technologies used in EDI transactions, there are a few proprietary standards and technologies that are used and deployed by the case company for its e-commerce processes. A brief overview of those systems and technologies is listed below:

4.1 NAIP

NAIP is acronym for *NSN Application Integration Platform*. This is an integration platform used by the case company for the exchange of xml files over the web. It is based on Webmethods 6, 5. The company's e-commerce order handling system works on NAIP integration for receiving EDI orders arriving from customer ERPs and also relies on NAIP to send back invoice and catalogs EDIs back over NAIP. NAIP is also acting as a data translation layer between the e-commerce order handling system and the SAP system within the case company converting the xml to Idoc for documents sent towards SAP and converting Idoc to xml for documents moving in the opposite direction.
[11 s. 11]

4.2 NOLS

NOLS is an acronym for *NSN Online Service Portal*. It is the extranet platform used by the case company for different e-business services. It is a secure online channel through which customers and partners of the cases company access their e-services. The main purpose and expected benefit of suing the e-services are:

- Efficiency in customer interaction
- improved data accuracy
- speed
- Enhance customer satisfaction

NOLS is a cyberspace, where there are various services available for the user and partner/customer companies. Users and customer/ partner companies are registered for the NOLS and they received customized e-services available to them according to the agreement. The NOLS services available to a particular company depend also on the type and range of products or services that company purchases from the case compa-

ny. NOLS is the first point of contact between the customer/partners and the case Company in the internet environment. It acts as a gateway through which the partners/ customers can access their designated e-services in the case company. The services themselves can be different and independent to NOLS.
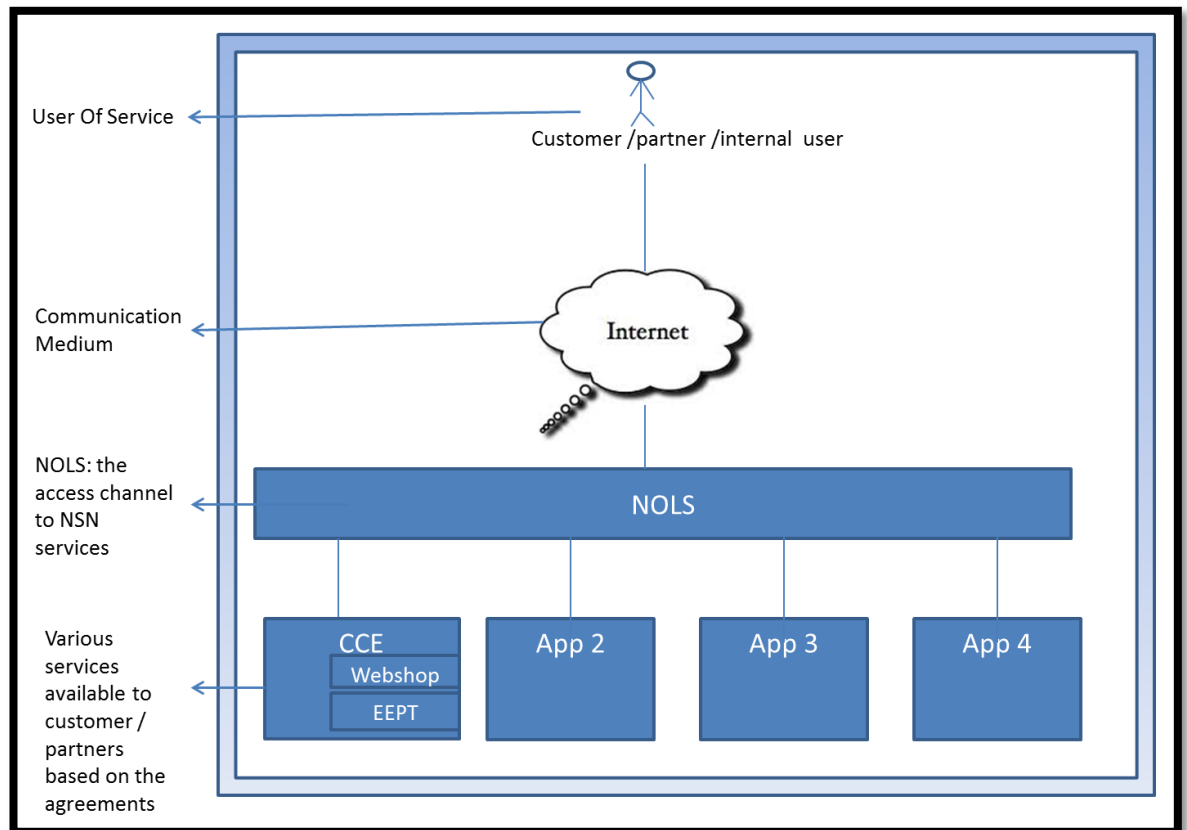
[31]

Figure 7 Structure of systems and tools in case company. The figure shows the position of NOLS in the case company

The figure shows the structural layer of systems in case company. NOLS is the access channel for users in different roles to various tools and services in the case company. User can log on to NOLS and access those services and tools. EEPT is one of the tools accessible through NOLS..

[32]

[33]
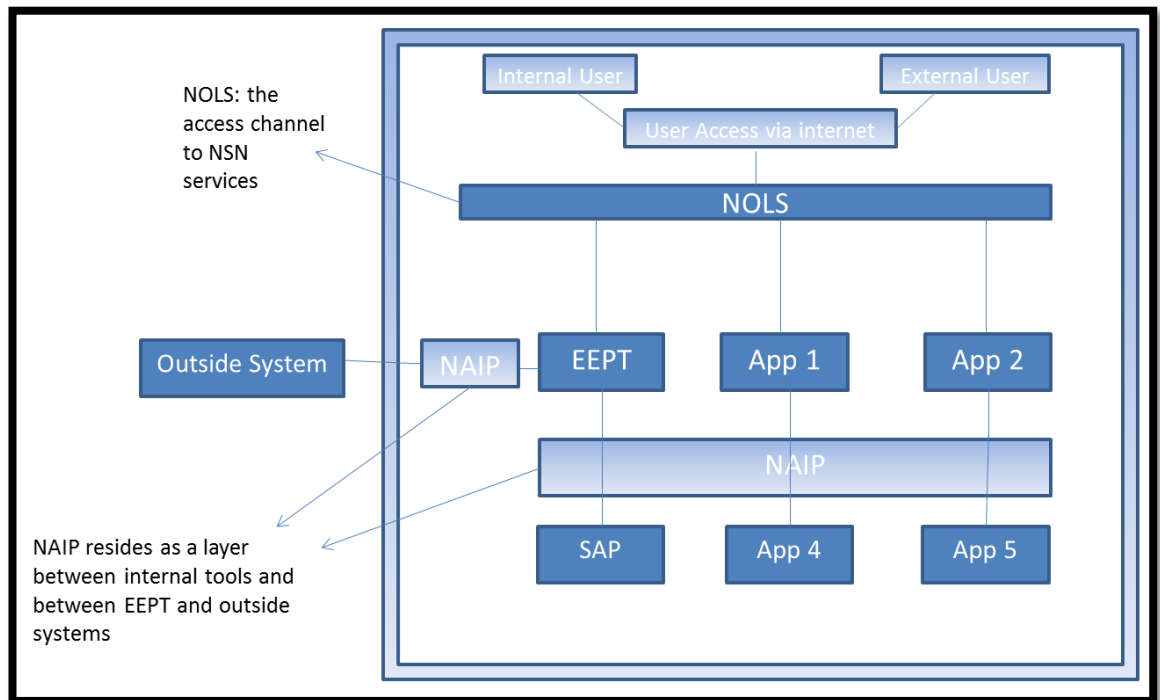
Figure 8 NAIP as a bridge between different internal tools as well as external systems

NAIP resides between the tools and external system or customer system and also between the case company internal systems and tools. Without getting into complicated details, the figure underneath gives an idea of how NAIP resides between services and also between internal and external systems.

[32]

4.3   CCE

CCE, acronym for *Common Commerce Engine*, is the core system of case company's portal based e-commerce solution. CCE is built on BEA weblogic product. It is the platform used to handle e-commerce transactions in the case company. BEA weblogic[1], consists of Java based Enterprise platform products like the following.

- Java EE application server
- Enterprise portal
- Enterprise application integration platform

---

[1] (Since the acquisition of BEA Inc., the parent company of weblogic product by Oracle Corporation in 1998, BEA Weblogic has been renamed as Oracle weblogic)

- transaction server
- telecommunication platform
- http web server

[34] [9 p. 2] [11 s. 11]

4.3.1 **Webshop (Portal Based Solutions)**

The case company has Webshop portal based e-commerce solution which effectively means an e-commerce service accessible by a web browser. The Webshop is one of the services in case company's extranet and is accessible over the internet. Unlike other b2b e-commerce system, the Webshop is not integrated to the customer's backend system. This makes it comparatively easier and cheaper to implement, however, without losing the benefits of e-commerce, primarily orders correctness, fast response times, and availability of information online. The case company has other e-commerce tools as well.

The Webshop provides the following services to the customers:

- Catalog viewing
- ordering
- order tracking
- order confirmation
- order approval
- invoicing

Each customer connected to Webshop has a customized catalog for itself. The Webshop is the customer interface for e-commerce and at the back end; it is connected to the case company SAP for order and delivery processing.

[11 s. 9]

4.3.2 **EEPT**

EEPT is the name of the tool designed to help the automation of system-to-system order-to-invoice processes in the case company's customer interface. This is an internal e-commerce tool used mainly by people in the Sales, logistics and finance.

The main reasons the tools has been designed and implemented re as follows.

- To support processes and activities that are not (currently) supported by SAP R/3. SAP R/3's deployment in the case company has been made in a certain way following strict procedures of implementation. EEPT helps the SAP processes by acting as a repository of arriving orders and order changes before directing them to SAP. During that period of time when the orders are in EEPT, if the customer wishes for making changes to that order, EEPT facilitates to change the order conveniently, which is later forwarded SAP as order or multiple orders depending on if the change required splitting the order. This makes the order handling in SAP side very smooth and less prone to errors.

- To support additional data requirements

- To speed up and ease error handling by identifying and correcting exceptions that are raised from automated order entry or invoicing process, prior to these errors reaching ERP system which are generally strict in process and would require heavy exception processes. [11 s. 9]

The tool has also enabled the case company supply chain to implement customer specific business requirements in order and invoicing process.

Besides having the function of a repository for a short period of time, for POs arriving to the case company, before forwarding them to SAP, EEPT also checks the customer PO for data consistency of the material records and prices entered by the customer against the records stored in case company SAP. EEPT checks the incoming orders for customer view of contracts against case company's sales contracts (a combination of items, orderable quantities and prices), that help to direct the incoming order to the correct sales contract in SAP. EEPT does not allow order creation if the order detail do not match with case company system contract.

Original contracts are saved in SAP side, but for the purpose of verification of items and prices against orders received from customers, the contracts are replicated to EEPT automatically on a regular basis. The same replicated contracts are sent to customers as product catalogs so that the customers enter the items and codes correctly as and the way they are saved in SAP contract. This ensures correctness of data and also reduces PO error handling time.

Moreover, due to the fact that SAP implementation in the case company has been done in a certain way that requires strictness in order entry and handling, the existence

of EEPT makes order processing easier in situations when a customer places or wants to place an order with one single order line with number of same item to be delivered to different sites or at different dates. In such a situation, EEPT receives one order from customer, and splits it into multiple sub-orders based on delivery site and/or delivery dates and sends them as separate orders to be entered and processed in SAP.

 EEPT stores all the documents and transactions related to one original customer Purchase Order, which facilitates the viewing of orders history.

The overview of how EEPT is situated as an intermediary interface between customer and SAP is shown here:

[35 s. 6]
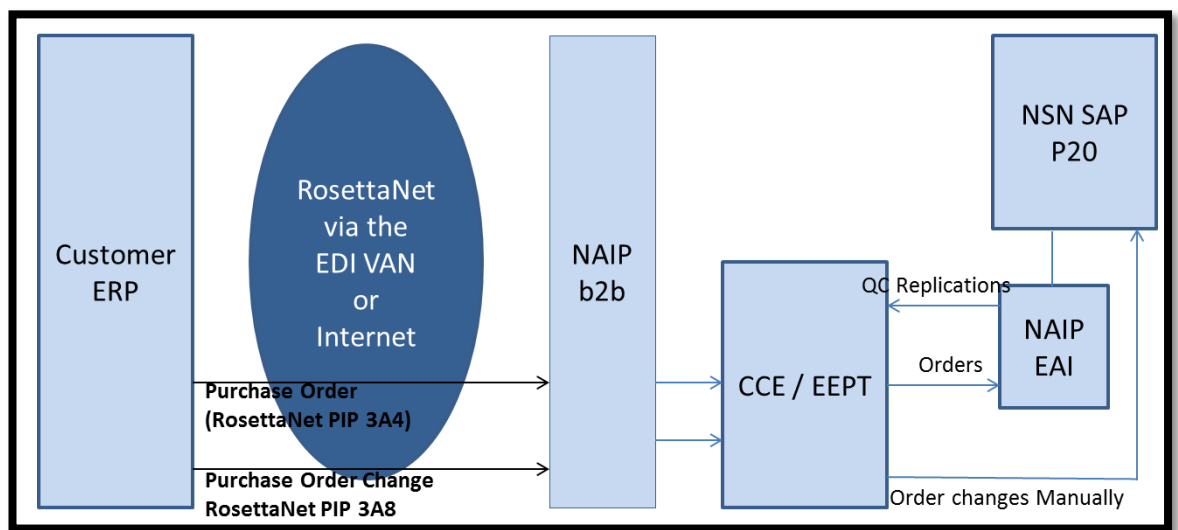
Figure 9 document flow (order and order changes) from customer to case company ERP. The documents in this figure are in Rosetttanet standard but NAIP is capable of handling and translating a wide variety of document and messaging standards to the case company's

 The documents are transferred via either of the following: EDI VAN, Internet. When the documents reach the company, they first go through NAIP, where they are converted from the original format (which could be one of many standards: NAIP can understand many standards) to the company's internal XML standard. From NAIP, the messages and documents go towards either of the many tools including EEPT.

[9 pp. 6-10] [11]

5 Case: Purchase Order Data Flow in case company

5.1 Introduction

This case study is about examining the flow of a Purchase Order as it arrives in the case company. As we have discussed in the background and previous sections, the case company has an integration platform for receiving Purchase Order from its customer to its ERP system electronically. But since a variety of customers use different platforms and systems, and processes between customer to customer can vary considerably, the case company being the supplier has to cope with customer demands. The case company has a separate intermediate system to send and receive order: EEPT which is connected to ERP. As the case company ERP follows strict processes in order handling, EEPT receives the messages, provides functionality and tools to take specific actions like order change and order splitting based on requested delivery date(s), quantity, and delivery address, before finally sending the orders to the ERP. The actual connection between companies and different applications within the company is done with internal connectivity platform called NAIP, which has been discussed earlier. NAIP is capable of handling multiple connectivity and document standards and can change the document format from one to another. All the internal messaging is done on a specific xml format. NAIP translates all external messages to/from this xml standard as needed. The outgoing external messages and the incoming messages from external environment can be in a variety of standard formats, all of which are converted to and from a standard xml format used in the case company.

In the case study, we will have a look at a Purchase Order xml document arriving at NAIP from an external source. NAIP converts that PO message into internal xml format and forwards it to EEPT. In EEPT itself, the S1 xml creates an order called EEPT order. We will review the order in EEPT interface and identify and tag the data elements for the purpose of matching them in the subsequent xml documents and SAP Idoc .The PO after being processed in EEPT environment goes to NAIP in internal xml format, and inside NAIP it is converted to Idoc format to forward it to SAP.

We will be handling the following messages and interfaces:

1. Rosettanet 3A4 (Purchase Order) xml arriving at NAIP
2. S1 xml (NAIP to EEPT)

3. EEPT order

4. S2 xml (EEPT to NAIP)
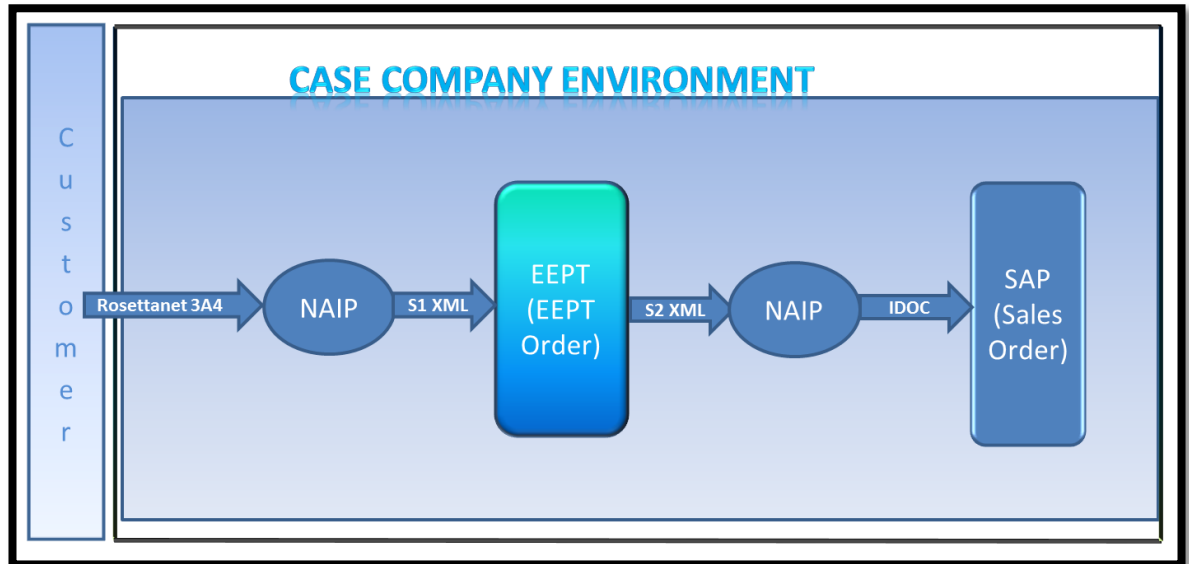
5. Idoc (NAIP to SAP

6. SAP Sales Order

[36]

Figure 10 the movement of external document (Rosettanet 3A4) within different tools and systems in the case company and format conversion along the process. The Purchase Order arrives in NAIP as Rosettanet 3A4 xml document, where it is converted to S1 xml and sends to EEPT. EEPT makes an order based on the S1 xml document and allows the user to change or process the order before it is sent to NAIP again as S2 xml document. The S2 document is converted by NAIP into SAP understandable Idoc and sent towards SAP

The original XML files are available as a part of appendix. The xml messaging documents are mined to find information in different data fields and used to create a mapping sheep in Microsoft Excel format, which is also appended to the appendix. The appendix is a separate document from the thesis report due to reasons of confidentiality.

5.2 System and resources

The process has been carried out in the case company premises using the following tools and resources. NOLS, EEPT and SAP production and test environment required special access rights through log-in.

- A Windows 7 PC
  - Microsoft Excel
  - Microsoft PowerPoint
- NOLS
- EEPT
- SAP test and production modules

This report has been prepared with Microsoft Word 2010. The editing was done on several computers, and to make the process streamlined and to reduce the need to carry around the file in physical storage, the original file was saved in the cloud (Microsoft SkyDrive) and directly edited on the cloud.

5.3 Mapping

The mapping process required extensive study of the xml and Idoc documents mentioned in section 5.1. The original Purchase Order arrives at NAIP in Rosettanet 3A4 xml format. During the process of translating and converting the xml message into internal xml formats as well as other formats, the data items contained in the original message might be placed in a different data field. The xml document from NAIP arrives in EEPT as S1 xml, where it appears to the users in the EEPT interface as an EEPT Order and users can handle the order for changes and other such processes before sending it to SAP via NAIP.

In the EEPT Order interface, the data values contained in the original Rosettanet 3A4 xml will largely be appearing in data fields natively named according to EEPT, increasing the chances of creating confusion on user's side to find a particular piece of information from the PO.

Similarly, as the PO moves from EEPT to SAP, it once again arrives into NAIP in S2 xml format from EEPT, which could contain differently named data fields than S1 xml for holding the same piece of information.

The same PO moving from NAIP to SAP is converted into the document format of SAP: Idoc. Idoc has its own naming conventions regarding data fields as well as the way of structuring data.

When we look at the whole picture, one original document, the customer Purchaser Order arriving at the case company, goes through various platforms and systems, changing the format and structure, then, the need for a data model becomes clear. Images in the following sections show the documents and messages moving from one system to another, changing the documentation standards and formats along the way.

[37]
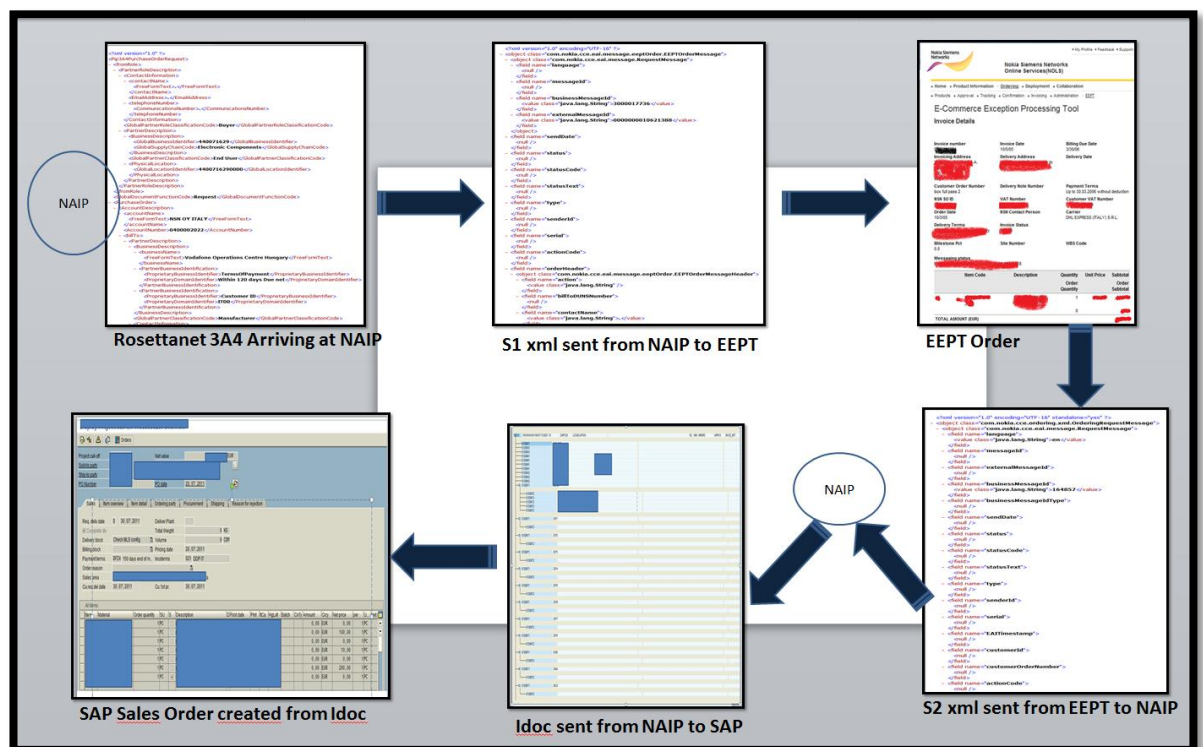
Figure 11 a figure showing the movement of messages and the changes in formats and standards of the original messages.

In following section, we can have a closer look at each of the mentioned documentation standards and message formats one at a time. There are 6 images that will display the Original Purchase Order which arrived in case company's system in Rosettanet 3A4 format, in different documentation standards and formats.

36

[38]

```
-<Pip3A4PurchaseOrderRequest>
 -<fromRole>
   -<PartnerRoleDescription>
     -<ContactInformation>
       -<contactName>
           <FreeFormText>.</FreeFormText>
         </contactName>
         <EmailAddress>.</EmailAddress>
       -<telephoneNumber>
           <CommunicationsNumber>.</CommunicationsNumber>
         </telephoneNumber>
       </ContactInformation>
       <GlobalPartnerRoleClassificationCode>Buyer</GlobalPartnerRoleClassificationCode>
     -<PartnerDescription>
       -<BusinessDescription>
           <GlobalBusinessIdentifier>        </GlobalBusinessIdentifier>
           <GlobalSupplyChainCode>            /GlobalSupplyChainCode>
         </BusinessDescription>
         <GlobalPartnerClassificationCode>End User</GlobalPartnerClassificationCode>
       -<PhysicalLocation>
           <GlobalLocationIdentifier>        /GlobalLocationIdentifier>
         </PhysicalLocation>
       </PartnerDescription>
     </PartnerRoleDescription>
   </fromRole>
   <GlobalDocumentFunctionCode        /GlobalDocumentFunctionCode>
 -<PurchaseOrder>
   -<AccountDescription>
     -<accountName>
         <FreeFormText>        </FreeFormText>
       </accountName>
       <AccountNumber>        /AccountNumber>
     -<billTo>
       -<PartnerDescription>
         -<BusinessDescription>
           -<businessName>
               <FreeFormText>                </FreeFormText>
             </businessName>
           -<PartnerBusinessIdentification>
               <ProprietaryBusinessIdentifier>        </ProprietaryBusinessIdentifier>
               <ProprietaryDomainIdentifier>        </ProprietaryDomainIdentifier>
             </PartnerBusinessIdentification>
```

[2]

Figure 12 image 1 of 6 presenting one PO in different messaging formats: the structure and layout of a Reoettanet 3A4 xml (Purchase Order). This is the original order message arriving at case company's integration platform (NAIP)

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[2] company confidential information have been blanked out

[39]


```xml
-<object class="c[                    ]EEPTOrderMessage">
  -<object class="com.nokia.cce.eai.message.RequestMessage">
    -<field name="language">
        <null/>
    </field>
    -<field name="messageId">
        <null/>
    </field>
    -<field name="businessMessageId">
        <value class="java.lang.String">[        ]</value>
    </field>
    -<field name="externalMessageId">
        <value class="java.lang.String">[        ]</value>
    </field>
  </object>
  -<field name="sendDate">
      <null/>
  </field>
  -<field name="status">
      <null/>
  </field>
  -<field name="statusCode">
      <null/>
  </field>
  -<field name="statusText">
      <null/>
  </field>
  -<field name="type">
      <null/>
  </field>
  -<field name="senderId">
      <null/>
  </field>
  -<field name="serial">
      <null/>
  </field>
  -<field name="actionCode">
      <null/>
  </field>
  -<field name="orderHeader">
    -<object class="com.nokia.cce.eai.message.eeptOrder.EEPTOrderMessageHeader">
      -<field name="action">
          <value class="java.lang.String"/>
      </field>
      -<field name="billToDUNSNumber">
```

3

Figure 13 image 2 of 6 presenting one PO in different messaging formats: the structure and layout of a S1 xml message, which is translated and converted by NAIP from Rosettanet 3A4 to send to EEPT

---

[3] Company confidential information have been blanked out

[40]

Figure 14 image 3 of 6 presenting one PO in different messaging formats standard: EEPT Order in the EEPT order interface, translated from the S1 xml in the previous figure

4

---

[41]

```
- <object class="                    g.xml.OrderingRequestMessage">
  - <object class="com.nokia.cce.eai.message.RequestMessage">
    - <field name="language">
        <value class="java.lang.String         /value>
      </field>
    - <field name="messageId">
        <null/>
      </field>
    - <field name="externalMessageId">
        <null/>
      </field>
    - <field name="businessMessageId">
        <value class="java.lang.String         "></value>
      </field>
    - <field name="businessMessageIdType">
        <null/>
      </field>
    - <field name="sendDate">
        <null/>
      </field>
    - <field name="status">
        <null/>
      </field>
    - <field name="statusCode">
        <null/>
      </field>
    - <field name="statusText">
        <null/>
      </field>
    - <field name="type">
        <null/>
      </field>
    - <field name="senderId">
        <null/>
      </field>
    - <field name="serial">
        <null/>
      </field>
    - <field name="EAITimestamp">
        <null/>
      </field>
    - <field name="customerId">
        <null/>
      </field>
    - <field name="customerOrderNumber">
```

Figure 15 image 4 of 6 presenting one **PO** in different messaging formats: an **S2 xml created in EEPT and sent towards NAIP**

5

---

5 Company confidential information have been blanked out

[42]

Figure 16 image 5 of 6 presenting one PO in different messaging formats: Idoc translated by NAIP from S2 in the previous image and sent towards SAP

[43]

Figure 17 image 6 of 6 presenting one PO in different messaging formats: A SAP Sales Order created from the Idoc received from NAIP

In the previous section and images, one original Purchase Order message was seen in different formats and standards as well as in different interfaces in different tools. For a user to determine a particular piece of information from a message format in another format of the same message is cumbersome. Moreover, many times, due to practicality, data elements from different fields of one messaging format are concatenated in one data field in another messaging standard Hence a document mapping the different data fields of these different document standards which hold a particular data is important. Additional to the mapping document, a visual guide pointing at the same data item in different documents and interfaces is also needed for the benefit and convenience of non-technical users. Both of those items have been incorporated into the classified appendix of this thesis.

5.3.1 **Procedure**

The mapping document was created in a step by step fashion. The whole procedure can broadly be divided into two stages:

Preparatory and data collection stage

- **Step 1**: to go through the original Rosettanet 3A4 xml documentation and identify and understand all the fields and values contained in those fields.

- **Step 2**: to go through S1 xml documentation that arrives at EEPT and identify and make a connection with the data elements selected in step 1.

- **Step 3:** an EEPT order was analyzed. The EEPT tool makes an order out of the S1 xml document arriving into it. So the data elements contained in the S1 document were searched for in the EEPT order interface and a logical connection made between the same pieces of information.

- **Step 4:** S2 XML document created in EEPT and sent towards NAIP was analyzed to find the relevant data elements in EEPT order and to establish a logical connection**.**

- **Step 5**: the Idoc document that has been created by NAIP based on the S2 XML arriving from EEPT was analyzed to find data elements. A logical connection between Idoc data fields and S2 data fields made based on the data items found in both documents.

- **Step 6**: The final step in the preparatory and data collection procedure was to analyze the Sales Order in SAP, which was create based on the Idoc arriving to SAP from NAIP. Once again, the data elements and items contained in the SAP Sales Order were identified and logical link made with the same items in Idoc document.

Document creation stage

The second stage of the procedure was to create documents from the analysis and the data collected from the previous stage. The case company's logistics team was in a need of a complete and up-to-date document that shows the mapping of data items in the above mentioned different document formats. Additionally, material to be used as a part of training new users as well as a troubleshooting reference was also needed. The most feasible was to create a sheet in Microsoft Excel spreadsheet program showing the different data fields in different documents concurrently while establishing a link between them based on the data item they contain.

As for non-technical users in the case company, one additional document was created, which is now called a visual map. The visual map is a data mapping document which excludes the html files and only focuses on the stages where the document is visible to a user under some Graphical user interface. This includes the EEPT order interface, the Idoc interface and the SAP Sales Order interface. The Visual map was created by taking screenshots of live Orders in different interfaces and marking the data fields and items in them with numbers. The EEPT order was used as the base, and the same items were traced and identified and tagged in Idoc interface and SAP Sales Order interface with the numbering that was given in the EEPT order. This way, the screenshots of the order in 3 different interfaces with the data items tagged and numbered formed the first part of the visual map.

Second part of the visual map contains one data field at a time, highlighted in the three different interfaces and also shedding lights on those items that are not transferred from one system to another, but created in one of the following systems.

5.4 Product

The products of the procedure are:

- Data mapping sheet: An Excel document containing the data fields in different document formats and interfaces, mapped with each other based on the data item contained within them.
- A visual map: a word document created by using a collection of system screenshots, showing the different data items highlighted and tagged with numbers and mapped with a data field in another system of format containing the same data.

6 Summary and conclusion

6.1 Summary

The intended objective of this thesis project was to conduct a research on B2B system integration and write a report on it, and also to create mapping document and a visual map based on b2b purchase order flow. The mapping document and the visual map were done for and in the case Company as a part of regular job assignment during a period of 3 months traineeship which lasted from the beginning of July until the end of September 2011. The mapping document and the visual map, both are based on a purchase order arriving to the case company's b2b integration platform and moving from there on to different order handling and processing applications and systems within the case company. The document format and the messaging standards are converted and translated into different formats as the original purchase order message send by the customer is received, processed and forwarded by different tools and platforms within the case company. The mapping document created in the project establishes a logical link between the data items in the purchase order document in different format, as converted and translated by different tools in the case company. The result is a sheet in Microsoft Excel file type, showing the various data fields in the documents translated from the original purchase order and containing the same data item in them.

The visual map however, having the purpose of serving non-technical users, has a more visual feel than the mapping document. The visual map displays the data items contained in the original purchase order in 3 different User interfaces used in the Case company for order processing and handling: EEPT, Idoc and SAP. Similar to the mapping document, the visual map also has a logical link established between the data fields in the 3 different interfaces but containing the same data element.
 Both the mapping sheet and the visual map were created as a part of the thesis project which the other part is a literary research on b2b system integration technologies, platforms and processes.

6.2 Conclusion

This thesis project has been of high value for my understanding of the process and procedure of b2b system integration, b2b-ecommerce, and also the xml documentation standards and processes. My understanding of the subject has been broadened considerably.

I joined the case company as a summer trainee to work for a period of 3 months, during the summer of 2011 and had the opportunity to work in a highly professional and expert team dealing with sell process excellence in the case company's b2b e-commerce.

During the traineeship, I was given an assignment to create a mapping document which would enable the case company's logistics team to easily trace data items located in different documentation format and standard, but which actually contains the same message. As we have discussed in the previous section of this documents, the messaging standards and the conversion of documents form one format and standard to another can possibly create confusion among the logistic team, there was a need for a complete and up to date mapping document. A document which would contain all the data fields in different documentation standards and a logical link established with data fields from other documentation standards containing the same piece of information of data item.

Additionally, I also got an assignment for creating a visual map for non-technical users. A visual map would be a training document made from screenshots of messages in different interface with the data fields tagged with numbers and linked with data fields of the message containing the same information but in different interface.

The creation of those two items required extensive study of various formats of XML documents, Idoc document, and also a study of the SAP and EEPT order interface. This was a big opportunity for me to broaden my knowledge about b2b e-commerce and system integration and also a potential opportunity to write a thesis on the task that I was assigned in the case company.

With the permission from the team, I was allowed to write a thesis on the task and received extensive support and help in the form of technical information, guidance and use of resources.

These information and knowledge have helped me deepen my knowledge to a great extent and I look forward to use this knowledge and understanding achieved to develop my future career and continue to gather further knowledge and skills in the field of b2b e-commerce and system integration as well.

And in the end, I want to thank the e-commerce team in Nokia Siemens Networks, especially, Tuomo Hannula, Veli-Pekka Somila, Cliff Hu, Simo-Jukka Kalliokoski, and Nigel Harrison for the support and help as well as providing this golden opportunity to write a thesis in this exciting subject matter

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Appendices

Appendix 1: Data mapping document

Full document Available as a separate confidential appendix

Appendix 2: Visual Map
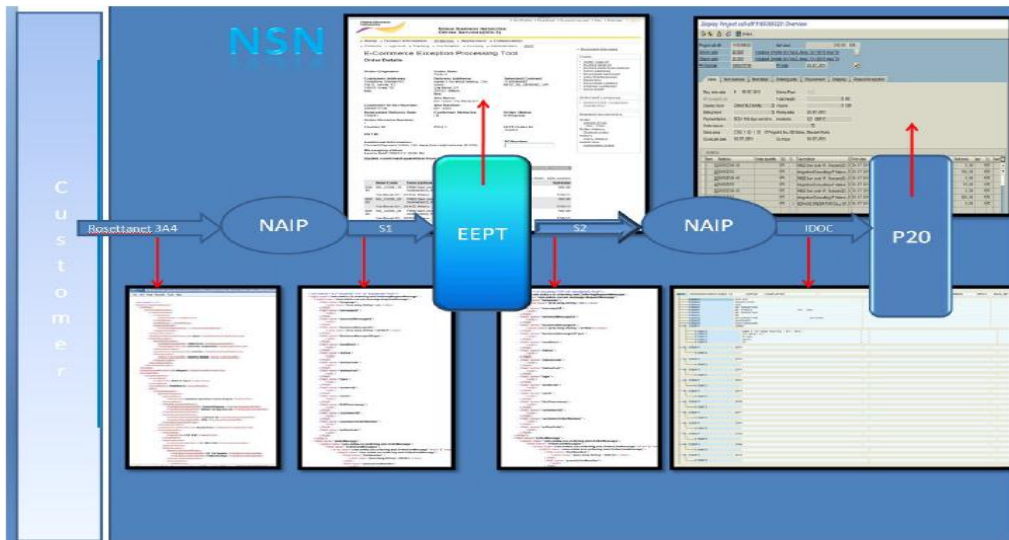
Purchase Order flow Visual Guide

Full Documents Available as a separate confidential appendix