papiNet

Global Transaction Standards for the Paper Industry

Implementation Guide

October 2003

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Sponsoring Organisations

papiNet G.I.E.

papiNet started as a project within the Publishing part of the paper industry. A number of major paper suppliers, large German publishers and printers worked together to create a common standard for electronic business transactions. Soon there was a requirement to develop supporting software for handling the transactions via the Internet. This work turned out so well, that it was decided to enlarge the pilot project to encompass other parts of the industry. papiNet G.I.E. currently has 25 suppliers and wide cooperation with customers within the industry.

IDEAlliance

IDEAlliance is the leading global membership organisation for advancing the processes of information interoperability and dissemination of knowledge. IDEAlliance accomplishes this by engaging in and supporting the creation and adoption of globally recognised standards for information definition and exchange. Over the last 15 years, IDEAlliance's B2B Standards Committee has been the recognized e-business and Electronic Data Interchange (EDI) standards development body in the North American paper, print, and publishing industry. More information about the IDEAlliance can be found at http://www.idealliance.org/.

American Forest & Paper Association

The American Forest & Paper Association (AF&PA) is the national trade association in the United States of the forest, paper, and wood products industry. AF&PA members include manufacturers of over 80 percent of the paper, wood and forest products produced in the United States. AF&PA acts as the clearinghouse for statistical information, as the leading force in technical, regulatory and policy issues, and as the national voice for the forestry, wood, and paper industries. More information about the AF&PA can be found at http://www.afandpa.org/.

papiNet Protocols

This section discusses the components of the papiNet documentation and the protocols associated with supporting them.

How to Suggest Improvements to the Standard

Improvements and issues can be reported through the papiNet.org web site at http://www.papinet.org/support.asp. Technical support, as it relates to interpreting and implementing the standard, is also available.

Version and Release Management

Versioning of the documents that make up the papiNet Standard is used to track updates to the papiNet standard. Versions are used to communicate significant changes or restructure of existing messages. Version 1.00, July 2001, was the first production version. Version 2.00, July 2002, represents the migration to XML Schema.

Releases are updates that do not alter the way that existing messages are processed. It is the goal that two trading partners at the same version but different releases would be able to communicate transparently with each other.

New messages may be introduced with either a version or with a release. As long as the new message does not impact existing messages it can be included with a release of the standard.

The entire suite of papiNet messages is included with a version or with a release. Work on the previous version or release is discontinued once the new release is published. Archives of previous releases are maintained at www.papiNet.org.

The naming convention used in files to communicate the particular version is VnnRnn where Vnn represents the version number and Rnn represents the release number. Version 1.00 would be communicated as V1R00. DTD and Schema files are named using the following Convention:

MessageNameVnnRnn.dtd or MessageNameVnnRnn.xsd where MessageName equals the XML root element of the message.

The papiNet Standard is comprised of a variety of pieces (printed documentation, Schema, use cases, implementation guide, stylesheets, and the business process). The same naming convention applies to all of them.

Examples:

Purchase Order	PurchaseOrderV1R10.xsd
papiNet Common Definitions	papiNetCommonDefsV1R10.xsd
papiNet Standard	PapiNetStandardV1R10.pdf

It is papiNet's policy not to create more than two releases in any give year. This policy assures stability within the industry and promotes confident use of the

standard. Our policy on version frequency is to minimize the number of them. At this point in time we do not have a timeframe for the next version (3.0) as there are no technological developments (like Schema) that would seem to require a massive change. We will continue to publish new releases to papiNet to support additional market segments, additional message development, and to correct problems.

We encourage rapid communication of suggestions to papiNet.org so that they can be included in maintenance releases (maximum twice yearly). Between releases of the papiNet standard it may be necessary for trading partners to implement temporary extensions to the standard. papiNet.org can provide you with help on the management of these overlays.

Introduction to the Implementation Guide

What is papiNet

papiNet™ is an XML-based transaction standard for the Paper & Forest Products Industry and its Business Partners for electronic communication of business transaction information between information systems.

More information on papiNet, including organisation, the standards documentation mentioned in this guide, Segment Implementation Groups, and news can be found at www.papinet.org.

Goal of the Implementation Guide

Entering into a papiNet system-to-system implementation project for the first time is a challenge for any organisation. There are potential pitfalls in any implementation project, but through commitment, careful planning and good project management these can be avoided.

The purpose of this Implementation Guide is to help companies avoid the pitfalls and drive down cost and time required for a papiNet implementation. This guide will assist implementers by identifying the issues, best practices, and potential risks of an implementation project.

Intended Audience

The primary audience of this Implementation Guide is companies who are considering a system-to-system papiNet implementation. The guide is recommended reading to anyone participating in such an implementation project, for example:

- Company management, the business development department, and users who participate in a project taking a business view on the implementation.
- IT personnel who are responsible for maintenance and design of the IT systems of participating companies.
- The project management team for the papiNet project.

Implementation Approach

There are two basic ways to approach any implementation:

- In the "Big Bang" the entire system is created before starting to use the system.
  - From a papiNet standpoint the big bang approach would be to implement every papiNet message for a given trading partner.
- In an incremental implementation the minimal set of trading partners and messages are selected for a first implementation. The implementation is later amended to include additional partners and messages.
  - From a papiNet standpoint the incremental approach would be to implement key messages for a given trading partner.

- ✧ After the initial messages have been successfully implemented new messages and trading partners are added. Additionally, changes to already implemented messages can be made usually for business reasons. For instance, to support additional information communicated in the message.

We strongly recommend the incremental implementation route as a smaller implementation means less risk, due to fewer parties and less work involved.

When selecting the business case to be implemented one of the main criteria is where you can achieve a quick Return On Investment (ROI). For example, implementing papiNet for order and order confirmation in a business relationship where a lot of transactions (orders and order confirmation) are exchanged.

papiNet Project Drivers

Entering into a papiNet integration should be a strategic decision, where the mutual goal for a company and its business partners is to become more efficient and to drive cost out of the paper supply chain.

The benefits that can be achieved from an implementation are two-folded:

Direct benefits
• Reduced manual work and administrative cost because information is entered once into one system and automatically updated to others. • Information is more accurate because the risk of erroneous information is minimised, as there is no need for manual re-entry of information into other systems. • Timely access to necessary information. When data is changed in the source system it can be synchronized to other information systems. • Transparency of information between business partners.
Additional benefits
Because of the direct benefits and depending on the business case implemented the company can achieve additional benefits, such as: • People responsible for manually entering data into systems can be freed to do more quality work. • Enable efficient planning and usage of personnel, equipment, and storage space, when the company knows when deliveries are arriving and what they include. • Reduced inventory through visibility in the supply chain, where business partners share inventory and planning information to enable just-in-time deliveries. • Reduced chance of incurrent inventory through better visibility in the supply chain.

However, before a company together with its business partners can achieve the additional benefits, they must be prepared to critically analyse their operations and invest time and money to make changes to areas in the supply chain where they both can benefit by becoming more efficient through papiNet usage.

Document Structure

This Implementation Guide will take you through the project phases of a papiNet implementation. The project phases are:

Preliminary Study	Define the business case and investigate how papiNet can help the business partners become more efficient. The end result of this phase will be a (rough) description of the required changes to existing business processes[1] and information systems, together with a preliminary budget and timetable for the project.
Go ahead decision	
Planning	Define how the business partners in the business case will implement papiNet and what changes are required to the existing business processes and information systems. The end result of this phase will be a detailed description of the required changes to existing business processes and information systems, together with a budget and timetable for the project.
Go ahead decision	
Realisation	Implement the required changes to IT systems and create a plan for the test phase and for the transition period to live usage of the changes, e.g. training of users.
Prepare testing	
Testing	Make sure that everything works as designed, i.e. verification of the design
Evaluate test results and adapt where necessary, either via re-design or realisation before going live	
Go-live	Start live use of papiNet implementation and the new business processes including new information flows using papiNet messages between information systems.

[1] The term 'business process' is used to describe the tasks, responsibilities, and information flow needed to complete a transaction or a set of transactions.

This Implementation Guide describes the main tasks that have to be completed in each of the project phases, what kind of skills are required, and what tools and best practices have been used in the papiNet community.

An integration project involves several parties, often from different companies. It is a big challenge to keep the project to the planned timetable and to stay within the agreed upon budget. Controlling these factors will determine how successful the project is in achieving the intended results. Amendments to the project scope and timetable have to be managed in a strictly controlled way to ensure that all parties involved in the project are aware of any changes.

This Implementation Guide assumes that the reader is familiar with the business scenarios the papiNet standard supports. Recommended first reading in this area is the document "Overview of the Standard" published as a part of the papiNet documentation and available at http://www.papinet.org/downloads.asp. Appendix A - Available papiNet Documentation contains a listing of the other types of information available at the papiNet website.

We also assume that the reader has some project work knowledge. This Guide describes the special characteristics of a papiNet implementation project where several parties from several organisations participate in the project. Commitment from all participants and project management is essential to guarantee a successful implementation.

Last, but not least, it is essential that the implementation project has access to expert knowledge of the business practices and information systems involved in the planned implementation.

Intended Usage

This Implementation Guide can be used as road map to guide companies through the project tasks in a successful papiNet implementation. Additionally the guide describes the technical building blocks of a papiNet implementation.

Based on experience the three main risks of any system-to-system integration project are:

- Lack of experience can be overcome by a structured approach to an implementation project, by following best practices and using templates.
- Complexity of the back-end integration to ERP systems. The solution must support connections with trading partners using different versions of the standard or requiring different subsets2 of the same version. This cost factor can be minimised by following best practices and taking this aspect into account in the system design already in the first implementation.

[2] A subset refers to how two partners have defined the way papiNet messages and their information contents are used in a papiNet implementation.

- Differences in implementations cannot be wholly prevented since the papiNet standard is designed to cover a variety of business scenarios and different paper industry segments. Segment Implementation Groups (SIG) consisting of main players within a papiNet industry segment (e.g. publishing papers, fine papers, packaging, pulp, and books) have created implementation templates to minimise ambiguities and aid implementation.

Preliminary Study Phase

Introduction

It is essential that the implementation project gets support and commitment from all parties of the companies participating in the implementation. Without this support and commitment the risk is that the anticipated benefits will not be achieved. It is also strongly recommended that the business side of the company lead the project with strong support from the IT organisation.

Preliminary Study Tasks

The tasks associated with Preliminary Study Phase relate to developing the business case for implementing papiNet.

- Determine the trading partners that you want to communicate with
- Define the business case
- Determine the implementation style

In the following sections we will discuss the aspects of the preliminary study and point you to locations where you can obtain additional information.

Determine the Trading Partners With Whom You Want to Communicate

Regardless of whether you are initiating a papiNet implementation project or are being invited to participate in one you will want to identify the potential trading partners for XML message communication and those with whom you can share the papiNet messages. After you determine the potential trading partners you will want to select a couple with whom you want to perform the initial testing. If you have been invited to participate in a papiNet implementation then you already have determined at least one trading partner with whom you are going to test! Refer to the Appendixes for information about tracking your implementation.

Define the Business Case

The preliminary study should roughly define the business case and how papiNet messages will be used in the implementation and has to be detailed enough so that a preliminary budget and timetable can be created.

The amount of work that has to be done and how comprehensive the preliminary study documentation is depends on the magnitude of change to current business operations, e.g. there is a big difference between automating a manual order entry process compared to moving to automatic stock replenishment based on inventory situation and forecasting.

When defining the business cases it is recommended that both current and future business processes are described to ease comparison of the two and to highlight the changes that will be introduced to operational work.

It is important to get a good understanding of the readiness of the companies involved in the implementation, to evaluate what kind of training is required and to define whether changes to operational responsibilities or company organisations are needed.

Define ROI Targets

The preliminary study should also include preliminary ROI targets for the implementation. That is, what kind of benefits and cost savings are expected. The cost of the current manual process should be analysed as well as the potential savings (ROI targets). The ROI calculations should also take into account the consequences if the decision after the preliminary study results in a "no go".

Depending on the business case there is a difference in the benefits that can be achieved. For instance, there are differences if suppliers and customers are:

- Automating a manual order process bringing benefits to the supplier who has to enter less data to his system; versus,
- Automating a delivery process where customers achieve benefits from receiving the delivery and invoice information enabling them to improve tracking of stocks and creating the possibility to automate invoice reconciliation, by comparing received invoices against deliveries.

See Appendix B - ROI Calculation for a model how to describe ROI targets.

Determine the Implementation Style

One of the first big questions to be answered is how to approach the implementation, for example:

- a big project completing the whole implementation at once ("Big Bang")
- an incremental approach of an initial small implementation and build on that.

We recommend that you take the incremental route as you will end up with a smaller, more manageable implementation resulting in a smaller workload, fewer partners to deal with, and reduced risk. This means that your aim is to find out the minimal work you have to do to complete the first implementation and gradually build on that.

Analysing the number of manual transactions, the required workload, and the error rate of these transactions is a good way to find areas to investigate as potential scenarios for a papiNet implementation that has a large payback.

While it is usually easier to automate an existing manual business process than to take the approach of dramatically re-engineering, the potential for larger benefits lies in carefully looking at the business process with your partners for possibilities to improve efficiency by re-engineering the process. Using papiNet as the enabler will make the process easier to sell.

papiNet provides support for the entire supply chain but you do not have to implement papiNet across your entire supply chain, at once. By implementing segments of your supply chain both parties in the transaction can receive benefits. Examples of message pairings that provide supply chain benefits are:

- Purchase Order and Order Confirmation
- Delivery Message, Goods Receipt, and Invoice
- Usage, Inventory, and Invoice

Define Required Changes to Existing IT Systems

From an IT perspective, an initial system design should be created, highlighting the changes that have to be implemented to the existing information systems.

Depending on how "integration ready" the existing information systems infrastructure is it might be necessary to also determine what kind of integration software has to be introduced; for example, mapping and communication software. See Appendix C - Infrastructure Building Blocks for a description of the building blocks recommended in a papiNet implementation, Appendix H – Mapping Principles for a discussion of code mapping, and Appendix I – Communications Software Components.

Define Preliminary Budget and Implementation Timetable

Create a preliminary project plan for the whole implementation, including all the subsequent phases. The project plan should outline the task list, workload estimate, resource requirements, timetable, budget, risk analysis, and communication plan.

At this stage the project plan for the planning phase has to be more detailed than the subsequent phases. After the planning phase is completed the project plan for the next phases will be revisited.

Please see Appendix D - Project Checklist for a checklist of tasks that have to be completed and Appendix E – Risk Management for information on ensuring success.

Skills Required

It is essential that the preliminary study phase has access to very good knowledge about the existing business practices and information systems that will be included in the planned implementation.

As a part of the Preliminary Study phase it is important to become familiar with the papiNet message documentation for the messages intended for implementation[3], including the business scenario descriptions. The documented

[3] The papiNet message documentation can be downloaded at www.papinet.org/downloads

papiNet use cases present practical implementation scenarios together with message examples.

You should also investigate whether the Segment Implementation Group (SIG)[4] for your particular market segment has already created a template for the intended business case or whether they can help to create the papiNet template for a new one.

Integration introduces the need to use IT systems specially designed to perform specific tasks in the communication of papiNet messages between the systems that will be integrated and also to handle the task as an interface towards the ERP system.

Best Practices

- Select clear business cases.
- Make sure you have commitment from all involved parties, at the highest level possible in their organisation.
- Use the incremental implementation model.
- Determine the minimum amount of work you have to do to for your first papiNet implementation and build on that.
- Become familiar with what business scenarios the papiNet Segment Implementation Groups have defined templates for and find out whether they can help you with your scenario.

Go Ahead Decision

Based on the findings in the preliminary study a decision to go ahead with the implementation or not is done.

[4] For a complete list of existing SIGs and their contact information visit www.papinet.org

Planning Phase

Introduction

The goal of the Planning Phase is to use the results of the Preliminary Study and enhance them to describe in detail the papiNet implementation, defining the least amount of work needed to complete the implementation.

Because integration projects involve at least two parties, which very often are two separate companies, it is imperative that the results of the planning phase very clearly define the target solution. The solution includes the business process, how the information systems will be integrated, a detailed definition of how the papiNet messages will be used, and how the information will be mapped to the systems being integrated. The definition phase requires very close cooperation between the business partners involved.

Planning Phase Tasks

Define the business case

In the planning phase the results from the pre-study phase are enhanced by defining the business case in detail including:

- Description on the new business process.
- What information systems will be used?
- What papiNet messages will be used and how?
- What companies and organisations are involved and what influence the papiNet implementation will have on these (this is especially important in bigger implementations, where changes to responsibilities and tasks completed in the supply chain solution might have to be introduced)?
- Revisit the ROI targets set in the pre-study phase.

Emphasis should be paid on describing the new business processes, to ensure all affected parties get a clear view on what changes will be implemented, and what their responsibilities and tasks will be after the implementation.

Define required changes to existing IT systems

The definitions made in the pre-study are enhanced to include detailed descriptions of the changes required to IT systems, for example:

- What changes to existing information systems are required?
- What papiNet messages are used and what ERP systems are they communicating with (include a gap-analysis of the information required
- Which systems create papiNet messages and which systems receive papiNet messages?
- How is the information in papiNet messages mapped to the information in the integrated information system?

- How is the integration created technically, that is, what XML mapping software will be used?
- What triggers creation of papiNet messages?
  - In real-time after completion of a transaction?
  - Batch-wise (time dependent, e.g. once per day)?
- How will the papiNet messages be communicated between the information systems?
  - What communication software will be used?
  - What communication media will be used?
  - What communication method will be used?
- How are the messages validated and what kind of alerts is generated when something goes wrong?

Go Live preparation

Go live preparations should start already at this stage by:

- Prepare a preliminary test plan for the integration test between the trading partners, including a list of the test cases that must be completed. A preliminary test timetable should also be agreed upon to make sure that required testers are available.
- Prepare a preliminary training plan to describe what user instructions have to be completed and what training is required before going live. The integration test is a way to take care of the training of key users.

Revisit project plan

One of the important tasks of the planning phase is to revisit the project plan for the realisation phase based on the definition made during the planning phase. The project plan must include all tasks that have to be completed before live use of the papiNet implementation can commence. The project plan will determine the timetable, resource allocation and budget for the implementation.

Skills Required

- Generally the same skills as in the preliminary study phase are needed, the difference being that planning phase requires more detailed knowledge of existing business practices and information systems.
- System analysts who are familiar with papiNet messages in detail, that is, how they should be used in the selected business case. Again, it should be investigated whether work done in some of the Segment Implementation Groups (SIG) can be of assistance.
- System analysts who know the IT systems specially designed to perform specific tasks in the communication of papiNet messages between the systems being integrated and also can handle the task as an interface towards the ERP system.

Best Practices

- Make sure you have commitment from all involved parties, at the highest level possible in their organisation.
- The papiNet SIGs can help you with examples on how to document the mapping of information between the papiNet messages and the ERP system.

Realisation Phase

Introduction

As in any project the main task is to make sure the project stays on schedule and within budget and that any changes to the plan are dealt with in a controlled way. When the planning phase has been completed properly (new business process and changes to IT systems are well documented) the realisation phase is straightforward.

Realisation Phase Tasks

Implement changes to business process

If the implementation introduces significant changes to the supply chain processes it is imperative to clearly document and communicate the changes in responsibilities and tasks to all concerned parties in the supply chain.

Implement changes to IT systems

Implement the required changes to IT systems, including:

- required changes to information content and functionality of ERP system
- functionality to send/receive papiNet message information from/to ERP system
  - mapping of agreed papiNet message content to the ERP systems
- implement technical connection between trading partners
- install and configure papiNet messaging infrastructure
  - XML mapping system
  - message communication between ERP systems

These steps are described in more detail in Appendix H: System Design

Finalise integration test plan

Finalise the test plan for

- the internal testing of new ERP system functionality and
- the integration test between the trading partners

The test plan includes

- description and checklist for all the test cases that must be completed
- testing timetable
- users assigned to complete the tests

It is recommended that an integration test session is arranged, where the parties involved in the implementation are at the same location.

Finalise training plan

Prepare plan for who will be trained and when and where training is arranged. Finalise the training plan, including who will be responsible for training and

start to document needed user instructions. The integration test is a way to take care of the training of key users.

Prepare Trading Partner Agreement

Start preparation of the trading partner agreement (TPA). See Appendix F – Trading Partner Agreement Template for details of what the TPA includes.

Revisit project plan

Revisit project plan with regard to testing, training and go live.

Skills Required

- System programmers to complete information content and functionality changes to ERP system
- System programmers to complete papiNet message interface to ERP systems

Best Practices

Refer to the Risks during Implementation section of Appendix E – Risk Management for a list of the Best Practices associated with a given Realisation Phase risk.

Testing Phase

Introduction

The testing phase is the quality check of the papiNet implementation. It is recommended that super users of the developed system participate in the testing.

Testing Phase Tasks

Test changes to business process and IT systems

Test the new business processes and developed information systems both internally and together with the trading partners involved in the business case.

Train super users

The test phase is a good way to train the intended super users of the papiNet implementation.

Finalise training plan

Complete training material, user instructions and revisit the training schedule.

Prepare Trading Partner Agreement

Prepare the Trading Partner Agreement (TPA) together with partners involved in the papiNet implementation. See Appendix F – Trading Partner Agreement Template for details of what the TPA includes.

Revisit project plan

Revisit project plan with regard to training, preparation of IT systems for go live and go live schedule.

Skills Required

- System programmers to complete information content and functionality changes to ERP system
- System programmers to complete papiNet message interface to ERP systems

Best Practices

As costly and time-consuming as testing is it is so very important to the success of the project to test.

- Resist all pressure to compress the time allowed for testing to meet delays in the schedule or too aggressive a schedule.

Go-live phase

Introduction

After a successful development and carefully performed test phase it is time to go live. If possible it is advisable to run the old and new process in parallel for a while, before switching over to only the new process. This is possible at least when a manual process is automated as is. This means for instance that during the parallel run paper copies of orders, order confirmations, delivery notes, and invoices should be sent as well as electronic papiNet messages.

Go Live Phase Tasks

Communicate changes

Plan and prepare needed communication material to be used to inform of changes introduced to business process and IT systems.

Train users

Complete the training of users so that they understand the new business process and know how to use the developed IT systems.

Prepare live system

Prepare systems for live usage, including the description of workarounds in case of problems after go live and make sure additional support is available during the immediate time after go live.

Finalise Trading Partner Agreement

Involved business partners finalise and sign the Trading Partner Agreement (TPA). See Appendix F – Trading Partner Agreement Template for details of what the TPA includes.

Go Live

Start to use the designed business process and the changes done to the information systems.

Closely follow up the implementation and support users in new business process and IT systems and implement changes if necessary.

Skills Required

- Business savvy users who can identify issues.

Best Practices

- If moving from a manual process to automatic information exchange through system integration, a parallel run using the old and the new process, is highly recommended. While time consuming and costly parallel runs are extremely effective.

Appendixes

Appendix A - Available papiNet Documentation

Implementation Information

- Information about who is implementing papiNet.
  - http://www.papinet.org/ImpFeedback/ImpFeedback_Intro.asp
- Feedback location where you can provide a status update of your implementation.
  - http://www.papinet.org/WhoIsImplementing.asp

The Current Version of the Standard

  - http://www.papinet.org/downloads.asp
- General Information including Message Overviews, Interoperability Guidelines, and the Schema.
- Detailed documentation for each papiNet message.
- Data Dictionary
- Stylesheets
- ISS Tool (data mapping helper)

Previous Versions of the Standard

  - http://www.papinet.org/preversions.asp
- Complete catalogue of previous versions

Information on How to Join papiNet

  - http://www.papinet.org/meminfo.asp

Whitepapers

  - http://www.papinet.org/whitepaper.asp

Brochures and Presentations

  - http://www.papinet.org/brochures.asp

Appendix B - ROI Calculation

Overview of the Model

Before commencing a successful papiNet project, it is important to define your approach, benefits, costs, and projected savings. We have created a very simple model that helps you quantify this choice. The model is developed in Excel and is available at www.papiNet.org/downloads.asp (look for "papiNet ROI Model.xls". It includes minimal data entry and clearly helps you demonstrate your financial benefit. It is intended to support a brainstorming process for those workflow changes that will accompany papiNet message implementation. Hopefully it will help you to arrive to a good conclusion.

All data in the model is by way of example only. It is a simple pay off calculation only, that is no calculation of present values is done.

You will find 6 different worksheets in the model. What follows is an introduction to each of them so that you can easily understand their scope.

Order to Invoice

This worksheet is the starting point for those trading partners who intend to go through an initial and gradual cost reduction. These trading partners will enable the exchange of electronic business transactions for the five core messages that define the ordering to invoicing process: purchase order, order confirmation, call off, delivery message, and invoice.

Consignment Stock

This is intended for those trading partners who want to commence Supply Chain operations by changing their processes with support of papiNet electronic transactions. There are many areas in the Supply Chain where it is possible to reduce costs and get benefits. Our model illustrates one form of a Vendor Managed Inventory (VMI) process.

Parameters

In this part of the model, we consider two major cost categories that contribute to the calculation.

- The internal interest rate measured in terms of **Weighted Average Cost of Capital (WACC)** that is the expected return on a portfolio of all a firm's securities. Used as a hurdle rate for capital investment.
- The cost for the different positions involved in the process.

Implementation Costs

This will help you to categorize your implementation costs and distribute them over time. This is a particularly important part to target and define for

the overall profitability. For both the model scenarios there is an implementation rate diagram to be filled in.

Process

It is important to document your intended business flow. This is very helpful in order to get a clear vision on the changes that will affect your company and the people involved. In the example a Consignment Stock VMI process is illustrated.

Profitability

You are at the end of your evaluation and the model will show you the final results according to the data and choices you have made. You can see in our example a comparison between the two processes, but there could be many alternatives or just a single one.

We hope this brief preliminary text will help you to use this model well and support you in your final choice.

Detail Review of the Example

Order to Invoice

If you decide to go for papiNet e-transactions without fundamentally changing your process, there are two different types of question you may ask yourself.

1. Start by projecting savings in the main areas of your process if business is automated. The three areas taken into consideration in our example are:
   - Purchasing
   - Receipt of the goods
   - Invoice administration
2. Ask yourself what would be the implementation rate of the new procedures, by area, assuming a development in 5 years time.

Conclusion

The model's calculation takes the time you assume to save by function multiplied by the cost of the personnel involved in each function which is input on the Parameter worksheet. This calculation will give you an idea of the benefits you may get out of your investment.

Consignment Stock

If you decide to change more fundamentally your existing business process and to support it via papiNet e-transactions, then you will need to answer additional questions according to the process you have in mind to modify. In our example, we describe a VMI scenario of automatic replenishment. The calculation incorporates a key element, working capital.

1. Calculate the current inventory value of paper that can be bought under a revised VMI-agreement. How many days does it cover?
2. Determine how many days of use would there be once the VMI process is fully operational.
3. Determine the implementation rate of the new VMI process enabled by papiNet e-transactions. In our example, we exemplified with a development of VMI process in 5 years time aiming to cover up to 80% of the articles used in a box plant.

Conclusions

The reduction of working capital, which in our example turns out to be extensively reduced from 14 to 5 days, will enable your company to invest in a more profitable way. As a result of this reduction, an immediate benefit is given from the fact that you won't need to generate the 15% (WACC) yield on the 9 days value representing the working capital you have virtually eliminated. This benefit could be added to any personnel savings.

Costs

Implementing a new system involves hardware and software investments, consultancy and manpower fees, and possibly other kind of expenses.

We took into consideration the same time period of 5 years and distributed the estimated costs.

Profitability

Our example demonstrates the profitability if both options are adopted in a company. It demonstrates the benefits of a revamped VMI process fully supported by papiNet electronic transactions.

Appendix C - Infrastructure Building Blocks

Basic Infrastructure

Communications Infrastructure

- Network Load Management
- Network Connection
  - Broadband, Dial-up, LAN or High Speed Internet
- Connectivity and Transport
  - ADO, COM/DCOM Support, CORBA, Filesystem Access, FTP, HTTP, HTTPS, IP Multicast, Lotus Notes, Microsoft Exchange, MSMQ, ODBC, SMB, SMTP, TCP/IP
- Communication Support
  - Point to point, Multi-cast, Dynamic Topologies, Logical Addressing

Data Management

- Access Methods
  - BAPI, CORBA, HTML/XML, IDOC, JDBC 2, ,ODBC, OLE, SMG
- Database Environments
  - Cloudscape, Microsoft SQL Server 2000 & JDBC Driver, MySQL, OLE Connector, Oracle, SAP DB, Sybase SQL Anywhere
- Database Export and Import

Data Management - Wire

- XML, ACORD, CORBA, EDI, EDIFACT, SAP ALE, X12

Data Management - Target

- Database Environments
  - Oracle, SQL Server, OLE Connector
- Access Methods
  - ODBC, BAPI, SMG, OLE, CORBA, IDOC, HTML/XML
- Profile Services
- eBusiness Standards
  - ACORD, CORBA, EDI, EDIFACT, OAGI, RosettaNet, SAP ALE, X12, XML
- Storage Services

Error Handling Utilities

Execution Scheduler

Message & Collaboration

- Message Queuing
- Message Tracking (Logging)

Presentation

- Web Browser
- WAP-enabled cell phones
- Stylesheet Support

Security and Authentication Services

- Certificate Services
- Digital Signature
- Encryption and Authentication
- Public Key Infrastructure
- Security Protocol Services

Transaction Management

- Execution Monitor
- Logging Utilities
- Real-Time Event Repair and Authorization

Translation &Transformation

- XSLT
- External Reusability
- Mapping Approach
- Data Type Translation

Basic Development Environment

- Language
- XML Editing and Validation
- Parser Support
- DTD and Schema Editing
- XSL/XSLT Editing
- XSLT Debugger
- Debug XML and XSL files in Grid and Text view
- Dynamic output in Grid, Text, and Browser Views
- Stylesheet Designer

Extended Infrastructure

- Application Server
- Deployment Services (IT)
- Distribution Services
- Transaction Server
- Environment/Configuration Setup Utilities
- Indexing Services
- Name and Linking Services
- Extended Web Services
    - ✧ UDDI, SOAP, WSDL

- Workflow
  - Business Process Modelling, Workflow, Profile Services, Business Rules Specification
- XML Tools
  - To support the extended web service environment.

Appendix D – papiNet Project Checklist

Activity	Days	Comment
Determine the partner with whom you will trade	1	Easier to do with someone with whom you are already trading electronically e.g. EDI
Determine which messages you will exchange	1	Easier to use messages that you are already trading electronically
Set up a joint project team with your partner	1	Ideally a business and IT person from each partner
Decide on information flow between partners		
Create a trading Partner Agreement	5	You may already have one but probably this covers business trading. You need something covering electronic trading e.g. liability and responsibility if messages don't arrive etc.
Create a business process model	5	This may already exist
Set up a high level joint project plan with your partner with interim milestones	5	This plan should be agreed with both parties. Pay particular attention to the resources and other projects for both yourself and your partner
Set up internal project team	1	Project team should ideally consist of : Project Manager (Business analyst), project leader (IT), a communications expert and developers, preferably one with XML knowledge and one with knowledge of the local ERP system
Internal kick off meeting	1	
Internal Project plan	5	Coordinate this with the high level project plan agreed with your partner
Familiarity with papiNet	20	Download the papiNet schemas, documentation, ISS Tool spreadsheets. Your IT project leader and developers have to be familiar with these documents. Don't underestimate this activity

Activity	Days	Comment
Mapping workshop with partner	2	Have a workshop with your partner to determine which data elements you will be exchanging. You should also decide here on exactly how data will be represented. For example: • What does unit price mean? • Does it include taxes, discounts etc? • If I send you an order with quantity in metric tons and your system works in KGs, how am I going to receive the Order Confirmation. • Determine the protocol you will use for exchanging messages, i.e.. SMTP, HTTP etc.
Use ISS tool to map to ERP system	10	Use the ISS Tool to map the papiNet attributes to data in your ERP system. At this point you should have defined if your ERP system needs to be changed to handle data coming in and data going out. Refer to Appendix H – Mapping Principles for more information.
Determine your communication tool	5	You may already have something in-house or you may need to invest in a new tool. Determine the rules for handling errors and resends. Make sure that the tool you choose can handle these rules. You will also need to determine if you need a mapping tool to map papiNet attributes to a flat file or directly to your ERP data base or will you develop this yourself. Refer to Appendix I – Communications Software Components for more information.
Reschedule plan if necessary	1	After the initial assessment of work involved in steps above you may need to revise the plan because of time or resource allocations.
Hardware	5	Determine if you need to get additional hardware or upgrade your existing hardware. If so this should be ordered as there is always a lead time involved

Activity	Days	Comment
Install and test new hardware	10	Maybe an overestimate in time, but can present problems
Install and test new software	10	As above. This will also involve configuration of communications parameters. Test also that the communications between any new hardware and your existing hardware works
Education on new software	5	Your IT staff will need some training on new software
Rules for error handling	5	Determine and document your rules for error handling. For example: • What do I do if a message never arrives but my partner says that it was sent? • What happens if I get systems errors during processing? • What if my ERP system rejects the message? And so on, these have to be well documented processes.
Logging and archiving	10	Determine these rules. How do I log, access the logs and after how much time do I archive messages
Validation	5	How will data be validated. There are two separate processes here. You need to validate the message is a valid papiNet XML message. Parsers can be bought that do this for you or you may decide to write it yourself. The other part of the process is the validation of data content in your ERP system.
Security	10	Determine if messages will be sent as signed and encrypted. You may need to make arrangements to get certificates. Make sure this is coordinated with your partner.

Activity	Days	Comment
Testing	20	Test first the that you can communicate with you partner. • Will you be using synchronous or asynchronous communications. If you are using asynchronous communications, you may want to have MDN (Message Delivery Notification) in place. • Once you have established that the two systems can talk to themselves, you begin with testing messages. ✧ Test that you can send and receive papiNet messages. ✧ Test your validation routines. ✧ Test that your ERP system can read and process the messages i.e., test your mapping tool. ✧ Test that your application can handle messages in your ERP system. ✧ Test all the message handling routines, both system and data errors. ✧ What happens if messages come in during my back up process, or during my purge and archiving process. Should messages be queued during these processes. ✧ Should queued messages be prioritised. ✧ Should I handle incoming messages with a higher priority than outgoing messages. ✧ Should order and order confirmations always have priority

Activity	Days	Comment
Volume testing	5	This should be done. We have seen applications and tools which can handle a couple of messages, but once large volumes of messages are involved or simultaneous sending and receiving then major problems occur. Test by sending the same order repeatedly (say once every 5 seconds over a period of 24 hours). At the same time your partner should be sending back confirmations.
Parallel or shadow testing	10	Once you are satisfied with the testing you and your partner should go into shadow testing. This means you test the applications and system using live data while still running with your existing system. If orders are handled by fax and phone you should continue to do so while also processing the orders through the new message application. This has to be carefully coordinated with your partner or else you run the risk of double ordering
Go Live	5	If you are satisfied with the shadow testing you determine when to go live. Some decisions still need to be made. As a buyer should I transmit all my open orders to the supplier to make sure he can process any changes to the order. When do I start with Invoice messages. Make an agreement on a cut off date for manual invoicing

Appendix E – Risk Management and Best Practices

Introduction

This section explains typical project risks, and introduces the Risk List, which is a tool that can be used to continuously monitor the impact and probability of these risks occurring. Alternatively, industry best practices are cited as a means of addressing the risks.

Classification of Risks

Project risks can be divided in risks during implementation and risks during operations.

- Implementation risks could result in a delay of Go-live or in a project running over-budget. The worst-case scenario would be an aborted implementation.
- Risks during operation could result in breakdown of messaging communication, loss of sensitive information, or transmission of faulty data. Ultimately, all these risks lead to unnecessary cost and loss of confidence.

The task of a project manager during implementation and operation is to control the risks by monitoring the probability of occurrence, and by taking steps to reduce this probability and plan for damage control. The best risk is the one avoided.

A simple tool for monitoring such risks is the risk list. Each risk can be assigned both a severity and a probability rating. The ratings are specified on a numerical scale from 1 (best) to 4 (worst). The priority for controlling and reducing a given risk is then the product of its respective Severity and Probability rating – the more likely a risk with severe consequences will occur, the higher the priority of controlling and reducing this risk. Industry best practices are cited as one source for preventative measures against risks. Other project managers may find that the risk list without any numerical ratings is just as useful.

Example Risk List

Risk ID	Risk Name	Description	Severity (S)	Probability(P)	Priority (S x P)	Best Practice
R003	Delay due to lack of Resources	There are not enough resources to perform the tasks of ERP-message integration in the allotted time frame.	3 – ERP mapping task 4.1.3.2.2 is on critical path, project delay up to 2 months, no work-around	4 - due to problems with the SAP implementation, ERP specialist will likely be reassigned by the CIO	12	Project Plan resource allocation should be pre-approved by management. Should resources fall short, the alternative is to extend rollout timeframe.
R001	Maintenance expensive due to lack of documentation	Due to time pressure and understaffing, documentation will suffer.	3 – lack of documentation will severely increase operations cost, as external resources will have to be brought in even for routine maintenance	2 – due to probable delay, there will be enough time for thorough documentation, this task is not on the critical path and could be outsourced	6	Development should include documentation, which is created as programming is generated. Even original developers have a need to return to their own documentation to determine historical events.
R002	System does not work (Stylesheets)	Due to unproven combination of BEA web server with new release of XALAN-J 2.0, stylesheet integration will not work.	1 – e-mailing HTML output of unsuccessful message trans-missions is nice to have, but not critical – administrators can work with raw XML	3 – Proof of concept does not work. No experience in the team with BEA. Fixing of problem in time is unlikely.	3	Interim translation with stylesheets in an alternative data flow is an option. Proof of concept evaluations prior to resource commitment prevent such an event.

In the example risk list given on the preceding page, three risks are being monitored. The table has seven columns: The first three columns (Risk ID, Risk Name, and Description) are used to identify and define the risk being monitored. In the next two columns, a severity and probability rating is assigned according to the rating scales given below. A rationale for providing both ratings is added. The sixth column gives the priority for controlling and reducing the risk being monitored. This column simply contains the product of the ratings given in the Severity and Probability columns, and is used for sorting the risks – highest priority first. The seventh and final column cites preventative measures and alternatives based on IT industry best practices.

In the example given, risk R003 has a higher priority than risk R001, even though their Severity is the same, since risk R003 has a much higher probability of occurring. Risk R002 on the other hand, while quite likely to occur, has only a minor impact in Severity, and thus the lowest priority of all three risks.

The risk list should be regularly updated and discussed in the project team – the weekly team meeting can be a good place for that. Regular reassessment of the current probability and severity of the risks being monitored is important for making this tool useful. In addition, the discussion of the ratings can lead to a productive brainstorming of ways to reduce the risk.

After an agreement has been reached on the highest priority risks, the next step is to find ways to reduce and control them. Typically, it is easier to decrease the probability of a risk by adding resources or testing an early prototype. Decreasing the severity of its occurrence by finding a work-around or a fallback solution is harder but a more permanent way to deal with a high priority risk.

Rating Scale for Risk Severity

The following table gives numerical ratings for the severity (impact) of a given risk on a numerical scale from 1 (best) to 4 (worst). Obviously, this rating scale can be adapted to your situation. However, the number of 4 choices works fairly well, since an even number of choices leads to a more decisive rating outcome, with no "average choice" in the middle. Increasing the number of choices (e.g. from 4 to 6), while allowing more fine grained ratings, does not improve the accuracy of the underlying estimates and assumptions.

The same reasoning applies to the rating scale for risk probability shown below.

Severity Rating	Description
1	Minor – risk could result in a nuisance or temporary degradation of service. A work-around is readily available
2	Medium - risk could result in implementation project time or cost overrun or result in need for work around during operation
3	Severe – risk could result in considerable implementation project time or cost overrun or in loss of revenue during operation
4	Very severe – risk could result in implementation project termination or in serious loss of revenue or reputation during operation

Rating Scale for Risk Probability

Probability Rating	Description
1	Very Unlikely – while possible, the probability of this risk occurring is remote
2	Somewhat likely - the probability of this risk occurring is real, but not very high
3	Quite likely - the probability of this risk occurring is substantial
4	Very Likely – while not certain, there is a very high probability of this risk occurring

Project Staffing Risks

The following list provides examples of risks associated with project staffing. Obtaining and developing a quality project team is critical to the success of the project.

Risk Name	Best Practice Alternative
No project team application experience	• Implement project team training classes • Provide access to helpline procedures • Add experienced members as needed • Have an experienced project mgr. closely monitor the detailed project plan
No project team industry experience	• Implement project team training classes • Attend industry seminars • Read trade journals • Add members with industry experience • Use subject matter expert as needed throughout the project
Utilizing an untried, state-of-the-art approach with no project team experience	• Send project team members to vendor training class • Have the technology vendor participate in the project • Define project back-up procedures
Project not run by a project manager	• Follow an implementation methodology • Have manager attend a Project Management training course • Structure the team to assume more responsibility • Implement frequent status meetings

Risk Name	Best Practice Alternative
Minimal user involvement in the project	• Conduct team building exercises • Implement more user training • Add experienced project team members • Issue an executive mandate for user involvement • Hold frequent steering committee meetings to validate progress
Insufficient resource availability	• Supplement project team with third-party consultants • Conduct training on any unique skill requirements • Recruit the staff needed • Extend the project time frame
Business knowledge	• Access to customer's specialists • Allow more time for communications

Project Environment Risks

The following list provides examples of risks associated with the project environment. While you will have little control over the environment you can take steps to mitigate risks.

Risk Name	Best Practice Alternative
Poor DP environment for systems implementation	• Evaluate performance issues • Move development off-site • Develop installation plan based on their capacity and performance • Upgrade facility • Gain access to technical specialists
Project located at several remote sites	• Install effective communication systems • Conduct frequent status meetings • Establish clear lines of responsibility • Implement frequent quality reviews to ensure all sites are following the project standards and methodology

Risk Name	Best Practice Alternative
New software and hardware installed	• Gain access to technical specialists • Integrate the delivery and training into the project schedule • Implement a training program • Hire expertise needed • Purchase proven software and hardware
Users were dissatisfied with their previous project	• Use a methodology and implement a training program • Demonstrate a success quickly • Highlight the project's benefits • Display strong project leadership skills • Show strong upper management commitment to the project • Hold frequent steering committee meetings to validate process
Undefined project success criteria	• Establish quality review board • Define and obtain a review of project objectives • Distribute and get approval from management
Undefined project deliverables	• Define and obtain review of project deliverables • Obtain management buy-in • Assign project responsibilities
Undefined project responsibilities	• Assign tasks to team members and gain approval • Ensure the team member has the experience necessary to fulfill the responsibility assigned
Extensive organizational policy changes are required	• Focus on thorough and frequent communication • Implement a steering committee structure • Obtain strong support for the project from upper management • Document changes and review with users as early as possible • Stress the benefits of the change • Identify training needs early • Assign a simple customer contact to coordinate and support change

Risk Name	Best Practice Alternative
Two or more third-party consultants	• Establish a clear project structure • Demonstrate strong project management • Conduct frequent quality reviews • Have clear assignment of responsibilities • Conduct team building exercises • Insist on the use of the methodology • Insist on a format for written communication

Project Management Risks

The following list provides examples of risks associated with the structure of the project. Dealing with the risks named below will result in projects that are manageable.

Risk Name	Best Practice Alternative
Project estimates not performed by the project team	• Validate the assumptions made to perform the estimates • Use similar engagements as a benchmark • Add contingency • Closely monitor the time
No project plan created	• Build a project plan • Customize a similar project plan • Establish responsibility for the project plan • Implement a planning tool • Use an implementation methodology
Project duration of more than six months	• Break the project into phases • Establish short and long-term goals • Conduct frequent status meetings • Institute a time and budget tracking system • Have a clearly defined project organization

Risk Name	Best Practice Alternative
Project schedule is aggressive and critical to the business	• Prioritize requirements • Maintain firm control over scope • Develop a contingency plan • Clearly define milestones and deliverables • Conduct more frequent management reviews • Compose an experienced project team
Project team size is larger than 10	• Conduct frequent status meetings • Divide into work teams • Clearly define responsibilities
Dependence on other projects	• Allow more time for communications • Share walkthroughs • Verify scope of other engagements including your engagement • Identify overlapping milestones • Share team members
Customer commitment to project	• Establish a Quality review board • Review benefits with users and executives • Establish a procedure for resolving conflicts
Number of system interfaces	• Redesign to reduce coupling • Modify another system • Reduce project scope • Consider manual interfaces

Risks during Implementation

The following list provides examples of risks during implementation, and needs to be extended and adapted to your situation. Obviously there is a strong connection between implementation and operation risks, as risky or low quality implementations lead to high risks during operations.

Risk Name	Description	Best Practice Alternative
Project Delay (due to insufficient resources)	There are not enough resources to perform the tasks in the allotted time frame. This can be a risk from the start (insufficient planning) or occur during the project (resources can leave the company, or are assigned to a different project)	Without a recovery of resources, the schedule timeline must extend into the future. Alternatively, using proven software tools and generic processes leveraging core OS level data management techniques reduces the dependency on exact skill sets uniquely available.
Project Cancellation (due to loss of management support)	Management support for the project is lost due to reorganization or a change in priorities. This can lead to loss of resources or budget, and ultimately to a cancelling because of the resulting lack of success stories. Insufficient communication or an unclear project charter tends to make the occurrence of this risk more probable.	Without executive level and senior level management support, no practical option exists.
Low Quality Implementation (due to resistance from within the company)	An automation of business processes leads to a substantial change in how work is performed, and can lead to fear and resistance from within the company. As a minimum, this resistance will result in information and support being withheld. Lack of communication tends to make this risk more likely.	Executive level management support is required to establish company policy. Senior management must exercise influence over internal departments in promoting company goals.

Risk Name	Description	Best Practice Alternative
Low Quality Implementation (due to wrong system)	The system is installed in a wrong or erroneous manner, software components with insufficient functionality are chosen, or set-up wrongly.	Aggressive testing during the development phase minimizes poor quality production implementations. Test, Test, Test.
Miscommunication with Trading Partner (due to bad mapping)	Bad mapping (content error) – data from your application is mapped to the wrong element within the PapiNet message, thus the meaning of your message is changed for the receiver.	Parallel testing and thorough documentation in the ISS tool should be used to minimize this risk.
Miscommunication with Trading Partner (due to missing mapping	No Mapping (content error) - data from your application is mapped to a part of the PapiNet message, which is not actually read by your trading partner. Thus critical information might not reach the receiver.	Parallel testing and thorough documentation in the ISS tool should be used to minimize this risk.
High Follow-on Costs (due to inflexible system)	The system works as planned, but is set-up in such an inflexible manner that changes or upgrades are too costly or even impossible. This risk is made worse by lack of documentation, and can be especially severe in regards to mapping.	Industry best practices should be applied using a generic programming approach. Documentation during program development should be considered mandatory.
High Follow-on Costs (due to lack of documentation)	Set-up and processes are not documented properly. Important knowledge is available only implicitly, i.e. tied to the resources having performed the implementation. If these resources were external, or leave the company subsequently, maintenance and upgrades will become very costly.	Industry best practices should be applied using a generic programming approach. Documentation during program development should be considered mandatory. Cross training across the development team prevents dependency on isolated resources.

Risks during Operation

The following list provides examples of risks during operations, and needs to be extended and adapted to your situation as well. Most of the risks covered in this table have errors during implementation as their root cause.

On the other hand, it is impossible to get everything right the first time while staying in time and budget, so following the 80:20 rule some of the effort spent on a hypothetical perfect implementation would be more economically applied to catching some risks during operations, once more experience is gained.

Risk Name	Description	Best Practice Alternative
Security Breach (due to unauthorized access)	An unauthorized party gains access to a message during transfer, and learns about the content, which might contain very sensitive information like price and trade conditions.	Transmission encryption or data encryption prevents interception by unauthorized parties. Trading partners agree on the level of security required.
Security Breach (due to Tampering)	An unauthorized party gains access to a message during generation or transfer, and changes the content.	The use of digital signatures based on a Public/Private Key Infrastructure (PKI) prevents this, so the real security issue becomes the protection and access authorization to the Private Key. Internal access controls and policies should prevent unauthorized access by local personnel.
Miscommunication with Trading Partner (due to loss of data through undetected transmission error)	Message is sent but not received. Control by using Logging function and the use of guaranteed delivery.	It should be clearly defined in the TPA where the responsibility for acting upon a message starts. If this goes further than the placing of the message into the inbox within the firewall, a functional acknowledgement has to be used. Local logging and error reporting is responsible for internal notification to support personnel.

Risk Name	Description	Best Practice Alternative
High Maintenance Cost (due to poor communication)	Failure to document and communicate properly, resulting in confusion and unnecessary work.	Use dedicated contact persons, regular meetings, newsletters to keep everyone informed about status and decisions.
Miscommunication with Trading Partner (due to corrupt message)	Corrupt message is transmitted; the XML is not valid against the Schema. Also an error if partners are on different versions of the Schema.	To control this, always parse the message for being valid and well formed.
Miscommunication with Trading Partner (due to wrong data content)	Corrupt data is transmitted as content of a message, even though the XML is valid against the DTD.	To control this, business application level (ERP) validation checks have to be put in place, which go beyond a message being parsed for being valid and well-formed. Data bounds and restrictions should be documented in the Content column of the ISS Tool.
Miscommunication with Trading Partner (due to duplication of data through undetected transmission error)	The same document is sent twice. The source of this error can be either in the generating ERP system, or in the information chain in between. The former case is harder to detect.	Full logging should be switched on. The receiving system should have duplication checking, i.e. incoming messages are compared against prior messages with the values PartyIdentifier, ordered product, quantity, delivery-date, and value. From this comparison, a duplication probability can be calculated, which will generate an exception.
System Unavailable (due to system breakdown)	Network error, hardware, software, power supply interruption.	Local system monitoring and error reporting must be an integral part of the overall development strategy. Recovery should be high priority and automated where possible. Cross-functional technology support teams must be part of the production rollout.

Risk Name	Description	Best Practice Alternative
System Unavailable (due to system overload)	Network, hardware, or software overload, which slows down the sending and receiving. If the slow down is too strong, a back log occurs and it has the same effect as system breakdown	Procedures have to be in place to quickly go into operations again, recover the state before the failure (roll back faulty system changes), and retransmit messages put on hold in the meantime. If manual workarounds were used, extra care is necessary to avoid sending documents twice.

Appendix F – Trading Partner Agreement Template

A Trading Partner Agreement (TPA) defines how trading partners will interact at the transport, document exchange and business protocol layers. A TPA contains the general contract terms and conditions, participant roles (buyers, sellers), communication and security protocols and business processes, (valid actions, sequencing rules, etc.).

In the context of papiNet, the TPA thus defines a specific implementation of the papiNet standard between two parties by:

- specifying procedures and expectations for operations
- specifying the technical framework for the implementation
- specifying /referencing the subset of the papiNet Business Process Model
- specifying /referencing the subset of the papiNet Data Model

This section provides general information on constructing a TPA and documenting it in a word-processing format. A complementary document describing the ebXML Collaboration Protocol Agreement and the papiNet standard is available at www.papiNet.org/downloads.asp (look for "papiNet Basic CPAs.doc"). The Basic CPA document provides detailed instructions for managing and the basic requirements of a TPA (the CPA is a specific instance of a TPA).

Identification (TPA Part 1)

This part of the TPA uniquely identifies the TPA document, and the parties.

Document Identification

- Unique identifier of TPA document
- Date of agreement
- Document location

Version Control

- Revision history
- Update procedures

Parties

- Name and address of parties to this TPA
- Contact list of responsible persons at parties

Communication (TPA Part 2)

This part of the TPA specifies the transport protocol(s) and electronic addresses of the parties.

- Communication protocol (http, SMTP, etc)
- IP address and port number of sender and receiver
- Transmission protocol (synchronous/asynchronous)
- Messaging software name and version to be used

Security (TPA Part 3)

This part of the TPA defines the certificates used for authentication, non-repudiation, digital envelope, and other security parameters.

Authentication

- Certificate authority used
- Location of certificate
- Technical details of certificates (key length, certificate standard, signature algorithm)
- Procedure for updating certificates
- Procedure for revoking certificates

Encryption

- Encryption algorithm
- Technical details of encryption (key length)

Invocation-Independent Properties (TPA Part 4)

This part of the TPA specifies overall properties of the TPA; for example, the valid duration of the TPA.

Messaging Rules (TPA Part 5)

This part of the TPA describes the requests (which can be messages) each party can issue to the other. The action definitions define the associated message flows between the invoker and the service provider, responsiveness, failure handling, and other attributes.

Regular Message Flow

- PapiNet Message name, message type, and version to be sent by each party
- Expected answer with response time

Failure handling

- Procedure for handling Messaging system downtime – service level for problem fixing, escalation procedure, fall-back solution
- Data problems – procedure for resolving bad data problems
- Security problems – procedure for handling denied access, signature, encryption problems

Sequencing rules (TPA Part 6)

This part of the TPA describes valid action invocation sequences in each party.

- List of supported use cases from PapiNet standard documentation
- Describe default properties for responsiveness.

Data Definition (TPA Part 7)

This part of the TPA describes the data being exchanged.

Data Subset

- Reference to an agreed upon Implementation Subset (ISS) sheet, including the unique identifier and version for the ISS (The ISS tool is available at www.papiNet.org).
- ISS contains subset information on existence, occurrence, data length and type
- The ISS would be an attachment to the TPA document

Code Mapping

Types of codes to be used are specified in the ISS tool. If a code is to be used which is not available in both the system of sender and receiver, then the TPA should contain a section on code mapping.

In other words, if both parties have agreed to use the DUNS number for party identification, and have this code ready in their system, this decision would be noted in the ISS tool, and need not be included here.

If, on the other hand, a Buyer Code is used for product identification, this code has to be mapped to the supplier code. Information pertaining to this mapping needs to go here.

- List of codes to be used for Party, Product, Location, Packaging, Transport
- Description of code mapping process
- Procedure for updating the code mapping tables

For more information on code mapping refer to Appendix H – Mapping Principles.

Role Definition (TPA Part 8)

This part of the TPA describes each of the roles specified in the TPA that can be filled by specific parties.

- A match between PapiNet roles (like SupplierParty) and actual companies
- Companies not signatory to the TPA can be included here (e.g. transport companies)

Comments (TPA Part 9)

Describe handling of disputes, termination of the TPA as a whole, and other exceptional conditions.

- Clause for waiver of claims between the parties
- Legal issues like confidentiality, liability
- Signatures of the trading partners

Appendix G – Keeping Track of Your Trading Partners

You are going to want to keep track of which messages you are implementing with a particular trading partner as well as the general timing in which you want to approach these trading partners.

In general you will be characterizing your implementation plans with your trading partners into four categories:

- **Live** – These trading partners have finished implementation and are actively using the papiNet messages.
- **Short Term** – You plan on starting the implementation in the next six months.
- **Long Term** – You plan on starting the implementation with the next year.
- **No Plans** – Trading partner is not currently targeted for implementation.

For those trading partners who are on your short term list you will want to maintain information on the status of the message service and the status of the individual messages. The information that you will want to maintain is:

- Trading Partner has been contacted
- Trading Partner agrees to participate
- Communications tested
- Message protocols agreed on
- Message testing
- Message is live

Appendix H – Mapping Principles

Code Mapping

This section is intended to share best practices on how code mappings will be stored, accessed, maintained, and exchanged for:

- Product codes
- Partner codes
- Location codes

Even though papiNet provides a simplified way to communicate codes there still are many codes that will need to be mapped. These guidelines can be applied to all codes in your environment.

Code Mapping Set-up

These steps have to be performed for all code types, examples are chosen from Product code, i.e. ProductIdentifier, with the kind of code determined by the attribute ProductIdentifierCode

For each partner, analyse which codes are being maintained in their respective systems, and how the data model is set up. Following questions have to be answered:

- How many types of code are used?
- If several codes are used, what is the primary key?
- What is the cardinality between the codes? (Is there a one-to-many relation between Grade code and Catalogue number. One-to-many relations will require that additional information be transmitted.)

Which product attributes does the key (or each key) describe? (In other words, for the range of products to be traded with your partner, if the supplier receives only the product identifier, which – if any - additional information would be needed to completely specify the product?)

How good is the data quality of the codes and master data? (Depending on the quality of the data in your system, you may need to use several codes, perform a data clean-up, or install more checking routines).

If there is an overlap (e.g. both partners are using the same code in their data model), then this code should be used.

If there is no overlap, one of the partners will have to maintain a code mapping table (supplier maintains a cross-reference table between CustomerPartNumber and CatalogueNumber)

Testing Code Mapping

The steps described here are taken if there is no code overlap. If both partners maintain the same code type in their system then, obviously, only this code will be transmitted.

Customer sends a PO with one instance of ProductIdentifier using their own code type (e.g. CustomerPartNumber)

Supplier matches the CustomerPartNumber with their own ProductIdentifier code (e.g. CatalogueNumber) using the cross-reference table look up

Optional step: To increase confidence in the reliability of the code mapping, it is possible to perform a secondary check between product/conversion characteristics in PO and the product master data of the matched product.

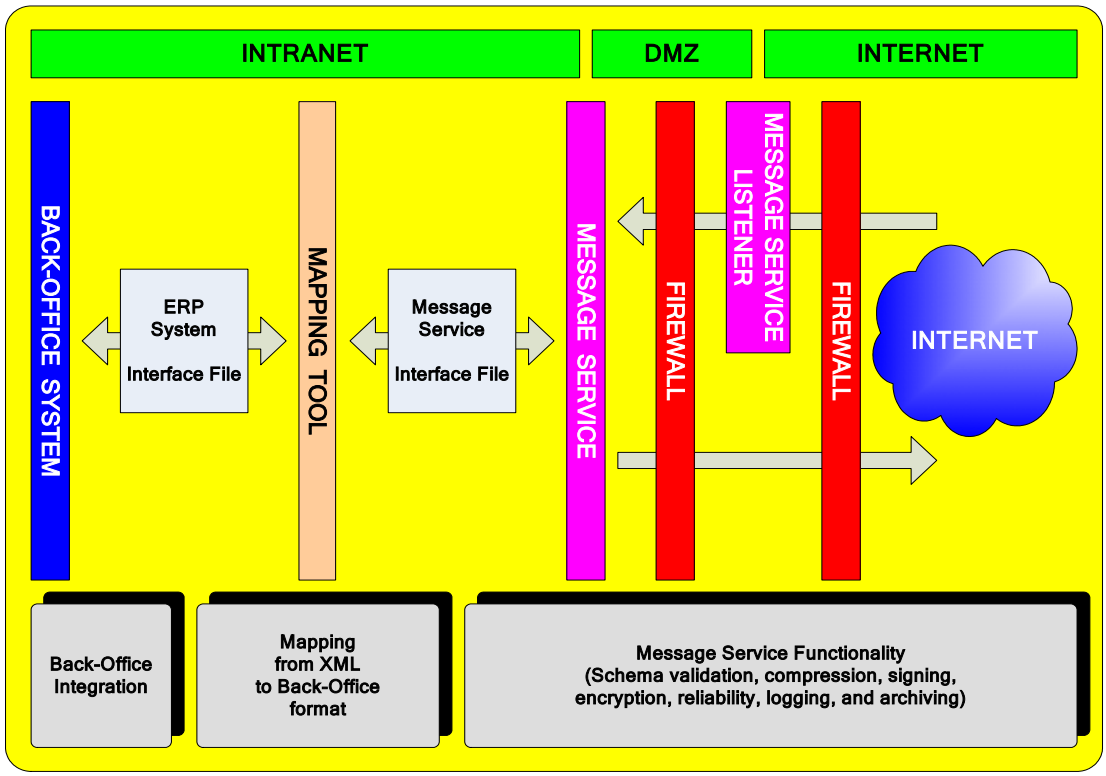
Supplier sends back OrderConfirmation with two ProductIdentifier(s), type CustomerPartNumber and type CatalogueNumber to explicitly state the match

All messages related to this initial exchange in this business transaction (i.e. Delivery messages, Invoice referencing this PO) use both codes. This is possible since ProductIdentifier (and indeed all codes referenced in this section) is a multiple element.

Appendix I – Message Service Components

Regardless of whether you are using HTTP, FTP, SMTP, or some other wire (or wireless!) protocol the components of your message service will have the same flavour.

This section will present the system components in a papiNet implementation, by describing what functions the different systems are doing.



Interoperability Horizon

The diagram above shows the required system components in a papiNet implementation.

- Message Service
  - Regardless of the communication protocol that you are using you will require some sort of service[5] to listen for messages and convert them into some sort of format that you can use.
  - Message services are usually developed for a particular communications environment (the primary ones are HTTP, FTP, and SMTP) so make sure that the message service that you select supports the protocols that your trading partners are using.

[5] A service is just a group of programs that are running in your environment

- Mapping tool
  - The mapping tool is the system that takes care of converting the XML message to a file format recognised by your back-office system. This could be a specialized mapping tool, transformation related stylesheets (XSLT), or in a manual system just interpreting the browser version of the message[6].
- Back-office system
  - Your back-office system is the system that takes care of the business functions related to the message. It could be an order handling system, an ERP system, a spreadsheet, or something else.

As the diagram shows it is recommended that the installation of the message service be divided into two separate layers for security reasons. The message service should be installed behind a firewall within the company's intranet. The listener should be installed in the company's DMZ[7] zone.

Let's go into some more detail about the components of the Interoperability Horizon.

Message Service

papiNet has done extensive research on the topic of interoperability and has published this information in our papiNet Interoperability Guidelines. You may have heard of SOAP[8] which plays an important part in internet-based communications. Well, papiNet has adopted the UN/CEFACT standard extensions to SOAP which are known as ebXML. SOAP-ebXML provides a consistent approach to message envelope structure that is applicable to all communication protocols. ebXML also is venturing into other aspects of interoperability and papiNet will consider these when they are more fully mature.

Mapping between the Message Service and Back-office System

While you should be able to assume that a message you receive from your trading partner corresponds to the schema that it references you will probably want to go through some preliminary compliance validation. XML tools and the papiNet schema make this process much easier than it used to be. An initial validation failure is important to manage as the entire message could be misinterpreted.

Once you have received and correctly understood the message the next step is going to be to convert the message to the format that your back-office

[6] papiNet provides standard stylesheets that enable a user to view a message in their internet browser.

[7] Yes, a "demilitarized zone" (DMZ). Probably a better term would be "quarantine" to more accurately reflect what is going on in that environment.

[8] SOAP – Simple Object Access Protocol.

system can use. In this process you will want to make sure that key fields and combination of fields are validated for missing or erroneous information so that your back-office system can process the transaction.

These checks can either be done by the mapping tool or through programmatic checks in the integration to your back-office system. To make the maintenance of the system easy you should try to have a clear distinction between what kind of checks are done by the mapping tool and what checks are done by the back-office system. The rule of thumb is that the fewer places you make these checks the easier the system is to maintain.

Problems caught by the mapping tool can be notified to the administrator using the configuration and administration functions of the mapping tool. Regarding the back-office system you need to find out what in-built possibilities the system has to decide how much development you have to do to create a system that runs reliably in a live environment.

Mapping Tool

A formal mapping tool is optional, but using one will make the mapping process more pleasant and provide you with some additional functionality. A mapping tool is a system designed to enable easy conversion from the XML format of the papiNet messages to the file format of your back-office system or to the file format of the business logic that populates your back-office system. Some mapping tools can be directly integrated with databases.

Most mapping tools have a graphical user interface to make it easy to create the mapping between the XML and back-office file formats. The mapping system uses the Schema to decode the XML message. To map XML message to the back-office file format you first have to define the back-office system file format in the mapping tool. After this has been done the graphical user interface of the mapping tool is used to drag and drop the fields from the XML message to the respective fields in back-office file format. The mapping tool creates a translation file based on the mapping, which is used when the messages are converted in the live environment. The procedure is the same for converting messages from the back-office system file format to XML.

There are various design approaches that can be used to simplify the conversion of multiple versions of a received message into multiple back-office file formats[9].

[9] Obviously you want to try to achieve a one-to-one relationship but if your environment is that you are dealing with multiple trading partners who are at different versions of the papiNet standard and you have multiple back-office systems then you are in a many-to-many relationship.

Best Practices:

- It is possible to have a papiNet implementation without a mapping tool, by writing program code to directly read and write the XML files.
  - A mapping tool is however strongly recommended, as it is a good way to handle different schema versions of the same XML message. The mapping tool is a flexible and easier way to convert XML message to the same back-office system file format, instead of having to go back and amend program code to achieve this.

Mapping tools also include built-in administration features, which you can use to follow-up that the system is running, as it should in a live environment.