



Automating with RosettaNet*

An Intel case study of order-to-payment automation in the Asia Pacific region

IT@Intel

Intel has adopted the RosettaNet* standard to enable business-to-business transactions in a seamless, secure, and real-time manner with many customers. This paper documents how Intel and its trading partner, the World Peace Group—an Intel distributor in the Asia Pacific region—have automated many manual processes, improved the timeliness of order information, inventory management, and decision-making. It identifies areas of focus for further work automation and process re-engineering.

Executive Summary

Over the past five years, Intel has made considerable progress toward our goal of becoming a 100 percent e-Corporation. We have gained improved operational efficiencies, greater customer satisfaction, and increased competitiveness.

The RosettaNet* standard forms a common e-Business language, aligning processes between trading partners on a global basis. It enables companies to carry out business-to-business (B2B) transactions in a seamless, secure, and real-time manner through system-to-system integration between customers and suppliers.

RosettaNet Partner Interface Processes* (PIPs) define business processes between trading partners and are specialized, system-to-system, XML-based dialogs. Each PIP specification includes a business document with the vocabulary, and a business process with the message dialog. The “clusters”—groups of high-level business processes—addressed by the RosettaNet initiative represent the core business processes or the backbone of a supply chain.

This case study documents how Intel Semiconductor Ltd. (Intel) and World Peace Group (WPG), a semiconductor distributor in the Asia Pacific region, deployed PIPs for RosettaNet’s Order Management cluster.¹ Topics covered include examining Intel’s and WPG’s business practices prior to the deployment, the changes made to the business processes, impacts on both organizations, and the benefits obtained through process improvements. Both WPG and Intel have realized an average of 60 percent efficiency gain in order-to-payment business processes.

One key advantage of RosettaNet is the ability to build repeatable interfaces throughout the industry with a group of RosettaNet trading partners—interfaces that are engineered once and deployed many times. Ultimately, we’ll deploy RosettaNet across our entire supply chain, to increase transaction visibility between our customers’ customers and our suppliers’ suppliers.

¹ In this document, WPG is the customer and Intel is the supplier.

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Business Overview

Business Vision

By integrating systems and automating manual processes, we make it easier and more cost-effective for customers to conduct business with Intel. WPG and Intel committed to implement a series of Order Management cluster PIPs for enterprise resource planning (ERP) system-to-system integration.

Intel and WPG seek to achieve the benefits described below, as well as competitive advantage, by further deploying the solution across the supply chain network and implementing additional PIPs over time.

The benefits include:

- **Improved inventory management.** Reduced costs through inventory and material planning.
- **Visibility across entire supply chain.** Reduced communication costs with RosettaNet trading partners.
- **Faster response to customer requests.** Increased customer satisfaction. We want to be the supplier-of-choice to our customers.
- **Improved efficiency by eliminating manual processes.** Benefits in efficiency, which enable resources to handle additional productive work, including supporting additional customers or product lines.

Background

Founded in 1981, WPG is a leading distributor of semiconductor components in the Asia Pacific region. It currently distributes over 60 products and brands for companies such as Intel Semiconductor Ltd.; Philips; Texas Instruments; Vishay; Integrated Device Technology, Inc.; Hynix Prime View International Co. Ltd.; and Silicon Image, covering numerous applications for the 3C industry. WPG, a listed company in Taiwan's stock exchange, posted total revenue of US \$1.25 billion in the year 2002. The company has sales and service offices in Taiwan, Hong Kong, PRC, Singapore, and Southeast Asia, with a workforce of approximately 1,000 employees.

As a cornerstone in the next phase of Intel's e-Business initiative, we are working with our trading partners to adopt RosettaNet standards across the supply chain. Intel and WPG spent eight months piloting and deploying five PIPs in the Order Management cluster, with business-to-business (B2B) integration for order-to-payment automation as the key objective.

Objective: B2B Integration for Order-to-Payment Automation

Before this project started, WPG had noticed certain weaknesses in its previous transaction processes, which included Web sites, fax, e-mails, telephone calls, and electronic data interchange (EDI). The previous processes were slow and restricted the volume of

What's a PIP?

A partner interface process (PIP) is a standardized implementation of a specific business process within RosettaNet. These standardized processes are specialized system-to-system, XML-based dialogues. Each PIP specification includes a business document and a detailed business process that includes interaction, data transmission, security, and error-handling requirements. PIPs use two data dictionaries—one for business properties and another for technical properties—that help different companies define the same product in exactly the same way. The RosettaNet Implementation Framework defines an exchange protocol, and Message Guidelines instruct implementers on how to encode individual PIPs into specific packages.

The deployment we describe here involves the following PIPs:

Segment 3A: Quote and Order Entry (3A4, 3A6, 3A7, 3A8)

Segment 3B: Transportation and Distribution (3B2)

Segment 3C: Returns and Finance (3C3, 3C6)

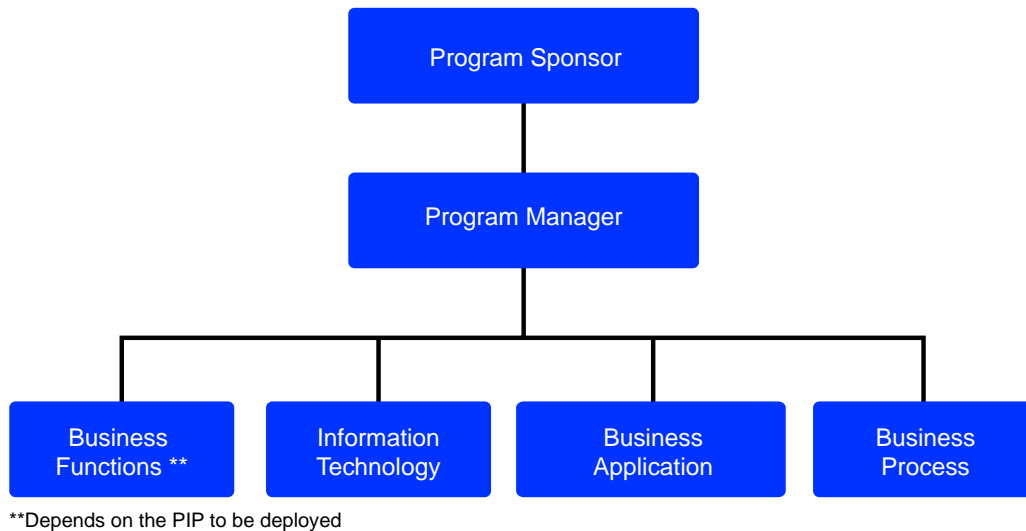


Figure 1. Generic project team structure

information that can be stored or accessed. These flaws prevented WPG’s supply chain from processing the orders faster and more efficiently.

WPG was placing orders through a special Intel Web portal service using a Web order management system. Although this Web portal improved information flow between Intel and its trading partners, it didn’t maximize efficiency gains for buyers. For example, entering incorrect product codes, pricing details, delivery dates, order quantity, and similar data can cause unnecessary exception handling. The objectives of this B2B integration for order-to-payment automation are to deliver value to Intel’s and WPG’s trading partners in the supply chain network, to achieve efficiency improvements through streamlined processes, and to provide better customer service through reduced human errors and lower response times.

Forming Cross-Functional Project Teams

With the business objectives defined, Intel and WPG formed internal cross-functional teams who collaborated on the deployment of RosettaNet Order Management cluster PIPs. These teams established project plans and resources, and defined key milestones. Teams communicated regularly to discuss requirements and issues, and they also conducted project reviews. Figure 1 and Table 1 show the generic project team structure with roles and responsibilities.

Table 1. Roles and Responsibilities

Role	Responsibilities
Program Sponsor	Set objectives and expectations. Review and approve budget. Allocate resources. Escalate and resolve conflicts.
Program Manager	Manage and coordinate project. Facilitate project activities. Manage budget. Update project status to sponsor.
Business Functions	Define business requirements. Manage domain experts (process). Process change management and training.
Information Technology	Define infrastructure requirements. Set up and test infrastructure for gateway and data transfer. Provide technical support.
Business Application	Define ERP system requirements. Set up and test system for RosettaNet transactions. Provide application support.
Business Process	Define process requirements. Map and analyze process. Monitor business process improvements.

Work Flow Automation

RosettaNet improves the lines of communication between the trading partners through the extensive use of XML, so that we can share business information regardless of the hardware and/or ERP systems on either end. The standardized format and content enable data processing automation that results in a shift of human focus from managing transactions to managing exceptions.

The order-to-payment processing activities are streamlined as shown in the following charts. Figure 2 gives an overview of the Intel and WPG integration. Later figures provide descriptions of each part of the process before and after deploying each RosettaNet PIP.

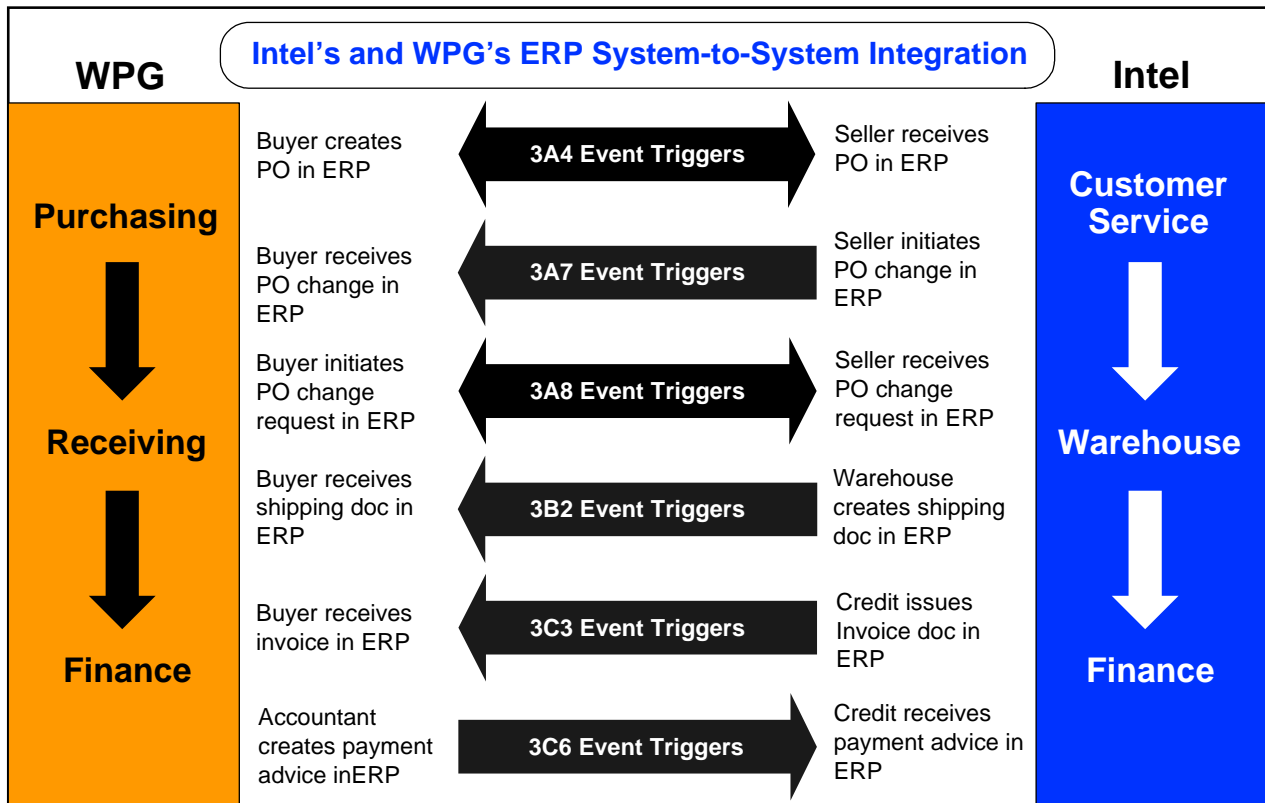


Figure 2. Scope of case study: B2Bi for Order-to-Payment

Request Purchase Order (PIP 3A4)

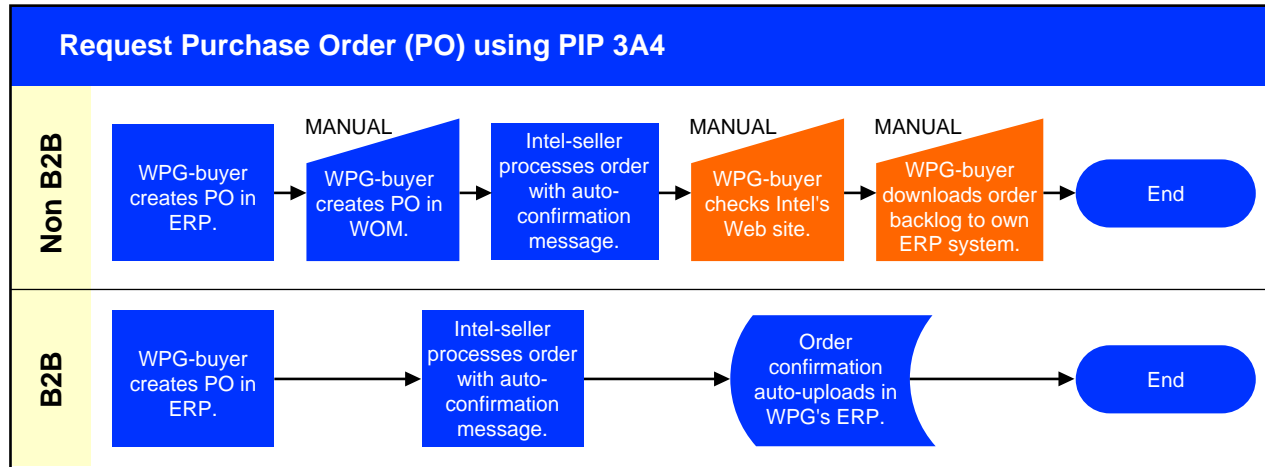


Figure 3. Request Purchase Order

Before B2B integration: The WPG-buyer had to re-enter the order through Intel's Web site. In addition, the WPG-buyer had to refer to Intel's Web site for order confirmation status and had to conduct weekly batching to pull the order status information into WPG's ERP system manually.

With PIP 3A4: The processing steps are simplified to placing orders and receiving order confirmations directly, in WPG's ERP system. This eliminates dual data entry (DDE) in a Web portal and also improves order response time from a weekly download to real-time information.

Overall efficiency between Intel and WPG = 13 hours per week gain
(yield of 67 percent timesavings per line item)

Request Purchase Order Change (PIP 3A8)

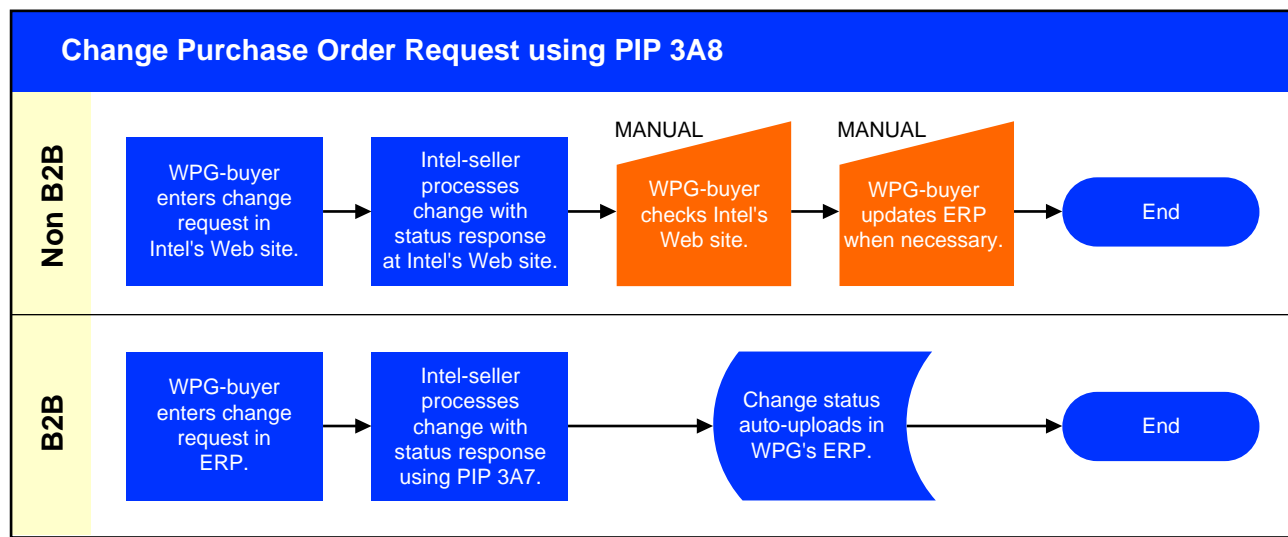


Figure 4. Request Purchase Order Change

Before B2B integration: Making changes to an existing order—such as changing purchase order (PO) quantity, requested delivery date, or Intel part number—was cumbersome. WPG would log in to Intel’s Web site to update the requests. The Intel-seller would review the change requests and, if Intel could accommodate them, update Intel’s ERP system.

With PIP 3A8: The RosettaNet change order process is an automated closed-loop with an automatic response from Intel. WPG now enters changes into its own ERP system, and then triggers the 3A8 PIP. The Intel system responds with a 3A7 notification (see Figure 5) that WPG loads directly into its ERP system.

Notify of Purchase Order Update (PIP 3A7)

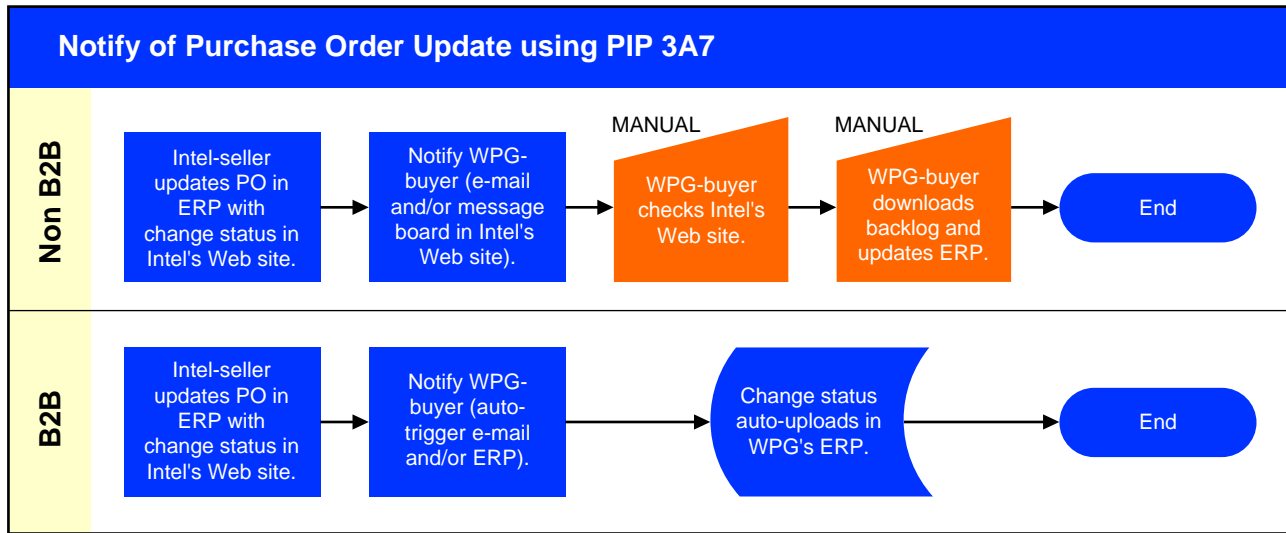


Figure 5. Notify of Purchase Order Update

Before B2B integration: If Intel updated any order details in its ERP system, it would notify WPG of the changes. The WPG buyer would then manually download the information from Intel’s Web site and update the changes in WPG’s ERP system.

With PIP 3A7: Intel’s systems now automatically upload purchase order change status into WPG’s ERP systems. Instead of a once-a-week manual download, WPG now has near real-time order status information. This prompt information saves time by removing manual work and also enables WPG to make better decisions regarding inventory management.

Overall savings between Intel and WPG = 4 hours per week
(56 percent timesavings per line item)

Notify of Advanced Shipment (PIP 3B2)

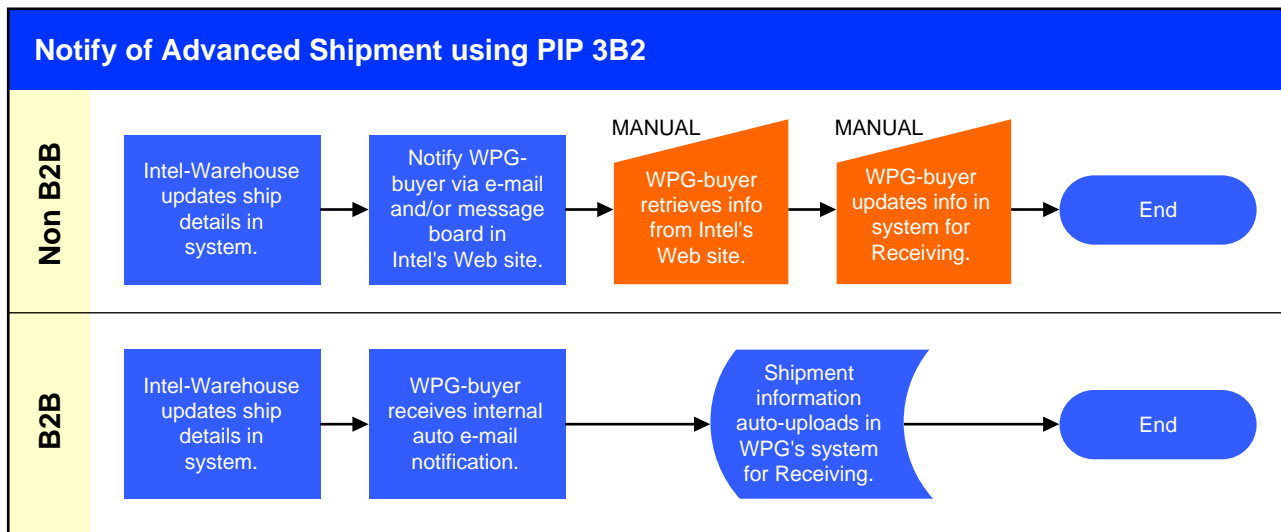


Figure 6. Notify of Advanced Shipment

Before B2B integration: WPG had to manually pull the shipment advice information from Intel's Web site and manually transfer the data to its internal receiving system.

With PIP 3B2: The advance shipment notice is uploaded into WPG's internal system with real-time information.

Overall savings between Intel and WPG = 2 hours per week
(50 percent timesavings per line item)

Notify of Invoice (PIP 3C3)

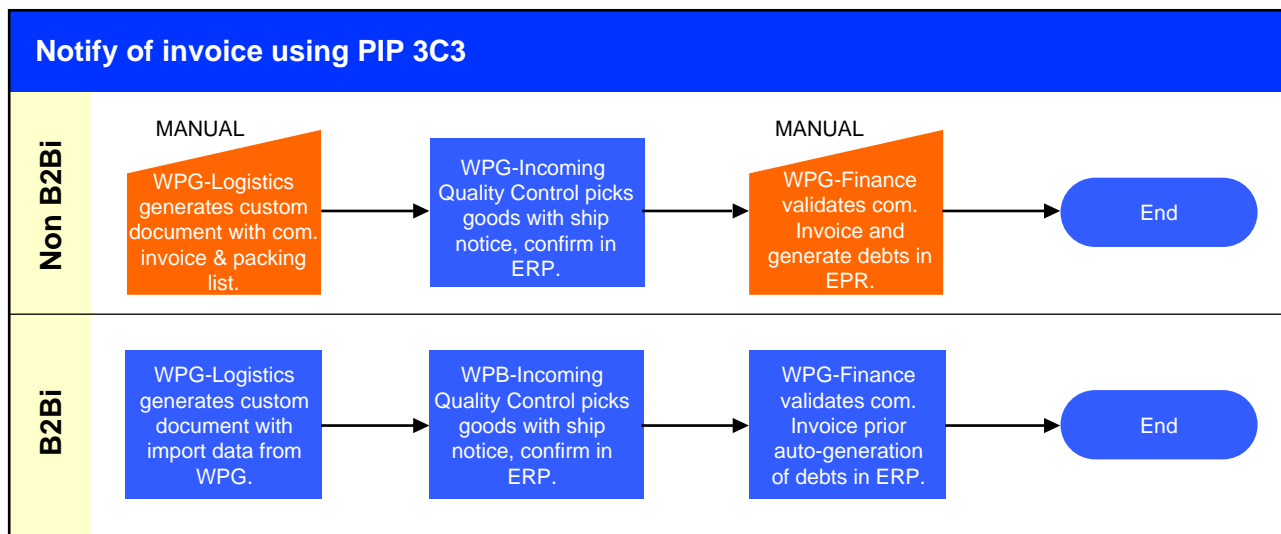


Figure 7. Notify of Invoice

Before B2B integration: Upon receiving a shipment with a commercial invoice and packing list, WPG's Logistics group had to manually generate a Customs document, which normally took three to four hours, during which time the shipment had to be held. After the paperwork was ready and the goods had cleared Customs, WPG's internal quality control had to confirm receipt of the goods into its ERP system. Only then could WPG's finance group validate the invoice and generate payment.

With PIP 3C3: WPG logistics can generate the Customs document earlier, using imported data. This shortens the holding time to just one to two hours, letting Customs clear the shipment promptly. When the shipment has cleared, WPG quality control confirms goods receipt in the ERP system, and WPG finance can automatically generate outstanding debt in the ERP by pressing a single button after validation (see Figure 6). WPG and Intel have moved away from hard copy invoices, removing the need for administrative and outsourced services such as printing, mailing, and filing of hard-copy invoices.

Overall savings between Intel and WPG = 2 hours per week
(70 percent timesavings per line item)

Notify of Remittance Advice (PIP 3C6)

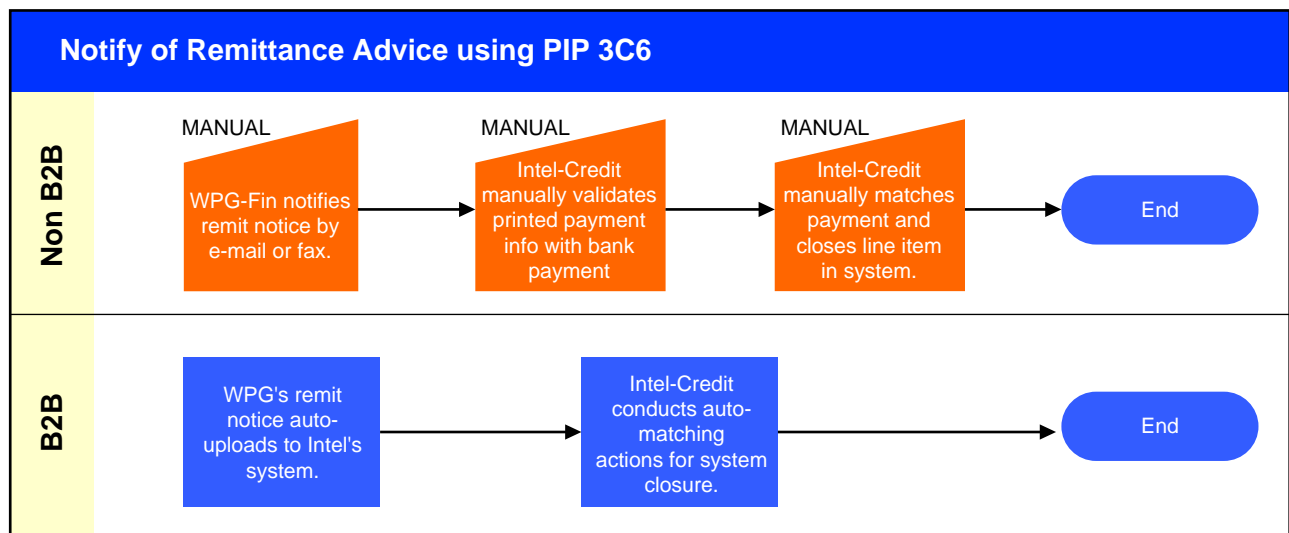


Figure 8. Notify of Remittance Advice

Before B2B integration: Payment creation at WPG and the payment collection at Intel were processed manually. Intel Credit, a finance department at Intel, had to manually match payment information, line item by line item, and enter them into Intel's payment system.

With PIP 3C6: WPG automatically uploads the remittance advice into Intel's system. WPG now implements the invoice PIP to automatically generate remittance advice in its back-end systems. Intel is moving away from manual matching to automatic matching through business process re-engineering (BPR) to automate the payment process.

Overall savings between Intel and WPG an average
of 50 percent timesavings

Business Process Re-Engineering

In this project, both companies carried out two major BPR activities to automate information flow for order-to-payment processing, Intel and WPG had to examine their current business processes and identify the disconnects that prevented them from achieving desired results. Pinpointing these disconnects provided both companies with an opportunity to re-engineer their processes so they could better use RosettaNet PIPs.

Change Order Management (PIPs 3A7, 3A8)

When deploying PIPs 3A7 and 3A8, synchronizing line items between two independent ERP systems is a known concern. Splitting line items into multiples in either system increases the number of manual interventions and communications required to match up the two systems, especially during the initial pilot phase.

Intel and WPG collaborated to resolve these issues and conducted business process and back-end re-engineering work to support change order management on RosettaNet, as shown in Figure 9. (See Appendix A for a checklist developed to evaluate readiness to implement 3A7 and 3A8.)

Intel and WPG adopted three matching criteria—PO number, buyer line-item number, and customer partner number (CPN) or global trade item number (GTIN)—to upload Intel’s change status into WPG’s system. If WPG has to split the line request, it flags the split

request in the comment field, which alerts Intel to trigger PIP 3A7. Supporting the request this way prevents both trading partners from splitting lines at the same time, which can cause a breakdown in line-item synchronization. For new line items Intel must create, the two companies agreed upon a format for the next split-line item number. In all cases, WPG can choose to auto-upload the data or verify it first.

Exceptions that must be validated prior to upload include:

- Newly added line items that failed matching criteria.
- Change in part number (Intel cancels the original line and adds a new line to reduce such exceptions).
- Cancellation of line items (Intel responds to acceptance of line cancellation with “Reject” and “Invalid Fulfillment Code”).

This process works automatically whenever the split-line request is supported. Where it is not supported, PIP 3A7 is not triggered because the ERP data does not change. For these cases, WPG refers to Intel’s Web site to verify that the request was rejected. WPG also receives a weekly backlog status report. Intel is currently exploring ways to trace these problems and close the loop for change requests.

WPG’s back-end system has the capability to capture PIP 3A8 requests with existing and new quantities and delivery dates. Thus, WPG does not need to change back to the original quantity and delivery date when the change request is not supported.

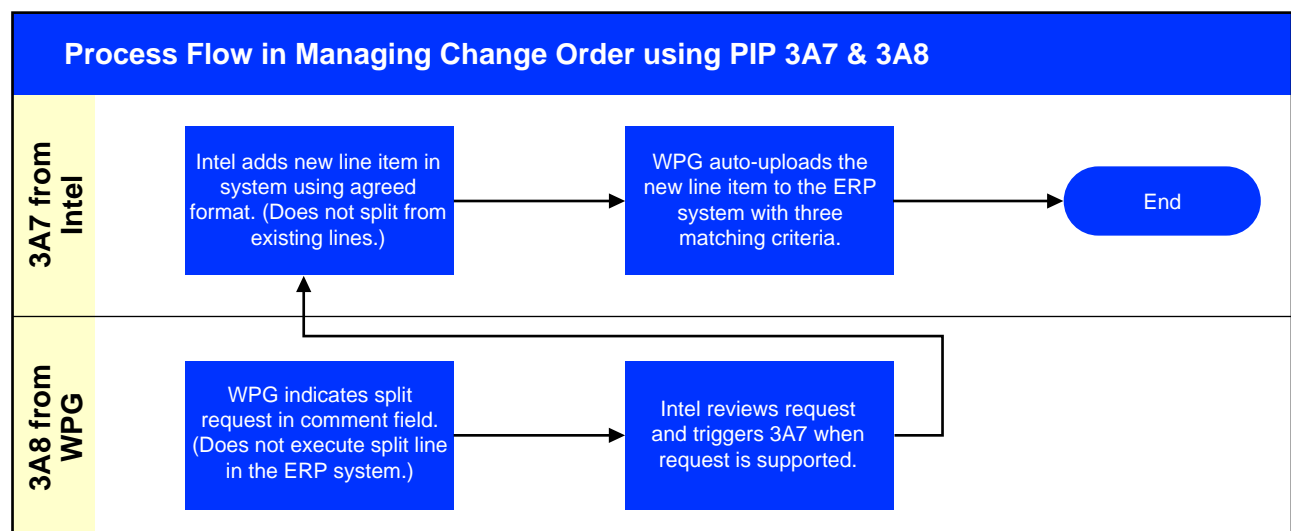


Figure 9. Change Order Management

Payment Collection Management

Both WPG and Intel have implemented PIPs 3B2 (Notify of Advance Shipment), 3C3 (Notify of Invoice), and 3C6 (Notify of Remittance Advice) for system notifications, auto-generation of Customs documents and outstanding debts in their ERP systems, and automatic matching of remittance advice. This back-end automation has eliminated several manual processes:

- WPG no longer needs faxes or e-mails remittance advices to Intel.
- Intel no longer needs to manually verify ERP payment amounts by matching them with amounts on the printed copy.
- Intel no longer manually offsets each line item as per the remittance advice for closing a transaction within Intel's ERP system.
- Both WPG and Intel no longer print, sort, mail, and file hard-copy invoice documents.

This change of business processes has brought several benefits in addition to efficiency gains:

- Delivery and Customs-clearance cycle times have been reduced by 50 percent with automatic generation of Customs documents.
- Eliminating hard-copy invoices (based on allocation study with one trading partner) has realized annual savings of \$1,000.
- Intel is seeing shorter debt and payment processing times with automatic generation of remittance advice.

Future Extensibility

Intel and WPG continue to work closely to examine their current business processes and have identified areas to explore for re-engineering.

We identified several key processes as a result of the RosettaNet deployment.

Close the Loop on Unsupported PIP 3A8

Intel and WPG are exploring opportunities to reduce the current 10 percent manual workload that WPG devotes to handling unsupported purchase order change requests. This currently results in frequent referrals to Intel's Web site whenever change orders are not supported.

Improve Pickup and Delivery Time

Current integration of shipment notice and invoice at WPG generates a Customs document once a day. WPG and Intel are assessing whether they can also integrate invoice unit price as near-real-time information, letting them generate the Customs document prior to a shipment's arrival. This would eliminate holding time for Customs clearance and thus shorten the delivery cycle. Instead of simply importing data on a regular basis, WPG is also working with its shippers to integrate RosettaNet for accurate and real-time shipping orders that can lower total delivery time. This also has the potential for better optimizing truck loads, lowering shipping prices, increasing efficiency, and speeding response.

Implement Electronic Payments

Now that Intel has successfully integrated payment advice with WPG, our next step is to look into implementing RosettaNet's payment program (<http://www.RosettaNet.org/Payment>), which is still under development. We hope to automate the reconciliation of accounts receivable by RosettaNet integration with our banks using PIP 3C6. We believe the RosettaNet payment program can save time, reduce costs, and improve customer satisfaction by eliminating manual processes.

Automate Notification of New and Obsolete Products

Our ability to electronically distribute new-product and product-discontinuation information enables WPG to explore re-engineering processes that will revise outstanding POs automatically and eliminate manual updates.

What We Learned

After its initial success deploying RosettaNet standards, Intel and WPG expect to easily integrate their B2B processes with those of other customers and suppliers who have also adopted the RosettaNet standards. Such integration will allow both companies to offer more value-added services and create an even greater business advantage. Here are some of the key things we learned during our initial RosettaNet deployment.

Team Commitments

Intel and WPG had regular discussions to understand the level of disconnect and ways to fill the gaps for an effective B2B integration. The working relationship was

strengthened tremendously through the Taiwan InterOperability Fest, an event hosted by Intel to accelerate proliferation and adoption of RosettaNet standards within the supply chain. Both teams collaborated on test scenarios to support gap analysis and are willing to make improvements, with extended monitoring periods to resolve issues.

Internal Process Review

Intel and WPG realized the weaknesses of the previous transaction process and incorporated the RosettaNet standards to conduct an objective and decisive check-up of overall internal processes. The review laid down a solid foundation for implementing automatic processes.

The Need to Compromise

The need for private, customized processes limits the extent to which we can use RosettaNet's full potential. It also indicates that even where we can integrate the technology and the business processes, we can never eliminate all inefficiencies. However, the integration that we have achieved so far gives both Intel and WPG a strong foundation on which to re-engineer or refine our internal private processes and to realize greater business value from the RosettaNet deployment.

Infrastructure

Both Intel and WPG have in-house engineering teams to tackle and resolve deployment issues within their control. This helped to reduce the turn-around time to close known issues. We also developed various methods to track any unsuccessful XML messages and to ensure that communications did not break down during this integration. Intel provided RosettaNet call center support to internal and external customers to help provide a stable electronic data-exchange environment.

Successful B2B Integration

Intel and WPG have reported efficiency gains in the Order Management PIPs implemented to date. The resources freed up through B2B integration can be used for other productive work, with the capability to handle more accounts when required. We can now apply these lessons to other trading partners at a much faster pace than if our implementation processes were not based on RosettaNet standards. Hence, we can spread the initial expense across multiple accounts in our supply-chain network.

Business Value

Automated workflows clearly demonstrate that Intel and WPG are reaping substantial benefits by replacing manual order-to-payment processing activities with RosettaNet clusters. In addition to direct financial and operational measures, such as transaction cost and throughput, we see indirect benefits as well, including faster decision making in supply chain management.

Process automation lets both Intel and WPG improve efficiency in procurement-to-payment processes. We hope to eventually extend this type of automation and the resulting efficiencies to order fulfillment, customer service, and other supply-chain processes.

By re-engineering business processes and implementing RosettaNet PIPs, WPG and Intel have reduced manual intervention to handling only exceptions, and realized an average of 60 percent gain in efficiency as measured by faster data processing turnaround in the order-to-payment process. Here are some of the immediate benefits.

Faster data processing with higher data integrity:

- **More efficient workforce.** Automation lets us eliminate numerous manual processes, including redundant re-keying of data received over phone, fax, and downloading of external Web site data into supporting ERP systems. Confining human intervention to handling exceptions has reduced the number of work-hours required to keep business transactions moving.
- **Reduced communications costs.** By eliminating expensive and time-consuming communications over e-mail, telephone, and fax, we have reduced the overall cost per transaction. Information is now sent directly and proactively to the trading partner's system instead of that trading partner having to specifically request or download the information.
- **Fewer errors.** By removing manual and redundant processes, WPG and Intel have reduced the probability of errors that could lead to incorrect orders and potential product returns.
- **Eliminated dual data entry in the order process.** WPG now enters new order requests only in its own ERP systems, with no need to re-enter orders through Intel's WOM system.

- **Faster, more efficient payment process.** Intel and WPG are moving from manual payment processes to full automation in their back-end systems. We've also reduced manual paperwork by eliminating hard-copy invoices and the need to manually match and reconcile invoices to payments and shipping data. Intel's credit system does this automatically.

Faster response:

- **Removal of batch processing.** WPG receives order confirmation and change order status directly into its ERP system in near-real-time, as compared to previous weekly downloads from Intel's Web site to WPG's ERP system. The improved availability of information has enabled faster and more accurate business decisions.
- **Improved communication.** The system sends automated alerts about the arrival of critical information such as order or payment status, thus shortening the communication loop.
- **Reduced lead times.** Eliminating redundant operations and batching transactions has reduced processing times, making both companies more responsive. The availability of more up-to-date information allows faster and more accurate business decisions. Reduced order-management lead time translates into shorter invoicing times and faster payments.
- **Improved inventory management.** With shorter order lead times, WPG can lower its inventory levels and reduce costs.
- **Reduced pickup and delivery times and faster response.** Having complete and up-to-date information helps shorten total delivery time, letting logistics providers respond to changes and exceptions and modify their shipping plans faster, reducing delays.

This successful deployment has also realized some of the "business visions" identified earlier, including increased visibility across the entire supply chain, faster response to customer requests, and improved efficiency.

Conclusion

RosettaNet has great potential as an industry standard. A private business-to-business RosettaNet deployment, such as the one described in this paper, demonstrates that potential even where it does not take full advantage of it. Although we saw some inefficiencies when the technology and the processes were not sufficiently integrated, Intel and WPG took the opportunity to re-engineer and refine internal processes to maximize the business value of our RosettaNet deployment.

Both Intel and WPG significantly improved operational efficiency and accuracy after implementing B2B integration using RosettaNet. Our business process re-engineering resulted in an average 60 percent efficiency gain in order-to-payment processes to date. Intel and WPG now see faster data processing with higher data integrity, improved response time, and fewer delays. Intel has realized savings by not having to support a variety of nonstandard systems, both hardware and software, with different suppliers and customers in the supply chain.

RosettaNet benefits will accelerate over time with more deployments across the entire supply network (end-to-end) using unified, interoperable solutions. Intel and WPG expect to see improvements in production planning, with better inventory management and shorter forecast-to-cash processing cycles. We have taken advantage of the smooth, error-free procedures to strengthen response capabilities and achieve increased customer satisfaction.

As we proliferate the RosettaNet processes to more of our trading partners, we expect even greater benefit. Even a two-hour timesaving can make a significant difference when you multiply that times the number of trading partners.

Acronyms

B2B	business-to-business
B2Bi	business-to-business integration
BPR	business process reengineering
CPN	customer partner number
DDE	dual data entry
EDI	electronic data interchange
ERP	enterprise resource planning
GTIN	global trade item number
PIP	partner interface process
PO	purchase order
WPG	World Peace Group

Checklist to Evaluate Change Order Readiness using RosettaNet (PIP 3A7/3A8)

Actions required to implement PIP 3A7

Ensure that a system is in place to upload PIP 3A7 response into buyer's ERP with:

- Three matching criteria: PO #, buyer line item #, and CPN/GTIN.
- For any change in CPN/GTIN, seller cancels original line and adds new line.
- For a new line added by seller in PIP 3A7, trading partner can choose to auto-upload into the system or verify in sub-system prior to upload execution (buyer and seller have to agree on the format of next split-line item number).
- For an unmatched line item, notify buyer by e-mail or any other means, in order to carry out verification in sub-system² prior to upload execution.
- For a line-item cancellation, Intel-seller responds to acceptance of line cancellation in "Reject" with "Invalid Fulfillment Code." Buyer has to manually update its ERP system when reject acknowledgement fails to auto-upload.

Actions required to implement PIP 3A8

Ensure that a system is in place to notify buyer on PIP 3A8 status, instead of referring to Intel's Web site:

- Refer to PO number and line item number (instead of change order record (COR) number, as in Intel's Web site).
- For a split-line request by buyer, do not execute in the system but enter split request in the comment field as "<Line Item><Free Text>."
- For an urgent and unsupported PIP 3A8 request, the buyer must refer to Intel's Web site to view the support status.

Establish additional fields or different PO version to capture request with new quantity and new date, so that the request data does not have to be changed back to the original when PIP 3A8 is not supported.

² Note: Sub-system may be a program within ERP or any other means.

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