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The Spectrum of Risk Management in a Technology Company

## Managing Goods and Services Acquisition Risks

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## ABSTRACT

In this paper we look at risk from the total supply chain perspective with the realization that there are inherent risks at every stage of the supply chain. Although we cannot control all the risks, we may put methods and tools in place to help mitigate risks, especially in the areas that require the most focus. We outline effective tools used at Intel to reduce risks in the supplier sourcing process, prevent the risk of business interruption, and moderate risks related to currency fluctuations in the capital equipment purchasing process. We conclude by demonstrating how risk management may be applied across a diverse organization, in this case Logistics, resulting in not only risk mitigation, but also in a continual cycle of process improvements, increased efficiency, and cost savings.

## INTRODUCTION

For the Intel manufacturing and supply chain to execute and deliver product to our customers, we require goods and services from a diverse and wide range of suppliers around the globe. These goods and services encompass a) manufacturing equipment that includes Fab/Sort (F/S) and Assembly/Test (A/T) tools including associated spares and in some cases services for installing and maintaining these tools; b) materials that include F/S and A/T production materials as well as materials for supply chain packaging and shipping; c) capacity subcontracting; d) warehousing subcontractors; e) freight forwarders and integrators; and f) miscellaneous, an array of other relatively minor goods and services that are vital to our functionality—for example, the laundering of clean room or “bunny” suits.

Our environment within the total supply chain is both complex and dynamic with old risks morphing and new risks appearing over time generating an infinite number of

things that can go wrong at any given moment. We cannot control risks such as natural disasters, but we can minimize their impact by having proactive plans in place. Other risks we can control, but we first must identify them in order to put proactive mitigation measures in place, such as capacity options to reduce equipment lead-time [1]. The challenge, given finite resources, becomes what to focus on at any given time. This requires constant vigilance and discipline to implement and monitor the effectiveness of controls across the supply chain so we may effectively manage significant risk areas. If we don't do this well, the consequences could be serious and costly resulting in an interruption of goods and services flow within the supply chain.

Once risk areas are identified and prioritized, dealing with them is a matter of using world-class tools and methods for creative supplier and logistics management. Figure 1 highlights various tools and methods that Intel employs to help mitigate risks in both the pre- and post-buy phases of the procurement cycle.

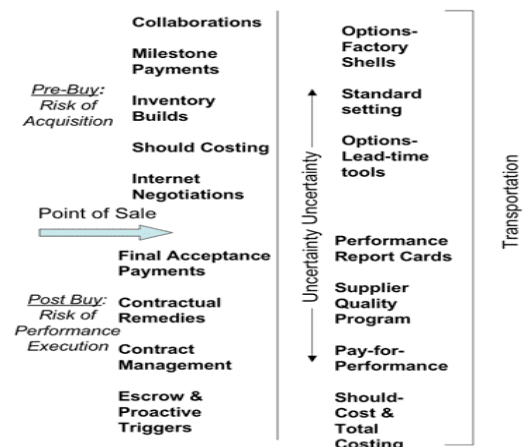


Figure 1: Risk mitigation tools and methods

In this paper, we highlight several high-risk areas that Intel currently mitigates and showcase the tools and methods used to address those risks. We first look at the specific tools used to deal with procurement risks and the support continuance risks posed by high-risk suppliers. Then, methods used to address currency fluctuation risks when buying equipment are explained. For the remainder of the paper we focus on how risk management may be effectively applied across the supply chain to minimize logistics risks.

## Reducing Procurement Risk Through Internet Negotiations

More than five years ago, Intel Corporation decided to introduce Internet negotiation tools and processes. Intel's intent was to determine what benefits such tools would bring into our strategic sourcing efforts, especially in the area of cost savings, and how we could use these new tools and processes to complement traditional negotiation methods at Intel. In addition to cost savings, Intel improved process efficiencies [2] through reducing risks inherent to the sourcing process.

Internet negotiations at Intel comprise two capabilities: eRFX and On-line Negotiation Events or ONEs. Other companies sometimes refer to ONEs as eAuctions. eRFX is the on-line execution of RFX; i.e., Request for Proposals (RFP), Quotes (RFQ), or Information (RFI). ONEs have been used at Intel since 2002. eRFXs, on the other hand, were introduced at Intel in 2006, and are really just establishing a foothold in the Corporation.

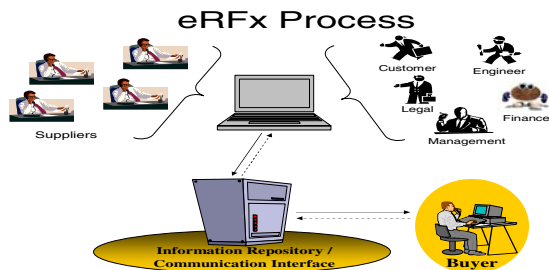
Before providing ONE and eRFX details, it is important to discuss the program infrastructure that has made Internet negotiation tools successful at Intel. Experts (White Belts) exist at the Internet Negotiations Program Office and within each of the Materials organizations. Formalized continued training and regular forums to discuss key lessons of recently completed events are fundamental components of the program. White Belts generally work directly in the Materials organizations they support. A strong White Belt community is critical in ensuring a successful Internet Negotiations program as it is the true caretaker of the program. Black Belts possess the highest level of expertise and are less common within the organizations because of the extra requirements, such as the ability to support ONEs or eRFXs across different commodities in various Materials organizations. Both sets of experts assist in reviewing market conditions and respective specific supplier bases. They act as resources for event setup and as strategic sourcing consultants. Successful ONEs are optimized by the strategies employed for each event as guided by these experts (see the section on On-line Negotiation Events later in this section).

As stated, eRFX is the on-line execution of RFX. eRFX introduces many efficiencies into the traditional RFX process. Among these efficiencies are standardized or customized templates, the ability to copy (and modify) past events, automated scoring, more accurate supplier responses, a data repository, audit trails, and the ability to easily evaluate multiple responses.

The use of standardized templates, customized templates, and even the use of past eRFX events (changing and improving specific items as necessary) to create a new eRFX eliminates or reduces time spent developing a standard RFP, as traditionally completed by a commodity manager or buyer. When developing an eRFX, the scoring of potential supplier responses can be automatically executed with the proper upfront planning amongst the commodity team. In fact, the process enforces this discipline in upfront planning. This eliminates after-the-fact discussions over scoring rules and allows for quick and efficient eRFX scoring. Additionally, suppliers are not able to provide incomplete eRFX responses. This ensures all suppliers provide complete responses, which eliminates the need to compare incomplete RFXs against fully completed RFXs, as is sometimes common with traditional RFXs.

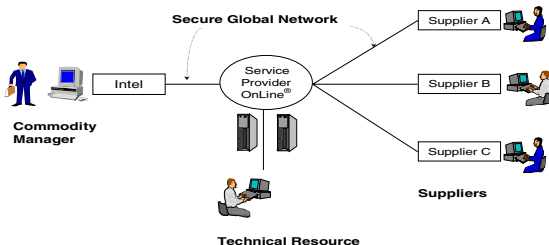
Further efficiencies are introduced with the use of a common data repository. An Intel engineer needing to submit a diagram as part of the eRFX is able to log into the document and place it there directly. Suppliers deposit their responses and any required attachments into the eRFX document as well. Additionally, potential suppliers may submit questions within the eRFX document for the entire commodity team to see and answer. With all these items being inserted, moved, and changed, a complete audit trail is not a bonus but a necessity. Commodity teams can view who logged on, when they logged on, and what they did. All actions by all parties are completely visible. Taken together, these capabilities enable the commodity team to send, receive, and evaluate more suppliers than they could evaluate using traditional RFX methods. Figure 2 shows a high-level depiction of this process.

Before delving into a more detailed ONE discussion, it is important to point out that Intel's ONEs are performed with only qualified suppliers. We do not allow just any provider of materials or services to participate in them. Equally important is that these ONEs are carried out with total cost factored on-line, or executed as price-only events with other total cost factors pulled in after the event. The total cost consideration is foremost in these events just as it is in traditional negotiations conducted at Intel.



**Figure 2: eRFX—enables communication with multiple suppliers and multiple internal partners in a controlled auditable environment**

One of the main differences between ONEs and traditional negotiations is that a ONE is a single negotiation executed simultaneously with multiple suppliers (see Figure 3). Just as with eRFX, sourcing professionals are able to use templates or copy and modify past ONEs. This reduces some non-value added work and allows the commodity manager or specialist to concentrate on sourcing strategies. Actual negotiation time is reduced from days or sometime weeks (in traditional negotiations) to 20-30 minutes (for almost all ONEs at Intel) because of early-in-the-process work completed by both the commodity team and the suppliers. The actual event itself eliminates emotions from the negotiations by its very nature. Additionally, ONEs allow Intel's private market to dictate what price it can actually bear.



**Figure 3: ONE—enables procurement professional to negotiate with multiple suppliers simultaneously thus shortening the negotiation timeframe**

Our benchmark studies have shown that we are usually able to achieve cost savings of between 7% and 24% per ONE executed over traditional negotiation methods. A word of caution here is necessary. ONEs are most successful in a supply unconstrained market with multiple potential sources of supply. The larger the number of bid participants, the better the opportunity to see true market dynamics. We saw this in the case of a recent furniture supply ONE where our supply base for the event included more than half a dozen qualified suppliers. In this case we were able to achieve cost savings of 50%. We are even able to achieve cost savings, albeit smaller ones, in a

supply-constrained market. This is where our White and Black Belt experts come in: they help with specific event strategies based on commodity-specific market conditions in order to ensure success. In some cases, review by the program experts results in recommendations of executing traditional negotiations. As mentioned earlier, Intel's intent is not to use ONEs to replace traditional negotiations but to complement them. Although Intel achieves cost savings using Internet negotiations ONE tools and processes, it is essential to point out that the process efficiency benefits are equally important.

These tools and processes are not without some issues. A complaint among new users is that the tool itself is not completely user-friendly. There is some training required and some ramp-up time is necessary. However, after a couple of events (eRFX or ONE), the end user is able to start pulling together their own eRFX or ONE. Reliance on a White Belt diminishes dramatically after consistent use. We have seen this occur in many commodities. Another initial-user issue the Internet Negotiations Program Office encountered is initial resistance to its use, particularly in the case of eRFXs. This is because eRFX demands discipline in executing up-front work sometimes relegated to the latter portions of a traditional RFX. This issue is overcome after the user completes several eRFXs and realizes that the up-front work pays off in better, more efficiently executed eRFXs.

What experienced users find with Intel's Internet negotiation processes and tools is just the opposite of what one might expect when it comes to supplier relationships. Specifically, supplier management and supplier relationships must be stronger especially when it comes to executing ONEs with established and qualified Intel suppliers. The up-front work required of the commodity team translates to smoother execution of eRFX events or ONEs. This early work requires good communication with our qualified suppliers. In fact, a twenty-minute ONE event requires solid before-bid-day communication with these suppliers. We have to ensure suppliers know exactly what is being offered for bid, any portioned allocations (by month, quarter, or year), lots (by time or geography), and total cost factors. Suppliers need to be comfortable with everything, from how they will log into the system and post bids to how the commodity will be allotted (for winning bids, second-place bidders, etc.) to various clarifications regarding the bid process itself. In short, the ONE process requires discipline in up-front planning and solid communication with suppliers in order to be able to execute a 20- or 30-minute ONE. Internet negotiations at Intel do not guarantee large cost savings as we have seen in some supply-constrained, price-pressured market conditions where margins may already be compressed; however, they do guarantee discipline and therefore

provide consistency and less variation in the sourcing process.

## **PROTECTING AGAINST RISK OF SUPPLIER SUPPORT CONTINUANCE**

Another Universal Business Risk that Intel strives to mitigate is business interruptions. Escrow accounts are utilized to minimize potential risks to factory production that are due to a supplier becoming financially unstable or failing to provide adequate support for his or her manufacturing equipment and software. These accounts contain critical supplier intellectual property to sustain the customer's manufacturing environment. Account contents should include all necessary documents and/or software source code to allow complete self-sustaining support. In this section we explore some of the issues with effectively utilizing escrow accounts as a risk mitigation strategy, and offer some new innovative solutions. No disruption to production is our ultimate goal, and our hope is to never require access to the escrow account contents. Suppliers can benefit by establishing these accounts to ensure uninterrupted supply, which can lead to securing initial or future business.

Having third-party escrow accounts in place has created a false sense of security. Escrow account contents cannot be obtained when required, which impacts the ability to mitigate potential risks to production.

Intel has encountered instances where escrow accounts could not be accessed after a supplier filed for bankruptcy. Most courts protect creditors in bankruptcy situations and do not allow any account contents to be used if obtained within 90 days prior to the filing for bankruptcy.

When a supply disruption occurs, many issues need to be resolved. Manufacturing equipment spare parts inventory must be micromanaged to ensure adequate supply to each factory. Alternative sources for supply of the spare parts must be identified and qualified. The inability to access contents of an escrow account during a supply disruption makes sourcing of manufacturing equipment spare parts difficult (especially when patents are involved or the parts are manufactured internally by the supplier). Service expertise must also be available to resolve any issues with manufacturing equipment.

In response to situations where escrow account contents could not be obtained when needed, a team was formed to develop new ideas on how to deal with these issues. As a result of this effort new methodologies were developed for managing at-risk suppliers. The team developed proactive financial and performance triggers to access account contents prior to a supply chain issue.

High-risk proactive financial ratios were defined to allow the release of account contents in advance of bankruptcy. The ratios are net operating cash flow divided by current liabilities less than 10%, return on equity (net equity divided by total equity) less than 0%, earnings before interest, taxes, depreciation and amortization (EBITDA) divided by interest expense less than 1, and retained earnings divided by total assets 0%. Accounts are structured so that contents are released if any of these high-risk ratios are met.

Release of account contents based upon the proactive financial triggers allows time to address supply-chain issues and avoid any disruption to production. Based upon previous experiences where account contents could not be accessed, having these triggers in place would have allowed release of the account contents at least a year in advance of the supplier filing for bankruptcy. Having this time to source and qualify parts would have been a big advantage in minimizing or eliminating the potential risk.

In order to effectively use the proactive financial ratios, financial statements must be provided by the supplier on a timely basis to determine if ratios have been breached. If financial statements are not provided as agreed upon, account contents must be released to the customer.

It is also critical that favorable release conditions are negotiated with both the supplier and the third-party escrow account agent. The third-party escrow company must be able to ship the account contents as soon as the customer provides documentation that a release condition has been met. Any issues that arise from releasing the account contents must be worked independently by the customer and supplier (after the release has been made). Any delay in releasing the account contents takes time away from pursuing solutions to mitigate risk.

If performance release conditions are used they should be customized to the unique supplier and situation. Release conditions must be based upon the potential high-risk issues that would require immediate access to the account contents. An example might be a performance trigger of not meeting on-time delivery. Release conditions can also be defined with a specific amount of time for the supplier to resolve the breach before account contents are released.

Obtaining a license for the account contents is vital. It needs to be clearly stated in the escrow agreement that the license cannot be used unless a release condition is met. A license granted up front establishes the right to use the account content (even in bankruptcy situations). The license must also allow the right to make, or have manufactured, any spare parts necessary to service the equipment (even if the spare parts were not included in the escrow account). If a third-party is used to develop and/or

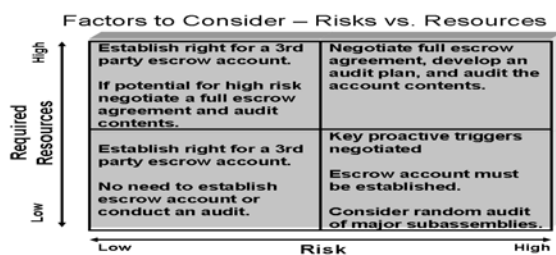
manufacture the parts required, the supplier must help and/or establish a third party as a viable source.

In bankruptcy an automatic stay is granted, which would prevent the release of the account contents. Under the new release conditions, relief from the automatic stay must be granted. This helps to ensure account contents can be released after a filing for bankruptcy.

Proactive release of the account contents is very important with regards to bankruptcy. Anything that is obtained less than 90 days before the supplier files for bankruptcy is set aside, potentially rendering the released account contents within this window useless.

Account contents should include detailed instructions to navigate any account files, which is a step-by-step process to locate purchased parts, manufactured parts, and assemblies. The account should also include spare parts lists, a bill of materials, and specific manufacturing documents (electrical, mechanical, jigs, and special tools), detailed assembly instructions, software/firmware, and manuals for maintenance and training.

Risk versus required resources must be considered when determining what potential account content should be audited (see Figure 4). Both current and future risk should be taken into consideration. A supplier might be financially stable now, but what happens if a substantial amount of revenue is lost due to another supplier being selected for future process requirements? The installed base of tools must continue to be supported with spare parts and service.



**Figure 4: Risks versus resources**

To enable an effective and efficient audit, the supplier needs to understand what the account will contain and the required format. Without proper planning for the audit, it will take a lot of extra time and resources to achieve the desired results.

Holding the account contents internally is being utilized with several suppliers. In one situation, proactive financial ratios were already outside of predefined limits when discussion began to put this type of account in place. Since the proactive financial ratios would not work in this situation, a creative solution needed to be found. The financially unstable supplier ended up providing Intel

shrink-wrapped source code for their software. If there is any disruption to the manufacturing environment as described in the contract, Intel has the right to access and use the source code. Holding the shrink-wrapped software source code is a creative solution to minimize risk with this particular supplier.

Another option to consider is for the customer to hold the account contents internally with the same release conditions as a third-party escrow account. If the contents are held internally by the customer, the account contents must be protected (i.e., lockbox in a bank vault). Account contents cannot be released unless a release condition has been met and the proper authorization has been obtained as defined by the account agreement. This eliminates the cost of a third-party escrow agent.

The above-mentioned innovative concepts have been successfully implemented with Intel suppliers. Accounts have been established with proactive triggers and a mechanism for quick release of account contents, if a breach occurs. Specific terms and conditions have been negotiated with suppliers to limit potential release issues due to bankruptcy. A process has been defined and utilized to ensure effective and efficient account audits are conducted. Implementation of these changes made the escrow account process a viable option to minimize potential supply chain disruptions.

After bankruptcy is filed there is no way to ensure, with 100% confidence, that account contents can be obtained. This is why it is so important for release of the account contents to occur prior to any bankruptcy filing.

The tools outlined in this paper provide the framework for this kind of scenario, but creative solutions need to be identified based upon each situation and supplier. In potential high-risk situations, proactive strategies must be developed to allow enough time to establish alternate sources of supply and minimize risk.

## CURRENCY RISK REDUCTION

The inherent fluctuation in the exchange rate when purchasing a product from a foreign supplier creates a volatile cost structure for the buyer. When buying capital equipment, this volatility could have a significant impact on the expected or planned costs. Capital equipment pricing is set either when the contract becomes effective or when a purchase order (PO) is placed, depending upon the type of pricing. Since lead times and fabrication facility (FAB) ramp cycles extend over a one- to two-year period, the average price of a piece of equipment is subject to the volatility of the foreign exchange rate over that period. Based on the historical data shown in Figure 5 this has resulted in an up to 30% swing in pricing. Similarly, the supplier is subjected to the same risk. The

volatility for suppliers affects their revenue stream and income statement, whereas it affects buyers' capital expenses, which are depreciated over time. Both supplier and buyer try to stabilize this volatility and curb the risk to their subsequent revenue and expense items. There are several options to consider to mitigate this risk. Understanding the portfolio of options and applying a disciplined process to select the best methodology results in the most consistent mitigation of this risk.

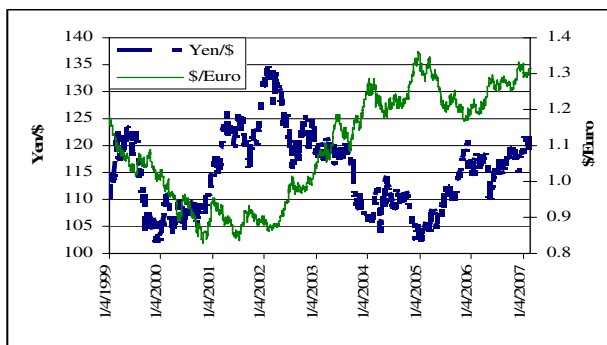


Figure 5: Exchange rate volatility from 1999 to 2007

### Supplier's Currency Pricing

One of the most effective methods of achieving a “win/win” in managing exchange rate risk between suppliers and buyers is the practice of denominating the equipment price in the supplier's local currency. Pricing equipment in the supplier's local currency transfers the risk of currency fluctuations to the buyer. The transfer of risk to the buyer should translate into an equipment price discount greater than or equal to the supplier's hedge cost or value of risk mitigation. The buyer has the ability to eliminate or significantly reduce this risk by hedging. Hedging is the taking of a position; either acquiring a cash flow or purchasing a financial contract, that will change in value and offset a change in value of an existing position. Corporate treasury departments have numerous financial instruments at their disposal ranging from forward contracts and currency options to currency swaps, to perform hedging activities. The procedures used to determine the appropriate financial hedging instrument are company specific and are not discussed here. It is important that whichever financial instrument is used that it be treated as a hedge under accounting rules and not a speculation on foreign currency movements. If the buyer is a US dollar-based corporation, there are specific accounting rules the buyer will need to meet to align the gains and losses from hedge contracts to the fluctuations in equipment prices. There are many benefits to both the buyer and the supplier when pricing is in the supplier's currency. First, buyers can better forecast the equipment purchases required to meet their forecasted production output, and therefore they are better able to meet FAS133 requirements than suppliers. Second, when pricing in the

supplier's currency, currency fluctuations impact the buyer's income statement at the same rate as the underlying asset, which could be between 4 to 30 years—a less immediate volatility than impacting the supplier's revenue, which could have an immediate impact on stock. Also, the buyer could choose to accept a higher level of risk by leaving purchases exposed, if the cost to hedge is prohibitive; suppliers, on the other hand, will be better served by eliminating risk to revenue. Buyers can also choose to hedge after the PO is placed for purchases that are deemed “risky” as the confidence level of the purchase increases; suppliers are required to implement hedges at the time they receive a PO. Additionally, if the credit rating of the buyer is higher than that of the supplier, it results in a lower hedging cost overall. The opposite is true if the supplier's credit rating is greater than that of the buyer. When pricing is in the suppliers' currency, it creates a “natural hedge” for suppliers, since the pricing should match their revenue with a majority of their expenses.

### Buyer's Currency Pricing

Even with numerous advantages in pricing in the supplier's currency, a majority of buyers prefer to have equipment priced in their own currency. By pricing in the buyer's currency, the risk from exchange rate fluctuations is transferred completely to the supplier. This risk can have an immediate impact on the supplier's revenue; therefore, most suppliers would hedge the full amount of the exposure. Unfortunately, hedging revenues do not completely eliminate the risk, because there is no certainty in the sales revenue. In cases where hedged sales revenue doesn't come to fruition due to a cancellation of a purchase by the buyer, the supplier would be required to unwind the hedge and have the effects of the hedge impact their other comprehensive income (OCI) on the balance sheet. Additionally, the lead time of the tools and the credit rating of the supplier would have a significant impact on the cost of those hedge activities, costs that supposedly would be passed onto the buyer in higher equipment prices. There are advantages to contracting equipment prices in the buyer's currency. If suppliers purchase their materials to construct the equipment in the buyer's currency, then suppliers can experience a “natural hedge” between their sales and expenses. Additionally, some buyers prefer to have prices set in their own currency because the systems their corporation uses may not have the ability to support the use of the supplier's currency. Buyers' systems would require a frequent, manual conversion to the buyer's currency if priced in a supplier's currency. Additionally, the procurement organizations of the buyers' corporations may not be as familiar with the suppliers' currency and therefore may not be comfortable negotiating in the suppliers' currency.

Also, if the credit rating of the supplier is stronger than that of the buyer, the supplier can enter into hedging activities at a lower cost than the buyer.

### Combination Currency Pricing (Bands)

Lastly, buyers and suppliers can enter into contract terms whereby equipment is financed in the buyer's currency, but regularly affected by the supplier's currency. Usually the buyer and the supplier agree to a fixed price in the buyer's currency, if the exchange rate is between two predetermined points. If the exchange rate at the time of the PO placement is outside the predetermined points, the price the buyer pays is adjusted, depending upon whether the buyer's currency is strong or weak. This type of pricing is referred to as a currency band (see Figure 6).

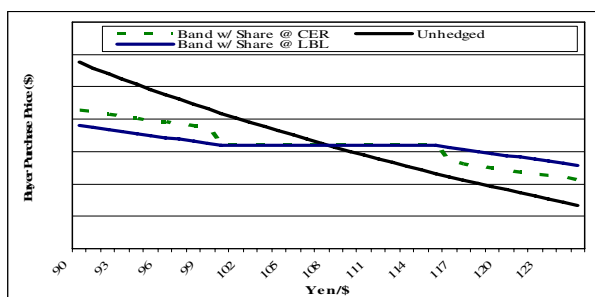


Figure 6: Combination currency pricing example

In the case of a currency band, the supplier is impacted by all fluctuations of the exchange rate while the buyer is not impacted, as long as those fluctuations stay between the band limits. If the spot rate moves outside of the band limits, the impact of the exchange rate is felt by both the supplier and the buyer. The challenge in creating the currency band at the time of the contract negotiation is determining where to place the band limits. Often times, the band limits are set 5-10% away from the spot rate at the time of the negotiations. For example, if the spot rate, or contract rate, is set at 100 Yen/\$ using 10% the band limits would be 90 Yen/\$ and 110 Yen/\$, respectively. As long as the spot exchange rate at the time of the PO placement is between 90 and 110 Yen/\$, the buyer pays a fixed cost, but the supplier experiences a gain or loss depending on whether the spot rate is above or below 100 Yen/\$. If the spot rate is above 110 Yen/\$, buyers pay a lower amount due to the strength of their currency. That amount would be determined by the rate of risk sharing agreed upon by the buyer and the supplier. Since the effect of the currency exchange movement is shared outside of the band limits, neither the supplier nor the buyer is completely impacted by the volatility of foreign currency. In the extreme circumstances where a currency is catastrophically weakened, the risk is borne by both corporations. Additionally, since the price is determined at the time of the PO placement, buyers can lock their price and eliminate their exposure by placing the POs as soon as

they are highly confident of the purchase. This effectively fixes those POs in the buyers' currency, effectively shifting the risk to the supplier until such time as the payment is made. These "early POs" can help the supplier determine future needs to meet the demands of the buyer, and could even help suppliers negotiate their own volume discounts with their sub-suppliers.

### Currency Risk Mitigation Results

There are several variables to consider when choosing a currency risk mitigation plan. Three options are discussed in this paper. Each has been used at Intel when the optimal conditions existed between supplier, buyer, and the macro economy to best reduce the inherent variability in the currency markets. Most recently the supplier currency methodology has delivered the best results for the supply chain. This methodology diverts the risk to the buyer where more flexibility to manage the risk lies, thereby reducing the overall cost to the supply chain. It is important for the supply chain members to understand the portfolio of options to mitigate this significant cost risk and to apply a disciplined process to determine the best solution for the situation.

### ORGANIZATION-BASED RISK MANAGEMENT

As demonstrated previously in this paper, risk management can convey a competitive advantage when applied to specific functions to mitigate risks to business execution. Internet negotiations reduce risks by driving discipline and consistency to the sourcing function, thereby reducing variation in the process. Reducing volatility of currency exchange rates is beneficial both to buyers and sellers. Escrow accounts may be used to minimize the potential risk to the buyer, including risks associated with the disruption to the supply chain.

All these individual functions touch and impact the logistics organization that moves equipment from the manufacturer to Intel, raw materials from suppliers to Intel, semi-finished goods from Intel to Intel, and finished goods from Intel distribution centers to customers.

In the remainder of this paper, we demonstrate how risk management may be taken to the next level and applied across the diverse organization of logistics to mitigate risks to business execution, to drive process improvements that enhance critical success indicators, and to achieve cost savings through efficient and effective controls.

The Customer Fulfillment, Planning and Logistics Group (CPLG) Risk and Controls department was chartered in 1998 to manage risks inherent in a global supply chain. CPLG is a worldwide organization that utilizes internally owned and operated distribution centers as well as third-

party forward staging hubs in Asia, the Americas, Europe, the Middle East, and Africa. The global transportation organization that sources contracts for transportation providers via Internet negotiations and manages these suppliers worldwide resides under the Logistics umbrella. Planners, supply chain strategists, industrial and packaging engineers, information systems experts, hazardous materials specialists, quality analysts, program managers, freight security personnel, and safety engineers augment the business unit.

Without one group overseeing risk management and driving consistent compliance to processes, distribution center and transportation personnel were interpreting specs and guidelines differently. This approach impacted cost savings and efficiency and fostered the development of conflicting business procedures that created issues across the supply chain.

The CPLG Risk and Controls department was authorized to drive consistent application of processes worldwide and to ensure as much as possible that risks related to the management of financial reporting and potential loss of assets and revenue were addressed. The team uses a three-pronged risk management approach to alleviate issues: 1) facilitating audits for compliance and risk identification; 2) conducting annual risk mapping sessions with business units to proactively identify risks and drive mitigation; and 3) serving as controls consultants for project managers.

### **Risk Mitigation Plan**

The risk mitigation plan contains an audit roadmap and strategies to address high risks identified through risk mapping. The site audit roadmap is determined by calculating risk factors based on the site shipping volumes and inventory on hand, recent or expected major changes at distribution centers and third-party hubs, past audit history, risk mapping results, and quality and security excursions. The mitigation plan is approved by a Controls Management Review Committee (MRC) consisting of CPLG senior leaders. Mitigation strategies for high risks focus on attributes such as meeting requirements for new environmental laws, complying with Sarbanes-Oxley (SOX) legislation, reducing threats to freight lanes, improving segregation of duties controls to reduce the risk of product loss, and mitigating the impact of business interruptions caused by system failures or weather. The MRC members review audit results and propose audit strategy changes monthly, supporting new controls and challenging existing controls to reduce bureaucracy and keep the focus on critical areas.

### **Audit Facilitation and Management**

The audit team developed a series of audit probes based on standard business risks and published guidelines and

specs for internal facilities, and on contractual terms and conditions for third-party run operations. Because there are countless risks in a global supply chain, the group focuses resources on high risks and maintains a dynamic database to mitigate continually shifting risks and to support changing business models such as outsourcing and consignment.

The team worked with software developers to create an audit management tool (AMT) to house audit probes and detailed business process flows, audit findings, and required corrective action plans. The tool was designed to enable multiple auditors across the world to utilize standalone versions on their laptops simultaneously while conducting field work. After their data entry is complete, the auditors synchronize with a master tool housed on a central server. The audit process, including a detailed audit checklist and management review of findings; plus the tool, enable reasonable and sufficient audit results whether the audit is conducted by a new or seasoned auditor. The tool configuration enables scalability of audits as probes may be associated with a type of audit, for example, finished goods distribution center, freight payment, or third-party cross-docking operation. The AMT reporting capability is used to provide data to site and business unit stakeholders and to set the focus of future audits. Among the available reports is a listing of all audit findings that may be sorted by site, audit category, and closure detail. Audit data automatically downloads from the tool into a spreadsheet available to site controls leaders via the Intranet. This enables sites to learn from one another and proactively manage similar risks. Furthermore, the tool allows the flexibility to rapidly edit, add, or delete audit probes while conducting field work. The AMT houses over 1700 active audit probes, all mapped to International Organization for Standards (ISO) elements. It serves as a repository for historic records, and it references audit working papers stored on the team's shared drive.

### **Developing to Internalizing**

The logistics organization recognizes the value of the audit program and actively consults with the Risk and Controls Team when developing processes to meet new business needs and when improving existing processes. The team is routinely engaged in the development of the statement of work, from which contracts for third-party logistics forward staging hubs are written. Team members worked with a joint operations team for third-party hub management to create a cookbook for rapid start-up of hubs. Finance engaged the team in developing improvements to the cycle counting (unit accountability) process. By using a statistical method rather than a set percentage to be counted each month, 30,000 annual hours of cycle counting have been reduced by

approximately 60%. As the value and time savings of proactive risk mitigation was acknowledged, consulting grew and now comprises 40% of the Risk and Controls Team's work.

Staff members facilitate over 20 risk-mapping sessions each year in areas such as supply planning, freight security, information engineering, order management, returned materials, finished goods operations, and supply-chain business continuity. They guide business groups in developing plans to mitigate high-level risks as well as evaluate the effectiveness of the new or improved controls. Closure of risk mapping issues has a five-year history of success in terms of process improvements, time, and cost savings. For example, new processes to manage inventory to be scrapped provide unit traceability in the system of record. The addition of a business continuity program to the Risk and Controls scope supported a reduction in the impact of business interruption to shipments by 18% in 2006 over 2005. The controls continuum (Figure 7) demonstrates the evolution of the Intel logistics controls program over a nine-year period.

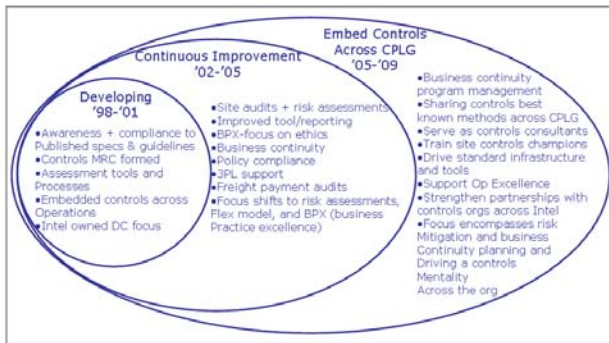


Figure 7: CPLG controls continuum

## Challenges

The top challenges to maintaining a central risk management function for a worldwide organization with multiple responsibilities and a broad scope of business processes and risks include maintaining and increasing skill sets to meet the business needs and comprehend the risks; developing and maintaining strong cross-functional partnerships; and influencing business groups over which the risk management team has no direct authority.

The team must have current knowledge of external requirements including customs requirements, SOX legislation, and ISO requirements. To meet these needs, team members obtain American Production and Inventory Control Society (APICS) and International Organization for Standards (ISO) lead auditor certifications. They complete internal training on corporate policies, review new and revised CPLG specs, and attend conferences such

as the MIT Center for Transportation and Logistics Business Continuity Planning Workshop. SOX (Section 240) requires that companies use a "suitable recognized control framework" for evaluating the effectiveness of internal controls over financial reporting. Intel uses the Committee of Sponsoring Organizations (COSO) of the Treadway Commission model of establishment of a controlled environment, risk assessments, control activities, and monitoring. The CPLG Risk and Controls Team leverages the COSO model and publications and the experience of other risk management personnel across Intel.

The team must also be cognizant of internal controls drivers including cost savings, minimizing the risk of loss and/or destruction of products, and productivity improvements. Strong cross-functional partnerships are necessary for maintaining trust in the audit process and results, and for engaging content experts in consulting projects. The ability to influence is imperative to bringing people with diverse agendas together to solve common problems.

The risk mitigation model facilitated by CPLG Risk and Controls resulted in a continual cycle of process improvements, improved efficiencies, and cost savings. After three years of mitigating risks across the business units through audits, risk assessments, and consulting, Corporate Internal Audit findings in the logistics group dropped by 90%. After eight years, internal indicators improved, loss of assets is well below industry standards, logistics ISO certification scores remain high, the organization is compliant to SOX provisions, and time expended in SOX controls testing has been reduced by over 60% as the team challenged external testing and worked to ensure time is spent on relevant areas. The team is viewed as a resource for driving controls compliance and efficiencies, enabling successful project deployment to meet business requirements, and meeting the challenges of emerging risks.

## CONCLUSION

In this paper, we demonstrated how Intel Corporation uses three specific risk mitigation techniques: Internet negotiations, escrow accounts, and currency risk reduction to reduce exposure to universal business risks [3]. Additionally, we discussed how risk management can be applied not only to specific issues, but across a diverse organization to reduce business risks, create a continual cycle of process improvements, improve efficiencies, and reduce costs.

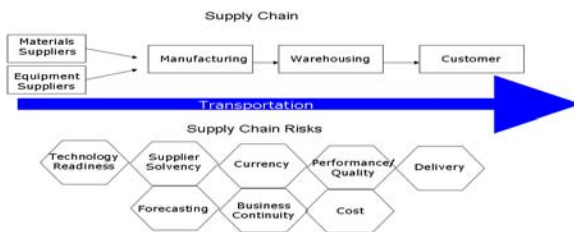
Internet negotiations provide cost savings through process efficiencies and decrease risk by reducing variations in the bidding process. Standard and custom templates, automated scoring, and specific required supplier

responses leading to more accuracy are key components of the success of Internet negotiations. Formal post mortems of these negotiations lead to continual improvement in the process.

Supplier escrow accounts minimize risk to production and provide the ability for a wide range of suppliers to secure initial and future business with Intel. The challenge is in the ability to access the account to avoid the pitfalls of micromanaging a disruption to the supply chain. Proactive financial and performance triggers that allow access to account contents prior to bankruptcy or a supply chain issue are key, as well as negotiating release conditions that are customized to the unique supplier situation.

Fluctuation in currency exchange rates when purchasing from a non-US-based supplier creates a volatile cost structure that can fluctuate up to ~30%. There are many options to consider to manage this risk. Careful selection of the method through a rigorous process will deliver less exposure to this volatile variable.

The supply chain has interactive elements and multiple risks that must be managed for success. Examples of this are illustrated by the supply chain risk mitigation pictorial (Figure 8)



**Figure 8: Supply chain risk mitigation factors**

Risk management is used to mitigate specific risks and must be applied at the organizational level as well. The Intel Logistics organization empowered a central risk management team to audit for compliance, facilitate risk assessments to identify current and emerging risks, and provide internal consulting to reasonably ensure universal business risks are addressed.

Risk management is essential to successful organizations. Today's environment is dynamic, and past solutions will not continue to serve indefinitely. Organizations must strive for continual improvement and employ new and innovative methods to manage supply chain risks.

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