Executive summary

In their continuing push to improve performance and reduce costs, HP business units are reinventing supply chain management. This reinvention is driven by significant changes in the business landscape, such as heightened competition, return on asset (ROA)–dependent financial models, and outsourced services. The era is long gone when just-in-time deliveries and one-to-one relationships defined a cutting-edge supply chain.

The HP Supply Chain Integrated Solutions (SCIS) organization now offers HP internal businesses a set of collaboration solutions that support a continuum of business models—from discrete orders to fully automated, self-adjusting matching of supply to demand.

HP Inventory Collaboration (IC) and HP Purchase Order & Forecast Collaboration (PO&FC) are part of a suite of leading-edge e-procurement solutions based on HP KeyChain, HP’s private e-marketplace architecture.

HP IC provides Web-enabled, multi-tiered collaboration capability within a configurable set of supply chain trading partners and business processes. It makes joint problem-solving and decision-making possible through the sharing of up-to-date supply, demand, and inventory status information across the extended enterprise. This enables high-performance supply chains that significantly increase availability while simultaneously reducing inventory and costs.

HP IC supports extensive information-sharing that allows HP and its trading partners to resolve supply-related problems before they become availability or excess inventory issues. Deploying IC allows HP businesses to benefit from:

- Lower inventory and inventory-driven costs
- Improved availability service levels
- Improved operational efficiencies
- Faster realization of material price reductions
- Greater visibility across the extended supply chain
- Reduced supply variability
- Greater supply responsiveness

HP SCIS also offers HP PO&FC, a Web-enabled solution that helps HP procurement professionals and their trading partners manage forecasts and POs and communicate more effectively.

Through automation of the purchasing process, real-time collaboration capabilities, and complete support for change management, HP PO&FC allows HP business units to:

- Reduce order cycle time
- Improve operating efficiencies and assurance of supply
- Improve the total customer experience through faster feedback on material availability and accelerated decision-making
- Benefit from fewer delayed or recommitted sales orders
- Achieve inventory savings
- Maintain visibility into current order status
- Benefit from business processes in common
- Improve supplier coordination and relations
SCIS collaboration solutions are deployed across HP and with more than 60 trading partners and 500 users. Some $200 million in purchase orders and more than 8,600 transactions flow through HP KeyChain each month. Both HP IC and PO&FC result in supply chain management that allows enterprises to remain adaptive by capitalizing on change.

Advanced collaboration in supply chain management

Outsourcing manufacturing and logistic services as well as shifting inventory ownership to suppliers has intensified the need for Web-based collaboration. In May 2002, Forrester Research reported that fully half of the buyers it surveyed collaborated with suppliers over the Internet. Among large firms, the number was 64 percent.

One of the primary reasons to collaborate is to reduce the degree of variability against which supply chains must hedge. The causes of variability are numerous—fluctuating order levels and supplier delivery problems, for example—and can impact both demand and supply sides. Historically, suppliers and consumers have acted independently from one another, with suppliers usually retaining physical inventory to protect against the supply and demand variability. Often there are months of inventory within a chain to cover potential shortages over the procurement time (lead time) of the material. The longer the lead time, the greater the variability. Forecast error often produces hedging at the wrong place in the chain and to the wrong inventory levels. As different supply chain participants attempt to protect themselves from upstream and downstream actions, inventory levels can increase uncontrollably. Conversely, the same processes can simultaneously promote shortages in areas of high demand.

HP Inventory Collaboration (IC)

HP IC provides e-tools and processes for HP businesses that must closely manage inventory and availability—as when inventory is highly valued and markets are particularly volatile. It allows buyers to set parameters around supply and manage trading-partner performance within those parameters.

The need for IC intensifies as product lifecycles shorten and competition forces rapid, unforecasted changes in demand. Consumer-market businesses are especially sensitive to these dynamics because many of the products they sell have become commodities.

Businesses must vary their offerings to match consumers’ price expectations if they want to be successful. This type of demand variability puts significant pressure on traditional forecasting and inventory management processes. HP IC can reduce much of the pressure on these processes by using information to synchronize supply chain actions and by proactively addressing supply/demand mismatches. Collaboration enables the management of supply through information-sharing rather than by reacting to physical inventory shortages and overages.

Finally, cost control is an imperative. Inventory on HP’s books amounted to more than $5 billion annually in FY01 and FY02. Operating with reduced inventories lowers carrying, obsolescence, warehousing, operations, and logistics costs. Coupled with an increase in service levels, IC can benefit both the top and bottom lines. In addition, shifting inventory to suppliers frees HP capital for other uses. In an outsourced supply chain, IC can provide visibility into inventory positions, enabling HP to better manage risk and liability.

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1 January 2004 data
Fluctuating order levels and product design changes are part of normal business operations. Procurement professionals frequently face supply and demand changes that require quick response from them and their trading partners.

In an effort to address these challenges, businesses have typically shared their material demand forecasts with their suppliers. Today, the labor-intensive process of gathering accurate data and delivering it in a timely fashion to the right suppliers can be automated and accomplished in near-real time, enabling rapid response to changing customer demand.

Forecast collaboration promotes more accurate inventory levels, which, in turn, improve asset use by lowering inventory storage requirements and freeing up capital. The forward visibility that forecast-sharing offers can increase service levels because it improves the ability to provide the right product at the right time.

Procurement professionals have typically relied on fax, phone, and e-mail to communicate with trading partners. Today’s global sourcing environment, however, may find buyer and supplier separated by multiple time zones. Establishing contact to discuss availability, delivery dates, and pricing can be a logistical challenge.

At the same time, time-to-market pressures demand rapid responses and shorter cycle times. Processing a purchase order through traditional channels—waiting for a buyer to act on it, sending it to a supplier, waiting for the supplier to respond, etc.—can add unnecessary time to the cycle. When extensive communication is necessary to reach agreement on quantity, schedule, or price, buyer and supplier may find themselves in a frustrating round of phone and fax exchanges. In addition, once an order has been placed, further communication around change orders, shipment notices, or other events is often necessary.

The Internet helps the procurement function to embrace automation. The HP PO&FC solution enables real-time information-sharing and management of forecast and purchase-order information. These capabilities not only reduce cycle time and process costs but also free purchasing staff to focus on activities with a greater value-add.

**HP KeyChain, a robust solution architecture**

HP KeyChain is the technical architecture that supports IC and PO&FC. Using RosettaNet B2B technology as well as a standard Web interface, it facilitates information exchange and communication between HP and its trading partners. Its logical architecture is flexible and extensible; moreover, it is able to integrate industry applications and frameworks from leading providers, making it adaptable and current.
HP KeyChain is the hub that enables HP, contract manufacturers, suppliers, logistics service providers, and other participants to share information in a private trading exchange. This information may include forecast collaboration, inventory status, replenishment plans, alert notifications, and minimum/maximum inventory levels. HP IC employs Sockeye Solutions’ Collaborative Application Framework (CAF), a business objects oriented framework that uses a business process management capability currently focused on supply chain management and execution. It provides a flexible framework for modeling a wide range of business processes as well as an execution layer with a proven track record within HP.

HP PO&FC employs i2 Technologies’ Supply Chain Collaboration module for handling business process workflows and the Web user interface.

HP business units and their supporting enterprise resource planning (ERP) systems can communicate supply chain information directly into HP KeyChain. Trading partners and their back-end ERP systems can also communicate relevant supply chain information into HP KeyChain. Straightforward, easy-to-use browsers enable HP and trading-partner users to log in from any location, view pertinent supply chain information, and quickly respond to any new situation.

HP KeyChain reduces manual supply chain processes and transaction costs. It also increases the flow of information across the supply chain for better inventory visibility, lower handling and processing costs, and improved logistics. As a Web-based technology, it also reduces ongoing costs associated with inter-enterprise data integration.

Inventory collaboration at HP

The HP SCIS team offers collaboration solutions to support various business models. PO&FC works well where discrete order-based management or collaboration is needed. IC is better suited to higher-value materials such as assemblies and products or to occasions when it is necessary to maintain tight control of custom materials.

HP IC allows HP planners and buyers, trading partners, and logistics service providers to orchestrate complex activities more quickly and effectively. With IC, HP businesses increase the amount and type of information they share with trading partners, improving their ability to work together to resolve problems.
HP IC e-tools and processes offer a continuum of capabilities. The most capable version of IC, Dynamic Replenishment (DR), includes functionality that controls factory starts, automated supply/demand matching, target inventory calculations, and automated daily shipments based on daily network status. This level of functionality is supported by full integration of HP and trading-partner systems and uses problem-solving logic and algorithms. Problems that cannot be resolved within a set of predetermined constraints are escalated to procurement professionals.

A less sophisticated form of Inventory Collaboration is the eSupplier-managed inventory (eSMI) model that allows buyers and suppliers to collaborate more traditionally to resolve inventory and demand issues.

Figure 2. The collaboration continuum

The Collaboration Continuum

With standard HP IC, HP provides suppliers with consumption plans, minimum/maximum requirements, and inventory-on-hand data. Suppliers then develop inventory and replenishment plans, which they use as a basis for responding to HP’s changing needs.

In the DR model, stocks at HP sites are automatically replenished as existing materials are consumed. DR includes automatic calculations to determine appropriate stocking levels and dynamically adjust shipments based on current supply chain status. DR allows quick, pre-emptive resolution of supply and demand imbalances across multiple HP sites and suppliers.

The decision to use HP IC standard or DR depends on several factors. DR currently requires that HP and supplier planning systems be integrated. As a result, DR is more suitable for use in cases where partners can support IT integration and where the benefits outweigh the implementation costs. DR offers substantial rewards. It supports higher performance and enables supply chain professionals to concentrate on activities with a higher value add.

HP IC may require significant changes in current business processes and concurrent management of change (MOC) investment. IC contributes dramatically to synchronizing the supply chain—effectively shortening it and increasing inventory velocity. HP eSMI solutions make it possible for members of the supply chain to see demand changes in near real time, improving their ability to match planned inventory to what is actually needed. This level of visibility supports better decision-making, faster response, and lower costs.
HP IC is highly configurable and can be adapted to any supply chain and business model. Business relationships can be configured to a specific group or cluster, permitting larger companies to operate portions of their business on a discrete basis.

Results

HP SCIS piloted its first-generation IC tool in July 2001 with notable early results:

- The HP Americas manufacturing operations saw a dramatic improvement in production-line uptime and significant savings through faster realization of material price reductions. HP also realized significant savings from the contract manufacturer based on the lower overhead of a replenishment-based supply system.

- Using the first-generation DR tool, the HP inkjet supplies business reduced its wafer inventory while achieving a very high material availability service level. In addition, HP converted inventory to a consignment-based model, resulting in a large one-time cash flow back into the business unit.

HP has deployed an additional five clusters on IC and has expanded supply management on a global basis.

Better control of forecasting and purchasing

HP business units that require discrete order-based management or collaboration typically deploy the HP PO&FC solution.

With PO&FC, a change in an HP ERP system initiates a purchase order by sending a message and data to HP KeyChain, which then directs the relevant supplier (via e-mail) to respond. The supplier can respond either via B2B message (if B2B-enabled), or the Web marketplace. The supplier can accept the order or respond with options, such as an alternative delivery schedule, quantity split, or price. HP KeyChain notifies the HP buyer of this response via e-mail, and the buyer accepts or counters the suppliers’ alternatives. Once agreement is reached, HP KeyChain automatically sends the updated purchase order to the HP ERP for update.

This “alert and trigger” function allows buyer and supplier to quickly reach decisions in real time. Where order placement once took days, it can now be executed in minutes.
Figure 3. Web-based screen view of PO&FC in HP KeyChain

HP PO&FC monitors the lifecycle of an order from the time the purchase order is created and acknowledged, through any required changes or cancellations, to the time it is fulfilled and shipped by the trading partner and finally closed on the HP system.

HP PO&FC enables forward visibility through forecast-sharing and communication functions, giving both buyers and suppliers more immediate access to information specific to their supply chain. When HP ERP systems identify demand shifts, they communicate the changes to HP KeyChain via a forecast. The HP buyer can review and modify the forecast or elect to have it sent immediately to the supplier. The Web interface prompts the supplier to acknowledge the new forecast. By sharing this information in real time, suppliers are better able to anticipate HP’s needs and plan explicitly to meet future requirements. The PO&FC solution also alerts HP buyer and supplier users to any exception cases where the supply does not meet the requested demand. This enables early problem identification and resolution.

The ultimate result of this forward visibility is better understanding of and communication on inventory requirements. HP can share and agree on forecasts with its suppliers, thus eliminating the need to maintain excessive inventory levels.

Automating the tasks associated with forecast-sharing and order management has driven performance improvements, cost savings, and operating efficiencies within HP business units.
Table 1. Comparison of traditional and PO&FC order management

<table>
<thead>
<tr>
<th>Manual process</th>
<th>PO&amp;FC</th>
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</thead>
<tbody>
<tr>
<td>Order managed by fax and phone</td>
<td>Order managed by Web and B2B</td>
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<tr>
<td>Overnight/batch information access</td>
<td>Information access in real time</td>
</tr>
<tr>
<td>Manual changes</td>
<td>Changes flow automatically when back-end systems are updated</td>
</tr>
<tr>
<td>Manual change-management process</td>
<td>Automated change-management process</td>
</tr>
<tr>
<td>Frequent interventions</td>
<td>Alert-based exception intervention</td>
</tr>
<tr>
<td>Manual, periodic view of order status and forecast visibility</td>
<td>Automatic, daily order status and forecast visibility</td>
</tr>
<tr>
<td>Potential for miscommunication</td>
<td>Documented communication</td>
</tr>
<tr>
<td>Potential for errors</td>
<td>Human errors minimized or eliminated</td>
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</tbody>
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Process flexibility

HP’s PO&FC solution supports various business models and processes. These include discrete orders, blanket orders, scheduling agreements, and direct fulfillment order processes.

Users can configure discrete order processes to either allow or constrain order price negotiations (in addition to delivery quantity and date). Scheduling agreements allow different processes on an order to be controlled, depending on the proximity of the requested date to the current date; for example, it is possible to limit change-order processes as a delivery approaches the firm shipment lead-time window. Pure B2B processes—with no marketplace collaboration—can be used for large suppliers who never log in to the marketplace. Direct fulfillment processes are used for services, where large volumes of drop-ship orders with fast turnaround times are expected and the marketplace is only used for exception cases of supplier re-acknowledgment.

HP PO&FC includes forecast processes that support regular and ad hoc forecast loads followed by optional buyer edits, publishing the forecast for the supplier, and subsequent supplier commit entries against forecast.
Removing time from the system

Automating and standardizing purchase-order and forecasting processes is a way to reduce overhead and delays caused by human intervention and outmoded technology. It also drives value through reduced errors and improved data integrity. Both HP buyers and suppliers have full visibility into the current forecast and order status. The HP and supplier enterprise resource planning (ERP) systems are also updated and synchronized.

Tools to facilitate the exchange of documents between buyer and supplier have existed for decades. Electronic data interchange (EDI) technology first appeared in the late 1960s, and procurement professionals were among its first users.

EDI has limitations, however. It is batch-oriented, which prevents full automation and real-time interaction.

To communicate with large, strategic trading partners, HP PO&FC uses Extensible Markup Language (XML) with RosettaNet standards. Unlike EDI, RosettaNet dictionaries, framework, and Partner Interface Processes (PIPs)—which define every step of the business process—make true automation possible. With XML, HP and its partners share information in real time.

For trading partners who do not yet use RosettaNet-based XML, HP PO&FC transactions execute through a Web user interface. Some partners use both the Web and RosettaNet PIPs.

Deployment and results

HP business units that have invested in HP PO&FC to link back-end ERP systems and suppliers to HP KeyChain have realized dramatic results. Nearly 400 users have deployed HP PO&FC with 42 trading partners.

The dollar value of purchase orders in HP KeyChain has increased steadily to approximately $167M as of the last month of FY03.
Summary

HP IC moves information sharing in inventory management to a new plane. Through integrated collaboration and DR processes, HP IC enables a higher level of supply chain performance and better service levels while enabling its businesses to significantly reduce costs.

HP businesses and their trading partners can now use common data to respond to changes in supply and demand, jointly addressing inventory needs. With better communication and visibility, partners throughout the supply chain can proactively address shortages or excesses in near real time and make rapid adjustments.

HP IC is flexible and scalable. Procurement professionals can quickly add trading partners to their supply chains. They can also choose where to be on an inventory collaboration continuum to attain their business goals. They can choose to share more information with suppliers, including ongoing demand, inventory levels, and minimum/maximum constraints, thus enabling suppliers to maintain a desired inventory level. Managers can deploy an even more capable model that fully integrates HP and trading-partner systems.

HP IC offers both cost reduction and assurance of supply benefits. These benefits include lowering inventory and inventory-driven costs such as warehousing as well as improving operational efficiencies and realizing price reductions more quickly. HP IC can relieve a business of the necessity of developing and maintaining a unique collaboration tool set. It also offers an alternative to making a costly investment in maturing, Web-based tools.

In scenarios where discrete, order-based management is more suitable to the business model, HP PO&FC offers a set of tools to automate routine purchase-order transactions and to facilitate sharing forecasts automatically with suppliers. It allows buyers to match demand and supply quickly, thereby reducing the cycle time for purchase-order placement.

Using the Web and/or B2B messaging, trading partners can gain immediate access to forecasts and purchase orders initiated by a business ERP system and sent to HP KeyChain. HP buyers no longer need to rely on time-consuming manual functions to share forecasts and manage the purchase order process. They and their suppliers can conduct the give and take of the purchase-order process online while tracking order status.

With HP PO&FC, businesses achieve shorter order cycle times, improve operational efficiencies, speed feedback of material availability, gain visibility into most current order status, and accelerate collaborative decision-making, leading to reduced costs and improved assurance of supply.

In an environment where change is continuous and often unsettling, enterprises require tools that make it possible for them to respond quickly and completely to new opportunities. A flexible, efficient supply chain can empower enterprise adaptiveness, strengthening its competitive edge well into the future.