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Seven steps to a lower-cost supply chain

An Intel executive explains how introduction of lower-priced Atom chips forced changes in the company's supply chain

Mark T. Hoske, *online products editor*

About a year ago, Intel realized that selling new-platform microprocessors at one-fifth the cost of the Intel Pentium microprocessor would require significant rethinking of its supply chain strategies.

"The results changed how Intel projects will be done in the future, and we're looking at how we can capture what we learned and improve the rest of the supply chain," said James R. Kellso, senior supply chain master, Intel Corp.

Kellso explained Intel's process for making those changes in a session at the Council of Supply Chain Management Professionals Annual Global Conference, which took place in Chicago in September. His advice is captured in these seven steps:

1. Gather and explain. A two-day Intel seminar, coordinated by Kellso and others, presented the challenges for managers in departments across the organization. The Intel Core Duo, with $100 average selling price, carried with it about $5.50 in supply chain-related costs, Kellso said. The new Intel Atom platform, selling for about $20 or so, would support perhaps $1 in supply chain costs, from sourcing to delivery, he noted.

2. Seek realization. After long discussions covering traditional changes, it was clear no one had a plan that could cut costs by a factor of five, which was what was needed to address a new $40 billion market—an opportunity with potential to double Intel's business. Finally, someone stood up and suggested that the opportunity warranted having the company dedicate a team of supply chain masters to finding a solution. Kellso was chartered to lead the team.

3. Form an all-star team, with help. "I agreed to coordinate the effort, as long as I could have more than 10 supply chain experts of my choice, half time, for six months, plus three consultants to help with coordination," Kellso said.

Ultimately, the internal supply chain experts devoted 75 percent of their time to the project, with three company VPs helping to eliminate potential roadblocks along the way.

4. Set scope and limits. Kellso said his team had leeway to rebuild the supply chain from scratch, as long as existing Intel fabs were used. (The company couldn't afford to abandon the $5 billion plus invested in each of those fabs.) The team also had to work with Intel's existing accounting system. A key device used in this project to help determine scope was a supply chain triangle (see graphic), developed by Larry Lapide at MIT Center for Transportation & Logistics.

This triangle positions customer response, efficiency, and asset utilization at each point of the triangle. The closer a company is to one point, the further away it gets from the others. Plotting where a company is within the shape, compared to competitors, can help with related decisions. The low cost supply chain (LCSC) team used this and other tools to find ways to significantly reduce costs

EXHIBIT 1

Aligning Operational Performance to Business Goals

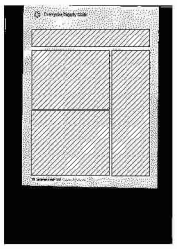
Customer Response (Customer-Facing)
- Order Cycle Times
- Perfect Order Fulfillment
- Quality
- New Product Time-to-Market

(Do Not Relate to Financial Statements)

Efficiency (Internal)
- Labor Productivity
- Supply Chain Costs (Relate to Income Statement)

Asset Utilization (Internal)
- Facility Utilization
- Inventory Turns
- Cash-to-Cash Cycle (Relate to Balance Sheet)

This supply chain triangle, developed by Larry Lapide at MIT Center for Transportation & Logistics, puts customer response, efficiency and asset utilization at each interconnected point.



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while increasing customer response and remaining utilization neutral. This led to a team charter to: "create the ability to deliver up to an additional 900 million units a year at $10 product costs by 2012 while increasing customer service."

5. Work the process. Working the details required looking at the business case, the process, the effect on the customer, and then repeating the cycle. After defining terms and identifying the roadmap, they looked at objective, scope, the approach, deliverables, timing, and resources. Quantifying costs was part

The Intel Atom processor powers the OpenPeak phone, which gives access to e-mail, web content, address book, and directory services in one device.

Supply chain lessons learned

Say no, delegate to lead, and focus on goals. These were among the supply chain lessons Intel learned while redesigning its processes, said senior supply chain master James R. Kellso. Additional learning follows.

Many wanted to join, but few were chosen, Kellso said. "The team began with 10-15 and expanded to 35. We did not let those who had particular pet projects latch them onto the low cost supply chain (LCSC) project," he explained.

Kellso affirmed what a Gallup poll said about teams, that conflict doesn't destroy strong teams, because strong teams focus on results. Further, strong teams prioritize what's best for the organization then move forward. Members of strong teams are as committed to their personal lives as they are to their work. Strong teams embrace diversity and serve as talent magnets.

As leader, Kellso listened to each person until they were depleted, making decisions by consulting and collaborating. Kellso asked again of each person, "Is there more?" He looked at how everything fit together and was the red-flag person. About half the time, he used subteams to move issues forward.

Having someone to assemble presentations (consultants) helped a lot, Kellso said. Consultants helped with project management, meeting minutes, presentations, and coordinating and communicating across subteams. "Consultants were arms and eyes into other teams, and freed me up to think about what we were doing," he said.

The process was more than creating a low cost product; Intel wanted to use new processes under development everywhere, Kellso noted. "To move from pre-exploration to proof of concept, we asked if it would be better to use waterfall or spiral design processes." Spiral 1 created real results in manufacturing. Spiral 2 started with customer engagement and built momentum.

"We are riding the wave as the product ramps up, and we are driving the process changes simultaneously," Kellso said. "We wanted to ensure we could do what we promised." That is: If the order is day 1, the delivery should be day 14. That required better signals from customers, and keeping some buffer so production would never miss. "We are in proof of concept with one customer now, and we hope to drive this with more customers, then throughout the chain on an expanded set of products, if the current concepts prove out," he said.

Along the way to running one part number in a four-day cycle, Kellso's team had a two hour meeting with the Intel plant in Malaysia. They found they couldn't run part of the plant on the four-day cycle; they wanted to and did run the *entire* plant that way. Getting customers to agree to firm, non-cancelable orders will help guarantee delivery in two weeks, he said.

Preconceptions to overcome included: we cannot build to order; we cannot get to a four-day cycle; and we cannot run fast with high utilization, Kellso said. Also, there was concern that proposed changes would lower utilization, a legitimate fear when it costs $500 million to build one assembly test facility. The idea was to build quickly and not change orders, since setup wastes time. The goal was to ensure utilization was neutral or positive as changes were made, he said.

Focusing on issues helped six organizations collaborate to create one view. What did customers actually want? "We went to potential customers [original equipment manufacturers, OEMs] and asked how they worked with customers in other markets. The goal was for us to provide equal or better service at a lower price," said Kellso.

One way to facilitate communication was to get everyone into a room for a face to face meeting every 14 days. A lot can get done in seven mandatory meetings, Kellso suggested, with a broad smile.

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of the challenge, Kellso noted, including putting inventory among operating costs. Considerations included simplicity, flexibility, lean, automation, and total landed cost to lower supply chain costs and increase service levels.

6. Determine changes. Kellso said the team recommended several fundamental changes to the current supply chain, including:

- Shift to a more pull-based model with cleaner signals;
- Shorter cycle times;
- Lower touch yet higher efficiency customer- and supplier-facing models; and
- Adopt lean processes and other operational changes to affordably support a new model.

7. Translate and implement. Kellso said that for Intel that meant:

- Instead of re-planning jobs several times before shipping, create a way to do them once, and faster.
- Consider building inside of the two, four-day shifts per week without rescheduling changes in between.
- Plan, build, and deliver in two weeks, to avoid building for stock.
- Quantify savings in ways accountants can understand. Build to ship means that many of the planners can do something more productive than rework order changes and updates.
- Don't increase utilization at the expense of other goals.

"Is 90 percent utilization the best choice if we're only building 80 percent of what's needed?" Kelso asked, pointing out that change orders go to the warehouse, which requires additional (wasted) transactions later. Building products to stock isn't as efficient as building and shipping.

"Working together on this, we learned more about the Intel supply chain than we had on any other project," Kellso said. ■

Huge market opportunities required Intel supply chain support

Explaining new market opportunities for the Intel Atom family helped clarify the need for supply chain changes. Intel, 40 years old, has 300 facilities in 50 countries, with 80,000+ employees, and 88 quarters of positive net income.

Trends—including the fact that another 1 billion people are expected to have Internet access by 2012—point to an increasing need for microprocessors, according James R. Kellso, Intel senior supply chain master. Here he describes new and expanding applications:

- Smarter homes may help the elderly stay in their own residences up to two years longer before they would need to go to an assisted living facility. Future embedded systems could observe and remind people what needs doing when and provide reminders and alerts if details are forgotten. On the convenience end of the scale, it might be as easy as saying, "The coffee will taste better if you turn it on." It also could help avoid hazards, such as, "The kitchen ceiling light bulb has burned out. Please don't change it. Your daughter can do that tonight when she visits."
- For those who use digital video recorders (DVRs) and fast forward through old commercials, microprocessors could add relevancy by updating commercials at the time the program is being viewed. That would prevent a viewer from seeing a sale that ended last weekend, which can happen now with viewer-recorded programming.
- On-demand advertising will interact with users. For instance, upon mousing over a particular dress, the microprocessor and software could say where the dress is available locally, for what price, and "click here to buy it now."
- Bearings wear out on rail cars. When they do, they squeal, lock, and may derail the train. A vibration sensor, with Atom microprocessor and radio frequency identification (RFID) technology [or other means of communication], powered by ambient natural vibration, could send an advanced warning as bearings (or tracks) begin to degrade. Having this knowledge could increase train velocity perhaps by as much as 5 mph, safely getting more speed from logistics systems.

Intel has high expectations for its Atom processor. According to Kellso, at product launch, the Atom was predicted to sell 5 million units in the first year. Actual sales exceeded 20 million units the first year. Besides the applications mentioned above, Kellso said Intel is interested in supplying microprocessors for enabling and linking technologies in handheld computers, embedded computers, visual computing devices, netbooks, nettops, notebooks, PCs, and servers, using WiMAX, and other communications.