

Supply Chain MANAGEMENT SERIES

Making Your Designs Fit

*Security and
incompatibilities
bedevil
Web design
collaboration*



Also:

Taking a page from
Acer's notebook

THE *Myths* OF WEB DESIGN

CELESTICA INC.'S experience with collaborative design over the Internet sounds like the stuff of marketing brochures. Working with clients early in the design process lops as much as 25% off design cycle times and reduces scrap rates, thereby saving money. It would seem natural that all Celestica's customers would scramble to gain such benefits. Not quite.

"Some of our customers won't do any design collaboration," says David Cefai, vice president of IT strategic solutions for Toronto-based Celestica. "They often don't realize there's tremendous value-add they can get." After grasping the concept, companies still have significant hurdles of integrating multiple software packages and training people to use new tools and new design processes. "In a lot of cases, we're going through a discovery process with our customers as well," Cefai adds.

And even after a careful launch



Collaborative design over the Internet was supposed to save time and promote efficiency. So why have projects been taking longer?

of collaboration, the pain can obscure any potential payoff. Many companies find design times increasing as a growing number of people become involved. Worse is

the software integration challenge—the collaboration tools are difficult to master and expensive. Furthermore, some design and business processes are not amenable to a cooperative approach.

Although Internet collaboration can pay off, it takes a lot of savvy, hard work, the right tools and patience. First and foremost, though, turning Web design collaboration from a catastrophe into a triumph requires managerial smarts.

Executives must determine which projects are appropriate for

Web design collaboration. They also need to decide which tasks within a design project are most appropriately done by which provider. Work flow and processes must be identified and codified in advance, especially systematizing the number and type of communications among Web design partners.

Then the partners have to decide how to mesh their frequently disparate software tools and whether to buy new tools.

ILLUSTRATION BY COURT PATTON

COLLABORATION

By Erik Sherman

Those new tools must be installed and users must be trained. Security issues also need to be recognized and resolved. Unless an organization adopts a comprehensive approach to Web design collaboration, its results will be disappointing.

Among major companies, **Acer Inc.**, **Celestica**, **Compaq Computer Corp.**, **IBM Corp.** and **Motorola Inc.** have adopted the Internet for external design collaboration. **Hewlett-Packard Co.** and StarCore Technology Center, a joint venture between the Austin, TX-based Semiconductor Product Sector unit of Motorola and **Agere Systems**, Allentown, PA, however, use the Internet for internal design collaboration only.

Evidence to date indicates that these companies, and the rest of the electronics industry, have not yet hit the big collaborative design jackpot. According to AMR Research Inc., Boston, most large electronics OEM and contract manufacturers are using the Web for design collaboration—but within their own firewalls. Internal Internet-based design collaboration shortened OEM design cycles, but only by about 5%. And only a small fraction of large OEMs collaborates via the Internet outside their firewalls.

A survey published in February 2001 by Cap Gemini Ernst & Young and the National Association of Manufacturers offers bleaker data. Of the 578 respondents, only 22% shared product designs over the Web, and their design cycles increased by 20% (see chart at right).

“Why it took longer was that there were more participants in the picture,” says AMR analyst Dave Cahn. More people became involved in the process simply because it was possible.

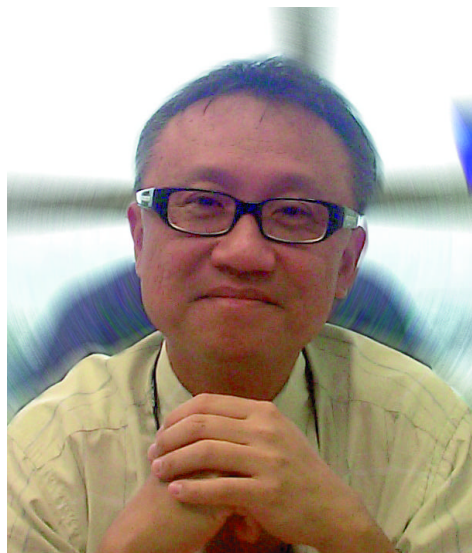
Cahn and others argue, however, that additional involvement during the design cycle avoids more expensive problems during manufacturing.

Instead of people finding problems after a product is in manufacturing, Internet-based design collaboration finds the problems while a product is being designed.

“When companies didn’t have to deal with the suppliers, customers and engineers in the loop, they were able to design pretty quickly, but they had a longer introduction time with higher scrap rate and poorer quality,” Cahn says.

Picking the battles

The first step toward collaborative design via the Web is to choose a project that lends itself to the process. Typically, there must be separable design tasks. Design groups can work on different parts and then bring the results together. “The way to make it work is to divide the issues between the groups and, from time to time, have some meetings and syn-



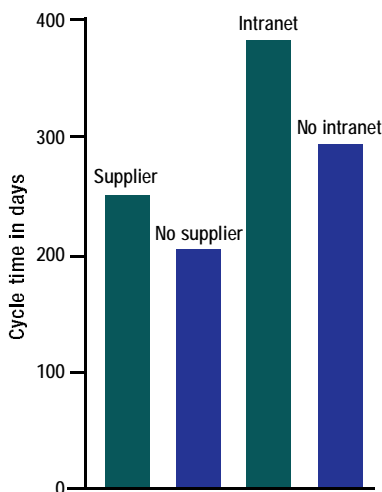
Robert Hwang, an Acer VP for the mobile system product center, launched a project codenamed M5.9. Its mission was to move products from the start of design to manufacturing in less than six months. Internet-based collaborative design was the chosen approach.

chronize them,” says Dan Bruck, IC design director for StarCore Technology Center. A microprocessor core, for example, is too complex a product to be done via Web collaboration, Bruck states. All of StarCore’s designers are under one roof.

After picking a project that is appropriate for Web-based design collaboration, top managers must decide which tasks are assigned to which partners. For the Home and Office Access division of Houston-based Compaq, dividing tasks usually means separating work along lines of expertise. **Synaptics Inc.** designed a six-button gaming touch pad for the Presario 1700 and 1400 series of notebooks beginning in May 1999. The San Jose, CA-based company worked with Compaq on the initial concept and requirements and then completed the design in five months. “We wanted to leverage the capabilities of our suppliers to the maximum,” says Jonathan Kaye, a manager of product marketing at Compaq. “The less intervention we

Slow and steady

Web collaboration can slow development efforts.



SOURCE: CAP GEMINI ERNST & YOUNG

CONTINUED ON PAGE S6

CONTINUED FROM PAGE S3

have in their competitive advantage, the better. We don't want to do the work if it's not our forté."

Assigning tasks brings up the issue of selecting design partners. In addition to the obvious selection criteria—ability to do the job at the right price—finding a partner with a compatible design philosophy and technology infrastructure is paramount. Given the challenges, it's not surprising that companies usually focus on e-collaboration only within their firewalls.

"Even internally, companies have multiple [product data management]

PDM systems, multiple CAD environments," Cahn says. With the multiple CAD and PDM systems and other design tools come a plethora of file formats. A lack of uniformity in managing information can make one organization's vital design documents cryptic to the other, no matter how fast the intranet connection between them.

"There's a breakdown if communication is not seamless because the process of managing a bill of material, for example, is different" from company to company, says Andy Lenzini, chief architect for high-tech electronics

in extended manufacturing at Hewlett-Packard, Palo Alto, CA, which started using Internet-based collaboration internally three years ago.

Keeping Web-based design collaboration within the firewall also avoids some security issues. Choosing a partner from the outside means the design team has major security issues to resolve. And the current crop of design collaboration tools has not satisfactorily solved the security conundrum: How is data protected from unauthorized people while easy access for authorized people is maintained?

A page from Acer's notebook

ACER INC. WAS UNDER THE GUN AND SWEATING.

The notebook OEM division of the Taipei-based company was building products for some big names in computing, including **IBM Corp.**, Armonk, NY. But an 11-month development cycle meant that products could be virtually obsolete when they reached distributors' shelves. Acer needed to do something, and it needed to do it fast.

"On some special projects, we needed [design and production] completed in perhaps five months," says Robert Hwang, vice president of Acer's mobile system product center.

So the company embarked upon its M5.9 project, a codename that stood for taking products from the start of design to manufacturing in less than six months. Acer decided that Internet-based collaborative design was the solution.

The first step on Acer's road to Web-based design collaboration was to clean up its internal information technology systems. "Most companies actually implement IT systems according to department requirements" and not corporate ones, Hwang says. Working on a departmental level would inevitably require the integration of diverse systems, a potentially expensive undertaking.

After evaluating several tools last year, Acer in September purchased systems from **Tonbu Inc.**, San Jose, CA, that automate document sharing and project work flow through a browser interface.

"We started with internal" use only, Hwang says.

"Firewall security is also our concern. But we have confidence that this platform can be easily used by any of our customers because it's designed and developed as an Internet environment." Acer has already found the necessary training time to be far less than that required by its product data management (PDM) system.

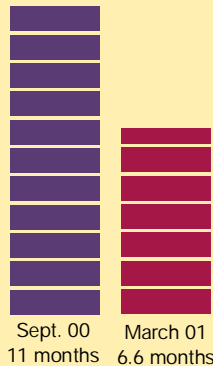
Implementation may have been fast, but it was not thought-free. "Design collaboration is a brand new concept for us, so sometimes we had to change our initial plans quite a bit," Hwang says. "Sometimes we developed a process and had to change it again to better work with our automated systems."

Tonbu is currently working on integrating work flow and document management capabilities into one platform, which could further increase efficiency. Currently, according to Tonbu President Austin Jieh, work flow and document management are generally treated as two separate tasks. "Today, event-triggering work flow that automatically generates the necessary design documentation does not exist," Jieh says.

Hwang stresses that because Acer's efforts are less than six months old, it has been impossible to quantify the ultimate benefits. Preliminary details, however, are encouraging. Acer started with 12 active users in September 2000 and, by March 2001, had more than 80 active users. Project execution time also dropped by more than 40% by March 2001, bringing the product development cycle down to about six-and-a-half months. —E.S.

Fast designs

Collaborative design has significantly reduced time from product concept to manufacturing at Acer Inc.



SOURCE: ACER INC.

"Some of the [e-collaboration] applications on the market don't have levels of security within the application to let them go effectively outside the firewall," says Cahn, who did not want to name names. He says companies that have managed Internet-based collaboration systems have had to build their own security infrastructures to support their applications of choice.

Domestic cacophony

These gaps and frustrations with existing tools, say collaboration veterans and analysts, make it imperative that collaboration partners work out the technology interoperability issues in the beginning. Differences can be ironed out, but each instance requires a manual correction process that reduces time savings. What's worse is that technology-induced misunderstandings in the design process, especially if they occur between design engineers and manufacturing, can be financially painful.

"When there's a breakdown in this way of communicating information, manufacturing will institute a shipment hold until they can get it straightened out," HP's Lenzini says. Each hold takes an average of five days to straighten out. "When an organization in the consumer business is shipping two million of something every month, five days of non-shipment is significant," he adds. "This is not a problem that technology is going to solve. The only way to solve it is process standardization that is supported by technology."

Inconsistencies in the processes of communicating information, incorporating alterations and processing changes cannot be surmounted by Internet technology. HP defined standard processes before considering which software packages to use for Internet design collaboration.

Sometimes, setting standard design processes must travel in lock-step with setting technical standards. **Electro Scientific Industries Inc.**, Portland, OR, has five geographically separate

Internet collaboration lessons learned

- Either standardize CAD/EDA software before collaborating via the Internet or develop interoperability processes before launching Web-based design collaboration.
- Don't assume everyone uses the same version of the same software.
- Don't assume that standards like XML will solve the interoperability problems.
- Discuss work flow and other processes at the beginning—and in detail.
- Pay careful attention to bills of material processing.
- Security provisions of existing collaboration tools may not be complete. Consider a virtual private network for storing and exchanging drawings, bills of material and other key documents.

SOURCE: ELECTRONIC BUSINESS

engineering locations. Three years ago, the company decided to use Internet-enabled collaboration to make better use of employee technical skills. By improving the utilization of existing staff members, Electro Scientific

telephone, but that was not enough to ensure true collaboration. Vendors and engineering groups, for example, might all need access to the same CAD files that represented a design.

"If you have part A and I have part A and a vendor has part A, how do we make sure that only one of us can modify it?" asks Laila Hirr, an Electro Scientific engineering systems manager.

The need to keep data synchronized was the major reason Electro Scientific moved to a new CAD environment from **Structural Dynamics Research Corp.** (SDRC), Milford, OH. This system was designed for Internet collaboration and can control changes. A single CAD standard also prevented Internet collaboration from becoming a never-ending series of sending CAD files in one format from one group, then converting them upon receipt at another. Before establishing the standard, the company spent significant time performing file conversions. "There's a penalty associated with selecting a vendor that is not on a common CAD system," Hirr says.

Other companies report that sharing CAD drawings via the Internet is doable. Celestica currently lets customers review CAD drawings through a browser interface using services from



Dan Bruck, IC design director for StarCore Technology Center, says it's critical to select the right kinds of projects for collaboration. A microprocessor core, for example, is too complex a product to be done via Web collaboration.

has less need to duplicate expertise and ultimately will reduce costs. In addition, the company uses outside design houses, so coordination and cooperation are at a premium.

The company used **Microsoft Corp.**'s NetMeeting to display designs while people spoke on the

e4enet.com Inc., Quincy, MA.

Sharing drawings is important, but Web-based design collaboration requires other tools. Collaborative design drawings have to be validated. And engineering changes have to be monitored and controlled. Celestica uses eMatrix from **MatrixOne Inc.**, Chelmsford, MA, to validate design packages as well as to globally control engineering changes. "You're changing parts and then you can forget you have to move this screw hole over here," Celestica's Cefai says. "The devil is in the details."

Sometimes the penalty of different file formats and software packages is unavoidable. Motorola's Computer Group produces OEM parts and systems for other companies, and an official there says standardizing on one set of collaborative tools has been virtually impossible.



Tonbu President **Austin Jieh's** company is trying to integrate work flow and document management capabilities into one platform, in an attempt to boost efficiency. "Today, event-triggering work flow that automatically generates the necessary design documentation does not exist," Jieh says.

"Quite frankly, there isn't one set of design tools or vendor or component database that everybody uses," says Wayne Sennett,

companies developed online consortia. Converge was funded by 15 major electronics corporations. Another group of electronics firms founded **E2open**, Belmont, CA. These consortia have become independent organizations, but according to AMR's Cahn, only 10% of the large companies he has interviewed are planning to use such a public exchange for collaboration.

"What we see is the large OEMs hedging their bets," Cahn says. "We see the same organizations building their own private exchanges" as well as joining the consortia. The major reason is concern about the security of intellectual property. Still, he expects that smaller companies

will look to such consortia because they won't be able to afford to build their own exchanges.

Converge's Kim disagrees that the large companies will stick strictly to private exchanges. "If you're going to force the contract manufacturers and tier one and tier two suppliers to work in multiple private exchanges, you will sub-optimize the network," he says. "You're going to irritate your customers and your vendors."

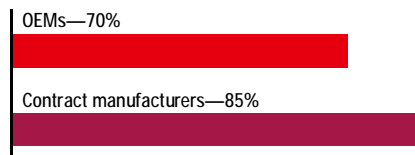
In Kim's estimation, real collaboration in electronics is still several years out. Adds AMR's Cahn: "The benefits for design collaboration are still yet to come." •

Erik Sherman is a writer in Marshfield, MA, who frequently writes about business and technology. He can be reached at esherman@triangle-publishing.com.

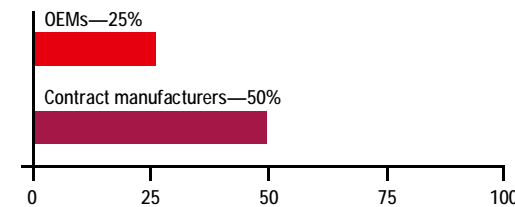
DISCLAIMER: *This is an editorial product of Electronic Business. No sponsor/advertiser has reviewed or influenced the content of this supplement.*

Many toes in the water

Most large electronics companies are using the Internet for design collaboration, but only within their own organizations. Contract manufacturers are further advanced, though.



Collaboration outside their firewalls



SOURCE: AMR RESEARCH INC.

Motorola's senior vice president and general manager. "We definitely need to be adaptable."

Notice the tinge of irony. On one hand, companies need integration and standardization to make Internet collaboration work. On the other hand, there can be no standardization because different companies—and even different departments within a single corporation—have their own software platforms. Include engineering, manufacturing, procurement, vendors and customers, and not even the Internet can solve the basic communications problems.

"There is a more fundamental issue—companies need to learn to collaborate," says Harry Kim, director of Converge Design and Knowledge at online trading exchange **Converge Inc.**, Cupertino, CA. Web-based collaboration "is a culture question and a business process question," Kim insists.

Design exchanges

To better master the culture and processes of collaboration, some