

Panel

The Electronics Industry Supply Chain: Who Does What?

Organizer and Chair: Rita Glover, EDA Today, L.C.

Abstract

The makeup and relationships within the design supply chain are changing rapidly. One-stop shopping, whereby a system house procures most of its design and fabrication services from a single source, is now being supplanted by a host of outsourcing suppliers. These players are developing online integration platforms for outsourced design engineering, business transactions, and data management.

This evolution is being felt by the entire design automation industry, whether it be focused on the electronic design of chips, boards, or systems, or even the mechanical design of their packaging and housing. What are the implications of this trend on cost, demand for services, and time to market? How can all parties ride this wave of the future to achieve the best outcome in terms of collaborative design capabilities and quality of results?

Position Statements

Marc Halpern

Gartner Group, USA

The CAD industry is at a turning point. Vendors that focused on core modeling capabilities over the years now emphasize capabilities for collaboration and the coordination of product lifecycle support. CAD's expanding role involves increasing the bandwidth of communication through greater deployment of the Internet for online interaction, product information sharing, and knowledge re-use. The capabilities to access, manipulate, and share a greater range of product-centric information and knowledge will continue to improve. While the \$6.5 billion plus marketplace for design and engineering software will grow at a rate of approximately 10% annually over the next 5 years, this smaller \$1 billion marketplace for collaborative software will expand at the annualized rate of more than 25% over the next five years.

Until now, the marketplace for such collaborative software has been driven by expectations of competitive advantage. Moving forward, this marketplace will expand out of a necessity to globally access the technical talent needed to deliver competitive products to market. Current engineering capacity in North America and Western Europe satisfies only 75% of industry needs. By 2005, domestic availability will satisfy only 60% of the need. Consequently, Western manufacturers must increase the productivity of their current engineering staff and outsource engineering both domestically and abroad to increase capacity. While outsourcing potentially fulfills the resource requirements, it exacerbates the communication challenges. Collaborative Product Commerce (CPC) functionality offers the best solution yet to address this communication bandwidth challenge.

However, since CPC is still a formative concept, few companies have experience with implementation. The collaborative nature of CPC challenges companies to reconsider their priorities and how they measure their performance, yielding cultural shifts and new business dynamics. Additionally, the formative state of the

technology and the shifting landscape of suppliers poses risks to success. To increase chances of success, implementation requires proactive steps to build new types of relationships across the value chain and strategic thinking to reduce the impact of unexpected events.

Rich Becks

Seagate and E2Open, USA

Design collaboration is part of an internal eBusiness initiative within Seagate called "collaborative computing." It has broad implications to our information technology infrastructure as well as our business processes and practices. Like many multinational companies, Seagate is spread over many countries and continents, giving it access to some of the best engineering talent in the world. This global presence can also create technical communications barriers as product teams become distributed among different time zones. In addition to these challenges, Seagate's product lifecycles are becoming so shortened that time in development can be longer than time spent in volume manufacturing.

Seagate is working closely with e2open and the other founding members to create a "virtual design center" to provide its partners a place to share project information and manage the delivery of designs to its customers. Through our participation in e2open, we have learned that our challenges are very similar to others in the electronics manufacturing industry. Manufacturing "food chains" are becoming increasingly interdependent, sometimes creating issues that cannot be solved by companies acting alone.

We have conducted two collaboration pilots using e2open as the central message center and file repository. Both pilots touched many different departments and companies and enabled the sharing of single versions of the latest files. Access security, revision control, and file management were all handled by e2open at a co-located hosting facility. During these pilots, we discovered the power of having "a single version of the truth" available to all team members and we witnessed the impact of a 24-hour design clock. We also discovered new challenges of communicating synchronously over the Internet.

Our experience with design collaboration has forced us to think about how we develop products. Our goal of integrating our Design Supply Chain into that of our partners has shown us that the answer may be as much about enterprise communication as it is about design.

Richard Kubin

Nortel Networks, USA

Many of the large electronics OEMs are undergoing a significant change from being vertically integrated to being 'virtually' integrated. While the newer players like Cisco and Dell have grown up in an environment where manufacturing and operations have been distributed across their supply chain, many of the longer established companies, such as Nortel Networks, HP, Lucent, Nokia, and Ericsson are making major adjustments as

they transform their product development and manufacturing models. In the past, successful concurrent engineering generally meant the colocation of all major functions, which by virtue of being co-located, worked off the same systems, tools, and processes (PDM, MCAD/ECAD, Engineering Change, etc.). In today's virtual enterprise, product development occurs across a "design chain." In an extreme example, functional/system design might be shared between an existing business unit and an acquisition--mechanical design and product integrity provided by one EMS partner, PCB layout by another, and PCBA and system box build/test by a third. Throw into this some custom ASIC activity, component engineering, and supply management and the fact that each entity has its own systems/tools/processes (some of which may be proprietary), and you get a highly complex environment. On top of this, product lifecycles are shrinking and we are being driven to decrease time and cost to market.

How can a large OEM excel amid this chaos and overcome these conflicting requirements? For Nortel Networks and others, the answer lies largely in three key areas: developing strong relationships with partners where risks/rewards are shared, roles and responsibilities are clearly defined, and there is a willingness to help develop or transfer expertise exists; leveraging the Internet and new Web-based systems and tools to bridge the system-to-system and geographical gaps, replacing the physical and system intimacy of co-location with a virtual one; and supporting and driving standardization in key areas of product data exchange and DfX practices.

While some of the CAD and PDM vendors are developing and offering collaborative solutions, they are generally somewhat limited in their ability to span this entire space and may require large, costly deployments. Some other recent initiatives are focused on providing a more complete hosted environment by integrating technology solutions from a number of vendors and offering them as more of an exchange or e-marketplace, providing many-to-many connectivity. Another approach is for some combined solutions to be offered in an Application Service Provider model. While all of these approaches have merit, none as yet can provide a complete solution. The path to success will involve meeting certain key requirements, including security, ease of use, flexible deployment options, and a clear value proposition.

Henry Jurgens Celestica, Inc., Canada

The continuation of the outsourcing paradigm between OEMs and Electronic Manufacturing Services (EMS) providers is presenting a number of opportunities and challenges. One major trend that is occurring with our customers is an increase in the number of New Product Introductions (NPIs), their complexity, and how quickly they must get to market. These business drivers necessitate tighter relationships, or partnerships, between the OEM designers and the engineering and supply chain communities within the EMS providers.

The best OEM and EMS partnerships are defined by a practice of working together during the entire NPI process, especially during the early design phases. This design or engineering collaboration ensures that the manufacturing and supply chain experience of the EMS provider is reflected in the product. The latest trend in the industry is to use design collaboration platforms to allow OEMs to access a broader range of skills across their EMS partners. These new easy-to-use systems will provide the opportunity to further improve on the existing collaboration model.

Rick Cassidy TSMC North America, USA

The IC foundry business was perhaps the initiating force behind disaggregation in the IC industry. IC foundries have led the IC industry into this new territory, redefining the scope of collaboration between the IC foundry and its supply chain, including EDA companies, library and IP developers, design centers, and other semiconductor companies.

TSMC has always shared excellent supply chain visibility with its partners, creating long-term collaborations that have resulted in many win-win successes. This has also resulted in a relatively transparent environment that allows customers to quickly and easily find and utilize the services they need to enable fast time-to-sample and time-to-volume.

While EDA-oriented companies typically view collaboration in terms improving the design flow, foundries see collaboration as a means to quickly solve problems and exchange information. Collaboration tools, such as mask-viewing programs, IP tagging schemes, or sophisticated customer work-in-progress (WIP) tracking software, are the by-products of a collaborate-first, productize-later approach that is typical of this dynamic industry. TSMC sees collaboration as a multi-faceted, partnership-oriented approach rather than a single "environment."

Ted Vucurevich Cadence Design Systems, USA

The EDA industry in general has been facilitating the disaggregation (and virtual re-aggregation) of the electronics design/supply chain for a number of years. We have provided "sign-off" verification and synthesis technology, libraries, and file formats (GDSII, Gerber) for over a decade. These technologies have enabled the design/supply chain to move from a completely captive environment in the 1980s to a rich set of well defined business relationships today (ASIC, COT/foundry, ASSP, and PCB contract manufacturing). Disaggregation opportunities have expanded with the advent of state-of-the-art silicon and PCB manufacturing capabilities (foundries and contract manufacturers) that boast technologies that are comparable and, in some cases, superior to captive offerings. The Internet has proven to be an additional accelerate in the transformation of the traditional in-house design chain into a multi-corporation partnership that links companies both at technical and business levels. Internet-based technologies for data management, security, and real-time collaboration are beginning to appear in EDA tools, services, and business models.

At Cadence we have pioneered the concept of large-scale, non-captive design services. Leading the trend in disaggregation of this portion of the design chain has given us insight into other opportunities. We have identified four critical articulation points in the design chain: system/implementation interface, electrical/mechanical interface, IC/IP interface, and the IC/PCB-to-manufacturing interface. We are actively developing technologies, services, and business partnerships to facilitate the next wave of optimization in the design and supply chains around these key points.