



BUILD ELECTRONICS BETTER

# JUMPING THE TECHNOLOGY CURVE COLLABORATION WITH YOUR COMPETITION

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# 1. INTRODUCTION

Regardless of the industry one competes, there is constant pressure to develop new products and penetrate new markets. This difficulty is heightened when your company is situated in a high-technology industry such as electronics. The electronics industry requires continuous investment in equipment, infrastructure, processes and, of course, skilled workers.

With increased competition coming from many of the so-called “low-cost countries” in Asia, small- and medium-sized printed circuit board and circuit assembly companies in North America and Europe are finding it difficult to compete. Certainly, they are not able to compete on cost alone. This would simply result in a race to the bottom.

At the end of the day, successful technology firms must up their game with respect to innovation, quality and yields, on-time delivery (meaning really fast), and managing increasingly complex interconnect devices. Recognizing that higher margins and profits lie in the state-of-the-art and leading-edge categories, how can a small firm that is unable to fund such innovation get into the game? The answer lies in either joining or forming an industry consortium or loose group of companies to share resources for the good of each firm.

Interestingly, most executives today are looking for significant government funds to maintain and enhance their companies’ competitiveness on the global stage. While this may be viable for some of the largest companies, the smaller enabling firms that are critical to the supply chain are often left out of the discussion. Certainly, the behemoth firms in the semiconductor and medical industries feel they can go it alone if only there were enough cash and tax breaks forthcoming. The arguments put forth are in the vein of national security, job creation, and technological leadership, and they have their merits.

However, from another perspective, this thinking is somewhat flawed. One can recall the Foxconn project that was highly touted to bring 13,000-plus jobs to the state of Wisconsin. The original project called for the construction of a very large LCD factory with an initial investment of \$10 billion. Now, the official word is that the factory will be drastically scaled down. Foxconn will now employ 1,454 people and invest \$672 million. With the amended agreement, Foxconn will only be eligible for tax breaks of \$80 million, down from the original \$2.85 billion (1). Even if the project met its original employment projections, what would be the end results for the state of Wisconsin? One will never know.

Could taxpayer funds be deployed in other ways to spur innovation and employment growth? Perhaps additional investments in workforce training and skills development will help close the gap and provide the necessary impetus for technology firms to innovate and compete successfully with the low-cost locales. With all this said, how can smaller firms leverage their respective techniques and know-how through collaboration?

# COLLABORATION AND CONSORTIUM

The word consortium is derived from the Latin word “con” (together) and “sors” (fate). Indeed, a consortium is a business collaboration framework for companies to work together and share both the risks and the future rewards of the collaboration.

For some, collaborating with potential competitors is met with deep-rooted suspicion. This is just human nature. However, consider the lack of action or collaboration. One loses the opportunity to learn from a diverse group of companies and individuals. Potential collaborators are like a team of medical providers. Some may be general surgeons, others may be heart surgeons, and others may be nurses. Each brings a unique set of skills and know-how to saving someone’s life. Together, the team stays focused on the task at hand.

The same can be said about collaboration or industrial innovations. Each individual partner brings valuable, unique skills that you may never acquire yourself. This is extremely valuable when attempting to solve a specific problem or issue.

Collaboration is a golden opportunity to innovate. Clayton Christensen, in his book, *The Innovators Dilemma*, wrote about “disruptive technologies,” describing how they gain market acceptance through small wins without necessarily drawing attention from larger firms who remain steeped in their tried and true technologies and products (2). This is the opportunity to fly under the radar and allow the innovation to evolve over time. Essentially this is an offering of a less than perfect product, however, one that is functional, reliable, and cost effective. Subsequent improvements can occur over time and can be done so relatively quickly. So, how do we get there? One can start by looking at clusters.

# CLUSTERS

In *The Competitive Advantage of Nations*, author Michael E. Porter detailed his view of clusters, which are geographic concentrations of firms in similar industries and market segments. Some of these companies are suppliers to other firms, while others may help with logistics, warehousing, and ancillary services. One can even go a step further and look to universities in the region, along with testing laboratories and consultants who can support these firms (3).

Indeed, if one surveys the North American electronics industry supply chain, there are several of these clusters spread out across the United States. This includes the Chicago-Milwaukee-Minneapolis area; Santa Clara/San Jose California; Orange County/San Diego, California; Dallas-Fort Worth, Texas; and Phoenix/Chandler, Arizona. In each of these clusters, there are multiple printed circuit board fabricators and circuit board assembly companies. Suppliers of necessary materials and chemicals are also in these locations. While many of these firms are in competition with one another, there are opportunities to forge mutually beneficial relationships. These firms have several things in common. And, if these firms cooperate or collaborate in some way, significant benefits can accrue, including financial, technology, and efficiency gains.





## CALL TO ACTION

The prevailing school of thought is that certain countries, the United States in particular, are not competitive in critical industries. One can cite the printed circuit board and printed circuit board assembly industries. These two interrelated industries form the building blocks (substrates) and the conduit that joins the semiconductor chips and packages to the final electronic product. Electronics are crucial in thousands of products from heart-lung machines, to engine control system for your automobile, or a myriad of other consumer items including smartphones and computers. Without highly reliable printed circuit boards and circuit assemblies, those complex chips and components cannot function. And this somewhat dire assessment places the safety and security of the United States at risk. The supply chain is already fragile due to numerous factors that have been presented elsewhere.

One idea is to form, under the umbrella of IPC, an HDI Institute to work on innovations in High Density and Ultra-High Density Interconnects. The consortia would focus on jumping the curve with respect to the state-of-the-art and leading-edge printed circuit board technology. The specific focus would be on the development of enabling technologies to manufacture interconnect devices to support chip packaging, semiconductor fabrication, interposers, and high-end internet infrastructure and telephony. In addition, the HDI Institute would support mission-critical defense/aerospace applications.

The consortia could be located in various clusters within the United States. Consider three separate “consortia.” Each separate group would focus on developing and delivering leading-edge and state-of-the-art printed wiring board interconnection substrates. The membership in each location could consist of three to five printed wiring board fabricators. These fabricators must be willing to share resources and essentially act as one company in each region. The business model for each consortia would be designed to compete on differentiation, not on price. The model would revolve around higher technology, e.g., higher layer counts, fine pitch HDI and Ultra HDI, manufacturing efficiencies, and marketing expertise. The latter will provide connections to the end users in support of the higher technology offerings of the consortia.

Now, is this only about collaboration to solve a particular technical issue? No, this goes deeper than that. This is about leverage, whereby the members of the consortia form a for-profit company outside of their individual entities. Each member of the consortia would provide expertise and the processes that will enable the entity to bring these complex interconnection substrates to the market. As an example, one member would provide ultra-fine line imaging services; another would provide the required array of solderable finishes; and another would provide the via-filling capability, and so on. Since the members of each consortia would be located in close proximity to each other, the logistics of moving boards from one member’s facility to the other would be simplified. Essentially the members of the consortia select the best practices and capabilities of each member. This ensures that the entity is able to deliver high technology, high reliability product to the end user.

## References

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