THE ACADEMY OF ELECTRICAL CONTRACTING

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MAKING HORIZONTAL INTEGRATION WORK
FOR ELECTRICAL CONTRACTORS

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At last year's Academy meeting I spoke with several people about the concept of Horizontal Integration across the entire construction industry.

Most people have heard of Vertical Integration, but not Horizontal; and they relate a paper manufacturer buying out a timber company along with a pulp mill to better integrate or obtain control of that vertical supply chain.

Taking the vertical and simply rotating it to the horizontal plane doesn't adequately explain what we're speaking of here. We're not talking about electrical contractors purchasing architectural firms so the entire process of construction, from design through delivery to the owner, becomes integrated. For the typical NECA member contractor that would be entirely impractical.

So I'd like to suggest a different box in which to place this concept—one of which I've heard during my discussions with industry peers: *Enterprise Integration.* To further this concept, I want to focus on the technology-related opportunities that are available today to our industry; and propose an endeavor that will make Enterprise Integration work for Specialty Contractors—not in a decade or two—but in a year or two.

The State of the Industry

Nothing I'm going to present here is shockingly new. But what I'm going to suggest is radical. We're talking about re-forming the mind-set of an industry. What I believe we need to look hardest at is changing the *perception of value* in the marketplace. Our primary objective is to expand the specialty contractor's core competencies *beyond* that of value added through skilled labor.

I go back to Gene Dennis' three vital challenges to our industry. For those of you unfamiliar with Mr. Dennis, he is the ELECTRI'21 COUNCIL Chairman. Through ELECTRI'21, he has challenged the entire industry to focus its research in three very specific and measurable ways:

1. System Thinking—Simply put, we must expand our research beyond investigating symptoms and look at our business and industry as a whole, a system.

2. Expand Our Market—This means growing our market, not by stealing business from our competitors, but through innovation, finding new ways we can serve clients needs by providing services that didn't exist before. I suggest a goal of doubling our market in real dollars in 10 years.

3. Dramatically Increase Productivity—We must improve productivity by 50% in the next 5 years."

The State of the Technology

While the Brown & Roots and Bechtels are able to purchase technological tools that allow them full-systems integration, from design and estimating through delivery (we call this integrated EPC systems, or Engineering/Procurement/Construction systems), the average NECA contractor simply cannot afford $45,000 for a software system.

The proprietary status of existing technology is forcing facility owners toward a single-source solution such as the self-performing EPC contractor. The larger contractors are able to minimize incompatibility challenges by standardizing the proprietary tools used throughout their organization, by providing electronic integration services to facility owners, manufacturers and distributors, and by branding themselves as a "one-stop-shop."

At the moment, there is no affordable tool available for you and me to integrate our systems with those of piping/mechanical and HVAC systems, and ultimately the owners—to offer something completely new and different to the marketplace.

While looking for an affordable alternative to proprietary software integration, Mark Browning, Systems Designer for Advanced Electrical

Technology, a division of Bagby & Russell Electric; and facilities owners including the VP of DuPont, as well as representatives from corporations such as Intel and DOW Chemical, have studied the available technologies and concluded that the problem is not big contractors gobbling up small specialty firms. The problem evolves from the word, "proprietary."

An excellent example from history might illustrate the specific problem and hint toward the solution we propose.

At the birth of the railroad industry, each company that built and operated the early trains had their own proprietary gauge of rail, size of couplings and control systems. It didn't matter that each rail or coupling was only inches or centimeters different from the other—when a carrier reached the end of "his" track, the freight had to be off-loaded from his equipment and re-loaded onto the next carrier's train whose specialized rails covered the next region through which the freight had to be shipped en route to its ultimate destination—it was not even possible at the time to simply exchange engines due to the proprietary coupling sizes and specifications on the freight cars.

It wasn't long before the industry saw the folly of this "proprietary" rail hardware system. Soon the rails, couplings and controls became standardized. Now keep in mind that it was the railroad industry itself that had to come up with the standards. We'll return to that concept a bit later.

The construction industry as a whole is at the point the rail industry was prior to standardization. Let's translate the technology of early rail gauges into today's technology of construction software.

We have software development companies that see a need in the industry and they focus on, for example, estimating software. Today, there is little partnering between the software development companies and the users of the estimating software, except after the fact, when the software is tooled to meet the specific needs of the user. And partnering between the company working on estimating software and the one developing CAD systems, for example, is practically unheard of.

In addition, there is often separate procurement software for the many supply chains accessed to procure the wide variety of supplies, equipment, fixtures and systems required to actually build the job. On top of that, the CAD drawings from the HVAC systems have been produced on different software than those illustrating the design of the electrical systems, so owners are forced to use hard copies rather than having easily generated electronic drawings of entire buildings with all systems included for them to use for maintenance over the life of the building.

These are values that (sometimes) can be delivered by the huge construction conglomerates that have interlinked their systems through vertical integration and ownership. Admittedly, both owners and contractors must pay amounts we would characterize as prohibitive for such value. Yet that is the way the industry is rolling; leaving the specialty contractors of medium size and smaller to become labor brokers only. Is this what we envision for our own future?

IBM, Readers, and Games

IBM ruled the American computer and data processing industries from the end of World War II to the early 1980s. During that time there was little, if any, component sharing among hardware manufacturers.

In the early 1980s IBM produced low-cost computers that small business owners could readily afford. To accomplish this, IBM freely published their personal computer *specifications* to other manufacturers and software developers. Based on these specifications, hundreds of manufacturers started producing "IBM Compatible" components and software. Small-business applications ranging from spreadsheets to CAD programs were developed.

The significance of personal computers built to IBM's specifications was not that they were technically superior to their proprietary competitor (Apple, Inc.), but rather that they could be mass produced, costing thousands less per unit, and with a variety of fully compatible add-ons (printers, etc.).

An open specification allowed PC manufacturers to buy motherboards from one supplier, hard drives from another, and RAM from yet another; and then to market the assembled units through such distributors as Computerland. Technology advancements were rapid while the selling price continually declined. PC manufacturers were able to concentrate on perfecting their assembly, marketing and distribution processes—leaving the creation of technically superior products to their component suppliers. Business owners like us can *economically* implement and support today's advanced technology largely due to open specifications promoting competition within the PC industry.

Ironically, although IBM's specifications advanced the PC to where it is today, due to a corporate culture that promoted a single-source solution, a competitive environment was created in which IBM could not compete (at least not in the small-business marketplace—of course, IBM is still a major player in the big-systems computer world).

On to Our Own Industry

Open interface specifications between the technological systems specific to the entire construction industry—from engineering to procurement; from installation to maintenance—would drastically reduce the specialty contractor's cost of technology implementation and support. Open specifications will allow the specialty contractor to offer the same services as the larger contractors, promoting competition.

This will not happen without industry stimulus. If left alone, proprietary software companies aren't going to simply spontaneously generate open construction specifications. It is because open specifications promote competition that it is very unlikely that key proprietary software developers will take the same risk as IBM and freely publish their software specifications.

It will take the initiative of the marketplace itself to take hold of the reins and generate its own market for the development of the software with standardized, openly available specifications. This is what the software developers require from us, and what this project proposes to deliver.

This is not unprecedented in today's technology side. Let's look at two totally different industries altogether: the publication/marketing industry and the video game industry.

Many publications (mostly marketing publications) have gone digital and are available through the internet. Remember the times when you'd try to get a catalog or brochure from a business partner via their website, and you experienced compatibility problems? You might have been able to download the document but you weren't able to open it, rendering it useless to you.

A company called Adobe provides a license-free document reader that is available to anyone who wants to download it off their website. It's called Acrobat Reader. It's not too complicated, it's universal, it's functional, and it's freely distributed. In a very short period it revolutionized the sharing of electronic documents via the internet. Today we take for granted that we can download almost anything we want and read it, print it, etc. with Acrobat Reader. The reader doesn't manipulate or generate information—it merely makes it useful and accessible to nearly anyone.

In the video game industry, they've developed an open viewer specification that crosses over corporate boundaries so that games made by one company can be played on a system manufactured by another, and by users physically located in different places. It's called an Extendable 3D Viewer.

By concentrating on viewers and envisioning the technology into our own industry, we simply fol-

low an approach already implemented by the video game industry. Viewers allow users (both human users and software applications) to print, dynamically interact with and share various types of data, regardless of origination, physical location or manufacturer.

Viewers are not software applications like AutoCAD or Microsoft Office. I don't think ELECTRI'21 should be in the software development business. I'm not talking about contractors or anyone else re-installing new software or developing new software ourselves. Viewers don't generate information. They are *enablers*— they will enable the typical NECA member contractor to help make Gene Dennis' challenges happen within our lifetimes. They enable the typical NECA contractor to offer to owners value *never before accessed*. They enable the construction industry to not only be envisioned as a whole, but to actually seamlessly share information *at the partnership level* to enhance involvement throughout a capital project's life cycle. We're talking major bottom line impact here.

Interface Standards

Here is a new medium, available to us here and now. Here is where we get into the perception of value in our entire industry by expanding our marketplace through offering something that has never before existed.

Interface standards: the cornerstone in this open systems approach to re-defining our industry. A standard is a *publicly available document defining specifications for interfaces, services, protocols or data formats*. The standards of which I speak here are going to have to be *established by consensus within the industry.*

We have the viewer. We have the need. We've been challenged by the leaders of our industry to make three things happen—to begin thinking in entire systems; to expand our market in new ways; and to increase productivity by 50% within 5 years.

What is needed next is the electrical industry to become the leaders in sitting down with our construction partners, the process facility/building owners and the software developers, and creating the standards themselves that will become universal. The viewers need to be customized to the construction industry so that a specific symbol generated on a computer screen anywhere in the US is universally recognized as being an outlet; that another symbol or figure generated by the software is known to be a control system box or is recognizable as a piece of flexible conduit or PVC. The software developers can't do this without us.

The Ultimate Customer – the Owner

The large contractors are already offering integrated EPC services. This is not only forcing "the rest of us" to become labor brokers—it is changing the facility owners' perceptions of value. Certainly the "true" value of EPC systems might be debated until nightfall. But look at the writing on the wall and guess where you and I might fit in 20 years.

What we can do better than the EPC systems people is to continue with the operations/maintenance of a facility's life cycle after the construction has been completed. The large contractors aren't geared up for the small jobs involved with maintenance.

This is why we're approaching this project description by citing the NECA member's involvement *throughout a capital project's life cycle.* With the proper tools, we really can do it all—if we can seamlessly share information and drawings and building systems with our partners in the creation and maintenance of the owner's asset, we become valuable to him in ways no one has ever thought of before. By definition, our productivity will increase.

We've actually spoken to several owner representatives. Most who understand the possibilities are extremely excited about this concept. We've asked, "If we can get all the electrical contractors together on this through ELECTRI'21, will you

work with us to accomplish standardized, open specifications?" They've all said *Yes* with enthusiasm.

One owner, when contemplating the measurable possibilities of being able to share information across disciplines, estimated that if something like what we're proposing were available to him, it would save his company around $500 million a year in maintenance costs, downtime costs and so forth. As one example, think of the impact on an owner's ability—if he has instant access to the original engineering drawings—to locate and pinpoint an electrical systems issue on site with the drawings and procurement specifications in hand, then to be able to send the drawing over to the electrical contractor with the problem already isolated so the contractor knows ahead of time who to send and what tools and equipment that professional will need to fix it. The possibilities are profound.

The Vehicle to the Future

ELECTRI'21, as the leader in Engineering/ Construction Systems Research, is the obvious vehicle to begin laying the foundation for this critical development. The supporting technologies, including the internet, standardization of cabling systems, the existence and availability of the Extendable 3D Viewer are all in place. The standardization of the technologies to the specific needs of the construction industry is the first step. Next we need the leadership to come together in a forum to apply the standards so that core competencies are expanded across the board. The leadership includes the owners of buildings—which speaks to Mr. Dennis' first challenge; to look at the buildings industry as a whole, not the mere sum of its very distinct parts.

Working in conjunction with facility owners, distributors, manufacturers, and software and hardware developers, ELECTRI'21 can generate an industry-wide definition of these open standards; and can implement the subsequent adoption of them to assist the entire industry in collaboration for better construction management, procurement,

engineering and maintenance. What better endeavor to be undertaken by a research foundation?

Like all ELECTRI'21 projects, anyone would be free to acquire a copy of the standard, to implement a product to its specifications, and to sell that product without restriction. What I envision is a small fee that might be charged by the Foundation to offset the cost of reproducing and distributing the standard—or perhaps a small license fee for its use. But whatever fees are assigned must be minimal and reasonable so that widespread use of the standard is encouraged.

If indeed we desire to rise up and meet Gene Dennis' challenges, this topic should be of critical interest to all NECA members and associated specialty contractors. Provided we, as small and medium sized specialty contractors, desire to expand our core competencies beyond that of value added through skilled labor, then the question of union versus non-union competition should not enter the equation. As we've proven again and again in the marketplace, qualified labor is critical—but this project is not about training or labor's skill. It's about the contractor's abilities and competencies.

The direct advantage to NECA contractors is that we are spearheading the specification. We will form close relationships with facility owners. We will create strategic alliances with manufacturers, distributors, *and software developers*—a situation nearly unprecedented in the construction industry as a whole. We will be in a position to economically implement and support the technology into the future, and therefore steer its development, guide its application, and assure its longevity.

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has been involved with the Gulf Coast Chapter for over 39 years serving on the Board of Directors for 14 years, as Chapter President for 11 years and recently reelected in 2004 and Governor for 8 years. He received a degree from Vanguard Technical School in electronics engineering, furthering his interest in integrated systems and his goal of keeping abreast on the leading edge of technology.