2012 Industry Trends
TABLE OF CONTENTS

TREND 1
The Changing Nature of Business in the Construction Industry
Is Construction a Commodity? ................................................................. 3
Return of the Master Builder Concept .................................................. 9
Changing for the Future ........................................................................ 10

TREND 2
The Federal Construction Sector: Understanding a Transforming Market
Government Construction Facing a Downturn .................................... 12
Increasing Opportunities for Small Businesses .................................... 20

TREND 3
Redefining Leadership: Strategic Thinking in Today’s VUCA World
It’s a Different World Today ................................................................. 25
Defining VUCA ..................................................................................... 25
Success Factors ................................................................................... 27
Elements of Strategic Thinking .......................................................... 28
Strategic Thinking Versus Strategic Planning ..................................... 28
Five Successful Tactics of Strategic Thinkers .................................... 29
Anticipating the Future ........................................................................ 32

TREND 4
Modularization and Prefabrication — Role Development and Evolution .................................................................................. 33

TREND 5
Recovering the Lost Generation for the Construction Industry’s Future
The Argument for College (Later... or Now) ....................................... 37
The Argument for Starting a Career in Construction ......................... 39

TREND 6
The Science of Efficiency and Productivity: Construction 2.0 in the New Normal
Lean ................................................................................................. 42
Building Information Modeling and Leveraging Technology ............. 43
Prefabrication and Modularization ..................................................... 45

TREND 7
Market Factors Shaping the Construction Trade Unions of Tomorrow
Union Construction ............................................................................. 51
The Construction Industry is Changing ............................................ 53
Politics and Embattled Unions ............................................................ 56
Union Benefits .................................................................................... 58

TREND 8
The Concilience of Design and Construction
Something More than Traditional Consolidation Trends .................... 60
Owners Drive Consilience .................................................................. 61
One-Stop Shopping .......................................................................... 63
Megaprojects on the Rise? ................................................................. 63
Signs of A/E/C Industry Consolidation ............................................. 64
Top Design and Construction Firms .................................................. 64
Strategic Positioning, Decisions and Indecisions ............................... 66
Buyers and Integrators .................................................................... 67
The Talkers ....................................................................................... 68
Survivors ......................................................................................... 68

TREND 9
Your Next-Generation Leaders: Are They Ready?
Understanding the Perfect Storm ....................................................... 70
Failing to Plan, Planning to Fail? ........................................................ 72
Developing Your Next-Generation Leaders ....................................... 73
What Best-In-Class Firms Are Doing to Develop Their Leadership Style ................................................................. 76
The Road Ahead .............................................................................. 79

TREND 10
Globalization and How it Impacts our Industry
Key Trends Shaping the Global Design and Construction Industry .. 81
Transforming Trends Into Knowledge and Action .............................. 83
Living In a Globalized World ............................................................. 84
Early Preparation Pays Off ............................................................. 86
Leading With a Global Mindset ........................................................ 88
Trends Synopsis

By Kelley Chisholm

FMI shareholders met in late 2011 and identified several key trends they felt would shape the design and construction industry in upcoming years. The result is this collection of 10 white papers, published throughout 2012, which identifies major issues and provides analysis and insight into what lies ahead for our industry.

Here is a list of the trends and some of the key points of each that FMI feels will help your company make informed business decisions in the days to come.

- **The Changing Nature of Business in the Construction Industry.** The nature of the construction industry is changing. Prosperous contractors of the future will be dynamic innovators in all aspects of their businesses and will:
  - Become more strategic
  - Build closer relationships with customers
  - Develop IT as a profit center
  - Be specialists in strategic niches
  - Self-perform more work
  - Know how to innovate, accept and manage risk
  - Embrace change
  - Become productivity experts
  - Be greener
  - Be collaborative and service-oriented

- **The Federal Construction Sector: Understanding a Transforming Market.** Federal budget constraints, shifting national security priorities and a diverse set of owners with multiple objectives are rapidly transforming the federal construction market. Some of the key trends that will shape the federal design and construction industry in the coming years include:
  - Decreased overall funding levels driven by budget constraints and large federal debts
  - Continued emphasis upon sustainability and energy efficiency in order to achieve larger policy goals
  - Lasting reality of federal small business initiatives

- **Redefining Leadership: Strategic Thinking in Today’s VUCA World.** Leaders in the design and construction industry have long dealt with volatility, uncertainty, complexity and ambiguity (VUCA) on a daily basis. As traditional leadership skills become obsolete, companies that invest the time, effort and money into developing the human capacity to think strategically today will survive. Successful tactics of strategic thinkers include the ability to:
  - Be aware and anticipate the future
  - Collaborate and constantly test new ideas
  - Develop critical-thinking skills
  - Be lifelong learners
  - Become agile yet focused on the horizon

- **Modularization and Prefabrication: Role Development and Evolution.** FMI predicts that modularization and prefabrication will play an increasingly vital role in improving the productivity of the entire construction value chain. For that to happen, industry players will need to alter their mind-set and be open to new approaches to designing, scheduling and constructing projects.
  - Owners will need to be convinced of the benefits.
  - Architects will need to embrace the possibilities and restraints of modular construction.
  - Engineers will need to familiarize themselves with the manufacturing processes associated with various prefabricated components.
  - Manufacturers will need to become involved in project discussions at the outset.
  - Contractors and specialty trades should recognize how prefabrication and modularization will reduce project schedules and improve safety.

- **Recovering the Lost Generation for the Construction Industry’s Future.** The recession is officially over, but given the size of the 18- to 34-year-old cohort and the shortage of “real” jobs out there, it may just be the beginning for the lost generation. Without some creative new ideas, the long-term outlook is bleak; but this generation will only be “lost” if it does not find its way to a new approach. How can industry leaders promote construction careers to this generation? They must:
  - Let go of old ideas about career progression and how a college education fits in and examine the new paradigms that were unveiled during this last recession.
  - Help this generation realize that construction industry’s reputation is outdated.
  - Get this cohort working, earning money and building its own recovery plans.
  - Show that the construction industry provides both long- and short-term solutions for this potentially “lost generation” to survive.
The Science of Efficiency and Productivity: Construction 2.0 in the New Normal. Market conditions have necessitated the need to make productivity a strategic priority. Simply building a better mousetrap will not suffice. Contractors must:

- Take an exhaustive and introspective look at how they build.
- Begin at the top of the organization to make change at the field level.
- Employ new techniques and tactics, such as Lean, BIM and prefabrication.
- Address and embrace the human element.

Market Factors Shaping the Construction Trade Unions of Tomorrow. The best solutions to labor market problems in the construction industry will be based on market solutions, not politics. The construction industry trade unions that are poised to survive the downturn and grow in the upturn must:

- Recognize the need to change and serve both their membership and their clients, the employers.
- Provide a trained and experienced workforce.
- Offer a pool of labor for trades and crafts.
- Provide workers with training, decent work conditions, higher pay scales and good benefits.

The recruiters and managers who deploy the most skilled workforce required to do the job will win the work on the labor front.

The Concilience of Design and Construction. Over the last few years, FMI has observed what appears to be a continuing trend in the construction industry where architectural, engineering and construction firms are coming together through mergers and acquisitions, partnerships, consortia and by organic growth to become effectively A/E/C firms. The primary drivers for this phenomenon are:

- The demands and needs of various owners.
- The need for industry firms to grow as well as survive.
- The increasing use of key technologies such as BIM, project tracking software, etc.

Your Next-Generation Leaders: Are They Ready? Every day for the next 19 years, 10,000 baby boomers will reach age 65. This aging of 26% of the total U.S. population will dramatically change the composition of the country and the A/E/C industry, specifically. Now more than ever, it is essential for organizations to put comprehensive succession plans in place by following these steps:

- Clarify your company's vision
- Develop business strategies and objectives
- Identify leadership requirements
- Evaluate the organization and candidates
- Create a development process
- Outline and implement the transition plan

Globalization and How It Impacts Our Industry. Characterized by multiple centers of economic power and activity, today's multipolar world has shaken up old business models and approaches and poses multiple challenges for construction companies. This new macroeconomic environment also offers a host of opportunities for companies that favorably position themselves in the changing landscape. Successful global companies will:

- View competitors as potential collaborators.
- Understand the cost and risk barriers to entry.
- Think strategically and understand their connection points to the world.
- Collaborate and innovate.
- Position themselves for success in multiple markets.
- Create new adaptation strategies and core competencies.

As you read each of these papers, keep in mind that it is a new world out there, one that is constantly changing. Successful companies will be innovative, adaptable and always looking ahead.
The nature of the construction industry is changing, and a major driving force for this change is what is often referred to as the commoditization of construction services resulting in margin compression for construction firms. Whether evolutionary or revolutionary in nature, these forces will drive some contractors out of business. Those who thrive in the next generation will not just survive; they will master change and remodel the industry.

A few years ago, we heard everywhere about the “Perfect Storm” that had come down hard on the economy and tossed the ships of the construction industry around like so many toy boats. We suddenly—it seemed sudden, anyway—learned the housing market was overbuilt, oversold and over-leveraged. We learned, whether we wanted to or not, about short selling, subprime lending, hedge funds, bundling, credit default swaps, margin calls, quants, derivatives and Ponzi schemes, all with the amazing abilities both to make money and to make money vanish into thin air. The bubble was so big, it covered the globe. Until it burst, most of us thought things were going well – we were in the “good old days” of the construction industry. In hindsight, we were watching the buildup of forces that would unleash an economic tsunami, the Perfect Storm that left the Great Recession in its wake. If that was not enough, there were real tsunamis, earthquakes and major storms to deal with that cost lives and the global economy untold billions of dollars, yen, Euros and Yuan. To this economic epic, add political grandstanding and deadlocks, leading to even greater uncertainties in the markets and the future of global currencies and debt. Real-life experience in this economy seems more than enough to put action movies out of business.

If the story of the beginnings of the Great Recession are starting to sound like modern history, that is a good sign. Nonetheless, we are still living through it. The forces that ripped through the economy will continue to reverberate across the globe for some time to come. The world is forever changed. Yes, there are signs that things are improving, but we still have continuing high unemployment despite more people finding jobs. Banks are making loans again, but only to the best, lowest-risk customers with more stringent regulations and equity demands. The construction industry has shrunk 30% or more since its highs in 2007 due to loss of employees and less available work. Some companies have gone away; most have just gotten leaner and meaner in order to survive a highly competitive, tight market. The economic outlook calls for continued slow growth, in large part because most of the problems that made headlines in 2011, including the global debt crisis, as recent downgrades of Euro-zone credit ratings indicate, are still with us in 2012. Global financial markets are still precarious.
Owner organizations have also downsized their internal engineering and construction departments to accommodate more moderate corporate expansion plans as we discovered in the “FMI/CMAA Eleventh Annual Survey of Owners,” 2010:

- More than half of all owners say they expect to either resume hiring in 2012 (10%), 2013 or later (14%), or never (28%).
- 28% of responding owners say they expect never to resume hiring. However, a significant minority do report plans to hire in 2010 (20%) or 2011 (22%). In the view of more than half of all owners, diminished staff resources are a permanent condition.

The result is that owners expect greater support from construction service providers, and they want the lowest price possible. That often means changing construction delivery methods:

- 55% of owners describe their approach to construction execution as “most like design-bid-build.”
- 24% said they took “a blended approach,” and about 18% said their approach was “most like design-build.”
- For large projects, however, the dominance of design-bid-build seems to be eroding, with only 47% of owners reporting using that method, compared to 24% reporting a blended approach, and 21% saying their approach was most like design-build. (Ibid.)

For owners, it is a buyers’-market bonanza where purchase of construction services is beginning to resemble online purchasing, like Amazon, Groupon™, eBay® or even the Chicago Mercantile Exchange. The information revolution has given purchasers more information than ever, and large owners are more sophisticated, with a ton of technology at their fingertips. Thus, there is growing pressure to look at construction as a commodity purchased on the open market for the lowest bid.

Is it the future of construction to battle it out in bidding wars or to become another product sold on eBay? Likely not in the near future, but there is a growing sense that the road out of the Great Recession will not land us back in some imagined “normal” state. The Perfect Storm and its aftermath have changed the course of the future for the world and for construction. We are not going back to the market of 2007.

The industry upheavals have put a severe strain on contractor profit margins, which in better times typically range between 2% and 5%. More recently, studies have shown sharp drops in profitability for contractors, approaching a meager 1%, and negative numbers becoming more frequent. Those results are unsustainable for the health of the construction industry. The question at this point is not whether or not contractors will go out of business in this economic environment, but how many and how soon? Then there is the other side of the coin; even in these tough conditions, there are contractors making money. How do they manage this counterrtrend? For one thing, they are firms that are not content to sit on the shore and watch the world go by.
Is Construction a Commodity?

Although we don’t expect to see construction procurement go the way of eBay anytime soon, there are already reverse auction sites for construction procurement. To say the least, this practice has not been endorsed by major contractor organizations. Savings to owners have not been demonstrated, and there are a host of problems associated with the open-bid approach. Construction is different from products and services sold online. Most contractors, and even most owners, would say construction services are not commodities. Buildings and the construction process are too complex to be considered commodities. Construction is a professional service requiring different mixes of skills, capabilities and technical specialties that make each service provider unique.

A commodity is defined as a product or service that is relatively the same no matter the source or provider. Commodities are “fungible”; that is, one product can be exchanged for another. Most commodities are traded on an open market where the price is largely decided by supply and demand. (However, speculators temporarily boosting demand or suppliers reducing output until the price goes up can artificially influence both supply and demand, for instance.)

The contractor’s perspective includes the fact that each contractor is unique with services differentiated from its competition. For instance, contractors have different experience levels, safety records, abilities to get the project built faster, or better customer relationships and communication systems, to name just a few areas of differentiation. The owner looks at the project and says, “Here are the bid package and drawings.” The contractor that can deliver on the details of the contract for the lowest price wins the job. That simple, right? No, of course not, as anyone who has entered into a construction contract will tell you. Otherwise, it might look more like a simple purchase order — x bushels of wheat at current market prices for May delivery.

One major area of choice for owners with a project and contractors offering services is seen in the area of delivery methods. The choices and variations of delivery methods have increased considerably over the last two decades. If low bid/design-bid-build appears to be more prevalent these days, it may have more to do with lack of information or just the idea that owners are going to take advantage of a desperate contractor market and push for the lowest price. Multiple options exist, including design-bid-build (D/B/B), design-build (D/B), construction manager (CM), construction manager-at-risk (CM/GC) with a guaranteed maximum price, or, the more recent addition, integrated project delivery (IPD). Optimally, the owner will make an educated choice to address the specific need.

One of the reasons there are so many delivery methods available is that the more traditional D/B/B approach was not yielding the desired results. D/B/B has a tendency to be contentious, pitting owner against contractor as one tries to outsmart the other, often ending in court cases. This may not be the situation with every D/B/B project, but the current cut-price market has greater potential for contentious change orders, poor quality and unsatisfactory results.

Over the past few years, we have heard contractors and even some owners caution against blindly focusing on low price for construction. Responding to our recent survey on construction delivery methods, one contractor commented:

Bidding has become stupid with contractors pricing at extremely low levels. Why? To keep their men working and maintain cash flow.
Owners are very aware that this is a good time to get the lowest price for projects, but some are cautious:

Everyone is doing more with less, less human resources as well as lower profit margins. The economy has produced a great bidding environment for owners relative to pricing; however, it does not come without risks – mainly quality of work and subcontractor solvency. A significant value is placed on contractor pre-qualification with the hopes that the subcontractors selected will last throughout the project. (Owner Project Manager, large university system, responding to the “FMI/CMAA Eleventh Annual Survey of Owners”)

According to William Terrasi, director, enterprise project management, DTE Energy, just getting more bidders does not assure getting the best contractor for the job:

You’ve got to be careful what you wish for. To put it simply, sometimes you are exposed to a real gem that you never knew about, and other times you get a lot of pretenders, and we don’t need more pretenders. Whatever their niche was, they need to stay there. (FMI “Win/Win Project Delivery”)

Despite what most owners know by experience and, for many, what their favored delivery method would be, we have found more owners, at least temporarily, have returned to something more like D/B/B. According to our 2010 survey of owners, nearly 55% have gone that way for project execution. (See Exhibit 1) However, when asked which construction procurement method they used, nearly the same amount selected low bid compared to select bid, and 29% still chose negotiated project procurement. (See Exhibit 2) These figures indicate that the majority of owners still recognize some differentiation among delivery methods and contractors. Low-bid procurement does not guarantee best value or even lowest price at project completion.

The pressure from owners to treat construction procurement as a commodity continues in structures that are characteristically not as complicated to build, have more or less standard designs and prototypes, and many builders have the capability and expertise to build them, thus making the market highly competitive. Examples include:

- Housing (residential and multifamily)
- Warehouses
- Chain stores/retail
- Office buildings (excluding high-rise, skyscraper)
- Lodging
- Schools

To say that the above list more closely fits the definition of a commodity is to say all housing, warehouses, etc., are the same or nearly so. However, building structures in each of these categories can have a wide range of special designs and features. Owners can also have different needs, like scheduling concerns or site requirements. Some contractors will be more experienced and capable than others, depending on the special requirements.
TREND 1: The Changing Nature of Business in the Construction Industry

Exhibit 1: On the majority of your capital construction projects undertaken during the past 12 months, use the scale below to portray your approach to construction execution. (All projects combined, regardless of size.)

Exhibit 2: Estimate the percentage of projects on which you used these selection methods to procure capital construction services during the last 12 months.

"FMI/CMAA Eleventh Annual Survey of Owners," 2010
Even those owners wanting to treat construction services as commodities when in the purchasing phase want unique buildings, something that sets them apart from the competition. That’s the case for community schools and housing. Commercial owners want their buildings to be differentiated from the competition to offer their own unique experience or support their brand in some way. But need and price can alter some of these differentiators. Sometimes a good, serviceable building will suffice when a community is facing a sharp increase in student population without a significant increase in tax income. A store chain may be able to modify vacant buildings to suit its needs. Companies keeping expenditures low may decide that this isn’t a good time to build a building with marbled halls and customized offices. In tough times, owners may be willing to modify their needs and desires in order to get the building at a price they feel is affordable. First, they want it all, and they will try to get it by looking for the lowest bid from contractors.

Construction projects that would not readily fit any description of commodity might include those that are characteristically complex, have unique designs, include innovative technology, present difficult building conditions, or are mission-critical or significantly large in scope, such as:

- Medical buildings
- Research facilities
- Power plants and other utilities
- Bridges
- Oil platforms
- Chemical plants
- Stadiums
- Museums
- Concert halls
- Water and wastewater plants
- Highways and roads

Building types not as likely to be treated as commodities are still subject to owners looking for the lowest bid, but the bidders must be pre-qualified. Savvy owners are looking for best value. Among the reasons for this include the cost of poor quality and missed schedules for large projects. If a contractor fails in the middle of a stadium or power plant project, the cost in lost box office receipts or production is extremely high. Structure failure in any of these projects is potentially catastrophic. The risks are too high for owners to take the chance that the lowest bid is not the best-qualified bid. Owners building most any type of project should feel the same way. But when times are tough, they are willing to take the chance that the contract will protect them from risk; and contractors hungry for business will cut prices even at a loss.

Reducing cost by soliciting the lowest bid in a design-bid-build delivery method is not the only way owners are seeking to reduce the cost of construction, but it still predominates, according to comments received from panelists of FMI’s Nonresidential Construction Index Report. In the first quarter of 2012, we asked panelists what they are seeing owners do to reduce and control project costs. There are a range of things owners are doing to reduce costs, but most of the com-
ments from construction industry executives focus on changing delivery methods and pressur-
ing contractors to get the lowest price possible. Among the most questionable methods, several
contractors note the increase of bid shopping. The following is a sample of comments on what
owners are doing to control costs:

- Cost is not an issue to owners. Bids are coming in well below estimates due to excessive
  competition and lack of backlog from some contractors.
- Rebidding multiple times to shop contractors.
- Bidding in the street so they get low numbers.
- Becoming CMs themselves and using multiple primes.
- Change comes slowly in the Northeast. We are seeing more competitive lump-sum
  bidding and less CM-at-risk.
- It has become a much more mixed result where certain owners who are more inclined
  to seek true life-cycle value are staying with or going back to the value proposition and
  quality-oriented contractors who can demand a fair margin on the work. Otherwise, there
  are still many developers and owners who know that contractors are desperate; and if they
  look diligently, they can get these contractors to compete to get all subs driven to a bottom
  number and the GC themselves to bid with a zero fee, sometimes less, in hopes they can
  bargain more from the suppliers and subs after award. This has resulted in GCs defaulting,
  and I suspect we will see more of both GCs and trade contractor defaults this year. Buyers,
  beware!
- The greatest frustration is that there appears to be only nominal consideration of the risk
  they are accepting when they award work to substandard trades. The concept of paying
  for value and workmanship have gone out the window, and low price wins 99 out of 100
  times.
- We are seeing the public sector in our areas finally get onboard with early selection of the
  CM/GC.
- We have seen a huge increase in bid shopping.
- We have seen several clients that have traditionally hired CMs for CM-at-risk work,
  based on qualifications only, go to a system where qualifications are the first step. Then,
  providing fixed fee and general conditions percentages or lump-sum amounts is ultimately
  the deciding factor. Others are hard bidding work vs. selection and negotiation.
- We are seeing heavier use of BIM and prefabrication.

Is the construction industry returning to the dark ages where relationships, collaboration and
the idea of value are retreating into the shadows? Certainly, contractors and owners are taking on
more risk when low price is the only criterion for awarding the contract. As commented above,
“Buyers, beware!” We should also add, “Sellers, beware.” Owners may be buying a Yugo when
they wanted a Ford or a Lexus. The result is potentially a great increase in legal disputes and
contractor bankruptcies, which is good for the legal sector, but not the best construction delivery
process.
Return of the Master Builder Concept

Not all owners are moving or regressing to design-bid-build or low-bid methods of procurement. According to our recent NRCI survey, the move to design-build delivery is more prevalent; yet owners still push for the lowest price. However, owners are also more willing to consider alternative materials and methods to save money, especially as material costs have continued to rise throughout the recession—one more concern that reduces profit margins for contractors. Interestingly, there is another trend, especially for midsize and smaller contractors; owners are involving CMs and contractors earlier on in the project in the design or even pre-design phase. Along with the move toward integrated project delivery (IPD), some have likened this to a modern version of the ancient Master Builder concept.

The use of qualified owner project managers (OPM) to serve as clerk of the works—mandated on large public projects in Massachusetts, for example—adds an upfront cost that increases initial price to reduce final project cost. Further, the OPM challenges the contractor to validate all elements of a project budget, the contractor’s margin and the project cost structure. The savvy contractor is learning to anticipate project audits, pre-audits and onerous review of margin opportunities. The construction industry is challenged to come to terms with an acceptable level of risk and return for the contractor to preserve long-term industry health. Without attractive margins and profits, ultimately the financial health of contracting is in question. There are limits to the margin compression squeeze being applied by buyers of construction services.

In response to the need for cost certainty and best value, the industry has developed robust and sophisticated pre-construction services. The delivery of high-quality, professional pre-construction is mandated for the owner to attain project objectives at maximum value and the E&C providers to earn respectable margins. Onerous, abusive and punitive contractual terms and pricing schemes are unsustainable. Effective “free markets” must arrive at an equilibrium.
The real risk in the low-bid squeeze play is that, even though owners are taking advantage of a highly competitive market, those providing construction services will play the game and do the best they can to make up for winning the bid with negative profit projections by cutting corners, increasing the cost and number of change orders and billing for any extras possible. Some cost recovery methods will be legitimate, some not, but the contractor wants to make money on the project. Contractors that do not play the game well risk going out of business. This type of atmosphere of contentiousness and deception is bad for business and something the industry has been working for years to improve. Therefore, there is some real potential of the construction industry returning to the dark ages.

On one hand, the return to something more like the Master Builder concept protects owners from process inefficiencies and contractors playing games that add cost to the project and the risk of going over budget and schedule. At the same time, the move to using more design-build, CM/GC and IPD, and generally bringing the contractors and all service providers to the table prior to design and construction can reduce risk and improve project success for all involved. Not all owners, nor all contractors, are ready for this, but for larger, complex projects, this is the future—or what appears to be one of the best possible futures—for the industry and one that ultimately can be more effective in reducing costs.

**Changing for the Future**

As we work our way out of the Great Recession, owners that have projects to build will continue to want the lowest price and best value. There appears to be a growing bifurcation in the market, just as we see in the economy in general. Those in the middle will be squeezed the most. So what can contractors do to survive and thrive in this future? The fact is that there are contractors making reasonable profits even in the downturn.

The following is a list of areas that are yielding benefits for contractors:

1. **Become more strategic:** If owners have more information about the contractors and construction process, contractors need to have more information about their potential customers. At the same time, contractors need a deeper understanding of their own processes, methods and all costs.

2. **Build closer relationships with customers:** This isn’t just a matter of a salesperson taking the customer out to dinner or playing golf anymore. Buyers need to have confidence in their contractors. They need better ideas of how to accomplish their goals. Contractors must understand those needs and more, long before estimating and bidding a job.

3. **Develop IT as a profit center:** The goal here is to make the IT department a profit center, not just a group that fixes computers and installs new software. Project management, productivity tools and tracking software for job progress and cost reporting will help get waste out of the system and reduce costs. Understanding and using BIM has become a necessity rather than just a nice-to-have gimmick. Improved communication in the form of software and hardware from smart phones and tablets to jobsite cameras and regular discussions among project managers, the field and clients will not only help build relationships, but also reduce the time it takes to get things done. Even installing and making full use of a CRM system will help track business development efforts and customer information.
4. **Be specialists in strategic market niches:** To avoid being more like a seller of commodities, become best-in-class specialists. Best-of-class contractors know their customers’ business and add value. While most forecasts and market discussion consider broader construction markets, there are many submarkets and market niches that can be profitable. Thinking strategically, a contractor may even be able to carve out its own market niche with few competitors.

5. **Self-perform more work:** Self-performing contractors are often the most profitable. They offer benefits to customers in having more control over schedule, price and quality and, if they are productive, can make greater margins with their own labor. As labor shortages return with the economy, those companies that can best recruit, manage and mobilize labor will have the edge.

6. **Know how to innovate, accept and manage risk:** The modern trend in business has been to avoid as much risk as possible by shifting it contractually or otherwise to others—who in turn move it on to others and so on. While it is important to avoid risk, the cost of shifting risk can be expensive. More contractors are working to get a deeper understanding of all the sources of risk in their work and, wherever possible, accept and manage the risk themselves. When done effectively, risk management can become another profit center.

7. **Embrace change:** Most of the firms that were surprised by market changes were either not paying attention or ignoring what they knew was happening. Sometimes one has to believe his or her own eyes and data and make the necessary changes to adjust to market forces. In a recent paper by FMI, “Adjust, Adapt, Act: Winning Stories from the Post-2007 Construction Industry,” Michael Vickery, senior vice president of BakerTriangle, is quoted as saying, “If as a company we were positioned today the same as five years ago, we were either wrong then or are wrong now, because the market is uniquely different.” It is important to have a company culture and a reputable company history, but if the firm is to have a great future, it has to make changes. Recognizing those needed changes early can mean the difference between a competitive edge and falling in line with the low bidders.

8. **Become productivity experts:** The construction industry is often chided as being unproductive and behind the curve of high-tech manufacturing sectors. However, more contractors are breaking out of that mold and looking for ways to employ technology and processes like BIM, prefabrication and modularization to gain on productivity, safety and workforce changes.

9. **Be greener:** It is not only important to understand owner needs and wants for more sustainable projects, but it is also time that contractors learn how to be more sustainable in their own business. Reducing waste and carbon footprint will not only provide a good example for others, but also reduce cost in a world where key materials are becoming scarcer and regulations stricter.

10. **Be collaborative and service-oriented:** While it seems to go against the grain of low-bid, price-slashing markets, thinking more like partners and service providers will be an advantage over time.
Conclusion

Be the Future of Construction not the Past

It does not take a crystal ball to see that the world will not return to pre-2007 conditions. It has been and continues to be a tough recession, and memories are not so short that we will see a credit-fueled building boom anywhere on the horizon. There are many trends and economic forces that are here to stay: sustainability and green construction, reduction of energy use, industrial technology use, consumer buying power and the Internet consumer market, scarcity of raw materials, and growing populations.

The beginning of the recession saw many companies hunkering down to try to wait it out; others saw opportunities for change. Competition will continue to be fierce, especially for those who follow the crowd and get in line. Owners will continue to be demanding, although we expect more will return to best value based on qualifications and experience rather than just low, low prices.

The thriving contractors of the future are dynamic innovators in all aspects of their business, making them attractive partners for the owners who need, want and value professional construction services.

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Philip E. Warner, Research Consultant, at 919.785.9357 | pwarner@fminet.com
Based upon federal budget constraints, shifting national security priorities and a diverse set of owners with multiple objectives, the federal construction market is transforming rapidly. Given these changes, it is increasingly important for companies working in this space to comprehend the key forces accelerating these changes, as well as the shifts that are impacting the design and construction industry as a whole. Keeping an eye on movements and events – both within the federal construction sector and beyond its boundaries – will lessen the surprise factor and help companies prepare themselves for the next challenge.

This paper highlights some of the key trends that are shaping the federal design and construction industry in the coming years. The main trends include 1) a decrease in overall funding levels driven by budget constraints and large federal debts; 2) a continued emphasis upon sustainability and energy efficiency in order to achieve larger policy goals; and 3) the lasting reality of federal small business initiatives.

**Government Construction Facing a Downturn**

When the American Recovery and Reinvestment Act (ARRA) of 2009 was passed into law, the landmark bill was intended to lessen the impact of the national economic recession. Workers would find jobs, the country’s infrastructure would be stabilized, and there would be a resurgence in both private investment and consumer spending. Those aspirations fell short. And while ARRA funding did help individual states, and the country as a whole, avert even deeper crises (roads and bridges were repaired, schools continued to be built and staffed, etc.), private sector investment in new capital construction projects didn’t flow back into the market as quickly as hoped.

With one crisis averted and the national economy slowly recovering, the U.S. is now facing a mounting national debt and a declining federal discretionary budget (see Figure 1).
Concurrently, the U.S. construction market is dealing with weak levels of private investment and proposed federal government cuts. The double whammy is alarming for government-focused contractors, and it is also impacting firms that – in light of the sparse private sector project funding – require federal spending for new project opportunities. Companies that assumed increased public spending would tide everyone over until the private market recovered are now wondering where their next project opportunities will come from.

Not surprisingly, numerous contractors, ranging from small to large, have recently attempted to grab a foothold in the fiercely competitive federal market. Consequently, given the complex and bureaucratic nature of the federal construction market, we expect to see less committed and financially unstable firms pull out in the coming years. Growth through federal construction opportunities begins with a well-thought-out plan and a focus on the different government agencies and departments. Working for the federal government should not be viewed as a short-term solution to shrinking private sector opportunities, but as a long-term strategy for growth and diversification. Those companies dedicated to a serious, long-term strategy will likely survive and thrive in the new federal business environment.

Department of Defense: Looming Budget Cuts Ahead

Budget cuts are on the Department of Defense’s (“DoD”) agenda. In January, Defense Secretary Leon Panetta announced that the department would request $525 billion for its base 2013 budget (compared to $531 billion in 2012). Panetta said the DoD would also request $88.4 billion for overseas contingency operations (compared to $115 billion in 2012) to maintain support for troops in combat. These budget cuts reflect the DoD’s new strategic direction and the department’s compliance with the 2011 Budget Control Act, which requires the department to reduce spending by about $259 billion by 2016, for a total of $487 billion in reductions by 2021.

The cuts don’t stop there. The Department of Veterans Affairs (VA) and the General Services Administration (GSA) are also bracing for significant construction program decreases. Having just completed its largest expansion since World War II, the VA is decreasing its construction budget by 45% (see Table 1). The GSA expects a similar decline and predicts that fewer construction projects will come online this year, compared to recent activity levels. A 2011 spending bill enacted in April reduced the GSA’s construction account for 2012 by 94% to $50 million. The House panel chopped the agency’s $869 million request for repairs and renovations by 61 to $280 million.

At the same time, the BRAC program for base realignment and closure, which started in 2005, is winding down. During the past six years, the U.S. Army Corps of Engineers (USACE) has executed $16 billion of Military Construction (MILCON) for 275 Army, 127 Air Force and 32 DoD BRAC projects and is on track to meet all of its BRAC program milestones on time. As

![Figure 2. Projected Total Spending for the Department of Defense](source: www.usgovernmentspending.com)
“In the future, we are going to see more small-scale projects — $100 million or less — including retrofit and O&M-type projects. The mega projects throughout the East Coast and the North Atlantic Division will be rare. There could also be more construction management (CM)-type opportunities since agencies won’t have the necessary resources to oversee large construction projects due to recent budget cuts.”

Steve Bowers, Chief, Contract Administration Branch, U.S. Army Corps of Engineers

the program nears completion, the DoD fiscal year 2012 budget for base realignment and closure will be reduced by more than 80% over 2011 levels. Steve Bowers, chief, Contract Administration Branch at U.S. Army Corps of Engineers, adds, “In the future, we are going to see more small-scale projects – $100 million or less – including retrofit and O&M-type projects. The mega projects throughout the East Coast and the North Atlantic Division will be rare. There could also be more construction management (CM)-type opportunities since agencies won’t have the necessary resources to oversee large construction projects due to recent budget cuts.”

Other military DoD construction, which makes up the bulk of the department’s construction program, would be reduced by 4% this year. Family housing is the one bright spot for the DoD. Spending in that sector is projected to increase by 4% in 2012 (see Table 1) as troops return home from Afghanistan and need housing.

However, President Barack Obama’s fiscal year 2013 budget proposes two new rounds of BRAC, one in 2013 and another one in 2015. As it has in the past, a new round of base realignments and closures could generate new work for engineering and construction firms. Shutting down facilities, modernizing bases and handling environmental assessments are just a few of the opportunity areas. Should another round of BRAC be implemented, however, the amount of work generated will depend on where the bases are located, says one industry source. If the bases are small, or if they are based overseas, then the opportunity window will be much smaller than it was during previous BRAC events.

A spokesperson from the Society of American Military Engineers adds that if the size of the Army and Marine Corps. is reduced, then the existing facilities – many of which were built within the last five years – will be readjusted in lieu of building new structures. The focus will be sustaining, renovating and modernizing existing facilities rather than replacing aging structures (see Figures 3 and 4). Many industry experts agree with this view since many of the buildings built during the BRAC boom lack standard energy systems. “I think there’s going to be a major push for rehabilitation of existing facilities,” says one executive of a large international construction company.

### Table 1. House Appropriations

<table>
<thead>
<tr>
<th>Program ($ millions)</th>
<th>FY 2012 House</th>
<th>FY 2011 Enacted</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOD base realignment and closure</td>
<td>482</td>
<td>373</td>
<td></td>
</tr>
<tr>
<td>DOD family housing construction</td>
<td>373</td>
<td>373</td>
<td></td>
</tr>
<tr>
<td>DOD other military construction</td>
<td>11,489</td>
<td>4,768C</td>
<td>C</td>
</tr>
<tr>
<td>VA major construction</td>
<td>590</td>
<td>590</td>
<td></td>
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<tr>
<td>DOD defense environmental cleanup</td>
<td>4,938C</td>
<td>4,768C</td>
<td>C</td>
</tr>
<tr>
<td>Corps civil works (regular appropriations)</td>
<td>822C</td>
<td>822C*</td>
<td>C</td>
</tr>
<tr>
<td>Bureau of Reclamation water/related resources</td>
<td>822C</td>
<td>822C*</td>
<td>C</td>
</tr>
<tr>
<td>Total</td>
<td>23,462</td>
<td>23,462</td>
<td></td>
</tr>
</tbody>
</table>

Note: Amounts are rounded. *Excludes $1,029 million in emergency funding for 2011 storm and flood damage repair, C: Approved by committee, no floor vote as of 6/20/2011

Source: House Appropriations Committee
DoD’s “Strategic Pause”

On January 5, 2012, President Obama announced a new defense strategic guidance entitled “Sustaining U.S. Global Leadership: Priorities for 21st Century Defense.” This new guidance is critical since it is intended to reshape future DoD priorities, activities and budget requests for the next decade. The guidance represents a framework for DoD decision makers as they face spending cuts of about $487 billion over the next 10 years to meet the initial budget caps set in the Budget Control Act (BCA) of 2011. The guidance does not account for the possibility of sequestration – further significant cuts that could be required pursuant to implementation of the BCA.

Given the potential scale of DoD budget cuts, security experts are currently debating the role of the U.S. in international affairs and how the U.S. military should be structured to best support this role. As programs in Afghanistan and Iraq wind down, there is a renewed focus on the Asia-Pacific region (mostly air and naval forces), while forces in the Middle East transition to a peacetime ground force presence. Obama’s new budget strategy calls for a shift in priorities, with some areas – such as special military operations – receiving more resources and others receiving less. According to Defense Secretary Leon Panetta, “We are at a turning point.”

How all these changes will affect DoD construction programs in the future is still unclear. Some speculate on possible scope changes related to multibillion-dollar build-up facilities such as the one on the Pacific island of Guam. Others think that the DoD’s plan to bolster its special forces could mean more work to develop infrastructure, such as new training facilities, to support those forces. Essentially, it remains to be seen how all of this will unfold.
The 2012 appropriations debate is far from over. So far, Senate lawmakers have taken no action on any of the 2012 spending measures. What is well-established is the increasing pressure to shrink the federal budget deficit. The ARRA funding spigot, which in 2009 and 2010 helped prevent construction put in place from falling more than 10% to 15%, has dried up. Changes in the federal construction sector present great challenge and opportunity for those firms, which can harness the trends in driving the market.

**Implications for the design and construction industry:**

- The pool of firms competing for federal construction will decrease. Likely survivors will be mature, federal sector-oriented companies.
- Focus on “sustainment,” renovation and modernization of existing facilities rather than replacing aging facilities. Extensive O&M spend contrasted with declining new milcon construction expenditures.
- New DoD strategy calls for a shift in defense priorities. Certain areas — such as special military operations (“black” or “secret” sites, cyber-warfare operations, data centers, etc.) — could receive more resources while others may receive less.
- Fewer larger projects and more small-scale ($100 million or less) retrofit and O&M-type projects.
- Construction firms with CM- and O&M-type capabilities will gain a competitive edge.

**Drive for Net Zero: Federal Push for Clean Energy Innovation**

The federal government operates about 500,000 buildings (3.34 billion square feet) and consumes more than one quadrillion BTUs of energy per year. In fiscal year 2010, it spent $21 billion for all energy use and is the single-largest energy user in the United States (1% of the nation's energy consumption).

Based on legislation enacted in 1992 and executive orders issued in subsequent years, the federal government has required all of its agencies to reduce facility energy consumption with the goal of having “Net Zero” buildings in place by the year 2030. The vision of a Net Zero energy building involves collecting as much energy from renewable sources as the structure uses on an annual basis while maintaining an acceptable level of service and functionality. Buildings can exchange energy with the power grid as long as the annual net energy balance is zero.

Today, many federal agencies have attained approximately 30% of this Net Zero energy use goal, primarily through innovative, sustainable design and construction practices developed during the past decade (e.g., LEED), building retrofits and various alternative energy implementations. The Army, for example, has numerous pilot installations under way to test renewable energy sources, such as solar photovoltaic panels, as well as new techniques to reduce waste and conserve water. According to Kristine M. Kingery, director of Army sustainability policy, a part of the Office of the Deputy Assistant Secretary of the Army for Energy and Sustainability, “The pilot installations involved now in the Army’s Net Zero Installation Strategy are test cases to see what’s possible. They are striving toward goals for 2020. By 2014, an additional 25 installations will come on board
in the program, and those installations will have a target year of 2030. The Army’s overall goal is to reach net zero status in all three areas (energy, water and waste), for all installations, by 2050.1

Furthermore, in a new solar power study commissioned by the Defense Department’s Office of Installations and the Environment, researchers estimated that there is enough vacant land on seven military bases – stretching from California to Nevada – to generate 7,000 megawatts of solar energy. That is the equivalent of seven nuclear power plants. According to the study, the federal government could generate up to $100 million a year (through additional revenues and/or reductions in energy costs) by leasing that vacant land out to solar developers.

The idea of trading land in exchange for renewable energy led to the launch of a task force of energy and acquisition experts. The task force’s main goal is to attract $7.1 billion in private investment over the next decade – the estimated amount of private capital that the Army needs to be able to derive 25% of its energy from renewable sources by 2020. Katherine Hammack, assistant secretary of the Army for installations, energy and the environment, explains, “We have land we need to keep in the Army inventory for multiple reasons... That land is one of the things we can offer a private developer. In exchange, we will be a purchaser of their energy.”

That scenario would find private companies building solar farms, wind turbines or other renewable energy projects on Army property. The Army would either accept the electricity as an in-kind payment for the land usage or become a guaranteed customer for the electricity generated. Hammack adds, “In many cases, the Army expects the solar, wind and geothermal facilities to end up producing more energy than the base hosting them actually needs. The developers will then have the opportunity to make money from selling energy back to the grid.”

Red tape could stand in the way of that plan though. The solar power study states that solar development on military bases is governed by a “complex web of laws, regulations and market rules, administered by public and quasi-public entities” at nearly every level of government. Written before solar energy made an impact on the renewable-energy market, the laws will push DoD staff and their partner companies to tread carefully before proceeding with development.

As part of their efforts to achieve Net Zero, federal agencies have also begun to adopt life-cycle cost analyses in order to evaluate new building opportunities. This “total cost of ownership” analysis will not only measure the upfront expense of a facility, but also take into account the cost of maintaining and operating a facility over its expected life-cycle. Such analysis presents additional opportunities for engineers and construction firms responding to government solicitations. While initial construction outlays will be important, a more expensive but more efficient building (when incorporating ongoing ownership costs) may be deemed superior. Further, creative design and engineering concepts that incorporate operational cost savings will likely be recognized and adopted.

Perhaps most importantly, all firms aiming to contract with the federal government need to understand and master the life-cycle cost analysis framework in vogue with the specific federal agency. As with any federal government procurement, both form and function will be important. Utilizing life-cycle cost analysis and being conversant with an agency’s methodology for calculating such benefits will be a competitive advantage in the proposal process.

**Retrofit as a Platform for Innovation**

The General Services Administration (“GSA”) is also leading the way in sustainable design and construction practices, with numerous initiatives under way to modernize existing buildings, construct new ones and establish new industry standards in collaboration with the private sector. One such initiative is the Green Proving Ground program (part of a larger smart building strategy), which utilizes the GSA’s real estate portfolio to test and evaluate the effectiveness of technologies and practices in a building operations environment. Larry Melton, assistant commissioner, Facilities Management & Services Programs at GSA, states, “We try to test 12 to 15 new technologies each year. Findings are then shared and discussed among industry authorities; if appropriate, we deploy the new technologies at a broader scale. These efforts also support our ongoing development of environmental performance specifications for federal buildings.”

The GSAs Net Zero Renovation Challenge, which aims to improve the energy performance of federal buildings through the use of energy service performance contracts (ESPCs), is another innovation platform that’s under way. Energy services companies that already provide ESPCs to federal agencies will retrofit approximately 30 federal buildings nationwide as part of the challenge. The projects will be evaluated by a panel of independent experts based on energy savings, technical innovation, cost savings and the applicability to other federal buildings. The winning entries will be awarded the ESPCs as well as future ESPCs.

Melton emphasizes how other programs, such as GSAs advanced metering program, have improved significantly over the past three years and are now more than just aspirations. He adds, “We have installed well over 1,000 advanced meters in our buildings nationwide (gas, electric or water) and continue to push this program in the future.” As smart building technologies continue
to improve and as costs come down, investments in such projects will become more feasible and prevailing among tenants.

However, the engineering and construction industry does face some challenges in the near term to assist federal agencies in accomplishing their smart buildings goals. As an early adopter, the federal government believes that today’s construction labor force is still relatively slow to catch on to technological advancements that are transforming the way buildings are being designed, built/modernized and operated. “The human aspect is the biggest challenge we face,” explains Melton. “Many mechanical, electrical or even general contractors are not used to working in this kind of technological environment. It will take time to adjust and adapt to these changes.”

Steve Bowers, chief, Contract Administration Branch at the U.S. Army Corps of Engineers, confirms this concern: “One of the challenges I foresee is the limited amount of skilled workforce to perform some of the more complex projects, particularly in the secured areas. In addition, design and construction firms will need to make sure they have sufficient U.S. citizen staff that passes all government clearances. That is something the industry needs to take into consideration.”

**Beyond Construction: The Big O&M Opportunity**

Federal building owners and facility managers face the ongoing challenge of improving and standardizing the quality of information that they have at their disposal, both to meet day-to-day operational needs as well as to plan for life-cycle costs, future upgrades and maintenance activities. Several industry stakeholders interviewed in this study confirmed that sustainable design and construction practices are creating novel opportunities for construction firms in the O&M space. Melton adds, “Right now, there is a unique opportunity for the construction industry to partner with the O&M industry for the sole purpose of ongoing commissioning. Construction companies that have strong partnerships with O&M contractors are the ones being most successful in this (smart facilities) market.”

Building information modeling (BIM) technologies play a key role in this discussion. BIM provides information to facility managers about building systems, including architectural, structural, plumbing, mechanical and electrical. While BIM has proven its value in design and construction for more than five years, BIM facility management technologies are still evolving. Despite the high number of new facilities and buildings that have been designed and built with BIM software over the last 10 years, the opportunities to improve facility management practice and leverage this store of information are plentiful.

Many federal agencies, including the U.S. Army Corps of Engineers (USACE), have made long-term system-wide commitments to BIM and associated technologies like the Construction Operations Building Information Exchange (COBIE). COBIE allows the USACE to capture BIM facility data and enable project stakeholders to enter the data (as it is generated) during design, construction, commissioning and use. This eliminates the need to create data at the end of a project in the form of post-construction or as-built hard copies. Today, USACE requires several types of projects to provide this kind of facility data as a project deliverable. Manufacturers, suppliers and contractors will have to embrace these technologies and collaborate in innovative ways.
Implications for the design and construction industry:

- Net Zero policy goals will continue to drive adoption of energy-efficient buildings and acquisitions of alternative energy solutions.
- Federal agencies offer fertile ground for innovative development and private investment opportunities, given the aggressive goals related to Net Zero compliance still to be achieved.
- Federal agencies are looking for construction companies that are knowledgeable of sustainable design and construction practices, comfortable using emerging technologies and open to new ways of building, financing, operating and maintaining structures.
- Facility management will be paramount and a well-trained, technologically skilled field labor force will be a benefit to construction firms attempting to meet the federal government’s energy retrofit objectives.
- Construction companies that develop strong partnerships with O&M contractors or that develop O&M in-house capabilities will gain a competitive edge.
- Strong consideration will be given to TCO/Life-Cycle Cost Analysis. Construction providers must learn how to build proposals that accommodate, and that are sensitive to, these concerns.
- Companies pursuing renewable energy markets such as solar power that master and learn to work within the patchwork of applicable laws, regulations and market rules governed by public entities will form a competitive advantage.

Increasing Opportunities for Small Businesses

The federal government awarded a record $97.95 billion in federal contracts to small businesses in fiscal year 2010 (Oct. 1, 2009 – Sept. 30, 2010) – or 22.7% of eligible contracting dollars. It was the largest, single-year award amount in five years and a significant improvement over FY 2009, when small businesses received 21.9% of contracting dollars (see Figure 7).

Over the past year, the Small Business Administration (“SBA”) has stepped up its federal agency collaboration efforts and created more opportunities for small businesses to compete for and win federal contracts. Final results for FY 2011 will not be available until the third or fourth quarter of 2012, but preliminary data indicates that the SBA will achieve its internal target for contracting – awarding 67.5% of all its contracts in FY 2011 to small businesses.

Federal departments and agencies are required to expend 23% of their annual procurement dollars on small business awards. Unfortunately, many agencies have fallen short of these targets and without penalty. To stoke agency participation and follow-through, Rep. Bill Owens (D.-N.Y.) introduced a bill in January entitled, “The Small Business Growth and Federal Accountability Act” (H.R. 3779). The Act is designed to “hold accountable federal departments and agencies that fail to meet goals relating to the participation of small business concerns.”

Figure 7. SBA Contracting Numbers for Fiscal Years 2008 - 2010 (Dollars in Millions)

If enacted, the bill – which is now being reviewed by the House Small Business Committee – would slash a federal department’s or agency’s budget by 10% for not hitting its established small business procurement goals. The question becomes: How will federal agencies react to this penalty?

**Other Key Developments for Small Businesses**

*SBA raises “small” business thresholds for engineering and architectural firms.* Until recently, engineering or architectural firms with average gross revenues up to $4.5 million (over three years) were considered “small” as defined by the SBA’s stringent federal procurement regulations. This changed in February when the SBA increased the size standard for architectural services to $7 million and $14 million for engineering services. The rule is effective March 2012. Consequently, architectural and engineering firms that did not meet these thresholds in previous years can now regain small business status provided they fall within the newly defined revenue thresholds.

*New bills aim to funnel more contracts to small businesses.* Along with “The Small Business Growth and Federal Accountability Act,” the U.S. House of Representatives’ Small Business Committee chair recently introduced a pair of bills: Government Efficiency Through (GET) Small Business Contracting Act and the Small Business Advocate Act, which would raise governmental small business contracting targets and intensify advocacy for small companies. These are the first of several bills that the Small Business Committee plans to unveil this session in an effort to reform small business contracting.

As a result of the GET Small Business Contracting Act, the government’s business contracting target would increase from the current 23% to 25%. This lower goal is one that the government missed in both 2010 and 2011. The 2% increase would funnel $11 billion in new business to small companies every year, according to the representative who introduced both bills, Sam Graves, R-Mo. Additionally, the bill would give 40% of all contracting dollars to small firms – an increase from the current 34.9%. Graves stated that if “federal agencies do not meet those goals, then senior agency officials’ bonuses would be withheld.”

The Small Business Advocate Act would also address contract insourcing and bundling, and would facilitate the Federal Office of Small and Disadvantaged Business Utilization’s activities around helping small companies in acquisitions.

Federal agencies have also instituted a significant push toward policing small business compliance. This intent was confirmed in an interview with Ms. Jackie Robinson-Burnette, associate director of the Office of Small Business, U.S. Army Corps of Engineers: “We expect to see a renewed focus and commitment to compliance and accountability in the area of small business subcontracting…No longer will a large business be able to win a large prime contract (which has a subcontracting goal to give a portion of the work to small businesses) and miss those goals without some type of consequence.”

*Increase in Service-Disabled Veteran-Owned Small Business (SDVOSB) opportunities.* With the wars in Iraq and Afghanistan concluded, all federal agencies are helping to put thousands of men

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2 In January 2012, legislation was proposed calling for a $500,000 penalty for large businesses failing to subcontract in accordance with their contract goals.
and women who once wore their country’s uniform back to work. This effort is part of the larger “Veteran Job Corps” initiative that the president unveiled in February. Burnette adds, “I think the SDVOSB program is going to grow the largest over the next few years. It is a newer program and one that we focus on more closely here at the Corps. We are committed to the soldiers and officers who risked their lives for our country and want to make sure that there is a place for them upon their return.”

Setting up a SDVOSB concern can be challenging, though, and requires thoughtful planning and extensive background research. According to Dean Nordlinger, counsel with PilieroMazza, a general business law firm with a specialized practice in government contracting, “In order to succeed, a SDVOSB must walk a fine line between complying with applicable regulatory requirements and dealing with business realities. Nowhere is this tension more apparent than with respect to an SDVOSB’s ownership structure. Ideally, an SDVOSB’s governing documents will strike the proper balance between the applicable SBA and/or U.S. Department of Veterans Affairs (VA) regulatory requirements and the pursuit of its business objectives. However, careful planning is necessary to make sure the right balance is struck.”

This detailed level of preparation and planning is even more critical considering the SBAs current scrutiny of SDVOSBs, which resulted from recent allegations of fraud and abuse in the SDVOSB program. To qualify as an eligible SDVOSB, a business must satisfy the following criteria:

- It must be considered small under the applicable NAICS code assigned to the government procurement.
- It must be at least 51% owned by one or more service-disabled veterans.
- The management and day-to-day business operations of the concern must be controlled by one or more service-disabled veterans.

**HUBZone small business concerns may lose program eligibility.** When 2010 Census data regarding unemployment rates and income levels was released on October 1, 2011, nonmetropolitan counties and census tracts that the program ‘re-designated’ in the program no longer qualified as HUBZones. That means small firms with headquarters in those expired areas are no longer able to maintain their HUBZone certifications. Roughly 3,400 firms will be de-certified, according to SBA estimates.

Those small companies remaining in the HUBZone program should check their status to ascertain whether or not they meet the 35% employee residency requirement. Any firms that do not meet this or any other HUBZone certification requirement are being encouraged to voluntarily remove themselves from the program. If warranted, those firms can re-apply for certification after a 90-day waiting period.

**Key Challenges to Overcome**

While the social and policy objectives of these small business programs are honorable, they present challenges in practice for the firms charged with implementing them. Certain of these issues

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3 For more information, check out: https://www.sdvosb-council.org/

4 For more information, check out: http://imedia.sba.gov/vd/media1/training/HUBZoneBriefing/index.htm
were raised during a hearing before the U.S. House of Representatives Armed Services Committee Panel on Business Challenges within the Defense Industry in January. Lynn Schubert of the Surety & Fidelity Association of America presented the following findings:\(^5\)

- **Contract size.** Very often government contracts are unnecessarily bundled into one large contract and bid. Consequently, small contractors do not have the capability to perform the work on these large jobs nor can they secure the necessary surety bonds. This will likely change in the future as confirmed by Burnette, who says, “I see a huge focus on avoidance of bundling contracts. Consequently, there will be more smaller projects for small construction companies to compete on.” Furthermore, industry representatives are advocating the development of more clearly defined procurement policies that provide small construction firms with access to projects that they can perform.

- **Bonding versus capital.** Frequently, small and emerging contractors that encounter difficulty in obtaining bonding actually may have capital problems instead. In today’s tight credit market, for example, they may not receive the bank lines of credit they need for long-term business stability. To get bonds, small contractors primarily need capital, capacity and experience. According to Schubert, “A capital access program combined with a surety bond access program would be the best solution for some contractors.”

- **More clarity around joint venture and mentor-protégé programs.** Mentor-protégé programs and joint ventures are a great way for small construction firms to team up with and learn from larger firms in order to win and perform federal contracts. In some cases, however, policies and regulations around these programs lack clarity and standardization among the procuring agencies as to what arrangements are acceptable. Occasionally, the regulations may present disincentives for smaller contractors to participate in such ventures. Schubert explains, “A small business may lose its ‘small’ status if it participates in a joint venture in which the partner does not qualify as a small business or, in some cases (such as the 8(a) mentor-protégé joint venture), the protégé does not control the joint venture. Once an otherwise-qualified small business loses its status for that particular set-aside opportunity, the small contractor cannot take advantage of the set-aside opportunity and the federal agency letting the construction contract faces an obstacle in meeting its small business participation goal.”

Some or all of the existing small business legislation that is currently being discussed will clearly impact the design and construction industry further down the road.

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Implications for the design and construction industry:

- The current administration is heavily focused on promoting small business opportunities. This trend will likely continue in the coming years.
- The new regulations and policies regarding “unbundling” of contracts will create more opportunities for small construction firms.
- Construction firms will have to dedicate more resources to contract administration and educate themselves more seriously about evolving contract requirements due to growing pressure to comply and adhere to government regulations.
- Large construction firms should partner with small business entities that are – and will continue to be – awarded a significant portion of agencies’ total project expenditures. Companies involved in joint ventures or mentor-protégé programs need to be well-informed and up-to-date on agency-specific regulations and policies regarding these programs.

Conclusion

The federal construction market is a complex mix of submarkets that are influenced by a broad range of constituencies and shaped by key forces like looming budgetary constraints, fierce competition, and stringent policies and regulations. More than ever, design and construction firms must gain deep understanding of the specific forces shaping their space within the larger federal “ecosystem” – one of the most complex and dynamic business environments in the world. Firms that anticipate and adapt to these changing circumstances will not only survive the current federal construction market transformations, but will thrive on those shifts.

Entering the federal construction market is not an easy feat. Success in the market requires a long-term commitment, a sharp focus and a well-thought-out plan. Once a firm has established its presence and reputation, the opportunities remain abundant, particularly in the realm of renewable/clean energy, smart buildings and small business initiatives.

Now is the time for design and construction companies to shape their own destinies by becoming experts in sustainable design and construction practices; to partner with the O&M industry (or add those capabilities in-house); to develop technically proficient workforces that think in terms of “systems” not “processes”; and to bring innovative financing solutions to the table. Additionally, by partnering with non-traditional industry stakeholders, industry leaders will further differentiate themselves from their competitors.

Short of devolving into commoditized, low-bid operations, the smart federal firm will carve out a long-term “space” by providing services that target its audience with acuity. The quickening pace of change will ensure that new leaders emerge from the field, and that former mainstays disappear. Tomorrow’s federal design/construction leaders will anticipate and adapt to this all-encompassing change. To get there, firms will have to ask themselves, “What makes us unique?” and then move beyond the value-cost tradeoff to create and fulfill new demand.

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Redefining Leadership: Strategic Thinking in Today’s VUCA World

It’s a Different World Today
Leaders in the design and construction industry have long dealt with volatility, uncertainty, complexity and ambiguity (“VUCA”) on a daily basis. VUCA is part of the industry’s DNA. Today, though, the rapid pace of change is transforming the global business landscape more and more, rendering traditional leadership skills obsolete and challenging executives to equip themselves with new insights and leadership abilities.

The concept of VUCA originally gained traction in military circles in Afghanistan and Iraq in response to the proliferation of nontraditional warfare. These environments required a new set of tactics and methods for dealing with conditions on the ground, where existing combat strategies and personnel experience no longer matched the new challenges. The VUCA concept also resonates with an increasing number of CEOs who are trying to make sense of the constantly changing challenges brought on by politics, economics, society, technology and the environment.

This article presents one component in effectively responding to a VUCA environment – the ability to think strategically. The research includes information gathered from FMI executive coaches and senior consultants, and interviews with more than a dozen senior executives from both design and construction companies. In addition, FMI captured input from almost 140 industry leaders through an online survey focused on decision making in today’s business context.

Defining VUCA
Each of the four components of VUCA present unique challenges, with the impact of all four simultaneously generating a “change tidal wave” that threatens to overwhelm today’s leader. The following examines each element of VUCA and describes ways to lead more effectively in the VUCA environment.

V is for Volatility. The design and construction industry is notoriously volatile, given all of the different market dynamics that are at play. One of the most relevant areas of volatility for design and construction leaders is the flow of capital into certain project sectors. The solar industry is a prime example: an opportunity fueled by state and federal spending, which generated rapid growth, and was followed by an equally rapid decline once subsidies diminished. Without the ability to think clearly and strategically, leaders find themselves chasing volatility into the next “hot” market, but always arriving a step too late. As we look to the future, we anticipate more unsettling and unforeseen shifts in financial markets, commodity and base materials prices, and many other key drivers of design and construction activity. As our world becomes more intertwined and connected, the more intense the impact and implications of volatility will be on our businesses. Key to preparing for volatility is anticipating where the critical shifts will occur, predicting how they might affect the industry (and the company specifically) and testing various scenarios. Equally important in responding to volatility is knowing what NOT to do, and avoiding impulsive and uncoordinated responses.
U is for Uncertainty. The modern leader faces uncertainty at an unprecedented level. One need only look to the events of the debt-ceiling debate less than one year ago for a prime example, with leaders facing the scenario of Congress refusing to raise the U.S. debt ceiling. Consider the case of an engineering and construction firm working in transportation markets trying to plan and strategize when federal, state and local entities are all saying different things. In addition, one need not look far to find an expert predicting a sustained recovery or an equally pedigreed expert threatening the dire consequences of a fallback into recession. Rushing to comprehend the uncertainty is also dangerous. Some of the symptoms of excessive uncertainty include acting with more confidence, when we are actually less certain than ever or increasingly, chasing immediate and short-term opportunities.

Our mental models and paradigms for assessing threats and challenges are often too simplistic and inadequate to protect us against the uncertainty inherent in today’s VUCA environment. Using mental models, we compare the new, unexpected challenge to past hurdles, assuming that those experiences will help us push through the new obstacles. Comments like, “The market will go back to what it used to be – it’s just another cycle,” are very emblematic of our industry mindset. Unfortunately, relying on our deeply held beliefs can sometimes result in flawed assumptions and force us to assume that the solutions that worked in the past will also work in this new VUCA world.

C is for Complexity. Quantitative easing, credit default swaps, collateralized debt obligations, integrated project delivery (IPD), federal health care and building information modeling (BIM) are just a few examples of the many external factors increasing the complexity of today’s business environment. Any one of these factors is a study in complexity, with many intervening factors, various inputs and outputs, and deep, far-ranging social, economic and technological implications. Leaders operating in today’s world must be able to make the “if/then” connections among these factors and go beyond viewing challenges and opportunities as collective; rather, they must see them as interactive.

Consider the example of contractors who have tried to move their businesses from private markets to chase federal markets, learning painful lessons in managing the complexity of new requirements and processes. Such complexities frequently result in confusion and increased attempts to make sense of the increasingly sophisticated business environment.

A is for Ambiguity. As we look around our industry, macro-and microeconomic trends continuously influence and shape our everyday business environment, requiring leaders to approach both opportunities and challenges from multiple perspectives without falling subject to their own viewpoint. There is no shortage of data to process, interpret and analyze. With a few clicks of a mouse, a leader can collect information on unemployment rates, consumer confidence, GDP growth and public market performance. However, without the clarity of strategic thinking, this information is ambiguous at best and can mislead us or only confirm what we want to see. For example, consider the rapid rise of key public market indices such as the Dow Jones Industrial Average and the S&P 500. Simply using these as indicators of a recovering economy leads to dangerous assumptions for leaders in the design and construction industry who operate in fractured, local and regional markets. The typical human response to ambiguity is to look for incremental problems to solve, but failing to grasp the larger root issues.
Success Factors

There are no easy answers or quick fixes to think more strategically in the face of a VUCA world. Following are some key success factors – each of which comes with a warning that they are “simple, not easy,” meaning that they sound simple but fall apart without rigorous discipline and dedicated attention:

- **Don’t lose sight of the big picture** by trying to solve all challenges at hand. Be ready to flex and respond to rapidly unfolding scenarios while also retaining a clear vision over which judgments should be made. Make sure your employees understand the company’s vision. This will equip them to handle unpredictable and/or violent shifts in your business environment.

- **Set up incremental milestones and develop consistent messaging and clear direction**, particularly when goals and priorities keep shifting. The path itself may not be clear, but having tangible milestones in place – and achieving them – will help assure that the organization is moving in the right direction. Small successes boost morale and are also great motivators for employees.

- **Carve out open space on your calendar to think on a regular basis**, and don’t let immediate needs usurp this important planning time. Many construction leaders seem to embody the admonition, “Don't just sit there, DO something!” when sometimes the best advice may be, “Don't just do something, sit there and think”.

- **Uncertain times bring opportunities for bold moves**. Find ways to challenge the appropriateness of your company’s mental models, both individually and collectively. Develop processes and concepts to test new ideas and challenge existing ones. Don’t be paralyzed out of fear of making the wrong move. Always stay open to new opportunities without losing sight of the longer-term goals.

- **Encourage networks rather than hierarchies**. Develop interdisciplinary, collaborative teams and avoid “silo-like” problem-solving approaches. Ensure that employees across the company communicate openly with each other.

- **Develop independent thinkers**. Employees who can think for themselves and make the right decisions in the right moments will help your firm effectively tackle new, complex projects. Be deliberate with your training and development campaigns.

- **Focus on how the company can improve in the future**, rather than looking to the past. The past is not necessarily an indicator of the future; moreover, it is highly unlikely that things will return to the way they used to be. Place value on innovative, temporary solutions that perform well in today’s unpredictable climate, and don’t rely too heavily on solutions that worked in the past.

The VUCA environment drives many behaviors that are exactly opposite of the most-effective response. To avoid impulsive, uncoordinated and ultimately ineffective responses to the increasingly challenging market, today’s leaders must develop new strategic-thinking mindsets. FMI’s experience working with hundreds of senior design and construction leaders underscores a strong belief that strategic thinking is like many other abilities, such as managing projects or learning a
new language. That is, strategic thinking can be taught and developed over time through intentional practice, discipline and reflection. However, just like in athletics, some are blessed with exceptional natural ability, while others are not.

### Elements of Strategic Thinking

The Strategic Thinking Model created by FMI’s Center for Strategic Leadership illustrates the necessary elements for developing strategic thinking skills (Figure 1). At the center of the model is organizational vision, which provides direction for strategic thinking. This allows leaders to match their thinking and decision making with the organizational strategic initiatives, and often results in long-term success.

The outer circle of Figure 1 shows eight different elements for strategic thinking. The right side of the model includes Mental Flexibility, Intellectual Curiosity, Creativity and Intuition. These skills are internal traits that help with strategic thinking. Some people feel that these skills are innate natural abilities, but psychological research shows that these skills can be developed just like any other skill. The left side of the model includes Analysis, Systems Thinking, Information Gathering and Decision Making. The skills on the right are centered more on insight and intuition, and the hard skills are built more on facts, logic and reasoning. Most leaders are stronger in one side to the detriment of the other, just like a weight lifter who only exercises one part of his body.

A quick way to self-evaluate is to think about one’s own decision-making process, asking questions like “Do you tend to base your decisions using aptitudes from the right-side or the left-side?” While some of these elements may come naturally to individuals, others may require development and training. These aptitudes cannot be developed overnight. Honing each area requires focus, time and energy from leaders who want to reach their peak potential.

So why is it important that today’s design and construction leadership teams — and more to the point, those of tomorrow — think strategically about the world around them? More importantly, what can be done to develop this capacity? Experiences over the last decade suggest that operating environments will become increasingly volatile, uncertain, complex and ambiguous in the years ahead. The future will be defined by VUCA.

### Strategic Thinking Versus Strategic Planning

Many design and construction companies have faced, or will face, a decisive inflection point that will sort them into two main groups: Those that pine for the past by reacting to a rapidly changing environment and those that anticipate the future by capturing opportunities. In fact, the capacity of leaders to think strategically is one of the greatest differentiators in the new reality of our current economy.

Strategic thinking is often misconstrued as strategic planning. Though the two are similar, there are distinct differences between them. When conducted without hard data and unflinching analysis, strategic planning involves very little “true” strategic thinking. In fact, it can diminish into a predictable and routine exercise conducted every few years, with decision makers taking an already agreed upon strategic direction and deciding how the organization should be reconfigured to align with that direction. The result is some form of extrapolation of the present and the past, with little consideration given to reinventing the future. This can create a “comfort zone” for the company instead of forcing it to face the reality of an uncertain future.
Strategic thinking goes beyond the creative process of understanding and adapting to a changing environment. It is a different way of thinking about the impact of markets, trends and other external factors on your organization, including the way you, as a leader, react to those changes. It also encompasses a different perspective and approach to dealing with the current and future environments we are all operating in – as individuals and organizational leaders. Jake Appelman, director of FMI’s Executive Coaching Practice, adds, “Many of the leaders we work with are dealing with the erosion of their traditional competitive advantages. They can no longer count on capturing their historical market share or avoiding competition from vertically integrated mega-firms. Many are realizing that one source of enduring competitive advantage is their ability to read their environment clearly, make sense of it and respond – to think strategically.”

Strategic planning and thinking are essential components in great organizations and neither is sufficient without the other. In fact, creative, groundbreaking strategies emerging from strategic thinking still need to be operationalized through convergent and analytical thought (strategic planning). The great challenge organizations face is capturing the best of both.

**Five Successful Tactics of Strategic Thinkers**

FMI spoke with executive coaches, senior consultants and more than a dozen executives from design and construction companies to find out how they were adjusting to the new VUCA world. The following section summarizes five key areas that strategic thinkers are focusing on in today’s uncertain design and construction environment. These areas are also displayed in relationship to FMI’s strategic thinking model (see graphic inserts), which covers all the strategic thinking tactics described below.

1. **Be Aware and Anticipate**

   More than ever, company leaders need a deep understanding of their entire “ecosystem” – both within their organization and the industry as a whole. They must also keep a pulse on how competition, owner behavior, political and economic drivers and other forces are influencing each other. Good business intelligence promotes faster, more effective decision making and can mean the difference between seizing an opportunity or being left behind. This type of business intelligence requires a solid information network that incorporates all levels of the organization. Executive mandates should center on developing “eyes and ears” that span geographies, industries and businesses, with a specific focus on understanding customer and competitor behavior. Glenn Bell, senior principal and CEO at Simpson Gumpertz & Heger (SGH), explains, “I’ve been in practice for 38 years now, and there’s been more change in the last three years than in the prior 35 years. The world changes too fast to make a five-year plan and stick with it. Therefore, we’re doing a lot more scenario planning, anticipating different outcomes and getting prepared for different opportunities that...
TREND 3: Redefining Leadership: Strategic Thinking in Today’s VUCA World

“\textit{The kind of strategy that works is to be very clear about where you’re going, but very flexible in how you get there.}”

Bob Johansen, Distinguished Fellow, Institute for the Future

might arise. It’s more of an opportunistic planning approach, where we look beyond the current boundaries of our business.”

2. Collaborate and Constantly Test New Ideas

Company leaders consume a vast amount of data and information on a daily basis and are often left overwhelmed and paralyzed in their decision making. As leaders try to make sense of the available information, they must engage in collaborative dialogue with their peers to test and confirm ideas and assumptions. Bell adds, “I am certainly much more flexible and open minded about doing things differently than I was in the past. I’m finding it valuable – even necessary – to make decisions in a more collaborative manner and reach out to others and ask: ‘Should we try this? What do you think about that?’ and so forth. It has changed me a lot.”

This kind of “empirical creativity” and collaborative dialogue is a concept confirmed by Jim Collins in his book “Great by Choice,” which advocates “firing bullets, then cannonballs.” According to Collins, successful companies test out their ideas by “firing bullets” rather than putting all their resources into one basket and “firing a cannonball” with the hope of hitting a target. Firing bullets helps successful leaders gather empirical evidence on which to base the bigger decisions and usually represents a low-cost, low-risk solution. The subsequent decision-making process itself may not always be based on total consensus or complete information, and thus requires a thoughtful balance between speed, rigor, quality and agility.

BakerTriangle, a successful contractor specializing in the drywall and plaster markets, exemplifies this way of thinking. “Change is uncomfortable, but has to start at the top and flow through all the way down,” says Michael Vickery, senior vice president. “When you go to the field, are they thinking differently? Are they saying, ‘Hey, I’m comfortable with 3D modeling? I’m comfortable working on an iPad; I’m comfortable doing a layout of my job with a robot as opposed to a tape measure?’” BakerTriangle’s management encourages positive changes in process or technology to achieve greater efficiency and believes that employees at all levels can drive change through peer influence.

3. Develop Critical-Thinking Skills

Leaders who qualify as critical thinkers constantly question their beliefs and mindsets and ask themselves what they should be doing differently. Such leaders are, by nature, skeptical—always asking questions and analyzing—and consciously applying tactics and strategies to reinforce meaning or confirm direction. This ability is essential in a complex VUCA world. It allows leaders to self-correct and monitor their rationality of thinking. When using critical thinking, individuals step back and reflect on the quality of that thinking. Mary Shippy, PhD, PCC, senior executive coach, explains, “My successful, nimble leaders are saying ‘Wow, things have really changed. What do we need to do differently?’ They are open to new ideas and perspectives, and are willing to challenge their beliefs and investigate contrasting opinions. Such leaders are truly critical thinkers.”
Developing critical thinkers begins with hiring the right people. Many company leaders are starting to realize that by leveraging diversity, they can draw on multiple viewpoints and experiences, which in turn increases the potential for innovation and change. Scott MacLeod, COO, Skanska, states, “Diversity is the cornerstone of our Talent Management program. When we talk about diversity, it is not limited to gender and race but expanded to diversity of thought. We have modified our recruiting efforts to reach out to individuals with a broader range of educational, cultural and economic backgrounds as well as life and work experiences. These new hires provide different perspectives, improve creativity and in many cases relate better to our customers. This is an industry that historically has been resistant to change. By improving diversity of thought we can break down past barriers to change, enhance industry-wide productivity and deliver a better value proposition.”

4. Never Stop Learning

Strategic thinkers never stop learning, and are always looking for new content and people to stimulate thinking. FMI’s online survey revealed that most leaders develop their strategic-thinking ability through reading, leadership workshops or retreats (Figure 2). Many of the reading materials listed are non-industry-related and focus more on leadership topics.

Lifelong learning is an essential ingredient of any successful business. Instead of simply sticking to what they know, strategic thinkers actively seek new perspectives and new ways of thinking about problems and organizational processes. A combination of training, mentoring and executive coaching can help such leaders stay on lifelong learning tracks. Informal groups of casual acquaintances from outside of the company can also help executives broaden their focus and help them gain a fresh perspective. Jake Appelman advises leaders to form a “Personal Board of Directors,” comprising of mentors, friends and experts who all share a deep investment in the individual’s leadership success. This setting also holds leaders accountable and identifies gaps in their thinking. In addition, formal peer groups can provide executives with a circle of like-minded individuals who can speak confidentially and in a non-competitive manner, about the challenges of their roles and responsibilities.

It has been proven repeatedly that the higher an individual rises within an organization, the less honest feedback he/she receives and the less willing people are to question his/her beliefs and assumptions.1 Leaders who try to go it alone in a VUCA environment are a constant danger to themselves and their organizations.

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1 See FMI’s paper “The Isolated Executive” for more details.
5. Become Agile, yet Focused on the Horizon

Nimbleness and flexibility are the new leadership mantras in today's business environment. Company and industry boundaries are shifting and forming global networks of complex stakeholder relationships – both on the ground and in the virtual space. Agile strategic leaders maintain a hyper-vigilance towards the world around them, while keeping a singular focus on their internal goals. Such companies are dedicated to what Collins calls the “20 Mile March” – “…Hitting step-wise performance markers with great consistency over a long period of time”. Bill Elkington, president of JV Driver Group, explains, “When you have a lot of market volatility, you become more risk averse. You don’t want to find yourself in a capital shortfall or other such problems. But your strategies don’t necessarily change with volatility. What changes is your time horizon and how you execute those strategies. Because otherwise, if you’re changing strategy all the time, you really don’t have a strategy. You’re dealing with tactics.” MacLeod confirms, “You have to be incredibly flexible in today’s marketplace. We have a business plan based on our prediction of the future. However, this plan is a living document in which assumptions are continuously being challenged and adjustments made to leverage changing conditions. The one constant is change, and companies that proactively manage change will be the industry leaders.”

Anticipating the Future

There is no doubt that today’s design and construction industry is increasingly volatile, uncertain, complex and ambiguous. It is also changing at a quickening pace, yet very few leaders know what to do about it. The answer lies in intentionally and purposefully developing the “strategic thinker” mindset. Those who neglect to think deeply and strategically will find themselves facing a future of entrenched competition and a constant struggle to catch up.

Yesterday’s design and construction industry has transformed drastically over the past several years and will continue to reshape over the coming decades. New leaders have emerged from the field, challenging former lynchpins with new ways of thinking and doing business. Tomorrow’s successful leaders will be able to anticipate and adapt to this all-encompassing VUCA environment and its inherent change, thus positioning themselves for the major shifts that occur not just over the next few years, but throughout the next decade. Companies that invest the time, effort and money into developing the human capacity to think strategically today will survive and be led by insightful executives who are poised to make the best decisions for their company.

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Modularization and Prefabrication: Role Development and Evolution

The National Institute of Standards and Technology recently addressed ways to improve the competitiveness and productivity of the construction industry in the United States. “Greater use of prefabrication, preassembly, modularization and off-site fabrication techniques and processes . . .” was viewed as one of the primary ways that the construction industry could improve productivity and become more efficient over the next 20 years. FMI’s experience confirms this view.

When many people think of modularization, they think of double-wide site trailers or temporary buildings at educational facilities. Those are indeed modular buildings, able to be relocated as needs change. However, modularization has also influenced more permanent structures, from power plants to hospitals to local office buildings. FMI has followed the evolution of modularization and prefabrication for some time. In 2010 FMI conducted several surveys related to modularization and prefabrication. In its 2010 Fourth Quarter Nonresidential Construction Index Report, FMI asked panelists to estimate their expectations of growth for prefabrication and modularization in construction. Only 11% expected growth for the next three years to be less than 1%, or less than expected GDP growth. Thirty-seven percent expected growth to be between 1% and 5%, and 49% fully expected growth in this area to exceed 5%. FMI also surveyed more than 1,000 mechanical and electrical contractors and found that 80% of respondents saved more than 5% in labor in the prior year due to the use of prefabrication, and 93% expected they could save more than 16% in labor costs in the coming years. These are significant growth and cost-savings expectations.

Prefabrication and modularization are concepts that have been in use for years. FMI predicts that in the coming years modularization and prefabrication will play an increasingly vital role in improving the productivity of the entire construction value chain – on par with lean construction techniques, alternative project delivery methodologies, and 3D and 4D modeling. Architects, engineers and contractors all use modularization and prefabrication in their work. Most agree that prefabrication and modularization can lead to significant decreases in project schedules, a reduction in project budgets and significantly less construction-site waste.

How does this happen? Due to the repetitive nature of fabrication, more work can be done by cheaper, lower-skilled labor. This labor pool can be made more efficient with specialized tools and equipment, and field equipment needs can be reduced as modules are fabricated off-site. Materials and completed modules can be stored off-site in controlled environments, and waste material can be used on subsequent projects or recycled. Work sites can be made safer with fewer weather-related complications, less work at heights and fewer conflicts among various trades. Safety also is enhanced by prefabrication facilities that provide a uniform, efficient manufacturing environment – one in which layout areas and schedules are optimized to provide for proper sequencing and sufficient room for people, equipment and materials. Manufacturing environments can also result in fewer supervisors overseeing a larger volume of work. Importantly, prefabrication allows site development, utility and foundation work to proceed at the same time that modules or pre-
Significant cost, schedule, safety and environmental benefits accrue to the users of prefabrication and modularization. These techniques can be applied to a wide range of project types. Fabricated components are being manufactured. Finally, manufactured modules can be installed over periods that are significantly shorter than traditional stick-built or site-built construction, resulting in less environmental impact on-site and quicker site restoration.

Two examples serve to illustrate the potential range of projects that can utilize prefabrication and modularization. In May 2006 The Shaw Group delivered the Astoria Power Plant in Queens, N.Y. The project was completed in only 21 months. Shaw used modular construction and pre-fabrication to construct the air-cooled condenser off-site and also constructed modularized pipe racks and equipment skids at facilities in Louisiana. Perhaps most impressive was that two fully constructed heat-recovery steam generators were built in Indonesia and shipped more than 12,000 miles to the plant site. In preparation for the 2010 Winter Olympic Games, Britco, a Canadian company, designed and manufactured a 100-room lodge and a 20-unit townhome complex in the athletes village. The projects were delivered on budget to tight deadlines, and the buildings were designed to LEED™ Silver standards. The lodge was selected as the best modular building in North America in 2010 by the Modular Building Institute, which cited its architectural excellence, technical innovation and energy efficiency. In addition, Britco designed and manufactured temporary housing used by almost 600 athletes and officials of the games. These temporary modular units were later disassembled and relocated to six different cities where they now are being used as permanent housing.

Significant cost, schedule, safety and environmental benefits accrue to the users of prefabrication and modularization. These techniques can be applied to a wide range of project types. Why, then, do prefabricated and modular buildings make up only $5 billion of the approximately $800 billion of annual put-in-place construction? We think that the reasons relate to mind-set. Modularization and prefabrication are not easily used in traditional design-bid-build projects, where each phase of the project is executed separately and apart from the following phase. Prefabrication and modularization are much more easily used in projects that use integrated project delivery or in design-build projects, where design and construction decisions are made with a view toward maximizing cost and schedule efficiencies and where all participants share in the risks and the rewards of project execution. Project participants must work together and be open to new approaches to realize the full benefits of modularization and prefabrication.

Better. Faster. Cheaper. The construction industry is being pressed like never before to create and find value for clients and owners. Building Information Modeling (BIM) in the vertical design and construction world and other three- and four-dimension modeling used in the heavy civil world are changing the way projects are conceived and delivered. As these software systems see broader adoption, it will be more and more common to have the same multidimensional project model used by planners, designers, engineers, fabricators, quantity surveyors, construction managers, and general and specialty contractors. These programs allow for precision that was impossible to achieve in the past. This precision, carried through to module fabrication and manufacturing, materials management, scheduling and conflict identification ultimately results in significant savings in time and materials and also produces less construction waste.

It is essential that owners are convinced of the benefits of modularization and prefabrication. Whether it is the architect, engineer, construction management firm or contractor that has the primary relationship with the owner, great effort must go into showing owners that they can end up with a project delivered at less cost and in less time with higher quality. Proving this to owners...
can be accomplished best by showing them similar projects on which savings and quality were well-documented.

How do you start? Start with the owners. Convince them of the benefits of a modular approach. Then, make sure architects are aware of the possibilities of prefabricated modules. Introduce architects to engineers who have worked with prefabricated modules as well as to the manufacturers of these modules. Have them tour the plant and other projects that are using prefabricated modules. Prefabricated modules often can only be used in a project if they are designed and included from the start. This is a crucial point in the entire value chain – make sure the use of prefabricated modules is explored early in the process so that your options are not limited right from the start of the project.

Get the engineers involved in designing the modules. With the right materials and design, it is often possible to use lighter materials that are more easily transported and installed. Engineers are in the best position to extol the structural benefits of modules manufactured to precise tolerances in controlled environments. Walls, roofs, floors, concrete spans, superstructures – all of these are being prefabricated, and engineers are in the best place to evaluate their applicability to specific projects.

Early collaboration between engineers and architects allows for the highest chance that significant cost and schedule savings will be derived from prefabricated modules. Architects and engineers need to be evangelists and extol the virtues of using prefabricated modules with both the owners and with the other parties involved in project delivery. The more architects and engineers are convinced of the benefits, the more likely it is that owners will be comfortable using prefabricated materials and contractors will embrace new installation methods and new project delivery schedules. Architects and engineers will need to take on a greater coordination role in the overall construction process. Since design and material choices must be made early, with little room for adjustment at later points in the process, and because these choices will dictate how and when much of the subsequent manufacturing and installation work will take place, engineers and architects need to bring all parties together early in the process to get buy-in and alignment around these choices. Finally, engineers and architects will need to design projects and systems as they have always done, but also will need to broaden their role to evaluate and integrate components, modules and materials designed and manufactured by others.

Where architects and engineers are interested in overall design and the best application of materials, contractors and construction managers are interested in project delivery – time and money. In fact, contractors and construction managers are probably in the best position to benefit from the use of prefabricated modules. Since manufactured modules do not lend themselves well to construction site modification, they have to be conceived well and designed and manufactured to tight tolerances. In many cases, this requires additional design time and expense to ensure that modules are designed and fabricated correctly. The big payoff of this early effort is often realized in the concurrent work that can be accomplished at the construction site while the modules are being fabricated at a nearby facility. This concurrent work, coupled with the ability to erect and connect modules on-site in an expedited manner, leads to significant schedule compression. Contractors who use a modular approach to construction can also save significant costs associated with site labor and equipment rental.
Perhaps more than other contractors, specialty contractors have already embraced prefabrication for mechanical and electrical systems. Their experience base can help them to remain competitive and differentiate themselves from competitors who are not using prefabricated components. In addition, specialty contractors can help speed the adoption of prefabricated modular methodologies in other parts of the project, by being vocal about the benefits they have experienced with prefabricated systems. Said another way, their positive experiences with pre-fabrication and modularization in the context of mechanical and electrical systems can help shape the way owners, general contractors and construction managers implement prefabricated components in the broader project context.

Contractors should work to gain experience with prefabrication and modular construction. Small jobs lead to bigger jobs. Familiarity and experience with the use of modular construction will allow contractors to build the advantages of these approaches into their bids and allow them to incorporate the benefits into schedule and pre-construction planning sessions. Time and money. A project delivered faster through the use of prefabricated modules is not exposed to as many weather delays, can be of higher quality, can result in significantly less construction waste and can allow the ultimate owner to begin utilizing the project sooner.

Better. Faster. Cheaper. The pace at which modularization will be adopted by players in the construction value chain will accelerate, as knowledge of the benefits becomes more widespread and as more players seek to differentiate themselves in today’s hypercompetitive market.

There is a growing base of successful projects that demonstrate the benefits of modular construction – benefits that argue for this approach in a wide range of projects. However, to recognize the full benefits of modular construction, industry players will need to alter their mind-set. They will need to be open to new approaches to designing, scheduling and constructing projects. Collaboration and partnering skills will be paramount. Owners will need to be convinced of the benefits of this approach. Architects will need to embrace the possibilities and the constraints of modular construction. Engineers will need to become familiar with the possibilities and manufacturing processes associated with various prefabricated components. Manufacturers will need to become involved in project discussions at the outset, and contractors and the specialty trades should use prefabrication and modularization to reduce project schedules, improve safety and reduce waste. The benefits of prefabrication and modular construction are most apparent in projects that utilize integrated project delivery or in design-build projects where design and construction decisions are made with a view toward maximizing cost and schedule efficiencies, and where all participants share in the risks and the rewards of project execution.

Because FMI works across the industry with architects, engineers, contractors and the specialty trades, we are in a unique position to see the positive impact that modular construction and prefabricated components are having on the construction value chain. We are convinced that managed correctly, prefabrication and modularization will improve productivity. The risks and rewards of modular construction will need to be shared among all parties that contribute to value creation. This will call for better coordination and alignment among owners, designers, manufacturers and contractors.

For more information on how FMI can help, please contact:
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Recovering the Lost Generation for the Construction Industry’s Future

If the Jeopardy subject was “The Lost Generation” and the $2,000 clue was “The Solution,” the answer would be “What is a career in construction?” The lost generation, in this case, is a cohort of young people who have recently entered the workforce or are about to. They represent a record number of 18- to-34-year-olds who have graduated with degrees ranging from two-year associates to advanced degrees but have virtually no career options in their chosen field of study. By many accounts, their employment future does not look promising. Till von Wachter, an associate professor of economics at Columbia University, testified before the Joint Economic Committee of the U.S. Congress in May of 2010 on the subject. His testimony was titled, “Avoiding a Lost Generation: How to Minimize the Impact of the Great Recession on Young Workers.” His thesis stated that “the consequences from entering the labor market in a recession [or just after one] are severe in both the short and the long run.” He goes on to say that, “young workers – who enter with no prior employment history and are presumably most flexible – can suffer from initial bad luck for a long period of time.” The fact that all of these new workers are entering the labor market during a large recessionary period is bad luck, but the bleak long-term outlook for this cohort is something that we are not accustomed to hearing. It seems un-American.

Von Wachter calls the process “cyclical downgrading” and suggests that it “can lead to reduced earnings for up to 10-15 years.” Ouch! The recession supposedly ended in 2009, but it might not feel like it for the workers entering the workforce today. Von Wachter provides the gloomy justification: “The decline in earnings arises because young workers entering the labor market in a recession take jobs at worse employers than they otherwise would have.” He submits that workers entering the workforce today will continue to be unemployed and underemployed as they begin to establish relationships, buy homes and start families. Young recruits finding jobs before the recession could recover by getting promoted or finding better jobs as opportunities open up. Their starting point was higher on the socioeconomic ladder. For many of today’s new employees, a full recovery may never happen, especially for people with only a couple of years of college but no degree. It is hard to argue with the logic. Coming out of a multiyear recession, this analysis does not bode well for a significant number of Generation Y. Will a significant portion of this generation be known as the Lost Generation? It does not need to play out this way. There is a solution, but it will press up against the conventional thinking. What about a career in construction?

The Argument for College (Later… or Now)

Many college graduates today are feeling disappointed and rightfully so. After all, they worked hard to get into college, invested four to five years to earn a degree, accumulated a pile of debt to pay for it, and expected to have recruiters lined up to hire them. Instead, they found themselves alone, competing for a limited number of lesser jobs within a stagnant economy – bad luck indeed. This generation and their parents had the expectation that a college education was the next step to success in life. It is becoming harder to believe, especially when the college graduate is still living in the parents’ guest room. It is still true that during their lifetime, Gen Ys with college degrees have greater earning potential than their non-college-degree peers. Historically,
Many in the industry, aware of a coming shortage of talent and skilled workers, have begun to realize that, not only will they need more people from Gen Y to consider the construction field, but alas this generation may play an important role in changing the construction industry’s reputation.

The investment of resources and time needed to complete a degree has always seemed to be economically worth it, until now. The Great Recession has moved the starting line and shifted the paradigm. According to von Wachter, although it is true that “lower-educated workers experience larger increases in unemployment than more educated labor market entrants…in the long run, less educated individuals tend to recover faster.” Of course they do; the “less educated” are not saddled with college debt, and while their peers are getting degrees, the “less educated” are getting jobs and earning income, even if the job is with a “worse employer.” The key takeaway is that everyone in the “lost generation” is starting out at a deficit in some way, but the recovery begins as soon as members of this generation start to earn money.

A college degree still provides the better long-term return on investment, but it puts the new entrant in the ranks of the employed behind in the short term. In fact, von Wachter suggests that the most “unlucky” group might be the “workers in the middle of the education distribution [those with some college but not a degree] who can suffer close to permanent earnings consequences from entering the labor market in a recession; those individuals at the bottom and the top of the education distribution recover more quickly from that bad initial start.” This makes sense given that the high school graduates are starting to work sooner, and the college graduates have degrees to leverage. The “partial college” folks have competition from both sides and loans to pay. No one can argue with the logic of this conventional mind-set, but the solution is unconventional: a job in the construction industry.

The reason considering a career in construction seems unconventional, especially to Generation Y, also known as Millennials, is that construction has a reputation for being a dirty, dangerous, cyclical, low-tech, dead-end, low-paying job. The reputation is not entirely undeserved, but it is also outdated. The construction industry has changed and continues to change. Many in the industry, aware of a coming shortage of talent and skilled workers, have begun to realize that, not only will they need more people from Gen Y to consider the construction field, but also this generation may play an important role in changing the construction industry’s reputation. If the conventional approach to finding a career is to match up one’s interests and skills with the needs of the career, it is unconventional to consider what one can offer to change an industry and make new careers. According to many reports, Gen Y potentially has the right characteristics to revive an old industry like the construction industry and make it a more attractive career destination. Gen Y’ers also need jobs. According to the PEW Research Center in a recent report titled “MILLENNIALS: A Portrait of Generation Next: Confident. Connected. Open to Change.” (February 2010, http://pewresearch.org/millennials/):

Despite struggling (and often failing) to find jobs in the teeth of a recession, about nine-in-ten either say that they currently have enough money or that they will eventually meet their long-term financial goals. But at the moment, fully 37% of 18- to 29-year-olds are unemployed or out of the workforce, the highest share among this age group in more than three decades.

Although the generation designated Gen Y may be lost in the sense of being career-challenged at the moment, you can find them on Facebook anytime. They are referred to as the “always connected” generation. “Steeped in digital technology and social media, they treat their multi-tasking, hand-held gadgets almost like a body part – for better and worse. More than eight in 10 say they sleep with a cell phone glowing by the bed, poised to disgorge texts, phone calls, emails, songs,
news, videos, games and wake-up jingles.” (ibid.) One of the concerns we often hear from
construction executives is that there is a lack of communication between the office and the field and
among others connected with a project. Generation Y’ers should be able to solve those problems.
Construction may not work for the majority of those of this generation, but it may help many who
are becoming lost find their way to new career paths.

Construction has an entry point for any education or skill level, and there are very few barriers
to entry. The attractiveness of the construction solution is that college becomes an option not an
expectation. A college degree can be used to enhance career choices not limit them. The more
education and training an applicant has, the more opportunities are available. In fact, it is more
accurate to think of construction as not a single career choice, but as an industry that requires
many different skills and backgrounds.

The simple truth facing all education is that the conventional four-year degree and the need to
attend day classes on a campus to obtain it are evolving into something more flexible. Technology
is forcing potential students and institutions alike to reconsider when and how to obtain a degree.
Online and distance learning is becoming the new classroom, and there is no reason for anyone to
deny himself or herself a college education if he or she really wants one. People no longer need to
“go” to college. They can get their degree on their own time using the computer on their kitchen
table. Traditional thinking saw college as part of a normal career progression, but demographics
and economics are shaping a new paradigm. In construction—with a few exceptions like struc-
tural engineer, for instance—a college degree does not need to be a prerequisite step in the pro-
cess. This helps entry-level employees start making a wage, while learning the ropes and working
toward a career. This approach works especially well in the growing number of construction firms
that have instituted career-path training programs. It could also be an integral part of a company’s
succession planning process.

The lost generation of this recession is facing a bleak future unless it finds a faster way to recover
from the career shock of entering the workforce at a lower pay scale than anticipated. In the con-
struction industry, and maybe uniquely so, education and training are still the road to prosperity
in the end. But in the short term, someone needs to build the roads, both in the literal sense and in
the figurative sense including creating attractive career paths. It is about getting to work as soon as
possible and avoiding being sucked up into a lost generation. In the construction industry, attend-
ing college represents a four-year delay into the workforce, and there is no compelling reason to
do so. The opportunity to begin a career sooner rather than later does not need to exclude college
later anymore. College can happen in tandem with work. Construction is not what it used to be.
The category referred to in the study cited at the beginning of this article, the “worse employer,”
really does not apply to the modern construction company. There are some exciting jobs in the
construction industry and lots of opportunities for advancement.

The Argument for Starting a Career in Construction

There is finally some “good luck” for the lost generation. It is there for the taking for anyone will-
ing to commit to a different career choice. The construction industry has a deepening craft labor
shortage due to the baby boomers starting to retire, and that goes for all levels of the company
from the field to the boardroom. This presents a challenge to the industry and an opportunity for
just about anyone entering the workforce. The Associated Builders and Contractors has estimated
that there is a gap of 500,000 craft jobs in America today, with a very slow pipeline of new recruits.
to fill them. These are jobs that need to be filled in order for this country to build and grow. It is not overstating the case to say that this is a critical need. These jobs are not for everybody, though. They require brains and skill as well as the ability to use tools to shape or manipulate work. They also demand a certain internal toughness and determination. Construction employees have to like working with their hands, sometimes in cold or wet environments. This commitment comes with a real payoff though. Along with a good paycheck and the knowledge of a skilled trade, construction workers must develop problem-solving and critical-thinking skills and leadership.

Construction is a team effort, and team members must learn how to collaborate within the team and with others on the project. These are valuable and necessary skills for any new professional, and you will not find a more effective training ground than working “in the field.” The industry provides a number of training opportunities and methods, including vocational training, OTJ (on-the-job) training, independent training centers—for example, the National Center for Construction Education and Research (NCCER)—or through union affiliation and/or apprenticeship programs (like the Boilermakers). Fieldwork can be very rewarding. In many ways, learning construction skills is still as much an art as it is a science. Admittedly, entry-level work means starting at a lower pay grade, but with improved skills and training, the apprentice can advance quickly to higher-paying positions. There are trades that boast of six-figure earnings within four years of starting. Contrast that to the four years of college debt recent graduates have accumulated in the same span of time.

Working toward a trade and going to school on one’s own time seems like a win-win proposition for those threatened with becoming a lost generation. In addition, it will help the industry. There are many trades to choose from and many regions to work in. The options in construction are expansive, and young applicants will have many choices to consider. For those who are more business-minded or already have some college credits or a degree in hand, construction is an industry that requires management and many different types of professional services. Members of the baby boomer generation who are now beginning to retire started their companies back in the day when college was not as accessible as it is today. They learned to run their construction companies like a business, and they need good people to succeed them and keep the companies growing. The timing could not be better for people coming into the workforce. Investing in construction-specific education is beneficial, but the industry also needs marketing, accounting, human resources and other professionals. Learning how this business works by being in the business is also effective. In addition to the construction management degrees from colleges and universities, there are also project management training programs and mentoring opportunities like the ACE Mentor Program. The ACE Mentor Program (ACE is an acronym for architecture, construction and engineering) is a partnership between businesses and all types of construction industry professionals, volunteering their time and facilities to introduce construction careers to young people. ACE mentors have been very successful in showing the wealth of opportunities available in the industry and setting young people on the right path to choosing a career in the construction industry.

It is a fact that baby boomers are retiring in record numbers, and, at this time, there are not enough Generation Xers to fill the vacancies. That means the Generation Yers, the lost generation, have an opportunity to step in and take over, sooner than they might expect. The opportunity for rapid advancement is very real and driven by the demographics of our aging population. The reason that these opportunities have gotten little press is that the economy has been in the tank, and
a large portion of the construction industry has been in survival mode. Now that we are beginning to climb out of the recession, the industry will begin to grow again. There are careers to be had in the construction industry at entry points that dovetail beautifully with expectations and goals of Generation Y, regardless of individual educational background or skill level. The same societal demographics that seem to be working against the lost generation are working for it in construction.

The Conclusion

The recession is supposed to be officially over, but given the size of the 18- to-34-year-old cohort and the shortage of “real” jobs out there, it may just be the beginning for the lost generation. Without some creative new ideas, the long-term outlook is bleak; but this generation will only be “lost” if it does not find its way to a new approach. Von Wachter, in his testimony to Congress, went on to state that “to recover…younger workers have to reorient their career goals. As the economy improves, changes in occupation, industry or region will speed the recovery.” In other words, we need to let go of the old ideas about career progression and how a college education fits in and look at the new paradigm this last recession helped us to see. More education is certainly beneficial for long-term prosperity, but college without job prospects does not help young workers recover from the short-term consequences of the recession we just experienced. We need to get them working, earning money and building their own recovery plan. The construction industry provides both long- and short-term solutions for this potentially “lost generation”, and it needs them to survive. The future of a generation and an industry are at stake.

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The race to the bottom has been fierce and bloody. The current perception of the marketplace revolves around being the low-priced provider with little room for value propositions. Contractors routinely lament about customers only caring about the bid and the continual downward pressure on price has further fueled this belief. There are plenty of contractors that are manipulating the market and “buying work.” As long as there is one bidder willing to work for cost, or even less in some cases, the paradigm of low cost providers will win. A less popular phenomenon, but one that bears contemplation, is that some of these “buying” contractors are in fact more efficient and productive than are their peers. “There is NO WAY the competition can do it for that,” is a fairly bold proclamation heard throughout contractor bid war rooms daily. What if even 50% of the competition is able to not only do it for that price but also make money in the process?

Many contractors fail to envision how the competition could possibly vary its construction enough to have such a dramatic effect on price. Considering contractors have such variation in the ways they individually track direct and indirect costs, it should be easy to see how so much variability could exist. It is also common for an estimator to envision a project from one perspective and have a field manager interpret it completely differently. Estimated and actual costs are rarely equal in the same company, so costs across firms are less likely to be equivalent. Simply put, construction firms that fail to recognize the differences in construction, however small or large they may be, live in a myopic and limiting vacuum.

Think of two separate crews installing a phase of work, perhaps a series of sewer lines and drainage structures. While there may be a finite number of techniques, it is unlikely that both crews will install the lines in the exact same way. Productivity-minded contractors currently employ the technique of “game film” which records these various techniques and approaches. Cameras set on top of excavators record everything from how the trench was dug to how the pipe was installed. Rather than the operations manager or “head coach” providing a critique, the crew reviews all of the videos side by side, like a quarterback reviewing game film, to discover deviations and enhancements. Inventory management, sequencing, equipment management and personnel management all affect the overall productivity. Most importantly, by enabling the crews through self-discovery rather than a dictatorial, big-brother approach, the likelihood of changing behavior is greater.

Efficiency is quickly becoming the mantra across construction organizations. Whether one examines its foundation in Total Quality Management (TQM) or its younger relative Lean Six Sigma, firms recognize the reduction of waste as an essential strategic imperative. Maintaining pace with the competition is no longer good enough. Production assets leveraging technology, with a seamless integration and a consistent, standardized approach, provide not only short-term gains but also a demonstrable platform for long-term sustainability. Lean construction, prefabrication/
modularization and building information modeling (BIM) represent not only the current concepts available to contractors but also a glimpse of the future of construction. While construction technologies will vary, there is no question that the construction industry will resemble that of a manufacturing firm rather than that of a traditional construction firm. Controlling the assemblies, mitigating the many risks and reducing inefficiencies all converge in the “perfect storm” of productivity improvement. Exhibit 1 illustrates the various productivity drivers at work.

There are many misconceptions about these new tools and processes. The first is the belief that only large, sophisticated contractors can benefit from construction systems such as prefabrication or elaborate modeling systems such as BIM. In all cases, there are levels and gradations from which contractors of all sizes can benefit. While implementation of any system requires investment and commitment, one can also anticipate an appropriate return on said investment. Put another way, contractors need to innovate and avoid the pitfalls associated with “small thinking.”

Another misconception is the belief that adoption of one or all of the aforementioned systems will immediately provide a return. There are no “silver bullets” or panaceas in any industry – the construction industry is no different. For instance, people discover the benefits of Lean construction and become enamored with grandiose expectations of waste reduction. The value is clearly there, but the largest hurdles to overcome lie in changing behaviors and a general reluctance to adopt a new paradigm by a firm’s associates. Incorporation of a Lean culture is not unlike dieting and getting healthy – on the surface, it is the right thing to do but battling the behavioral inertia associated with a sedentary lifestyle becomes the greatest barrier to change. All productivity drivers carry benefits, but it is important to recognize the pitfalls associated with each one.

**LEAN**

Lean construction’s foundation stems from the automotive manufacturing sector. Known as the “Toyota Production System,” experts carefully analyzed every aspect of the production cycle, from how materials were stocked to how the fabricators interacted with the finished product. Taiichi
Ohno, Shingo Shingo, Sakichi Toyoda, William Deming and Henry Ford all have impacted the Lean model during its evolution. By its strictest definition, Lean is the continuous elimination of waste driven by customer satisfaction. Combined with Six Sigma – another methodology for improving effectiveness and efficiency – Lean aims to drive out waste of all forms including, but not limited to, the following:

- Defects – construction not completed to the specifications the first time
- Overproduction – construction that is faster, sooner or more than required or that leads to waste in another capacity
- Waiting – time lost when people, materials or equipment is kept waiting
- Nonutilized talent – wasted potential when the people doing the work are not consulted for improvements to the methodology
- Transportation – poor handling of materials and equipment around a site
- Inventory – excess materials not needed
- Motion – movement of personnel and equipment that does not add value
- Extra processing – doing more than the specified requirements to transform the raw materials into the finished product

There is a cavalcade of examples for each of these forms of waste within the construction industry. Experts have long viewed the construction industry as simply an extension of the manufacturing process, making Lean methodologies applicable to any trade.

Excitement and intrigue about Lean have contractors at a fever pitch. However, the overall concept of process improvement is far from new. FMI’s 2012 Productivity Survey examined Lean and its implications on the industry. Exhibit 2 illustrates that an overwhelming 42% of the survey respondents felt that Lean is more or less management best practices rehomogenized under a new heading.

As one examines the connectivity between such management philosophies as Lean, Total Quality Management, Six Sigma, etc., it is easy to see many of the same figures leaving their indelible mark. Regardless of the packaging, it is important to recognize that the processes and tools for driving out waste, poor quality and inefficiency are very valid and provide results. Six Sigma’s DMAIC methodology (Define, Measure, Analyze, Improve, Control), which helps consultants and organizations alike develop solutions, is timeless and the foundation for any best practice development. Elimination of “labor waste” greatly affects contractors and their customers.
While perceptions of Lean may vary, translation to bottom-line growth is apparent. Exhibit 3 shows that 77% of the survey respondents saw some level of productivity enhancement as a result of their Lean initiatives.

For contractors that achieve as low a net income as 2% to 3%, a 5% to 10% improvement in labor productivity has the ability to double the bottom line dramatically. While businesses appear far too concerned about top-line growth, productivity improvements impact the more important aspect of the income statement.

As discussed previously, the challenges of Lean lie not with the tools themselves, but in the deeply ingrained behaviors associated with the status quo. For instance, short-interval planning tools, or “last planners” in Lean terminology, are important proactive devices to help field managers allocate resources and set measurable goals. The benefit is clear—better planning eliminates emergencies and reduces costs associated with overtime, quick shipping, rework, etc. However, adoption of a new planning system across a contingent of managers and supervisors is not easy, and without strict accountability metrics from senior management, the planning tools simply become another sheet of paper. Skepticism of new doctrines such as Lean does not originate from disbelief in the tools or process, but rather in the inability of an organization to change simple human behavior. Superintendents and managers need to see how new tools and processes will reduce costs over the long term, while changing their habits in the short term. Just as one needs to change a car’s oil on a long journey, businesses need to incorporate new systems on theirs. It is incumbent on construction firms in this new era to create sustainable models that allow their personnel to construct projects as efficiently as possible. Whether that is called Lean, Six Sigma or TQM is irrelevant.

**Building Information Modeling and Leveraging Technology**

Dramatic changes in the design of projects have had one of the most influential changes on contractor productivity. Interestingly enough, the groundswell in this design enhancement has been led by trade contractors, not by the designers. Recognizing the need to compensate for poor or inadequately designed structures and systems, contractors assumed the reigns of this three- or four-dimensional design tool to control their risk and delivery higher quality finished projects. According to FMI’s Productivity Survey, 63% of the respondents have engaged in a project on which BIM was used (see Exhibit 4).
Proactive contractors recognize the movement toward this model is inevitable. In fact, the future is less likely to include a world without BIM, but, more likely, BIM 2.0.

From a strategic perspective, firms must make a serious commitment to the long-term use of BIM. Many firms view the costs associated with rework, inefficiency and poor coordination as enough motivation to consider integration of such a system. The contrarian view is the considerable investment and operational costs associated with BIM, which have a tendency to scare many contractors away from adoption. Exhibit 5 shows that 62% of the respondents experienced some increase in their labor productivity relating to the application of BIM.

One could argue that while labor savings occurred on these projects, there was the corresponding cost associated with BIM offsetting any savings. Furthermore, the cost only exists because of inefficiencies in the delivery system and compensation for design inadequacies. Regardless of the rationale behind needing BIM, it is important to recognize that the likelihood of designs improving in the short and long term is doubtful. Architects and engineers are under many of the same budgetary constraints as contractors, and within this risk-adverse business, contractors are better-suited to adopt and cope rather than argue and complain. Proactive contractors recognize the movement toward this model is inevitable. In fact, the future is less likely to include a world without BIM, but, more likely, BIM 2.0. The software capabilities are no longer limited to simple three-dimensional designs, but also incorporation of budget and scheduling dimensions to further aid in the ultimate goal – better construction.

Mechanical contractors, electrical contractors and steel fabricators view this as a platform to supplement their prefabrication capabilities. One of the main challenges to BIM is in the overall adoption across a team of contractors, not just by the individual firm. It is much like the early days of the fax machine – a great tool, but the real benefits are realized when everyone has one. According
The cost associated with an unproductive crew waiting on a resolution to a conflict is enormous. There are countless case studies demonstrating the power of clash detection by eliminating requests for information and contentious claims. It is apparent that BIM offers not only direct correlation to labor productivity but also customer management, trade coordination and materials handling. BIM’s larger role in the world of integrated project delivery provides another competitive advantage for organizations seeking to avoid the fray of the hard bid marketplace. However, just like any strategic initiative, it is imperative for contractors to recognize that there is little room for dabblers, and it requires a wholesale investment.

Technological enhancements relating to productivity are not limited to BIM. Truly innovative organizations are utilizing everything from RFID tags for tools and materials management, to handheld devices, such as tablet computers, to drive information to the field. Drawings, specifications, planning documents, time reporting and labor-cost feedback are just a few examples of data being shared in real time with field managers and foremen. No longer is it necessary to wait 30 days to evaluate job performance. Instantaneous flow of information allows everyone to know the score of the game. More importantly, many of these tools are extremely cost-effective and require a signifi-
TREND 6: The Science of Efficiency and Productivity: Construction 2.0 in the New Normal

Significantly smaller investment than one would anticipate. The infrastructure required is minimal and, more importantly, the training required to drive the necessary change is less than the anticipated commitment of learning the intricacies of a laptop. The main theme contractors should recognize is the embracing of new technology and the incorporation of productivity enhancers. With some of these alternatives, there is the question of investment a firm needs to consider. However, there are equally lower-cost options available that may integrate with minimal conflict. Neophyte thinking is dangerous, and too often contracting organizations assume the role of laggard. It is acceptable to be innovative and be in construction simultaneously.

Prefabrication and Modularization

Whether inspired by the engineering spirit of the “Extreme Home Makeover” or simply recognizing the similarities to the manufacturing world, prefabrication and modularization have begun to revolutionize the construction industry. Many contractors are examining their projects from the perspective of what they can prefabricate rather than what they cannot. While some trades lack the ability to prefabricate (i.e., earthwork), more and more are utilizing a controlled environment to mitigate site risks and lower their labor expenditures.

Both concepts; Lean construction and BIM – bear significant weight in the world of prefabrication. BIM creates spools of documents that allow for fabrication that is more accurate, while Lean construction principles correlate even more to this new manufacturing setting. Many experts agree that construction in future generations will more accurately resemble an assembly line, with workers piecing systems together in the same way as a factory worker connects an engine to a chassis. Unions will debate the intricacies and nuances of “ownership,” but smart businesses are recognizing the need to build more efficiently through the dictation of the end users and customers. Labor issues aside, few can argue the benefits of constructing an electrical system in a climate-controlled facility, as opposed to the extreme elements of a northern winter or southern summer. Additionally, prefabrication provides mitigation against safety hazards that exist in one of the world’s most dangerous workplaces. According to Exhibit 7 from the Productivity Survey, 69% of the respondents have engaged in some sort of prefabrication on their projects.

Prefabrication also allows for improved scrutiny of production rates by limiting external factors that impact construction. With the exception of extremely customized construction and construction within the bounds of unknown site conditions, there are few examples where even small prefabricated or modularized products would not benefit a contractor. Furthermore, the list of pre-
fabricated and modularized systems continues to grow:

- Mechanical, electrical and plumbing systems
- Bathroom pods
- Hospital headwalls
- Pipe racks
- Load-bearing wall systems
- Internal and exterior wall systems
- Sectional bridges

Within the realm of integrated project delivery systems, it is much more common to see true collaboration across firms. For instance, mechanical contractors and electrical contractors work in tandem to construct modular systems because it benefits the entire project, not just one party.

Exhibit 8: Productivity Savings Due to Prefabrication

Much like BIM, case studies abound about contractors building complex and sophisticated projects using this delivery system, all while saving time and money. However, unlike BIM, the initial investment in prefabrication is much lower. Careful experimentation is allowing new contractors exposure with less risk and less investment. The greatest hurdle that these businesses will encounter lies in the human element. Spatial constraints aside, individual can-do attitude is a pitfall that must be monitored and adjusted. Should further evidence be required, Exhibit 8 illustrates the savings achieved through prefabrication.

Overall, 98% of the survey participants achieved at least a 1% labor savings. A proponent of prefabrication and modularization would argue that as the process becomes further ingrained, firms would naturally achieve higher savings through consistency, standardization and repetition. Once again, in this controlled environment, measurement is achieved through process transparency, ultimately allowing enhancements to the production techniques.
CONCLUSIONS

Many contractors give the concept of productivity lip service – they know they need to do it but they fall victim to the circumstances surrounding them. Poor designs, onerous contracts, inconsistent site conditions and demanding owners appear to command more attention than focusing on controllable factors associated with their businesses. Market conditions have necessitated the need to make productivity a strategic priority. Simply building a better mousetrap will not suffice. Contractors must take an exhaustive and introspective look at how they build. Change at field level truly begins at the top of the organization. Once the leaders of the organization are committed to making any enhancement for the good, they can begin not only to employ new techniques and tactics, but also to address the human element. Lean, BIM and prefabrication are mere examples of productivity enhancements in 2012 and the coming years. One inalienable truth that exists is the need to commit to efficiency, regardless of the buzzword.

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Market Factors Shaping the Construction Trade Unions of Tomorrow

The successful construction firms of the future will be the best recruiters and managers able to deploy the most skilled workforce required to do the job. What part will construction trade unions play in the future of successful construction firms?

There is a labor shortage in the construction industry. Hard to believe that statement when so many millions of construction workers are unemployed. According to the latest report from the Bureau of Labor Statistics (BLS), “Employment in construction increased by 21,000 in January, following a gain of 31,000 in the previous month. Over the past 2 months, nonresidential specialty trade contractors added 30,000 jobs.” (February 3, 2012) However, the unemployment rate for construction workers has improved from 20.7% in December 2010 to 17.7% in February 2012. Although the construction industry is slowly climbing out of recession, the unemployment rate for construction workers remains more than double that of the current rate of 8.3% for the U.S. in January 2012. Since 2007, the construction industry has downsized around 30%. While some construction workers have managed to become re-employed in the industry, many will leave the industry altogether to find work in other fields, retire or become self-employed.

One comment we have heard from contractors who have downsized sharply is that they now have the best workers on the job. However, we also hear that contractors have had to cut below the bone, so to speak, and let many of their best skilled workers go as well. When asked in the fourth quarter of 2010 whether or not there had been some good to come out of the deep recession, most panelists cited becoming leaner and more productive and taking advantage of the downturn to hone processes and refocus the company, and several admitted it was painful to have to make the hard cuts. A few sample comments illustrate:

- Compensation in the industry had grown to a point that was not sustainable, and the recession has slowed down/reset expectations that are more in line with a low-margin/commoditized industry.
- No. There is nothing redeeming about dismantling one’s company to survive after spending years of life force in trying to build it.
- We are certainly reviewing a number of our operations to reduce cost, improve productivity and position ourselves for future growth — all of which we should constantly perform; but recessions seem to create more urgency around these efforts.
- It delayed the shortage in skilled labor that we have been expecting.

Downward pressure on compensation, increased competition and low margins all create a greater urgency to be more productive; all these concerns point to the need for a better-trained workforce and efficiency in every corner of operations. If there are gains in these areas across the industry, it
In the most recent BLS “Career Guide for Construction,” it is reported that, “The number of wage and salary jobs in the construction industry is expected to grow 19 percent through the year 2018, compared with the 11 percent projected for all industries combined.”

... will mean being able to do more with fewer people. But as one remark above confirms, contractors are well aware of the potential shortage in skilled labor. It does not appear that critical as the industry works its way out of the recession; but the need has only been postponed.

In the most recent BLS “Career Guide for Construction,” it is reported that, “The number of wage and salary jobs in the construction industry is expected to grow 19% through the year 2018, compared with the 11% projected for all industries combined.” (BLS: Career Guide to Industries, 2010-11 Edition Construction http://www.bls.gov/oco/cg/cgs003.htm) According to the BLS, occupations with the best prospects for jobs as the economy recovers will be those that require the most difficult levels of certification and skill training, including:

“... crane operator, some employers have been unable to fill some positions. Electricians, plumbers, pipefitters, and steamfitters are also licensed occupations that should have a favorable outlook due to projected job growth. Roofers should have favorable opportunities due to job growth and difficult working conditions, which lead to high replacement needs. Boilermakers; brickmasons, blockmasons, and stonemasons; and structural and reinforcing iron and rebar workers should have excellent opportunities because of the skills required to perform their duties and the difficult working conditions. Installation and maintenance occupations—including line installers and heating and air-conditioning mechanics and installers—also should have especially favorable prospects because of a growing stock of homes that will require service to maintain interior systems.” (ibid.)

Although many have reported on the coming shortages of skilled personnel in the construction industry, including FMI (See “The Next Big Threat ... And It’s Probably Not What You’re Expecting” 2011), the immediacy of the problem is often lost in the current unemployment figures. Using BLS’ estimations, the construction industry is poised to move from twice the national unemployment rate to nearly twice the growth rate over the next six years. However, the potential shortages are not likely to occur across the spectrum of construction skill sets. That will depend on many economic factors. For instance, the president and others are calling for a multilevel energy strategy that will include oil and gas as well as solar, wind, nuclear and even modern coal plants. Although nuclear energy has had severe setbacks for many reasons, not the least of which is the aftermath of the Fukushima disaster, those in the industry realize that we do not have the necessary level of skilled personnel to crank up the number of new plants to the level some expect the sector might achieve. Add to that the potential for a renaissance in major infrastructure projects from rail to roads and bridges, and it becomes clearer that skilled American labor may be in short supply in the not-too-distant future. We say American labor, because it is hard to imagine in the current political and economic climate that we would have a great influx of foreign workers even if business increased considerably. However, consider, for instance, the building of the Transcontinental Railroad, a project costing twice the 1865 federal budget and employing predominantly Chinese immigrants. If the country undertook a similar project today, where would the workers come from?

The American Society of Civil Engineers (ASCE) estimates that the country needs to invest $2.2 trillion in the next five years to bring its infrastructure up to acceptable levels of safety and efficiency, as well as to keep from falling behind in the global economy. At this time, with increasing budget deficits and decreasing political collaboration in Congress, no one knows where the funding for such projects will come from. That also suggests no one really knows where the labor to
build it all out would come from either. Even if infrastructure is a non-starter in the current and foreseeable environment, there are other concerns for the future of construction labor in the U.S., especially for union construction workers.

**Union Construction**

The latest report on union membership and employment in the U.S. from the BLS (“Union Members” January 27, 2012) states that union membership for all of the U.S. “was 11.8%, essentially unchanged from 11.9% in 2010.” (Exhibit 1) For construction trades, the “unionization rate has fallen to 11.9% overall. Unionization is expected to fall even further over the next decade.”

Nationwide, public-sector workers claim the highest percentage of union membership at 36.25%, while only 6.9% of private-sector employees are union members. It should be of greater concern for construction unions and the outlook for skilled construction workers in the future that the largest number of union workers is older than 55 (15.7%) and only 4.4% are younger than 24. A recent survey conducted by FMI found that only 20% of those employed by respondent companies were younger than 35. (The focus of the survey was construction industry productivity. Fifty-three percent of the respondent companies were union, and in some cases both union and nonunion—“double-breasted”—shops.) (Exhibit 2) If the BLS forecast for the growth of skilled construction workers (19% by 2018) is even close, it is unlikely that those now older than 45 will fill those jobs. That could mean both a loss of experienced workers and a shortage of more than a million skilled and unskilled workers in the next five to six years. With union membership dwindling and unemployed construction workers finding work in other industries or retiring, we cannot expect to fill a large percentage of those jobs with workers now just sitting “on the bench” or in union halls waiting to be hired.
In the midst of a protracted recession for construction, there are a number of factors that conspire to reduce the potential labor pool. Perhaps one of the largest factors affecting both union and nonunion labor recruitment is the cyclical nature of the industry, which in the current down cycle has resulted in double-digit unemployment rates for several years. The industry and unions, in particular, have a number of challenges, some perceptual and some real, to meet to recruit workers. Consider the following challenges preventing an increase in younger talent from considering the construction industry:

- Construction continues to be perceived as an unattractive career option.
- Jobsrated.com ranked 200 job titles based on five factors:
  1. Physical and emotional work environment
  2. Income
  3. Long-term employment outlook
  4. Physical demands
  5. Stress
- No construction industry job placed in the top 100.
- Ten industry jobs ranked lower than “maid.”
- Moreover, five ranked below “Nuclear Decontamination Tech”!

There are several other areas of concern for union labor in the construction industry and labor in general:

- **Change**: The deep recession is changing the nature of construction to be more collaborative and productive.
- **Politics:** The question of union vs. nonunion labor is highly politicized—and the long recession further added to the pressures on both sides of the question.

- **Competition:** Competition comes from several sources at all levels of the value chain and from other countries in the global economy. With the growth of modular construction technologies, construction can no longer be thought of as an exclusively local undertaking.

The Construction Industry Is Changing

The construction industry is heading toward more collaborative construction delivery methods in the future, but not before it works its way out of the lowest-price cycle. Although owners are currently seeking the lowest price possible and using, or reverting to, a design-bid-build construction delivery method, there has been a longer-term trend toward more collaborative delivery methods, with the latest being a move toward integrated project delivery (IPD). In a recent FMI study of owners and construction delivery methods, Keith Reester, public works director/airport director, City of Loveland, comes right to the point: “If you’re an owner with money right now, get out there and do some work, because you’re never going to get better prices.” (Win-Win: Project Delivery in a Recession and Beyond, FMI, 2011)

Low-bidding processes for construction are often contentious, especially in a tight economy where contractors are desperate to win projects, but also need to make a reasonable profit. That situation can either put a contractor out of business if it cannot become highly productive on the project or lead to more expensive change orders and cutting corners any way possible. These approaches often lead to differences with the customer. In our report on delivery methods explained above, Reester noted, “Our industry historically spends a lot of money on conflict, and the less money we have to spend on that, the better off we will be.” While mindful of the need to get the lowest price, Reester is still interested in working with contractors that are able to take advantage of new technologies often associated with more collaborative delivery methods like BIM and knowledge of sustainable construction methods. The twin goals of driving out the cost of conflict in the construction industry by moving toward more collaborate construction delivery methods and the continuing need to get the project at the lowest price can be seen as pertaining not only to the construction industry as a whole, but also to labor issues in particular.

Even though union membership as a percentage of total construction employment has declined over the last several decades, construction trade unions still play a significant role in providing skilled labor. This is especially so in larger metropolitan areas where unions maintain a stronghold. But the current push to lower prices on just about everything and the extreme competition for work as the recession lingers on are making that position more tenuous and embattled. Contractors desperately trying to win bids are certainly feeling it, as contractor comments from surveys conducted by AGC of Minnesota and FMI exemplify:

- We are union and we can’t compete. Our pricing had to come down to the point of four years ago. The industry, especially residential, is out of control with regard to cutthroat bidding. Also, distributors are now selling directly to contractors just to make a sale, and that leaves us with labor only. There is no way we can continue in this market with the wages and benefits that the unions are requiring. (AGC of Minnesota, “Construction Industry Field/Craft Employment Outlook,” August, 2009 study report)
While contractor productivity has been improving during the recession—mostly due to accomplishing more with fewer people—the cost of materials and labor has been rising at the same time, putting enormous margin pressures on contractors, especially trade contractors with high labor costs.

- The nonunion sector has taken the majority of the little work available. We see no improvement for the next 12 months. (ibid.)

- We are doing more maintenance and service work. We fully expect nonresidential construction to be an absolute wipeout for the next two or three years. No reason for any office buildings to be built for three to five years. The unions can’t seem to understand they can’t keep getting raises when everybody else is taking pay cuts. It’s pretty abysmal, and now that the government is broke, I expect public work to slow as well. We can’t cut expenditures and tax our way to growth.” (Construction executive panelist from FMI NRCI Q3 2010)

While contractor productivity has been improving during the recession—mostly due to accomplishing more with fewer people—the cost of materials and labor has been rising at the same time, putting enormous margin pressures on contractors, especially trade contractors with high labor costs. Having cut employee levels to the bone, contractors are looking to changing processes and employing greater use of technology to make significant improvements in productivity. On the technology side, the growing use of building information modeling (BIM) to provide scheduling, clash detection and accurate information for increasing use of prefabrication and modularization is significantly changing the construction process by saving time and improving safety, quality and the bottom line for contractors. As these trends continue, it will also change the nature of the work on construction sites, which in turn could mean a different set of skills needed to build or assemble the project components.

Politics and Embattled Unions

Industry trends to lower costs have not gone unnoticed by the construction labor unions. The economic situation with tough credit, high debt load—for individuals and the nation—reluctance to invest on the part of owners and a host of other factors reflected in the construction industry have raised the level of contentiousness all around with few signs of improving soon. We can look to Congress to see just how contentious the nation has become with the rise of the Tea Party and now the Occupy movement, trying—and often succeeding—to make this a war of classes that squeezes out the middle class. Union/anti-union conflict has been thrown to the center of this contentious national mood. It is not the purpose of this paper to detail all of the issues currently being fought in the political arena; there are hundreds of articles—mostly polarized—on these issues to be found in the press and on the Internet. The short list below gives an example of the top issues in the news today:

- Project Labor Agreements (PLAs)
- Union pension funding
- Health care
- Wage rates

The union movement was born in the early 1800s on the basis of struggle and conflict with laborers organizing in order to get pay rates and working conditions that Americans would now consider unacceptable. Today, the workers’ rights fought for in countless battles between corporations
TREND 7: Market Factors Shaping the Construction Trade Unions of Tomorrow

and labor are written into labor law. This is among the many great successes that unions can point to as creating jobs and working conditions that are the envy of the rest of the world. Workers in many other countries, particularly in Europe, have fought for and won similar rights for workers. Ironically, in today’s global economy, there are corporations that envy the low price of labor in those countries that have not made such strides in improving wages and working conditions, and consumer countries enjoy the low prices of such things as automobiles, clothing, and electronics.

It appears, among the many reasons that union membership is declining, that its work is largely done. That is, most Americans—those with jobs, anyway—have at least acceptable working conditions and livable wages. Although workers continue to want to earn more, they largely expect to be able to improve their situation on their own merit and abilities to work harder, be more educated and market their skills to their employers. Reality doesn’t always match up with ideals, however, so there are still serious pockets of dissent and disparity among workers. Additionally, this idealized picture seems to better describe the pre-recession economy than the current economy where jobs are scarce and benefits, like health care and pensions, are under threat of being reduced or disappearing altogether.

The rush for reducing project pricing in the construction industry reflects the mood of owners and buyers across the economy. The most politically charged conflict has recently been seen in the public sector, where, for example, the governor of Wisconsin shut down the government while in a dispute with public labor unions over their ability to conduct collective bargaining, pay and benefits. The argument, much like that of owners everywhere, is that, if we want to reduce taxes, we must reduce costs, and union pay and benefits in the public sector represent a large part of those costs. The political decisions were settled in the courts but caused a great deal of protest and backlash that rumbled around the nation and further spread the national political divide.

The general sense in the mainstream media is that we are seeing the waning days of unionism in America.

The struggle for unionized labor in the construction industry has not been as controversial or contentious as that of Wisconsin and the plight of public labor unions recently. One reason for that is that the anti-union forces are focused on public unions that have the highest concentration of unionized employees. Another reason may be that market forces are already reducing the number of those employees by trade labor unions, especially when it is the case that union employers cannot win project bids, because their costs are too high. Using PLAs or government-mandated labor agreements (GMLAs) is one way labor unions are trying to reverse the trend, especially for large federal construction projects. This has been the subject of great debate in the construction industry with the majority coming out against PLAs as limiting competition and giving unions a monopoly on projects. The Associated General Contractors (AGC) of America has been clear in its position, particularly in regards to GMLAs:

- **AGC is Committed to Full and Open Competition for All Public Projects.** AGC strongly believes that the choice of whether to adopt a collective bargaining agreement should be left to the contractor/employers and their employees, and that such a choice should not be imposed as a condition of competing for, or performing on, a publicly funded project. Government mandates and preferences for PLAs can restrain competition, drive up costs, cause delays, lead to jobsite disputes and disrupt local collective bargaining. In
cases where use of a PLA would benefit a particular project, the construction contractors otherwise qualified to perform the work would be the first to recognize that fact and to adopt a PLA voluntarily. They would also be the most qualified to negotiate the terms of such an agreement.

- **Government-Mandated PLAs Can Have the Effect of Limiting the Number of Competitors on a Project.** This is because government mandates for PLAs typically require contractors to make fundamental, often costly, changes in the way they do business. For example, a PLA may require a contractor to recognize the local unions as the representatives of their employees on that job; use the union hiring hall to obtain workers; reintroduce inefficient work rules that have been abandoned over the course of collective bargaining; and pay into union benefit and multi-employer pension plans that nonunion employees will never be able to access, forcing nonsignatory employers to pay twice for retirement and health care benefits. Such changes are impracticable for many contractors and subcontractors, particularly those not historically signatory to collective bargaining agreements. According to the Bureau of Labor Statistics, union representation in the U.S. construction industry dropped another 5.6% in 2010, to a level of only 13.7%.

Political solutions these days seem only to last as long as the party who voted them in lasts. That causes more confusion and insecurity among workers and markets alike. It is undeniable that we do need laws that regulate labor and working conditions and safety. Few would disagree that it should be unlawful to employ children in sweatshops with 80-hour weeks and meager wages. That seems absurd today, but those conditions and worse existed in America before union organizations came along. But the more difficult argument is how America will compete in a global economy when third-world countries that have no unions or labor laws can trade on an even keel with high American wages. The fact that buildings and contractors are not commodities traded on world markets and delivered by supertankers does not excuse construction markets from worldwide competition.

**Union Benefits**

The best solution to labor market problems in construction will be market solutions, not political solutions. The construction industry trade unions that are poised to survive the downturn and grow in the upturn are those that have recognized the need to change and serve both their membership and their clients, the employers. Like any other product or service, that means delivering higher-quality and more desirable goods. In the case of construction workers, that means highly skilled craftsmen and women who can deliver the work effectively, safely and efficiently. It may also mean providing a sufficient pool of labor and craft workers.

If, as noted above, we are going to need two to three times more skilled labor in the next six years or so, how will unions help to solve that problem better than the market would otherwise? One answer is to improve recruiting of newer, younger members and to provide excellent training to this upcoming workforce.

The United Brotherhood of Carpenters and Joiners of America with “over 532,000 members,
representing 872 locals” is one example of a forward-thinking union that is building new training facilities and working on new ways to recruit and train the younger generation for tomorrow’s jobs. Apprenticeship programs have been important in the skilled trades for hundreds of years, but unions will have to rely on more than just tradition to compete in the marketplace of the future. For one thing, they must be more flexible and contribute to new productivity solutions. They must become partners in the process rather than just outside labor. In other words, when we talk about union benefits, we must also mean the benefits unions bring to owners and contractors.

**What do unions provide for the construction industry?**
- Trained and experienced workforce
- Safer workforce
- Pool of labor for trades and crafts

**What do unions provide for the workers?**
- Craft training/apprenticeship programs
- Better working conditions
- Higher pay scales
- Health insurance programs
- Pension benefits
- Representation for the above with employers and government
- Security

Just as contractors struggle against being caught up in losing low-bid wars, unions must demonstrate added value and reduce the “cost of conflict” by being more collaborative rather than more combative. If all this seems that it only leads to constantly cutting wage and benefits, it likely does at first. However, consider also the potential for growth in the construction industry in the next decade. If, a big if, the economy recovers and returns to something like a 5% growth or more, there will not be enough labor to build all the projects proposed. Market forces will likely allow for rising wages, and more new recruits will look for construction jobs. The best recruiters and managers able to deploy the most skilled workforce required to do the job will win the work on the labor front.

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Over the last few years, we have observed what appears to be a continuing trend in the construction industry where architectural, engineering and construction firms are coming together through mergers and acquisitions, partnerships, consortia and by organic growth to become in effect A/E/C firms. The primary drivers for this phenomenon are various owner demands and needs. However, there are other subsidiary drivers affecting both the supply and demand side including the need for industry firms to grow as well as survive. The long recession also plays a role. In the following, we will take a closer look at what appears to be a longer-range trend and examine its consequences.

**Something More than Traditional Consolidation Trends**

The apparent trend in business toward increasing consolidation in the design and construction industry that we are currently examining may be part of a broader natural trend or cycle found in science and technology and elsewhere in the economy. Evidence of such trends, notably in the field of science and technology, is bound to play an important role in any movement toward convergence in the A/E/C industry.

In the realm of science, it has been called “consilience,” a term resurrected by E.O. Wilson in a book of the same title, (Consilience: The Unity of Knowledge, 1998) to describe the unification of all knowledge. The term describes a “jumping together” of scientific fields of study to form stronger theories and means of discovery. For instance, Wilson cites the changes in academic fields of study with examples of what he calls “hybrid domains in which consilience is implicit” such as “chemical physics and physical chemistry to molecular genetics, chemical ecology, and ecological genetics.”

If consilience describes the convergence of knowledge in science, in modern consumer technology, it is the smartphone — and its ancestral relatives, the personal computer and the tablet computer — that serve as real-world examples of technological consilience. It is of course a telephone, but it is also a connection to the Internet, email, social websites, calculator, word processor, compass, video phone, music player, dictation device, library, television, still/video camera, calendar, scheduler, mapping and GPS device, alarm clock, filing system, drawing board, gaming system and even a flashlight. Did we leave anything out? Yes, too many apps to mention, and more are arriving every day. Although these technological changes are still new, it is hard to imagine going back to having to buy or carry around all of these things separately for personal use.

If science and technology are undergoing a period of unification or convergence/consilience, can the construction industry be far behind? Actually, yes it could, as the construction industry is often chided for its slowness to adopt new ideas and become more productive. While some of that criticism may be deserved, more construction industry firms are realizing that their survival
and future profitability depend on adapting to change and getting out in front of modern trends. Those that do not recognize the need to change—or make bad decisions about the direction of change—will see their customer base disappear, as owners increasingly demand and expect more from the industry and their construction service providers.

**Owners Drive Consilience**

Owner demands often change in periods of economic peaks and valleys. Although owner demands in any period seem to come down to faster, better, cheaper, these and other demands are magnified during economic swings. The rise of design-build and related delivery methods in the last several decades has largely been an answer to the need to reduce project completion times, but new delivery methods also tend to address improvements in project collaboration and conflict reduction. Indications of consilience in the construction industry can be seen in the rising variety of construction delivery methods from design-bid-build to design-build, construction management coming together as an increasing move to program management, and the most recent entrant, integrated project delivery or IPD. All of these methods and others have their variations that suit specific owner needs or specific marketing approaches trademarked by industry firms to differentiate their services from the rest of the pack.

The unifying forces in the construction industry are enabled by the increasing use and acceptance of key technologies like building information modeling (BIM), smart building technologies, project tracking software and digital communications ranging from smartphones, tablets, globally integrated project management systems and a host of others increasingly able to work together. BIM technology, like the smartphone, is a perfect example of convergence or consilience with the capabilities to merge a wealth of information into one model, capturing materials, design, scheduling and record-keeping tasks all into an impressive 4D model of the final project.

If consilience or the unity of knowledge in the sense described by E.O. Wilson is in fact a trend—and the theory has its detractors and skeptics—then we can expect this phenomenon to flow into the industrial space, especially those industries that are dependent on science and technology like the construction industry. The evolution of the construction industry does in fact mirror that of other fields. For instance, consider the early days of the ancient master builders, who, it has been said, were the last to understand all areas of the construction process from pre-design to material use, engineering needs and construction. With the growing complexity of the construction process and resultant projects, the master builder position splintered into a number of professions, trades and areas of expertise each with its own guilds and specialized areas of knowledge and expertise. Are new technologies allowing firms to turn again to the old ideal of the master builder?

As with the sciences, we can now choose from a wide range of talents and specialties in architecture, engineering, design, construction management, contractors and specialty trades to build almost anything we can envision. That is, if we can get all of these different specialties to work together to get the structure built on time, within budget, safely and with high quality and usefulness. If the reader is not an owner, then imagine the position of an owner looking to build a new power plant, a university or even a research lab. Imagine the long list of scientists, engineers, financiers, accountants, designers, tradespeople, etc., one would have to engage to accomplish the task. Assembling a team of such scale from scratch is a daunting task. Of course, that is why the owner hires an architect, engineer, construction manager, contractor and others, as is generally the case these days. However, too often, the owner sees that these various entities do not always
work well together as each seeks to protect its own turf and profits. Conflict has its costs in terms of schedule, change orders and lawsuits. Now that we are thinking like owners, why can’t we get what we need from a single source?

Ultimately, we can say that competition is the underlying driver for industry consolidation or most any other trend one examines. Underlying economic forces, like a long recession, add fuel to increase the rate of change. As the recession caused owners to reduce or eliminate their capital construction plans, industry competition increased rapidly. The following is a list of key requirements of owners undertaking construction projects or programs:

- Low price
- Single source
- Long-term operational efficiency
- Sustainability
- Reduced conflicts resulting in lawsuits and delays
- Greater depth of expertise
- Improved productivity through reduced duplication and wasted time
- High quality
- Safety
- Best value and low price

FMI has surveyed owners for many years, and one of the standout requirements mentioned by owners has been the increasing need for greater collaboration between all those involved on the project. That overarching desire is reflected on all the items above. Although historically, low price hasn’t been the greatest concern for the owners in our surveys — they are predominantly large owners who are serial builders usually with many ongoing projects — the recession has changed the list such that low price must be a consideration along with all the above. Greater collaboration usually means working with construction service providers that pay greater attention to the details and provide best value, which in turn is reflected in the delivery process leaning toward design-build, construction management and IPD. However, a great number of owners have reverted to design-bid-build during the recession, and many have been or will be paying for it in a return to greater contract conflicts, unfinished work due to contractor failure or ongoing lawsuits. Although design-bid-build does not always result in such problems, most agree and know from experience that this method has always increased conflict between the owner and the contractor, and the contractor with the architect and engineer. Owners are mad as hell, and they are not going to take it anymore. (Even though there are many owners who have been the catalyst for such problems when they create onerous contracts that shift all risk down the line while admitting none themselves.)

If owners are in the driver’s seat in the current demand-side economy, will they just continue to press for lowest price and expect all the other benefits to fall in line? Some will; however, our most recent study of owners indicated that, although they are taking advantage of a low-bid environment, they are not changing from their approach to best-value procurement. (See FMI/CMAA “Twelfth Annual Survey of Owners 2011”)

Conflict has its costs in terms of schedule, change orders and lawsuits. Now that we are thinking like owners, why can’t we get what we need from a single source?
**One-Stop Shopping**

The one-stop-shopping concept has been around for a long time going back even to the ancient marketplace or ye olde country store. Recent history has seen the rise of department stores and shopping malls anchored by large chain department stores. Growth in the retail sector serves as both a model of consolidation of services and an industry trend that has helped small A/E/C firms grow into larger, national firms as they follow the needs of their customers in the retail market space. Chain stores and malls provide good examples of owners who want a single-source provider for their construction programs. Although many larger chains have in-house design and construction capabilities, those departments have been severely downsized in recent years; therefore, owners are expecting more from A/E/C firms, again, at “low-low prices,” as the storefront signs shout at every turn. If owners are selling their products low, can we expect them to want to pay more for construction?

**Megaprojects on the Rise?**

While smaller owners with little or no in-house construction management capabilities may be seeking more single-source solutions, owners with megaprojects — defined variously as those of more than $100 million, more than $500 million or greater than $1 billion in project value — solicit bids increasingly from single-source providers. Megaprojects are most often government or quasi-governmental owners, but as government spending is expected to decline in the near term, more private owners or public-private partnerships (P3s) are expected. The projects tend to be very complex, demanding and often require many years to design and complete. Owners naturally want to work with firms that have the capacity to perform the entire project as well as the resources needed to take on the various challenges presented. Examples of recent megaprojects include the Panama Canal expansion, the Hoover Dam Bypass Project and Pat Tillman Memorial Bridge, the Tappan Zee Bridge project, the Dulles Corridor Metrorail project and the new World Trade Center. This is just a small selection of high-profile projects. One of the key areas of concern for the growing number of megaprojects is bonding capacity from both the owner's perspective of working with firms with sufficient bonding capacity and from the surety industry's point of view in taking on such large risks. (The surety industry itself is another model of recent industry consolidation.) We asked about this in a 2010 survey of surety providers with the following findings at that time:

“The surety industry has the ability to continue to support mega-construction projects (>100M in value).

While the recession may have temporarily slowed the number of large mega-project announcements, the need to rebuild America’s infrastructure and industrial facilities will continue to generate complex megaprojects. Through co-surety arrangements, increased underwriting vigilance and other developments, the surety industry is currently well-positioned to support the underwriting of increasingly prevalent megaprojects. As the construction market gradually re-emerges from the present downturn, this support is expected to remain in place.

The benefit to owners of building large projects is that they do not have to be as concerned about dividing the megaproject into smaller projects, a task that can overwhelm an owner's internal staff as owners become more dependent on outside construction and program managers. On the other hand, megaprojects usually have fewer bidders since they tend to shut out smaller contractors due to lack of bonding capacity, another point of concern.
that sureties must address.” (FMI “Surety Firms Weigh in on Construction Markets and Contractors: FMI Surety Providers Survey” 2010)

The trend toward a greater number of megaprojects has been one major factor in industry consolidation. Mid-sized and smaller firms can only hope to be subcontractors or minor partners on the projects. However, that is a real possibility for select firms as few complex megaprojects are fully performed by one firm, with the formation of teams, joint-venture partnerships or consortia more the norm at this time. Projects do not have to fall into the mega-project category to be large and complex, these days. Owner requirements combined with regulatory requirements often necessitate that providers of design and construction services have a wide range of expertise, either on staff or through partnerships. There is something of a consilience needed in A/E/C firms where design and engineering are informed by social and environmental concerns, and building designs are affected by climates, not only today’s climate, but the projected possible climate 30 years from now. For structures to be sustainable, there also needs to be a deeper understanding of materials and energy balance both to meet requirements of regulations and to provide a safe, clean environment for building users and occupants. In more cases, there needs also to be a coming together of financiers and bankers to assure funding for the life of the project and beyond. Few smaller firms have the capacity to address all of these issues on their own and will be shut out of the market unless they amend their strategies.

Signs of A/E/C Industry Consolidation
The construction industry has long been considered one of the few mature industries that has not seen a wide bifurcation between the largest firms and the many midsized and smaller firms, a phenomenon seen in most every other industry from agriculture to semiconductors. Is it possible that current market trends are changing the historical competitive balance in the industry? Among the factors that contribute to market bifurcation are technological advantages, price leadership and economies of scale. We can certainly see some of these advantages conferred on the largest firms in the industry or in a given market in signs that, for example, megaprojects have far fewer bidders than say a local shopping mall would have. However, those bids are still highly competitive in most areas and generally require joint ventures and partnerships to undertake. They also present increased risk that may preclude some potential bidders from entering the competition.

Another sign that there might be a distinguishable trend toward consolidation and an increasing divide between larger and smaller firms is the number of firms larger than a given size compared with all others. We are limiting our examination to the top design and construction firms as reported annually in the ENR “Top” lists. By definition, then, we are only looking at a given number of firms, so there is no consideration for total industry firms. Nonetheless, the design and construction firms in the ENR lists represent a considerable portion of annual construction revenue. For instance, in 2011, the “Top-400 Contractors” accounted for about 50% of the total construction put in place for 2011.

Top Design and Construction Firms
In 2006 and early 2007, news in the construction A/E/C industry was still about the problems of handling all of the work coming in and how the industry could find more talented individuals to perform the work. Five years later, we are still working our way out of the long recession that started in the latter half of 2007 and downsized the industry roughly 30%.
The tremendous economic pressure from the onset of the recession and subsequent reduced demand have taken their toll on the industry, but how much has this pressure affected the consolidation of the industry, so far? In 2006 the top 21% of firms represented 75% of the total revenue for the Top-500 firms. In 2011 this figure increased, and the top 22% of firms took in 82% of the revenues. In 2011, 16 firms with more than $1 billion in annual revenues represented approximately $44.4 billion, or 52% of Top-500 revenue whereas, in 2006, 13 firms of greater than $1 billion in annual revenue represented only about $25.6 billion, or 37%, of total revenue. (See exhibits below.)

In 2006 there were no firms reporting in the Top-500 below $20 million in revenue, while in 2011, 39 firms met that criterion. It does appear that mergers and natural growth have raised the revenues at the top of the list and decreased the number of firms in the middle ranges. Some firms merged and moved up the list, some firms lost revenue, and a number of new firms moved into the Top list, yet it does not show an overwhelming trend one way or the other. There are also firms merging between disciplines, although the total number of firms designated EAC, EC or A/E/C differs little from 2006 to 2011. Nonetheless, the majority of multidisciplinary firms are in the top 20%.

For contractors in 2006, 46 firms with more than $1 billion in annual revenue represented approximately 54% of the Top 400 revenue, while in 2011, 54 firms represented 62% of total Top-400 revenue. Changes in revenue distribution between these two years show that only a few firms in the middle moved up due to natural growth and mergers, while many more moved lower. Comparing the Top-400 firms’ revenue against total nonresidential construction put in place for 2006 (48%) and 2011 (50%), we see that, although this list does produce a significant portion of annual construction, there is a good deal of distance to go before there is as much consolidation among contractors as there appears to be in design firms.
Looking at the activity in the changing picture of the “Top-600 Design Firms,” we see more evidence of the larger firms getting larger and smaller firms getting smaller. Similarly, the largest contractors are winning market share. As our two comparison years bookend the recession, it appears the larger firms have been able to add to their backlogs, in part due to the ability to take on megaprojects, especially when government spending was increasing and private spending decreasing. The conclusion, then, is that this analysis is not definitive, but there does appear to be some greater division between larger firms and smaller firms at this time, and there is a good case that market forces could widen the gap between larger and smaller firms in the near future.

**Strategic Positioning, Decisions and Indecisions**

While the above discussion seems to imply the primary goal of merger and acquisitions growth is to move to the top of the “Top” lists, that strategy could prove to be very costly. Firms that make strategic acquisitions may in fact move up the list; however, taking a strategic approach to growth is more sustainable. Some strategies to be considered include moving into new markets, expanding service offerings, broadening the firm’s talent and technology base, capturing economies of scale, taking advantage of a buyers’ market and combinations of the above designed to build client relationships and capture more work.

As mentioned above, it is expected that more large owners will be looking for full-service firms or groups of firms that can work together seamlessly, as in IPD contracts. This will be especially necessary in the case for projects in the “mega” range. Looking at the number of transactions in the engineering and construction space since 2007 (for both Canada and the U.S.), we find that there has been 170 instances where construction firms were buying engineering firms and 133 instances where engineering firms have purchased construction firms. (See exhibit.) Many of the firms involved in these transactions were not on the Top lists, although many on the buyers’ side have been larger firms. This recent M&A activity has caused some firms to move up the list and others to disappear from the list, as they are no longer independent firms. While M&A transac-
TREND 8: The Concilience of Design and Construction

Activations have cooled somewhat since the peak in 2008, we expect this type of activity to continue as owners seek new services and capabilities and A/E/C firms prepare strategically for future market changes.

Other factors for M&A activity include the large number of firm owners reaching retirement age and the struggles by some firms to compete in a tough market. Many of those firms will simply close their doors, but there will be a growing number seeking buyers or alternatives that allow owners to sell their shares and transfer management of the firm to the next generation.

There is no clear conclusion that there is an overall industry trend to combine or consolidate design and construction services into one firm; but there is a significant amount of activity in this direction. Greater consilience would mean a combination of vertical and horizontal integration with more emphasis on combining disciplines. There also is no clear sign that midsized firms will be squeezed out to become larger firms or be relegated to the lower end of the revenue spectrum, but the recession has certainly added to the pressure for mid-range firms vying with larger and smaller firms for fewer projects. Ultimately, as far as a clear trend goes, we can offer no bandwagon here for the industry to jump on. However, we can identify and characterize three types of firms based on their strategic choices:

- **Buyers and Integrators**: Large A/E/C firms, global in scope.
- **The Talkers**: Uncertain which way to go. Need to assess the risks for either direction.
- **Survivors**: Small firms in the market mostly just trying to get by right now. Not sure which way to go as in #2, but with fewer options.

**Buyers and Integrators**

The buyers and integrators are very large firms whose revenues run in the range of billions of dollars per year, or they are moving in that direction. They are able to take on or take the lead on practically any sized project an owner can come up with, not only in the U.S. but also in any part of the globe. While most have special niches or specialties in the types of projects they are involved in, they usually have a broad and deep range of expertise.

To be sure, smaller firms also share most of these concerns, but the effects can be magnified on a large scale, and no construction industry firm has yet been proven to be too big to fail.
In order to thrive and continue growing, the Buyers and Integrators must excel in management practices and business development. Consider the challenge of reaching $2 billion in annual revenue in terms of weekly revenue, which is $38,461,538 a week. That means each week the $2 billion firm needs to capture enough sales to surpass about half the firms on the “Top-600” list of design firms, and each month’s sales would put the firm in the top-350 construction firms on the “Top-400” list. That’s a lot of mouths to feed, a lot of client relationships to build and maintain around the globe, and an enormous challenge to create an efficient management structure to accomplish all of that. Now consider that the recession has caused many large owners, namely governmental entities with large projects, to cut budgets drastically. The risks and challenges are enormous and, considering that many of the firms in this size range are publicly held firms, the pressure to perform these feats month after month, year after year, requires nothing short of excellence in all areas of operations. One failed megaproject, political upheavals, economic distress, lack of qualified talent to staff offices and manage projects, sudden inflation or deflation—all of these things and more threaten ongoing success. To be sure, smaller firms also share most of these concerns, but the effects can be magnified on a large scale, and no construction industry firm has yet been proven to be too big to fail.

The Talkers
The Talkers are more likely to be midsized firms that feel caught in the middle, especially when they are seeing more competition from large firms looking to fill the backlog voids as there are fewer large projects being put out to bid. Many of these firms have done quite well over the years in their traditional or core markets and service offerings. With new economic pressures and seeing the trend of owners to favor larger firms with one-stop-shopping options, these firms are increasingly finding that they are at a crossroads. Should they sell to a larger firm, merge with others or consider entering into more joint venture partnerships in order to compete with larger firms? We call this group the Talkers, because they can be caught up in talking about strategies and unable to take action. They have successfully operated with much the same strategy for many years, maybe even generations, so it is hard to make big changes. On the other hand, they sense there is something different in the wind, and maybe their old strategy needs an overhaul. There are risks at every turn, so they keep talking about the problem, hoping the economy will change, and the problems will go away even if they know better.

The Talkers are in a position where they need to make some tough decisions. Denial is not an option. Markets are changing and the firm will need to change with them. The options are not limited to merging or partnering. Firms that find themselves caught in the middle may find a side door into niche services or in providing specialized services to both owners and larger firms in the industry. However, in all cases, at some point they will have to stop talking and take action toward change or risk missing the ship when it sails.

Survivors
The category we call the Survivors here includes both midsized firms and smaller firms, or midsize firms that find themselves becoming increasingly smaller firms as recessionary forces continue to plague the markets. However, we must note that, in our studies and observations of contractor failures, even though a poor economy is often blamed for a firm’s demise, there are many other forces at work that increase a firm’s vulnerabilities to failure. Survival is critical in order to make it to the next “round,” but a survivor mentality can mean a firm keeps its head in the sand too long while the seas of change wash over it. Bidding low on work that is a sure loss or that the firm has
little or no experience in can have tragic consequences for survival. Simply shrinking the firm and decreasing overhead can work for short downturns, but lack of a strategy for moving forward means the firm is further limiting its options for future growth and survival.

Firms that get caught up in just surviving also limit their options to participate in mergers and joint ventures as they work down their cash reserves and ability to scale up for larger projects. With no plan and dwindling options, it is a showdown of how long the firm can last until the next boom comes where everyone is busy. The answer to what looks like a growing malaise is to closely examine the market and the firm’s capacity and capabilities to serve it. This will require a greater degree of entrepreneurship and strategic thinking. Even if the Survivor firm is a larger entity, it needs to be able to change faster than others and set the pace in some particular area of expertise. Once momentum is gained, it will be easier to take on larger projects or plan to grow through targeted acquisitions or even a sale of the firm.

**Conclusions**

The combination of owners’ needs making it desirable to have greater collaboration on projects and/or single-source providers and the increasing use of modern technologies like BIM will continue to bring about something like consilience in the design and construction industry. This is especially true for the very large, complex projects. It may also be a growing trend for smaller or midsized projects, as owners have greater demands for multidisciplinary talents for sustainable projects and reduction of conflict on the project. The firms that fit into our category of Buyers and Integrators will be the most prepared to provide solutions to owners with these needs. However, such firms may not need to be the largest on the Top lists as long as they are able to provide the capabilities and capacity needed by owners. At the same time, Survivors, in the sense that we have described above, need to move out of survivor mode or they may not survive much longer. The Talkers are in the toughest position, and some will wait too long to make a decision.

While the megaproject trend may slow in the near future, very large, complex projects are likely here to stay. Owners of large projects will continue to want assurance that their partners and construction firms have talent, expertise and abilities to improve trust and collaboration in order to reduce risk and bottom-line cost. Construction industry firms will continue to grow both vertically and horizontally in order to be able to respond to their clients’ needs. However, sheer growth of large firms does not guarantee long-term results, and if work slows for large-scale projects around the globe, expect to see the “whales” dive deeper for their meals.

While we have conveniently divided A/E/C firms into three categories for the sake of argument and example, all firms might have, and probably should have, some of the better characteristics of the Buyers and Integrators, the Talkers and the Survivors in their strategies or at least understand the challenges of each type in order to compete. Nonetheless, the ultimate answer of who will survive and grow is to know the customer and the future customer and be there when they are, if not a bit sooner. While the trend toward greater convergence of A/E/C firms will have its limits, it is very likely that firms surviving and thriving in the future will represent a greater consilience or convergence of disciplines into deeper knowledge to solve tomorrow’s problems. Consilience as an idea on a broader scale affecting science as well as the A/E/C industry is as yet just a theory with some interesting potential, but if it proves useful for a greater number of firms and fruitful for a greater number of owners, we may be able to determine a broader trend as we continue to work our way out of the recession into whatever comes next.
Your Next-Generation Leaders: Are They Ready?

In the fall of 1991, one of the strongest storms in recorded history hit the coast off Gloucester, Massachusetts. This storm created an apocalyptic situation in the Atlantic Ocean where boats encountered waves the size of 10-story buildings. This event is known as “The Perfect Storm” because of the simultaneous convergence of three separate squalls into one. The construction industry faces its own perfect storm; however, this event will come without the drama of crashing waves and gale-force winds. Instead, it will be a perfect storm of factors preventing firms from effectively identifying and adequately preparing next-generation leaders for succession.

Many construction leaders assume that leader development and succession issues have blown over since the recession put a swift end to the boom years’ war for talent. However, these issues have not gone away; on the contrary, they have become even more acute as a result of the Great Recession. This article examines the following key factors driving the succession-planning dilemma facing our industry:

- The demographics bubble of retiring baby boomers followed by a much smaller Generation X.
- The construction industry’s inability to present itself as a desirable industry for future generations.
- The impact of long-term unemployment, which has driven many young workers out of the construction industry for good.
- Owner and/or company capital bases, which have been reduced by the recession.

These factors, combined with recession-driven cuts in investments in recruiting, training, coaching and other forms of talent acquisition and development, put ownership transfer and management succession (OTMS) high on the list of critical issues shaping our industry’s future. Most of these factors come as no surprise to design and construction industry leaders. However, it is easy to let these needs recede into the background in the face of intense competition and the need to find sufficient backlog to keep people employed.

This article examines each of the factors driving the current succession planning challenge in detail and provides guidance to plan for a successful ownership transfer and management succession.

Understanding the Perfect Storm

The issues of ownership transfer and management succession in the construction industry have been talked about for decades. Though many company leaders realize the importance of planning and preparing for this critical phase in a firm’s progression, the topic often gets deferred until it’s too late.

Successfully transferring the ownership and management of a construction firm requires a dedicated effort and can take more than a decade to accomplish. Procrastinating succession plan development – and the accompanying stock transfer implementation – limits an owner’s options, may delay the timing of his or her exit, and puts the business at risk.
Today, several key trends are affecting the pressing issues of ownership transfer and management succession in the construction industry. These include:

- **The nation’s largest generation is retiring.** According to the Pew Research Center, the oldest members of the baby boom generation celebrated their 65th birthdays in 2011. Every day for the next 19 years, 10,000 baby boomers will reach age 65. The aging of this huge cohort of Americans (26% of the total U.S. population are baby boomers) will dramatically change the composition of the country. Currently, just 13% of Americans are 65 and older. By 2030, when all members of the baby-boom generation have reached that age, 18% of the nation will be at least 65. At that point, a significant number of construction firm owners will fall into their ranks, leaving their companies to be operated by family members and/or current employees. Those who don’t plan ahead and develop OTMS plans will face critical challenges when the time comes to retire. In fact, the baby boomers’ ownership transfer needs are more challenging compared to those of any other age group in light of their expected time of retirement and current ages. Finally, economic uncertainty has prompted more baby boomers to stay in their current roles, thus frustrating the next generation of leadership’s ability to move up the corporate ladder.

- **The construction industry is not adding enough new talent to replace those exiting.** When educated and skilled workers consider career paths, construction isn’t typically near the top of their target job lists. Public perception is that the industry is dirty and dangerous. Uninformed perceptions about low-paying work further prevent entry by a high number of next-generation leaders. Compounding the problem, construction employers have not done a good job of embracing diversity, either gender or ethnicity, thus draining the talent pool of a large portion of the working population.

- **The prolonged recession has taken its toll on the construction industry nationwide.** During the Great Recession, 2 million jobs vanished within the design and construction industry, making up 20% of the total national job loss across all industries (8 million in total). In a sector already facing an uphill battle in attracting next-generation leaders, the construction industry has laid off – and in many cases permanently lost – a significant pool of talent to other faster-recovering industries. According to AGC’s chief economist, Ken Simonson, “Over the past two years, construction employment was virtually unchanged, but the number of unemployed former construction workers fell by 746,000, suggesting workers are quitting construction, either to take jobs elsewhere, return to school, retire or otherwise leave the workforce.”

Many experts foresee an extended period of high unemployment to transform the life course, career path and character of an entire generation of workers – and leaders. As we look to the future, the “human recession” could have dramatic consequences for the construction industry, particularly once markets start to rebound two to three years (2014–2015) from now. Forward-looking contractors are already preparing for what promises to be one of the most severe labor shortages in the industry. As firms gear up to meet increased demand, they must reassess their human resources strategies and more closely examine the relevancy of their succession and leadership development plans.

- **Depletion of owner and/or company capital bases through the recession.** FMI is witnessing how financially conservative owners who are close to retirement age want to
protect what they have by “getting out” rather than continuing to “risk it all” in today’s ultra-competitive construction environment. Their options generally include liquidation, third-party sale and internal transfer. While about 30% of construction businesses are eventually liquidated, particularly the small ones, this is the least desirable choice for most owners. Of the owners who responded to FMI's most recent OTMS survey (to be published in fall 2012), only about 4% expect to liquidate the business, while 13% expect to sell to a third party. Twenty-three percent were uncertain at this point, and the remaining 60% expected to sell to employees, family or both employees and family members.

The combination of these significant trends could make or break construction firms in the future. Companies with effective ownership transfer and management succession plans will be best equipped to handle the rapidly transforming business environment. The next boom probably won’t look like the last one; company leaders need to think strategically and align employees’ capabilities and career aspirations with the organization’s overall business strategy now to build a company fit for the next challenge.

Failing to Plan, Planning to Fail?

The average organization turns over about 25% of its management ranks annually. Considering that half of the replacements hired in their places will fail within 18 months1 and that more than half of current senior leaders are expected to retire within five years,2 the firm that lacks a solid leadership development plan pays dearly for the oversight. Knowing this, today's top corporations – across all industries – are putting time and effort into developing their top talent, cultivating leadership candidates and aligning that talent pipeline with long-range business strategies.

Not all companies are following suit though, particularly in the construction industry, where the highest percentage (32%) of ownership transfers involves family members or key employees. Unfortunately, many of these firms “fail to plan” when it comes to leadership pipeline development and wind up using 11th-hour strategies to transfer company ownership. This trend is confirmed in FMI's upcoming OTMS survey, where results show that almost 40% of CEOs older than 61 who plan to retire within five years have yet to choose a successor. The consequences for individual companies and the industry as a whole will be impactful: Critical knowledge transfer may not occur within existing organizations; young leaders will become disengaged due to ambiguous career prospects and move to other companies (or perhaps other industries); and companies’ financial performance could suffer from the resulting leadership and talent void.

FMI's OTMS survey revealed several key reasons for owners delaying ownership transfer. These include 1) The timing wasn’t right due to owners’ concerns about being unprepared to leave (28%); 2) Their employees didn't have the requisite skill sets to take on larger roles in the business (31%); and 3) Most surprisingly, 29% were hesitant to move forward because they were unaware of the appropriate technique to use.


The human element, which underpins all of these personal issues, represents by far the most difficult aspect of ownership transfer and succession planning and must be carefully synchronized with leadership development. Ironically, succession planning and leadership development are frequently treated as two separate issues, with the former defined too narrowly to uncover or correct skill gaps that can derail even the most promising young executives. According to research conducted by Harvard fellows Jay Conger and Robert Fulmer, firms that take a comprehensive approach to succession planning – instead of simply filling out a list of candidates – can effectively develop deep and long-lasting bench strength across the organization. They create a long-term process for developing an abundance of talent at all levels within their organizations, and combine succession planning and leadership development into one practice.

Based on FMI’s experience, candidates for future ownership and leadership positions must be identified early in the business succession process and given time to grow into their new roles. This may feel uncomfortable to current owners, who fear losing their positions or authority in the business and community. However, it is a vital step toward achieving the larger goal of ensuring business continuity long after current leaders retire. Business consultant and author Peter Drucker once said, “The final test of greatness in a CEO is how well he chooses a successor and whether he can step aside and let his successor run the company.” No succession plan will work if the business lacks the people and leaders to make it happen.

Oftentimes, emerging leaders and future successors are not exposed to the banking, bonding, finance, insurance and relationship-building aspects of the organization. Consequently, they lack the big operational picture and the community ties that the current owners have. Exposing future leaders and successors to these broader aspects of the business requires a purposeful and intentional process that’s unique to each individual. It also takes time. Frequently, owners underestimate how much time it takes to develop a successor (often a group of new leaders) to carry the business forward. They are also unaware of how their own roles and behaviors must change in order to effectively pass the torch to the next generation.

**Developing Your Next-Generation Leaders**

FMI’s experience shows that effective succession planning requires specific steps. It is important to remember that succession planning is a process and not a stand-alone event.

1. Clarify the organization’s vision
   A clear vision is the foundation of an effective ownership transfer and management succession process. Great organizations with the desire to endure multiple generations know who they are (defined by purpose and values) and where they want to go (defined by an envisioned future projected out to 10-20 years). The values and purpose provide cultural stability and a critical litmus test for leadership potential. Establishing or clarifying an organization’s vision is also a

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critical step in developing and aligning future senior leaders of the company among themselves and with the current leadership team. Leading an organization with vision creates alignment across the senior leadership team, transitions critical company history from the current leadership to the successors, and develops additional internal champions to successfully drive the vision throughout the organization. When leaders focus on vision, other aspects of the business – such as strategy, business goals and human capital management – fall into place.

2. Develop business strategies and objectives
Understand how the business will compete over the next five years and move toward the 20-year vision. Then, identify leaders who will execute on that strategic plan. You want to be able to answer the question, What do we need to accomplish in the next five years to be successful 20 years from now? With that in mind, leaders can develop an overarching strategy that relies on market research, customer understanding, competitor analysis and a candid organizational assessment of the company’s capabilities and limitations. For leaders to be able to adjust the strategies under changing conditions – which will surface at any time – those strategies must be supported by robust business analysis. By understanding the forces driving the strategy, leaders can recognize change, make necessary adjustments rapidly, overcome obstacles and capitalize on new opportunities. All of this analysis is guided by – and with the intent of achieving – the overall vision.

3. Identify leadership requirements
Identify which leadership traits, competencies and skills are required to successfully implement the current business strategy (see Figure 1). Knowing whether you have the right people and creating leadership competencies around the organization’s strategy and vision both go a long way in creating an effective leadership development strategy. Do a quick assessment: An organization moving into new markets would require a completely different set of leadership skills than one that is well-positioned and acquiring market share in a strong market. The first approach may require outside technical expertise and a résumé of work to gain credibility with potential clients. The other strategy requires a leadership team focused on executing and driving performance to maximize the current position. The long-term vision may require a balance, but the strategy brings the immediate requirements to the forefront. Armed with a solid understanding of the specific need for people and talents, the organization can make an honest assessment of its current capabilities and needs.

Figure 1. Leadership Success Model
4. **Evaluate the organization and candidates**

Candidly assess the organization and the leadership candidates against the necessary leadership requirements for achieving the current strategy. This is the gap analysis – what we need versus what we have. Through the evaluation of individual leadership candidates, the organization can identify critical gaps among the designated talent pool for succession across the organization. This organizational gap allows leadership to determine which company strategies will close the gap, and the individual gaps that can be developed over time to improve the overall potential of each candidate and that of the organization’s talent pool. Plan for the unexpected and create a potential talent pool equal to twice what your company needs. You will lose candidates for a host of reasons, and if there are not enough in the development process, then you will have to identify and develop candidates on an abbreviated timeline. This is not in the best interest of the organization or the candidates.

5. **Create a development process**

Build upon the current team’s effectiveness and leadership capabilities to achieve the organization’s long-term vision. Intentional and individual development of a candidate pool ensures that the necessary talent is available and at the highest level of preparedness when called upon. Most organizations haphazardly prepare their next generations of leadership. When the project mix enables it and when they have the time, they send those prospects to training events, seminars or some other one-off type of development. Just as the organization must develop a long-term vision, those individuals need to work toward a long-term development goal that yields a return on investment for leadership and responsibility preparation. Imagine a group of leaders working through an intentional development process focused on their needs, and then consider how each of the individuals’ increased performance will affect the overall performance of the organization.

6. **Outline and implement the transition plan**

Succession planning should happen when the leadership is stable. Leverage the experience of the current leaders to define and explain how a methodical transition would be executed. Do emergency planning on the short list of critical transition items. Once the plan is built, it can be adjusted based on situational needs, but you have to start somewhere. The process of planning the transition is as important as the plan itself. It will force leaders to think through the critical responsibilities of their current roles and may answer key questions like: What can be delegated for the development of my people? What am I not doing that they should be doing? How can we phase the transition to ease my successor into position?

When the time is right, refine the initial plan and implement the transition. If the succession is planned, there will be time to refine that plan based on the current business needs and the successor’s capabilities. Knowing exactly when to transition understanding, authority and responsibility of key tasks is a critical step. The succession process will typically begin with developing the successor’s understanding of the roles and responsibilities of the new position. While most successors think they understand the role they are about to assume, they often do not see the critical, “behind-the-scenes” leadership responsibilities and the fine details of the job.

This educational phase helps the current leader create a smooth and effective succession. A well-thought-out process of transferring understanding will prevent the proverbial “drink-
ing from a fire hose” and the inherent lost information that occurs when too much knowledge is given too rapidly to the successor. Oftentimes, the information provided far exceeds his or her capacity to fully understand and remember what is being learned. The transition of authority places the task in the successor’s duties. The successor plans, makes recommendations and executes the task, but the current leader retains authority for final decisions and responsibility of the ultimate result.

This phase can be viewed as a “partnership,” with the successor trying new things, developing his/her thought process and making recommendations while still having the backup of the experienced leader asking the tough questions and helping to ensure success. When responsibility is transitioned, the successor suddenly has the primary ownership of execution and for the results produced by the executed task. This is typically accomplished on the transition day, when the successor assumes the new role and all of the responsibilities of his or her new position. Depending on the situation, the actual transition process can take from 30-60 days once the transition begins.

Using this six-step process, today’s leaders can effectively develop internal strategies that not only help cultivate strong future leaders, but also help drive their organizations toward success today.

What Best-In-Class Firms Are Doing to Develop Their Leadership Pipeline

API – Preparing Tomorrow’s Leaders Today

It’s been about 10 years since Minnesota-based APi Group Inc. refocused its leadership development strategy and began filling its pipeline with qualified, innovative and exceptional candidates. But even with a decade of planning under its belt, Russell Becker, president and CEO, states the billion-dollar holding company for 40 independent construction and construction-related businesses “never has enough leaders in the pipeline.” This single example proves the need for a long-term plan regarding leadership development in the construction industry.

To address the ongoing issue, APi created a highly selective internal leadership development program. Selected candidates demonstrate superior leadership potential with less emphasis on the technical knowledge of the construction industry. According to Becker, critical thinking and strategic leadership abilities are more difficult to teach than the technical aspects of a leadership role. The program provides candidates with experiences that will teach them to mold and leverage their leadership skills to excel in the APi environment. Men and women who are recruited into the program spend their first year of work on a sequence of six to eight diverse subsidiary rotations.

Key Challenges and Opportunities

The need for solid, deliberate leadership development plans – and the fact that many companies overlook this requirement – will continue to cause a surge of challenges and opportunities for construction firms, including:

- Identifying, selecting and developing a new generation of leaders (how to do it faster, more effectively and without making the mistake of selecting the wrong people).
- Creating a compelling economic value proposition for the next-generation leaders while preserving value for current owners. Aligning economic interests in a transaction.
- Understanding generational differences and building a “Millennial friendly” organization.
- Managing the extended timing and corresponding risk of internal ownership transfer, which takes five to 10 years to transition.
- Capturing and embedding the cumulative knowledge of outgoing employees.
- Developing intentional, purposeful succession plans.
- Growing high-potential employees’ abilities to lead versus manage and think strategically versus operationally.
- Preserving organizational culture and legacy for future generations.
“The recruits spend time working with the presidents of those respective divisions and getting to know the specific industries that those businesses operate in,” Becker said. “They also learn the culture of those companies and their various leadership styles.” When the yearlong period is up, graduates of the program are usually placed in a “position of responsibility” within one of the eight businesses.

APi’s leadership development approach doesn’t end there. Twice yearly APi holds “leader labs.” All company leaders join for a day and a half of leadership development enrichment. The company has also sent more than 600 of its employees to FMI’s Leadership Institute, with focus on growing both new and existing employees who show leadership potential.

There’s also a grading exercise for all company leaders. Becker meets two to three times a year with APi’s chairman of the board to grade individual leaders on an “A, B or C” scale. To achieve an A, for example, leaders must meet or exceed financial expectations for their divisions, develop those organizations effectively, tap new business opportunities, maintain a favorable work environment, and conduct regular 360-degree reviews of themselves and their own leadership teams. Other critical metrics examined during the grading period include succession planning and relationship building.

Becker is quick to point out that the grading exercise is about cultivating effective leaders, not just weeding out those who don’t measure up.

“We know that when our employees are successful, then our company is successful,” he said.

At APi, leaders are taught how to identify up-and-coming talent and help integrate promising candidates into the leadership pipeline.

“Everyone is part of the business and succession planning process,” Becker said. And because the company operates in a decentralized manner, internal talent growth is focused on the specialty areas of each company within APi. “We spent a lot of time and energy on training and developing that company’s president,” Becker said, “so that he or she is capable of developing leaders within that specific organization.”

DPR – Making a Long-Term Commitment to Leadership Development

Leadership pipeline development is a critical component of DPR Construction’s strategic plan. Based in Redwood City, Calif., the national general contractor put the concept of “people practices” at the top of its to-do list shortly after celebrating its 15th anniversary. Part of that initiative involved the development of new and future DPR leaders. “We had a lot of leaders who were in their 50s and would be transitioning into new roles in the next 15 years,” recalls Cari Williams, the construction firm’s people practices leader. “We spent about a year researching different program options and performing intensive internal focus-group work. In the end, we decided to create our own internal program.”

That leadership development program aligns with other leadership development programs and also factors in DPR’s unique corporate culture. In 2007 the company kicked off the program by working with its top-tier leaders first. “Our leaders believed so deeply in this program that they dove in first,” Williams explains, “and to serve as the voice of the program from a position of truly understanding what the experience is all about and how it helped them grow.”
Key components of the program included self-assessments and the development of 360-degree reviews of current and prospective leaders. “We started with one of the templates that FMI had worked with us on nearly 14 years ago,” says Williams, “and then asked ourselves what we were trying to understand so that people can fit better into leadership roles.”

The 360-question assessments were narrowed down to a svelte 18 queries, all aimed at obtaining “rich feedback,” says Williams. “It was less about the score and more about getting feedback on what the participant could be doing better.” In addition to 360 self-assessments, the Leadership Development program includes the Myers-Briggs Type Indicator Profile (MBTI), four months of dedicated coaching with an external coach and the EXPLORE retreat – a three-day immersion with an external facilitator to dive into the feedback the participants receive and ways that they can take their leadership to the next level.

During the early phases of its leadership development program, DPR also surveyed current leaders to get their take on where they pictured the company would be, leadership-wise, by the year 2015. Key questions included: How many leaders will be left? How many will retire? How many offices will the company have? “From that exercise, we decided that by 2012 we needed to have 80 more individuals readied for leadership positions,” says Williams.

DPR has successfully immersed 72 current and future leaders in the DPR Leadership Development Program in the past four years. DPR realized that it needed to ‘amp up’ the program and in 2008 developed a “leadership lite” program called Professional Development. This program was one-quarter the cost of their full-blown program and faster to complete. Potential leaders take part in a 2-1/2 day retreat and two coaching sessions. About 200 people – selected using DPR’s leadership characteristics sieve – have gone through the program since 2008. DPR’s leadership development process has produced various measurable outcomes, including:

- Better understanding of what is working with its current leadership style and areas of improvement or opportunities for change.
- Improved communication skills and enhanced relationships with employees and regional teams.
- Stronger relationships among leadership development participants as a group resulted in participants reaching out to each other more for feedback and input on business decisions.
- Improved communication with employees (giving feedback, having difficult conversations, providing recognition for good work).
- Validation of existing leadership styles and behaviors that already exist and that are successful.
- Knowledge transfer through increased connections among other regions and regional leaders sharing knowledge and expertise.

Williams says DPR plans to stay the course with its leadership development program, which has proven to be a valuable component within the company’s long-range success plan. “We never stop investing in our people,” says Williams. “We continue on our path despite the past economic issues and the realities of the outside world. This is a long-term plan and we’re committed to it.”
The Road Ahead

Business owners recognize the inevitability of a transition, but they often do not plan for succession or ongoing leadership development. The economic crisis didn't help with this issue and, in fact, threw many retirement and leadership development plans into disarray. Now that the shock is over and recovery strategies are in place, it is time to put leadership development and transition plans back on track.

As we look ahead, several key changes will likely shape the dynamics of ownership transfer, management succession and leadership development in the construction industry over the coming decade. These include:

- **People are living longer and boomers want to retire differently.** Since people are living longer, funding longer retirements and managing associated health costs are top-of-mind issues for company owners. Closely defined by their businesses, owners are staying in place longer; the magic retirement age of 65 is no longer desirable to those who still want to contribute to their firms while reducing their time obligations. Next generations of family or employees who want the reins may have to wait until later in their careers to take over. At the other extreme, some owners want to retire early or slow down. To maximize their financial security, these individuals may ask for a greater price for the business or sell stock more slowly, as their roles are reduced to maintain an income stream.

- **People issues are more important.** Today’s construction industry is changing rapidly and getting increasingly complex. Emerging delivery methods, advanced technology utilization, new banking and bonding regulations are just a few of the many forces influencing the industry. As such, hiring (and retaining!) the right people has become critical. Leadership training and development is even more critical since there is more to learn. Failure to provide focused training and development may result in a loss of next-generation leaders.

- **Owners don’t want to risk it all in today’s competitive business environment.** The recession depleted many owner and/or company capital bases. Stocks, bonds, cash and real estate were once the prime categories for investment. With the ongoing difficulties of the markets, conservative owners want to protect what they have by getting out rather than continuing to “risk it all” in today's ultracompetitive construction environment.

- **The government’s role in the economy undermines confidence in the future.** Budget and trade deficits, the falling dollar, entitlement liabilities and expectations of rising taxes combine to undermine business owners’ confidence. Inflation and taxes could take a significant chunk of the industry's personal net worth and retirement dollars in coming decades.

- **M&A activity will pick up and change the composition of the industry.** Many businesses struggle with the challenges of transferring ownership. This will lead to increased merger and acquisition activity (as an alternative exit strategy), failed businesses and perpetual change/dynamism in the top ranks of the industry. At the same time, it represents a tremendous opportunity since millions of people aging out of the ownership role and workforce will create a great wealth situation for 30- to 45-year-olds in the industry.
Ownership transfer and management succession (in conjunction with leadership development) are crucial components of an enduring organizations. For OTMS to work effectively, all stakeholders – including owners, employees, sureties, lenders, customers and so forth – must be involved in the process. Transformational change needs to be communicated and planned for, just like any other major strategic decision that a company makes.

Furthermore, preparing future leaders is a process, not an event, and it starts at the top. Company owners must champion policies, practices and attitude around leadership development and clearly align employees' capabilities and career aspirations with the company's overall business strategies.

As construction firms continue to emerge from and shake off the effects of the Great Recession, new leadership challenges will emerge. For successful contractors, transitioning ownership and leadership to the next generation is another true test of greatness — one that will establish their legacy, provide opportunity for others and allow them to realize the value of their life's work.

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Globalization of the Engineering and Construction Industry

A relatively new concept for many U.S. design and construction firms, today’s global business environment has grown significantly over the last 10 years, and along the way, has pushed companies of all sizes to begin “thinking globally.” A seemingly simple proposition, the idea of doing business beyond domestic borders is actually quite complicated. Today’s global economy remains under enormous strain. The West is grappling with a sluggish economy that’s endured for more than three years, and Asia is wrestling with numerous micro-problems spurred on by rapid growth. Wrenching political change is impacting the Middle East; Europe is still struggling with monumental economic issues in the wake of the Great Recession and subsequent bailouts of Greece and now possibly Spain; and Africa is facing a trio of economic, political and humanitarian challenges. No country has escaped these wraths, and yet today’s design and construction firms are expected to embrace and play in the tumultuous global business environment.

Despite these turbulent times, “Global Construction Perspectives and Oxford Economics” estimates that construction in emerging markets – including Asia, Latin America, the Middle East and Africa – will double within the next decade and become a $6.7 trillion business by 2020, accounting for some 55% of global construction output.¹ The world’s endless need for more infrastructure is a primary growth driver, and today’s engineering and construction firms are well-positioned not only to tap this opportunity, but also to lead the way in shaping infrastructure projects for decades to come.

Consequently, many large multinational engineering and construction companies are broadening their footprints across the globe, strengthening their competitiveness by securing strategic positions in these high-growth emerging markets. Competition is intensifying with new players from China, Brazil and India proving themselves as a new class of powerful emerging market multinationals. Just how adaptive these construction companies are, however, remains to be seen as they expand into an increasing number of highly regulated markets.

In this paper, we summarize some of the key trends shaping today’s global design and construction industry; explain the importance of understanding and anticipating these trends and associated effects on your company; and provide some strategic recommendations on how to succeed in today’s global business environment.

Key Trends Shaping the Global Design and Construction Industry

Several key trends are shaping today’s global design and construction industry. Recognizing and understanding these trends can help corporate leaders create business strategies that capture market opportunities and avoid pitfalls or shocks in the future. Main topics and associated trends are summarized as follows:

Table 1. Trends (organized by topic) shaping the global design and construction industry

<table>
<thead>
<tr>
<th>TOPICS</th>
<th>TRENDS</th>
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<tbody>
<tr>
<td>Global</td>
<td>- Need for new/improved/upgraded infrastructure, particularly in emerging economies (e.g., increase in large, complex projects)</td>
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<tr>
<td></td>
<td>- Increase in competition for resources: energy, water, materials, brainpower/talent</td>
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<tr>
<td></td>
<td>- Increase in economic interdependence</td>
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<tr>
<td>Social</td>
<td>- Independence and mobility of workforce (“in-sourcing,” 24/7 workforce)</td>
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<tr>
<td></td>
<td>- Aging of population (and A/E/C leadership) in various markets</td>
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<td></td>
<td>- Pending A/E/C workforce shortage after the Great Recession (U.S., Europe, Japan)</td>
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<td></td>
<td>- Increase in owner technological literacy is leading to customized project delivery</td>
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<tr>
<td>Technological</td>
<td>- New technologies are getting smarter and increasing efficiency (e.g., “cloud collaboration,” virtual project teams)</td>
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<tr>
<td></td>
<td>- Consilience of knowledge and business practices through new technologies (globalization of best practices in A/E/C industry – death knell of parochial construction practices)</td>
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<tr>
<td></td>
<td>- Technology advancements in A/E/C industry are geared towards effective and economic design, construction and operation/maintenance of buildings/infrastructure</td>
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<td></td>
<td>- Virtual models are replacing paper as the deliverable for design models</td>
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<td></td>
<td>- Communication always gets faster, cheaper, easier (24/7 workforce)</td>
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<tr>
<td>Economic</td>
<td>- Increased global competition (e.g., new international players entering the U.S. market and U.S. firms expanding their footprint globally – more M&amp;A activity)</td>
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<td></td>
<td>- Large A/E/C firms shift focus from slow-growth markets to emerging economies</td>
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<tr>
<td></td>
<td>- Volatility of energy prices</td>
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<td></td>
<td>- Increase in public-private partnerships (P3s) to fund large, complex infrastructure projects</td>
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<tr>
<td></td>
<td>- Investments and doing business in emerging markets are still a major challenge (e.g., Foreign Corrupt Practices Act)</td>
</tr>
<tr>
<td>Political</td>
<td>- Increased regulation of built and natural environment</td>
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<tr>
<td></td>
<td>- Limited restrictions on labor mobility across the globe</td>
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<td></td>
<td>- Greater government control exercised over use, trade and export of resources</td>
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<tr>
<td></td>
<td>- Changing dynamics in political stability in emerging economies (e.g., Middle East, Africa)</td>
</tr>
<tr>
<td>Environmental</td>
<td>- Widespread economically driven sustainable movement</td>
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<tr>
<td></td>
<td>- Demand for power and energy is changing the direction of construction</td>
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<tr>
<td></td>
<td>- Tightened regulations on use of natural resources</td>
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The industry drivers listed in Table 1 will impact design and construction firms both directly and indirectly with differing severity in the coming years. While company leaders are accustomed to benchmarking their firms against competitors, these long-term trends and drivers provide leaders the opportunity to analyze their firm in the context of a dramatically different future. Implemented as a gap analysis of a company's current capabilities versus potential future demands on its business, they provide strategic insight for long-term growth and adaptation.

Transforming Trends Into Knowledge and Action

Understanding trends – and how they interplay and shape the contours of an industry's operating environment – has become a critical skill in today's business world. Insightful leaders anticipate and systematically observe, spot and act upon emerging trends to capture market opportunities, test risks and spur new ideas. In a world where the playing field of resources, competition and customer demands is constantly changing at an ever-increasing rate, company leaders must look beyond traditional performance measures and near-term thinking to define their corporate strategies.

Knowing what is going to happen is quite different from being prepared for an eventuality. In a new era underpinned by sustained economic uncertainty and volatility, business leaders are learning to insure themselves against an unpredictable future. Keeping an eye on movements and events both within the industry and beyond its bounds can lessen the surprise factor, but the complicated nature of the worldwide economy and associated political, social and environmental responses reinforce the fallibility of forecasts.

Such pervasive uncertainty can paralyze leadership or lead to improvised, ineffective and costly decisions. Instead, leaders need to be a few steps ahead of the game. By looking at a range of key forces and their possible outcomes, and by integrating them into their strategic thinking and planning process, corporate leaders can reduce the shock of industry shifts and minimize crisis-mode decision making.

Building future contingencies – or scenarios – is one popular way of forcing an organization to think about long-term trends. First popularized by Shell Oil in the 1970s, scenario planning is experiencing a revival, driven by risk-averse, action-driven CEOs.² By drafting and visualizing several different outcomes based on the trajectory of key variables or trends, leaders can rehearse for tomorrow, creating action-driven strategic plans for each. When one scenario emerges, the firm is poised to mobilize the corresponding plan swiftly, adapting its business units, operations and geographical focus to a new game.

Clearly, effective response strategies to the scenarios depend on solid business intelligence. This is where the awareness and deep understanding of global trends comes into play: being able to anticipate how changes in certain markets or geographies may affect the company, knowing how owners will react to specific external market shifts, or simply understanding drastic fluctuations in commodity pricing and related effects on the design and construction supply chain. Ron Magnus, director of FMI’s Center for Strategic Leadership, explains, “Today’s corporate leaders need to have a sense of what they think could impact their local markets. For example, if China’s economy continues to slow down, or if Israel attacks Iran tomorrow – what are the implications here in the

² See FMI’s paper: “Visionaries: How today’s leaders are using future contingencies to plan strategically.” 2010.
local market in Denver, Colo., for example? These types of events would have an overnight effect on specific market segments; therefore leaders need to evaluate their portfolios, understand their risk and be ready to respond quickly if necessary.”

**Living In a Globalized World**

Many of the greatest business challenges and opportunities facing corporate leaders today are global in nature and therefore demand leadership with a truly global mindset. Thanks to emerging technologies and advanced information sharing tools, successful design and construction companies can connect and leverage resources and talent across cultural and geopolitical boundaries – both within their own companies and beyond. Thomas Z. Scarangello, chairman and CEO of Thornton Tomasetti – a leading international engineering company – adds, “The tools of collaboration such as BIM, 4D and 5D data utilization, cloud project hosting/delivery, etc., have made the ‘virtual project team’ a reality. We have reinvented the master builder's brain in a virtual environment and it is completely turning around the silo-ed project team environment that delivery tools like CAD fostered for over 25 years. This kind of ‘in-sourcing’ allows us to take full advantage of the diverse talents of our global workforce, not just for marketplace and cost diversity, but so every project can benefit from a creative and technical worldview as well as a 24-7 workforce.”

Research conducted by Thunderbird – one of the world's top schools of international business with more than 60 years of experience in global management – confirms the importance of connecting as a critical skill set for effective global leadership in today's business world. Through broad and far-reaching connections, for example, true global leaders add value by developing innovative processes or products, serving new markets and clients, or accessing new pools of resources and expertise.

The importance of “connectivity” and collaboration among stakeholders is nothing new for the design and construction industry, but it has taken on a new level of significance in today's interconnected business world. Whether your company works locally or globally, the effects of global interdependence will likely influence your business environment on some level. Paddy Ashdown, a former member of the British Parliament and a diplomat with a lifelong commitment to international cooperation, sums up today's global interdependence very pointedly: “In the modern age, where everything is connected with everything, the most important thing you can do is to network with others. The most important part of your structure is your docking points, your interconnectors – your capacity to network and collaborate with others.”

Progressive design and construction companies of all sizes are adjusting and adapting to this new era of interconnectedness and “fusion of knowledge.” Technology has – and continues to play – a critical role in this trend toward virtual knowledge sharing in a cross-cultural context. Collaborative tools such as building information modeling (BIM) or globally integrated project management systems, for example, are increasing the use and acceptance of technology across the A/E/C industry and transforming the way of doing business worldwide. New technologies also enhance efficiencies and are being used by successful companies to optimize O&M services and drive both construction and field-engineering activities.

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In conjunction, the mounting demand for all forms of infrastructure, particularly in high-growth economies, is driving industrywide change at an unprecedented rate and shifting the playing field for many different companies. According to a recent infrastructure report issued by KPMG, the expected cost for infrastructure worldwide over the next forty years is approximately US$70 trillion. Typically huge in magnitude and complexity, infrastructure projects turn company size and access to resources (especially human capital!) into a critical competitive advantage. To meet these growing infrastructure demands, both engineering and construction companies are morphing from traditional general engineering and construction providers into larger, more diversified businesses with specialized skills and multicultural workforces. Many of today's global industry leaders are expanding their portfolios along the infrastructure value chain, adding new expertise in project management and financing, program management, systems integration, and lifetime operation and maintenance of facilities. Magnus adds, “Many of the large engineering firms are growing their construction capability to capture what construction work is available to international companies… Working on a global scale requires a different lifestyle and competence in the E&C profession.”

Superimposing this movement toward increasingly complex, large projects is the owners’ persistent demand for more collaboration among project team members and the request for increased transparency and efficiency. This push is resulting in new team formations and joint-venture partnerships, further transforming traditional industry business models to accommodate customers' needs.

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5 Booz Allen Hamilton, Global Infrastructure Partners, World Energy Outlook, Organisation for Economic Co-operation and Development (OECD), Boeing, Drewry Shipping Consultants, U.S. Department of Transportation.
specific needs. Scarangello adds, “Old delivery labels like fast-track and “new” ones like Integrated Project Delivery (IPD) are either passé or too confining. In the 21st century world of global engineering and construction, successful project delivery needs to be customized, not categorized.” Though the apparent trend toward industry consolidation among large global E&C firms will likely continue in the future, small to midsized design and construction firms will probably undergo very different changes (see FMI’s recent paper “The Consilience of Design and Construction,” September 2012). While the trend toward greater convergence of design and construction firms will have its limits, it is very likely that firms surviving and thriving in the future will represent a greater consilience or convergence of disciplines into deeper knowledge to solve tomorrow’s problems.

**Early Preparation Pays Off**

Following are some select recommendations on how to prepare and deal with these overall trends in globalization – regardless of company size or type.

1. **View competitors as potential collaborators.** Despite the overall trend for large multinational E&C firms to shift focus onto high-growth emerging markets, FMI expects to see increasing competition from international organizations working within the United States in the coming years. Hugh Rice, senior chairman of FMI, states, “Although the U.S. design and construction market has slowed significantly, we still see many foreign companies with a lot of interest in expanding their presence in the U.S. That’s particularly true of the European and Asian firms (including Japanese, Chinese and Korean companies).” Though larger firms might muscle in on smaller-size contracts, smaller firms can prove complementary on a larger contract where they bring niche capabilities or knowledgeable staff to the table. Likewise, smaller companies may offer specialized staff or capabilities to a larger project that a firm is looking to shepherd.

2. **Understand the cost and risk barriers to entry.** Companies considering doing business on a global scale need to have strong balance sheets and solid bonding capacity as well as a deep understanding of the risks involved. The cost of entry is typically much higher than anticipated. Risk management becomes a prime factor in strategic planning, and the intricacies of risk allocation often present new ground for contractors to cover when doing business in a new country. Public-private partnerships (P3s), in particular, can be very challenging and often bring with them greater risk in terms of a longer life cycle, larger scale of liability and heightened vulnerability to changes in external dynamics as the project progresses. Magnus Eriksson, senior vice president, Skanska Infrastructure Development Americas, emphasizes the novelty of new arrangements: “First of all, you have to understand the difference in risk allocation – the additional risk in a P3 project you are required to absorb as a contractor (especially if you’re an American contractor) – it’s probably something you’ve never seen before.”

3. **Think strategically and understand your connection points to the world.** Strategic thinking goes beyond the creative process of understanding and adapting to a changing environment. It also encompasses a different perspective and approach to dealing with the current and future environments we are all operating in – as individuals and organizational leaders. Jake Appelman, director of FMI’s Executive Coaching Practice, explains, “Many of the leaders we work with are realizing that one source of enduring competitive advantage is their ability to read their environment clearly, make sense of it and respond – to think strategically.” Don’t lose sight of the big picture by trying to solve all challenges at hand. Be ready to flex and respond to rapidly unfolding scenarios while also retaining a clear vision over which judgments should be made. Focus on the risks and questions – the
connection points to the world – that are most likely to affect your company, and how they are actually likely to do so.

4. **Collaborate and innovate.** Many of today’s international design and construction jobs are highly complex, huge and collaborative in nature and therefore cannot be run in a silo-type manner. New emerging technologies, as well as owner demands, are pushing design professionals and contractors to work as a cohesive team from the outset, communicating and approaching projects more holistically. As part of this effort, it is key to build strategic alliances with reliable partners and to develop a deep network of companies that are team players, open-minded and innovative. Magnus adds, “Strategic alliances are the main entrée to the global playing field. Very few go alone… core competencies in building strategic alliances are mandatory.”

5. **Position your firm for success in multiple markets.** In this slow recovery, no one is taking his/her backlogs for granted. As many firms look to reorganize and rebuild, bringing on new staff a few years after deep cuts to their operating budgets, the opportunity arises to diversify into new markets and geographies, reducing risk and resting profitability on a larger base for the future. Christian Büscher, VP of corporate development and risk management at Flatiron, adds, “Diversification means investing in areas you can control – the work types, the kind of business you do – but adding geographical areas to it. Say ‘Let’s have a second leg to stand on.’”

6. **Create new adaptation strategies and core competencies.** In order to adapt to ongoing globalization trends and succeed in the long term, companies should consider the following adaption strategies:

   - Develop a deeper understanding of financing alternatives.
   - Niche marketing: Find the pockets of prosperity and aggressively pursue work in those areas.
   - Work with diverse teams and adapt quickly to changing social and political environments.
   - Strive to become a firm driven by design execution and field productivity.
   - Invest in talent. Continue to develop technological skills.
   - Empower the younger generation of leaders to shape their own destiny (“star-making”).

**Core qualities and competencies for successful design and construction firms include:**

   - Strong relationship-building capabilities across interdisciplinary teams and a deep understanding of process design.
   - Innovate, incorporate new technology and react to change.
   - An ability to drive efficient processes and emphasize project control and financial metrics.
   - A reputation as a leader in sustainable business practices, which will help to attract bright individuals from outside the industry.
   - Knowledge of alternative funding sources and strong connections with financial and political communities.
   - Strong connections with local suppliers to obtain materials at the “best price.”
Grooming New Global Leaders

Globalization presents unique leadership development challenges for companies in the construction and engineering fields. Grooming leaders who can look beyond traditional, domestic borders and adopt a global mindset takes time and requires an entirely new learning approach. Following are some critical strategies to developing global leaders:

- **Develop “cultural empathy.”** Global leadership development needs to focus heavily on enhancing emotional intelligence, empowerment and self-awareness, promoting empathy and respect for different opinions and viewpoints.

- **Develop a diverse mindset and worldview.** Start building a diverse workforce today to encourage diversity, understanding of different cultures and aptitude across new languages. Understanding customers in new geographic markets – particularly in emerging economies – requires diversity across the highest levels of the organization. Opportunities at the highest levels, including C-suite and CEO, must therefore be open to people of all national origins.

- **Focus on decentralized leadership.** Today’s global leaders don’t act like traditional hierarchical managers. Through emotional intelligence and self-awareness, they’re able to lead a diverse workforce and align employees around their organization’s vision, goals and values. Rather than focusing on hierarchy, they focus on values and empower their local (geographically dispersed) teams to run their operations in ways that align with local cultures, governments and communities.

- **Broaden the reach of leadership development.** Giving future global leaders the opportunity to live and work abroad is a great way for them to broaden their mindset. This approach helps to: 1) Self-select whether or not they can handle leading abroad (this is the primary reason for expatriate-turnover); 2) Learn another language, culture, business model, regulations, etc.; and 3) Provide the organization with insights into whether or not that region or location is worth targeting.

- **Stretch assignments across continents.** Give leaders a typical assignment (e.g., design a building, order materials, etc.) but base it in the U.S. Once they’ve completed the task, have them go through the same process in three or four different countries, all with varying cultures (e.g., China, Russia, Brazil, Dubai, Mexico, Australia, etc.).

- **Leverage cross-training opportunities.** Train leaders in differing areas within the organization. Chances are, they will need to have some knowledge of each area in order to run an international office. After all, overseas locations are typically much smaller offices where people wear multiple hats on a daily basis.

- **Use organizationwide training on the same initiatives.** The goal here is to get everyone rowing in the same direction by making sure that all future expatriates are all working towards the same organizational vision. If they aren’t (or they have stronger self-interests), then things can go wrong quickly.

Leading With a Global Mindset

Today’s global design and construction industry is changing rapidly. Barriers to global trade have been reduced significantly, enabling capital, labor, goods and technology to flow freely across borders and increasing business opportunities exponentially across the globe. However, globalization has also vastly increased the complexity of the A/E/C business environment; changing customer demands and new funding mechanisms are driving industry players to diversify, seeking mergers and acquisitions in new markets around the world to gain access to new expertise and project opportunities.

To compete in today’s uncertain, dynamic and interconnected business environment, design and construction firms – both home and abroad – will need to stay focused on key trends shaping their external environment. They must also remain nimble and agile in order to respond quickly to change and opportunity. Being agile and adaptable requires a deep understanding of how different markets operate and calls for an organization that is sensitive to the cultural values of other regions or countries.

With the incredible “shrinking” of the globe, fast-growing firms from the emerging markets are set to challenge established Western industry leaders in the future. As new competitors enter the scene domestically and internationally, both local and global design and construction firms are responding with new business approaches, stressing greater involvement of clients and suppliers and reassessing their risk and capital allocation. Emphasis on greater efficiency and innovation, in particular, will ensure that industry players can rise to the challenge of the new competitive landscape – both at home and abroad.

Lastly, today’s successful industry players are professional services firms, offering top-notch human resources, to the end that they understand the importance of hiring the very best professionals with risk management capabilities, market knowledge and an in-depth understanding of client behavior and job-specific challenges. These companies are deeply tuned into their “connection points to the world” and maintain a global outlook on whatever they think and do.

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ABOUT FMI

FMI is the largest provider of management consulting, investment banking and research to the engineering and construction industry. We work in all segments of the industry providing clients with value-added business solutions, including:

- Strategic Advisory
- Market Research and Business Development
- Leadership and Talent Development
- Project and Process Improvement
- Mergers, Acquisitions and Financial Consulting
- Compensation Data and Consulting
- Risk Management Consulting

Founded by Dr. Emol A. Fails in 1953, FMI has professionals in offices across the U.S. FMI delivers innovative, customized solutions to contractors; construction materials producers, manufacturers and suppliers of building materials and equipment, owners and developers, engineers and architects, utilities, and construction industry trade associations. FMI is an advisor you can count on to build and maintain a successful business, from your leadership to your site managers.