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FMI QUARTERLY
ISSUE FOUR
2017

More Innovation and Progress Ahead for the Built Environment

By Chris Daum, CEO of FMI Corporation

Welcome to the final edition of the Quarterly for 2017. It's hard to believe we're already well into the fourth quarter and gearing up for 2018, ready to take on new challenges during the coming year. But before we welcome in the new year, we'd like to take a step back and deliver some great ideas around innovation and transformation in the engineering and construction (E&C) industry.

Here at FMI, we believe that the North American E&C industry has reached a tipping point and is ready to go down the path of significant innovation and transformation, driven by positive developments around technology, automation, robotics, advances in building materials, material science and the introduction of industrial processes to the built environment.

In this issue of the Quarterly, you'll learn how to effectively transform industry disruptions into viable opportunities, leverage your board of directors to help create a culture of innovation, and successfully combine customer feedback into future product innovation.

Our authors also talk about the influence of high-performing teams—a key competitive advantage in today's world, where projects demand more information, more coordination and more integration than ever before. Whenever we see companies outperforming their peers by two, three or even five times, in almost every case, it starts at the top, with the firm's leadership. Beyond being well-positioned at the right time or operating in a growing niche, leaders of high-performing firms excel at pursuing clearly understood and compelling visions of what they want to achieve, how their organizations are going to behave, and how they are going to execute to achieve their goals. They do this by building highly effective teams within the organization that increase performance and hold everyone accountable for execution, follow-through and delivery.

As the new year begins to come into focus, we're hoping to see more E&C firms adopting these mindsets and concentrating on customer demands, creating innovative solutions and services, developing high-performing teams and transforming the industry from the inside out. The sheer amount of national infrastructure that's in need of upgrade or replacement is just one key driver, not to mention the availability of public finance and capital in general. The future looks bright; only through innovation and advancement will the E&C industry be able to fully leverage these advantages and continue growing and expanding in 2018 and beyond.

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ISSUE FOUR
2017

Five Steps to an Innovative Compensation Strategy

By Sal DiFonzo

How to develop a pay philosophy to guide your compensation strategy.

Merit increases for salaried construction professionals, excluding executives, were 3.7% in 2017, according to FMI's recent compensation research. What is interesting about this figure is that companies projected 3.1% for merit increases in 2017. Most years companies spend less than what they project. The reasons for this are many, including turnover and the fact that not everybody receives an increase every year. In fact, 63% of salaried construction professionals received a merit increase in 2017.

The reality that companies overspent on their merit projections indicates a competitive labor market. Hiring talented construction craftworkers, professionals and executives has never been more difficult. According to "FMI's 2017 Talent Development Survey," 89% of contractors are facing talent shortages, compared to 53% in 2013.

What can contractors do? Few companies have the time or resources to "build their own" through apprenticeship programs or co-ops. Most will need to retain their current employees and attempt to attract qualified new talent from the sparse labor pool. It will take innovating current compensation practices to improve competitiveness in the labor market.

Start With a Compensation Philosophy

To create a foundation for a sound compensation strategy, first define your organization's compensation philosophy. A thoughtful compensation philosophy will guide pay decisions consistently across the company. Here are some examples:

Market Base/Market Incentive

The most common strategy is to pay market-rate base wages or salaries and market-rate incentives. What is market? Broadly speaking, the market is the 25th to the 75th percentile of the labor market. Some companies specifically define market as the 50th percentile (where half of all companies pay less and half pay more).

Pro: It's the "Goldilocks" strategy of not too hot and not too cold.

Con: Top talent may not consider organizations with middle-of-the-road pay plans.

Low Base/High Incentive

The low-base/high-incentive philosophy ensures low fixed costs and pays outsized rewards to those individuals or teams that perform. Base salaries may be at the 25th percentile of the market, but incentives would target the 75th to 99th percentile of the market.

Pro: Philosophy attracts "risk/reward"-oriented employees who would like to earn high W-2 income.

Con: During a downturn, this approach can leave the company exposed to high turnover if it cannot pay outsized bonuses or any bonuses at all.

High Base/Low Incentive

High-base/low-incentive philosophies make it easier to attract employees and limit variability in compensation expenses. Base salaries may be at the 75th to 90th percentile of the market, and incentives may be either nonexistent or only at the 25th percentile of the market.

Pro: Job offer hit rates are higher with this philosophy.

Con: Limited variable pay opportunity may attract risk-averse employees or those who are looking for a more relaxed work environment.

There are multiple permutations of pay philosophies that combine these examples. Companies can also bifurcate the philosophy by level or by job. For example, FMI worked with a heavy civil client that developed a market compensation philosophy for all positions except for one job: project superintendent. The company decided to pay this critical role with a high-base/high-incentive opportunity due to a lack of skilled candidates with bridge-building credentials.

Because similar jobs receive pay in the same manner, a defined compensation philosophy that is consistent across the organization facilitates mobility of resources across job assignments. It eliminates the situation where one manager pays "whatever it takes" to recruit somebody versus another manager who might say "they need to earn it over time." Put simply, a common philosophy reduces compression issues. Compression occurs when a new hire makes significantly more than existing and seasoned incumbents. This means that a company with a market compensation philosophy wouldn't hire someone who is demanding a base salary at the 90th percentile of the market.

Strategically, a defined compensation philosophy translates the overall business strategy into action. It defines the talent the company seeks and determines who will be responsible for achieving the goals which derive from the business strategy.

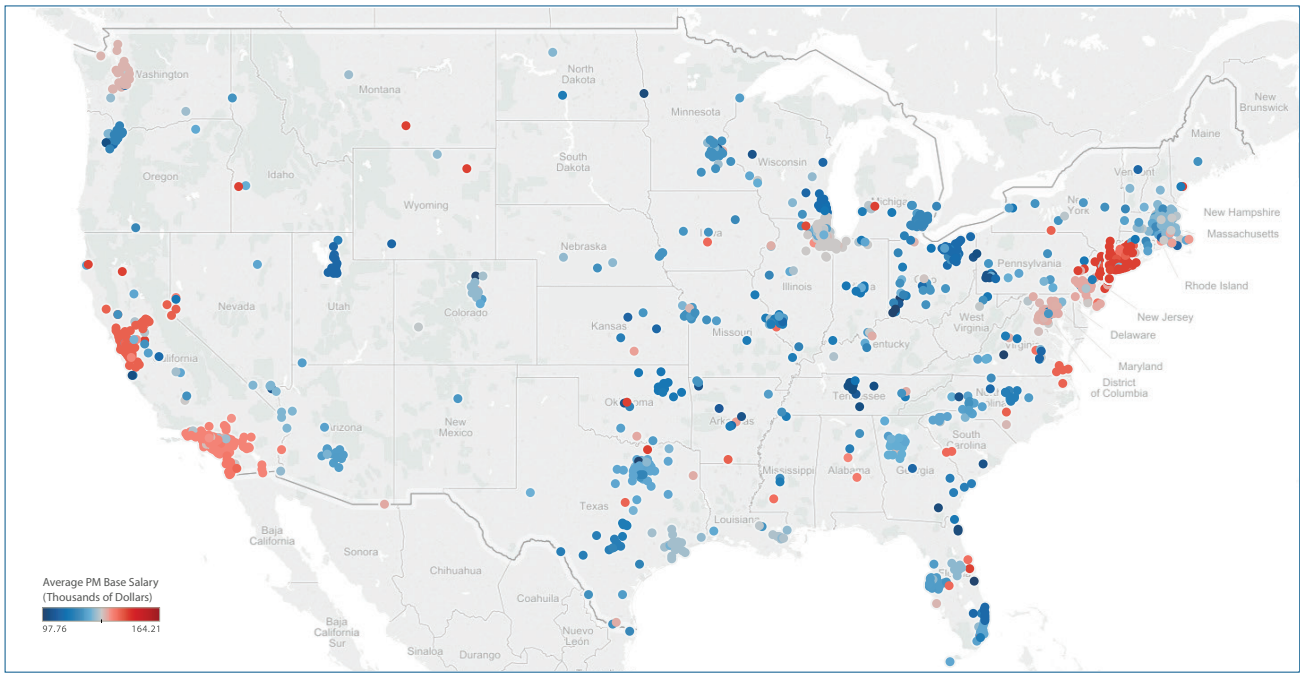
Use Data to Make Pay Decisions

Not many car buyers would walk into a showroom and pay full sticker price. Most buyers research invoice costs and markups through websites such as Kelley Blue Book, Edmunds or National Automotive Dealers Association (NADA). With informational power in hand, purchasers can ensure a fair deal.

It is surprising that "FMI's 2013 Incentive Compensation Study" revealed that only 25% of contractors use compensation surveys to research pay rates. Most executives rely on information from peers, competitors and recruiters. Accurate as it may seem, the small sample bias can lead to highly inaccurate and costly decisions.

Companies with advanced pay practices use industry-specific surveys to gather insightful market intelligence. These surveys typically contain payroll-sourced data parsed by geography and job (e.g., Exhibit 1). In construction, craft and construction professional labor markets are local, while executive labor markets are national.

Exhibit 1. Average Project Manager Pay (Thousands of Dollars)



Source: FMI Compensation Survey Data, 2015

Average base salary for project managers is shown at the city level and includes PM levels 1 through 5.

Convert to a Structured Plan

FMI's research also revealed that 75% of contractors have purely discretionary bonus plans. The problem is that these "trust me" plans are falling out of favor as discerning new entrants into the labor market are choosing to work for companies that have structured incentive plans. Structured plans answer the questions of how much one can earn and what it takes to earn it. Having a structured plan makes it easier to recruit against trust me plans. For more information on how to create a structured incentive plan, see "Designing Effective Incentive Compensation Plans."

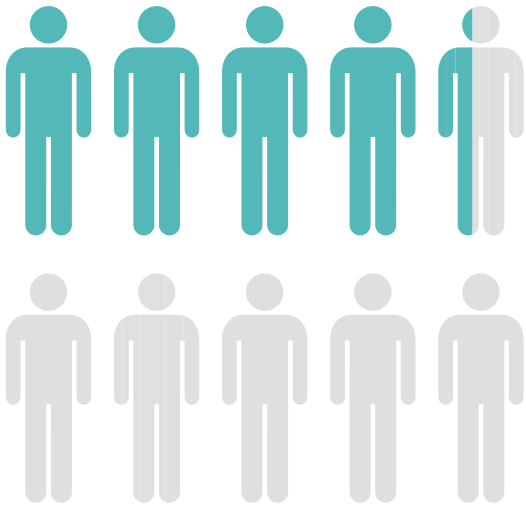
Leverage a Long-Term Incentive Plan for Executive Retention

A contractor may already distinguish itself by having a defined compensation philosophy to guide pay decisions, and the company may also offer a structured incentive plan—making recruiting easier as well as clarifying the relationship between pay and performance. What else can the company do to set itself apart from the competition? With only 44% of contractors having long-term incentive plans (according to "FMI's 2016 Incentive Compensation Study"), this compensation element aims to retain key talent (Exhibit 2).

Examples of long-term incentive plans include simple cash-based plans, stock, phantom stock as well as stock appreciation rights (SARs). In this widely privately held industry, synthetic equity programs like phantom stock are popular when owners (often families) choose not to offer actual equity.

These programs create "golden handcuffs" by taking annual awards and deferring payout, typically more than three years into the future. Balances build over time, making it very difficult for participants to leave. For more information on long-term incentive plans or non-qualified deferred compensation programs, please see "Looking to the future: How E&C firms can leverage long-term incentive plans."

Exhibit 2. Does your company have a long-term compensation plan?



44% Yes 56% No

Source: 2016 FMI Compensation Study

Set Your Plan in Action

Companies can avoid repeating a pattern of old practices by creating innovative remedies for each of these problem situations:

1. ***Problem:*** Allowing multiple compensation philosophies to exist within the organization can lead to inequities, compression and the reinforcement of siloed cultures.

   Remedy: During the strategic planning process, define a compensation philosophy that unites the company behind pay principles focused on the desired culture and talent pools.

2. ***Problem:*** Guessing or using anecdotal data to make pay decisions can lead to overpaying or underpaying errors.

   Remedy: Utilize available labor market data to make empirical—not uninformed or emotional—decisions.

3. ***Problem:*** Utilizing hackneyed, 100% discretionary pay plans that have no connection to established goals or outcomes.

   Remedy: Create a structured short-term or broad-based incentive plan that communicates the earnings opportunity and develop the performance measures that lead to successful outcomes. Link the goals to the business strategy. The result is easier recruiting, more motivated employees and improved financial or operational results.

4. ***Problem:*** Creating special deals for executives (to retain them) that are difficult to unwind.

   Remedy: Install a structured long-term incentive plan to retain key executives and high potentials. A long-term incentive program will create a competitive advantage and reduce the likelihood of losing key leadership that may defect to competitors (or form their own competitive firms).

The investment in an innovative compensation strategy will provide a return to the organization in both good and bad economic times. Getting started can be difficult, but once you build a solid pay philosophy—and incorporate it into your annual strategic and business planning process—the rewards will pay off well into the future.

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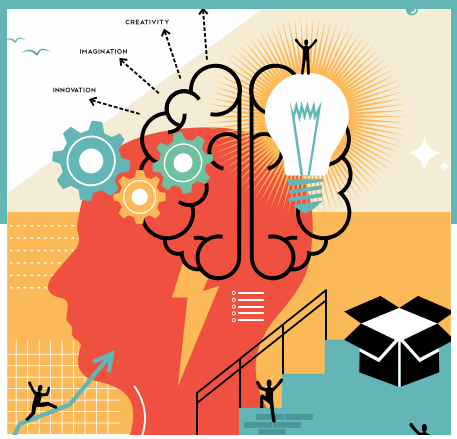

Eight Factors That Will Increase Your Board's Innovative Aptitude

By Michael Mangum and Paige Kelly

A highly effective board can help drive innovation and keep your company ahead of the curve.

An elusive target that many companies attempt to chase and capture, innovation helps engineering and construction (E&C) firms gain a sustainable advantage in a highly competitive industry landscape. But how is this best accomplished? And how does the organization determine the proper amount of innovation needed to stay relevant in today's ambiguous and complex built environment yet avoid the "bleeding edge"—a place of change-induced danger?

One of the most overlooked resources available to help accomplish this objective is a peak-performing board of directors. While many elements are involved with productive, sustained innovation, a board of directors can provide a vital initial impetus. And if that board is high-performing in nature, the organization will greatly benefit from its measured wisdom.

Stop Doing "More of the Same"

Companies that want to grow by continuing to do "more of the same" will, at best, achieve incremental growth. Exerting additional collective effort, when misguided, will simply move the organization to an undesirable place more rapidly. For corporate objectives that lie beyond modest growth targets, some sort of game-changing shift is required. An engaged, savvy board of directors is often the perfect vehicle to accomplish precisely this, providing a forum for both the rigorous analysis and effective collaboration essential in moving from idea to commercial success.

For E&C firms, the board's organizational role can encompass a variety of activities—all of which fall under the umbrella of positively influencing the business's executive leaders. Whether it is focused on strategic planning, risk mitigation, financial oversight or succession management, a board can deeply impact the organization's innovation trajectory.

Here are eight factors to consider when assembling and leveraging your next innovative board:

1. **Failures are an inevitable aspect of innovation.** Directors serving on a peak-performing board typically have a deep understanding of the company's direction as well as the chosen strategies that guide its future progress. Boards can vet new ideas and encourage the investment in a "department X" (or project X) for a company to achieve higher returns. In addition, boards should assist in the calculation of risk, yet expect some failures along the way. A recent industry study focused on boards[1] showed that 18% of boards try to avoid failure in all of their dealings. If an organization skirts all failure, even the most experimental and inconsequential innovation will be stifled. A CEO would surely avoid venturing outside the norm if failure equated to dismissal. Thus, a board must embrace and encourage a calculated—and hence, acceptable—level of risk in an organization's strategic goals.

2. **Performance matters.** A culture that values innovation aligns performance metrics to reward behaviors that advance those ideals. The process of aligning CEO/president performance metrics with the promotion of new ideas prompts both achievement-oriented action and disruptive innovation—a winning combination. We are aware of multiple businesses that succeeded in aligning executive incentive compensation with KPIs, effectively driving change in the decision-making processes of senior leaders. One such leader remarked, "So in this situation, you want me to turn away the more profitable project for the sake of the one that furthers our strategic vision? I don't understand why, but if that's what you want, that's what you will get!" In this case, the board insisted that revenue concentration be dispersed more broadly to reduce shareholder risk. Logic dictates that absent board involvement, the decision to decline high-margin projects would have proven far more difficult for profit-driven managers to embrace.

3. **Good risk management is critical.** A board must help find the middle ground between reckless risks (i.e., on unique projects, new market sectors, technology advances) and being overly risk-averse. In an FMI special innovation series, three industry executives from companies that are leading the innovative charge spoke about courageous leadership. Specifically, they addressed the ways that innovative leaders embody this trait. Examples of their insights include, "…lead others well so that they can create a plan for testing the idea, learning from the outcomes and trying again," "…clarify roles and responsibilities associated with the innovative risk so expectations are clear all around," and "…after you've listened to others, ask yourself if you are willing to take the risk on behalf of the organization, because at some point you have to trust your knowledge, experience and intuition." For a high-performing board, it's important to be able to tell if the business's stakeholders are genuinely willing to embrace organizational risk. Consequently, the degree of enterprise-level risk—and the degree of willingness to accept innovative risks—start with the board.

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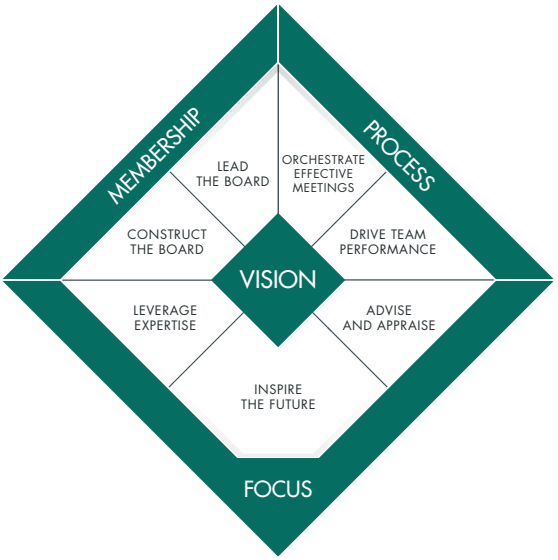
[1] "Radical Innovation and Growth – Global Board Survey 2016." Deloitte and Board Network. February 2016.

4. **Directors must accelerate (and not impede) progress.** The first place to look when assessing whether your board supports and drives innovation is its membership. Do you have directors that support and add value to the growth of the organization? Do all directors model openness and receptivity to change? Are they knowledgeable about risk inherent to the industry? Are they capable of thoughtfully assessing ideas for validity, implications and opportunity? A PwC survey of corporate directors found that 35% indicated their preference to remove at least one director from their board. This might have been because the individual consistently didn't arrive prepared, he or she was not aligned with company strategy, or there was a different set of qualifications required than what the individual fulfilled. Interestingly, more than 50% of those surveyed indicated that a director replacement was not made, even when board evaluations showed that was needed. If your board is acting as a barrier to innovation, it may be time to refresh its members; directorship is not a "till death do us part" proposition.

5. **A spirit of openness and adaptability must prevail.** An organization's board exists to influence management and ensure that strategies and finances are aligned in a way that optimally supports business success. Therefore, there is great temptation to embrace proven methods of success. Yet, a key aspect of this duty is the vetting of new ideas, which is often the place where innovation either prospers or dies. FMI's Peak Boards model (Exhibit 1), developed after years of in-depth research of the critical components of the very best boards, identified "Inspire the Future" as one such domain. We found that a true Peak Board challenges the organization to embrace new perspectives that foster innovation. Consequently, outstanding boards assure that an array of new ideas are fully heard and carefully explored. Unhealthy boards often marginalize and dismiss even the most promising of initiatives for the sake of preserving the status quo—a doomed strategy in an environment of rapid change and complexity.

Exhibit 1. FMI's Peak Boards Model



Source: Model is based on in-depth industry research.

6. **Diversity rules.** Recommendations for new board members occur mostly through peer endorsements.[2] Many individuals have a vast network of professionals who make for strong board candidates. Often we are drawn to like-minded individuals, which often results in a homogenous board—one less than ideal to fuel innovation. Drawing from a wider pool offers the best chance to include multiple perspectives, experiences and world views. Consideration of diverse individuals—whether in gender, ethnicity, experience, education, industry familiarity, age, etc.—ensures a board that can offer unique per-

[2] "The Governance Divide: Boards and Investors in a Shifting World. Insights from PwC's 2017 Annual Corporate Directors Survey." PwC. 2017.

spectives. Board diversity is grossly underutilized as an innovative advantage, with less than 20% of boards having any gender or ethnic diversity. This represents a significant missed opportunity. Given these statistics, current directors can improve board diversity by looking for opportunities to network with other individuals through community or professional networking events. While diversity is important, diversity for the sake of diversity isn't the answer. Organizations need to be diligent in building diverse, qualified boards that provide different perspectives to help the organization achieve its long-term vision.

7. **Seek outside director competencies to fill internal competency gaps.** What will your business look like 10 years from now? What knowledge gaps exist in getting there? Knowledge about the E&C industry is important for board members but should not be a singular requirement to join a board. A case can be made that industry expertise is one of the defining factors of all successful company leaders. If this is true, why would we prioritize this as the most imperative qualification for new directors? And if innovation is a priority, would it not be wise to seek directors from adjacent spaces and from outside of our industry? For example, if your company is looking to innovate its technological processes, a board member with experience from the software industry could have relevant experiences and expertise that might be applied to the E&C world. We believe that the director search process should begin with personal attributes: Is this a person who is a good cultural fit with my organization and someone whom I can trust? Industry experience follows in importance.

8. **Innovation can't be an afterthought.** If increasing opportunities for innovation is said to be a priority—prove it! Make time on the agenda for activities that will advance opportunities to innovate. This might include exploring national or global trends and identifying how they might impact the business. Invite an external subject matter expert to address the board. Consider an internal competition that challenges (and incentivizes) employees to bring their best innovative ideas to the board to be tested for feasibility. A board session might encompass judging this competition and giving feedback. The possibilities are almost endless as to how a board can stoke the spirit of innovation.

Keeping the Momentum Up

When appointing a new CEO or president, a board must consider the organization's current and future needs. The characteristics of the organization's leader will directly impact the organization's ability to capitalize on strategic, innovative objectives. If innovation is at the forefront, the succession and executive selection processes should reflect that. With this focus, the board positions itself to choose a future CEO capable of successfully leading the business for many years to come.

We encourage boards to partner with management to create an innovation-friendly environment. Broad perspectives and experiences provide opportunities to further innovative thoughts, respectfully challenge new ideas and sharpen concepts worthy of adoption. Consider also that each director has the power to propel or stifle innovation. Are the right people serving on your board? Or are they holding you back from utilizing the board to its maximum potential? The answers to these questions will help you shape a board that guides your organization today and keeps you on track to excel in the years to come.

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Peak Teams: An Innovative Model for High-Performing Teams

By Matt Kennedy and Rusty Sherwood

How to make the connection between exceptional leaders and high-performing teams.

In today's engineering and construction (E&C) industry, it is more important than ever to develop extraordinary leaders—those who clearly articulate direction, leverage and align resources to maximize opportunity, and inspire and motivate greatness in others.

But truly exceptional leaders also have a special ability to build great teams. As we look across the industry to our peers, partners and competitors, the mantra is the same: We need more talent, whether that is increased performance among our people or just more talented team members in our organizations.

In fact, availability of talent is the No. 1 challenge facing our industry today. "FMI's 2017 Talent Development Survey" found that 89% of E&C organizations currently face talent shortages. As organizations try to solve this challenge, they begin focusing on highly effective leadership, building teams within the organization that increase performance, and retaining the people they do have. Effective leadership, especially team leadership, can help organizations increase their capabilities and retain the talent they want to keep.

Engineering and Construction: The Ultimate Team Sport

As we look across the E&C industry, we see a multifaceted and integrated system of people and behaviors as well as technology and processes that are aimed at addressing bigger and more complex problems. The rise of megaprojects (i.e., projects of $500 million or larger) is one example of the increased complexity leaders face in today's business environment. Mega or not, today's projects demand more information, more coordination and more integration than ever before.

This new paradigm creates an environment where larger, more diverse teams must operate more efficiently across departments, organizations and geographies—a trend that's being driven by owner expectations for faster, better and cheaper project outcomes. In the simplest of environments, the most efficient team is a team of one that requires only self-leadership and minimal coordination to complete a task.

But look at your daily schedule and you'll see that the time dedicated to individual contribution is very limited. Once teams expand beyond one person, the required amount of coordination and integration grows exponentially. According to a recent study,[1] the average person receives 304 weekly business emails and checks his or her email 36 times per hour. The average team member attends 62 meetings monthly, and half of the time, these meetings are considered wasted time.

Let's face it—we waste a lot of time. Addressing these challenges begins with taking a step back and fundamentally recognizing that engineering and construction is a team sport where synergy, alignment and commitment to one common purpose make or break success. This should be followed by a renewed focus on how to effectively lead teams that operate at peak performance despite generational differences and rising complexity. Exceptional team leaders maximize available talent while creating a magnetic pull for the types of people today's organizations increasingly need.

Peak Leadership: The Individual Leader Solution

Leadership's role in this increasingly complex environment can be dramatic. In fact, leadership development can be an organization's competitive advantage, or it can be its Achilles heel. So how can an organization know if the leaders are achieving success? FMI's experience in E&C has led to the development of the Peak Leader model, which helps evaluate leadership performance and plan for individual leader development based on eight essential leadership behaviors: set direction, think strategically, align resources, motivate and inspire, focus on others, execute and follow through, lead within and develop talent (Exhibit 1).

Exhibit 1. FMI's Peak Leader Model

Source: Model is based on in-depth industry research.

Let's look at two leadership behaviors that serve as strong predictors of overall success and which are amplified when used within teams:

Set direction: Establish the why, how and where. One of leadership's primary responsibilities is charting the team's course. Defining objectives, connecting those objectives with the larger organizational objectives, and then showing how each team member contributes to success can be liberating for high performers on any team. With a clear direction, team members are empowered to fully engage, solve problems and act

[1] "You Waste a lot of Time at Work." Atlassian.

intentionally to achieve the overall organizational objectives. When the direction is unclear, team members must constantly check in for additional guidance, get permission for any change in action, and constantly seek reassurance that what they are doing is right. Remember those 304 emails a week? This is a symptom of leaders who are not effectively setting direction. If your team members constantly check in on small details, ask for your permission or "run stuff by you," it may be an indication that you can increase your leadership effectiveness by clearly setting direction and engaging your team to pursue results on their own.

Execute and follow through. Many leaders in the E&C industry worry that an increased focus on leadership behaviors, such as setting direction and creating a project team purpose, will distract them from getting their work done. To resolve this concern, we return to the Peak Leader model and look to engage the leadership behaviors around execute and follow through. When leaders are performing at a high level in "execute and follow through," there is clarity around how they will communicate as leaders and how the systems and processes will ensure individual accountability. Far too often in our industry, leaders overlook their communication systems, relying too heavily on email and phone calls to address immediate issues and underestimating the power of highly effective meetings and team integration in communication. For example, do your team members know the most important communication points and the required timing and extent of such information across the team?

To answer this question, the military uses a system called the Commander's Critical Information Requirement (CCIR), which clearly defines what information must be conveyed to senior leaders and across teams to help everyone make timely adjustments and achieve given objectives. The same system can be applied in construction, where equipment utilization, manpower changes, critical path schedule disruptions and safety concerns should all be factored in. The key is to keep the list short and to let everyone know what those items are. Other than the CCIR items, most actions and information are handled at the execution level. Does your team know what is most critical and important to you and to the organization? Do you talk about these items as critical rather than just another item on the meeting agenda? As a leader, if you are not clear about what critical information is needed to make decisions, then there is a strong probability that your team doesn't know either. As such, the team might miss the opportunity to identify vital information in a timely manner.

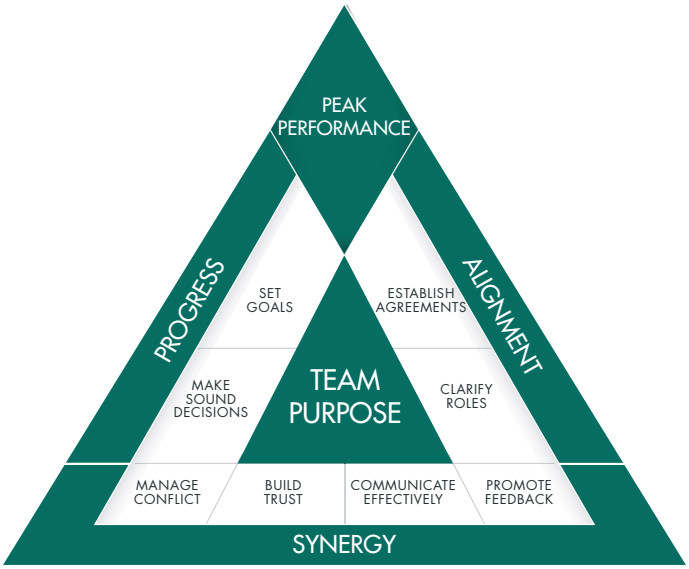
These are just two of the eight leadership behaviors that FMI has found to be critical to success in our industry. Each of the eight total leadership behaviors can be tied to team performance, but let's take a deeper look at how these two can be applied directly to high-performing teams.

Peak Teams: An Innovative Team Leadership Solution

When you stop and consider the drivers of high-performing teams, whether examining dynasty-like sports franchises or reflecting on those construction project teams that consistently exceed delivery expectations, these foundational principles always seem to be in place (Exhibit 2):

1. A clear sense of common team purpose.
2. A deep synergy and an abiding trust among team members.
3. A clear alignment of roles and team behaviors.
4. Well-established and clearly communicated processes and systems that enable timely decisions, create stretch goals, elevate accountability and deliver results as a unit of one.

Exhibit 2. FMI's Peak Teams Model



Source: Model is based on in-depth industry research.

Think about the last time you were on a team that delivered consistently high-quality outcomes and results. That team probably operated with a sense of having one, unified goal versus acting as a group of individuals pursuing separate targets. Team trust and open lines of candid, effective communication are more likely prevalent, bringing speed and effectiveness to addressing obstacles and overcoming schedule challenges.

It is also likely that a set of clear team rules and roles were in place, thus eliminating ambiguity related to performance expectations and personal accountabilities, and creating little wasted motion or lost production time.

Before game day or the start of a new project, these behavioral norms, processes and expectations have already been put in place, reinforced and practiced. This is all done with the understanding that when the game begins and challenges of unforeseen obstacles arise or changes in owner expectations occur, these behaviors and processes allow teammates to lean on one another. This kind of framework can help leverage the team's collective wisdom and skills and ultimately lead to better results.

It is fair to say these high-performing teams usually have exceptional leaders, putting in place the foundations and instilling the principles of unified purpose (setting direction) and reinforcing the set of processes and behaviors in a way that unifies a group of individuals to deliver exceptional results (execute and follow through). You will also notice that these leaders create a deep sense of ownership and "buy-in" across the team and establish a group of co-leaders committed to consistently delivering the team's purpose and mission. Such leaders also build a team where each member believes in and fights for the set goals, and where everyone is held accountable for execution, follow-through and delivery.

Great Teams Often Win, Lose Occasionally but Never Stop Growing

Strong leaders understand there is no such thing as a "success guarantee." Sometimes no matter what we do, setbacks occur. And yet, these same leaders know that the likelihood of success is far greater when time is invested in building and reinforcing Peak Team foundations versus leaving expected behaviors and processes to chance. They also know that strong teams learn a great deal from their losses and have formalized those mechanisms (i.e., formal debriefs and real-time feedback) that allow the team to quickly adjust plans and rethink methods.

A recent industry executive study revealed that more than 90% believe that a lack of collaboration (i.e., teamwork—both internally and externally) stands as one of the top-three challenges slowing performance today. A similar study estimated that up to 25% gains in productivity are achievable when team collaboration is optimized (i.e., synergized, aligned and unified). No wonder elevating team leadership is considered a top development priority by more than 85% of executives polled!

Winning the team game in our industry today and in the future will continue to require the formation of highly synergized, aligned and progress-oriented Peak Teams. Building and reinforcing these kinds of teams, whether in the boardroom, at weekly operations meetings or on the job site, remain, the signature of exceptional leaders and sustainable organizations.

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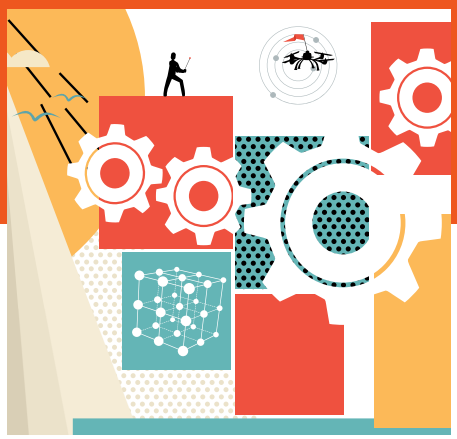
ISSUE FOUR
2017



Preparing Your Company for Growth and Innovation

By John Murphy

How E&C firms can think out of the box and become true "innovation machines" during the years ahead.

As a leader in the current market, you may be feeling a bit schizophrenic right now. On one hand, many markets are growing, and there's so much work that you can be more selective as you face the tension of deciding whether to hire more people or take on less work.

On the other hand, the sands seem to be shifting at an ever-growing rate. Not only are we looking over our shoulders, trying to anticipate the next turn in the market, but also we are increasingly aware that technology may make our way of life obsolete—whether it is removing our key retail client, destroying our value proposition or quite literally doing our jobs for us. In an industry that drives toward control and risk mitigation, if you are not uneasy in the current market, then you probably have your head in the sand.

In this article, we explore the need for innovation and the various factors that drive it; the challenges that engineering and construction firms face on the path to innovation; and the roles that vision, divergence and understanding play in some of the most innovative organizations in the built environment.

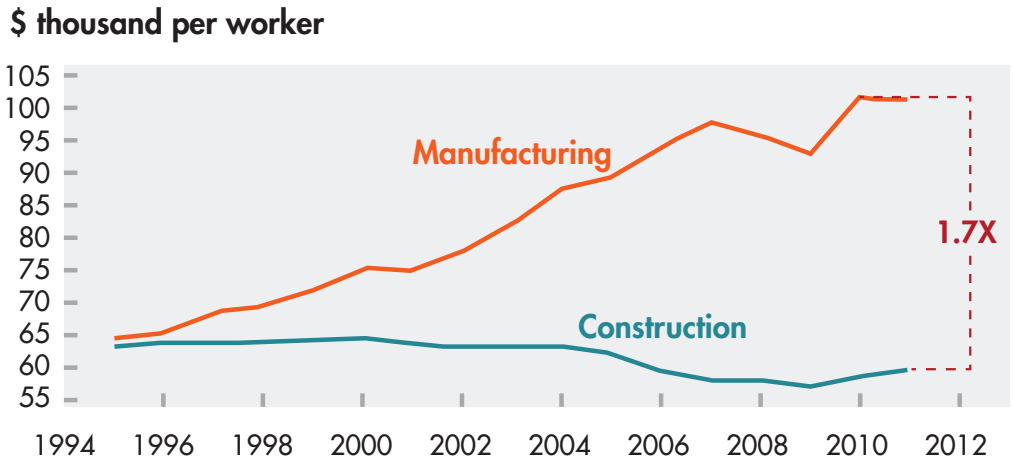
Visions of the Future

In "Visions of the Future," theoretical physicist Michio Kaku states that during this century, we will transition from the "age of discovery" to the "age of mastery." That means that rather than observing new phenomena, technology will converge, enabling industries to fundamentally transform, whether it is the impact of high-capacity batteries and photovoltaic cells on the power industry or the impact of artificial intelligence on the transportation industry.

The built environment is no different. From drones that can take precise measurements to virtual reality, to artificial intelligence and autonomous vehicles, most of the technology needed to radically transform the industry already exists. At this point, it's a matter of combining and integrating technology in a manner that is new and valuable to customers. For it is not the technology itself that matters, but rather how we use it that determines the pace of change in the industry.

An innovation revolution in the built environment can't come soon enough, since our industry is ripe for transformation. On the supply side, we have a lean labor market (1.5 million fewer U.S. construction workers compared to pre-recession levels), and construction productivity levels remain flat (Exhibit 1). At the same time, project margins are thinner, contractual conditions and projects are more complex, and baby boomers are reaching retirement age at a rate of 10,000 per day, with a younger and more inexperienced (millennial) workforce moving into the industry.

Exhibit 1. Overview of productivity improvement over time[1]



Source: Expert interviews; IHS Global Insight (Belgium, France, Germany, Italy, Spain, United Kingdom, United States); World Input-Output Database

Increasingly, we are seeing private equity firms making investments in construction technology firms. According to CBInsights, 2016 hit an all-time high of 94 investors, following some ups and downs in prior years. This represents a 169% increase from the number of investors in 2012 (35) (Exhibit 2). This shouldn't come as a surprise when the global construction industry is predicted to grow to $15 trillion in revenue by 2025.[2] Fundamental transformation in the engineering and construction industry will be necessary to meet such demand.

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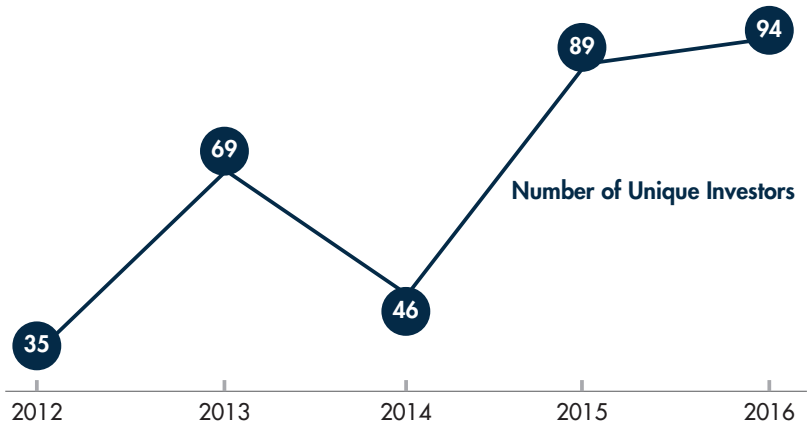
[1] Sriram Changali, Azam Mohammad and Mark van Nieuwland. "The construction productivity imperative." McKinsey. July 2015.

[2] "Shaping the Future of Construction: A Breakthrough in Mindset and Technology." World Economic Forum. May 2016.

Exhibit 2. Yearly Unique Investors Into Construction Tech



Source: CBInsights

It All Starts With a Clear Vision and Strategy

Fortunately, if your organization is not particularly innovative, at least you can be. It all starts with strategy. "Ha!" you may say, "Well, we have a strategy and we are not particularly innovative." Chances are that you really don't have a strategy. You probably have a business plan dressed up with words about strategy.

To determine whether you have a true strategy, or if it is just a plan, ask yourself questions like:

- Do I have a clear picture of the industry and where it is likely to move in the next 20 to 30 years?
- Do I have a clear picture of existing technologies and an understanding of how they might evolve?
- Do I understand how technologies can help me deliver value?
- Do I have a clear understanding of my company's role in that future?
- Do I know what investments I need to make to be able to achieve that future?

If you answered no to any of the questions, you probably missed one or more of these three key elements:

Vision

Often overlooked or dismissed, vision is a critical element of strategy. Lauded in theory, but much maligned in practice, vision has had a checkered past because it is usually improperly developed in organizations. But as I conveyed to a boss in a previous life, "Vision is the difference between leadership and management."

Jim Collins' and Jerry Porras' quintessential book, "Built to Last," provides a solid framework for success and is as relevant today as it was 20 years ago. In it, the authors describe how a well-developed vision provides the essence of leadership via purpose, direction and motivation. Their vision framework prompts the exploration of a company's core values and purpose to define "who we are and why we exist."

An organization's core ideology establishes the foundation upon which to make decisions, while the envisioned future provides a compelling view of the potential of not only the company but also the industry itself. Arguably, this is the most difficult part of developing a corporate vision, and yet it is the element that is critical to driving innovation in an organization. Having a sense of what can be helps you shape the future towards what will be.

Unfortunately, many corporate visions revolve around a revenue or profitability goal. In such organizations, the best you can hope for is incremental innovation—or improvements based on raising revenues or decreasing costs. To break out of this mindset, companies need to think beyond what they can be doing better and look more closely at "how to do better things."

Understanding

In "The Art of Innovation," Tom Kelley, partner at IDEO, a consumer products design firm, states that innovation begins with an immersion into the consumer experience. The theory was popularized on the "The Deep Dive" episode of ABC's "Nightline," where IDEO team members developed an in-depth understanding of customer needs based on interviews and in-situ observations. Through this process, the team members developed a novel design to one of the most mundane tools: the shopping cart.

Within our own organizations, we can see the impact of in-depth understanding through some of our most innovative employees (e.g., our superintendents and foremen). Closest to our customers and experts in their crafts, these professionals are constantly evolving means and methods, developing new ways to increase efficiencies, and overcoming challenges in the field. Likewise, as business leaders, we must develop our expertise in market dynamics and associated impacts on our customers, our competitors and ourselves.

After all, how can we begin to develop a view of the future if we don't even understand the present? As leaders, we should be like inquisitive children who are constantly asking "Why?" and "What if?" For example:

- Why are our competitors able to consistently underbid us?
- Why do our customers buy from us?
- Why do we work in our current markets?
- What if we worked differently?
- What if we attracted different customers or worked in different markets?

We must seek answers through scanning the environment (i.e., by reading industry publications; attending conferences; and speaking with employees, peers and customers, etc.) and filling gaps through commissioned market research. However, we cannot do this alone. After all, construction is too complex of a topic for one person to master on his or her own. As a result, we must challenge organizational leaders to expand their knowledge and share it with their teams.

Divergence

It takes time to develop a coherent, compelling vision coupled with an in-depth understanding of our market, but it is well within the capabilities of most companies, and we need only to exert the effort. Unfortunately, instigating the actual moment of innovation—when new ideas are created—requires an entirely different mindset. Fortunately, we know that divergent thinking is a catalyst for creativity and, if used when formulating strategies, will support the development of an innovative approach that propels your company into the future.

Divergent thinking comes from a diversity of ideas and can be used to effectively frame and solve problems. Much innovation is propelled from the concepts in one field and then applied to another. Unfortunately, most construction companies are very homogeneous and focus on building expertise in an industry that thrives on mitigating risk to deliver within cost, schedule and performance. As a result, we tend to hire those who think and work in that mindset. To buck this trend, as leaders we need to expose ourselves to ideas from outside the industry. Similarly, when we are in the process of developing new ideas, we should include individuals who have different educational and experiential backgrounds.

After all, it wasn't Hollywood that created YouTube, the largest provider of video content. Hollywood early on recognized the value of "reality television," but could not conceive that user-generated content would be a profitable means to tap into the demand. Similarly, we have had modularization and prefabrication in the construction industry for decades; however, its transformative potential wasn't realized until recently, with entrants from the manufacturing and technology sectors applying that capability to innovative projects.

Jump-starting Your Innovation Engine

Be Proactive

You will never lead your organization to new levels of innovation if you are always working in the business and not on the business. Too often, I work with clients whose CEO or president is involved in making day-to-day decisions, because the company relies on the entrepreneurial instincts of a founder who exploits opportunities as they arise. Unfortunately, this behavior creates a reactive mindset. Empower your lower-level managers and field leaders to make decisions and innovate their activities to adapt to changing situations. Create space to allow yourself to think about the big picture and focus on proactively shaping your company, markets and the industry within which you operate.

Focus on the Customer

Most companies tackle new technology with an incremental, one-off approach. They take a new technology and think about integrating it into their current delivery model to reduce costs. This "capabilities-based" approach can be effective for incremental innovation, but more often than not, it creates churn as corporate chases the latest and next best technology. Disruptive innovations start from the customer's perspective. This may require a little bit of empathy, but it shouldn't be too hard. Just think about yourself as a consumer and your ideal situation: "I want to get what I want, when I want it, at the lowest cost and with little risk."

Then Focus on Competing Differently

Competing differently not only addresses the integration of new technologies, but also means re-evaluating and constructing relationships with new and current partners to develop a delivery model that generates a competitive advantage. Business model innovation has been the most disruptive in business from the top retailer that started without stores to a top ride-hailing service that started without cars. Since we haven't had an Amazon or Uber moment in the built environment, are we next?

Get Your House in Order

It is very difficult to develop and implement innovation if you don't have the money and time to invest in the process. If your company is not financially strong, you must either tighten up your operations to internally generate the capital or return to your entrepreneurial roots and develop an idea so compelling that you can find external investors. Regardless, you need to get your house in order.

When people think about an innovative leader, they envision someone who has the latest technology gadgets and who constantly discusses new product introductions and trends. While this may be true in some cases, there is more to the story than just technology, according to FMI's series "The Innovation Collection 2017." To effectively drive innovation, leaders in the built environment must focus on more than just the way they design and build structures; they must harness very different characteristics than what stereotypes and tradition would tell us. Only then can we begin to fully leverage the power of innovation across the entire enterprise and industrywide.

John Murphy is a senior consultant with FMI. John specializes in designing and implementing solutions to complex problems through systematically developing a comprehensive understanding of the environment, applying multidisciplinary models to design solutions, and integrating assessment analytics to allocate and prioritize assets for optimal strategic impact. He can be reached at ***jmurphy@fminet.com***.

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ISSUE FOUR
2017

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How to Leverage Customer Feedback to Drive Product Innovation

By Keven McCook and Steve Hillis

How to effectively draw out ideas and feedback from customer communities and translate that information into product innovation.

An invaluable resource for informing road map decisions for both new and established products and services, customer feedback helps firms glean insights from the people who matter most. Whether they have 10 customers or 10,000 clients, this feedback helps companies uncover customer pain points, identify the features and functionalities customers care most about, and prioritize product road maps accordingly. Using customer interviews, usability tests, surveys and customer advisory boards—the top-four tools according to a recent UserVoice survey—companies can get the good, the bad and the ugly on what they're doing and on what they need to be doing better.

Constantly challenged to stay ahead of their competition by designing, developing and launching products that will sell successfully in their markets, building product manufacturers (BPMs) must be able to innovate effectively, using solid, honest customer feedback to get product development right. In this article, we'll explore one effective method to draw out innovative ideas from customer communities and then leverage that information into business success.

Creating a Closed-Loop Feedback Process

Product teams put a lot of time into collecting and managing customer feedback, and, as products mature, invest even more time into garnering and utilizing that feedback. The problem is that most product teams lack a consistently effective process for closing the customer feedback loop. As a result, they often miss out on the key benefits of a closed-loop feedback process.

FMI often witnesses how building product manufacturers think they're listening to their clients, but in reality, they rarely do an effective job during this part of the customer feedback process. Gathering the right feedback is difficult, but understanding how to take action on that feedback is an extremely difficult, yet critical, step in the product innovation loop. Here are some key challenges:

- **Honest feedback doesn't always go over well.** Product development or marketing departments may not want to hear the truth. Instead, they may protect the product they have worked hard to develop. After all, negative feedback can make them look bad and set them back on product launch schedules.
- **Asking the right questions is critical.** Figure this out early, and the overall customer feedback process will be much more successful. Focus only on the most important questions.
- **Marketing and product development teams aren't always the best ambassadors.** The customer may tell you what you want to hear, and you may be tempted to ask leading questions. Honest customer feedback requires the right environment and the right questions; set up a customer council and bring all participants to your location to contribute in a group council setting.
- **The wrong things may be incentivized.** Asked to launch a certain number of products per year, the product development team that receives negative input on a new product in the development stage may take a hit when annual bonuses are handed out (e.g., if the number of products launched is the metric).

While few would question the importance of customer feedback in the product development process, actually collecting and managing feedback is a necessary but difficult task. Done right, this process leads to rigorous analysis and complements data-driven decision-making. Therefore, it's in product teams' best interest to find and embrace efficiencies in feedback collection wherever possible. This will allow them to spend less of their time managing data and more time uncovering insights and understanding their users.

Customer Feedback: Not Just for New Products

On average, companies spend about 12.4 hours a week (or 2.48 hours per day) collecting and managing customer feedback (Exhibit 1). In rating their feedback follow-up effectiveness, 19% of companies follow up "sometimes," 35% follow up all of the time, and 44% do so most of the time (Exhibit 2).

Exhibit 1. Time Spent by Product Stage

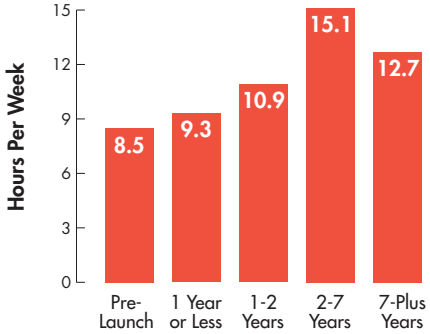
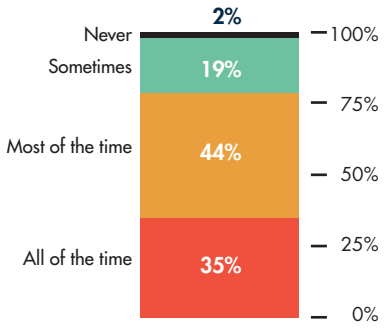


Exhibit 2. Feedback Follow-Up Effectiveness Rating



Less than 50% of respondents, regardless of product age, said their process for following up on customer feedback is effective all the time.

Source: "The Influence of Customer Feedback on the Product Development Process." Survey. Uservoice.

Regardless of how long a particular product has been on the market, customer feedback should play an important role in the product development process. BPM product teams should reflect on what aspects of collecting and managing customer feedback are taking up the bulk of their time and then seek out ways to streamline their processes and improve efficiencies.

The problem is that many companies are not engaging customers early enough in the process. Waiting until a product is near completion makes the job of getting customer feedback extremely difficult. If the product is already developed, for example, it's hard to stop and make changes—and too costly to scrap the product—when that negative feedback starts to surface.

One of the best ways to avoid this challenge is by always putting your customers first. In other words, ideas for new product development should originate from your customer feedback. Companies that invest in developing customer councils, for example, should meet with the customer on a regular basis to solicit input. Doing so ensures that the BPM firm receives the benefits of new product innovations and better success rates with new product launches.

Securing the Voice of the Customer

Many companies have attempted to secure the voice of the customer through councils, meetings, focus groups, peer groups or a variety of other methods. While these may be well-intentioned, what often happens is that the company winds up sending one, or two, or maybe three people (e.g., someone from product development or marketing, and someone from sales) out on a road trip to visit the customer. During those meetings, they'll show the customer some new product ideas that are already 70% to 80% through the product development pipeline.

At that point, the company just wants feedback from the customer; so the representatives take a few notes and basically get the customer to tell them what they really want to hear (i.e., that the product is great). The team may garner a few clues—a color could be better, a pattern could be changed—but it doesn't gather any open, honest and objective input. To further complicate the situation, they come back to the factory with the information, which basically falls on deaf ears. After all, if the product development phase is already 80% complete, those products are going to get launched one way or the other.

This eventually turns into a vicious cycle of irrelevant customer feedback and, subsequently, a very high product failure rate. Put simply, the products don't sell, so they have to be pulled off the market. Having worked with a large number of BPMs over the years, we've found the customer council to be one of the most effective ways to break the cycle and garner useful customer feedback that can be applied in the manufacturing environment.

We've experimented with a few different approaches and found the best success with a 10- to 12-person council that meets twice a year (i.e., spring and fall) and that is not set up to be a sales pitch for customers. In most cases, the participants—each of whom will serve a two-year term, for a total of four meetings—will represent key architectural and design firms from various geographies. Get those industry leaders to come to your factory for a two-day meeting, twice a year, to participate in brainstorming sessions, analyze current products and review new products that are currently under development.

When you use a council, you stand the best chances of getting customer feedback in a very open and honest environment. Recently, we worked with a company that set up a council to help reduce its own 65% new product failure rate. Two years later, thanks to the customer input and subsequent decision-making, that number dropped to about 40%. The cost savings for the manufacturer were astronomical, not to mention the goodwill that its salesforce earned with its own customers (i.e., by bringing better products to market and not having to "drop" products).

Putting Words Into Action

It's not enough to have a pow-wow with your customers and then go back to doing things the way you've always done them, or continue down the product development path as if those meetings never took place. To glean the most benefit out of your customer council, you'll want to gather all the notes that you collected and then use that information to conduct a follow-up debrief with your team the next day. You'll probably end up with pages and pages of feedback notes to work from. So cull through them for the most important points, and then work with your product development team to start budgeting time and/or money to test out the new, innovative approaches suggested by your customers.

Be sure to discuss both schedule and timeline, and then begin assigning team members to record the progress over the next three to six months or so. If a team member tries to bring one idea to life and fails, for example, be sure to make a note of it (to avoid reinventing the wheel the next time a customer makes a similar request).

Six months later, at the next customer council meeting, share the results of your efforts with attendees. Allocate at least two hours (of the biannual meeting) to this, and use data, photos and sample materials to illustrate your points. "Here's what we found and here are the results," you can tell them. "This product turned out to be a great idea, and we have some samples to show you," or "This one didn't really make good economic sense, and here's why."

After just two council meetings, when those key designers or customers see that your company listened to what they said and took action—and actually worked on developing products or using their input to change products—the magic will begin to happen. The council will come alive and start giving you more ideas and feedback than you ever could have imagined.

As one council participant confirmed, "The most gratifying aspect of being on the design council was the exchange of ideas and information within this diverse group of hospitality experts and seasoned designers. It was wonderful and eye-opening to step out of my own yard and into their worlds."[1]

Real Feedback Counts

Anticipating customer needs and then serving those customers well isn't always easy, but it's a very necessary part of a BPM's mission. To best serve those evolving needs, customer feedback can provide that critical link between "wondering" what clients want and truly making them a part of the product development process. Knowing that the success rate of new product development can be improved by getting real feedback from customers before the product launch happens, many companies have realized significant cost savings from investing in effective customer councils.

Organizations that regularly follow up on customer feedback win by having a closed-loop, honest feedback process. Organizations that ignore this step risk leaving their customers in the dark, wondering whether their feedback is being used—or even heard at all.

Finally, customer councils can also positively influence the company brand (i.e., when products are not dropped as often), which allows for less customer distraction from product disruption. The salesperson will be motivated and pleased to see that his or her company is investing in getting real customer feedback, and the entire organization will operate in a more profitable and successful manner.

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[1] "A Meeting of Creative Minds. Milliken Hospitality takes customer feedback to another level." NEWH. The Hospitality Industry Network. 2010.

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ISSUE FOUR
2017

Health and Wellness: The Next Disruption in Sustainable Building Design

By Greg Powell, Elizabeth Bowen and Marvin Roeder

How companies can effectively transform environmental- and health-related disruption into true opportunities now and in the future.

In today's global economy, building owners and employers are looking for ways to compete for talent, reduce operating costs and benefit the environment. While Leadership in Energy and Environmental Design (LEED) certification continues to be the leader in U.S. commercial real estate sustainability certification market share, trends in the market are causing building owners and employers to consider new aspects of sustainability, new certification systems and new technologies.

Millennials have now surpassed Generation X to become the largest generation in the American workforce.[1] This group's preferences for sustainability, wellness and business transparency are expected to be major influences on building design. This trend creates significant opportunities for architecture, engineering and construction (A/E/C) firms well-positioned to meet this generation's demand for all things green, healthy and innovative.

LEED Reigns in A/E/C

The most prevalent green building rating system in the world, LEED is used in over 165 countries and territories.[2] Expanded to serve practically all building, community and home project types, this certification addresses both human and environmental health, primarily by rating various components of a building's design and construction. However, there are varying tradeoffs with LEED's holistic human and environmental strategy. Among them is the inherent challenge that comes with engineering a building to bring in more outside air for improved human health without compromising energy efficiency goals.

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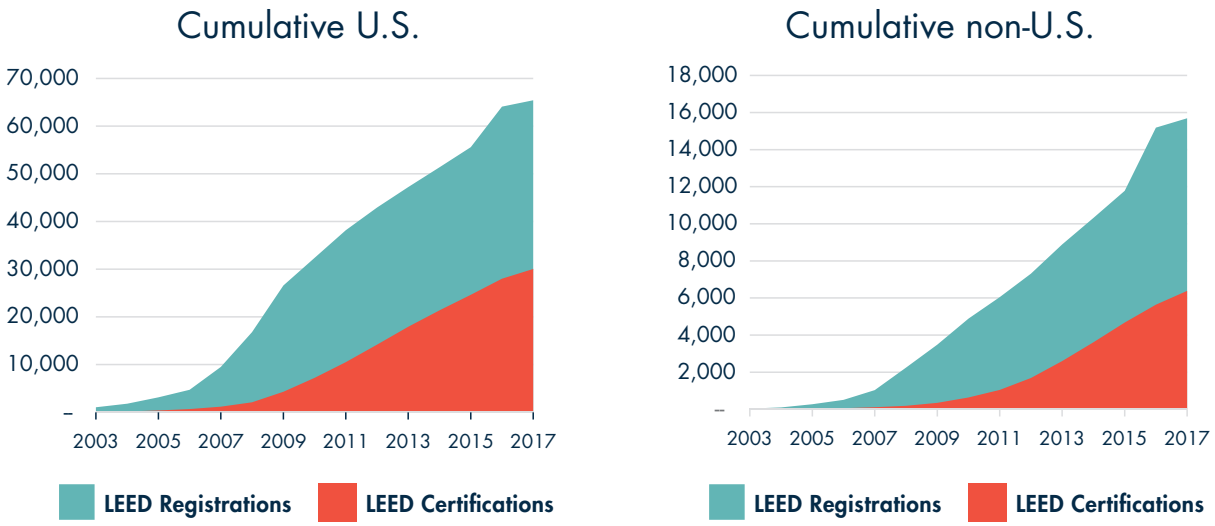
[1] Feeney, N., "Millennials Now Largest Generation in the U.S. Workforce", Time, May 11, 2015.

[2] LEED, https://new.usgbc.org/leed, November 2017.

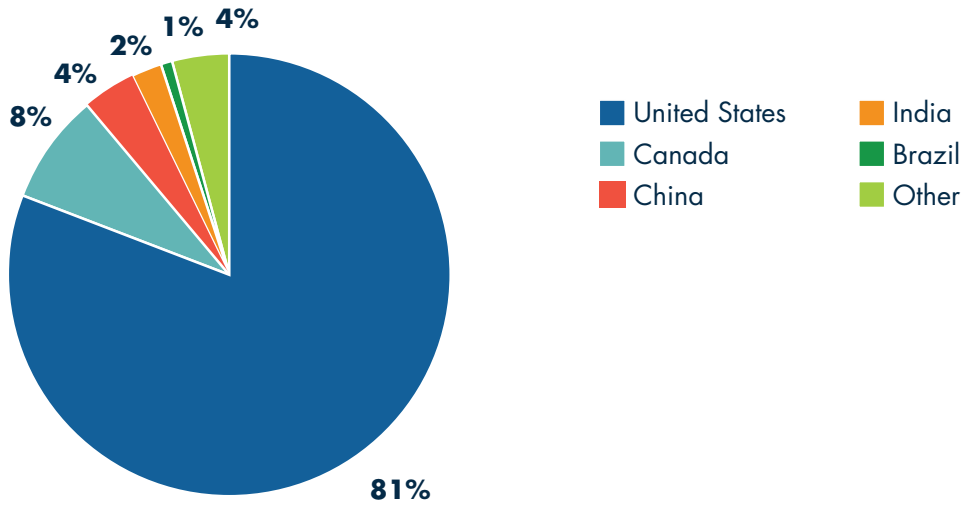
LEED continues to dominate the green building certification market and appears to have as many as 65,000 projects in the pipeline for the next few years. As shown in Exhibit 1, LEED adoption rates have grown consistently over the last 15 years; as of July 2017, there were 90,900 total commercial LEED certifications. The larger number of LEED registrations serves as a proxy for anticipated future growth in LEED certification and sustainable design.

Exhibit 1. LEED Adoption Rates[3]



While the U.S. is by far the most active country in the world for LEED certifications, it's by no means the only supporter of green building. Many global markets are pursuing widespread measures to reduce carbon footprints and maximize energy efficiency. China, Canada and India, for example, are all increasing adoption of green building standards (Exhibit 2).

Exhibit 2. LEED Certifications by Country[4]



[3] LEED, "Country Market Brief", https://www.usgbc.org/advocacy/country-market-brief, November 2017.

[4] LEED, "Country Market Brief", https://www.usgbc.org/advocacy/country-market-brief, November 2017.

Growing Diversification in Sustainability Measurements

LEED has responded to the trends in transparency, wellness and technology with the addition of a new Performance Path to LEED certification using Arc, which allows building owners or consultants to collect energy, water, waste, air quality, occupant satisfaction and transportation data to benchmark themselves against other projects. This level of benchmarking helps to improve overall building performance.[5] Arc can be used both to recertify LEED certified buildings and to certify non-LEED buildings. The program uses data from occupant satisfaction and other key performance indicators to influence a daily or monthly dynamic LEED score.

Over the past two decades, many new green building certification programs have emerged with and without LEED alignment. Some are geographically focused, such as BREEAM, which dominates the U.K. market. Others are focused on a sector or issue that LEED does not specifically address, such as Living Building/Zero Energy Certification, Passive House and Green Globes, all of which have shown rapid adoption rates, but still with far fewer certifications in place compared to LEED.

The Next Phase in the Evolution of Sustainable Design

We're now witnessing the increased **convergence of green and wellness**. While green certifications such as LEED focus more on the environmental impact of a building, wellness rating systems emphasize the health and well-being of the building's occupants. According to Leigh Stringer, EYP, workplace strategist and author of "The Healthy Workplace," "Many of the strategies for creating a healthy and productive physical work environment stem from the efforts to make buildings greener or more environmentally friendly."

This progression is driven by, in part, a growing focus among employers on health costs as U.S. health care expenses spiral out of control. Studies have shown that the building environments affect human physiological systems. Americans spend more than 90% of their time indoors, on average, yet indoor air is generally two to five times more toxic than outside air due to poor ventilation and off-gassing of toxic chemicals from a host of products, from carpeting to furniture.[6] The Harvard T.H. Chan School of Public Health identified these nine foundations of a healthy building: air quality, thermal health, moisture, dust and pests, safety and security, water quality, noise, lighting and views, and ventilation.[7]

The benefits of "healthy buildings" have been documented in numerous studies and include reduced illness and absenteeism among workers, higher worker productivity, higher test scores among students and greater workplace satisfaction.[8] One such study directly quantified the impact of indoor environmental quality on cognitive functions. By changing levels of air ventilation, carbon dioxide and volatile organic compounds, the study measured how the indoor environment in which we work and live affects our health and productivity. The results show a clear correlation between improved indoor air quality and cognitive performance (Exhibit 3).

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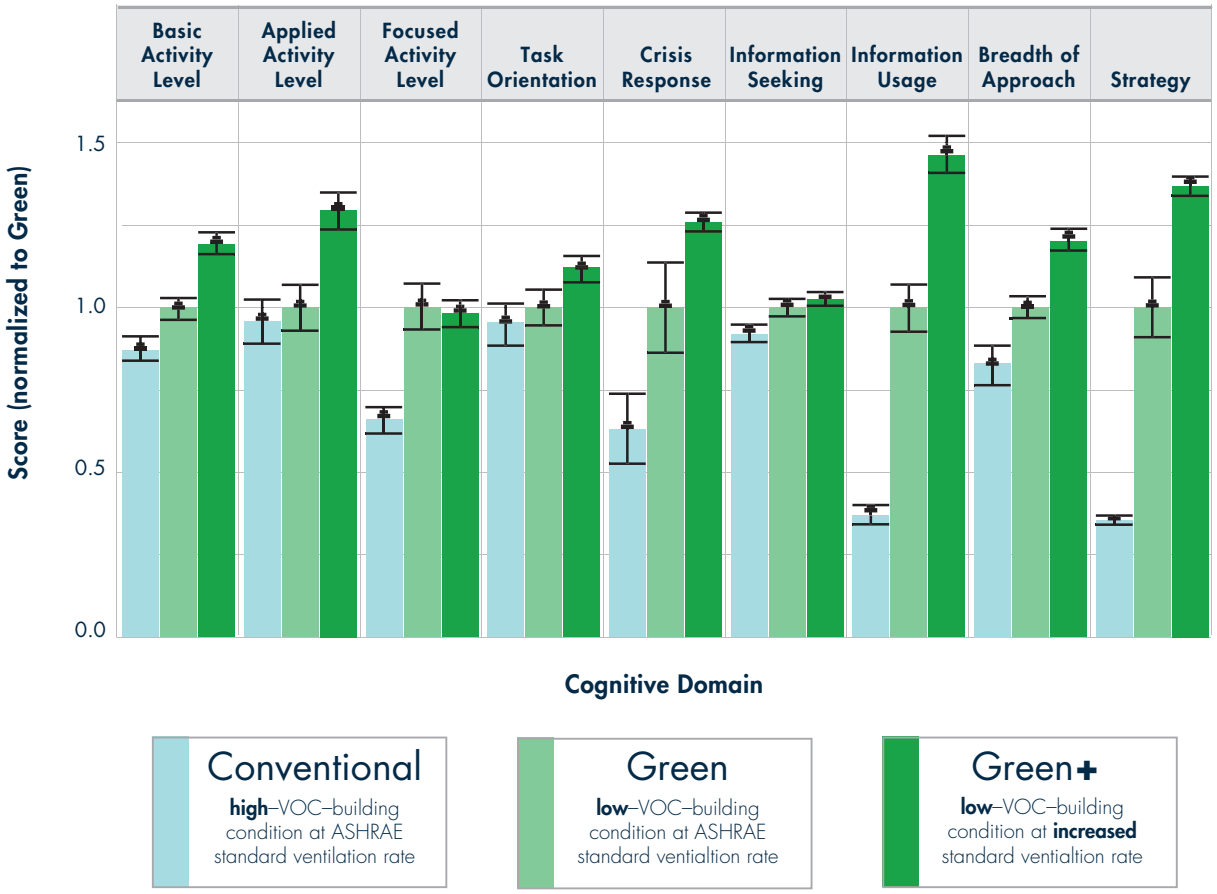
[5] ARC, http://arcskoru.com, November 2017.

[6] National Geographic, "5 Surprising Ways Buildings Can Improve Our Health", http://www.nationalgeographic.com/environment/urban-expeditions/green-buildings/surprising-ways-green-buildings-improve-health-sustainability/, February 2017.

[7] Harvard T.H. Chan School of Public Health, "The 9 Foundations of a Healthy Building 2017", http://www.forhealth.org, November 2017.

[8] Allen., J, MacNaughton, P., Satish, U., Santanam, S., Vallarino, J., & Spengler, J., "Associations of Cognitive Function Scores with Carbon Dioxide, Ventilation, and Volatile Organic Compound Exposures in Office Workers: A Controlled Exposure Study of Green and Conventional Office Environments", https://ehp.niehs.nih.gov/15-10037/, Volume 124, 2016.

Exhibit 3. Study on Cognitive Impact of Indoor Air Quality[9]



These cognitive benefits translate into documented monetary cost savings for building owners and employers. In turn, building certification standards are evolving to hold designers and contractors accountable to deliver these cost-reducing and revenue-boosting benefits. However, a survey conducted by Virgin HealthMiles Inc. illustrates some of the challenges with wellness initiatives: 89% of employees reported a company's health benefits as significant to their choice of employer, but only 36% of employers reported having the information needed to be able to make actionable decisions about an employee health strategy.

Partly in response to the financial potential in addressing occupant health in the built environment, industry stakeholders developed the WELL Building Standard, which integrates health, design and management.[10] According to the International WELL Building Institute, 90% of the costs associated with the life cycle of a commercial building come from the people inside (salaries and benefits), while only 10% come from operating the building itself. Wellness certifications have emerged to improve returns on the 90% invested in human assets. As Rachel Gutter, senior vice president of the WELL Building Institute, explained to FMI, "Our indoor environments have a profound effect on our health and wellness, impacting everything from our stress levels to alertness

[9] Allen., J, MacNaughton, P., Satish, U., Santanam, S., Vallarino, J., & Spengler, J., "Associations of Cognitive Function Scores with Carbon Dioxide, Ventilation, and Volatile Organic Compound Exposures in Office Workers: A Controlled Exposure Study of Green and Conventional Office Environments", https://ehp.niehs.nih.gov/15-10037/, Volume 124, 2016.

[10] International Well Building Institute, https://www.wellcertified.com/, November 2017.

to productivity. The WELL Building Standard was developed with this relationship in mind. Designed to be as interactive as possible and to work in harmony with other building certifications like LEED, WELL encompasses over 100 features addressing seven core concepts of building performance that have been scientifically proven to impact the occupant experience."

It's important to note that WELL certification is not the only certification gaining a significant amount of attention in the market. "A new wellness program, the Facility Innovations Toward Wellness Environment Leadership (Fitwel) certification program, was developed by the Center for Disease Control (CDC) and was piloted on General Services Administration buildings, an organization also known for its early adoption of LEED certification," Stringer explains. "Many of my clients are adopting Fitwel as a certification tool because the strategies have been vetted by CDC's research team and are intentionally low-cost and fairly easy to implement, even in existing buildings."

Wellness Implications

Wellness standards have yet to achieve broad market adoption, with 28 WELL certified buildings and 159 Fitwel buildings currently operating in the U.S. However, it's clear that human health and wellness in the workplace are both high priorities for millennials, and more certifications are on the way. In the U.S. alone, there are currently 224 registered projects. Worldwide, 522 projects are registered for WELL certification. Studies show that millennials are increasingly emphasizing a healthy work environment when making employment decisions.[11] Rising demand for human wellness-focused work environments among this most influential component of our workforce is leading more companies to respond by considering wellness certifications in both new and existing buildings. Architects are beginning to witness this uptick in building owner and employer interest in wellness. Maria Papiez, sustainability leader at design firm EwingCole, notes "There is now a critical mass for wellness in the marketplace as big brands compete for talent."

One such brand is technology leader Lenovo. "To attract today's top talent, Lenovo committed to both LEED Platinum and WELL certification for its new building at the North American Lenovo headquarters," explained Erin Bolduc, Lenovo technical project manager. "We pursued WELL late in the design process as we recognized a significant amount of overlap between the two rating systems while pursuing LEED v4. Where LEED and WELL did not overlap, Lenovo corporate policies made it obvious that, with our benefits and the site characteristics, we would be able to achieve WELL certification."

In addition, the demand for wellness and "healthy buildings" has driven—and continues to drive—advancement in building innovation and technologies that monitor and enhance health benefits for building occupants, as illustrated in Exhibit 4. Technological innovation has a rapidly growing influence on the broader design and construction industry, and its role in fostering healthy building environments is growing in equal measure.

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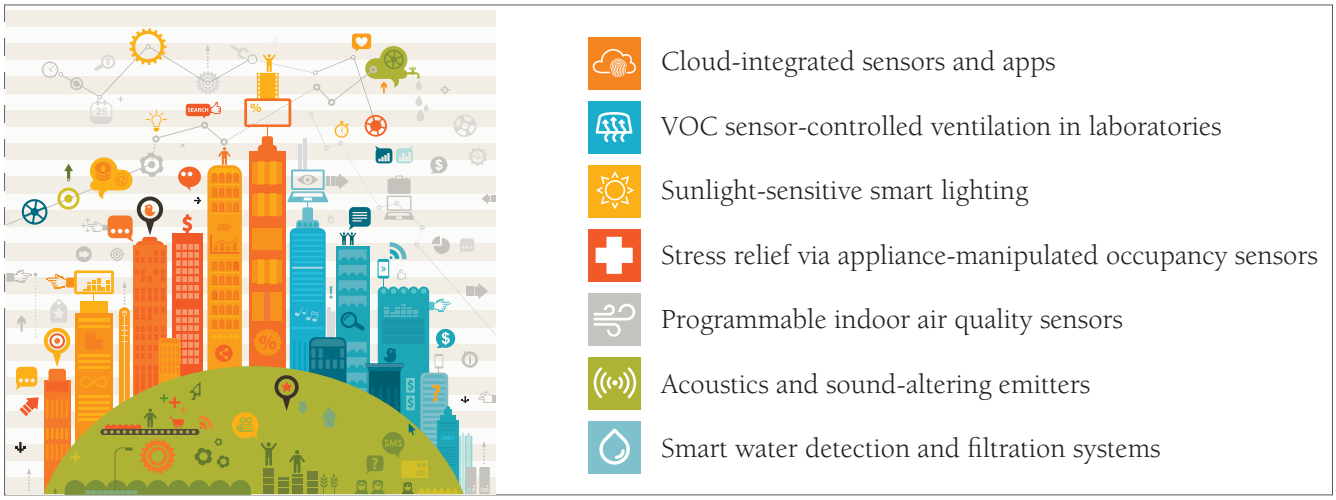
[11] Rigoni, B., and Nelson, B., "Millennials Want Jobs That Promote Their Well-Being", http://news.gallup.com/businessjournal/196985/millennials-jobs-promote.aspx?version=print, November 2016.

Exhibit 4. Building Technologies Targeting Wellness

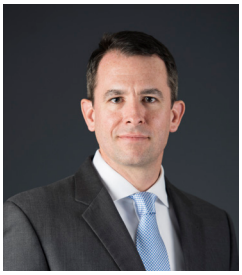


In time, buildings that achieve wellness certifications may earn health insurance incentives, as insurance providers continue to explore ways to reduce risk. Companies pursuing less formal employee health and wellness initiatives—such as lifestyle and disease management programs—have accrued similar benefits.

Impact on the Design Industry Moving Forward

When sustainability became the new normal, designers adapted to the demand for LEED and similar capabilities. Building stakeholders are now broadening this environmental focus toward the human experience, and the industry must once again adapt.

As the convergence of green and wellness continues to gain momentum, the design industry will be facing new demands. To deal with these shifts, firms will need to address the various wellness programs gaining in prominence; navigate new and emerging building technologies; and cater to shifting priorities among building owners, employers and employees. As these demands grow, design firms will also need the right balance of talent and capabilities to compete and thrive in this evolving environment.



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FMI QUARTERLY
ISSUE FOUR
2017

Assessing Your Exposure to Design Risks in an Evolving Marketplace

By Michael Davis

Evolving project delivery methods present new roles, opportunities and distinctive challenges for general contractors.

The construction industry has weathered a considerable amount of tumult since the Great Recession, and that turbulence has not been confined to economics. The evolution of project delivery methods (PDMs) continues to change how buildings get built and, by design—both literally and figuratively—, the roles and risks assumed by general contractors (GCs).

Design-Build, Construction Management at Risk (CMAR) and Integrated Project Delivery (IPD) (and the variations therein) have introduced new working models for the industry. General contractors are being enlisted earlier in the design phase to share their expertise and make meaningful contributions. Surveys commissioned by the Design-Build Institute of America (DBIA), for example, point to design-build accounting for 40% of nonresidential construction projects in the U.S.[1] An increasing number of public sector projects, which have historically used only the traditional design-bid-build model, are allowing alternative project delivery models. The DBIA alone reports that its members can use design-build, in some form, in all 50 states, and a majority of states permit design-build "for all agencies for all types of design and construction."[2]

While bestowing more collaboration and additional opportunities to GCs, these PDMs also expose them to more design risk. While many (particularly those involved in design-build) understand this changing role, it's also true that many are taking on design risks they are not necessarily seeking out—or even know they have. This is the case not only for the new PDMs but also with design-bid-build projects. As projects become more complex, owners are looking to transfer risk, and increased collaboration is blurring the lines of who's responsible for what.

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[1] "Research Finds Continued Growth of Design-Build." Design-Build Done Right. Design-Build Institute of America. 26 June 2014.

[2] "State Advocacy: 2017 Design-Build State Authorization." Design-Build Institute of America website. 2017.

"Over the last few years, a large and growing number of disputes have arisen on construction projects litigating responsibility as between the design and construction teams," attorney Jennifer Lowndes recently wrote in an article for the American Bar Association. "Shop drawings, attempted design delegation and scope that includes installation of specialty or engineered systems are just a few ways in which contractors have seen their design-related responsibilities—and the potential for corresponding liability—expand."[3]

Some of these responsibilities can indeed come as an unwelcome surprise. Take a GC who provides some preconstruction consulting services, reviews an HVAC design or makes a small change in a shop drawing. A misconception may exist that because the GC reviewed someone else's design, it has automatically assumed responsibility for it. The GC may never have intended to assume that responsibility in its contract, but a successful claim could be made against the company.

Subsequently, as alternative building methods bring flexibility and innovation to the construction industry, GCs need to evolve with them. Here are some ways to help mitigate design risks in this increasingly complex marketplace:

1. **Keep your contract as specific as possible.** GCs need to ensure that their long-term customer contracts clearly define the professional responsibilities and liabilities they intend to assume, while avoiding vague language that might be interpreted as shifting design responsibilities to them. Takeaways from a webinar hosted by The Associated General Contractors of America on the topic advise GCs to put the parameters of design delegation in their contracts. Delegated design, it added, can be masked as a performance specification, making it difficult for a GC to realize it has design responsibility when pricing out a project. Terms such as "means and methods design" and "shared design," the AGC noted, "may not have the same meaning for all parties within the industry, furthering the need for clarity."[4]

2. **Make sure your insurance is broad enough to protect you.** GCs need insurance coverage that's expansive enough to pick up any professional design exposures that they accept, as well as those exposures that may be imposed upon them—but not so broad as to encourage things that are appropriately addressed by other policies.

   Misconceptions continue to prevail on the protection afforded by general liability (GL) insurance as it pertains to design risk for GCs. General liability coverage is designed to offer protection incurred by construction operations that result in bodily injury or property damage. It will offer little, if any, coverage against a professional design claim, and amendments to GL policies are unlikely to provide sufficient coverage for a host of reasons. General contractors also shouldn't expect the design professional's liability policy to extend to them; these policies typically have low limits and rarely extend coverage to an additional insured.

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[3] Lowndes, Jennifer. "The Contractor's Emerging Exposure for Design Responsibility." Construction Litigation. American Bar Association. aba.org. 17 May 2017.

[4] "Takeaway Lessons from AGC Webinar on Design Delegation." AGC of America. 21 October 2014.

Professional liability (PL) coverage for GCs has gained currency for this increased exposure, covering against damages from negligence in specialized or technical areas (i.e., professional services) that result in financial losses. Because these claims can be staggering, more GCs are obtaining this coverage. We have also seen an increase in contracts that require the GC to carry PL in addition to what the designer carries. It's vital to communicate closely with your risk manager and a knowledgeable broker to achieve the best and proper coverage.

3. **Make a case for a single carrier for multiple lines of coverage.** Consider placing GL, PL and the excess with one carrier. As important as it is to draft coverages to be broad and interlocking, recognize that a claim dispute argument will be made based on fact. If you place coverages among different carriers with a broker who does a great job of having the policies structured to work together, you still have the basic problem of a claims department saying, "We think the facts of this case are driven by what the other policy does." So you're not necessarily discussing a disagreement in coverage intent; you're arguing about a disagreement in the fact base, and this can take time to resolve.

Four Habits That Can Help Mitigate Risk

Mitigating risk is really about making thoughtful decisions as well as identifying and addressing issues early on. Here are four good habits that can help companies mitigate risk:

1. **Do your homework.** The uptick in the construction industry is a good problem to have—until it isn't. The continued lack of skilled workers in the trades and of experienced designers, combined with an abundance of projects, sets the stage for a party accepting a job that it's unprepared to handle in terms of scope or size. It can also prevent GCs from performing due diligence prior to taking on a project. One or two bad jobs can threaten even the largest of firms in terms of the costs.

2. **Establish good relationships before signing the contract.** General contractors must understand the importance of individual relationships among the principals involved in each project. The owner involvement and the owner's personality matter, and the same applies to the designer. Relationships are built with individuals, not companies. Consider the actual participants of the contractor-designer-owner team and make sure you're confident that everybody will be doing his or her job. Zurich's data indicates that at least one in four large PL claims against GCs involved work for a new customer.

3. **Borrow the best from IPD.** It gets talked about a lot, but IPD isn't actually undertaken often. Ostensibly, the goal is that the owner, contractor and designer share more of the responsibilities for the project. The best thing about IPD, from a key practice perspective, is that more attention, time and money are spent upfront working through issues. The other interesting thing we've seen in IPD is that it flies in the face of the interconnected world, where design can be done while you're sleeping on the other side of the planet. Just having the owner, contractor and designer physically located in the same place seems kind of old-fashioned, and it can't always be done; but it helps immensely in terms of driving better results.

4. **Embrace the bigger picture.** Recognize that project success depends upon things that are outside the responsibility of each party on the project and that you must separate what's important to your success versus what you're responsible for. You want a tight contract. But if you are going to focus only on delivering your contract—which in theory is all you're legally obligated to do—and the owner or designer is failing on his parts, it's unlikely that you're going to walk away successfully from that project. It's vital to recognize that there is interplay, regardless of what the contractual responsibilities or PDM may be.

4. **Don't ignore what's not your contractual responsibility.** Although GCs are very comfortable managing materials and workmanship, they may be less comfortable managing design because it hasn't historically been their responsibility. It has been the responsibility of a professional designer; and if it doesn't work, the professional either fixes it or is sued for damages for not fixing it. In today's increasingly collaborative environment, GCs must recognize that whether or not they have contractual responsibility for a design error, allegations can be made asserting construction defects or adequacy for intended use. Perhaps it was design negligence, material failure or workmanship inadequacy; often, it's a combination of those things. It can get very technical and difficult to identify what the source of the damage was, and it can take a long time to sort it out.

5. **A risk manager can help.** In a 2016 AGC/FMI industry survey on managing and mitigating risk, which represents best-in-class construction firms generating $50 billion in industry revenue each year, PDMs were on the lower half of respondents' concerns. However, it's noteworthy that "contract language/insurance terms" was cited among their top challenges, and the study reported, "…survey participants perceive a shift in design risk and responsibilities from the architects and engineers to the contractors." Nearly 70% of those respondents had a formalized risk management department, and 67% reported having a dedicated risk manager. The study also noted that those companies with dedicated risk managers rated the effectiveness of their risk assessment process higher than those companies without one.[5]

Today's evolving marketplace can be exhilarating or intimidating, depending on how you approach this new landscape. Those GCs that embrace a changing role will differentiate themselves in a highly competitive market, but increased design responsibilities heighten risk as well as opportunity. Success will likely depend on a clear understanding of what's expected of you, in each and every project, and having a solid team to provide direction on contractual responsibilities and proper insurance coverage as you, too, evolve with your industry.

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[5] "Managing and Mitigating Risk in Today's Construction Environment: The 2016 AGC/FMI Industry Survey." https://www.fminet.com/wp-content/uploads/2017/03/ManagingandMitigatingRisk_Survey_FINAL.pdf. AGC of America and FMI. September 2016.

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ISSUE FOUR
2017

Moving from Offsite Construction to Smarter Project Execution

By Jay Snyder and Sabine Hoover

It's time to rethink offsite construction and align it with your organization's overall project execution strategy.

Prefabrication, modularization, pre-assembly—all different variations of offsite construction—have been around for decades and are making a comeback during an era where low cost, resource efficiency and tight schedules are priorities. So what is all the hype today around these proven business concepts, and why haven't they become standard practice across the entire industry by now? There are several reasons for this, and our article summarizes key challenges and opportunities that owner organizations and project teams face when tackling offsite construction. We also provide fresh insights into some of the organizational dynamics that owners face when making decisions around offsite construction and discuss why it's time for the industry to rethink project execution entirely.

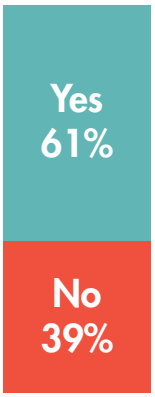
Ripe for Change and Disruption

We've entered a new era: Tight labor markets, emerging and integrated technologies, and increasing project complexity are all driving high levels of coordination, collaboration and project team alignment. Today, we see dozens of innovative companies—on both the owner and design/construction/manufacturing/building product side—reshaping and transforming outdated business models.

According to our latest industry study,[1] owners confirm that today's offsite construction environment is different compared to just three years ago (Exhibit 1). On the contractor side, the average use of prefabrication almost tripled between 2010 and 2016 (Exhibit 2 – see "Prefabrication: The Changing Face of Engineering and Construction" for more details).

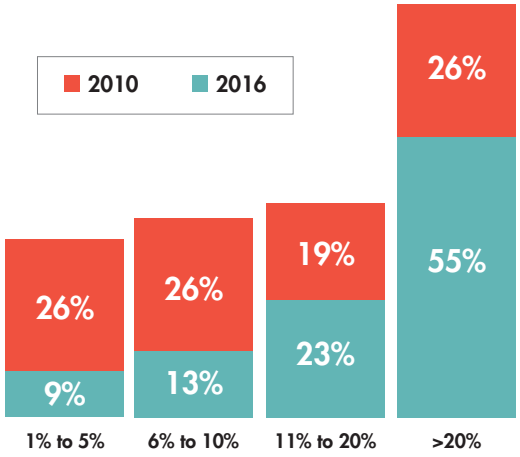
[1] "2017 FMI/CURT/CII Offsite Construction Study." Release in December 2017.

Exhibit 1. Is today's offsite construction environment different compared to three years ago?



Source: 2017 FMI/CURT/CII Offsite Construction Survey

Exhibit 2. What percentage of your project work is currently accomplished using prefabricated assemblies?



Source: 2017 FMI/BIMForum Prefabrication Survey

Today's industry innovators are learning and adapting new manufacturing and offsite construction techniques to work smarter, faster and safer, and they're turning the entire traditional construction value chain upside down. So why don't we see and hear more about these success stories? Why aren't owners dictating these innovative approaches on all their projects, given the benefits in schedule and risk reduction, for example?

For starters, not all projects lend themselves to offsite construction. Therefore, before jumping into the world of offsite construction, owner organizations must learn industry best practices and start thinking about some key questions, including:

- What type of scope and trades are best-suited for offsite construction?
- How does offsite construction fit into our company strategy and vision?
- How does offsite construction differ from traditional delivery methods? And what are the implications for our standard owner project management processes in planning, design and construction?
- How does offsite construction fit within our overall project execution strategy?
- What new skills and competencies are needed? How do we prepare our workforce to adapt to these changes? What are the cultural implications?

Time to Think Differently

One of the key challenges that many owners face is the lack of awareness and understanding of what it takes to truly maximize offsite construction. Too often, decision-making related to project procurement and delivery occurs at the owner organization's executive level, while project execution occurs at the project management level. In many cases, executives don't understand construction industry pressures, drivers or bottlenecks and what it takes to execute a capital project effectively. In some cases, the owner procurement teams drive cost de-

cisions without understanding the overall project sequence and associated dynamics. As such, offsite construction is often not evaluated in the context of a broader project execution strategy. Consequently, contracts don't allow for early involvement of key stakeholders, such as equipment vendors, fabricators and construction service providers, which further impedes project success.

As one owner participant stated, "Oftentimes, the procurement groups aren't necessarily experts in project execution. They're experts in how to buy pencils for 5 cents cheaper, for example, but they're not necessarily project execution specialists. Therefore, they're really good at suboptimizing each part but not good at optimizing the whole."

Another way of thinking about this issue is to view offsite construction as a delivery method, in the same way owners would select design-bid-build, design-negotiated-build or design-build, for example. The reason being that an early and deliberate decision is needed to incorporate offsite construction, since the planning, design and construction phases of such projects are very different compared to the other three traditional project delivery methods. For example, for offsite construction, project planning must include (but is not limited to):

- Firms available to the owner with expertise in prefabrication that can be considered for the project.
- Offsite resources (e.g., real estate) for fabrication and staging.
- Logistics/shipping and delivery of large prefabricated assemblies to the job site.
- Specific skills and equipment associated with offsite construction tasks.

During the design phase, the offsite construction firm(s) must drive the coordination and production of architectural and engineering drawings. In fact, with a true offsite construction project delivery approach, the construction drawings could conceivably be exclusively produced by the contractor and specialty trades with further coordination and review by the architecture or engineering firm(s). In this scenario, the construction phase also requires considerable ongoing planning and coordination as building assets and systems move through fabrication, shipping and final assembly/connection onsite. You can quickly see how offsite construction can serve as a project delivery method that maximizes the benefits and success of this approach.

Strategic Project Execution Pays Off

As with all important strategic initiatives, the "business of offsite construction" starts at the top, with committed leaders who communicate a clear strategy and strong vision around what the company is trying to achieve (e.g., start with the question: Why are we pursuing offsite construction?). Successful companies typically select an executive-level champion to lead the offsite construction initiative and align all teams with the company's overall project execution vision and strategy. This approach often requires close collaboration and coordination across different business groups and ultimately helps build a better business.

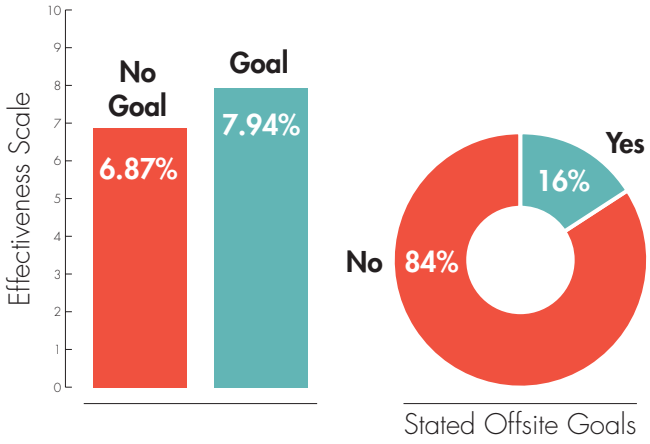
An interesting finding in our owner study confirms the importance of looking at project execution holistically and planning for it strategically. Exhibit 3 shows owner organizations that have formal offsite construction goals perceive such projects to be more effective compared to owners without strategic goals.

In our work with contractors, we often come across situations where a project manager or superintendent experiments with offsite construction on a project-by-project basis. But offsite construction is not something you can just dabble in and expect to see big returns from. It is an entirely different business philosophy that must be a fundamental part of the corporate strategy. Otherwise, it just ends up being a very expensive mistake.

The same goes for owner organizations. Unless offsite construction is fully understood and supported at all levels and an integral part of a corporate project execution strategy, with measurable goals and objectives, it will not be successful.

Atul Khanzode, Ph.D., head of technology and innovation at DPR Construction, confirmed, "The challenge with doing prefab is, it's not just thinking about prefab. Instead, it's more about thinking of how your prefab strategy fits within the overall strategy of delivering a project."

Exhibit 3. Do you have stated offsite construction goals?



Source: 2017 FMI/CURT/CII Offsite Construction Survey

Wanted: A New Era of Collaboration

As with many new concepts (though prefabrication has existed since the '60s), success breeds success. In fact, offsite construction is no different than any other innovation, and therefore it is essential that industry players alter their mindset and get educated on the benefits and dynamics of this proven delivery method. Everyone will need to be open to new approaches to designing, manufacturing, sequencing and putting construction projects in place. Collaboration and partnering skills will be paramount, for example:

- Owners will need to be more educated around the planning, sequencing and pricing of offsite construction and will play a critical role in selecting the right teams.
- Architects will need to embrace the possibilities and constraints of offsite construction, including concepts such as miniaturization, which could apply to megaprojects in the future.
- Engineers will need to become familiar with the manufacturing processes and opportunities associated with various prefabricated components.
- Manufacturers, contractors and specialty trades will need to become involved in project discussions at the outset and well-versed in modeling and designing project components.

If it's planned and managed correctly, offsite construction will improve productivity dramatically in the coming decades. The risks and rewards of this delivery approach must be shared among all parties that contribute to value creation. This will call for better coordination and alignment among owners, designers, fabricators and contractors, and ultimately lead to a more productive and safer industry.

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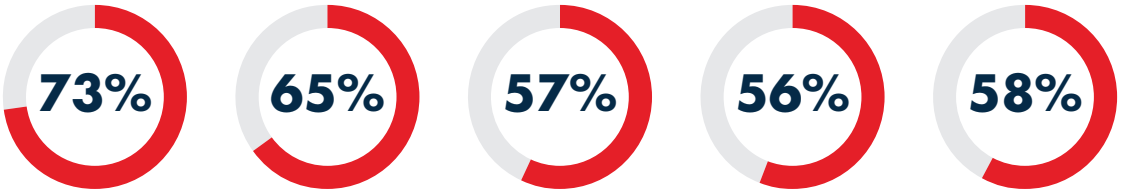
FMI Client Highlights



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