

AIA Practice Management Digest – July 2018

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Tech Trends

Manage exposure to common cyber risks, learn about virtual practices, contemplate digital realm impact, and innovate with a virtual design and construction delivery process.

Letter from the editor

By Sara R. Boyer, AIA, LEED AP BD+C

A personal technology apocalypse: a Revit fatal error, C4R is down, online meetings aren't working, conference call lines are inaudible, emails bounce, our home WiFi and repeaters are on the fritz, all the contacts on my iPhone are gone, even my turn signal is malfunctioning. If someone said the gravitational pull of the earth was off, I would have believed them. As this issue of the Practice Management Digest wrapped, this was my week, a personal technology apocalypse. We have come to expect technology to work. And when it doesn't, it's Operation Code Red.



What if we change our expectation? The authors of the articles in this issue of the Digest outline various strategies to change our expectations and to make technology work for us.

“Cyber risks in an architect’s typical day” by Kevin J. Collins, RPLU, Associate AIA delineates 10 specific security essentials to create a more secure environment for your business.

Ricardo Rodriguez, Associate AIA makes an intriguing point that our profession is highly creative with analog business practices. Check out the list of industry disruptors in his article “Surviving the end of architecture.”

Read about the transition from traditional two-dimensional to model-based deliverables in “the inherent value in leveraging a Virtual Design & Construction (VDC) Process by Brian Skripac, Associate AIA.

And compare two approaches to the virtual office, one as the transition of an existing firm and one as the business model from the start in “Building an office without walls” by Craig Park, FSMPS, Associate AIA and “Business in the cloud: Building a virtual architectural firm” by Peter S. Macrae, AIA, respectively.

The overarching theme of Tech Trends can be far reaching. These articles offer practical and relevant perspective on a few of the current trends impacting our industry. What trends are you seeing in your firm?

I would like to especially thank [Seth Anderson, AIA](#) for his service as editor of the *Practice Management Digest*, as well as his mentorship as I step into the role.

Features

Cyber risks in an architect's typical day

By Kevin J. Collins, RPLU, Associate AIA

Architects encounter cyber risks every day, often without considering the implications of the risks they face. Building awareness and creating greater understanding of the common cyber risks will help architects manage their exposure to hackers and other bad actors.

Building an office without walls

By Craig Park, FSMPS, Assoc. AIA

The Sextant Group made the move from brick-and-mortar space to home offices for more than two-thirds of their staff. Here's how building a collaborative culture, empowering employees, and using the technologies they specify has been positive for both their staff and their clients.

Surviving the end of architecture

By Ricardo J. Rodríguez De Santiago, Assoc. AIA, LEED AP BD+C

Architecture portrays itself as being highly creative, yet its business practices are decidedly analog. We need to challenge the notion of what it is to be an architect *sans* archaic labels by expanding our digital toolkit, providing cross-disciplinary services, and driving value through data-driven insights.

The inherent value in leveraging a virtual design & construction process

By Brian Skripac, Assoc. AIA, LEED AP BD+C

Virtual design & construction evolves our integrated and collaborative project delivery methods to enable our industry to transition to model-based deliverables. This shift—and its results—ensure greater value while achieving our clients' goals.

Business in the cloud: Building a virtual architectural firm

By Peter S. Macrae, AIA

One architect shares how he launched a virtual firm—leading to tangible benefits for clients, employees, and the firm—and tapped into the global marketplace.

Contribute to the Digest

The next issue of the *Practice Management Digest* will investigate “Prosperity: Firm Culture.”

Join the conversation and share your firm's culture with *Digest* readers . Submission deadline is Friday, July 27th.

We are always looking for topics that you would like to see addressed in an edition of the *Digest*. If you have topics related to practice management that you'd like explored or articles you would like us to consider, please contact Sara Boyer, AIA, at sboyer@moodynolan.com.

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Cyber risks in an architect's typical day

network.aia.org/blogs/kevin-collins/2018/07/03/cyber-risks-in-an-architects-typical-day

By **Kevin J. Collins**, RPLU, Associate AIA

Architects encounter cyber risks every day, often without considering the implications of the risks they face. Building awareness and creating greater understanding of the common cyber risks will help architects manage their exposure to hackers and other bad actors.

Understanding cyber threats: The broad brush

Many of the notable data breaches that occurred over the last few years were the result of attacks that exposed credit card data and volumes of personally identifiable information. These breaches potentially compromised the safety of the affected organizations and endangered the security of millions of individuals who were exposed to the possibility of identity theft.

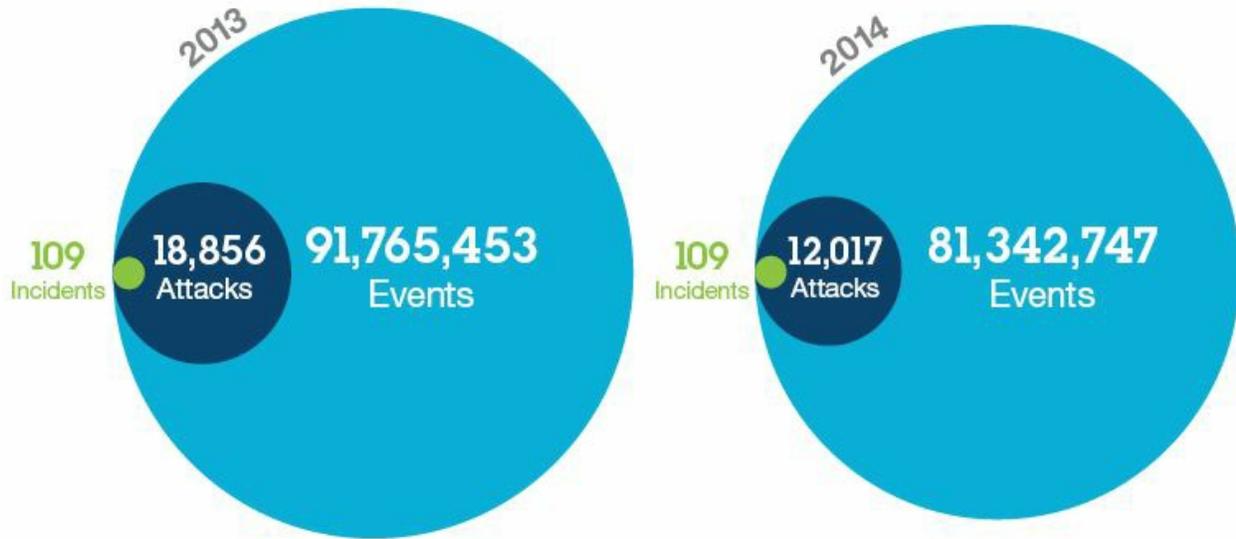


As an architect, if you don't think you need cyber protection or don't believe someone would want to hack into your system, you may already be in trouble. It's tempting to think that your practice is small or not well known, or if you're not in one of the most frequently attacked industries, you may not have much to worry about. Unfortunately, that is not the way hackers are thinking. Companies of all sizes and in all industries are at risk, including architects.

Different types of cyberattacks:

- **Security event:** an event on a system or network detected by a security device or application.
- **Security attack:** a security event that has been identified by correlation and analytic tools as malicious, activity that is attempting to collect, disrupt, deny, degrade or destroy information system resources or the information itself.
- **Security incident:** an attack or security event that has been reviewed by an analyst and deemed worthy of further investigation.

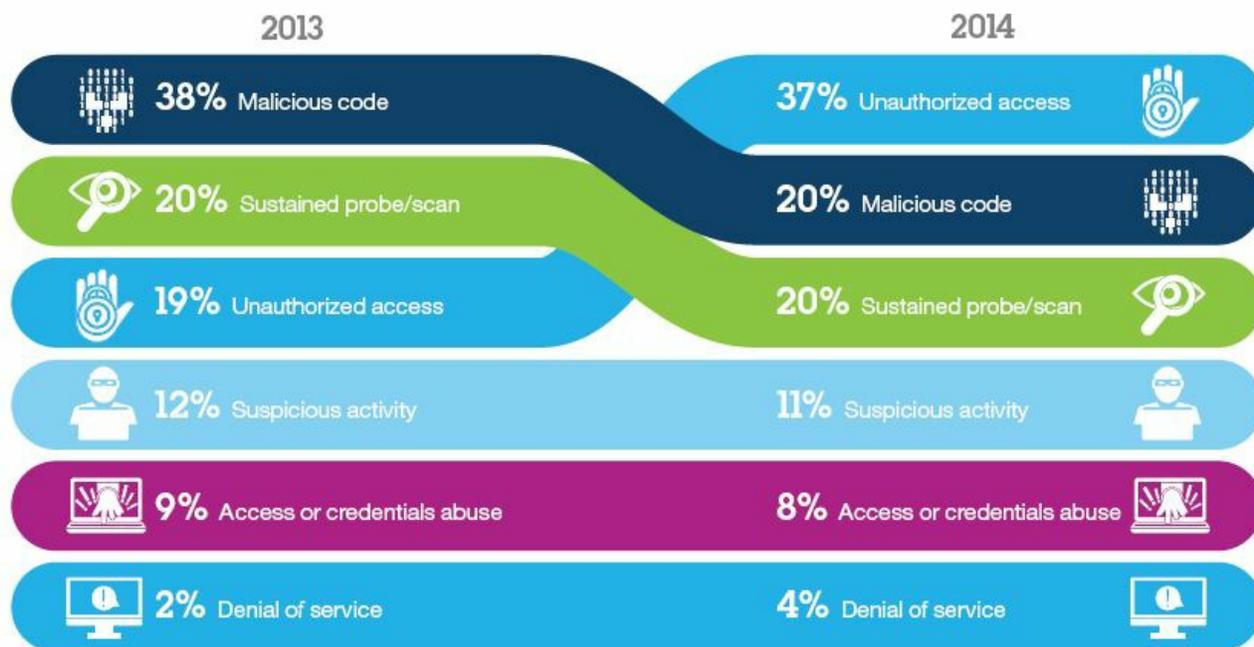
Average annual security events, attacks and incidents



Recent trends: How the cyber risk is evolving

Over the past few years, malicious code and sustained probes and scans accounted for most of the security incidents. However, all that changed in 2014 when certain types of unauthorized access incidents rocketed to the top, accounting for 37 percent of the total. However, with an ever-expanding array of malware for which attackers may choose—including viruses, worms, Trojans, spyware and adware—it seems certain that malicious code incidents will continue to wreak havoc for the foreseeable future. Attackers are typically interested in finding the path of least resistance and these methods can provide that.

Categories of incidents among the top five industries



attribution to IBM Security Intelligence 2015

Everyday cyber risks of architects: Recognition is the first step to mitigation

Business Interruption: AAA Architects, Inc. launched a new website allowing users to access their projects, schedule meetings and appointments, and monitor the architects progress. One month after the website launched, the website was compromised by a distributed denial of service (DDoS) attack by a hacker. It took nearly a week for AAA Architects staff to bring the website back online. They had been the victim of a DDoS attack that disabled the company's network and online services.

Cyber Extortion: Smith & Smith, LLC, a mid-sized architecture firm, held confidential information on many of their clients. A hacker based in Russia gained access to their computer system and sent an email with a copy of a project file from one of the firm's clients. The hacker threatened that unless they are wired \$250,000 they would not only shut down the firm's computer systems, they would also publish all the data obtained from the system.

Digital Asset Loss: XYZ Architecture just put the finishing touches on a set of 3D CAD drawings for a new academic building at a local university. The firm sent out an internal communication thanking everyone for their hard work on the project and announcing that the job was nearly ready to deliver to the project owner. Later that night, a disgruntled IT administrator accessed and destroyed the CAD files, destroying months' worth of hard work and putting the firm in danger of losing its contract with the university.

Telephone Toll Fraud: ABC Architects, LLP installed a VoIP telephone system in their new office location. The firm had several international projects and the VoIP system offered by their local telephone carrier had attractive rates on international calls. Two months after opening the

new location, ABC Architects received a telephone bill totaling \$175,000. Upon investigating the phone bill, they discovered hundreds of calls placed on the last Saturday of the previous month. They determined that they were a victim of telephone toll fraud. Hackers had breached their VoIP system and routed hundreds of phone calls through a premium 900 number. The phone carrier claimed ABC Architects did not have strong internal controls in place and refused to let them out of the bill.

For each of these instances, there is a preventative measure that would have well served the architectural firms that were victimized.

A call to action

Architects must educate their employees, clients, and vendors to these risks and take the appropriate actions to protect their information. **Follow these security essentials to create a more secure environment for your business:**

- **Build a risk-aware culture** - Whether you open a dubious attachment, use an infected flash drive, or fail to install a security patch on your laptop, everyone is at risk. Educate your employees about cyber risks and the measure they can take to protect themselves and the company.
- **Manage and report all incidents** - Report all cyber-attacks and potential attacks to local authorities or insurance carrier. Security breaches that occur at different companies or different locations may be related, but this can only be discovered if incidents are reported and analyzed.
- **Defend the workplace** - Ensure all devices connected to a network - from a laptop to a printer to a smart TV - are up to date with the latest security software and follow all cyber security management and policy enforcement. Ensure frequent, regular system backups are performed.
- **Security by design** - One of the biggest vulnerabilities in information systems - and wastes of money - comes from implementing services first and add security on as an afterthought. Build security into your network from the beginning and maintain regular tests to track conformance and compliance.
- **Keep it clean** - Cyber criminals target people and businesses that are using old, out of date software. Maintain a comprehensive security system and install necessary updates and patches as they are released.
- **Control network access** - Companies that channel registered data through monitored access points will have a far easier time spotting and isolating malware.
- **Security in the clouds** - If your company utilizes public cloud data centers, ensure you have the tools and procedures in place to monitor possible threats and isolate your data from other companies in that data center.
- **Patrol the neighborhood** - Ensure your vendors and clients are also aware of your risk-aware culture.
- **Protect the company's crown jewels** - Every company has crown jewels, whether it is scientific data, acquisitions documents, or clients financial and person information. Whenever your company carries out an inventory, critical data should get special

treatment, guarded, tracked and encrypted as if the company's survival depends on it.

- **Track who's who** - Ensure you have procedures in place to manage the access and permissions of your employees. When an employee leaves, you must have the control to revoke immediately any access they have to company, client, and vendor information.

Conclusion

Although dealing with risks such as professional liability, client expectations, and solving difficult design issues are often easier to address, more interesting, or may be more top-of-the-mind for every architectural firm, understanding that you are a business and are not immune to the risks of technology and cyber-crime is a vital first step to addressing these risks proactively. Implement the 10 steps listed above. Consider cyber liability insurance to protect your firm—and find out more about it in [The Architect's Guide to Buying Cyber Liability Coverage](#)—to help transfer your cyber risks, evaluate the cyber liability policy options available to you, and select the best match in terms of limits and coverage to meet your needs.

Kevin Collins, RPLU, Associate AIA, is a Senior Vice President with Victor O. Schinnerer & Company, with more than 20 years' experience working with design firms and other construction-related professional service firms on issues of professional liability exposure and business risks. He has spoken extensively on challenges to the design profession and a wide array of practice management issues. For more information you can reach the author at Kevin.J.Collins@Schinnerer.com or 301-951-5412.

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Building an office without walls

network.aia.org/blogs/craig-park/2018/07/03/building-an-office-without-walls

By **Craig Park, FSMPS, Assoc. AIA**

Over the past eight years, national technology and acoustical consultants, The Sextant Group, headquartered in Pittsburgh, PA made the move from brick-and-mortar space to home offices for more than two-thirds of their staff. From fixed base to virtual space, building a collaborative culture, empowering employees, and demonstrating the productive benefit of the technologies they specify, has been a positive for both their staff and their clients.



Improving communication without boundaries

Since I joined The Sextant Group in 2010, opening our Midwest office in Omaha, NE, we have grown from a staff of 50 in then five offices — Pittsburgh, Atlanta, Phoenix, Santa Barbara, and Omaha — with a just a handful of SOHO (single occupant home office) staff. Today, Pittsburgh remains the lone leased office space for 30 of our employees, and we have nearly 50 home-officed employees (including our president and CEO, Mark Valenti) spread out across the country, organized into 11 location-based teams.

As a text book baby boomer, I initially resisted the home office trend. My local business plan called for renting an office space and expanding our staff as the business grew. After five years, as first our lease came due renew, we realized that with clients spread in a widening circle from Omaha to Minneapolis, St. Louis, Chicago, and Denver, it was extremely rare to have anyone come to us. Further, only two of our five staff were close enough to use the space on a regular basis; three of the staff living 3-4 hours away.

The Sextant Group's organizational model is what business author Tom Peters would call "a *blueberry pancake model*" — very flat, very thin, and all blueberries are created equal (some a little more equal than others).[1] The Sextant Group operational approach is based on a matrix organization teaming technical and production expertise — which can be anywhere — with project proximate local/regional principal/project management leadership developing relationships and supporting our architect and end-user clients.

Creating culture across time zones

As technologists, most of our staff are comfortable with the varieties of electronic communication and collaboration tools we recommend daily for our clients. But most of us are also used to working in small teams in shared office space. Shifting our culture from place-

based to technology-based took some effort.

We created a taskforce group to evaluate communication options. Our younger millennial cohorts were both eager to lead and the first to embrace extensive use of a desktop collaboration software (Teamwork) that offers phone and tablet apps for messaging and project task monitoring. We combined those tools with secure VPN connections and cloud-based virtualized CAD (Revit & Bluebeam) and workplace software (Microsoft 365 & Deltek Vision), implemented firmwide desktop video (initially GoToMeeting; now Skype for Business), and upgraded our voice communication with an Avaya VoIP phone system.

The increased use of desktop video has had the greatest impact on cultural shift. All staff, project, marketing, and purpose-based taskforce meetings utilize video given the disparate locations of the participants. Video augments not only formal meetings, but informal conversations as well. We often find teams working during the day with live video connections between designers and project managers as they collectively work through a project analysis and recommendations.

Enhancing collaboration without travel

Image: Mark Grassi, Principal and Director of Design, The Sextant Group, in his home office in New Jersey



As consultants to the architectural community, our face-to-face client interactions are primarily marketing- or project-driven. An initial reason we considered home offices was the challenge of finding good people in the places we had already leased space. Ideally, we would find talented technology designers, project managers, CAD operators, and marketing and business development staff in the proximity of an existing office.

The reality was more challenging. We found good staff, but in many cases, they were an uncomfortable or unproductive commute from our physical offices locations. Our SOHO model accommodated the growth we required to meet our client's project needs and allows us to expand geographic coverage and business-to-business connections.

In a recent Harvard Business Review article, Tsedal Neeley cogently noted that *“trust can develop early when managers endorse virtual team members during introductions by highlighting relevant or important experiences, or when team leaders explicitly set rules requiring frequent communication to reduce uncertainty and foster trust.”*^[2]

Now, as new employees join the firm, email introductions go out to all staff, and face-to-face video introductions are included in bi-weekly principal and project management, marketing and business development, design and operations meetings. Project team meetings are also regularly conducted using desktop video.

Embracing virtual connections

Mike Finley, co-founder of AI-analytics company, AnswerRocket, observed, *"The smartest office may be no office at all. With people working where they want to be, productivity and morale improve, while costs fall. The outdated idea of 'eyes on' supervision can be replaced by real measurements of progress, in real time, by tools that connect business processes to profits. Video augmented meetings are already taking shape and enabling a new level of collaboration."*^[3]

With the shift to virtual officing, The Sextant Group sees real value from both an employee satisfaction and effectiveness perspective. At the same time, it reinforces our ability to connect with our clients regardless of where our services are based. The potential for the virtual workplace has dissolved the traditional boundaries of the place-based office and had a positive impact on our employees' attitudes and the quality of the work we produce.

[1] Peters, Tom, *The Pursuit of Wow!: Every Person's Guide to Topsy-Turvy Times*, 1994, Vintage Books

[2] Neeley, Tsedal, *How to Build Trust with Colleagues You Rarely See*, Harvard Business Review, January 2018

[3] Uzialko, Adam C., *The Smart Office: How Connected Tech is Redefining the Workplace*, Business News Daily, October 2016

Craig Park, FSMPS, Assoc. AIA is principal in the Omaha office of The Sextant Group and has been active in the building industry as a technology consultant for over 40 years. Park is a past Associate Director for the AIA Omaha Chapter. He received a BS in Architecture from California Polytechnic State University in San Luis Obispo. You can reach him at cpark@thesextantgroup.com or 402-932-6121, x341.

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Surviving the end of architecture

network.aia.org/blogs/ricardo-j-rodriguez-assoc-aia/2018/07/03/surviving-the-end-of-architecture

By **Ricardo J. Rodríguez De Santiago, Assoc. AIA, LEED AP BD+C**



Do you think contemporary architectural practice is averse to the digital realm? Our profession portrays itself as being highly creative, however, its business practices are decidedly analog. This article provokes the *status quo* and introduces the technological advances that set the stage for business models rooted in 21st century solutions.

An inconvenient truth – A critical look at our profession’s role

A *Fast Company* article asked a cross-section of innovation and technology sector leadership, which would be the jobs design professionals would have in the next decade? The list read like something straight out of *Blade Runner*: augmented reality designer, avatar programmer, chief design officer, chief drone experience designer, digital conductor, embodied interactions designer, human organ designer, machine-learning designer, real-time 3D designer, simulation designer, etc.[1] Noticing the lack of Architects within the list, I questioned how did the industry that was so enamored by object-oriented and data-enabled design, namely BIM, not appear in a list of the “it” professions of the future? Some would argue that their responses are indicative of not only an industrywide problem of adaptation speed, but that of relevance.

The main concern, regarding relevance, is that architectural firms tend to lack control, confidence, or even competence over the critical metrics which define its’ practice. The low margin/productivity/scalability nature of their work and a highly segmented knowledge framework are a detriment to their scope, stability, connectedness, effectiveness, and resiliency of their businesses.[2] While I am critical of how we practice our craft, I’ve always pushed firms to embrace the use of emerging technology, not only for 3D development, but to allow them to understand design problems more comprehensively. An expanded view of practice would allow for open collaboration, processes aligned with key performance indicators, and to empower professionals in tangibly communicating the undeniable value they bring to

communities. So, beyond the discussion on “what” would be possible in the immediate future, we should be more interested on the “how” we will practice. This is especially important considering that nearly all the technological toolkit required already exists.[3]

Is the end near? – Technological disruptions in the AEC industry

Much of the technology required to provide a wide-range of intelligent design solutions is now reaching consumer-level maturity. It’s thus not a matter of questioning if “the end” for the traditional architecture profession is here or not, the end IS here, it’s just that a great number of us do not have a seat at the proverbial table. To relate the technological singularity theory – *where inventions which will abruptly trigger runaway technological growth, resulting in unfathomable changes to human civilization* - to the architecture professions, there’s a real opportunity to develop a myriad of practice models fully-empowered by their digital arsenal.[4]

The fourth industrial revolution – also referred to as Industry 4.0 or X.0 - is upon us, with it we are at the end of the first information age.[5] As nearly every other industry, except hunting & agriculture, have plunged into a new era, the tools required to navigate in it have the promise of disrupting our practice beyond what the current inherent growth within traditional firms would allow to cope with.[6] User-experience design, generative design, coding and augmented / virtual / mixed reality (AR, VR, & MR respectively), will give way to a fundamental industry shift. Advancements in machine learning and computational design will allow for on-the-fly building-code research, and automatic space planning. Likewise, data analytics will permit us to both quantify and qualify the impact of our work. In this new era, through documented R&D, “standard-of-care” will finally be focused on creating human-centric and environmentally responsible spaces.

As a means of understanding the major changes affecting AEC practice, let’s summarize the main disruption influences and their potential impact to our businesses: [7]

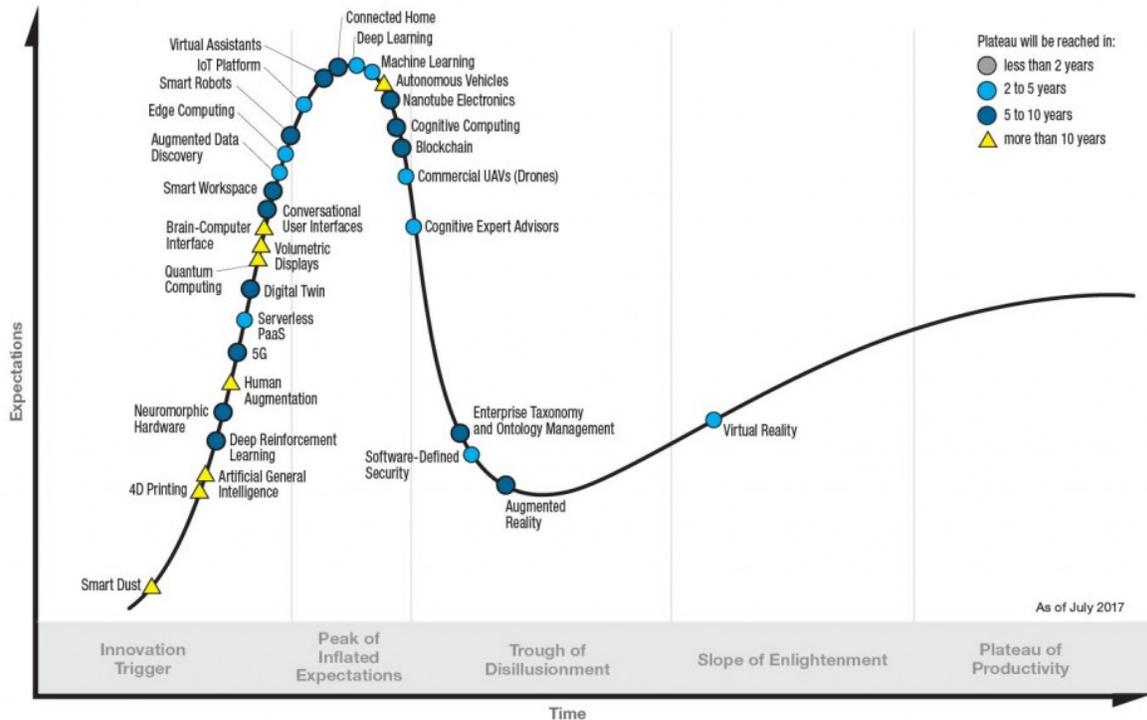
1. **Personalization**—Personalization is a common vector in the internet-of-things (IoT) discussion. However, as applied to easily-accessible tools, it may allow for customers to potentially circumvent and challenge the Architect’s usual role.
2. **Usage-based pricing**—Customers benefit by being charged only for their actual use. Allows companies to eliminate “broad strokes” and provide alternative services at varying increments.
3. **Closed-loop systems**—using business data and establishing partnerships across the value-chain, firms may reduce operational costs, repurpose assets, and services. With smarter tools, such as automated image processing AI, practices shall challenge commonplace ideas that computers can’t be creative or empathize.[8]
4. **Collaborative ecosystems**—Establish partnerships with value-chain stakeholders and adapt current processes to maximize market engagement. Leverage opportunity with non-traditional partners by identifying key opportunities as manufacturing converges with the AEC industry.
5. **Software as a Service (SaaS)**—Companies shall revolutionize contractual documents authentication and procurement processes by unlocking the access-economy through

asset sharing platforms, cloud-deployed services, computational design, and even Blockchain technology. Firms and clients alike shall interpret data assets and analyze these strategically.

6. **Agility through data analytics**—Develop new business applications, which support real-time adaptation and decision-making. AEC firms sit on a mountain of untapped data, that could give them a competitive edge over competitors.
7. **Haptic interfaces**—How AR/VR/MR environments allow users to interact within the system using bodily movements or sensations. As passive gestural controls, voice-activated solutions, and facial recognition technology matures, the AEC industry will have broader means to interact with its stakeholders.^[9]
8. **Smart materials**—The development of self-healing concrete, kinetic paving, 4D structures (which reshape over specified conditions), photo-catalysts (smog inhibitors), will afford additional life-cycle benefits.

Considering the disruptors mentioned above, we should consider that despite our profession portraying itself as being highly creative, its business practices are decidedly analog. As we weigh the benefits/risks of operating in a fully-digital environment, our strength-weaknesses–opportunities–threats (SWOT) analysis should also consider the cost of obsolescence, loss of competitive advantage, and market irrelevance into the equation.^[10] At the current rate of emerging technology adoption, an unknown third-party (mainly software developers), will have a transformative impact on our workflow, greater than the 2D-3D (CAD to BIM) transition.^[11] Either by poaching talent from architecture firms (brain-drain being a measurable concern), or expanding their value chain, commercial real estate professionals and general contractors will dedicate more resources to expand their sphere of influence over the traditional boundaries of typical design practice.

Gartner Hype Cycle for Emerging Technologies, 2017



gartner.com/SmarterWithGartner

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Gartner

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While job-stealing-robots are not yet at our doors, architects should consider themselves temporarily safe; on the other hand, “architectural drafters”, consider yourself warned. As AEC firms find their technological beachheads and develop more adaptive workflows, their decisions should account for the incorporation of technology currently in the development pipeline.[12] Should we want to be at the virtual design & construction technology table, we must challenge the *status quo* by embracing design-thinking, *Agile / Lean* processes, and adaptive innovation.[13] Taking emerging technology adoption into account, implementation should be done in conjunction with a more robust internal development process, coupled with data-driven research to identify new services, products, methodologies and markets.



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The emerging value chain: Navigating new business models

In a recent special report by Kermit Baker, Hon. AIA - the Institute's Chief Economist - he discusses the "perennial concern" of our profession regarding the availability of sufficient architects to serve the economy's needs.^[14] While the report does note that, "*Many of the fastest-growing occupations will be in the areas of technology (e.g., software developers)...*" and concludes indicating "A 2015 AIA survey of firms looking to fill architectural positions found that more than half reported that finding candidates with either the required technical skills... was a major problem, And this concern does not appear to be easing." When one considers the jobs emerging in the next decade, it doesn't take too much analysis to see how a professional equipped with an architectural, spatial, and design thinking background could thrive in, instead of relying on the technology sector to, at best employ, and at worst replace us.

As a profession, BIM was pursued and implemented with the promise of creating a more coordinated, organized, and collaborative project. However, architecture firms were seduced by the 3D model and documentative aspect of it, and ultimately ignored the "i" in BIM. Up until very recently we did not harvest nor analyze the data we generated, and when we did, it probably was because some jurisdictional agency required it, and not necessarily with the goal of gathering insights for our business practices. Should BIM be approached as a methodology,

rather than a software, several viable opportunities would arise and allow the promise of developing the framework by which the 4.0 revolution interfaces building data with everything. What's in question is whether we will be the ones to lead this effort.

Is design, in the most comprehensive and ample sense, what's essential to the profession? Or is it our destiny to become operators of building documentation? Are irrelevance and obsolescence in our immediate future? They well might be, and maybe "the end" wouldn't be so bad for architectural practice. When recently discussing emerging technology trends with firm stakeholders, most seem to think that most of the technology required to fundamentally disrupt architectural business is a couple of decades down the road, without realizing that they use most of the technology required daily through their smartphones, streaming a movie, or even configuring their dream ride online.

I do not have the definitive answer to any of these huge questions, but from my perspective, what's important is that we continue to challenge the notion of what it is to be an architect *sans* archaic labels, expanding their digital toolkit, providing cross-disciplinary services, and driving value through insights on the data they already have access to. The positive outcome is that the industry might take a turn into providing more comprehensive solutions grounded in digital humanism, which are anchored by experience metrics, rather than arbitrary parameters. In the "data is king" world the physical, cultural, environmental, technological, and even personal contexts can be mapped out to inform design decisions and quantify the intrinsic value proposition of their ventures. At the beginning of February 2018, *Microsoft* deployed a series of TV ads focusing on their AI platform, "*Microsoft AI + Iconem: Preserving History*", I'll let those curious to guess which industry does the ad focus on. **[15]**

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Ricardo pursued a Bachelor of Architecture at the Polytechnic University of Puerto Rico and later worked alongside industry leaders at Gensler, NIKA Solutions (formerly NIKA Architects + Engineers), and an Associate / Project Manager at WDG Architecture. Ricardo recently

transitioned into a Global Virtual Design & Construction / BIM Specialist role at BASF and presented Rage Against the Machines: Surviving the End of Architecture at AIA's Conference on Architecture in June 2018. For comments & contributions, you can reach Ricardo via rjrodriguezds@gmail.com

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The inherent value in leveraging a Virtual Design & Construction (VDC) process

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The inherent value in leveraging a Virtual Design & Construction (VDC) process

By **Brian Skripac, Assoc. AIA, LEED AP BD+C**

Virtual Design & Construction (VDC) is much more than a technology conversation. Instead, it's one that evolves both our integrated and collaborative project delivery methods, as well as team behaviors, to enable our industry to transition away from traditional two-dimensional deliverables to model-based deliverables. This shift and the subsequent results ensure greater value for all parties while achieving the goals of our clients.



Moving beyond the technology conversation

Virtual Design & Construction (VDC) is a concept commonly associated with an architecture or engineering firm's construction partners rather than our internal Building Information Modeling (BIM) discussions. All too often, the industry uses Revit interchangeably with BIM, which is unfair as Revit is simply one of many technologies that can help us generate such a model. In this context, a BIM should be thought of as a noun or an object, as it can be a deliverable for our projects. With this understanding in place, VDC then becomes the process of developing reliable multi-disciplinary BIM(s) to support the Design-Construct-Operate continuum, which provides an opportunity to be a facilitator for the lifecycle of the project, ultimately driving a new standard of care.

Technology can only go so far, innovation in team and process is truly what makes BIM successful. This new standard of care we can facilitate leverages opportunities to advance the project management, project delivery and quality standards initiative in firms similar to the work we're doing at CannonDesign. Here, we are focused on the development of these VDC processes to achieve bottom line cost savings and drive new business opportunities.

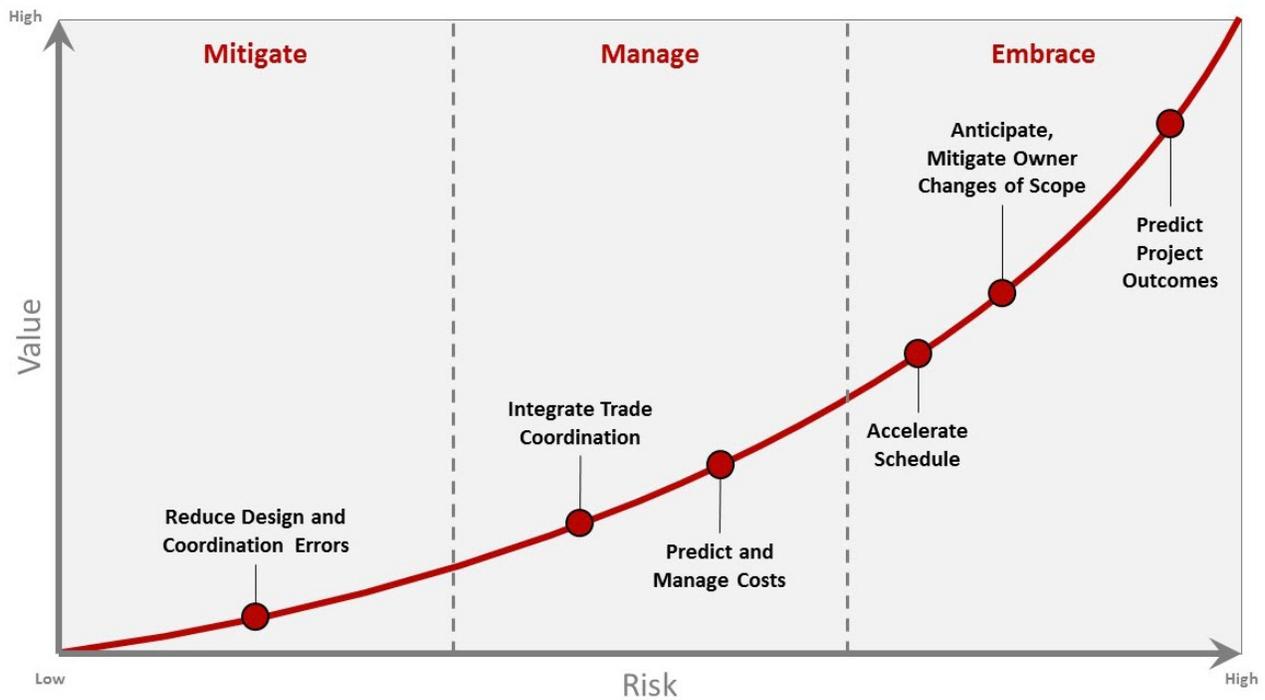
A foundational element to this effort is an ability to transform how we define our deliverables. The need to spend time detailing aspects of the building on needless, redundant sheets of paper that will ultimately be overridden during the procurement and shop drawing phases become waste in the process. This is echoed in Barbara White Bryson's book [The Owner's Dilemma: Driving Success and Innovation in the Design and Construction Industry](#) where she comments that "BIM is the perfect complement to collaborative teams, especially ones that care about the fluidity of information sharing and the coordination rather than the sanctity of drawings."

Leveraging a model based-delivery strategy drives opportunities for a consistent, integrated, and collaborative project delivery method to solve constructability issues through the use of object-based virtual representations affording project participants a common language of the built environment. The resulting workflow enables enhanced certainty of outcome, improved coordination (reduced RFIs and Cost), adherence to budget and scope, and a reduced total cost of operation in accordance with the prescribed level of reliability of our multi-disciplinary BIM deliverables. All of this drives our ability to achieve our client's expectations through innovative project delivery methods and service line integrations.

BIM deliverables to advance project delivery models

As we embark on these new collaborative delivery models like Integrated Project Delivery, Design Assist, Design Build and Progressive Design Build Strategies, being able to leverage a model as a deliverable becomes a strategic advantage to how team collaborate, communicate and drive leaner processes, reducing the redundancy and waste referenced above. This is a compelling topic that served as the basis for numerous presentations at the AIA Project Delivery Knowledge Community's recent 2018 Symposium titled "Delivering the Future." This ability to properly set expectations of what information is critical to be in a BIM, how it should be leveraged in construction, and who will model what elements to a certain level of development (LOD) for what collaborative use cases becomes an extremely important conversation.

Needing to occur from the outset, this is also a discussion that impacts our contract language's ability to identify how the project will be executed. Here BIM execution plans become less about a technology standards or best practice document and develop into a project delivery roadmap that integrates into our AIA Digital Practice Document contract language. Clash detection occurs prior to the release of construction documents and clash prevention part of the design process providing a level of model based quality assurance enabling us to move from a position of avoiding risk to managing risk as seen in Phil Bernstein's Risk vs. Value diagram from the Delivering the Future event.



In a recent project our team worked on, a final clash prevention review at the 90% CD phase demonstrated that in less than 12 hours the project team was able to identify 164 meaningful clashes. The ability to resolve these clashes during design avoids the development of future RFIs that could have resulted in 820 hours and \$111,520 of project time and costs. As you can imagine, the sooner this process starts, the greater opportunity our model-based deliverables have to drive value.

These initial strategies set the expectation of more collaborative project delivery strategies while advocating for enhanced qualifications-based and/or best-value selection processes like those found in Progressive Design-Build models. These strategies also look to engage Design-Assist partners to drive opportunities for schedule alignment and cost control measures as integrated pieces of the design process. These efforts will also catalyze greater prefabrication and modularization opportunities driving positive outcomes to accelerate delivery, provide design certainty, improve quality, and enhance safety. As these advantages are realized, more firms may seek strategic mergers and acquisitions to position themselves as single-source delivery partners. Such entities will be able to thrive in the future thanks to information sharing and repeatable proven processes.

BIM deliverables for owners

While advancing our project delivery methods is important, we need to stay focused on the full lifecycle of the facility. BIM, in and of itself, is not the end, but rather the means to a number of potentially valuable project delivery outcomes for the Owner. This causes us to look beyond the first two or three years of the design and construction process for a facility, to understand how our work can positively affect the next thirty plus years of that building and explore the opportunity for BIM to reduce the total cost of operations/ownership.

Integrating BIM post occupancy is not about technology, it is all about process. Being able to understand how projects will leverage a virtual design and contraction process to execute their work while defining how deliverables will be formatted is a critical conversation that more and more owners are embarking on by creating BIM Project Delivery Standards. Supporting this strategy, the National Institute of Standards and Technology (NIST) quantifies an opportunity for a reoccurring value of \$0.23/sf/year throughout the building's lifecycle through ongoing avoidance, mitigation and delay costs from a more integrate BIM delivery model. At The Ohio State University, they have validated the potential cost avoidance of 7.1 percent on their \$225,000,000 annual construction budget through a fully implemented BIM Standard that we helped them build and implement.

The development of these guidelines is essential to setting up the “fluidity of information sharing” that was discussed earlier. In addition, this gives the facility manager the opportunity to define a meaningful data capture strategy that starts in design and construction phases (not at handover) so it can be more immediately advantageous. The earlier this strategy is defined, the sooner owners can begin reducing the data entry period at the completion of the project from 12-18 months to the click of a button - immediately moving structured facility data into critical operational systems, such as CAFM, CMMS, and GIS.

While there are opportunities for innovation all around us, we must keep in mind the need to continuously improve our project delivery processes and understand how these virtual design and construction efforts can facilitate the evolution of our deliverables. Being able to transform to reliable model-based deliverables from the traditional 2D documents we create today will continue to drive higher levels of collaboration, quality and value for all participants. Whether the opportunity for disruption is in the design, construction, or operation phase for your firm, taking advantage of these opportunities will certainly provide value and keep moving the industry forward.

Brian is CannonDesign's Director of Virtual Design and Construction (VDC) who continually drives innovation by focusing on the process orientation of the firm's Building Information Modeling (BIM)-enabled VDC delivery process. He has 21 years of industry experience, dedicating the last 11 to the integration of BIM and VDC to transform project delivery. Brian has successfully developed and managed BIM-enabled delivery systems for large efforts in Design-Led Construction. In addition, he focuses on the use of building information models to capture and structure relevant facility data to achieve the value a BIM-enabled VDC delivery process brings to facility owners from an interoperable lifecycle management strategy. A thought leader in this field, he is an advisory group member and past-chair of the AIA National Technology in Architectural Practice Knowledge Community and serves on the BIMForum committee responsible for authoring the LOD Specification. You can reach author at bskripac@cannondesign.com.

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Business in the cloud: Building a virtual architectural firm

network.aia.org/practicemanagement/blogs/peter-s-macrae-aia/2018/07/03/business-in-the-cloud-building-a-virtual-architect

By **Peter S. Macrae, AIA**

One architect shares how he launched a virtual firm and tapped into the global marketplace.

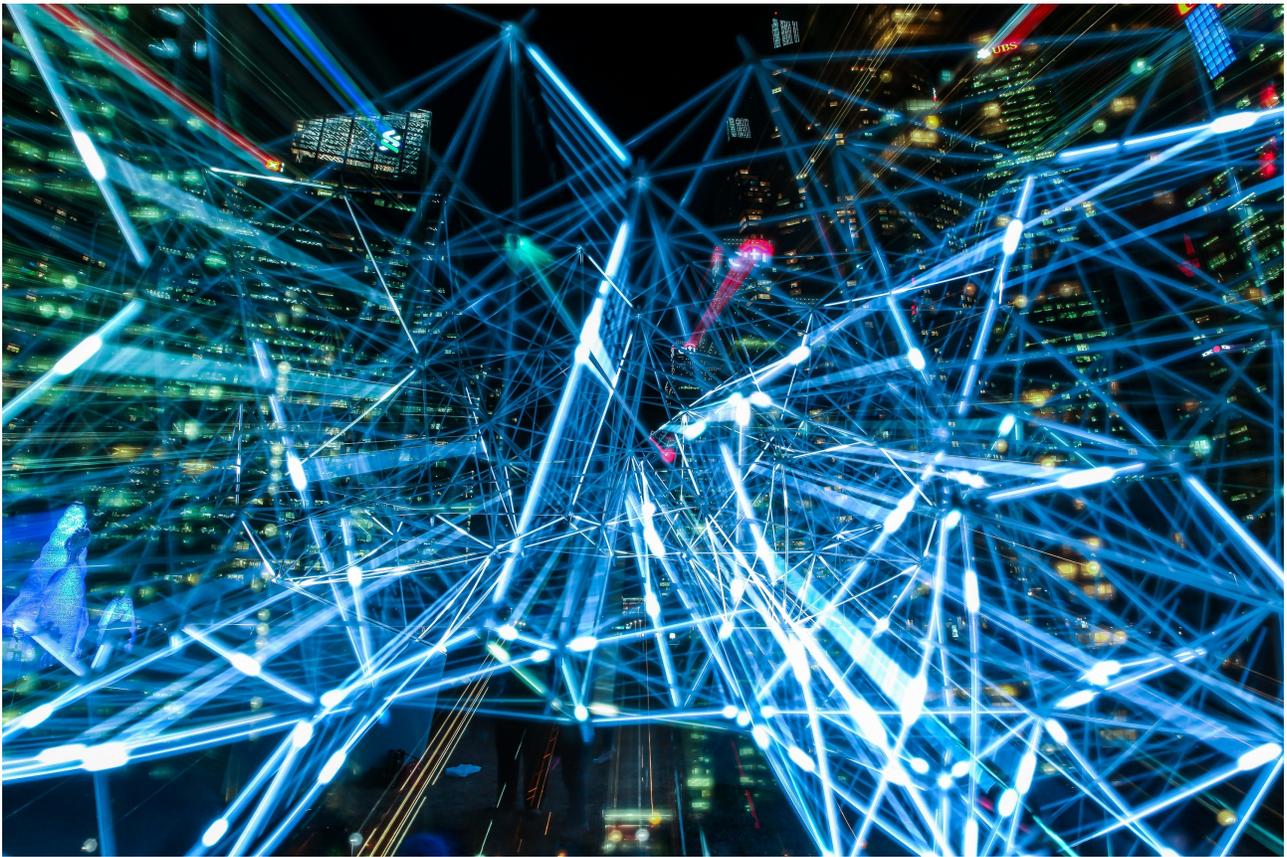
Establishing the firm: A notion

Like many of you, I was impacted by the 2008 recession. My firm was at a precipice, and as a result, we had to reduce our staff. We felt badly about having to let go of many bright, competent, and creative people.



Then the epiphany arrived: The world had changed so much in my 40 plus years as an architect, but the architectural practice model hadn't. When I started working, architects were mostly men bent over their drafting boards, covered with T-squares, lead holders, triangles, and protractors with piles of diazo-prints strewn across the layout tables. I can't tell you how many times I hit my head on that balanced-arm lamp. The new practice reality is that today, emerging professionals are no longer dialoguing across their workstations. Instead, they are wearing ear-buds and virtually sharing ideas and drawings—all digitally. When my wife reminded me that we were supposed to be spending our 60s traveling, a national architectural virtual practice model became an economic and personal opportunity.

The first thing I did was talk to my attorney and accountant. Having 38 state accreditations through NCARB certification was a huge asset. After establishing the legal and financial foundation, I then set out to collect a flexible and talented staff. To diminish fixed costs, such as payroll and health care, we decided that each employee would be an independent consultant or a "solopreneur." And from day one, we had a positive cash flow, and I am able to conduct business between sips of coffee in a café in Columbus, Sydney, or Paris.



The benefits of a virtual practice

Presently, we have nearly zero fixed overhead expenses. Contrast this with a traditional bricks and mortar firm, which has to navigate fixed costs such as rent, employee payroll and benefits, computer hardware, infrastructure, and printers. The virtual architectural practice model is far more flexible. In fact, it is all but recession proof since it can grow and shrink with market fluctuations. I never have to “fire” anyone because our employees are independent businesspersons. Our entire practice is cloud-based; therefore, we do not have to buy and maintain servers, expensive programs, or equipment. It’s all paperless, stored and retrieved virtually. I can complete most of my work with a cellphone or a laptop, and we use a local print shop to process, sign, and seal drawings. All of our expenses are directly billed to projects, and are not only reimbursable, but profitable with markups.

We have learned that the virtual architectural practice model is ideal for millennials who prefer flexible work arrangements: Parents can raise children and work from home, while the recreational-minded can go for a hike or a swim in the middle of the day. Of course, virtual firms need project managers, interior designers, drafts-persons, engineers, 3-D modelers, and a host of other collaborators. Team members are assembled only if needed for a project. Currently, we have grown to six teams that work on various project types around the world. Last year we completed 150 projects nationally and also collaborated on select projects in Australia, New Zealand, Canada, and Mexico.

An incubator of solopreneurs

We are in business to do business. With each project, I analyze what is required, then assemble the resources and talent from across the country. I saw very quickly that I needed to empower my employees. Indeed, my solopreneurs manage themselves. Their income is consistent if they work efficiently and effectively. In particular, I ask my contractors to help identify future projects, and then we develop them together—sharing the risks and rewards. It's a “win-win” for all of us, and we are all paid when we receive remittance from the clients. Moreover, I only perform the tasks for which I am most suited, and I delegate the rest to the most qualified. For example, architects are often asked to perform countless site visits. But, if an electrical engineer or a contractor is better suited for that particular task, I send them instead. The client benefits because of diminished costs and delays.

Surprisingly, there have been few tech challenges with a virtual practice. My firm uses a variety of online resources such as Skype for meetings and Dropbox or WeTransfer for project collaboration. In fact, my personal time is spent more constructively. I do virtual networking at flexible times and, amazingly, I have not had to do any marketing since initiating a virtual practice—we have gone “viral.” We are not limited to small projects, having recently collaborated on projects as large as \$30 million.

One of the things I am most excited about is how our firm mentors aspiring architects. College students work for us at a lucrative hourly rate, using their unique software skills that they may not be able to apply to actual building projects in the university setting. Plus, each student builds greater independence while earning Architectural Experience Program (AXP) credit. Going virtual has been the best decision of my career. We have creative and highly skilled collaborative consultants. Solopreneurs have enjoyed consistent, meaningful, and lucrative ventures, realizing powerful independence for all participants. With a virtual architectural practice model, the world is now our marketplace.

Peter S. Macrae, AIA, NCARB, has 40 years of experience in architectural design, project management, and business development and his focus is on the acquisition and design of environmental projects, both nationally and internationally. As principal of Macrae ARCHitecture, LLC, he has led the design and development of several large-scale, mixed-use master plans in several states. His projects have won numerous national design awards and have been published in a variety of national and international publications. Peter currently serves on the national AIA Project Management knowledge community leadership group.

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