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CBD STRATEGY MEETING

Smart | Sustainable | Safe

The following are highlights shared by some of the discussion group facilitators from the CBD Strategy Meeting on March 29, 2017 in San Francisco.

Visit our NCS Madison blog for more insights gathered from the CBD Strategy Meeting, and share your thoughts on any of these discussions with us on LinkedIn and Twitter.

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PROTECTIVE DESIGN

Peter D. DiMaggio
Senior Principal and Weidlinger
Protective Design Practice Leader
Thornton Tomasetti

> Threat definition is growing.

Discussion Summary

What is Protective Design?

Protecting against threats, discussing the current state of the art, and determing what's in store for the future.

Types of Threats:

- Physical Attacks (Bombs/Active Shooters), Cyber Attacks (Data Breach/System Shutdown), Chemical Biological Attacks, Information Theft

What types of facilities do we protect?

- Office Buildings, Commercial, Museums, Libraries, Federal Buildings, Transportation (Bridges, Rail, and Tunnels), Public Assembly Venues (Stadiums, Arenas, Convention Centers), Treatment Plants

Project Management and Execution

When should we get involved?
- As early as possible

What are the hurdles to getting Protective Design included in a project?
- Cost, Schedule, Aesthetics, Programmatics, Perception, Free society vs. Big Brother mentality

What would increase an owners desire to include Protective Design?
- Insurance Industry, Safety Act, better understanding of ability to be cost effective

How could we increase communication among stakeholders?
- Outreach, Education

How has this changed?
- New threats, new techniques to address threats

Where have the biggest advancements in the industry been made?

Materials, computational modeling, simulation techniques, awareness of the threat

Takeaways

Industry is changing at the fastest rate in recent history, emphasis on holistic, multi-hazard design, Public Assembly Facilities require new design approach, threat definition is growing.

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BUILDING INFORMATION MODELING (BIM)

Cliff Moser
Director BIM Services, Planning Design and Construction
Stanford Healthcare

> We haven't begun to use the BIM database as much as we could.

Discussion Summary

Opportunities and Challenges of BIM

> Current relationships with BIM processes and the future of BIM.

Current Usage of BIM
Designers and constructors have been using it for years for coordination, take-offs, and scheduling. But that it was still seen as electronic drawing and not a data-repository. Current processes totally miss opportunities to utilize the data in a model for operations.

Where is the BIM world going?
It won't remain where it is today - as little more than the next generation of CAD

- **For architects:** starting to utilize its database features, and creating room data sheets that could be plugged into models to build up generative floor plans, sections, and elevations.
- **For contractors:** beginning to use BIM for generative routing of systems against other systems.
- **Owner experience:** facilities management team know there are great things available to them in the model, but the last thing they wanted to learn was modeling.
- **Takeaway:** Future self-updating models will be a thing. And the need to learn software or have certain hardware requirements for drawing, modeling, and facility operations would no longer be necessary. In this case, BIM linked to IoT.

BIM Shared Learnings

- The use of BIM needs to rise above electronic drafting.
- We haven't begun to use the BIM database as much as we could.
- BIM for Facility Management and Operations is an open opportunity.

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THE MOVE TO THE INTERNET OF THINGS (IOT)

Cliff Moser
Director BIM Services, Planning Design and Construction
Stanford Healthcare

> IoT means different things to different users.

Discussion Summary

The Future Impact of IoT

> Predicting the affects of future IoT based on a shared case study.

Personal Example
I opened the session with the story of my daughter getting hit by a car while riding her bicycle in 2013. She suffered a broken leg. But the technological tools that were in place in 2013 (4 years ago) - an emergency phone call, an ambulance arrival and triage, a trip to ED and the following aftercare - have not changed significantly.

Based on this personal example, how will things be different in 2023, and how will the Internet of Things affect these changes?

- She wouldn't have been hit by a car, because of self-driving sensors.
- If she was hit, then all of her wearable sensor tech, would have notified us (here parents), as well as her doctor, and then emergency responders who would have known her vitals before arrival and taken care of her immediately.
- Perhaps even a self-driving ambulance would have already been dispatched and began care on the way to the ED.
- Once treated at the hospital, we would have met her at the ED and monitored her follow-up.
- Sensors would have ensured that she follow her physical therapist's requirements (by sending data regarding her exercise requirements).

Key Learnings

- IoT means different things to different users. Augmented Reality, Building Sensors, Find My Phone, etc.
- Internet connected equipment is open to hacking.
- The future doesn't look anything like we can imagine today.

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DRONES IN CONSTRUCTION

Brian Konie
Chief Information Officer
O'Neil Industries, Inc.

> Drones are a method of putting tools (cameras, laser scanner, RFID scanner) in places that would otherwise be inefficient, impractical, or unsafe to access by a person.

Discussion Summary

Drone Usage Methods, Rules, and Risks

Guidelines, different uses, and potential hazards of construction drone usage.

Legal Framework:

- Operators need to be licensed with the FA, Drones need to be registered with the FAA and labeled, and be sure to follow all guidelines on the FAA website
- Add licensed pilots and drones to your insurance policies
- Consider untiring drone management platforms such as Skyward to organize drone usage and logging

Uses beyond aerial photography:

- Inspecting industrial piping
- Farmers utilize special cameras to determine crop health
- Safety Inspections in limited-access areas
- Topography mapping / surveying with LIDAR imaging devices
- Heavy civil contractors use for pre-bid data gathering
- Thermal imaging
- Materials management using RFID tags/scanner to locate and track items
- Imaging prior to concrete pour to double check location of PT cables, conduits, etc.
- Material quantity measurement
- Photogrammetry techniques to compare installed work to a BIM model
- Progress monitoring, comparing installed work to a 4D schedule.

Risks of using Drones

- Legal liability if unregistered device, unlicensed pilot, flying in restricted air-space, etc.
- Physical risk seems minimal with operational caution, especially on construction sites where PPE is mandated
- The amount of data generated is so immense that it is nearly impossible to comb through all of it, and in a litigation scenario, a discovery team might find a crucial detail that went unnoticed by operations
- Evaluate whether it is more cost effective to own or to procure 3rd party services. Factors to consider include insurance cost, hardware cost, operator time, storage cost and software cost.

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ENTERPRISE MOBILITY

Brian Konie
Chief Information Officer
O'Neil Industries, Inc.

> Define company workflows first, and then match tools to the process.

Discussion Summary

Defining Enterprise Mobility and its Impact

> Processes for choosing the right tool and handling challenges.

Tips for choosing the right tool:

- Define a process for vetting mobile apps
- Define company workflows first, and then match tools to the process
- Promote innovation via challenges, hackathons, innovation rooms, or other ideation methods
- Manage the "shiny nugget" syndrome - the prettiest, newest tool may not be a good fit
- Focus on improvements in construction process and construction cost
- Rotate operations personnel into IT to help vet tools and define process

Mobility and distributed data creates new challenges:

- Defining and managing the single source of truth
- Ensuring the accuracy and integrity of data from multiple apps
- Look to vendors to provide an audit trail for their data
- What is the owner handoff if the data resides in multiple systems?
- Personal mobility and consumerization of apps/devices encourages an "I want it now" attitude
- Training: some folks adopt easily with little training, some require training and are willing to learn, while others flat out resist change.
- Lack of standardization across tools makes it tough to measure the effectiveness of one vs another, and as part of a larger business process

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BUSINESS PARTNERSHIP

Michael M. Ghilotti
President
Ghilotti Bros Inc.

> One key to success is to flush out the hidden goals of the client.

Discussion Summary

Forming Effective Business Partnerships in the Construction Industry

Best practices and lessons learned from forming valuable business partnerships.

Important to set both qualitative goals as well as quantitative goals.

- Goals should be set equally important to both partners.
- The partnership should challenge the norm, strive to do things differently to get true buy-in from partners.

In addition to monitoring the project, it's important to monitor the partnership with frequent check-ins.

- Be mindful of the need to support the psychological process as it contrasts with the typical transactional system.
- Culture is extremely important when evaluating business partners.
- Important to establish and maintain trust and respect, and to like the other side in your business partnership.
- The single most important ingredient to a successful partnership is a genuine commitment from the top.
- With all the compelling reasons to enter into a business partnership the bottom line still needs to be answered "Does it make good sense for us?"
- Intergrade subs, craft agreement for culture, declaration of interdependence, and on – board new employees.
- Business partnerships are a very good way to deliver a project but you need to manage costs up front.

One key to success is to flush out the hidden goals of the client.

- After the honeymoon period of the partnership it's important to refresh.
- Success of the partnership is when your client thinks of you as trusted business advisor – no spin on issues.
- At the end of the day, the most important aspect of a business partnership is the outcome of the client relationship. You must constantly ask the partnership "What brings value to the owner?"
- Be aware of geographical issues/constraints which affect the capability to perform when selecting a business partner.
- Craft an agreement to support a vibrant culture in a business partnership – one example is to create "The Declaration of Independence."
- Be sure to on–board new employees to the partnership to make sure the culture of the partnership is sustained.

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OWNER ADOPTION OF NEW BUILDING TECHNOLOGIES

Deepak Aatresh
Founder & Chief Executive Officer
Aditazz

> No matter how complex a concept, the innovation must be easy to implement.

Discussion Summary

Addressing Challenges and Strategies for Innovation and Technology Adoption

> Establish the challenge and discuss solutions accordingly.

Getting customers (the owners) to adopt new technologies (or broadly speaking, innovation) in the AEC industry is a huge challenge.

- Although many in the industry (the owners) do actively seek innovation and many service providers can provide it, there seems to be significant friction in bringing the mutual interest to fruition.
- How do we solve this? Are there engagement patterns that have lead to success? Is there something to learn from other industries?
- **Additional insights:** Customers are wary about unproven concepts. Very few are willing to be the first adopter. So, the hardest part is to get the first customer to support the innovation. It gets easier with subsequent customers, but it is important to have a proven case study from the first engagement.

Customer care about their return on investment (ROI).

- Prepare a compelling (potential) ROI before the engagement and prove it is true after completion.
- The innovation must be relevant to and demonstrate value to 'today's' customer pain point (here and now). It is best to align the value from the innovation to support the organization's stated mission (e.g. green building technology is well aligned with a healthcare provider owner).

No matter how complex a concept, the innovation must be easy to implement.

- Often, implementation hurdles stall customer adoption, even when the innovation concept is straightforward.
- The customer is sensitive to past mistakes being repeated. Be aware of past failures and do not repeat them. Although the customer is willing to take risks and give your innovation a chance, he expects service providers to learn from past failures and not repeat them.
- A large part of success is achieved by educating the customer upfront about the challenge and making him a valued stakeholder in a successful outcome.
- Innovations that create new regulatory hurdles have a bigger barrier to adoption. So, break down the innovation to avoid these barriers.

OWNER ADOPTION OF NEW BUILDING TECHNOLOGIES - CONTINUED

Discussion Summary

Prove and demonstrate the value.

Innovation that can demonstrate value with a short engagement (at low risk), but has huge impact in the longer term with a broader engagement is more likely to succeed.

- Private sector customers are more open to innovation than the public sector counterparts who have many rules and regulations that prevent them from being early adopters.
- The higher education customers are frequently inclined to be early adopters.
- Customers are more willing to engage with technological innovations when there is no perceived lock-in (i.e. open source software, standards based solutions where multiple sources can suppliers).
- While the first sale is hard enough, it behooves the suppliers to make the sale sticky by offering additional downstream services [perhaps by offering a service to measure and monitor the benefits of the innovation for the lifecycle of the product]. This allows the first offering of the innovation to be tweaked over time and be improved upon leading to expanded engagements.
- Use modeling and simulation (instead of the actual implementation) as a demonstration to convince the customer of the value of the innovation.

Innovation adoption is hard and challenging, but rewarding when it works.

- These days, customers are opening their gates wider as compared to a decade ago.
- Seek to create a partnership with early adopter customers and offer to share the value created if the innovation should succeed.
- The 'Agile' method in software development seems to be a successful process to prove innovation --- 'fail fast' and learn from mistakes early to innovate. 'Fail small to win big'.
- Share case studies and stories of both success and failure with other service providers (collaboration in innovation is key) so we can all improve.

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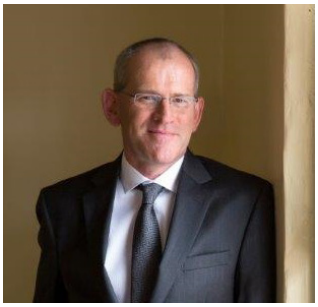
BUSINESS INTELLIGENCE AND BIG DATA MANAGEMENT



Aidan Hughes
Principal
Arup

> Availability of data is improving business performance.

Discussion Summary

Benefits of Big Data and its Affects on the Business

> Management issues, and how Big Data is helping and changing business structure.

Issues with Data Management.

- We have a lot of data but people don't know what questions to ask
- Or, people want to keep mining the dta before they figure out what problem they want to solve
- **Education on the use and management of data for "non-experts" is key**

- Data doesn't replace the need for hands on – "walking the site"
- The network infrastructure can't keep up with the demands for analysis
- The dashboards and analysis are only as good as the data input – people still need to generate or input data
- **The role of people and managing people's expectations is key**

How is Big Data helping?

- Helps firms to do more work with fewer people – efficiency
- Informs decision making for better business outcomes
- Saves clients' money by providing them with better information
- Provides unbiased decision making based on data and not intuition
- **Availability of data is improving business performance.**

Is data changing our business?

- Yes, it changes the way a business looks at everything and supports better long-term planning
- Will make design more efficient but won't change the fundamentals
- Design will move away from drawings and into simulation and virtual reality
- **Availability of data is and will change our businesses**

Miscellaneous

- Some firms are hiring data scientists, some don't understand the value.

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INTEGRATED DESIGN AND BUILDING ECOSYSTEM

Kevin Gent
Principal
DLR Group

> Through the P3 process the balance between quality, cost and time can be better managed and adjusted through the course of a project.

Discussion Summary

Creating an Integrated Ecosystem for the Construction Industry

Creating an integrated ecosystem for the Construction Industry
- Project Delivery - methodologies outside of the traditional design-bid-build
- Integrated Design – how is this changing the way you do business
- 3D Modeling / BIM – the technology linking Integrated Design and Project Delivery

In this group discussion, we explored how design and construction are becoming more integrated, how the traditional delivery structures are breaking down, and what new tools and technology for delivering projects are integral to these growing trends.

Increasingly we are finding projects being developed under many new structures, not just the typical Design – Bid – Build development structure. We are seeing more projects being funded, designed, constructed and operated through Public / Private Partnership (P3) structures. This requires design, development and construction professionals to interact in new ways and find common cause in the development of projects.

Why is this happening? This is happening for two main reasons:
1. P3 structures shift some of the risk of large projects from public entities to those that understand how to manage risk; financiers, developers, contractors, consultants, operators, etc.
2. P3 structures allow public entities to develop projects with little or no public funding, as the financing comes from private partners.

One advantages of various P3 models in project development is the opportunity to deliver the highest value to the client rather than the lowest cost. Rather than developing projects based on the selection of the low construction bid, owners are able to select project teams on a wider set of criteria that fit the end goals of the project in design, financing, construction and operation. In addition, through the P3 process the balance between quality, cost and time can be better managed and adjusted through the course of a project.

The challenges with a P3 approach also exist. Each member of a P3 team will have separate goals and visions for the project. P3 partners must understand and align these differing goals and expectations for the project, in order to succeed. If you have the wrong team or partners, the project will be very challenging. Working with partners you know and trust in P3 projects can go a long way to smooth out problems and project conflicts. Close client involvement and clear scope definitions and expectations are also essential to achieving a successful P3 project.

INTEGRATED DESIGN AND BUILDING ECOSYSTEM - CONTINUED

Discussion Summary

Integrated Design through the involvement of many project stakeholders early in the design process is becoming more common and even a necessity on many projects. Projects are more complicated and involve many specialist disciplines to meet project needs.

Additionally, the increasing requirements of regulatory agencies adds more complexity to the process resulting in the need to coordinate many disciplines early in the design stages of a project. In construction, the 3D design models developed for projects are being handed over to contractors to assist them in construction cost estimating, clash detection, scheduling and other activities. All of this can lead to better, more coordinated projects but it is also more challenging to accomplish.

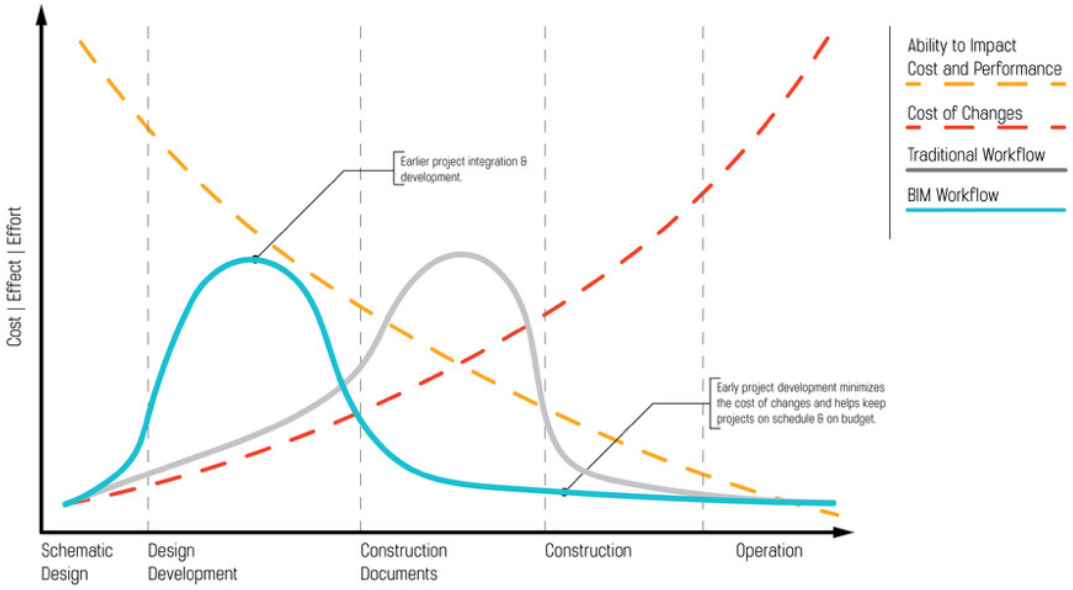
For example, 3D models can serve many needs but only if the model is built with these end goals in mind. For clash detection, specific and necessary information must be included in the model. This level of information typically goes beyond what is necessary to develop a design and prepare construction documents. In the same way, involving specialty consultants and construction managers early in the design process can lead to better design solutions or it can lead to greater confusion and design chaos, if the process is not managed correctly. This puts a greater burden on all team members to work together to find the best solutions for the various design goals of a project. Ultimately, these approaches offer more advantages than disadvantages for developing better projects and the trend towards fully integrated design will only grow.

The advent of 3D design modeling and Building Information Modeling (BIM) has supported the growth of integrated design approaches and alternative project delivery systems. 3D Modeling/ BIM have become essential bridging tools that enable integrated design to happen. Thanks to 3D BIM, the stages of design are shifting from document-based project phases such as conceptual, schematic design, design development, and construction documents to a more collaborative, model-based approach. That way, every discipline can make contributions early in the design process, when important decisions such as building orientation and selection of major building materials need to be made.

INTEGRATED DESIGN AND BUILDING ECOSYSTEM - CONTINUED

Discussion Summary

Using 3D design tools and collaborative environments available from cloud-based products, collaborative project teams can update 3D models in real time; discuss design iterations; merge structural, MEP, and architectural models; and eliminate clashes—all early in the design stage. Using BIM in the cloud is helping engineers and architects collaborate more easily and in a more timely fashion. This is shifting the intense design and decision making to earlier phases in the design process, where changes are easier to make and the cost of change is lower. Designs issues can be explored, studied and decided much earlier and in an informed way, as shown in the illustration shown below.



This is an advantage to Owners, Contractors and design professionals, allowing for earlier decision-making ahead of construction document production. It does, however, require much greater cooperation and coordination of all involved and puts greater pressure on design disciplines and construction representatives to provide useful and detailed information at these early stages so that decisions can be made.

As discussed and agreed, it isn't business as usual. Changes are happening more and more rapidly as technology advances and expectations change. Success is not static, but must depend on staying ahead of the curve of change. Construction means and methods, new materials, new modes of delivery, new modes to share risk, how we create and communicate design and in how we weave all of this together in an ordered and systematic way through integrated systems. This all determines how successful we will be now and into the future.

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FIND MORE INSIGHTS FROM CBD STRATEGY MEETING FACILITATORS ONLINE!

Daniel Feitelberg
Senior Advisor to the Chancellor
University of California, Merced Campus

> Sharing lessons learned through larger complex P3 projects will ultimately enhance everybody's understanding and means for these projects to evolve.

Discussion Summary

Public-Private Partnerships Impact on U.S. Infrastructure

Read an interview with Daniel Feitelberg as he discusses how public-private partnerships are taking U.S. infrastructure by storm on the NCS Madison blog. **Click here to read the full post.**

John Griffiths
Principal
Mazzetti + GBA

> Aligning team members from IT, finance, facilities, marketing, and sustainability departments EARLY on will help ensure long-term success of the connected buildings approach.

Discussion Summary

Smart Buildings: What's the smart strategy?

Read the musings of John Griffiths as he talks about embracing the infrastructure and data generated by connected buildings. **Click here to read the full article.**

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