The **10** Guiding Principles behind the Success of Wisconsin's BIM Guidelines and Standards

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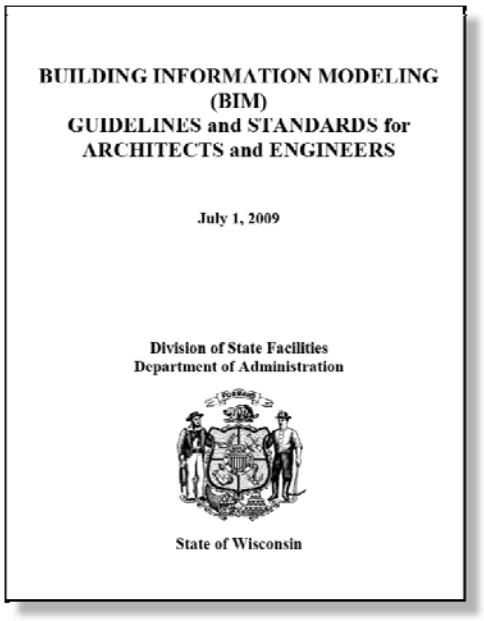

Introduction

"Owner leadership and involvement is a prerequisite for optimal use of BIM on a project."

Chuck Eastman, BIM Handbook

In October 2006 Dave Haley, AIA, then Chief State Architect with The Wisconsin Department of Administration (DOA), took his staff of project managers to a daylong workshop. The topic was building information modeling and integrated project delivery and was presented by The American Institute of Architects – Wisconsin. What he learned solidified his thinking and began the change in the way facilities are planned, developed and managed in the State of Wisconsin.

About a year later Dave had cleared a path and progress followed. He assigned Bill Napier, project manager with DOA, as his BIM champion. He then hired me as his lead BIM technology consultant.

Very early our team recognized three unique but interdependent drivers that were changing the capital facilities industry: documented productivity declines that were both shocking and unacceptable; advances in project development and management technology; and a data centric, facility lifecycle perspective. They were the problem, the solution, and the guiding vision.

To be honest, our initial goals were indefinite, probably to some degree on purpose. We wanted to be sure the first step we took was well thought out, so we did not limit our early research. However we did begin with a few rules to guide our thought process. As we progressed new rules were appropriately added. It was not until we were actually complete with the BIM guidelines and standards in July of 2009 that we recognized how well these rules, now called the Ten Principles, supported our thought process. They not only guided our decisions but reinforce each other as you will see below.

Here they are in approximately the order they evolved.

Principle 1: Exploit Parametric Digital Technologies to the Extent Possible.

The "I" in BIM is the letter that embodies what this technology is all about. How information is digitally represented and parametrically connected to other data in other software platforms is the real potential of BIM. For example room area and use parameters in

BIM software linked to rent factors and tenant parameters in asset management software. Changing the area parameter in BIM would automatically affect the rent factor in the asset management system. Team members are able to make connections between up-to-date information in real time to analyze a current situation or to study the effects of a decision on a future situation.

We recognized that parametric digital technology though still young, is already making important connections in the AE industry. These were most notably in the areas of design and construction documents. Firms were using geometric parameters to quickly explore multiple design solutions and nearly automatically generate a set of construction documents. Some were adding energy and cost parameters to the BIM then exported out to analysis programs.

As the research continued and guidelines evolved this principle was always in mind. Where we felt opportunities existed (Principles 7, 8) and we took advantage of those technologies when we could.

Principle 2: Be Incremental, Progressive, and Scalable

BIM capabilities are woven between many project team members, through other technologies and across a facilities lifecycle. Capital project planners, architects, engineers, contractors, and facility managers all touch BIM; geographic information systems, facility management software and building automation systems integrate with it; and both short and long term information quality assurance and file management processes and systems act upon it.

We soon realized that if we were to effectively accomplish our tasks we had to narrow our focus yet widen our awareness. We also accepted the fact that we were not going to get it all right the first time. Based on our research we selected the AE industry as our first step. Goals were established that we believed were directionally correct and scalable in many dimensions. Each was designed to progressively move us towards next steps such as an added requirement, a new team player, a quality control measure or others.

In the future our next increment would look to the end of the delivery process and identify what information facility managers would need from BIM. This would inform the next iteration of the BIM guidelines. Our informal implementation roadmap will also take us to the beginning of the process and address how a project is planned by the various agencies. Then we will look to the construction process to tie the ends together. This incremental process will help the BIM guidelines evolve with purpose as new team member, software integration and data standards are included.

Principle 3: Pick the Low Hanging Fruit First: Achieve Immediate Successes.

BIM case studies abound with success: improved energy outcomes, confidence and assurance of planned cost and schedule outcomes, better visualization and understanding of design decisions, the validation of the design, increased confidence in the coordination and quality of construction documents, information reuse downstream, and much more.

All these benefits were in complete alignment with the aspirations of Wisconsin. However it was important to have immediate success so to maintain forward progress. What should we pick first? The AE sector was furthest in BIM adoption. So they were the first incremental step (Principle 2) and were the lowest "hanging branch". But what benefits were Wisconsin's AE's able to deliver immediately? (Principle 7)

The overall AE community's BIM capabilities varied as did their deliverables to the state. So to achieve immediate success we had to address both of these issues. In terms of capabilities we allowed some flexibility by requiring some BIM processes to be used (based on our AE research, see Principle 7),

and encouraging others. This allowed AE's to be relatively successful on day-one and and pointed to future steps the State would take. In terms of deliverables we leveled the playing field by specifying exactly what had to be modeled by all AE's. It was also necessary to require generally accepted BIM practice standards so to improve the chances of success. However there was a line we purposely stay back from. (Principle 9)

Principle 4: Stay within State Statutes.

Wisconsin State law could have been a barrier to BIM adoption. For public work, transparency and competition is the law. Restrictions to fair trade are prohibited.

The use of any project delivery method other than design/bid/build is the exception in Wisconsin and requires special approval. Any new requirement could not be predicated on a delivery process that was contrary to state law. To some the BIM process was perceived as a form of design/build delivery where the contractor had to do the modeling with the AE's. We focused on the value BIM as a tool and limited requirements as a process. (Principle 6) Doing so established that there was much value that could be captured from BIM, independent of the delivery method.

To eliminate the potential perception that the guidelines were restricting AE business we did not dictate any particular software. We did specify the capabilities of the software and its deliverables (Principle 5). Further we refrained from dictating how an AE firm was to achieve the goals and requirements set forth in the BIM guidelines (Principle 9).

There was one statute which was of great benefit to the BIM implementation process. The DOA is charged with administering all of the state's capital facilities projects. This means there is one central point of policy, procedure and information development and disbursement, and a single project management system to implement it. Much of the success statewide would be due to this single point responsibility system.

Principle 5: Be Committed to Open Standards for Interoperability.

When information is exchangeable with other systems, efficiencies grow exponentially. But the real potential is discovery of data without any pre-existing knowledge of it; to have the ability to find new relationships between information or to analyze a current situation or more importantly a future one. What future physical, social, economic or political parameters would change if a particular "virtual" decision was made? (Principle 1)

We decided early on to take the long view; to look beyond the project to the asset, and to look beyond the documents to the data. Of course it is impossible to know future uses and users of the data, or what new processes will act upon it. Thus we decided that the data had to be transportable across platforms and across time.

I will admit to the ever present temptation to just pick a horse and ride it. Life would be so simple. But we knew that our hands would be tied in the very near future. No one software vendor could even anticipate all the solutions needed. Furthermore the State would not dictate what tools its consultants should use. (Principle 4)

The interoperability commitment has set the foundation for long term use and growth of technology knowledge.

Principle 6: Separate the Technology from the Methodology.

Some people equate building information modeling with integrated project delivery. This is wrong and the perception could have been a major barrier. (Principle 4) BIM is a tool, IPD is a process. IPD may support effective use of BIM, but BIM has been successfully used with all delivery methods and processes.

It was important to educate both senior leadership and the AE community of this

distinction. This fact continuously framed our effort as we moved forward.

Principle 7: Stay within Wisconsin's AE Industry's Capabilities and Direction.

Organizations must realign their employees, culture and business systems to support new technologies. BIM technology requires a significant shift in the way one thinks about design, how teams collaborate and how value, cost and benefit are balanced. These have been major reasons for BIM's slow and spotty adoption. So there was concern as to Wisconsin AE's level of maturity with these technologies.

A dozen major State projects were nearing design completion. It was discovered that all of the AE firms had used BIM to some degree on these projects. So these became our informal pilot projects. Interviews were held to determine how the tool was being used, how much of the project was modeled, were models being exchanged with the consultants, and more. Though answers varied widely it was clear the industry was ready, at least to some degree.

In addition to ongoing research we held an informal fact gathering lunch at a local BIM user group meeting. The group was surveyed on a number of BIM uses and applications. Design visualization and architectural construction documents were the values most were getting out of their BIM. Others reported coordination with Structural and MEP engineers. And a few were trying out programming tools, energy analysis, clash detection and quantity surveys.

These efforts informed the guidelines content and ensured its success (Principle 3). The strategy was continued into the implementation stages with a public internet forum set up to take suggestions, answer questions and inform future guideline updates.

Principle 8: Stay within the Mainstream Capabilities of the Software Industry.

There is much BIM excitement out there. The software industry, AEC businesses, professional organizations and universities are all eager to show what they have, or can do with, or know about the technology. The webinars, articles, books and case studies leave you feeling you have missed the boat. And, the natural tendency is to believe the technology is ready to go.

Before moving forward we needed to separate the facts from the hype and determine what was actually doable. We critically evaluated the research as it developed. For example: Was the described software feature in a current release? How dependant was the technology on the project delivery method for its success? Was the case study a full and completed project or an isolated pilot?

When the "sifting and winnowing" was completed we believed that BIM technology, though relatively young and still evolving was mature enough to use. The technology was heading in a clearly positive direction and there were solid principles behind it. We did the research, understood what was mainstream and then developed the requirements.

Principle 9: Stay out of the Kitchen: Minimize the Impact on AE, DSF and Agencies' Business Workflows.

Technology in the capital facility industry is evolving (Principle 8) Naming convention dictionaries are developing; data exchange formats are evolving; the legal and insurance companies are catching up to support BIM and others. Therefore, even putting aside our concerns about restricting business (Principle 4), any attempt to established overly detailed data standards or AE's operational procedures would have been counter-productive.

Our objective was the data (Principle 1). We specified what we wanted modeled and the generally accepted BIM practices that would

achieve a good degree of quality – but then allowed firms to get to that quality in their own way. We did reference existing industry standards. If there were none, then that was an indication of a part the BIM technology that was not ready for a requirement.

The primary objective of our requirements was to support the AE's ability to deliver similar content that was in alignment with the State's vision for future deliverables. To get AE's used to a standard set of deliverables today then add to them later as the technologies mature. (Principle 2)

Principle 10: Encourage social/cultural acceptance from stakeholders.

The transition to BIM is not without its challenges. The first challenge, in any organization, is its people. We knew our key stakeholders in this change were the senior leadership of The Wisconsin Department of Administration, The American Institute of Architects of Wisconsin, and The American Council of Engineering Companies of Wisconsin. To achieve success we had to be considerate of their concerns and support new understandings.

We achieved this by being transparent to those who wished to look in from time to time. We also communicated progress to all stakeholders on a regular timeframe. We listened, understood and respond to stakeholder concerns. And we provided assurances that the research, findings and recommendations would be shared before decisions were made and that the stakeholders would vet the decisions and directions before we moved forward.

An example of our communications strategy was at the 2008 Annual DSF/Consultant Conference. Over 200 AE professionals attended a breakout session where they heard about the early research and general directions towards a statewide BIM standard. A lengthy Q&A was planned and used (Principle 7) that helped the AE community prepare for the coming requirements.

Another example that characterized our effort to listen and respond to stakeholders' concerns was the State's acknowledgment of the BIM work-effort shift and agreeing to increased early phase fees.

This principle helped us obtain the needed incremental approvals that lead to release of the BIM Guidelines and Standards.

Conclusion

These ten principles guided the goals and strategies used to develop the Wisconsin BIM Guidelines and Standards. Their effectiveness has become evident as the State and its AE community has made the smooth transition to BIM and has integrated these technologies into their organizations.

As technology knowledge in the capital facility industry evolves, these principles will continue to guide Wisconsin's incremental progress into the future.

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