



Adopting New Technologies into Your Business

By ASCE/SEI-BPAD Business Practice Committee

Evolving technology is as inevitable as the sunrise and sunset. It is easy to always want “the next best thing.” Firms must have a process in place to define, implement and evaluate their return on investment of any technology before blindly making the leap to adopt it. Effort spent up front can ease new technology integration in terms of time, money and staff acceptance.

Categories of Technologies

Given the proliferation of software and hardware available, this article will focus on project production technology within the A/E/C environment. Undoubtedly, there are many ancillary components to project delivery, each with their own universe of technologies, yet the integration process is similar across all technologies.

To be clear, the process for office-wide adoption of a new mobility resource such as GoToMyPC is the same as introducing BIM. A short list of categories and associated technology your firm may be considering includes:

- Shared/virtual offices and branch offices via Regus or DaVinci
- On-line records storage with tools like Google Docs, Newforma, or any private cloud
- Online meeting tools such as GotoMeeting or WebEx
- Collaboration tools such as Files Anywhere
- Paperless shop drawing review using Acrobat or BlueBeam
- Email marketing using Constant Contact or iContact
- Social media such as LinkedIn, YouTube, Facebook, and Twitter

All technology requires adequate background assessment and preparation before adoption. Prior to implementation, appropriate members of the leadership team must understand and agree on the various issues that could impact the firm as a result of the technology. It is impossible to anticipate every possible threat, but the old adage “better safe than sorry” definitely applies here.

Considerations Prior to Moving Forward

One of two scenarios usually prompts firms to consider introducing a new technology. The first scenario could be called “the dust”, as in

the place where a firm will be left if the new technology is not adopted. Firms in this position generally know it is not a matter of *if* a certain technology will be implemented, but *when*. The best example of a current technology causing firms to be in this situation is BIM. Structural firms know clients and the A/E/C industry are pushing BIM as a project requirement.

The second scenario is “early adopters”; these are the firms willing to risk potential setbacks through trial and error. These are also the firms viewed as industry leaders because of their ability to harness technology as a means to further the industry.

After acknowledging the scenario applicable to your firm, firm leadership should frame the technology discussion in strategic planning terms, which answers the basic question of “Why are we considering this?” Planning for technology should be no different than the planning process for other business decisions, such as opening a new office or diversifying into other market sectors. Firm leadership should candidly assess whether the firm will be on the cutting edge with the technology, or scrambling to catch up. When a firm is forced into adopting a new technology, there can be a tendency to hold back.

From a practical standpoint, the internal technology manager or an external consultant should brief firm leadership on security and privacy issues as well as employee usage policies as part of this strategic evaluation.

Think also about the potential for culture clashes as a result of the new technology. This is common because of the multitude of differing knowledge and comfort levels with technology in general. The division may be between staff members of different ages, levels of education, or backgrounds. It could be prudent to consider a mitigation strategy to prevent some group from derailing the implementation.

Structural engineering and other professional consulting firms must determine if adopting the new technology could mean production standards might drop below that which another engineer would reasonably provide under similar circumstances in the same locality. For new technologies, Engineering Standard of Care is not always well defined. Answer the following questions in advance:

- What are the owner and client expectations?
- What is the role of the other participants?

- What are the deliverables?
- Who owns the final work product?

For technologies that impact clients or other outside firms, develop an implementation plan; it can have varying degrees of complexity, depending on the need.

Anticipating potential setbacks up front can help develop the roadmap and timeline for implementation once the decision to adopt the technology has been made. Once due diligence is complete and the leadership approves the new technology, the hard work of implementation can begin. A four-step adoption process for any new technology includes Planning, Definition, Implementation and Evaluation.

Planning

The planning process during implementation is much different from the initial assessment of the technology. Implementation planning needs to be diligent, thoughtful and purposeful. There are many different approaches that range from complete immersion to incremental bridge building. During planning, the firm’s leadership should look at the business case for the technology in specific areas such as start-up costs and return on investment, and how to market new capabilities resulting from the technology.

With a solid plan there must also be unwavering commitment in terms of time, money and people. Firm leadership should be unified in their support, and ensure the necessary staff and financial resources are dedicated to successful adoption of the technology. The final piece of the Planning phase is cost evaluation. In addition to the cost of purchase, installation and training, there may be hardware and software costs and, very likely, the cost of lost time and productivity.

Definition

The broad definition of the new technology needs to answer three questions:

- What are the business drivers for the technology?
- What are the merits of adopting the new technology vs. maintaining the status quo?
- What does the value potential of the technology depend upon?

By example, look at adopting BIM for production in an A/E/C firm. The industry drivers for BIM are Virtual Design and Construction, Integrated Project Delivery,

and Lean Construction. The merits include drawings linked to the design models, multidisciplinary coordination (clash detection), and the use of an Integrated Practice Model (for fabrication, cost estimating, scheduling and constructability review). The value depends on collaboration opportunities, and team member capabilities and willingness to participate.

More specifically, you must also have a clear definition of how existing workflows will change to accommodate the new technology. Again, consider using BIM to improve workflows by way of improved communication among the internal/external team members. Internally, software interoperability allows the model to start in an analytic or graphics platform (engineer or drafter/designer). Who will start and finish the model? Who will check the model? How do you ensure design intent is conveyed? Externally, the structural model is used by the architect and MEP engineer as a reference for their drawings. Detailers use the model to create shop drawings; general contractors use it for cost estimating and scheduling; and, owners use it for facilities management. Additionally, the model allows better interaction among the team members by improved visualization of design intent. How will the information be distributed? Who manages the information and verifies its accuracy?

To facilitate all this, one may define strategic partnerships – complementary firms, peers, or professional organizations – that can participate in synergistic relationships. To improve BIM capabilities, the relationships might be with designers (architects, MEP engineers, other peer firms) or with software developers that can add capability to the technology, such as a third party add-in or standalone application.

Finally, does the technology offer the chance to provide additional services resulting in new revenue streams? Effective structural BIM creates value by improving the schedule, reducing RFIs, mitigating the risk of change orders and delays, and it improves cost and schedule control. Providing early certainty to the structural system cost estimate reduces waste. What can be added to the consultant's scope? How will you price your services? Can the consultant partner with a subcontractor or fabricator to produce deliverables?

Implementation

We all know to “plan the work and work the plan.” Even with a clear plan, implementation can be daunting. Dissecting this phase into smaller parts makes the process easier. The


biggest areas of concern during implementation include:

- Infrastructure acquisition & maintenance
- Training
- Added stress on staff




Maintaining infrastructure usually comes down to simply spending money. However, the budget is always limited and budget approvers will expect to see the money is spent wisely. For example, early research into the recommended hardware can eliminate midstream computer retrofits. Likewise, overspending on an unnecessary state-of-the-art item may force

sacrifice of something else potentially more useful. For infrastructure budgeting purposes, keep in mind that one-time and annual costs are known. Commitment to renewing these costs must be firm, and a discretionary budget for miscellaneous expenses should be established to keep the program moving forward.

Also be mindful of your current hardware. Is it necessary to change workstation hardware configurations (for example faster processors, dual monitors, new OS, more memory)? Would it be prudent to improve network thru-put speed? What software applications should be used, and,




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what are the software licensing options? How can you maximize utility and investment? Most importantly, is your IT department ready for the new challenges?

Training is another fairly straightforward process. However, if not planned properly, and without proper follow-up after the training takes place, it can easily be unproductive. Key elements to consider when planning training are:

- A sufficient budget
- Time AND money
- A clear allocation of Out-of-House vs.

In-House training hours

There are unknowns with any new initiative, thus a tendency towards doubt. Pro-active communication is one way to reduce the doubt. Make affected staff members aware of the time, money and effort invested to achieve success. If they have to guess how you are handling the process, they may assume you are not considering important factors – such is the nature of contending with unknowns.

There can be tension between the “old ways” and “new ways”, which adds stress on the staff. This can be significant as you push people to learn new skills. It may be aligned with experience demographics, since less experienced staff may be more willing to try something new. You should be adaptable by recognizing staff members

who won't ask for help, but need additional encouragement or training.

Evaluation

Especially after a lengthy integration, it may be tempting not to devote adequate time to evaluate the technology and adoption process. This final step is the litmus test when it becomes questionable whether to maintain the technology, change it, or pursue more. The implementation team should discuss basic questions together. Has the firm become more profitable? Has the firm generated new revenue? Are you better positioned for growth? Find out and make any necessary changes. The initial evaluation meeting is the ideal time to identify metrics to be used, the means for gathering the data, and the “Keeper of the Data”. Successful metrics will illustrate how the new technology affected billings and the bottom line. Evaluation meetings held at regular intervals post-implementation can help identify other metrics necessary, or fine-tuning of the measurement process.

The simplest approach to gauge differences in old versus new technology is to use your current accounting software to track how much you spent on implementation. One suggestion is to study the shift of hours between higher and lower level personnel. If the man-hours went

down, but the man-hour-dollars did not, you need to be more careful about staffing to ensure you take advantage of the hour savings. Another suggestion is to consider the portion of necessary early design work in order to avoid costly revisions later on. If you find that some of your workload shifts from the detailed design phase to the schematic design phase, should you, and would your clients agree to, put a larger percentage of your fee into earlier phases?

It is also critical to discuss lessons learned throughout the process. Be inclusive of the entire project team, but also review this at the management level. Do not be afraid to identify failures. And finally, broadly share the lessons. This is the way to incorporate the data collected in order to help meet your original goals.

Conclusion

Evolving technology is a constant business consideration firms cannot ignore. Technology has the ability to truly transform a business. Whether the transformation is positive or negative is in each firms' hands to determine. Firms must focus on the future. SEI-BPAD's Business Practices Committee believes strongly that successful firms must be introspective and gain knowledge from the recent past. To this end, the Committee presided over a panel discussion on *Lessons Learned from the Recession and Where Do We Go from Here* at the SEI 2012 Structures Congress. We hope to pass along some of that discussion in a future article. ■

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