

**Applied  
Software®**

# **BIMplementations**



MATT DILLON



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# Introduction

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Regardless of an organization's size, implementing building information modeling (BIM) technologies such as [Revit](#), [Navisworks](#) and all of the other BIM-supporting products and tools requires more than just taking a class and investing in the software. It requires commitment, patience, a knowledgeable resource for ongoing assistance, buy-in and proactive support from upper management, and most importantly, a plan. This document describes proven techniques for developing and executing a BIM implementation for members of the design community and facility owners and operators.

Implementing a BIM workflow is significantly different than implementing a CAD workflow was 30 years ago. When firms began transitioning from manual drafting to CAD, new tools had to be learned, but the basic process of generating construction documents was still based on the same rules of drafting that had been in place for decades. We simply traded our parallel bars, triangles, lero sets, and other paraphernalia for computers, plotters and software that allowed us to more efficiently draft. But we were still drafting.

On the other hand, BIM is a disruptive process that in large part uses disruptive technology. The term "disruptive" may conjure up negative images, but in fact, most leaps forward in history have been the result of disruptive technology. The printing press changed the way people communicated with the written word. The automobile has had a significant impact on the way we live. "Smart phones" are an excellent recent example of disruptive technology.

BIM, as disruptive technology, will necessitate a change in culture in any organization that wishes to successfully adopt and implement it. It will impact nearly every aspect of your business in one way or another and will impact the way your organization collaborates with others. In more and more cases, the deliverables themselves are changing as a direct result of what BIM offers to building owners and managers. To implement BIM, then, you need to take a different approach than what was done 30 years ago. Simply investing in new software and sending some people to a class, while certainly a part of the process, will not be enough.

Though disruptive, BIM is no longer a new, untested concept. Many firms have adopted it successfully. Depending upon your discipline, you may find that if you have not yet implemented a BIM workflow, you might be falling behind your peers. The technology adoption curve can be applied to virtually any new technology and certainly holds true for BIM. Generally speaking, over half of architects and engineers plus larger contractors are beyond the "early adopter" phase.

# BIM Implementation Best Practices

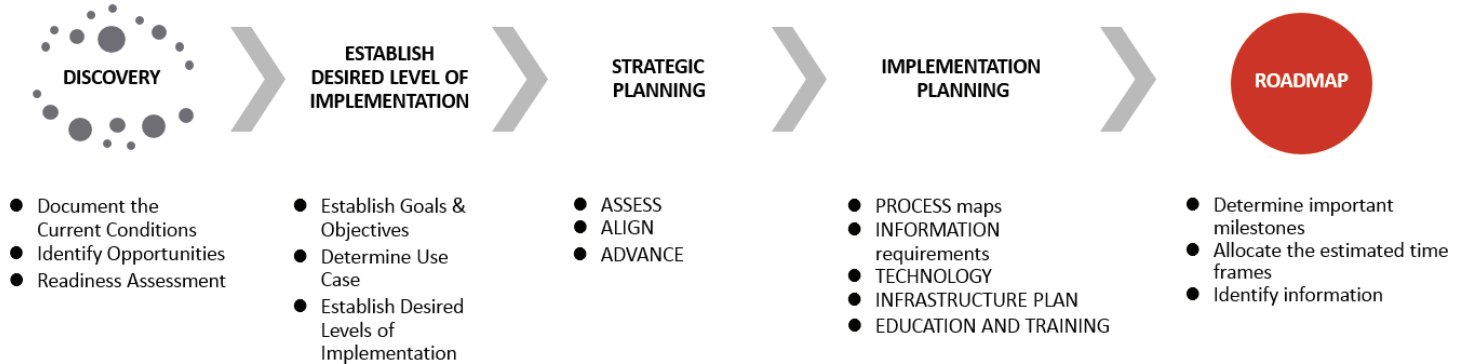
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There are a variety of reasons for a BIM implementation to fail. You can avoid them by using these best practices:

- **Ownership and buy-in from leadership:** This can make or break an implementation. Leadership must not simply tolerate or support a BIM Implementation. Leadership must mandate and drive the BIM implementation efforts. It is rare for a BIM implementation to succeed from a “grass roots” effort that proceeds in spite of leadership opposition or concerns.
- **Plan:** The old saying is true, “Fail to plan, plan to fail.” A plan, or Implementation Roadmap, is crucial to success; it needs to honestly and realistically acknowledge current strengths and weaknesses and have reasonable, attainable and measurable goals. Attempting to implement BIM organically, with no real direction, is a sure recipe for failure.
- **Dedication:** It is inevitable that there will be bumps along the way, especially in the very beginning stages of an implementation. It can be tempting to drop back to older more “comfortable” technologies and processes. But it is important to remember that disruptive technologies like BIM require a “culture of continuous improvement”, which is one that embraces change rather than avoiding it. It should be expected that the first two or three projects of a BIM Implementation may not be profitable, and that should be factored in as a part of the overall investment required to realize a successful implementation.
- **Understanding:** BIM is not just a replacement for CAD or an upgrade of existing technology. It must be understood that BIM requires learning new tools, new methods and new thought processes.
- **Accountability:** All participants must be accountable and take ownership of their part of the BIM implementation effort.
- **The time is now:** Organizations frequently put off a BIM implementation waiting for “down time” so that their active, billable work will not be adversely affected. The problem is, “down time” either never comes, or during the “down time” period, management is hesitant to invest in the resources necessary to successfully implement BIM. There is never a perfect time to implement. The best time is almost always “now.”
- **Commitment:** Many firms are feeling forced to adopt BIM, either to respond to owner/ client mandates or because of increased competition from organizations that have already implemented BIM. In many of these cases, the effort is limited, and BIM is only used when absolutely necessary, and at a very low level. Again, total commitment is a key component of a BIM implementation. Regardless of the motivation for making the move, it needs to be a committed, comprehensive effort with the leadership coming from the top down.

# The BIM Implementation Roadmap

BIM implementation plans, or roadmaps, will vary based on discipline, firm size, goals, and budget, but there are elements that are common to nearly all of them. The development of a BIM implementation roadmap has its own process.



## Discovery

Before any planning can be done, data needs to be gathered to determine the current state of technology, current processes and workflows, bottlenecks, business and design goals, and challenges to project delivery. It is best for this to be done by an objective third party through the use of in-depth questioning of principals, managers and project team members, all of whom will have different perspectives on goals, challenges and bottlenecks.

Question	Answer	Action	Confirm		
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What aspects of your current design and/or drafting process do you intend to improve with new software? OR What are the main business problems that you expect a new software implementation to reduce or eliminate?		What are your company's primary business goals or objectives?			
Have you established specific goals to reuse engineering design data created by third party and/or internal software in your creation of C.D.?		What is the Principal/Owner's single, highest priority or goal for this year?			
What are you planning to minimize documentation coordination errors between disciplines?		What are the current barriers to achieving your goals?			
Who is your largest customer?		What changes need to be made to achieve your goals?			
In what ways do you want to improve design presentations?		What is the most important activity in your business?			
In what ways can communication, coordination, and collaboration of design information be improved with consultants, owners and contractors?		What are the top five factors that most hinder your ability to secure additional business?			
What would make the review, revision, and change tracking process easier for you?		Have you established specific goals with respect to those factors?			
Who is your largest customer? In what ways can your design process improve customer satisfaction?		Who are your biggest competitors?			
How much work is "thrown away" or duplicated?		What is your strategic advantage over your competitors?			
		What advantages do your competitors have over you?			



Testing should determine staff proficiencies with BIM technologies that are anticipated to be incorporated. There are a variety of testing methods, from self-evaluation surveys to formal testing. Web based utilities, such as [SurveyMonkey](#), are useful for conducting self-evaluations, and there are a variety of services available to conduct more formalized testing. Autodesk provides [Certification Exams](#) for certain products, such as Revit, [AutoCAD](#) and [3ds Max](#). [KnowledgeSmart](#) and other third parties provide for testing with reports that indicate knowledge and skill shortcomings for specific areas of software utilization. At the same time, a survey of existing technology and infrastructure should be conducted to identify any necessary upgrades or improvements. IT staff can complete basic questionnaires and surveys to gather information about client workstation hardware, software and operating systems, and network infrastructure. In addition to interviews and questionnaires, it is frequently helpful to develop process maps of critical aspects of project delivery. During process mapping sessions, it is not uncommon for people to discover elements of their project delivery methods they unaware of, as well as revealing hidden bottlenecks that can be targeted to be addressed during a BIM implementation.

During the Discovery process, short-term, mid-term and long-term BIM goals can be identified through interviews with key staff members. It is important to keep the immediate goals to a limited set of realistic, attainable goals and not “bite off more than can be chewed.” By focusing on immediate, reasonable goals first, there is a better chance of more quickly realized benefits, which in turn should spark interest in furthering the implementation once those immediate goals have been realized. Mid-term and long-term goals can be addressed in future evolutions of the BIM implementation.

A more complete list of information to be gathered during the Discovery phase includes:

<b>Data</b>	<b>Source</b>	<b>Method</b>
Business Goals	Principal/Owner	Direct interview with open-ended questioning
Design Goals	Project Managers/Principals	Direct interview with open-ended questioning
End User Data (applications currently used, past training, etc.)	End users or managers	Questionnaire, Survey or Form
End User Proficiency with BIM Applications	Self-evaluations or testing	Survey, Proficiency or certification tests
Current Design/Project Delivery Workflow and Bottlenecks	Project managers and Project teams	Workflow process mapping session
File Management Standards and Protocols	CAD/BIM Manager	Questionnaire or form
Integrated Systems and Third-Party Applications	IT Dept. and CAD/BIM Manager	Form or direct questioning
File Server Information	IT Dept.	Form
Network Topology, Backup process, A/V Software	IT Dept.	Form
Client Workstations – CPU, Graphics Card, OS, etc.	IT Dept.	Form

## Analysis and Planning

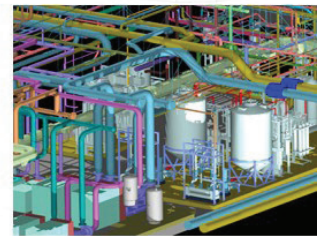
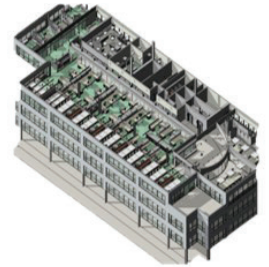
Once critical information about the current and desired states of BIM implementation has been gathered, it needs to be analyzed and assessed as the first step in developing the implementation road map. The very first thing that should be done is to finalize the BIM goals. These should have been determined to some extent during the Discovery.

### BIM Uses

Short Term: *Italics*

Mid-Long Term: Underlined

- Building (Preventative) Maintenance Scheduling
- Building System Analysis
- Asset Management
- Space Management and Tracking
- Disaster Planning
- Record Modeling
- Site Utilization Planning
- Construction System Design
- Digital Fabrication
- 3D Control and Planning
- 3D Coordination
- Design Authoring
- Engineering Analysis
- Energy Analysis
- Structural Analysis
- Sustainability (LEED) Evaluation
- Code Validation
- Programming
- Site Analysis
- Design Reviews
- Phase Planning (4D Modeling)
- Cost Estimation
- Existing Conditions Modeling



While several possible benefits of BIM may have been identified before or during the Discovery process, the goals of the initial implementation should remain limited to a smaller number of attainable and reasonable goals, with others targeted for later evolutions of the implementation. It's tempting to try to accomplish too much with the first round, which can lead to overload, stagnation and ultimately failure. On the other hand, if the result of the implementation effort is the successful realization of a small set of immediate goals, then the initial adjustment (or "disruption") resulting from the adoption of BIM produces a positive outcome. The stage is then set for expansion of the implementation to realize more ambitious goals, most likely with far less effort than the first round of process changes. Once the goals have been finalized, then analysis can begin. The primary tasks during this phase are:

- Identify existing strengths that can be leveraged.
- Identify weaknesses that must be addressed.
- Identify limitations in current technology that need to be addressed in order to fully realize the BIM goals. Is there additional technology – software, hardware or cloud-based – that needs to be acquired and implemented as a part of the larger BIM implementation?
- Identify bottlenecks in the current workflow that can be addressed with a BIM approach.

- Determine if any staffing changes need to be made. Is BIM support staff needed to assist the BIM manager? If the size of the firm does not warrant a full- or even part-time BIM manager position, some provision must be made for the tasks that person would normally fulfill, and outsourcing may be necessary. Specific elements from the Discovery that can assist with this analysis are:
  - Surveys or test results on software proficiency.
  - Information from IT on client workstations and network infrastructure.
  - Information gathered from interviews with principals and project managers.
  - Information from IT and the BIM/CAD manager on current installed applications and their utilization.

## Roadmap

Armed with the results of the Discovery and Analysis, the roadmap for the initial BIM implementation can be developed. This will include:

- Hardware and software upgrades, including network upgrades, if necessary.
- Staff changes.
- Third party applications that have been identified as necessary to meet the short term BIM goals.
- Curriculum for training based on knowledge gaps and proficiency shortcomings that were identified, as well as any training required for third party applications that have been identified.
- BIM Execution Plan Template to assist in developing a BIM execution plan for delivery of projects – to include critical milestones, Level of Development requirements, meeting schedules, responsible parties for various aspects of the project, etc.
 

**Note:** While a BIM Execution Plan is not absolutely necessary for a successful BIM implementation, it should be considered, either for the initial implementation or future evolutions.
- If a process in the overall project delivery workflow is going to be changed, flow charts and diagrams illustrating the new process should be included.
- Modifications to typical project team make up and roles. For example, there will most likely be a need for a model manager, who will be involved with maintaining the BIM database and any custom content that needs to be developed for a given project. This is typically not a BIM manager but, instead, someone actively engaged in the project who will also interface with the BIM manager.
- A schedule for implementation, including a start date, an end date and critical milestones between.
- Pilot project that is large enough to involve a respectable-sized team, but not so large or complex as to impose unnecessary complications on the project delivery.

## Execution

As indicated earlier in this document, there are reasons for a BIM implementation to fail, and fortunately, ways for it to succeed:

- **Choose to adopt BIM:** Whatever your motivation for adopting BIM, you must choose to do it. It cannot be forced upon you. You cannot be properly committed to something that is being forced on you from the outside. If you are feeling backed into a corner, step back, look at the situation objectively and determine if there are benefits for you in adopting BIM. If so, focus on the benefits rather than the pressures that drove you to this point.
- **Leadership driven top-down approach:** The effort must begin with the organization's leadership. Beyond support, leadership must take an active role in mandating the effort and making sure the resources are provided to make it successful.
- **Market internally:** Foster a culture of excitement among the staff. This is a growth opportunity for everyone involved.
- **Partner with a trusted, experienced resource:** Find and partner with a resource that can assist you – someone who has experience and can help you not only in the initial planning stages but with ongoing support as your implementation evolves.
- **Reward staff:** In order to encourage active and willing participation in the process, provide goals, incentives and rewards for the staff.
- **Provide support:** Provide resources, internally and externally, to support your staff as they develop new skills and adapt to new workflows and processes.
- **Develop and follow a plan:** Have a plan and follow it. Make it attainable and reasonable. Don't bite off more than you can chew. Consider developing a plan for a phased implementation with short term, mid-term and long-term goals.
- **Make course corrections:** All plans need adjustments along the way, so be prepared to make changes to address unforeseen developments and changes in technology and situations.
- **Don't bail - get help:** There will be bumps in the road. It is important to power through them and resist the temptation to retreat to more traditional, "comfortable" technologies and processes. These rough spots are your best opportunities for learning and development. Frequently when your staff is experiencing the most frustration, a milestone in your efforts is just around the corner, but you must persevere to realize it.
- **Be patient:** Be patient with yourself as well as your team members. New processes and workflows take time to master and to become comfortable with.



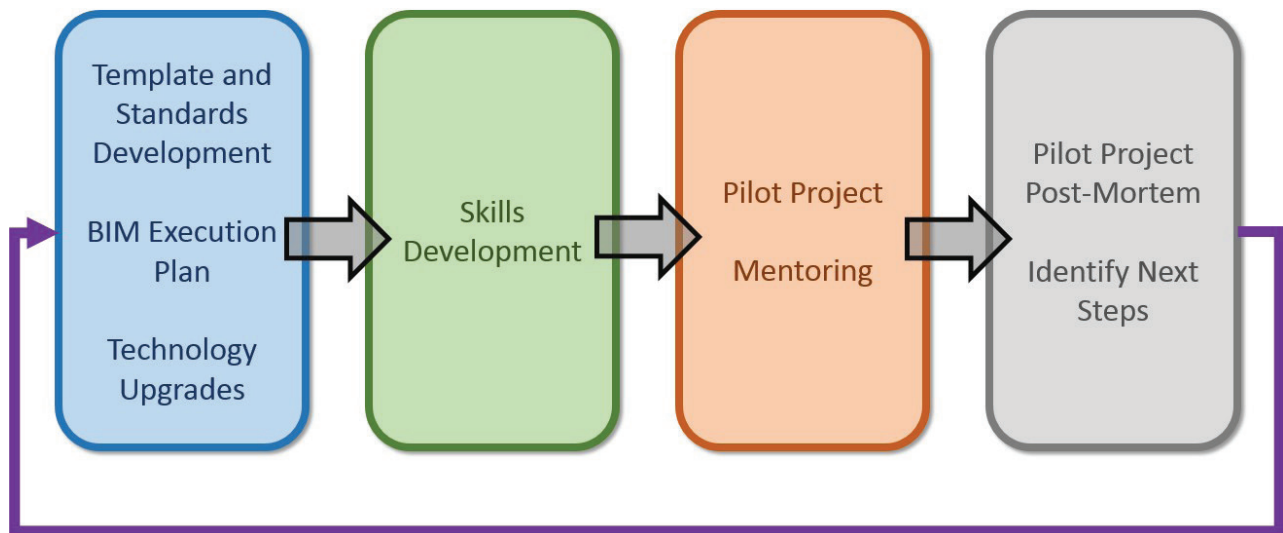
# Evolving BIM – A Culture of Continuous Improvement

Since BIM is constantly evolving, your implementation will never truly be “finished.” You should be constantly looking for ways to push the boundaries of your current BIM implementation to take advantage of new technologies and capabilities. You should adopt a “culture of continuous improvement,” choosing to steadily evolve. Spending months or years in the same state of BIM evolution will result in the inevitable realization that, once again, technology (and your competitors) have passed you by, and you have another long learning curve at the very least to get caught up. If you make it a practice to be constantly looking for ways to improve and grow your BIM implementation you will find that it becomes easier and less disruptive.

Consider holding a “post-mortem” after each project and ask at least three questions:

- What did we do well?
- Where do we need to improve?
- What can we implement on our next project to improve our process and possibly deliver additional services?

The result will be a continuous (but much more easily digested) cycle of *Implement->Execute->Refine*:



## Summary

Embarking on a BIM implementation can appear to be a daunting task and can be intimidating in the beginning. However, with a plan that contains the critical elements of a BIM implementation you can succeed. Once your initial implementation has been attained, don't get complacent and consider it “done.” *Adopt a culture of continuous improvement.* The technology is constantly changing and improving, and with the changes come more opportunities for additional services and better deliverables.