

## The Speed of Change

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### Introduction

I am starting this article as I fly to Miami to attend the AIA National Convention. We have a booth at the show and I will be giving a presentation for the AIA. My talk is an updated version of the talk I gave last year, "BIM 1.0, BIM 2.0, BIM 3.0". (As I did last year I will publish a version of this talk in the future). The talk looks at what is being done with BIM graphics, analysis and simulation. Last year the talk was more conceptual, this year the talk shows the work that is being done by practicing architects, engineers and contractors. The presentation is a snapshot of "what is happening", a look at CHANGE, what has happened in the last year, and what will most likely happen in the coming years. We are in a time of dramatic and rapid change.

When you are in the technology, business "change" is an important topic. A product or idea brought out too early will not result in change, a "great product" that is not understood, accepted or has a bad interface will not bring change, a product that you think will sell to 10% of the market that only sells to 1% of the market may not survive and therefore will not bring change, a product introduced too late will not bring change. Why do we focus on change? In my case that is an easy question, the practice of architecture is a great profession with admirable goals, "firmness, commodity, delight". But traditionally, architecture has been archaic, error prone, litigation prone, high risk, and reliant upon a very inefficient, hard to predict construction processes that result in owners taking over projects with little information on how to operate and maintain their buildings. For the last 25 years I have worked to come up with technology solutions that will result in helpful change.

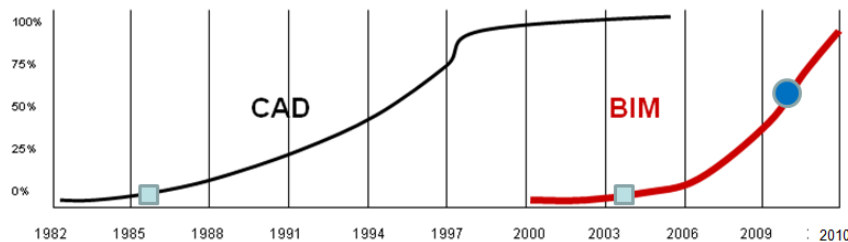
There are two sides to "change":

1. Technology - What will technology, research and intellect offer?
2. Speed - What will people do, and how soon will they do it?

I suspect for us in the technology side of the equation we often perceive the speed of change as painfully slow while on the user side they perceive the speed of change as painfully fast. I am often introduced as a futurist, a job that is really easy if all you need to do is state what is going to happen. In the case of CAD it was clear to me in 1985 that CAD would replace hand drawing.

We brought CAD into our architectural firm, Neeley/Lofrano, San Francisco, in 1985. Within a few weeks, in spite of ugly fonts and no line weights, it was clear that CAD would replace hand drawing.

Soon after this insight we licensed the software we created that sat on top of AutoCAD to Autodesk. This resulted in the product AutoCAD AEC Architectural, a product that significantly increased the speed of adoption of CAD. Not long after the introduction of AutoCAD AEC Architectural I created the left graph on the chart below, my prediction on the adoption of CAD. I do not think many believed the chart at the time, as it turned out adoption closely followed the chart, this is how to become a futurist, predict what is going to happen.



Blue box indicates when the charts were created. CAD adoption closely followed the 1985 prediction. Blue circle indicates current adoption of BIM; adoption is accurately tracking the prediction made in 2003

In 2003 when I first used Revit it only took a few minutes to believe that Revit (or better stated, the concept of BIM) would replace CAD. I believed that BIM would replace CAD much faster than CAD replaced hand drawing because it was a faster way to create drawings, reduced drawing errors and because architects had already overcome the shock of having to master software and purchasing computers, and plotters. I created the graph on the right side of the chart above soon after that time. Once again few believed the prediction, luckily so I can maintain my futurist title, adoption is tracking closely to the prediction.

When you look at other major changes, automobile, airplane, car, computer, cell phone, they took generations to result in significant change, so CAD changing the architectural and engineering professions in 15 years is amazing. If architects and engineers make the change to BIM in less than 8 years the speed of this change is beyond amazing. However, CAD was not a transformational change; it fundamentally mimicked hand drawing and had little effect upon responsibilities or process. If architects and engineers adopt BIM as predicted this will be more than amazing, but in this case there is much more at stake than just using the tool. There will be transformational changes to responsibilities and process. So BIM is a two part change:

1. Adoption, the 8 year prediction above, and,
2. Transformation of the industry, the prediction in the next section of the article.

## Transformational Change

CAD was a change in fundamentally how to do the same thing with a new tool, it actually changed almost nothing. BIM is not about architects and a new way to design and draw, BIM is about all those that are touched by building.

So the real chart that is needed is not how fast architects and engineers will adopt BIM, but how fast BIM will change the world. Yes, it will change the world. When you can design and document in exacting detail and accuracy, when you can test and simulate without constructing, when construction costs can be reduced 20% and more, when construction time can be reduced significantly, and when you can efficiently maintain and operate completed projects it changes “everything”. The cost savings will change rent on new buildings, and that will affect rent on existing buildings. The cost savings will determine how many projects retailers build, and how many people are employed. The cost savings will affect new housing costs, and therefore resale values of existing buildings. Knowing what is going to be specified collectively across the country (world) will change how manufacturers fabricate, warehouse and distribute. If contractors cannot count on errors and omissions for change orders they will need to change their approach to pricing. BIM will change everything.

To figure out how long before this transformational change will take requires understanding of what is needed for this transformational change, this is complicated. Why did it take generations for the cell phone to become ubiquitous? Was it cost, reliability, coverage, the economy? Predicting what BIM will do is many times more complicated as it touches so many, but there are very clear clues appearing.

Autodesk licensed more copies of Revit to contractors than architects in the last few months. Integrated Project Delivery (IPD) success stories are just being published. A&E firms are getting new clients because of their BIM expertise. Owners are just starting to realize there is much more to BIM than simply asking their architects to use BIM. Government agencies are requiring more use of BIM. Manufacturers are paying to have BIM objects created.

## **The Individual Discovery Phase**

We are currently in the individual discovery phase for BIM. Each of the players is discovering what BIM means to them.

- a. Architects & Engineers - They are learning BIM. They are creating objects, or getting them from companies such as ours. They are learning how to manage large projects and share data. They are figuring out how to transition from CAD to BIM. They have not yet realized they can raise their fees and create projects with IPD levels of detail, they will over the next few years.
- b. Contractors - Just a handful of the hundreds of thousands of contractors are using BIM. I have given several talks recently to contractors and the talks make many of them nervous. BIM will divide the contractor community initially into two groups, BIM users and non users. Over time,

the non BIM group will decrease. The BIM user group will be very powerful very quickly because of the significance in cost savings and reduced construction times.

- c. Building Product Manufacturers – They have been conservative in their movement to BIM, it is new, it can be expensive, and it can be confusing. But their interest is rapidly growing as represented by how busy we are in creating BPM's objects.
- d. Owners – Owners have the most to gain, but are currently the least knowledgeable about BIM. Most do not yet know enough to ask for their projects to be designed and documented using BIM. When they ask for BIM they do not realize that getting ten different BIM projects from 10 different architects will be of little value for facilities management and operations. Even when they use one architect they do not realize that there must be consistency in the objects and assemblies. Architects are fundamentally using BIM to create paper drawings; owners need BIM for the life of the project.

In this discovery phase, our current phase, each of the players is getting familiar with BIM; it is the next phase that results in the transformational change.

### **The Transformational Phase Will Begin When:**

The realization of BIM value, the transformation of the building industry, will happen when the players come together with a common vision and an integrated approach. The IPD projects now underway are the precursors to this future; these are equivalent to the clinical trials that drug companies undertake. This is a time of tremendous learning, refinement and team building. IPD is not the final solution; it is the demonstration of the future. IPD projects are mandated, the process is not yet natural. The transformation will happen when:

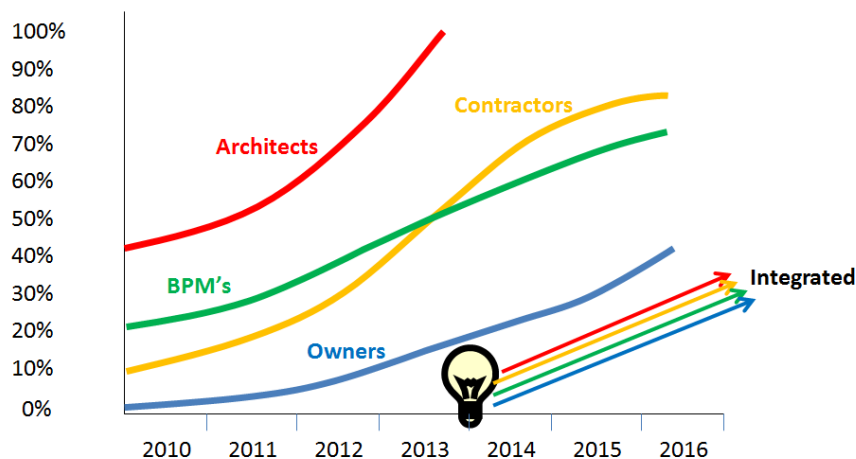
- a. Architects & Engineers – Create the project with IPD levels of detail as their standard of practice, they will either become experts in construction or team up with contractors to generate IPD level of contract documents. They will do multiple automated cost studies at high levels of design detail to ensure the owner is provided the best project at the best price. They will take on more responsibilities (and work) and see their fees increase.
- b. Contractors – The documents they receive for construction will include 3D models, animations, and exacting construction detail and quantity take offs. There will be less mystery, bidding will become more competitive, owners will make their decisions based on quality, confidence in the construction team, and past performance. The time of massive bid ranges will end.
- c. Building Product Manufacturers – Products fall into two fundamental categories, commodity products (gypsum board) and customizable products (light fixtures, skylights). While gypsum

board does not appear complicated, the assemblies that they are a part of are complicated. Many projects have assemblies that are not appropriate for their use, fire rated walls where they are not required, sound walls that do not perform, etc. Think of a future where the architect starts to insert the wall and the software presents logical options, including costs. For manufacturers of customizable products, think of a future when the architect's design is the basis for fabrication. In the future, manufacturers will know years in advance what products are being specified.

- d. Owners – Owners are just starting to push for IPD. They are dictating the new “standard of practice”. The transformation of the building industry will happen when we move from the owners dictating IPD, to when the other players bring an integrated approach to the owners.

## The Start Date of the New Era – the Transformation of the Building Industry

The chart below shows my predictions on the speed that Architects, Contractors, Owners and BPM's will realize that BIM will lead to the transformation of the building industry, the speed they will go from individual BIM thinking to integrated BIM thinking. The years are along the bottom and the percentages indicate the percentage of the group that understands that BIM is transformational.



The architects and engineers will be the first to figure out that the future will be very different than today. The success stories on IPD will place tremendous pressure on them to redefine the standard of practice of this new era. They already are well along the path to this understanding which is why they start out at 40% understanding now. BPM's are catching on that they need to provide BIM objects, next they will see that they can do more, such as providing complete spaces of solutions and asking how they can know more about what is being specified earlier in the design process. BPM's will move faster and faster into BIM as they see this technology gives them a competitive edge. The contractor group is massive and ranges from a single individual to companies with hundreds of thousands of employees.

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There will be contractors that will most likely never need or use BIM, but for most contractors BIM is a major part of their future. Currently their understanding of the transformational nature of BIM is low, but their knowledge and interest will rapidly grow.

Owners have the least understanding today of how BIM will transform their companies, processes, operations and profits and what they need to do to deal with BIM. The number of owners is massive, and their organizations are complicated which will result in a slow realization of the true value of BIM. Owner's building operations are extremely complicated, commonly including design, construction, prototypes, trends, approvals, property purchase, leasing, asset management, relocations, remodeling, operations, and more. Knowledge of the transformational nature of BIM will take many years to expand throughout an owner's organization. But it will only take a few owners to demand the new standard of practice on all their projects, or it will only take a few architects, engineers, contractors and BPM's going to an owner together to make a joint presentation on how their team will work together and deliver a project faster and less expensively to jump start the integrated approach to design and construction. Once these start to happen the transformational part of this new era will have begun.

The start of this transformational event will not be a firm date, just as there was not a firm date when we all knew that CAD was the future. But this date is close, not far. By the start of 2014 there will be; 1) Many success stories on IPD projects, 2) Alliances of architects, engineers, contractors and BPM's making integrated presentations to owners on the savings in money and time they can offer, and 3) Owners expecting their building teams to be using the IPD approach on all their projects.

We are all in for some major CHANGES.