# Autodesk Revit World
# Parenting your design: BIM & IPD

## Parenting Your Design

For anyone new or existing to the field of building design and documentation, these are difficult times. Try to find an article that doesn't slap you silly with all sorts of acronyms. In no particular order: AEC, DBF(M), BIM, BEP, IPD, IPDP, IDM, BIM-P, BIM-E, LOD, LOD (yes, to make matters more interesting we'll use that one twice), MVD. Those were just off the top of my head.

## Now Read This:

*"To fully execute BIM the natural way for the AEC industry is to embrace IPD. This means that a company's BEP should also incorporate a model IPDP and IDM for a standard IPD situation. These IPDP and IDM are tailored in a project specific BIM-P, which contains rules for both LOD's as well as the MVD. Looking specifically at construction we see BIM and particularly IPD demand DB-type contracts, not unlikely with Finance and or Maintain added to the bid."*

Granted, that is a fictional paragraph. Nevertheless, that does not mean I haven't seen a lot of texts just like that. We all have. And it makes my head hurt real bad.

I am currently in a project started by the Dutch Architects' Alliance to help Dutch Architectural firms transition to BIM. The first order of business is to determine "What is BIM?", both in general and for these specific firms.

During this project I've read about a dozen so-called "standards" on BIM: Company standards, standards by software vendors, companies, universities, (inter)national committees. None of them share the same definitions. I was going to write up a nice, complete overview of all these definitions to make it all better but unfortunately I got completely lost. I mean, the AIA202 (US Architects Union BIM Standards) only knows one kind of LOD. Others use two: LODevelopment and LODetail... (See, I mentioned two distinct LOD's).

BIM is an acronym with so many definitions we can't even figure out if it's a process or a noun! Which makes me wonder how standard are these standards anyway? What is the end result of all this? I don't know, I'm afraid we're not quite there yet.

I mean, the example I wrote down earlier (you know, the one you skipped because you couldn't figure out what the heck I was talking about?) well, it isn't all that weird. All of the "standards" are filled with that kind of language. Now I'm a fairly educated guy, if I may say so myself; but I just can't seem to get through all that mumbo-jumbo. So I figure that there has to be a lot of other people out there spreading the word, advocating the use of BIM in all its glory; but who just as me, get more and more confused the more they learn about it. What is going on here? Have we hired every genius known to mankind to write these standards and are the rest of us left with a blank gaze? Or is this really so complicated that I need to go back to school, if I ever want to grasp it?

Yet, it is happening right now. We are doing this collaboration trick together on multi-gazillion dollar projects, based on the rudimentary idea that we all, to some degree, use the same definition. To me that sounds like a disaster waiting to happen. BIM was supposed to make all this more easy. We were supposed to make the entire design and build process less prone to errors. Yet while we were doing our thing for a few hundred years with those awful "traditional" methods, at least it was clear who did what, how and when. That doesn't even seem to be the case right now, so I figured I should take it down another route.

## First: Conception

Yes, that *is* what it says...conception. You know, the moment a new life is formed. Yes, this is still about collaboration and don't worry, I'm not going into any graphic details here. Still, since my puny mind seems to have trouble grasping how all these WonderfulLetterCombinations fit together I thought I'd find a metaphor. That always seems to help me, and I hope it does the same for you.

Reading many different definitions for "BIM" I always notice that they are all somewhat similar to the definition of life itself. There is birth, life and death: design, usage and demolition. So one could define BIM as: *Building Information Modelling -the process to capture the entire lifecycle of a building in a virtual dataset*. Sort of like a buildings' autobiography. So, let's explore this and see if this sheds some light on how all those acronyms fit together.

## Right, Conception

At a certain point a future owner of a building will say "I want to have a building". At this point, the owner needs a partner. It's tough to have buildings all on your own. So maybe they are already in a steady relationship with an architect, or maybe they just find one to get the job done. Fact of the matter is there needs to be chemistry between those two. They need to hit it off...

Thus the concept of a building comes into being...

Now before going there, they need to sit down and have a talk. It's one thing to decide you want something, taking care of a newborn is quite something else. How are they going to nurture it, feed it, bring it to its full potential?

Every parent will know that it's crucial to be on the same page & back each other up from time to time. There needs to be a set of agreements beforehand, a BIM parenting plan so to speak.

Now in real life, this usually slips in. It kind of happens by itself: couples talk about expectations they have: what kind of education are we giving, what school will the kid go to, and so on. Who will be responsible for raising the kid? Will there be traditional role models, mom taking care of the kids, dad taking care of the money? Will there be a more equally divided responsibility? How did it work when you were growing up? What were the good things, the bad & the downright ugly aspects of your childhood?

It's something different when it comes to having a building, of course there is talk about the end result; we all know "what it's going to be like when it's finished" but the parenting itself is usually forgotten about. And yet this spark of concrete and steel-based life, the concept of having a building needs parenting too, in order for it to ever reach its full potential.

Now we find ourselves facing the first set of acronyms. Before going into the adventure of having a building, there are some decisions to be made; some things to agree on.

The first decision is best shown with a real-life example: What if you are on the verge of becoming a parent; is this what it's supposed to look like:

*- Mom and dad tell about their expectations when the child is growing up and what it's growing up to become.*

*- The child is born; dad leaves to go to work and promises to check in every year around birthdays and Christmas time.*

*- The child goes to school. Parents kind of randomly choose one based on price tag. Mom sort of coordinates school stuff, dad goes off to do his own thing.*

*- Child graduates after going through preliminary, elementary, high school and finally college. Parents don't really bother with education plans or all that nonsense, as long as junior smoothly continues year after year. Teachers come, teachers go without any form of discussion or debate.*

*- From school to school, there's no real consultation or transfer. Nor does anyone check whether the stuff taught is actually viable in the next educational step.*

*- When finally graduating, everybody is baffled it took so long, and, for all that money invested, the ROI is surprisingly low.*

If this sounds somewhat weird to you make no mistake: these ARE the "traditional" ways of the AEC industry.

The principal/owner (dad) is away most of the time, only around to sign off at preset moments in the design and construction workflow. The architect (mom) nurtures the design until it's time to get some outside expertise, then passes it around to several advisors (teachers) and repeats this process in various design stages (schools). There is no saying that these advisors do coherent work, because they're usually selected solely based on their pricing. They get the design, examine it on its merits and do their thing. When finished, they send it back again. There is little to no communication between the different fields of expertise. Same with the contractor (college); they get an educated model, in which they had no say so and then they are expected to be the final frontier between design and actual existence.

And yes, usually the ROI is surprisingly low! There have been all kind of extra costs due to design/construction errors and more often than not; the building does not fully comply with the owners/principals demands.

Suddenly it doesn't seem all that weird to find another way, does it? On to the next order of business…

## To BIM or Not To BIM

Looking at that example there is one major thing wrong: why is it that every time someone new gets involved, they have to start from scratch? Why is there no central place where everybody can get a clear view of what's going on, what everybody else is doing? You know, just in case someone gets the crazy idea to check whether it's all compliant...

That, my dear readers, is what BIM does: transform the fragmented, decentralized pieces of a buildings grow path from conception to realization in a single (set of linked) document(s). Database if you will.

Which is nice because now, the physics teacher (MEP engineer), can see what the math teacher (structural engineer) is doing: and they can all coordinate their education plans. Then the parents (architect and owner/principal) are no longer the only ones with a (hopefully) clear view of the end goal...

BIM is a design process, which enables the possibility of a centralized view of the building growing up. An educational oversight, which passes, from school to school, from teacher to teacher and where they all store the lessons they have taught our building to be.

Does this mean BIM only works when everybody is connected? Of course not: but the more, the merrier.

## Second: Tear down the Walls

Now that we have established the conception of our project, it's nice to have a clear overview: let me ask you this: "Are you REALLY just sending your own kids to the cheapest school you can find? Is that your only agenda: save money on the short term?"

No? Then read on...

After seeing the light about BIM, people quickly started wondering: what would happen if we gathered every single teacher, from every single school upfront, and explain to them what we are aiming for...? *I know: revolutionary concept, the idea of picking an educational path based on the desired outcome is just..., well... In real life it's what you do.* In the AEC industry, we invented a term for it: IPD or Integrated Project Delivery.

### IPD

A BIM workflow based on the assumption that you are more likely to reach your end goal by explaining it before hand and then having all parties involved participate in the discussions on how to reach it: that inevitably means two things…

1. You want to limit the amount of people involved so you don't lose control over the discussion and can keep a workable situation. The only logical way to do this is to ***tear down the walls between different stages of design***. There's no longer a preliminary, elementary and high school followed by college. You are going to have to sweep them together into one big melting pot. Hence the Integrated Delivery: not just disciplines working together, but they're also working together across traditional boundaries. Everybody gets shared responsibility on everything.

2. It's a fairytale that BIM/IPD is going to make every aspect of your design process cheaper. It's not. Just like a good education, BIM is an investment. It's going to make the overall lifecycle of a building cheaper. So what's in it for, let's say, the structural/MEP engineer? They have to go to more meetings; they have to do their own model checking for other disciplines, they now have to think about stuff that they were never previously needed to. The only

way IPD will work is if everyone shares responsibilities AND benefits within the entire design, build and (ideally) maintain process: *as one group*. This is why DB/F/FM/M (Design, Build/Finance/Finance and Maintain/Maintain) contracts are seeing the light of day: it's the natural way to challenge people to step over their traditional boundaries.

### Third: Lay down the law

Since we now agreed that having a coherent parenting view is necessary and a joint venture between all parties strongly advocated, we need to lay down some rules on how to make this all work. The architect is supposed to have done this before, she will have a Model Plan for this: a BIM Execution Plan (BIM-E or BEP) or, in the case of IPD an Integrated Project Delivery Plan (IPDP). These plans contain the general plan of attack: who does what, when, where, why and how.

The owner does need to sign off on this. Why? Because this requires a greater investment: an investment of money, time and energy. He is not going to get away with just checking in 'every now and then'. The owner is required to do some serious parenting too.

The BEP contains every single agreement made between the different contributors in a buildings growth and education. If you talk about it, write it down. Every possible question or remark you could have: write it down. Later on we will see that there are a few fixed subjects which make up the most of the contents of a BEP/IPDP

### Pregnancy.

Everybody who has ever designed a building, or has been close to the design process knows this phase. It's that exhilarating time when both the owner and architect know that there is something beautiful happening. They talk and talk about dreams and expectations. What will it become? What will it do? Will it be a success or an utter failure? Will it be beautiful, just a normal, regular building or, god forbid, a hideous monstrosity?

At this point, there's no sense in trying to define this building. There are just bits and pieces. Like an ultrasound, the architect shows you glimpses of the future to come, which isn't quite there yet. Pretty soon you are able to tell whether all desired limbs and organs are accounted for and approximately where they are supposed to be. There will be a rough and partial view on how it will look like. There is no shame in not "BIMming" this one (although it can be done). It's kind of hard to have a centralized and coherent view on something that's not there. Usually the modeling starts at birth. In this point of time, it's best to just let the mother sit on it in piece and do her artistic thing. There is no use in trying to bind or constrain it. This is a force of nature not to mess with...

### Giving birth

So there it is. Completely out of the blue it seems. Of course, you all knew it was coming, but what a joyful day it is when you get the call: "it's done; we have a conceptual design..."

Now you have something to look at, talk about. It's there, and all the vitals should be attached and/or inserted. This is now the moment you can start with (growing) your BIM: there is a basic level of information, now you can start nurturing it.

### Education

The fun begins. You have a basic level of design. It needs to grow. It needs to be educated. This you can do jumping in head over heels or you can conjure up a plan. If you do conjure up an educational plan, it's going to be called your BIM Execution Plan (BEP/BIM-E) / BIM Protocol (BIM-P) or, in the case of an Integrated Project Delivery (IPD) your IPD Plan (IPDP).

In all cases, your educational plan has three types of education:
1. Stuff your model needs to know
2. Stuff your model needs to understand
3. Social standards your model needs to follow

For these three types of education you need to define who is teaching what, when, where is it stored and how.

### Stuff you need to understand vs stuff you need to know

The AIA only recognizes Level of Detail, which encompasses both the knowing and the understanding. I think that's not quite correct, because there's a fundamental difference between the two.

I love my real-life examples, so here's another one:
I don't know if any of you has taken the Autodesk Certification Program Exams, but it contains two types of questions:
1. Where can I find command A, option B or setting C. To answer these you need to know the software.
2. Provide an answer which requires a series of handlings of the software. To answer these, you need to know where to find the information needed. Understand the software.

*Level of Development is the amount of information present in the model*: does the model contain the information needed to understand and analyze complex questions?

*Level of Detail is the amount of factual detail present in the model* needed to correctly display the underlying information in any chosen form or function at any given point in the design process.

### A real life AEC example:

Let's say you're working as an architect in a Revit based architectural model, together with a structural engineer working in Tekla.

In Tekla it's easier to create a beam-column connection WITH plates, bolts and the lot. The software acknowledges the fact you can't have a beam just floating around and puts in a connection type, even if you haven't calculated it yet. So when you ask him to provide a preliminary structural design, chances are he returns a model with all bolts and nuts. But that doesn't mean they are fully calculated!!!

Is this the smart thing to do? Maybe, maybe not, I don't know frankly; but you should be ok just as long it's abundantly clear that the DETAIL shown in the structural model is not mirrored by the DEVELOPMENT of the structural analysis! This is precisely why you should incorporate those tables showing LODetail and LODevelopment in your BIM Execution Plan, for all stages of design.

## Dress to the occasion: Model View Definition & Modelling Standards

The first thing we all learn is how to dress ourselves and that is something you should teach your BIM too. In order to form a community and raise our buildings together there are things we can and cannot do.

Model View Definition: when I work at home, I wear shorts and a T-shirt. When I go meet a client, I put on a suit. When I'm needed in court as an expert witness on building engineering, I face the judge wearing a suit and tie. It's that simple: we have social standards on how we should look on certain occasions. So does your model. If it's all really schematic design, we just put in the gridline dimensions. No general notes, no dimensioning every piece of geometry, no fancy schedules and quantity takeoffs; just the raw visuals. When it's time to submit for the building permit, you put on the whole entourage. What that entourage is, well that's something to define in your BIM Execution Plan and it's related to both LOD's (LODevelopment & LODetail) AND to the entire design process.

### Modelling Standards

We don't pick our nose in public, we turn off our phones in the theater… There are things that we cannot do and there are things that we are expected to do. We need these standards to keep everything nice and civilized. Disregard them and we will no longer know how to approach each other, how to interact. Same with modelling standards: if you want to model a piece of building geometry, define how it's modelled; by whom and who has responsibility for keeping it in check. Again, based on both LOD's and the level of design you're on.

### Final Summary.

When we look at the design process from first conceptual design (birth) to being construction ready (graduation), we, the professionals in the AEC industry, need to teach our buildings.

The BIM philosophy states that we should do this as a continuous process with a continous adding of skills without gaps or dropoffs.

To do that, we need an educational plan, called a BIM Execution Plan, which defines Who does what, When, Where and How; and perhaps most importantly: How all these elements are tied together.

IPD is a logical next step where we get one team of teachers to work the educational plan throughout the entire process of growing up. When you use IPD in nurturing a building, the BIM-E/BEP is suddenly called an IPDP.

The first part of the educational plan is focussing on the why's: Why do we want this building?, Why do we want a certain degree of education?, etc. These questions & answers basically define the endresult and motivates it.

The second part of the educational plan is focussing on four related things:

**1)** What stuff does the model need to know, what factual knowledge needs to be there? When do you need to know it, and who's going to teach it? **This is the Level of Detail**

**2)** What stuff does the model needs to understand, wat underlying information does it need to have? When do you need to understand it, and who is going to teach it? **This is the Level of Development**

**3)** How are we going to teach it? How is it going to be added to our building model? **These are the drawing & modelling standards**

**4)** What is it going to look like at any given moment in time? **This is the Model View Definition**

You see, it's not all that complicated... Now go out there and raise some buildings! -And for those of you still questioning the need to embrace BIM or IPD, remember the old African proverb: *"It takes a village to raise a child"* **and keep in mind: that also applies to the AEC industry.**