

BIM 101 for Project Managers

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BIM myths

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- *Presentation Outline:*
 - *Target audience are Project Managers from design team (A/E)*
 - *Construction manager and owner/client PM's can benefit too*
 - *Covers many activities during design*
 - *Covers some activities during construction (as needed)*
 - *Covers some activities during operations*



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- *Presentation Goals:*
 - *Hopefully everyone can walk out of here with at least one+ idea you can use in your company*



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BIM myths

- *This section covers these areas related to Marketing BIM:*
 - *Marketing BIM Capabilities*
 - *Marketing Against the Competition's BIM Capabilities*



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- *Marketing Our BIM Capabilities*
 - *Selling capabilities versus promising too much*
 - *Ask yourself:*
 - *Are we overselling?*
 - *What does it take to deliver what we are saying?*
 - *Do we even have buy-in from the staff???*
 - *Understand your client's requirements and expectations*
 - *This is all about knowing your company's core BIM competencies, just ask your company's BIM folks, they will love you for it*
 - *It's quite possible your BIM guy can give you the "BIM hook"*



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- *Marketing Against the Competition's BIM Capabilities*
 - *Selling our capabilities versus promising the moon*
 - *Ask yourself:*
 - *What is the competition saying?*
 - *Has the competition done BIM with this client before?*
 - *This is all about knowing the competition's core BIM competencies, this information is not easy to find but it's out there*



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YOU'RE HEARING SOME TODAY!



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BIM myths

- *This section covers these areas related to Contracts:*
 - *A Client's Perspective*
 - *Types*
 - *BIM Things to be Aware of*



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- *A Client's Perspective:*

- *The client issues a contract for the development of contract documents and the subsequent construction of a facility.*
- *The contract has a BIM requirement, but the requirement is not solely about the development of a BIM model and Facility Data*
- *The requirement is about the adaptation and integration of the proven benefits of the technology and processes to produce:*
 - *Efficient and effective planning documents*
 - *A well coordinated set of contract documents produced from a virtual facility*
 - *A physical facility built with few errors and omissions*
 - *A foundation for efficient Facility Management processes*
- *Facility life-cycle application of BIM is a win for everybody*



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BIM myths

- *Types:*
 - *Traditional “off-the-shelf” standard contracts (D-B-B)*
 - *Language is not current*
 - *File types, work sharing, other electronic agreements*
 - *Integration of stakeholders facilitated by BIM tools is not taken into consideration*
 - *Coordination tools used, model handoff*
 - *Ownership of models*
 - *Traditional contracts do not begin to outline this*
 - *Risk and reward*
 - *Stakeholders further upstream lose out*



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BIM myths

- *Types:*
 - *Integrated project delivery (IPD) contracts*
 - *Customized for each individual project*
 - *Integration of stakeholders for coordination of design*
 - *Stakeholders share risk and reward*
 - *More time is required because the stakeholders need to discuss contract requirements extensively up front*



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BIM myths

- *Types:*
 - *Those between traditional and IPD (D-B)*
 - *Not everything needs to be spelled out*
 - *Much of the process will be determined during the project but all the stakeholders need to commit to working together*
 - *This is always better than ‘throw-it-over-the-wall’ traditional contracts but don’t let the details slow you down*
 - *Logistics that need to be addressed*
 - *Purpose of using BIM model*
 - *Limitations of BIM model*
 - *Identify what is to be modeled*
 - *Specific deliverable requirements*
 - *File access*
 - *Exchanging electronic data*



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- *BIM Things to be Aware of:*
 - *Required model file and facility data format deliverables*
 - *Your company may use a BIM modeling (authoring) tool that is different than what the client is requiring*
 - *Furthermore, your BIM modeling tool may not export to the required file format very well*
 - *Delivery standards*
 - *3D model and facility data delivery requirement*
 - *Is there a BIM deliverable? Do you have to hand over the model?*



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BIM myths

- *BIM Things to be Aware of:*
 - *During negotiations you will have to make split second decisions*
 - *Don't be afraid to ask why the client wants a certain BIM deliverable*
 - *Once again, ask your BIM folks for a contract/services cheat sheet*



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Fee Structure



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BIM myths

- *This section covers these areas related to Fee Structure:*
 - *Traditional Fee Structure*
 - *Theoretical BIM Fee Structure*



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BIM myths

- *Traditional Fee Structure:*
 - *Majority of company's still use traditional fee structure*
 - *Bulk of allocation is at the end of a phase or project*
 - *Yet, the BIM model(s) wants more information early*



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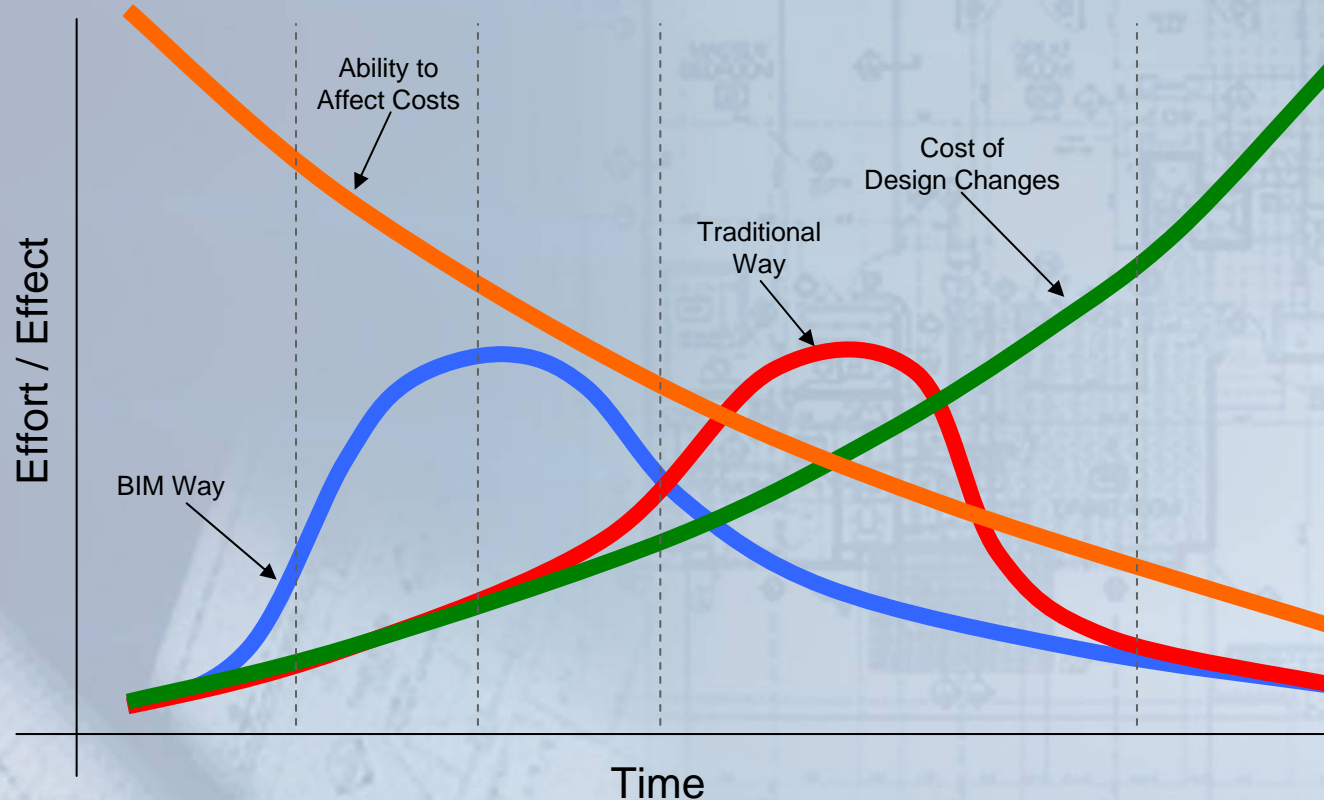
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- Theoretical BIM Fee Structure:*



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BIM myths

- *Things to Note:*
 - *Hard to realize BIM Way unless your senior designers are modeling*
 - *Owners can be reluctant to make major decisions early*
 - *BIM Way leads to greater returns on investment*
 - *Better design*
 - *Better decisions*
 - *Better coordination*
 - *Better long-term relationships!!!*



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BIM myths

- *This section covers these areas related to Planning:*
 - *BIM Kickoff Meetings*
 - *BIM Work Plan Description*
 - *BIM Work Plan Outline*
 - *Sample USACE BIM Work Plan Requirement*



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BIM myths

- *BIM Kickoff Meetings:*
 - *Internal BIM kickoff meeting*
 - *Needs to happen as early as possible*
 - *Every discipline who has a vested interest in the project (not just those modeling in 3D)*
 - *Happens before external BIM kickoff meeting*
 - *External BIM kickoff meeting*
 - *Get the consultants on board*
 - *And get the contractor and owner/client on board if possible*
 - *After BIM kickoff meetings a BIM work plan is established*



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BIM myths

- *BIM Work Plan Description:*
 - *What?*
 - *The BIM work plan is a planning tool.*



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- *BIM Work Plan Description:*
 - *Why?*
 - *The recent adoption and complexity of BIM software in lieu of traditional 2D CAD products introduces greater risk to our project environment. However, there is also incredible upside and we have observed most risk can be systematically eliminated with a good BIM Work Plan in place.*
 - *Ensure that client BIM requirements are thoroughly understood and addressed.*



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BIM myths

- *BIM Work Plan Description:*
 - *Who?*
 - *The Project Manager along with his/her office's BIM Manager/Coordinator should prepare a BIM work plan.*



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BIM myths

- *BIM Work Plan Description:*
 - *When?*
 - *Preferably the BIM work plan should be prepared after there has been a BIM kickoff meeting and before any BIM models are started.*



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BIM myths

- *BIM Work Plan Description:*
 - *Where?*
 - *For every project.*



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BIM myths

- *BIM Work Plan Outline:*
 - *Covers these key points*
 - *The project*
 - *For categorical reasons*
 - *Big picture/mission critical decisions are made using this information*
 - *The project team and project files*
 - *Roles and responsibilities*
 - *Standards*
 - *Deliverables and client/owner requirements*
 - *The model*
 - *Maps the organization and flow of files/information*
 - *Collaboration*
 - *Work sharing within the lead company's office, supporting offices and consultants*
 - *Coordination*
 - *Most importantly for the long-term*
 - *Codifies experience and knowledge*



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- *Sample USACE BIM Work Plan Requirement:*
 - *Prior to the Initial Design Conference, submit a BIM Execution Plan, documenting viability of the BIM design and analysis technologies selected for the Project Model (integrated with the AEC CAD Standard) from concept development through As-Builts as a design, production, coordination, construction, and documentation tool and the collaborative process by which it shall be implemented. Insert reference to District BIM Manager assistance here. See Section 7 for guidance on developing the Plan.*
 - *The Plan shall describe uses of BIM during design and construction phases to include value management, interference management, and design-change tracking, or such other uses as the Contractor proposes.*



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- *Sample USACE BIM Work Plan Requirement cont.:*
 - *The Plan shall identify how the BIM data shall be managed and interoperate* (data storage, sharing, viewing, quality control parameters in Section 2.3 Quality Control, and updating, as necessary) among all Contractor team members.
 - *Conduct a demonstration at the Initial Design Conference* to review the Plan for clarification, and to verify the functionality of Model technology workflow and processes. The Government shall confirm acceptability of the Plan or advise as to additional processes or activities necessary to be incorporated into the Plan. If modifications are required, the Contractor shall complete the modifications and resubmit the final Plan for Government acceptance. *There will be no payment for design or construction until the Plan is acceptable to the Government. The Government may also withhold payment for design and construction for unacceptable performance in executing the Plan.*



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BIM myths

- *This section covers the following areas regarding the Project Team:*
 - *Model Managers*
 - *Model Builders*



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BIM myths

- *Model Managers:*
 - *Possesses ultimate accountability of BIM model(s) success*
 - *Responsibilities:*
 - *Meet owner/client's BIM requirements*
 - *Maintain model performance*
 - » *Platform specific modeling methodologies are followed*
 - » *Model is accessible and not "slow"*
 - *Implement and enforce company best practices (if applicable)*
 - *Maintain company standards*
 - » *Traditional QA/QC process still rule*
 - *Maintain collaboration between internal and external stakeholders*
 - *Develop model specification*
 - *Communicating with resources external to the project*
 - » *Corporate IT/BIM department*
 - » *Industry groups*



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BIM myths

- *Model Builders:*
 - *Constructs the model*
 - *Responsibilities:*
 - *Maintain model accuracy*
 - *Maintain attributes*
 - *Follow company standards*
 - *Follow company best practices*
 - *Follow model specification (if applicable)*
 - *Model manager may also assume responsibilities of model builder on small to medium size projects*



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BIM myths

- *This section covers these areas related to Model Content:*
 - *Scope of Creation*
 - *Creating Content*
 - *Obtaining Content*



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BIM myths

- *Scope of Creation:*
 - *Get an estimate of how much you will need*
 - *What needs to be modeled for your project?*
 - *How much is globally shared at your company?*
 - *How much is available from outside sources?*
 - *How much will you have to build from scratch?*



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BIM myths

- *Creating Content:*
 - *Cost allocation*
 - *Project time versus overhead*
 - *Ownership*
 - *Does the owner/client own the content?*
 - *Avoid unauthorized reuse of content*



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BIM myths

- *Obtaining Content:*
 - *Manufacturers*
 - *Usually their content is too detailed to be used in a BIM model*
 - *Developer sharing*
 - *Check online forums*
 - *Internet sites*
 - *Networking at conferences*



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Model Specification



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BIM myths

- *This section covers these areas related to Model Specifications:*
 - *Definition*
 - *Benefits*
 - *Creation and Development*
 - *Excerpt*



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BIM myths

- *Definition:*
 - *A document prepared by Project Managers with assistance from the Model Manager or provided by the client*
 - *Establishes the Granularity requirements*
 - *Tells what building elements will be modeled and to what level of detail*
 - *Establishes Quality Control requirements*
 - *Establishes Project Review requirements*
 - *Every project, every phase*



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BIM myths

- *Benefits:*
 - *Controls information flowing into the BIM model(s)*
 - *Old database adage applies... “junk in, junk out”*
 - *Management tool*
 - *Becomes management “assistant”*
 - *Reviewable document*
 - *Shared with all team members (current and future)*



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BIM myths

- *Creation and Development:*
 - *Minimal time investment*
 - *After 2nd or 3rd attempt = 2-3 hours*
 - *Work upstream from output demands*
 - *Talk to your BIM folks*



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BIM myths

- *Excerpt:*

Architectural Design Development

- **Walls** (model to correct representation at 1/8" scale & smaller)
 - **Interior:** Use basic composites with basic materials.
 - **Ex:** 4 7/8" gyp., 5 5/8" CMU, 7 5/8" CMU
 - **Exterior:** Use basics composites with materials. Model components to actual dimensions.
 - **Ex:** 7 5/8" block, 1" rigid insulation, 1" air space, & 3 5/8" brick.
- **Doors # Door Numbering**
 - **Interior:** Use cu_door_std.gsm object. Model basic standard sizes. Model to known information, i.e. glass, sidelight, etc. Basic material.
 - **Exterior:** Use cu_door_std.gsm or cu_door_estm.gsm object. Model to known information, i.e. glass, sidelight, or custom curtain wall object.
 - Use cu_door_tag.gsm object to label.



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- *Sample USACE Granularity Requirement:*
 - *Models may vary in level of detail for individual elements within a model, but at a minimum must include all features that would be included on a quarter inch (1/4" = 1'0") scaled drawing (e.g. at least 1/16th, 1/8th and 1/4th).*
 - *Piping and communication conduit 1 1/2" or larger at a minimum*
 - *Fire Protection piping is fully modeled.*



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- *Sample USACE Quality Control Requirement:*
 - *Standards Checks. QC checking performed to ensure that the fonts, dimensions, line styles, levels and other contract document formatting issues are followed per the A/E/C CADD Standard.*
 - *Model Integrity Checks. QC validation used to ensure that the Project Facility Data set has no undefined, incorrectly defined or duplicated elements. Report non-compliant elements and corrective action plan to correct non-compliant elements.*
 - *Other Parameters. Develop such other QC parameters as Contractor deems appropriate for the Project and provide to the Government for concurrence.*



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- *Sample USACE Project Review Requirement:*
 - *Perform design and construction reviews at each submittal stage to test the Model*
 - *Visual Checks to ensure the design intent has been followed and that there are no unintended elements in the Model.*
 - *Interference Management Checks for locating conflicting spatial data in the Model where two elements are occupying the same physical space. Log hard interferences and soft interferences in a written report and resolve.*
 - *Provide an IFC Coordination View in IFC Express format for all deliverables. Provide exported property set data for all IFC supported named building elements.*



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BIM myths

- *This section covers these areas regarding Coordination:*
 - *Definition of Coordination Meetings*
 - *Types of Coordination Meetings*
 - *Goals*
 - *Conducting a Coordination Meeting*
 - *Problem Resolution Process*



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- *Definition of Coordination Meetings:*
 - *Assembling various project stakeholders in order to identify and/or anticipate and resolve problems, this process is facilitated by the BIM model(s)*
 - *Currently most meetings are face-to-face but some clients are encouraging virtual meetings*



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BIM myths

- *Types of Coordination Meetings:*
 - *Model Coordination*
 - *Design Coordination*
 - *Construction Coordination*
 - *Construction Sequence Coordination*



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BIM myths

- *Goals- Model Coordination:*
 - *Identify:*
 - *Model accuracy*
 - *Best practices adherence*
 - *Standards adherence*
 - *Building system collisions from poor modeling*



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BIM myths

- *Goals- Design Coordination:*
 - *Identify:*
 - *Building system collisions from uncoordinated design*
 - *Best routing of systems based on design intent and best information available*
 - *Buffer zone around major equipment to allow for installation of accessories (i.e. hangers, flanges, access panles etc.)*
 - *And resolve constructability issues within design intent*



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BIM myths

- *Goals- Construction Coordination:*
 - *Identify:*
 - *Conflicts among trades and between trades and Architectural, Structural, and MEP*
 - *Best routing of systems based on fabrication level information*



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BIM myths

- *Goals- Construction Sequencing Coordination:*
 - *Sequence:*
 - *Work to minimize conflicts between different trade work crews*
 - *Work to eliminate rework due to poor planning*
 - *Work to maximize production of craft workers*



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BIM myths

- *Conducting a Coordination Meeting:*
 - *Is the room set up correctly (furniture & lighting)?*
 - *Who is facilitating the technology and BIM model?*
 - *Who is transcribing meeting minutes?*



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BIM myths

- *Problem Resolution Process:*
 - *How do we fix the problems discovered in coordination meetings?*
 - *Fix them on the spot*
 - *Fix them later*
 - *Model builder team and model correction team*
 - » *Limited by number of staff*
 - » *Getting the changes into the most current model*



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BIM myths

- *This section covers these areas related to Technology:*
 - *Interoperability*
 - *Sharing Information*
 - *Modeling in 3D versus Drawing in 2D*
 - *Various Models*
 - *Summary of Time Investment for Output*



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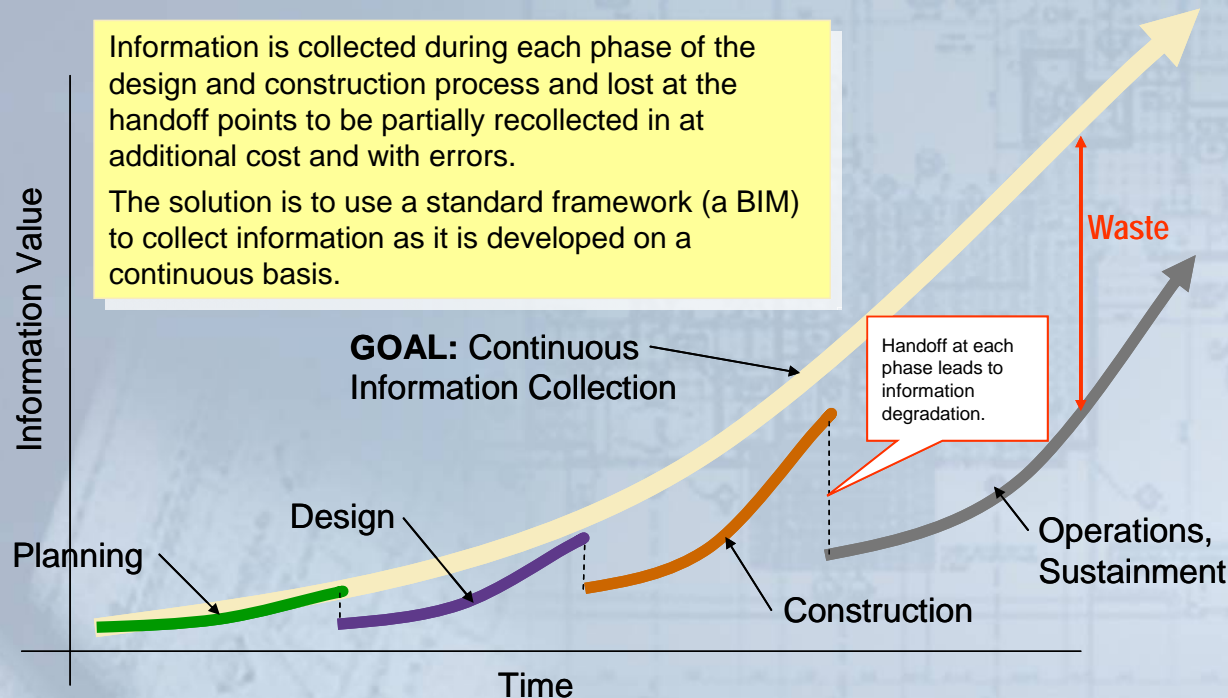
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BIM myths

- *Interoperability:*
 - *Loss of data*



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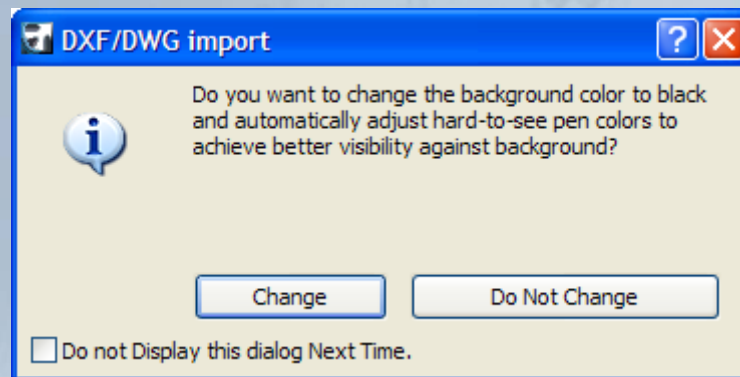
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BIM myths

- *Interoperability:*
 - *Accuracy and readability of data*



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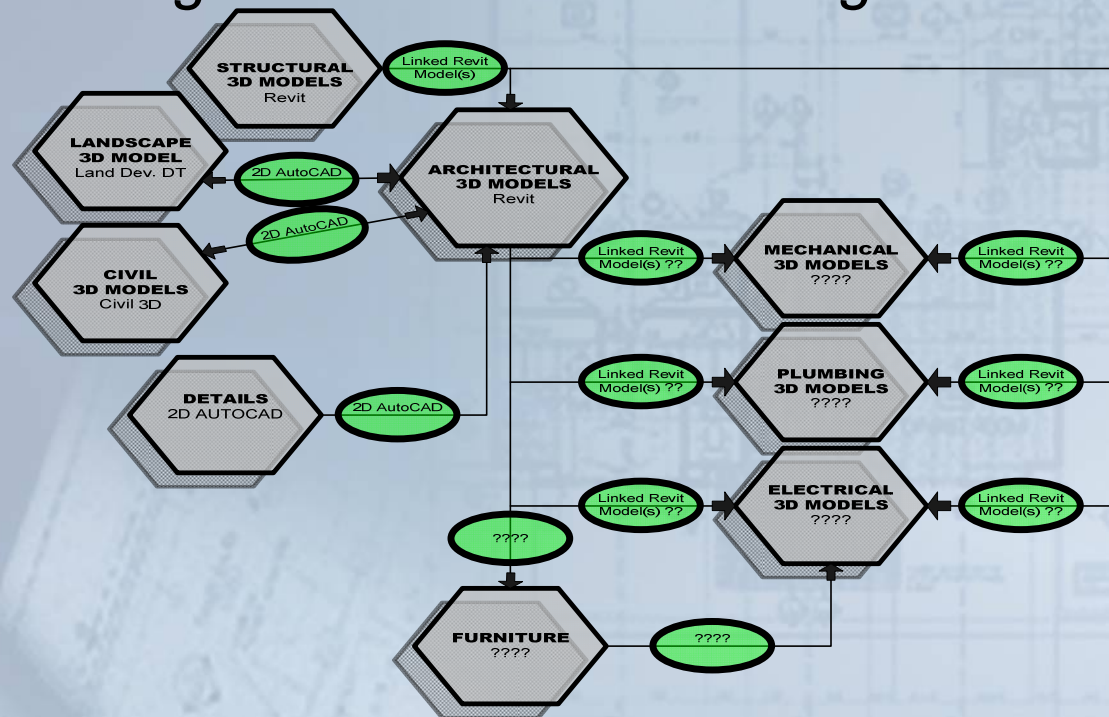
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BIM myths

- *Sharing Information:*
 - *Live backgrounds and maintaining models*



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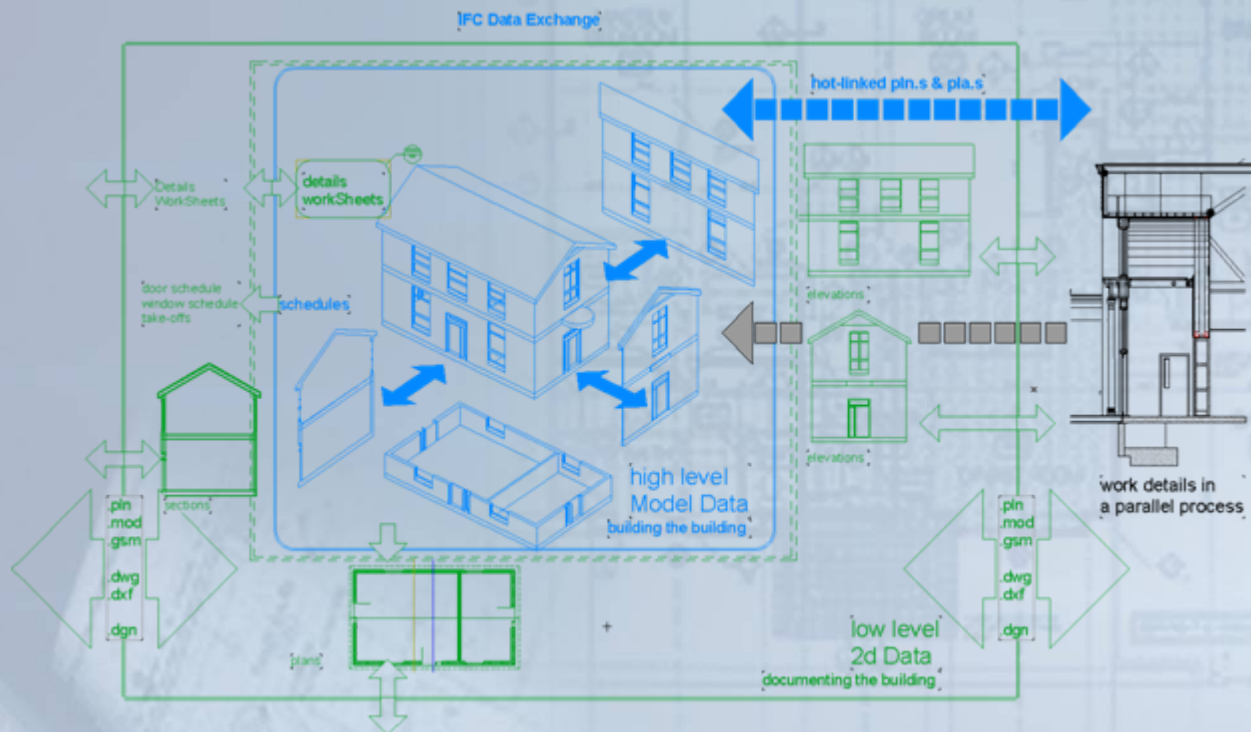
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BIM myths

- *Modeling in 3D versus Drawing in 2D:*



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BIM myths

- *Various Models:*
 - *Presentation models*
 - *Very low level of detail*
 - *Built for visualization purposes*
 - *Aesthetics matter*



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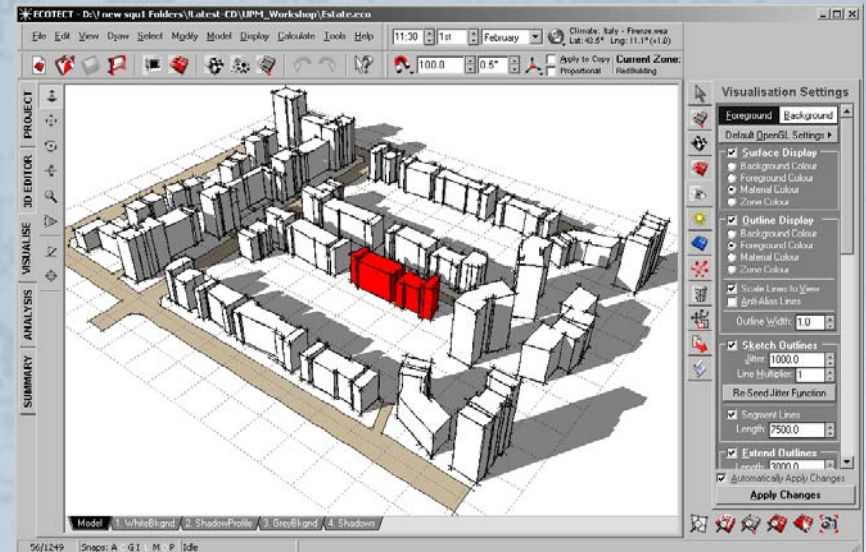
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BIM myths

- *Various Models:*
 - *Energy analysis model*
 - *Low level of detail*
 - *Built to run efficiently in energy analysis software*
 - *Design changes (form and orientation) should be able to happen quickly*



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BIM myths

- *Various Models:*
 - *Design intent models*
 - *Relatively low level of detail*
 - *Built for design coordination and contract documentation purposes*
 - *Building components are generally monolithic (e.g. CJ's and EJ's, full wall height, slabs)*



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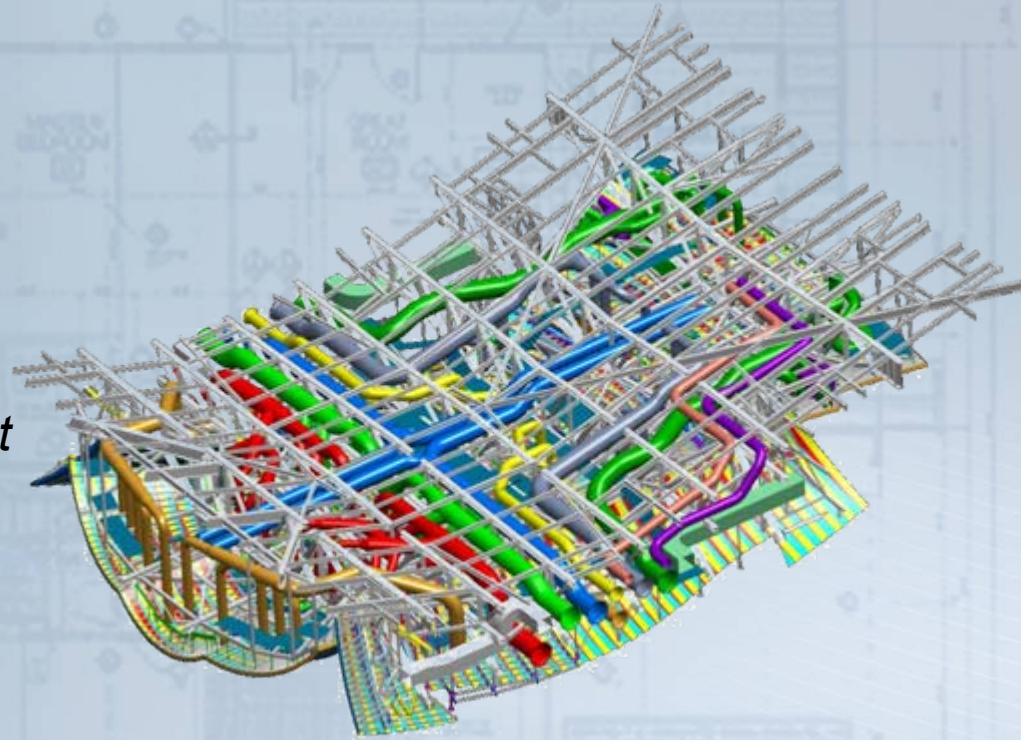
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BIM myths

- *Various Models:*
 - *Coordination models*
 - *Moderate level of detail*
 - *Many models linked into one*
 - *Need geometry only, associated properties not needed*



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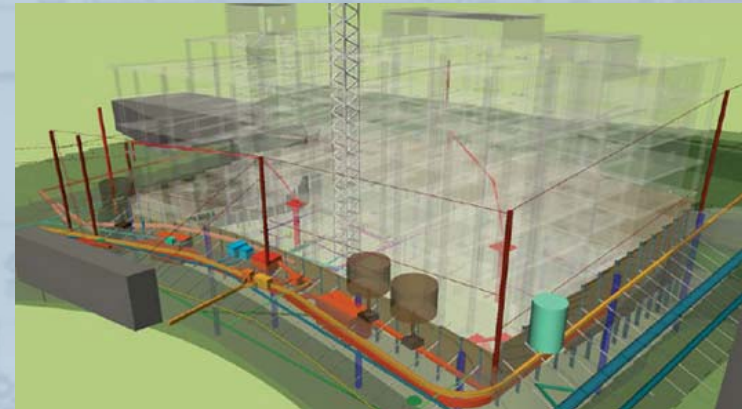
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BIM myths

- *Various Models:*
 - *Constructability model for scheduling and sequencing (4D)*
 - *High level of detail*
 - *Building strategically divided for sequencing*
 - *3D model plus time as 4th dimension*



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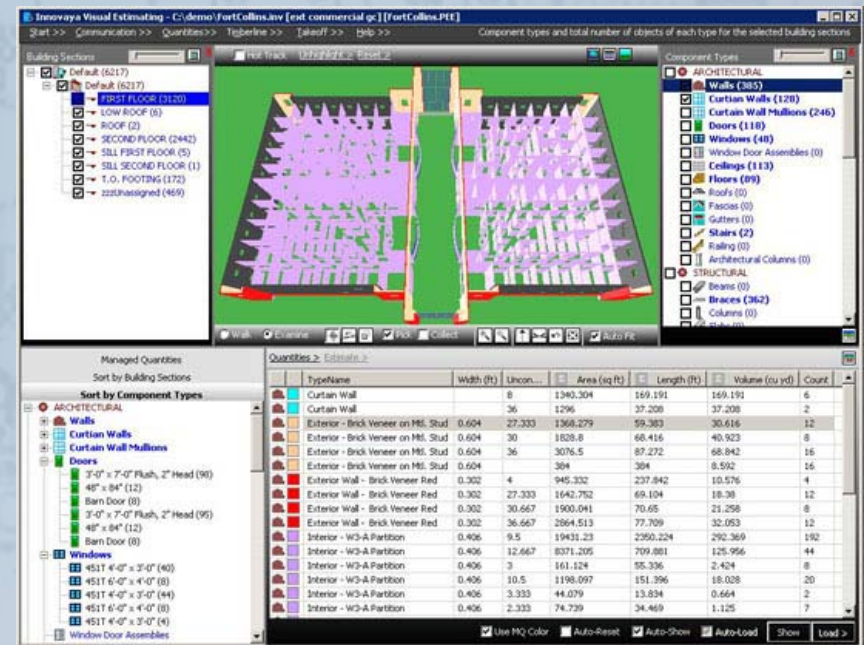
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BIM myths

- *Various Models:*
 - *Constructability model for cost estimation (5D)*
 - *Very high level of detail*
 - *Associated with a complex database of current unit costs*
 - *Quantity variance reporting*
 - *Cost management tools*



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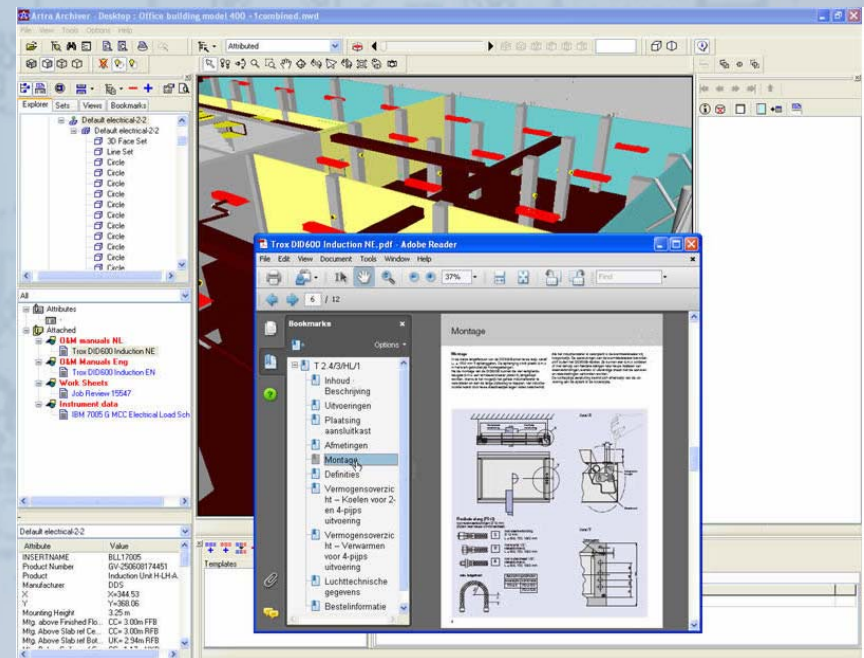
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BIM myths

- *Various Models:*
 - *Facility management model (record model)*
 - *Highest level of detail*
 - *Very large file size*
 - *Represents the building as it was constructed*
 - *All building components have associated specs, warranties, supplier information, maintenance history, etc.*
 - *Occupant logistics*



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BIM myths

- *Summary of Time Investment for Output:*
 - *Low time investment*
 - *Documentation*
 - *Coordination*
 - *Visualization*
 - *Door, window, finish, equipment schedules*
 - *Medium time investment*
 - *Quantity takeoffs*
 - *High time investment*
 - *Bill of materials*
 - *4D scheduling*
 - *5D cost estimation*
 - *Sequence animation*
 - *Facility management data*



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BIM myths

- *BIM Myths:*
 - *BIM is software*
 - *BIM is a tool that provokes/facilitates a process change*
 - *BIM allows for design flexibility late in the documentation phase*
 - *Design change costs increase exponentially as we advance through documentation phases*
 - *BIM is faster*
 - *The process does not necessarily accelerate the schedule however it can require fewer people*
 - *BIM is only for large companies*
 - *BIM is only to be used on big projects*



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*Thank You
Questions?*

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