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You are a Project Manager or Designer without Revit experience and now are faced with having to deliver projects done in Revit. What key items should you be aware of to effectively manage the Revit project team?

1. Definition of BIM

The National Institute of Building Sciences defines a Building Information Model as “a model that utilizes cutting edge digital technology to establish a computable representation of all physical and functional characteristics of a facility and its related project/life-cycle information, and is intended to be a repository of information for the facility Owner/Operator to use and maintain throughout the life-cycle of the facility.”

The AIA Document E202-2008 defines a Building Information Model as “a digital representation of the physical and functional characteristics of the Project. ‘Building Information Modeling’ means the process and technology used to create the Model.”

Revit is a building design software from Autodesk used to create building information models.

2. BIM has been in the AEC industry for more than 20 years, why is it becoming the ‘norm’ now?

Hardware advancement: Powerful, inexpensive computers with lots of storage space are readily and cost effectively available.

Connectivity advancement: Fast inter-office and intra-office data connections are commonplace along with fast, reliable internet service for speeding the exchange of information.

Software development: Strong competition between software firms has lead to better software suited to the AEC and building industry.

Heightened awareness: Construction Contractors have discovered the efficiency of BIM and have positioned themselves to reap the benefits. Government entities such as the GSA and the states of Texas, Wisconsin and Ohio have embraced the BIM process for many of their public projects.

3. Become familiar with Basic Revit terminology definitions:

Parametric: Parametric refers to the relationships among all elements of the model that enable the coordination and change management that Revit provides. These relationships are created either automatically by the software or by you as your work.

An example of an element relationship is the outside of a door frame is a fixed dimension on the hinge side from a perpendicular partition. If you move the partition, the door retains this fixed relationship to the partition.

Model Elements: Model Elements represent the actual 3D geometry of the building (Walls, windows, doors and roofs). There are 2 types of model elements: Host elements and Model components. Host elements are generally built in place at the construction site. For example, walls and roofs can be hosts. Model components are all the other types of elements in the building model. For example, windows, doors and cabinets are model components.

Datum Elements: Datum Elements help to define project context. For example grids, levels and reference planes are datum elements.

View-specific Elements: View-specific Elements display only in the views in which they are placed. For example, dimensions, tags and 2D detail components are view-specific elements. There are 2 types of view-specific elements: Annotation elements & Details.

Annotation Elements: Annotation elements are 2D components that document the model and maintain scale on paper. For example, dimensions, tags and keynotes.

Details: Details are 2D items that provide details about the building model in a particular view. Examples include detail lines, filled regions and 2D detail components.

Project: In Revit, the project is the single database of information for your building – the building information model (BIM). The project file contains all information for the building design, from geometry to construction data.

Levels: Levels are infinite horizontal planes that act as reference for level-hosted elements, such as roofs, floors, and ceilings. Most often, levels are used to define a vertical height or story within a building.

Element: When developing a project, Revit parametric building elements are added to the design. Revit classifies elements by categories, families and types.

Element Category: Category – a group of elements that you use to model or document a building design. For example, categories of model elements include columns and beams.

Element Family: Family – Families are classes of elements within a category. A family groups elements with a common set of parameters (properties), identical use, and similar graphical representation. Different elements in a family may have different values for some or all properties, but the set of properties – their names and meaning is the same. For example, 6-panel colonial doors could be considered as one door family.

Element Type: Each family can have several types. A type can be a specific size of a family, such as a 32" x 84" door.

4. Building a Revit model is a process that often starts with general or generic content (ie. Walls are generic 6" walls instead of specific wall types). As the project progresses more data is added and more specific information is assigned. Progress is typically organized into five defined Levels of Design (LOD).

Level of Design: BIM has been organized into five levels of design (LOD). These levels help define consistent expectations throughout the building lifecycle from planning through design and construction and ultimately the building lifecycle. The five defined LOD standards are in accordance with the AIA E202 document. LOD 100 - 300 have a reference to the traditional 2D project delivery method while levels 400 and 500 are specific to the BIM process.

LOD 100 - Essentially is the equivalent of conceptual design, the model consists of overall building massing designed to perform whole building type analysis including volume, building orientation, square foot costs, etc.

LOD 200 - Similar is to schematic design or design development; the model would consist of generalized systems or assemblies with approximate quantities, size, shape, location and orientation. LOD 200 models are typically used for analysis of defined systems and general performance objectives.

LOD 300 - Model elements are suitable for the generation of traditional construction documents and shop drawings. LOD 300 models can be used for estimating as well as construction coordination for clash detection, scheduling, and visualization.

LOD 400 - This level of development is considered to be suitable for fabrication and assembly. LOD 400 is most likely to be used by the trade contractor or fabricator to build and fabricate project components.

LOD 500 - The final level of development represents the project as it has been constructed - the as-built conditions. The model is suitable for maintenance and operations of the facility.

5. You need to recognize the shift in culture when managing a Revit project. The process does not follow the same workflow as traditional methods of designing and documenting a project. We are all used to the traditional method where schematic design is fairly quick. Design development requires a bit more time and effort but the majority of work and time is scheduled for the construction document phase. In Revit the bulk of effort is shifted earlier in the project timeline. SD and DD phases require more time and effort but the CD phase requires less.

It is very important for all involved in the project (including client) to understand the Revit workflow and associated phase schedule.

6. Shift in culture: Expectations
Presently, clients are requiring more 3D visuals during their review and approval phases. Clients are expecting to see more 3D information such as walk-through, shade analysis and axon details.

As a designer or manager you should utilize Revit's ability to generate 3D and axon views to help your team better solve complex design issues. This is quite valuable in communicating and developing concepts with team members and consultants, but be careful whom you show and when. Some clients that see 3D images too soon can react negatively as the model may appear anemic and without character early in the process. Just because you can show these types of views to clients doesn't mean you should. It is important to know your client and how they might react.

Remember – Just because something looks “okay” in 2D, does not mean that it is modeled correctly, and the 3D review will help to reveal a flaw in the modeling effort.

Standard of Care change – There is discussion in the AEC community that if the design professional can avoid conflicts using BIM, the standard of care eventually will say that the design professional should use BIM.

7. Top 10 tips

TIP 1 : Assign CORRECT STAFFING roles (Who should do what)

- The Architect - Leads the creation of architectural elements, Design' elements, Code requirements. The workflow that BIM brings should support the “mentor-student” relationship between more experienced Project Architects and Interns.
- The Drafter - Responsible for creating documents adding Keynoting / Text noting, Dimensioning, and Other Annotations. The drafter will set up the Sheets and create the Schedules.
- The Modeler - Creates Parametric model elements and creates Family elements. Modelers should know how the physical building is constructed.

TIP 2: Plan the workflow. Before jumping in and creating the Revit Central file, take the time to work with the experienced Revit staff to establish the standards for the team to follow. Have templates and standards in place for:

- Outline of steps to starting a Revit project
- Revit template usage
- Naming conventions

- Worksets
- Graphic standards
- Plotting and printing procedures
- Import / Export procedures
- Addendum / RFI procedures
- RFP and Change Orders
- Support

TIP 3: Don't bring in the 'fire fighters' during the CD phase. There are optimum points in time when you might need to bring in the 'fire fighters'. It is not advisable to bring in new people to the project prior to deadlines as this has great potential to disrupt the workflow. New team members are not familiar with the project/model and what they do in the model will affect the work of others. Potentially, more problems will be created than resolved and there may not be time to address new issues at the last minute. Keep the majority of your team intact throughout the project. The longer they work together the better they understand the building and how to work in sync as a team...and the more efficient the project will be.

TIP 5: You and your team are working in a Model-Based Design Workflow. Think in terms of modeling, not drafting. Don't try to run a BIM project like a CAD project; there are differences in the workflow.

TIP 6: Do not over-model; develop the Model to the appropriate Level Of Detail for what you need to communicate at that phase of the project. (See item #4 above for Level Of Detail explanation.)

TIP 7: Progress Reviews should include analysis of the work in 3D mode. Again, just because something looks "oaky" in 2D does not mean that the model has been created correctly.

TIP 8: Be careful of your mark-up terminology. When correcting a set of documents don't use terms like "delete this" but rather say "hide in this view" (unless you want the element removed from the project altogether). Some building elements may not be appropriate to show on some sheets but are needed on others.

TIP 9: Don't "fake" things in Revit. Or if you do, you will end up in a lot of trouble down the road because...it is becoming common practice to share the Model (even inadvertently) with Contractors and/or Sub-contractors. Contractors are using the model for analysis, estimating, and clash detection purposes. The more sophisticated Owners are using the Model downstream to support their business processes. It is important to have appropriate use-agreements drawn up and in place for all parties before any Model distribution occurs.

TIP 10: As with anything, in order to be effective, you need to put in the time to understand the concepts and process of Revit. Take the tutorial first and use what you learn to build a small project for yourself. This will help you understand basic concepts and more importantly, cause and effect. It would then be beneficial to take a Revit Class now that you have a decent base understanding. This will allow you to ask more meaningful questions and give you more confidence when managing your team.

Remember - You don't need to become a Revit 'guru' but you should learn enough to know what Revit is capable of and the process involved to be able to manage your team effectively.