

5D BIM: Shaping the Future of the Construction Industry

Gain insights into how you can leverage
tools to work smarter in this era



AUTODESK®
REVIT®



SIGMA
ESTIMATES



RSMMeans data
from **GORDIAN**®

Industry Overview

The architecture, engineering and construction (AEC) industry is rapidly evolving to meet the demands of faster project delivery while minimizing costs and increasing productivity and quality. Construction professionals must stay at the forefront of this changing industry and improve insights into project costs and risk elements across all stages of a project's lifecycle.

According to a recent McKinsey study¹, projects in general take 20 percent longer to finish than scheduled and are up to 80 percent over budget. Building Information Modeling (BIM) has been slated as the new standard of the AEC industry to improve on these stats, and more and more companies are recognizing the value added in streamlining design, cost and scheduling in the pre-construction process and throughout the project lifecycle.

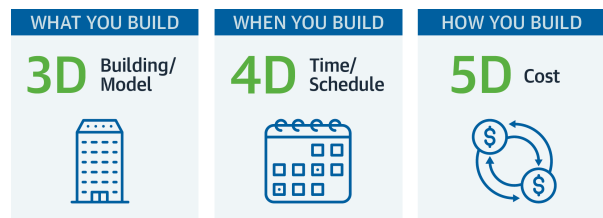


Relying on the traditional 3D modeling system will no longer be enough.

In its place, 5D BIM has positioned itself to be the industry's next big win. 5D BIM refers to the financial cost and risk, and the construction resources and activities that make up HOW the project is to be built. Intelligent linking of individual 3D modeling components of WHAT you build with 5D BIM results in a fully dynamic real-time model to explore what you want to build in terms of finance and risk. Furthermore, when linked to the 4D BIM scheduling, it results in a

collected model to offset and manage the construction phase itself, always being one step ahead.

"Companies will be pushed into the next era of estimating and takeoff solutions when integrating BIM and estimating becomes more widespread. We have seen significant effects of the BIM mandates in Denmark and the UK, and we believe this new model will take more hold across North America as well", explained Magnus Therkildsen, CEO of Sigma Estimates.



Solution

To help address this new wave of 5D BIM, Sigma Estimates has partnered with RSMeans data from Gordian, North America's leading construction cost database, to strengthen the 5D BIM and Virtual Design & Construction (VDC) solutions and improve insights into costs and risk elements across all project stages.

According to the most recent technology report by JBKnowledge², more than 50 percent of estimates still rely on manual takeoff and homebuilt spreadsheets.

"The opportunity for error is high when dealing with manual process and non-industry specific software," explained Therkildsen. "This integrated platform spans planning, design, pre-construction, construction, closeout and maintenance, and it will be easier for construction professionals to adapt and employ fully integrated BIM/VDC workflows."

Strategic collaboration between Gordian's RSMeans data and Sigma Estimates, coupled with Autodesk's popular Revit BIM design software, is transforming the construction industry. This quick, easy-to-use solution is based on digital representations of the building process to facilitate exchange and interoperability of information throughout the duration of the project.

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By bringing together design, planning and finance in real time through this integration, the AEC community is able to make accurate and timely decisions based on clear insight among project teams and members that use traditional 3D BIM models.

According to Noam Reininger, Chief Data Officer, Gordian, "The solution combines design, finance and real-time updates in VDC, providing users with instant access to RSMeans data, the most trusted construction cost data with industry leading accuracy, directly integrated in their workflow. This radically improves budgeting and planning decisions throughout the project lifecycle by providing more up-to-date, accurate and specific cost data within the software environment that the user is most comfortable with."

Like the fundamentals of BIM, this platform is based on objects and works seamlessly through all stages of the project lifecycle to deliver data validation, slice and dice functionality, integrations and reuse of information. The flexible hierarchical structure of unit components in Sigma combined with the RSMeans data makes it adoptable to any project, project stage and output.

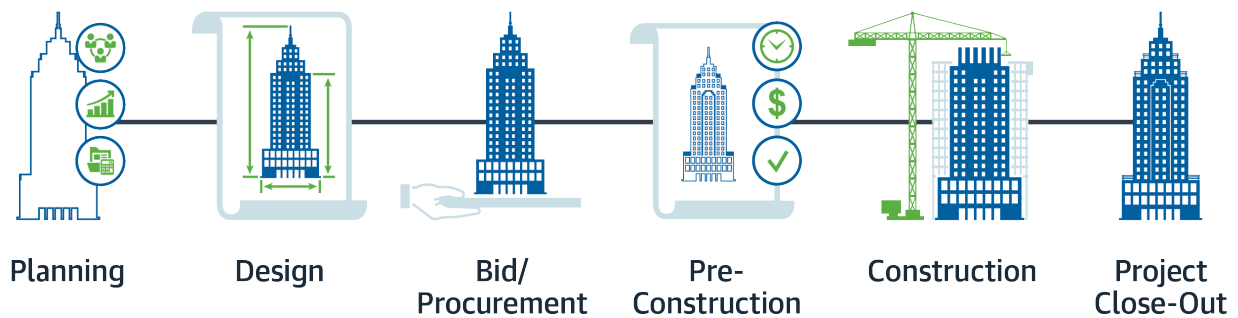
“Through this platform, we provide an integrated, real-time view of project design, cost, and schedule,” explained Therkildsen. “We built Sigma to be a 5D BIM and estimating platform. This platform gives users an extremely advanced yet user friendly and intuitive solution and enables them to work more efficiently and help the overall performance of design construction projects. Unlike alternative solutions, Sigma is 100 percent adoptable and object-oriented like the fundamental principles of BIM.”

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A single platform connects the entire project lifecycle

Leveraging Sigma with RSMMeans data through live integration with REVIT, users gain direct access to cost and estimation tools through all stages of the project lifecycle. The platform provided by the three systems brings together design, planning, construction and finance in real time, granting users a fast, data driven, user-friendly experience, grounded by the familiarity of spreadsheets. This is much more than simply estimating the cost of a project. It is establishing transparency and providing a thorough understanding of how the project is to be built, resulting in a clear recognition of the activities, resources and workflows that lay the foundation for construction. The visual and intuitive nature of 5D BIM with Sigma gives contractors a better chance to identify risks earlier and thus to make better decisions. By enhancing communication and timely decisions across all project stages, users reduce time-spent, unnecessary risk and costs to avoid information loss between the gaps.





Planning Program Development

By bringing together stakeholders as project needs and conceptual designs are being developed, the planning stage creates various challenges. These range from securing investments through finance and risk estimates, project analysis and simulation, all on top of quality assurance. To help address these hurdles, the platform allows users access to RSMeans data, the universal language and accepted data for costing. This data is enhanced by accessing localized costing and predictive model application in conjunction with assembly or square foot models and project budgets dependent on location and initiation start times. The platform also allows for simple and efficient three point estimations while tracking changes during data driven "what if" scenarios to mitigate project risk through easy and editable risk assignments.



Design Conceptual and Detail

Both conceptual and detailed designs are developed in preparation for the documentation and project award. The platform allows users to leverage RSMeans data with assembly and square foot model considerations for conceptual estimating and budgeting while allowing access to easily update your budgets as new revisions to the drawing develops. These revisions are tracked and also allow for hypothetical scenarios. The combination of Revit, Sigma and RSMeans data gives users the ability to quickly complete 30 to 70 percent of the design development with

direct links to the 3D model. Sigma also provides quality assurance reports during this stage generated based on user preference for design resources, insights and figures while tracking and validating the project.



Bid/Procurement Project Award

In the bid/procurement stage, users prepare and issue Request for Proposals (RFPs) for subcontractors to bid based on the design developed in stage two with quantities and proper document. The platform saves significant time by providing automatically generated materials, equipment and labor project lists to ease preparation of bid documents for procurement, ensuring clear definitions of what is being tendered. With this combination of RSMeans data, the lists include line item descriptions, costs based on quantities and specifications. This combination helps general contractors establish accurate baseline values to identify high risks amongst all project line items. For example, the platform indicates dependencies of rare materials as well as largest cost potentials associated with quantity requirements. The platform leverages Sigma's templates and libraries to help mitigate risks with decreased chances of errors and material omissions. By creating project libraries directly from the estimate, the user is able to reuse historical data to help with change orders and other projects at later stages. RSMeans data is pulled into project libraries and allow the bid review process to be more efficient by offering validation and accuracy. Through the Sigma link to REVIT, sub and general contractors can easily

review scope – linking cost directly to drawings and a Bid Levelling feature allowing bid comparison views.



Pre-Construction

Planning and Scheduling

After the project is awarded, a detailed project plan is critical for optimal timing, scheduling and site logistics. Collaboration between estimates in Sigma—built with REVIT and RSMMeans data—is easily exported into e.g. MS Project and handed over to a project manager to develop precise plans and schedules based on the resources and activities list from the 5D model. Dependencies can be added directly in Sigma and carries over to the project plan. RSMMeans data and Sigma facilitates workflows by providing unit quantities and durations through line item productivity rates taking the project from 3D through 5D activities to 4D scheduling. Construction conflicts, dependencies and project planning are easily identified for scheduling and project analysis.



Construction

Structure and Sitework Complete

Once construction has commenced, it is imperative to stay on budget. This is made easier by following the outlined materials and equipment lists automatically generated from Sigma and costed with RSMMeans data. These lists tell users who to have on hand, insights into ordering materials and work orders around crews, durations, etc. Tasks and hours for each task are automatically generated and linked with

dependencies for construction scheduling. The platform allows comprehensive cost management and reporting by providing costs associated to complete the estimation and other reports to ensure projects are staying on schedule. Any revisions are easily tracked through insight views, reported and visually displayed real-time within Revit. These views afford users insight into the impact change orders have on budgets and are seamlessly updated throughout the estimate. Because RSMMeans data is leveraged over the entire course of the project, the user has accurate construction cost data to assist with proper cost management while allowing adjustments to be made on the fly with dynamic and up to date cost information.



Project Closeout

Program Hand Off

At the conclusion of construction, the project is handed over with documentation to the facility manager. Owners are provided with insight reports and detailed views of various aspects of the completed project. Because the change order resolution has been documented throughout the entire project lifecycle, complete documentation is available from start to finish. Construction QA for the owner can be conducted using precompiled check lists. By using custom fields in Sigma, the user can track closeout documentation from subcontractors and export reports according to user preference to present to the owner or other project stakeholders. The underlying RSMMeans data allows facility managers access to the lifetime cost and budget of the building for future operations.

Conclusion

There is a general agreement the construction industry is ripe for transformations by technology. According to McKinsey study¹, the only industry with less technological adaptation is Agriculture/Hunting.

Construction is one of the oldest industries, and some of the most iconic structures have been built by using time tested and true methods. The industry may seem conservative and slow to adopt. However, according to the latest technology report by JBKnowledge, the number of builders who do not use BIM fell by 30 percent in 2016 when compared to 2015 numbers, and McKinsey identified 5D BIM technology as one of five big ideas poised to disrupt construction.

The platform provided by Sigma Estimates in combination with Gordian's RSMMeans data and Autodesk Revit will enable the construction industry users to embrace the next level of 5D VDC workflows as it offers easy to use, and time saving options for users of any level to participate effectively.

5D BIM is the future of project development and management. You can deliver on the promises of this next level of project delivery. Unleash the power of 5D BIM and join the industry front runners today.



Sigma Estimates combined with RSMMeans data from Gordian and REVIT from Autodesk provides the next generation integrated solution from the conceptual planning stage to project close-out in budgeting, estimating and 5D BIM. The solution saves users ample time and resources while being intuitive and accessible for everyone – not just the experts. With improved efficiency, increased profitability, reduced risk and less need for changes and rework, clients can use 5D BIM to effectively construct and manage future projects. 5D BIM is crucial for better delivery of projects and will enable companies to stay competitive and ensure the growth of our industry.

Sources

1. <https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/imagining-constructions-digital-future>
2. JBKnowledge's fifth annual Construction Technology Survey in partnership with the Mechanical Contractors Association of America (MCAA), the Construction Financial Management Association (CFMA), and Texas A&M University's Department of Construction Science



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