GSA's Building Information Modeling Program Raises Cutting-Edge Construction, Contracting, and Procurement Issues

By Aaron P. Silberman and Michele McKee

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Design technology has literally leapt off the page with the development of sophisticated 3D/4D/5D modeling programs. The General Services Administration (GSA) is at the forefront. Since 2003, GSA has initiated 10 pilot projects in its current capital program, while assessing and supporting virtual building model (VBM) applications on more than 20 ongoing projects across the country. For all major projects receiving design funding in fiscal year 2007 and beyond, GSA requires that spatial program VBMs be the minimum requirements for submission to the Office of the Chief Architect for Final Concept approvals, and all GSA projects are encouraged to deploy mature VBM technologies.

VBMs are revolutionizing construction, providing a powerful tool to help keep even the most complex projects on time, on budget and defect-free. But, as with any breakthrough, there are going to be some growing pains and, not surprisingly, the procurement and contracting process will experience more than its fair share. This article discusses the practical and legal effects of the VBM "revolution" on government construction contracting.

How Is 3D/4D/5D Modeling Used on Construction Projects?

Modeling in 3D allows project participants to view construction components in three dimensions, highlighting conflicts and inefficiencies before they impact construction. The addition of 4D modeling features extends 3D modeling techniques by incorporating the construction schedule and sequencing into the model. Finally, 5D modeling incorporates costs from initial estimates through final construction and maintenance costs. The 4D/5D VBMs may ultimately be used over the entire life of a building—from conception through final construction and facilities maintenance.

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Design Phase

Design professionals regularly use VBMs to provide owners with early visualization of the final building "product," affording more realistic expectations of the design and more informed perspectives to suggest changes. Modeling in 4D extends the benefits 3D modeling provides in preconstruction design conflict resolution into constructability analysis, sequencing, and scheduling. Use of 5D modeling allows more efficient integration of design and estimating, making them a parallel, rather than sequential, process and providing earlier ability to respond to budgeting concerns.

Construction Phase

VBMs provide benefits, especially in the mechanical, electrical, plumbing, and fire (MEPF) design and coordination process, by enabling the owner to bring on contractors and coordinate their work during the design phase. Potential benefits continue during construction by streamlining field conflict resolution and assessment of cost and schedule impacts from scope or schedule changes. Field verification of as-built construction and schedule progress may earlier identify defects or delays. Similarly, synchronized design, cost, and schedule data from the VBM improves the ability to analyze delay and cost impacts for any post-contract negotiations.

Facilities Maintenance

VBMs programmed with building maintenance, material and warranty data enable facilities maintenance personnel to integrate the model into a comprehensive systems management process. VBMs may also be utilized for future building renovations.

Areas of Potential Conflict on VBM Projects

Who will be the "provider" of the project's construction modeling services?

Until now, the government typically would receive construction modeling services, if at all, not because it specified use of a model in its solicitation or contract documents but, rather, because its design professional happened to use modeling as a tool in its design work. GSA policy is changing that by directing its building organization to require VBM in new solicitations. In addition, with more and more design professionals actively promoting the use of sophisticated modeling, they are likely including modeling information in their proposals for all government construction work, and so government buyers may be considering that in evaluating proposals in best-value procurements.

To the extent they are doing so, they should be careful to ensure that this consideration is consistent with the evaluation criteria stated in the solicitations.

Where GSA or other government buyers want to ensure that they will receive the many benefits modeling services can provide for their projects, they should specify those services as requirements in their solicitations and contract documents. VBM technologies are rapidly becoming less expensive and easier to use. As this occurs, the requirement for VBMs on a contract price will go down significantly. This effect will be driven not only by reduced technology and training costs, but also by greater price competition due to what will likely be a dramatic increase in potential offerors with the required modeling technology and expertise to compete. Although requiring VBMs may initially reduce small business participation in competitive procurements—at least as prime contractors—it will likely have the opposite effect over the long term as the modeling technology allows contractors to do much more project management with significantly fewer resources.

The government may procure VBM services by (a) contracting with an independent construction modeler, (b) including construction modeling in the scope of work in its contract(s) with the design professional and/or general contractor, or (c) including that work in its contract with a construction manager. Each approach has its advantages and disadvantages. In today's market, many more independent construction modelers and design professionals are likely to have construction modeling capabilities than general contractors and construction managers. Thus, the government will be more likely to find significant cost competition by procuring construction modeling from those entities. Hiring an independent modeler introduces another project participant, but may mitigate problems due to other parties' lack of technology expertise; it may also provide the owner with readily available operations and maintenance assistance. Using the project's design professionals or contractors or both for modeling requires significant coordination, may increase scope conflicts, and, due to varying technology experience among the parties, may be harder to manage. Although design professionals typically have greater modeling experience and expertise, using a design professional for modeling usually means injecting that party into a direct relationship with subcontractors and suppliers that do not owe it any contractual duties. Where the construction manager has sufficient expertise to do so (few do), using it for modeling may make the most sense; where the owner uses this approach, it should bring on the manager at the beginning of the design phase during integration into the model of design, estimating, and schedule.

Clearly defining each participant's VBM responsibilities at the outset is key to success. Effective use of VBMs may require departure from some traditional relationships between project participants. Most notably, comprehensive modeling depends on timely, accurate, and compatible data from specialty contractors and suppliers. To the extent that primary modeling responsibility lies with the architect or construction manager, rather than the general contractor, this will require substantially increased interaction among parties that are not in contact with each other. The government's contract with the prime contractor should contain language clearly defining subcontractor and supplier responsibilities for the VBM and require that this language be flowed down to the appropriate subcontracts and supply agreements.

Most likely, the government will increasingly specify VBMs in its design professionals' scopes of work. The pendulum that, over the past 25 years or so, has swung toward taking project management responsibilities away from the architects and giving them to construction managers will now swing back as architects manage projects through VBMs. They will manage constructability with 3D models, add schedule management with 4D models, and add costs management with 5D models. Construction managers' roles will either adapt—if and when they acquire more modeling expertise—or diminish to more administrative duties.

Who "owns" the VBM after project completion? Is it a deliverable to the owner? Who is responsible for delivery?

The VBM is not only a tool; it is also intellectual property. A solicitation and contract that includes modeling services should address who will own what rights to that property. If the government specifies that it will acquire limited rights in the VBM, it will be able to use the model for future government projects. Alternatively, the solicitation and contract may provide for more restricted rights, permitting the government to use the model only for that particular project (meaning, for construction and facilities maintenance and management). Unless otherwise specified, the parties that created the model will retain an unlimited right to use the model on future projects.

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Solicitation and contract documents should also address whether the model is treated like design drawings, formal project deliverables, or both. The government may treat design drawings and models simply as tools used by the design professional without requiring that they be in any particular form, contain any particular information, or be submitted to the government. On the other hand, the government may include in its solicitation and contract documents detailed requirements for format, content, and delivery; to ensure compatibility with existing or anticipated government systems and capabilities, the government

may even choose to specify particular software (brand name or equal) for the VBM. Performance specifications, requiring use of a model without dictating the details, lies somewhere in between. To the extent that the government requires delivery of the model, this may implicate statutory and regulatory requirements for government information technology purchases, include requirements for domestic sources, cybersecurity, and disabled accessibility.

Who is responsible for the input and accuracy of information in the VBM?

Solicitation and contract documents should address responsibility for input and accuracy of information in the VBM at each stage of the project. Ideally, the documents will designate a central inputting "entity" for consistency and clearly identify who will be responsible for fixing any "errors" or "bugs" and for any damages they cause. Standard terms and conditions may already address this issue, but the government should consider whether the unique aspects of construction modeling merit different treatment than other types of design errors. Special attention should be given to indemnification, insurance, and bonding provisions. For example, it is unclear whether any currently commercially available insurance policies would cover liability for modeling errors. Specifying both construction modeling and comprehensive insurance coverage for errors and omissions may impose an impossible, and arguably unenforceable, requirement.

Likewise, the parties should consider whether their contract disputes provisions are adequate to deal with special issues raised by the use of VBMs. Are the provisions adequately drafted and flowed down to ensure that all the parties necessary to resolve possible disputes will participate (for example, the design professional and/or modeling contractor, the subcontractors, and suppliers contributing significant data, etc.)? If there is a dispute escalation clause, are the various government and management representatives listed qualified to deal with disputes regarding technical modeling issues? If the project will employ a dispute review board or project neutral, are they qualified to evaluate those kinds of issues?

Finally, the government should consider how its contract pricing should be structured to best reflect the risks assumed and the potential benefits that may be enjoyed due to use of VBM. If the design professional is assuming some project management responsibility through the VBM, a reasonable price for that party will go up, while a reasonable price for the construction manager will go down. If the VBM allows completion ahead of schedule, should the modeling entity receive an incentive fee? What about completion under budget? Can or should the modeling be separately priced, perhaps even using a shared savings contract (where authorized)? These issues should be considered before the procurement starts.

Who will have access to information in the VBM at each stage of the project and after project completion?

The parties should consider whether restrictions on access or modification rights during design and construction are necessary for security purposes as they will exclude project participants from the process. Contract documents should include nondisclosure provisions as needed to protect the parties' rights, but should not be unduly restrictive to the detriment of using a model effectively. Access to information after project completion becomes especially important for projects with heightened security issues. Specifying in the contract documents each project participant's rights to obtain copies of the VBM at the completion of the project also may prevent disputes over those rights when issues arise over contract claims or construction defects.

How will government evaluate whether bidders are qualified to participate in the project VBM? What happens to the VBM if a contractor defaults?

Solicitation and contract requirements should address what qualifications any party with VBM responsibilities must possess. Defining these requirements is difficult with such a new and evolving technology. On the one hand, the government should avoid being overly restrictive and thereby reducing or eliminating effective price competition. On the other hand, the government will not enjoy the full benefits of a modeled project if its contractor does not have the ability to create and manage this sophisticated tool on a complicated project.

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The solicitation and contract documents should also identify who has takeover responsibilities if a party with VBM duties defaults and how the takeover will be accomplished. Performance bond requirements should be specific in this regard. Unfortunately, this may have significant cost consequences to the extent that performance bond sureties are unfamiliar and uncomfortable with new modeling technology.

Conclusion

The use of VBM is increasing: 3D modeling is everywhere, 4D is on the rise, and 5D is on its way. Nowhere is this more apparent than at the GSA, and use of these technologies will only increase on other agencies' construction projects as awareness of their benefits increases and the costs of their use decreases. VBMs pose special challenges that should be addressed as thoroughly and clearly as possible in all solicitation and contract documents for projects that utilize them. The promise of VBMs is exciting, but the government and industry will have some work to do before much of that promise will be fulfilled. PL