DESIGNER'S BIM:

Vectorworks® Architect keeps design at the center of BIM process

By Jerry Laiserin

Architecture remains first and foremost about design. For the foreseeable future, design processes and deliverables will include both drawing-centric and model-based workflows. Vectorworks Architect and the larger Vectorworks Designer suite focus on architects' needs as the hub of design, regardless of workflow. Every architect and design firm struggling with the transition to BIM, or contemplating starting on the journey to the BIM approach owes it to themselves—and their core design values—to give serious consideration to Vectorworks Architect from Nemetschek North America.

Background

As the adoption of BIM (Building Information Modeling) automation tools and processes slowly spreads across global design and construction markets, architectural professionals—with whom BIM originated—must be careful that their choice of BIM software and methods continues to support architectural values and objectives. For most architects the principal value always has been and is likely to remain "design," whether expressed through inventive form, optimal function, innovative technics or some combination thereof.

Other users of building information, upstream and downstream from the architect in the design/construction supply chain, appropriately have different values and objectives. This, in turn, leads to differing needs for analysis, simulation, and various forms of information integration, coordination and management. Despite some academic theoreticians' wish for a

single-model, single-tool approach to end-to-end project delivery, real-world experience of BIM adoption increasingly points toward multiple models, created in differently focused tools, each serving the specific needs and value systems of the diverse actors.

In other words, constructors may best be served and are most likely to choose tools that enable them to model and manage costs, schedule risk and construction methods—such as the comprehensive offerings of Vico Software. Structural engineers, fabricators and erectors may gravitate toward tools such as those from Nemetschek, SCIA and Tekla to address unique characteristics of steel and other structural systems' supply chains. Likewise, a software suite such as IES, Ltd's Virtual Environment may be the tool of choice for many MEP/building systems engineers.

Architects, while they must interact with and provide information that is interoperable with the tools of these other actors, need not—and in most instances should not—sacrifice their core focus on design and documentation just to achieve BIM interoperability, integration and coordination. A case in point is Vectorworks Architect from Nemetschek North America (NNA). While some BIM model-authoring tools started life very (perhaps even excessively) "BIMmy" and have tried of late to layer on some "design-iness," Vectorworks Architect (VWA) has a long and continuous history as one of the best design and documentation tools, now augmented by a robust and flexible approach to BIM.

For a majority of architects—those in firms with 50 or fewer total staff—VWA easily can serve as the sole tool for design, documentation, presentation and BIM integration, as it does for many studios and large firms around the world. Even for the smaller number of larger firms who adopt and support multiple tools across various project phases, VWA's unique design strengths make it a worthy contender as part of any large firm's portfolio of solutions.

VWA has rigorous, built-in features to comprehensively support all phases of the design process—from the earliest translation of program/brief into design intent; through preliminary/schematic design; and all the way to sophisticated presentation and detailed construction documentation—not just design development, as is the case with some of VWA's BIM model-authoring software competitors. This kind of "full-service" support for design (in the broadest sense, including "total design") in VWA is combined with thorough, standards-based BIM management and exchange functionality—enabling designers to effectively collaborate with any/all members of a BIM-project team without sacrificing or compromising one iota of design freedom, flexibility or capability.

Think of the design/BIM tool selection process this way:
- "Design" is the most important source of value that architects bring to any project
- BIM does not (yet) apply to every project; and, even on BIM-based projects, much of the "BIM benefit" accrues to team members other than the architect
- BIM deliverables and design capability need not be mutually exclusive
- Therefore, why would/should any architect sacrifice design capability on the altar of BIM-ability?

To fully appreciate the central importance to architects of strong design capabilities when evaluating, choosing and implementing any BIM tool, it may be instructive to explore some of the ways in which architects are—or are not—using BIM methods and approaches.

Just Do It
For some firms and some projects, BIM deliverables are mandated by the building client/project owner. The extent and scope of such BIM mandates varies among client types and across diverse markets and international borders. For example, in the USA, most Federal agencies procuring design and construction services now require some level of BIM deliverables at most if, not all, design phases. The list of agencies includes the General Services Administration (GSA), Department of Veterans Affairs (VA), Coast Guard (USCG), Army Corps of Engineers (USACE) and others. However, while deliverables are mandated, typically in open formats such as IFC (industry foundation classes) and/or PDF (portable document format), the tools and methods for creating such deliverables are not.

Thus, any model-authoring tool that complies with the current version of IFCs (2x3 at the time of this writing) and/or other client-specific requirements, such as the GSA Spatial Validation Tool or other model view definition, will enable those architects using that tool to meet client mandates for deliverables and information exchanges.

Similar principles apply to most of the (still few) state governments in the USA that have so far mandated BIM deliverables, and much the same can be said for the small but growing segment of institutional and corporate clients seeking some degree of BIM-readiness on their projects. Speaking from first-hand experience as the Technical Editor for the recent *BIM Execution Guide* of the VA, the emphasis of BIM-mandating clients is on information exchange within the design team and among the design team, construction team and project owner. Such project owners wisely permit and expect that project participants will choose standards-compliant software that best meets their respective internal needs (constructors, therefore, are free to choose construction-centric tools; designers are free to choose design-centric tools, and so on).

Although the USA market accounts for roughly 25% of global construction, BIM trends in the USA trail those of a few international markets, yet lead others. Finland and Norway often are held out as global leaders in implementing BIM methods, although each is subject to special circumstances: both have relatively small and homogeneous populations and domestic markets; in both countries the construction market of the capital city and its immediate environs constitutes a significant plurality of the entire country; the design and construction industries are far more concentrated than in the USA (Finland's largest engineering firm and largest construction company dominate roughly 25% of their respective markets; no firm in the USA accounts for even 2% of its domestic market; thus, BIM collaboration by just two Finnish firms can achieve a kind of BIM momentum not easily attainable by dozens, perhaps hundreds, of participating firms in the USA).

On the other hand, Japan stands alone among major, developed economies in not yet having an official government policy towards mandating BIM deliverables. This approach is consistent with an observed trend in Japanese business culture toward being late, but sudden adopters of

technological change—the so-called "fast follower" strategy. This doesn't mean that Japanese architects are not interested in the BIM approach, just that they are not yet mandated to do so.

Thus, the bottom line on whether any architect anywhere in the world currently is required to use any BIM tool or method truly depends on the country in which one is practicing, the specific clients or client types being served, and often the particulars of an individual project. Even in those cases where BIM deliverables are mandated by country/market/client/project circumstances, the choice of BIM tool rarely is dictated by the client (almost never in the case of government clients in the USA). That leaves each architect free to choose a BIM tool that serves not only the information exchange needs of her client, but that caters specifically to the design and documentation demands of architectural practice. As noted above, VWA will fill that bill better than its software competition for a significant number of architects.

Free to Be You and Me
But, one may well ask, what about the large proportion of architects not engaged in projects on which the client has mandated BIM deliverables? Why choose a BIM model-authoring tool at all?—especially when many such tools currently on the market impose considerable costs in money, training time, workflow conversion and disruption, and a general sense of turning one's practice around to head down a one-way street from which there may be no easy turning back. Indeed, despite nearly a decade of hype and hoopla about BIM purveyed by the design and construction media and by public relations manifestos of CAD/BIM software vendors, real-world BIM adoption has barely reached 50% of firms (and a far smaller percentage of projects) even in a relatively advanced market such as the USA. This despite the solemn assertion in a leading research report of a few years back that BIM had already (back then) passed the "tipping point."

Readers who have followed my analyses of BIM tools and methods since I helped launch the global conversation about BIM back in 2002 know that I am a "true believer" in the benefits and advantages of model-based design, or what my friend and mentor Chuck Eastman (at Georgia Tech) has defined as "using computers instead of drawings" for design—an insight Chuck had in 1975(!), which is why he is the true father of BIM. When I call myself a true believer, I shoulder some of the blame for the media "hype and hoopla" cited above. However, under one of my other hats as consultant to a wide range of AEC/O businesses who seek real-world solutions to here-and-now problems, I am also compelled to be realistic about the current status and slow pace of change regarding model-based information exchange versus the ongoing need for drawings, sketches and all the other traditional tools of design practice (and I intentionally use the broader term, "design practice," rather than limiting the discussion to "buildings" or "architecture"—the best architects always have aspired to a "total design" approach).

Therefore it seems to me that architects today are better served by a design-centric tool that also is capable of industry-standard BIM deliverables and information exchanges than by a primarily BIM tool with add-on, plug-in and/or third-party design capabilities. Architects can, and perhaps should, educate their clients regarding the benefits of model-based deliverables and information exchanges. Unfortunately, not every client will buy into the BIM approach, sometimes out of fear of the unknown, or concern about risk in new processes, or unwillingness to assume the burden of model management, and sometimes for valid, project-specific reasons as discussed below.

Unless and until typical design firms can reasonably expect that all projects will be "done in BIM," why should such firms choose "BIM-first" or "BIM-only" software to serve their BIM projects?—if the "price" includes sacrificing on every project the geometric flexibility to design any form in a true solid modeler, attach any building semantic data to those forms, and carry the resulting building elements through construction documents, all in the same tool (yes, you guessed it—as in VWA). Allow me to reemphasize this point: ==VWA allows designers to focus on design issues all the time, while still producing industry-standard BIM deliverables whenever they are needed.==

Up the Down Staircase

Again, return to the premise that the principal value system and source of added value for a design firm is design, or the process of fulfilling clients' needs to shelter their businesses, families and institutions. In that context, adoption by architects of the BIM approach, worthy though it may be in delivering benefits to downstream members of the design/construction supply chain, should not force out or diminish the primary focus on design. This is not a new conflict. One of the earliest digital design tools (outside of PhD dissertation projects) was a mid-1960s, one-off system cobbled together by IBM for General Motors and proudly dubbed "DAC"—for Design Augmented by Computer. By the time such technology reached commercialization by other vendors for other users, the nomenclature had been flipped to "CAD"—or Computer-Aided Design. One could easily argue, as many serious architects do to this day, that CAD—despite all its indisputable benefits—still has its priorities backwards (with the "D" for design coming last in the acronym).

Whereas most commercial applications of CAD merely replaced paper drawings with digital drawings, BIM promises (or threatens, depending on one's point of view) to replace the entire design, documentation and delivery process of the physical, analog world with a digital, virtual one. Some BIM tools risk throwing out the "design baby" with the "analog bath-water." Other BIM tools, such as VWA, deliver BIM flexibility without sacrificing design capability. That's a choice many architects need to ponder when considering a transition to the BIM approach.

Dumb and Dumber

A dirty little secret of BIM is that not every building project requires or justifies the BIM approach. There are two sets of reasons for this: one focused on the type and size of client; the other focused on buildings themselves. The client-centric reason mitigating against applying the BIM approach to every building everywhere is that a significant proportion of building clients lack the resources to effectively manage and benefit from complex, data-rich models they may receive from their design and construction service providers. Smaller clients, with fewer projects, smaller building portfolios and less frequent alterations and additions often lack the technological and management infrastructure as well as the scale of operations to reap the putative life-cycle cost savings often promised by the BIM approach.

The building-centric reason mitigating against applying the BIM approach to every building everywhere has to do with the information content and/or relative complexity of different buildings. Back in 2005, Bill Mitchell at MIT published a paper addressing the content and

complexity of building designs relative to the complexity of the software employed to express those designs. Bill is one of the true pioneer thinkers about digital design methods in architecture, and I agree with much of his reasoning in this paper. However, I think the argument can and should be carried to its logical conclusion: there are some buildings and building types in which the information content is so low as to require little if any descriptive complexity.

Consider the typical neighborhood "strip mall" that dots the suburban landscape of the USA (many other countries have equivalent building types). Love them or hate them, strip malls and similar, low-aspiration building types exist and, indeed, continue to proliferate. While affording some leeway for "design," such buildings present issues better resolved through urban planning and political will, not a designer's choice of software tool or process.

With minor regional variations based on climate, soils and local materials/methods, strip malls tend to be nearly identical. They often start with slab-on-grade construction (although in colder regions there may be a crawl space or basement). Masonry block enclosure on three sides and demising walls between tenant spaces. Open-web bar joists spanning the masonry walls (supported on pipe columns for tenant spaces with longer spans) topped by metal decking and hot-mopped roofing. The public façade consists of stock aluminum and glass storefront systems framed by a decorative cornice or faux-mansard roof to carry tenant signage. Add roof-mounted, packaged air-handlers, one WC per tenant space, plus a simple sprinkler system, and the "building services" are complete. There is virtually no information content (in the sense of news, novelty, or non-standard items) in such a building; nor is there much more content in any among dozens of other occupancy/use types that make up much of the "background" building stock in most American towns and cities.

Yet, in nearly every town and city there are many contractors who can (and who sometimes do) build such buildings with little or no documentation, whether drawings or specifications, hand-drawn or CAD-generated. They can do so because, beyond the legal technicality of filing for a building permit, there is effectively no need for detailed documentation of so simple a building. While it is possible to debate the aesthetic and social merits of simple buildings (or simple-minded buildings, depending on one's point of view) there is no plausible argument—based on currently available building and fabrication technology—that BIM-approach, model-based deliverables and information exchanges can make such buildings faster and cheaper, let alone better (an observer more cynical than I am might suggest that the application of any process, such as BIM, to making such buildings faster and cheaper would be, at best, a mixed blessing).

By some estimates, building types with little or no information content account for 30% to 60% of the total building stock. At the low end are buildings such as mini-storage warehouses, for which the BIM approach would be frivolous overkill. At the higher end are buildings such as walk-in clinics, branch banks, chain-store retail outlets, or "garden" apartments, where minimal application of the BIM approach with some simple design parametrics might "automate" many architects currently in these markets out of a job. Either way, that's a lot of buildings for which "design" and "BIM" don't necessarily mix or may even be mutually exclusive. If the only deliverables needed consist of a relatively straight-forward set of drawings, why choose a tool that sacrifices the requisite clear, easy drawing production for a level of BIM integration that may be unnecessary?

What's It All About?
Recapping the story so far:

- Some buildings (and their clients/project owners) do not need and/or cannot justify any BIM approach or method. In these cases there would be little sense in architects applying a BIM-only or BIM-first tool, especially if the use of such a tool involved sacrificing the very documentation and delivery capabilities that such projects call for.
- For the foreseeable future, most architects will need to deal with a mix of BIM and non-BIM projects, some with model-based information exchanges, but nearly all still requiring at least some conventional drawing deliverables. As architects, their core focus and added value is design. Therefore, why choose a BIM tool that sacrifices design flexibility?
- A growing number of architects (perhaps someday a majority) face client-driven mandates for BIM deliverables. While BIM deliverables may be mandated on, say, US Federal government projects, the choice of BIM tool generally is left to the designer (provided the resulting deliverables comply with the requisite standards). Again, if a client has hired a BIM-capable architect to provide design services, doesn't it make sense for that architect to choose a BIM tool that enhances, rather than detracts from the architect's design capability?
- Although not explicitly discussed above, some architects are being drawn into integrated project delivery (IPD) project arrangements. In most IPD arrangements, design and construction teams collaborate and to some extent overlap. So long as model-based information can be exchanged via standard formats (e.g., IFC, PDF) this situation is little different than that of client-mandated BIM deliverables. Architects' participation in IPD is and should be design-centric. Let me emphasize the point: IPD teams look to architects for design leadership; IPD does not and should not mean that contractors become designers. Therefore, yet again it is in architects' best interests to choose BIM-capable tools that reinforce design values and objectives.

Why VWA?
Before my technology consulting and analysis career, I was a practicing architect—RA, NCARB, elected FAIA, and so on—responsible for designing roughly half a billion dollars worth of institutional, governmental and commercial buildings and renovations (that's in current USDollars). While I may have left the active practice of design, I did not abandon the importance of design in making and practicing architecture—even if now filtered through the lens of digital technology. Design is why nearly every architect chose to become an architect in the first place, no matter how far afield our career paths may have taken us into project management or specifications writing or digital technology or any other of the innumerable facets of architectural practice. Whatever else architects may do, we all think of ourselves as contributing to or participating in the design process. That fact remains as true today in the world of BIM methodologies, model-based deliverables and information exchanges as it was in the days of CAD, or of technical pens on Mylar, or of India ink on linen.

So, when evaluating digital tools for architecture, one of the most important criteria I consider is how well the tool serves the design and documentation needs of practice. Some architects,

especially in very large, departmentalized and/or multi-disciplinary firms, may give somewhat greater weight to collaboration, or specific file formats, or addressing the organizational needs of CAD managers and IT staff. There certainly are tools on the market that cater to those folks; I've written favorably about many such tools and their targeted benefits for appropriate users. Yet, <mark>architects who put design first need to consider software tools that also put design first.</mark>

Model Behavior

From a designer's perspective, one key differentiator for Vectorworks software is its Parasolid® modeling kernel (licensed from Siemens PLM). Parasolid provides the Vectorworks package arguably the best 3D modeling core among the major BIM tools on the market today (Bentley Systems' BIM-tool lineup also includes the Parasolid kernel, but Bentley's focus otherwise has been on the largest multi-disciplinary practices). Some competing BIM model-authoring solutions don't have true solid modeling capabilities at all, but rely on importing geometry created in third-party tools (and often surface modelers or "skins" at that) and/or "massing" add-ons not integrated with the rest of the design/BIM tool.

This is not to imply that other BIM tools are not competent at DD-phase (design development) building fabric design; indeed a couple of the market-leading tools are extremely competent in this regard. It is, however, to say that VWA is more comprehensive in covering architectural needs via the complete, rich set of 2D and 3D primitives and operations available through Parasolid. Not only does this support the geometric freedom to create virtually any shape, but VWA has gradually been integrating the dimensional constraint management (DCM) functionality from Siemens PLM.

What DCM means to designers is "associativity," or the interactive control of geometry via dimensional notations and vice versa. VWA delivers its associativity in a 2D/3D environment that is approachable by any user: to properly align 2D and 3D views; modify models in 3D views; and modify 2D views in context of 3D. The underlying Parasolid approach to form creation/modeling is flexible and not overly prescriptive—in other words, it affords multiple ways to accomplish the same thing. In turn, this flexibility makes VWA's modeling procedures easily adaptable to users coming from other software environments as diverse as those of Autodesk or Adobe.

There are other, free-standing, front-end design tools that support geometric flexibility, but VWA adds the ability to custom-tag any shape via IFC with any building semantical data. Because VWA can accomplish this even at the early, schematic design (SD) phase, it's possible to transfer design intent—with intelligence—from SD to DD and beyond (via IFC). Furthermore, as is true of its less geometrically-flexible BIM-tool competition, all the architectural content provided with VWA and its "standard" architectural objects obtain or include the IFC data automatically. VWA's melding of these two kinds of design intelligence (automatic IFC data attached to standard objects, plus the ability to tag any custom geometry) also supports the widest possible range of project types—including the "highest" of high-end design projects, such as museums where custom design elements that might otherwise be considered "interiors" become an integral part of the overall architecture.

Historically, VWA (like its pre-1999 predecessor, MiniCAD®) was not just a CAD program, but effectively a CAD toolkit, affording a wide range of functionality across all phases of design practice. In a similar vein, the current version of VWA is not just BIM alone, but a BIM toolkit spanning front-end design to construction documents, plus support for interaction with analysis, simulation and construction applications as deployed by those with whom architects collaborate throughout project delivery.

Are We Having Fun Yet?
On the subject of VWA's roots (in pre-1999 MiniCAD), veteran CAD and BIM users may recall a long-running series of competitive events called "The Designer's 3-D CAD Shootout," created and produced by Boston architect Geoff Langdon. These shoot-outs consisted of intensive design charrettes performed by teams using competing design software tools in front of a live audience. I had the privilege of serving as a judge for several of these annual contests, and I recall VWA/MiniCAD regularly winning such categories as "easiest sections" and "fastest 3-D perspectives" (as well as overall best-in-show on at least one occasion). More importantly, the VWA/MiniCAD contestants always seemed to have more fun than most of their competition—not surprising if one considers that a tool which makes design easy likely will be experienced as more enjoyable than software that requires designers to struggle against the tool.

Much the same contrast applies to today's fully BIM-capable VWA and its current competitors. Whether dealing directly with designers through my consulting practice, lurking in user group forums for various CAD/BIM products, or fielding emails from designers frustrated by the challenges of their firm's chosen BIM-authoring tool, I see a disturbingly broad sample of folks struggling against their software tools. Designers' drive to spawn design ideas too often is impeded by the constraining currents of overly BIM-centric software (so much so that some firms with the resources and the will to support multiple software tools across diverse phases of design may set their designers free altogether from using the firm's nominally "standard" BIM-authoring tool).

Designers choose to be designers because the creative process of design is both intellectually and emotionally rewarding (as well as adding practical value to projects by fulfilling client needs). Getting BIM tools to "do design" should not be a frustrating process of work-arounds, add-ons/plug-ins and integration with myriad third-party programs. Among architects I have observed attempting design with BIM-capable software, VWA users appear to have more fun and achieve greater design satisfaction than users of competing BIM tools.

Well Grounded
Returning to the subject of VWA's historical strengths, I have written many times in the past about two of these unique strengths: site analysis and space planning, which together form the backbone and universal starting point for any architectural design process. Every building occupies a site, and VWA has consistently had the best tools for site design of any major building design tool. This is especially so when VWA is taken in context of the slightly more expensive Vectorworks Designer bundle (VWD) that includes the companion Landmark program (a particular favorite among landscape architects as well). Together, VWA plus Landmark provide the best site integration available to architectural designers today—including contouring, accurate cut and fill, and so on. This integrated site capability makes the VWD

bundle a strong contender for use by campus planners and urban designers, and provides a gateway for integrating GIS data (geographical information systems) with building design.

Robust space planning also has been a long-standing and unique feature of VWA. This includes adjacency diagrams and bubble diagrams that cover the crucial early transition from the building program or brief to schematic design. VWA now supports programming tables/worksheets with two-way connectivity from data entry in the table and report generation to the space object.

At the other end of the design spectrum, the industrial design capabilities included in the Vectorworks Designer bundle already support such "rapid prototyping" features as 3D printing and likely will evolve in the not-too-distant future to provide more 2D/3D detailing capability to support downstream constructors' transformation of design intent models into construction models (e.g., for constructability analysis).

All in the Family
For all the emphasis on design strong points to support architects throughout the full range of design phases, VWA also supports all the expected, standards-based modes of BIM information exchange and workflow. VWA incorporates some simple structural and MEP tools suited to small firms and small projects, but the real cross-discipline functionality is provided through IFC. For example, as third-party tools emerge to translate between IFC and gbXML, VWA will easily connect to MEP analysis tools such as EnergyPlus and IES/VE.

Nemetschek North America (NNA) also is part of Nemetschek, AG, a Munich, Germany-based global AEC software company doing a couple of hundred million (in USDollars) of annual revenue. This gives NNA access to: deep corporate pockets; strategic alliances (such as Siemens PLM for the Parasolid kernel, or Tekla for structural detailing); and corporate siblings such as Maxon/Cinema 4D for high-end visualization and simulation, and SCIA for structural analysis. For example, Maxon/Cinema 4D provides literally cinematic presentation and animation effects beyond the already-robust capabilities of the Vectorworks program and its native companion tool Renderworks. Similarly, SCIA provides both structural model and structural analysis interfaces that are round-trip compatible with VWA via IFC (contrasted with some other BIM suite vendors who may require separate architectural and structural modelers, plus separate or third-party analysis tools, all of which lengthens or impedes architect-engineer interaction).

The Bottom Line
No CAD or BIM tool can anticipate every possible construction method, material variation or regional building practice. What's important to designers is, or should be, the flexibility to represent anything and to attach any data to those representations. This design functionality, embodied in VWA, is suited to support a wide range of "world" construction markets: from "first world" countries/regions such as the EU, Japan and USA; to the "second world" of so-called BRIC countries—Brazil, Russia, India and China; and the "third world" that spans much of Africa, Latin America and South Asia.

VWA combines competitive and flexible BIM capabilities with world-class architectural design functionality and full-blown documentation and drafting tools—all in a single, integrated package behind a consistent interface. The latter point bears further exposition, especially during

this critical transitional moment in the AEC industry's struggle to adopt the BIM approach. While VWA is fully capable of supporting advanced BIM workflows, it also remains capable of supporting traditional workflows in what likely will remain a split market for many years to come.

Unlike the transition from paper-based drafting to CAD, the BIM transition entails as much a mindset shift as it does a shift in the toolset. Some of VWA's BIM competitors force users to work with different toolsets for the different mindsets of model-based versus drawing-centric workflows. This process understandably can be as intimidating as trying to grasp a new mindset like theoretical physics while simultaneously learning the communication toolset of an exotic language such as Estonian (little wonder, then, that so many firms experience frustration with their BIM migration). Perhaps even more challenging, this mindset/toolset dichotomy compounds the difficult training and staffing issues associated with the BIM transition—especially in today's trying business environment.

Architects today face great uncertainty about their technological future as well as their economic future. Adhering to the priority of "design" in design practice promises to be a viable strategy for managing both the technological risks and economic risks that confront the profession. By providing a flexible solution to BIM without compromising design, Vectorworks Architect can help architects address these critical needs for survival.

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ABOUT THE AUTHOR: Jerry Laiserin helps AEC/O businesses build smarter through the integration of technology strategy and business process. His consulting clientele includes "Top 500" design and construction organizations, public and private owner/operators, as well as many leading vendors of software and services for this market.

He also writes and edits the *LaiserinLetter™*, an e-mail/Web service providing analysis, strategy and opinion about computer and communications technologies for senior managers in design, construction, facilities and real estate. In addition to the *LaiserinLetter™*, he has served as contributing editor and monthly columnist for *Architectural Record*, *CADence* and *Cadalyst* magazines, and has written for, or been written about in nearly every other significant design and technology publication. In all, his analyses and opinions have reached a cumulative audience of more than a million readers in 138 countries. Jerry has presented seminars on emerging trends in design, construction and facilities to nearly 100,000 professionals worldwide—including leading professional society conventions, trade show venues, international research conferences and talks at major universities ranging from the Harvard Graduate School of Design and Pratt Institute to Georgia Tech and MIT.

Jerry Laiserin has helped shape the agenda for twenty-first century digital practice in design, construction, facilities and real estate. In 1999 he helped launch and served as Interim Executive Director of the aecXML Project, an industry-wide, vendor-neutral initiative for data exchange via the web that was subsequently merged into the International Alliance for Interoperability (IAI) and the National Institute of Building Sciences (NIBS). His career achievements "leading the profession and the industry in the Information Age" were recognized in 2000 by his election to the College of Fellows of the American Institute of Architects (FAIA). In 2002–2003 he helped achieve industry-wide consensus around both the term and concept of "building information modeling" (BIM) as the future direction for representation, simulation and management of buildings. Jerry extended that trend by co-producing and co-presenting the first industry/academic Conference on BIM at Georgia Tech's College of Architecture (2005) and the first BIM4builders™ Conference at the University of Florida's Rinker School of Construction (2008).

Jerry is a Brandeis University alumnus with advanced degrees from Princeton University's School of Architecture (M.Arch) and New York University's Stern School of Business (MBA, *with distinction*, ΒΓΣ). Prior to his present technology consulting practice, Jerry was a project architect responsible for design and construction of more than $500,000,000 of building projects (in current USDollars)—ranging from work on the New Jersey Capitol complex and Governor's Mansion to labs for biochemical research. His service to the industry includes past terms on the steering committee of the Association for Computer-Aided Design in Architecture (ACADIA) the Information Technology Council of the International Facility Management Association (IFMA) and the national board of directors of the American Institute of Architects (AIA). Jerry currently serves on the President's Advisory Board for the School of Architecture at Carnegie-Mellon University and on the Editorial Advisory Board of the *International Handbook of Research on Building Information Modeling and Construction Informatics: Concepts and Technologies*.