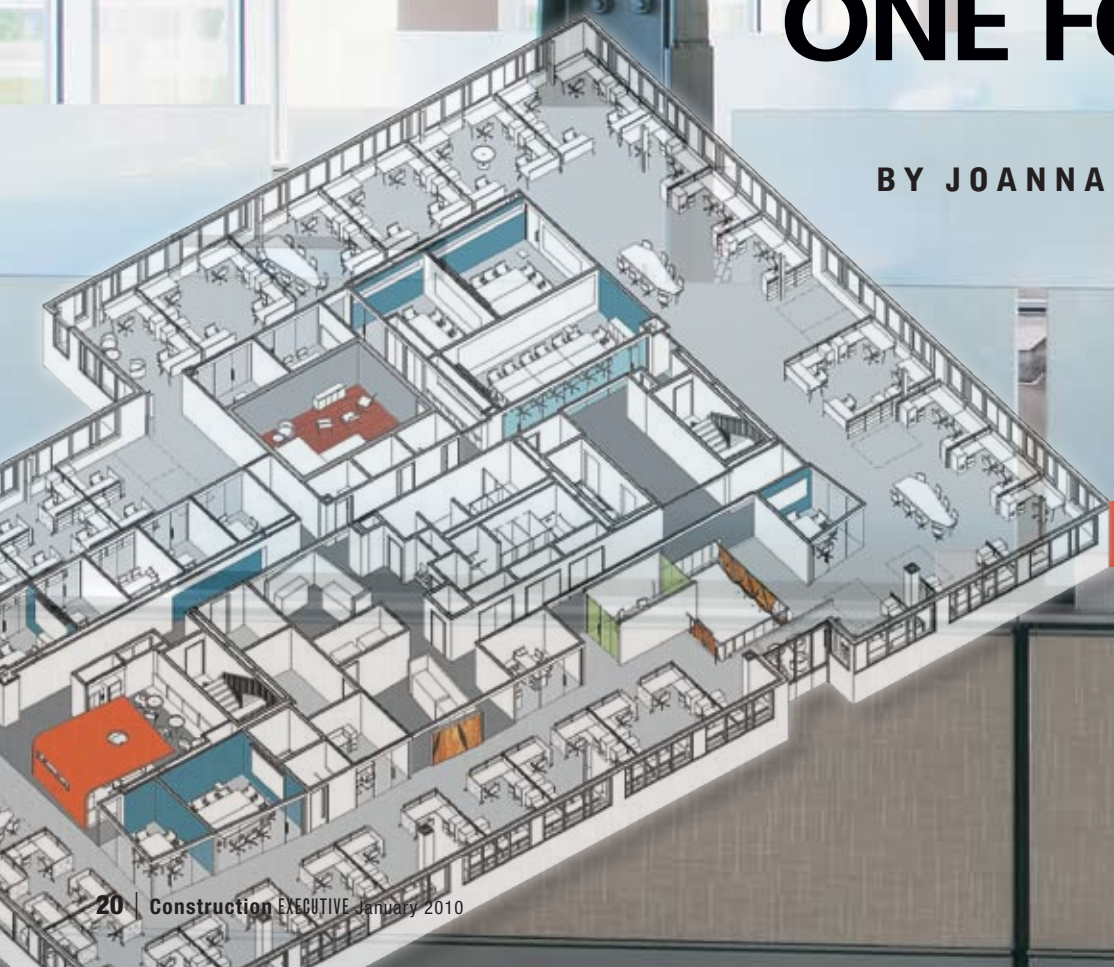
ALL FOR ONE, ONE FOR ALL

BY JOANNA MASTERSON



Tocci Building Corporation built out 61,000 square feet of office space for Autodesk's Waltham, Mass., headquarters using BIM and integrated project delivery.

ESTO PHOTOGRAPHICS (3)

Trust, Teamwork and Technology Define Integrated Project Delivery

The Three Musketeers could teach the construction industry a thing or two. Each member of the trio is talented, but together they make the biggest impact. And if one is in a jam, the others come to the rescue: all for one, one for all.

Imagine the same scenario on a complex multi-million dollar construction project. Owners, architects and contractors make decisions as a team, take on risk as a team and are rewarded as a team, with the goals of the project placed ahead of individual interests.

According to early adopters, this is all possible through a leaner, more integrated approach to project delivery.

The crux of integrated project delivery (IPD) is bringing together owners, designers and contractors at the initial stages of project development to collectively share expertise and decision-making. For contractors, this means helping identify and resolve design issues, providing more strategic cost estimating services, influencing construction sequencing, streamlining materials procurement and ideally eliminating the need for change orders.

The tool that allows IPD teams to quickly and confidently make decisions is building information modeling (BIM). In other words, IPD is the entire football organization—from players and coaches to groundskeepers and equipment personnel—and BIM is the playbook.

IPD is in its infancy, but the outcomes reported thus far show real promise for an industry that is itching to emerge from a 45-year decline in labor productivity.

IT ALL STARTS WITH THE CONTRACT

IPD requires the owner, architect and contractor to be bound by a single contract that specifies their roles, rights, obligations and liabilities. Core team members are selected based on their experience, technical expertise, and ability to communicate and work collaboratively—not just on who offers the lowest price. Other team members, such as subcontractors, sign onto the contract and agree to adhere to the scope of work and level of responsibility and collaboration.

Contingencies are lumped together, so the success of every team member is directly tied to the performance of all other team members—a far cry from the

Federal Campus Commands New Approach to Project Delivery

The complex nature of the National Geospatial-Intelligence Agency (NGA)—which develops imagery and map-based solutions for the U.S. Department of Defense—is reflected in the $1.77 billion endeavor to consolidate seven existing facilities into one 2.4 million-square-foot federal office building on Fort Belvoir's 98-acre New Campus East.

With a complicated job on their hands and a 2011 deadline mandated by the Base Realignment and Closure program, NGA and the U.S. Army Corps of Engineers Baltimore District (USACE) decided to take a different approach to project delivery: integrated design-bid-build.

While integrated design-bid-build is more of a public model of construction manager at-risk than a true integrated project delivery, early contractor involvement was still a must. NGA and USACE put out a draft request for contract in 2006, when less than 20 percent of the project had been designed by the joint venture RTKL, Baltimore, and KlingStubbings, Washington, D.C. After meeting with each firm that responded, USACE selected joint venture contractors Clark Construction Group, LLC, Bethesda, Md., and Balfour Beatty, Fairfax, Va., based on their value, approach to integration and portfolio of building fast-track jobs.

"This is a very specific execution model. Some other USACE districts have used similar methods, but this is the first time we've done it just like this—fast track and large scale," says Mike Rogers, USACE program manager. "The Corps is now trying this on several large programs across the country."

Traditional design-bid-build and design-build were ruled out due to NGA's desire to be hands on, as well as its desire to maintain the services of the design joint venture.

"Having a contractor on board very early in the process has helped us engineer things that would not make sense or that would be costly," says Tom Bukoski, NGA's assistant program manager for design and construction on New Campus East. "We were able to get real-time prices on what we were trying to do and find out where we could get the biggest bang for our buck. Having a contractor look over the drawings helped us design the facility in a way that would get us what we wanted, but would prevent construction problems."

For example, the team realized it could save $50 million by exchanging cast-in-place concrete for precast concrete on the 5,100-space parking garage. Clark/Balfour Beatty also urged USACE to consider precast concrete for the building skin, originally designed as a glass curtain wall. Though the change didn't end up shaving much off the budget, it did ease some strain on the project timeline because the precast contractor was only about a mile away from the jobsite.

"We decided the project would be LEED Silver early on, so we opted for a unique chilled-beam cooling system," Bukoski says. "We thought it would cost more initially, but it also chopped four feet off the building height. So we got a state-of-the-art system to save money long term, and it helped with initial construction costs."

Thanks to early collaboration on a number of fronts, the overall construction schedule is about six months shorter than the original proposal.

Though the value of partnering is difficult to quantify, it has "reaped benefits for all parties," Bukoski says. "The USACE's management structure brings all the team players together at a senior level and project level. The cooperation, collegiality and singular focus on achieving the end date with quality construction has really driven this project forward."

Adds Rogers: "It's clear all the stakeholders are very focused on the end point. There's a shared vision."

That vision continues to evolve as 1,700 workers transform Fort Belvoir's old military testing and training grounds into a specialized, secure campus with two miles of access roads and 10 miles of underground utility infrastructure. The 146,000-square-foot technology center and 105,000-square-foot central utility plant are both 99 percent complete. Furniture is being installed at the southern end of the eight-story main office building, while the northern end just topped off steel—with virtually every trade working at points in between. The final piece of New Campus East will be a 7,300-square-foot remote inspection facility.

Above: Mike Rogers, USACE program manager, and Col. Peter DeLuca, commander of the USACE North Atlantic Division, review the site map for the New Campus East project.

Clark/Balfour Beatty work on the National Geospatial-Intelligence Agency's 2.4 million-square-foot office building, which features an atrium (above) that joins two wings.

silos associated with traditional project delivery. Preserving these contingencies and reducing the project's guaranteed maximum price (GMP) creates a pool of incentives, or the maximum amount for which the parties are at risk. If performance goals (e.g., safety, sustainability, innovative design) are met, the pool gets bigger; if one party misses the mark, the entire pool is depleted.

The idea is to establish trusting relationships in which team members focus on overall project outcomes rather than individual responsibilities, as well as work collaboratively to find solutions rather than shift blame. Major decisions are made by consensus of the core group (owner, architect/engineer and contractor), which usually is responsible for resolving disputes as well. Some teams even agree to waive their right to litigate.

From the surety industry's perspective, the main concern with IPD is ensuring all parties clearly understand their responsibilities and liabilities.

"We want to make sure the clear delineation of duties is preserved," says Bill Maroney, executive vice president of City Underwriting Agency, Inc., Lake Success, N.Y. "IPD is a more efficient way of doing business, but it needs to keep the contract responsibilities intact."

Details on the different types of multi-party agreements, such as single purpose entities and relational contracts, are available in the American Institute of Architects' (AIA) *Integrated Project Delivery: A Guide*. Sample agreements are available from the AIA (C191-2009 Standard Form Multi-Party Agreement for Integrated Project Delivery) and ConsensusDOCS (300: Standard Form of Tri-Party Agreement for Collaborative Project Delivery).

HOW IPD PLAYS OUT IN THE REAL WORLD

DPR Construction, Inc., Redwood City, Calif., first took a chance on IPD in 2005, when BIM was coming to the forefront and the idea of having subcontractors influence design was still pretty radical. Today, only about a dozen of the firm's 200 jobs use IPD, but these account for about 20 percent of its volume.

"The full implementation of IPD is dependent on a customer who really wants to try that delivery process," says Eric Lamb, executive vice president of DPR Construction, which employs 2,000 people in 10 offices across the country.

BIM plays an integral role in the process, too. The team must agree on how the model will be developed, accessed and used. For example, on DPR's $96.9 million Sutter Health/Camino Medical Group project in Mountain View, Calif., each trade maintained its own system model that then was integrated into a single model for clash detection and conflict resolution.

"IPD is enabled through the use of BIM because it forces builders and designers to be together and build the project virtually. This requires integration at an early stage," Lamb says.

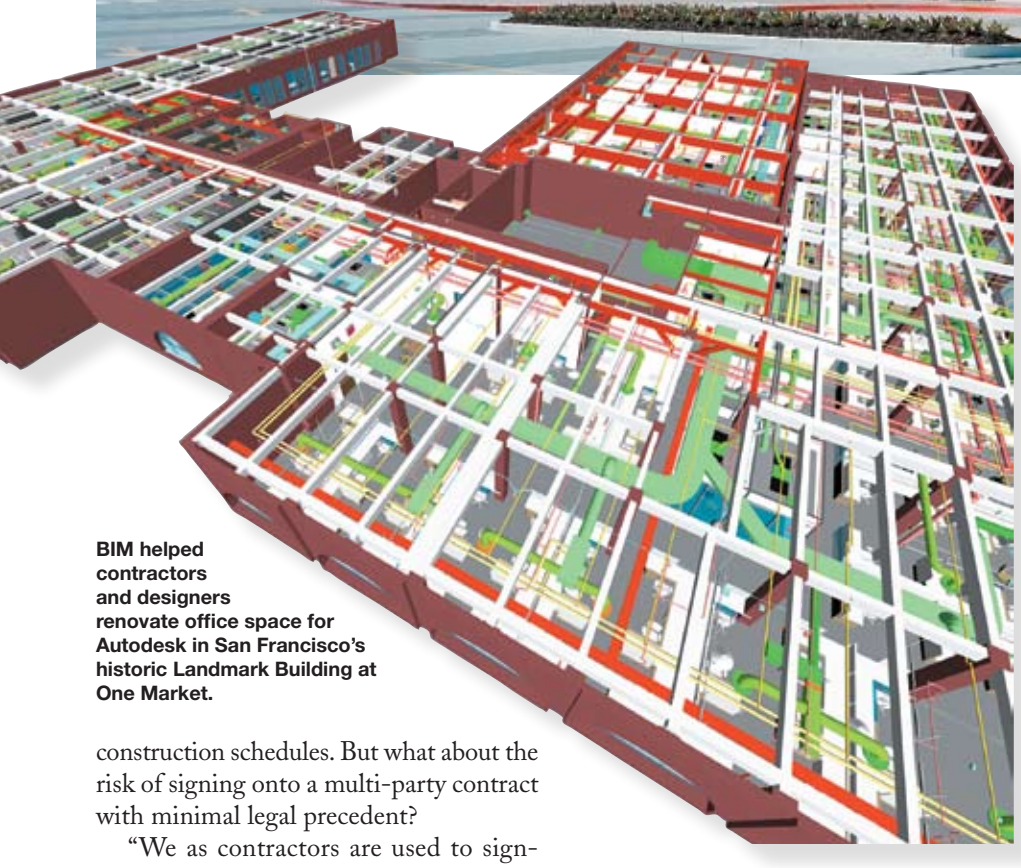
On the Camino project, mechanical, electrical, plumbing and fire protection contractors collaboratively created 3-D models and used them to generate fabrication spool sheets and assembly drawings. Components were prefabricated and delivered to specific project zones, with no onsite fabrication required.

DPR estimates modeling the entire project cost less than 0.5 percent of construction, while the use of IPD saved approximately $9 million by shortening the schedule by six months.

The firm reports similar results for all of its IPD work during the last four years: better quality designs, more predictable estimates, and smoother, faster

MARC BARNES (4)

DPR's superintendent spent less than two hours per month on field coordination issues on the Camino Medical Group campus in Mountain View, Calif.



BIM helped contractors and designers renovate office space for Autodesk in San Francisco's historic Landmark Building at One Market.

construction schedules. But what about the risk of signing onto a multi-party contract with minimal legal precedent?

"We as contractors are used to signing agreements and taking on risk," Lamb says. "Some designers are fearful of putting themselves at construction risk because they're not used to this. You need to be able to put them in a position to be rewarded if the team saves money. Hopefully that overcomes the fear."

Another major adjustment for architects is the replacement of value engineering with target value design, which mandates the GMP cannot be exceeded. Architects design according to a detailed estimate, rather than having builders estimate based on a detailed design. No design element is set in stone unless it has undergone a cost analysis, and the team shares any savings incurred.

To tackle target value design on large-scale projects, DPR organizes team members into "system clusters" (e.g., structural, mechanical, sitework) that include a designer, contractor and subcontractor.

"Nobody designs without knowing what they can afford, and then they work on strategies to lower that cost. Each team is committed to designing to their own budget," Lamb says. "The challenge is when people retain their old behaviors and operate within their own silos rather than the interests of the entire team. You can't have members of the team withholding information from their budgets or scopes of work. You need to strip away that fear and work openly."

GROUP DYNAMICS

Co-location is a valuable way to build camaraderie and streamline the flow of information among project participants.

When Autodesk put out an RFP with a full IPD contract for its new headquarters in Waltham, Mass., architects and builders were required to respond as a team. Architecture firm KlingStubbins joined forces with Tocci Building Corporation, Woburn, Mass., to win the bid, launching a close partnership that lasted throughout the eight-month project.

Laura Handler, Tocci's virtual construction manager, had a desk at KlingStubbins during the design phase, and the architect relocated to Tocci during the construction document phase.

Subcontractors were brought into the mix as well, with HVAC and drywall specialists collaborating on a budget-reducing exterior soffit solution that allowed money to be spent on higher quality materials elsewhere. In another example, a vendor worked with subcontractors to devise a custom-built installation that shaved 90 percent off the $200,000 cost overrun tied to the window treatments Autodesk wanted.

"We combined the best available union and open shop contractors and enabled them to work together without the usual constraints," says Amy Thompson West, Tocci's director of workforce and community development. "We all had one contract and were either going to share the risk or the reward. Barriers go away when the stakes are so high on who profits and who doesn't."

Adds Phil Bernstein, Autodesk's AEC vice president of strategy and industry

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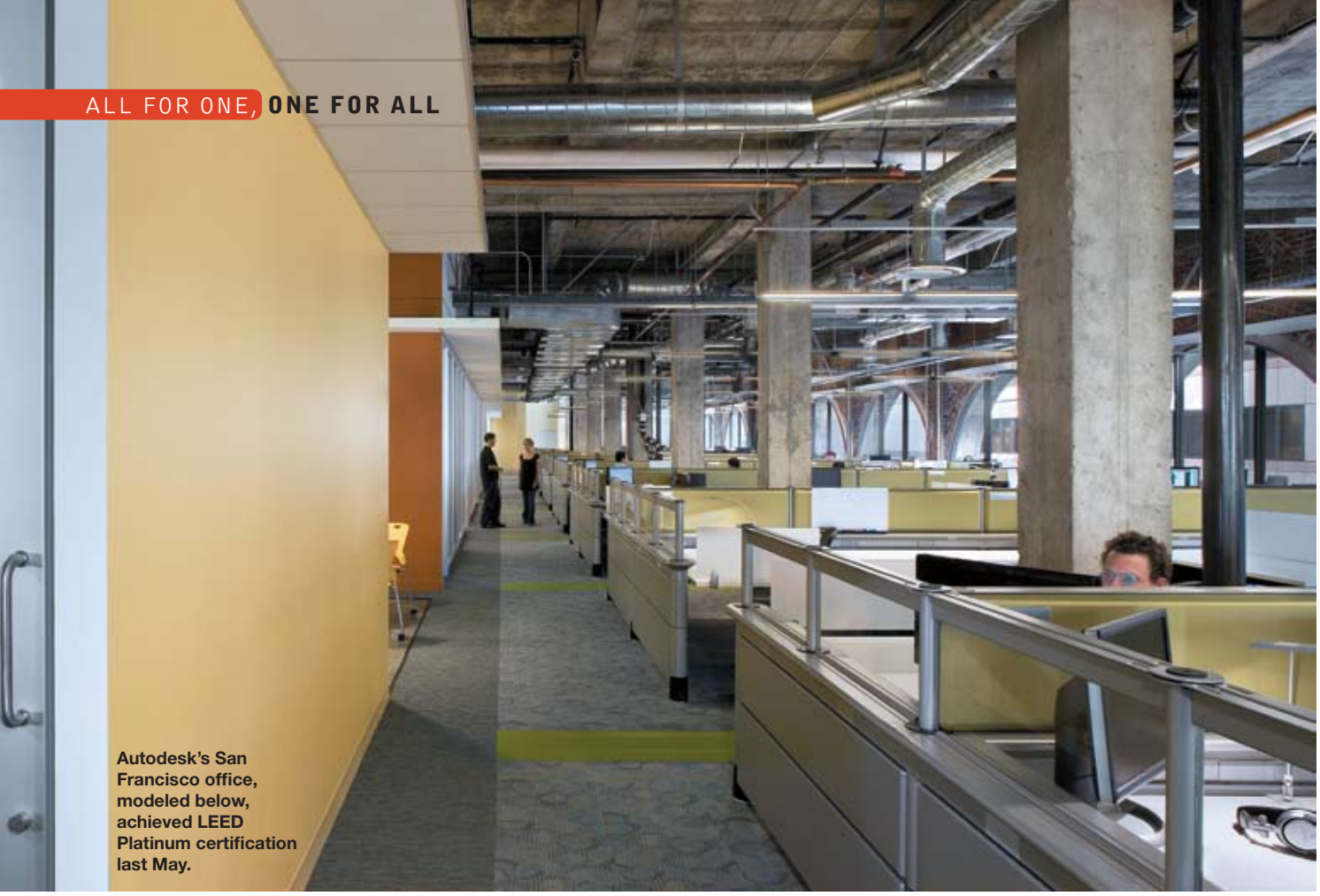

Autodesk's San Francisco office, modeled below, achieved LEED Platinum certification last May.

relations: "We have been advocating for a process revolution in the building industry, with technology as the catalyst, for several years now. This project was the chance to walk the talk. We got significantly better results by forming truly integrated teams early in the design process—specifically better cost control and a higher-quality design—and we met a schedule that would have been nearly impossible in a traditional contractual arrangement."

The 61,000-square-foot project wrapped up a year ago, with zero construction claims or lost-time accidents. The team added 7.4 percent in "design quality" at no extra cost to Autodesk, which garnered LEED Platinum certification for its new headquarters in October.

"Achieving LEED Platinum was a contractual requirement for which profit was at risk," Handler says. "In addition, we had to meet budget, schedule, design quality and functionality goals."

Getting team members to buy into the shared risk scenario wasn't difficult, according to Handler. "All of the subcontractors we contacted were on board as soon as IPD was explained. Cooperation went down to the field level—foremen shared tools and information and stayed out of each other's way. They knew if something was beneficial to the project, it was beneficial to their company."

ADOPTING THE THREE MUSKETEERS MENTALITY

With today's increasingly tight financing and complex building needs, contractors should prepare to respond to owners that seek a more efficient construction experience.

"You need to look at your own firm and learn how to think in terms of IPD and learn how to use BIM on your own. This will help qualify you for collaboration," Handler advises. "You also need internal trust and communication in place."

In addition to being BIM savvy, DPR seeks subcontractors that add value to meetings and are willing to share how they build their costs.

"We don't want a subcontractor to come to a two-hour mechanical design meeting and contribute nothing," Lamb says. "You need to have suggestions on constructability. Everyone needs to be engaged during the design stage for the owner to really derive benefit from IPD."

With this in mind, Lamb suggests inexperienced firms do what DPR has done: Arrange for in-house training on BIM and start implementing it on projects to see how it can help coordinate the construction process; learn about lean techniques from the Lean Construction Institute; and learn the design management process to understand how architects and contractors approach projects differently.

"Learn about the tools and processes, and then start talking it up as a delivery option with your clients so they can see how they could benefit," Lamb says.

Joanna Masterson is senior writer of *Construction Executive*.

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