Chapter 2

What Every Executive Needs to Know About Low-Bid Contracting

All too often projects suffer because the design and construction team are cobbled together for the first time and have no expectation of ever being together in the future. Worse still, most of them will have been selected on a lowest price basis, where profit margins have been squeezed to the bone and the only way of making a decent profit may well be through claims against other team members, or against the client.

—Clive Thomas Cain, *Profitable Partnering for Lean Construction*

The 2004 U.S. Olympic men's basketball team should have won the gold medal. They were the best players on the planet. They all wanted to win gold; they had strong incentives and the pride of representing their country. Yet the team failed. In 2008, the U.S. team—great players with strong incentives and the pride of representing their country on the world stage—did bring home the gold. The difference wasn't in the varying skills of the individual team members, but in the

specific kind of leadership provided by Coach Mike Krzyzewski. In picking players for his team, he invested a great deal of time considering not only individual talents, but how well the players interacted with other team members: chemistry and complimentary talents. The winning difference is seldom the aggregate of talent but how well players act as a team, making the most of the talent they have.[1]

The 2008 team's success was crafted and assured before they ever assembled as a team.[2] This winning approach would seem tailor-made for the building projects, which require teams of architects, designers, engineers, and contractors to get the job done. As one building owner says, "If you have the right team, you don't need to bid." Unfortunately, our bidding system virtually ensures that a winning team—one that brings in a well-designed building on time and on budget—will only be formed by accident. This behavior is sometimes described by the ironic acronym CATNAP: Cheapest Available Technique Narrowly Avoiding Prosecution.[3]

When owners go to the market for new space, they want answers to a few basic questions: What do I want and need? How much will it cost? When will it be completed?

But once they get into the bidding process, they find themselves with a whole new set of questions that are not easy to answer: Where will I most likely get screwed? How late could the project be and how much extra will I end up paying? How many compromises will I end up making?

The primary cause of this shift to uncertainty and suspicion lies in the nature of the bidding process itself: design-bid-build (DBB) the most common project delivery approach.

WHAT'S WRONG WITH DBB?

DBB is easy to define. It simply means "the owner develops the parameters of the project, the architect prepares the design, the owner invites contractors to bid on the design, and the selected contractor then builds the project."[4]

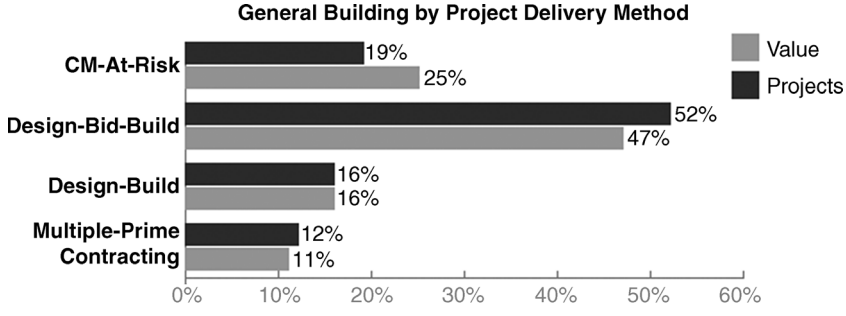
As we saw in the last chapter, it worked well for a few decades but ran into problems beginning in the 1960s. It was also during the 1960s that we also begin to see new delivery models, like fast-track and design-build. We now have a multitude of models, including multi-prime, construction manager agency, construction manager at risk, bridging, alliance teaming, and integrated project delivery. It's easy to get lost among the selections and understand fully the nuances

and trade-offs for each model, so we'll briefly review just the four dominant strategies.[5] The first three basically follow an RFP (Request for Proposal) or bid approach:

- **Design-bid-build (DBB)** gives separate power to two main players. The architect is responsible for design, coordination of trades, and quality. The general contractor is responsible for hiring the subcontractors and building the structure (including cost control and schedule) according to the plans.
- **Multi-prime** makes the owner responsible for contracting work to the architect, structural engineer, HVAC, and other trades. Each of these players bids individually.
- **Construction manager at risk** makes the individual or firm that acts for the owner liable for selecting the construction team, holding the contracts, and coordinating the design and construction. The construction manager typically follows a DBB approach.
- **Design-build** lets the owner give accountability to either the general contractor or the architect, and the other trades essentially work for that person.

According to a top industry publication, *Outlook 09, Industry Forecast and Trends* (McGraw-Hill), 82 percent of projects follow one of the first three approaches, with 52 percent using a straight DBB model and 18 percent utilizing the design-build approach. Each of

Figure 2.1 Project Delivery by Percent (provided by McGraw-Hill)



Source: McGraw-Hill Construction, 2008

these strategies describes a method of assembling a team to work on a project through bidding: an adversarial system in which each player submits an estimate of how much it will cost to do the job and how long it will take, wherein decisions are made on who the owner or contractor thinks can do the best job, the most quickly, for the least amount of money. But if the initial team selection process creates a fragmented collection of companies that are introduced to the project *after* the big planning decisions have been made, then the delivery model selected will make little improvement in the outcome. Let's take a closer look.

PRE-QUALIFICATION

Most owners should understand that projects either succeed or fail due to the team dynamic and the complimentary sets of skills and expertise that each participant brings to the job. So before requesting pricing proposals, owners usually try to pre-select companies that they think perform well as a group. This prequalification phase takes into account a company's size, their work on similar projects, financial strength, and a presentation that some refer to as a "beauty pageant." If no glaring weaknesses show up, and the presentation demonstrates some thought and effort, the short list of qualifiers can range from four to a half-dozen. Elimination from consideration is often due to nothing more than a need to limit the bidders to a manageable number, or a poor showing at the beauty pageant (typically a presentation to show off a firm's capabilities and best projects and find a way to create a hook or some distinctive trait that sets the firm apart).

The threshold and investment of time for prequalification is pretty low, and the list of necessary credentials is fairly predictable. The pre-selection process typically reaches out to what the industry calls "the usual suspects" frequently firms the owner already knows through a prior relationship or a nationally or regionally known company—which reflects an industry with few clear choices. Prequalification is therefore unfortunately based on a limited knowledge of the choices and a glaringly false assumption: that starting with the best known players available will lead to a successful project. But if team selection were that easy, then successful teams would simply be a collection of best-known companies.

INVITATION TO BID

The short list of suppliers that have been pre-selected by the owner then compete in a system that serves only to turn every participant into looking out for their own interests. Bid documents essentially strip away each company's unique value and experience so that all bidders can fit into a common box of qualifications and requirements. Bidding assumes that once the requirements are defined in a Request for Proposal (RFP), each firm can be compared side-by-side (apples-to-apples) to the other bid submissions. The translation: All other things being equal, the low price wins.

The goal and assumption for the bid document is that it creates a context where all things are equal. This linear breakdown of a project allows decision makers, who may or may not know anything about construction, to collect bid submissions and enter each quote on a spreadsheet for comparison. The owner is looking for the lowest total cost/price from the "bid tab" and for their consultants to point out any glaring omissions or possible mistakes.

For their part, bidders comb through the bid documents and identify errors, ambiguities, and loopholes—anything that might poke a hole in the box. These holes also allow bidders to lower the cost of their bid (even below acceptable profit levels) knowing they have these discrepancies to fall back on to recoup—and, in some cases, enhance—their profit.

AN EXPENSIVE PROPOSITION

Traditional bidding is clearly an expensive proposition. One vendor in particular created a spreadsheet to help owners better see the time and cost that goes into this procurement model, in the hope that they would re-channel the effort into better preconstruction analysis and planning. The spreadsheet used the example of a 200,000-square-foot building. At a cost of $200 per square feet, it represented a $40 million project. The owner may consider four developers, and the selected developer sends a bid request to six architects. The chosen architect then sends a bid request to five contractors and several consultants. Each general contractor will have anywhere from 25 to 50 sub-trades on a project, and bid each trade to four or more sub-contractors. In the end, the selection process alone will have involved more than 300 organizations, more than 800 individuals, and more than 30,000 man

hours at a total cost to these organizations of $2 million—5 percent of the cost of the project.[6] And the owner doesn't realize that the contractor will need to recoup this cost somewhere once the contract is awarded, or in a future project with another owner if they did not win.[7]

BIDDING IS A WASTE OF THE SUPPLIERS' TIME AND RESOURCES

Another point of frustration is the time that is invested—rather, wasted—to respond to bid requests. One contractor said that a project in the range of $30 million can easily take five people four to five weeks to complete. Hard costs for blueprints, proposal documents, and props can cost $20,000. The salaries for the five people are in the range of $50,000—a fact of which many owners are unaware.

Another contractor I know expressed his frustration with a process that ignores the work and effort that he and his colleagues invest to demonstrate why their approach to successful projects matters. He called a particular owner's representative "Bottom-right-hand Bob," referring to this consultant's narrow interest in the bottom-line price.

THE WINNING TEAM

The owner has to create a team overnight, essentially performing a shotgun wedding among all of the successful companies. They may already know each other and have established relationships; however, it's more likely that they've either never worked together before or have some reason to distrust each other.

The winning contractor starts off the project with a "bid-deep" understanding. They are hardly ready to switch gears and begin building immediately after winning the job. First, it will take a few weeks to buy-out the sub-contractors—in other words, to make the final selection between subs and lock in their contracts.[8] The contractor also has to analyze the plans from a whole different paradigm—from winning a bid to building. He will send the architect a list of errors and omissions required to correct the plans and documentation, and those amendments become the first round of change orders.

Once the team is assembled, the project is officially underway. Unfortunately, the collection of winners only behaves as a team for the duration of the initial kick-off meeting. The adversarial outlines of

their relationships, which are established in the bidding process, are soon cemented into place. The bid process produces low-priced winners whose motive is to protect and restore the margins they cut in order to win the job. They have no natural loyalty or reason to work as a team. The commodity approach to procurement, the reality of working with different players on every project, the normal cynicism and distrust between trades, and an industry that supplies little training in team formation or healthy team dynamics leaves owners with a raw collection of companies who are now expected to behave as a cohesive, collaborative group and successfully deliver a complex project.

Even when the architect and general contractor are selected based on qualifications rather than bids, the sub-trades are not. This is bad for the project and bad for the long-term survival of the subcontractors. According to Clive Thomas Cain, author of *Profitable Partnering for Lean Construction*:

"In the case of the construction industry, 80% of the team members are drawn from the specialist suppliers' sectors of the industry . . . they are generally selected on a project-by-project basis by the lowest price they can tender for the individual project. Consequently, their long-term security and profitability is at risk, the rate of bankruptcy is far higher than in other industries, their entry level is dangerously low and the valuable skill and experience of the specialist suppliers is hardly ever harnessed to drive out unnecessary costs and drive up quality."[9]

Clearly, these circumstances produce a system that rarely results in a positive or constructive outcome. It simply begets further distrust and heightened divisions between teammates and serves only to impede the project's development.

THE WINNER'S CURSE

The bid process sets up a common—and predictable—behavior pattern: Bid low to win. If successful, find justifiable ways to recoup and protect profit. And make sure there is someone else to blame as the cause for additional fees. In the industry, this built-in tension is called "the winner's curse." It goes like this: "The good news is, we won. The bad news is, we won." Or, as the construction industry joke goes, "The low bidder is the one wondering what they left out of the bid."

Contractors and consultants have a reputation for devising elaborate schemes to overcharge unsuspecting owners. The system certainly

encourages and allows an element of bad behavior, and a cup of coffee with a construction auditor could lead one to see opportunism around every corner. The reality, however, is quite the opposite. Most contractors and consultants *do* play by the rules. One contractor even made this shrewd observation: "Contractors don't make money on change orders; they simply make up for what they should have charged." If contractors should have charged more for the project in the beginning, then why don't they? Because the object of the game isn't delivering the building, it's winning the bid.

An executive for a large contractor recently expressed frustration over a tense meeting with an architect. The architect complained that this contractor used a grade-one wall finish, instead of the grade-five that the contractor typically includes. The contractor told the architect bluntly that had they bid the normal grade five the additional $500,000 would have cost them the project. "If you wanted a grade five finish," he said, "then it should have been made clear in the bid." Now the architect's choice was to approve a change order for $500,000 worth of finish or resell the owner on the lower quality finish. Even though the contractor and architect had worked together many times in the past, this conflict at the very outset of the project immediately put them at odds with each other and eroded the architect's credibility with the owner.

This very typical situation illustrates just one of the many built-in problems with a bid document that attempts to specify a complex interconnected set of requirements. Under the current circumstances, this conflict is unavoidable. With new thinking, however, the players would be free to lay their cards openly on the table and work to avoid such oversights.

Architects and contractors don't like the existing process, and do not believe it serves their clients. They know that designing and delivering a building is a complex process whose success depends upon good communication, integration, and tight coordination. If owners began their projects by asking themselves what it takes to create a high-performance team, the rules and process for selection would dramatically change. Instead, they tend to see architects and consultants as interchangeable commodities. Using that framework, a bid among four or five equals defaults to the lowest price. A principal from one of the largest U.S. architectural firms lamented that clients always begin by saying that their decision will not be based on price, "so we go into to the effort hoping and preparing like our experience and expertise

will make some difference. But at the end of the process, it always gets down to price.''

Is improving the system an impossible dream? No, not by a long shot. In fact, the projects reviewed in Part Three bring to light success stories of owners who made this mind shift: viewing success as a matter of team formation, not a collection of low numbers on a bid tab.

VALUE ENGINEERING

At the fall 2008 CoreNet Global Summit, a meeting of the world's leading professional group for corporate real estate, we heard story after story on this common theme: projects that go out for bid return with prices higher than the budget. Given the current, fragmented structure, the ability to get a project back on track once initial costs come in too high can often become a losing proposition for everyone. The name of this process is a nice little euphemism: value engineering or VE. VE essentially means that the size, quality, or features of the job are reduced in order to lower the price.

Despite valiant attempts, value engineering has *not* proven effective at bringing projects back into budget.[10] More often, it produces a series of unintended new problems of coordination and quality issues by raising cost and negatively impacting the schedule. A VE project quite often returns to its original costs or higher, but now with lower quality or reduced scope or both.

WHAT EXACTLY DOES THE WINNING BIDDER *WIN*?

The winning bidder earns the right to reprice the project without any competition. Adjustable (or mutable) contracts and the contractor's superior knowledge over the owner ensure the contractor comes out on top. Leading construction attorney Barry LePatner compares this asymmetrical relationship to practices employed by lawyers, accountants, and doctors: No matter what, they will make their fee and, in the case of the contractor, their profit.[11]

Once the contract is signed, control of the costs, schedule, and quality shifts disproportionately to the contractor. LaPatner explains in detail the dramatic monopolistic power shift that takes place once a contract is awarded. That power increases as the project progresses and the owner's investment grows. The contractor knows—and the

owner soon discovers—that challenging the contractor is a game of chicken, which the owner is sure to lose. If the owner raises issues or points out problems, the contractor can easily find reasons to justify his charges for any added costs. One architect remarked that a contractor on a recent project suggested a different method for an area to simplify the job. They then tried to submit a change order for additional fees, because they claimed the architect had altered the scope of work.

To level the playing field once again, LaPatner recommends using true fixed-price contracts based on completed detailed drawings, strong and punitive contracts, and highly competent and forceful construction managers. This forces owners to carve out more time for planning and shift budget dollars forward in the process.[12] However, we do think many owners will need stronger outcome assurances before they'll be willing to make this shift in thinking and front load their planning. If owners were to make the adjustments that LaPatner suggests, it would certainly put a dent in the 70 percent of budget-busting projects with runaway schedules. Yet the reality is that few owners will do this. We think there is a better chance for large-scale shift to early planning by changing the rules altogether. The system is ripe for overhaul, and Part Three provides examples of owners who have not given up speed-to-market and quality and are not paying a premium to reign in cost and schedule overruns. By doing so, they have additionally reduced the remaining 50 percent waste, improved the quality and life performance of their buildings, and made sustainable construction the norm rather than the exception. "When you improve things by an order of magnitude," says Steven Levy author of the article in *Wired*, "you haven't made something better—you've made something new."[13]

DISPELLING MYTHS AND MISCONCEPTIONS

Almost everyone in the building industry is operating under the burden of one or more of the common misconceptions and myths about the bidding process. They are worth looking at (and dispelling) here.

Myth #1: Line Item Bids Provide Apples-to-Apples Comparisons

In truth, they simply compare numbers and offer no indication about how the supplier will perform or contribute to the success of the

project. Picking a vendor based primarily on a number is like picking players for a team based strictly on their statistics.

Myth #2: The Process will Help Me Arrive at the Best Value

This may indeed be the intent, but it is seldom the reality. Even evaluations that go through a prequalification phase end up with a short list of suppliers that give each competitor equal status. Every team has unique qualifications, processes, values, and track record. Owners have not yet devised consistent methods for comparing individual firms let alone project teams, and the industry has provided little support for establishing guidelines of standards of practice to aid owners.[14]

Myth #3: Once We Get the Bid Prices, We can Select a Contractor and Finalize Our Costs

Most owners are prepared for the reality that the final project cost will be higher than the awarded contract price. However, they are typically unprepared for just how much deviation there will be and the many reasons why. One report cites 75 percent as the amount of projects that came in over budget—at as high as 50 percent over than the contracted price.[15]

Requests for bids often take place when plans are less than 50 percent complete, and bidders will always interpret incomplete plans on the low side of the cost. One contractor told us that he creates a two-column price sheet: one column responds to the letter of the bid, and the second column includes all of the identified errors and omissions that will need to be added as the plan details develop. The contractor bids the first column, and uses the second column for his change orders.

Myth #4: As an Owner, I Have Different Delivery Models that Help Me Control Cost and Risk

The owner begins with all of the risk and creates a structure (delivery model and contract) whereby he selects a team to distribute that risk, which includes financial (final cost), safety, performance (quality and

schedule), and design (concept and function) components. The level of undefined but anticipated possibilities determines risk. An experienced owner may take more responsibility to manage that risk or pay the architect, contractor, and consultants for their expertise and time to reduce it. Spending more money and taking the time to define details reduces the chances for error, but there are no industry formulas for working this out. A Mindshift member and developer recognized and described the reality: ''At the end of the day, we carry all of the risk, like any owner.'' Assessing and assigning risk and proper compensation comes down to the level of trust and confidence one has with their partners.

The bid process is, at its core, all about risk and who feels its effects. Documents attempt to tightly identify a supplier's scope and responsibilities (shifting risk). The supplier then works hard to narrowly define scope and responsibilities, while adding disclaimers and qualifications (shifting risk back). Written accounts and partially completed drawings fail to convey the complex coordination and real world variables that suppliers face and must work out. The bid process sets the stage for the finger-pointing and blame-shifting process—leaving no one accountable and the owner footing the bill.

Myth #5: The Competitive Bid Process Ensures We Get the Best Price

The upfront bidding process looks competitive, but what, exactly, are entrants competing *for*? Firms are not competing to see who can deliver the best building for the best value; they are vying to win a fierce, margin-eroding contest. Once they've won, their focus shifts to recouping and protecting that margin. As we've seen, contractors compete for the right to re-price the project with no competition. Only when this aspect is satisfied does the focus shift to the success of the building.

Myth #6: Our Process will Help Us Find the Best Team

When the owner selects a contractor, they really don't know who will be working on their job. Sub-trades handle 80 percent of the work, and the owner will not even know the names of the companies let alone their lead people. The scenario is similar to picking a team based on its coaches, without ever seeing the players.

Myth #7: I'm Dealing with Well-Qualified Companies

Many firms are reputable firms, but some are not, and the industry does not make it easy to tell the difference. There are no established standards of practice for an industry mostly made up of firms under 20 employees. As cited in the previous paragraph, owners often do not even know who is performing four-fifths of the work they commission.

The threshold to become a subcontractor is fairly low. The story of "Joe the Plumber" during the 2008 presidential election illustrates the point.[16] Samuel Joseph Wurzelbacher was videotaped asking then-presidential candidate Barack Obama a question about small-business tax policy. His simple inquiry propelled him to immediate celebrity status, and he became a symbol for the challenges facing small businesses. Additional research into Mr. Wurzelbacher's background revealed that he was not actually a licensed plumber, although the company he worked for is. Joe had not finished the union apprentice program he began several years earlier, and the company he works for is reported to have somewhere between two and eight employees. If Joe's amateur status remained unknown to the nation at large, then it isn't hard to believe that other unlicensed professionals can have a similarly easy time obtaining jobs.

Myth #8: The Winning Contractor Gave Us Their Best Price

For the bid, perhaps, but the contract award was just the first step for the contractor to recover everything they may have given up on the bid and more. The process begins with the general contractor (GC) buying out the subcontracts, which is a hidden, second-round bid exercise. The GC has two points of leverage for renegotiating original bid submissions. First, they have a real project. Second, they have more information and better-defined scope and can compel the subcontractor to take a second, more realistic and more detailed, look at their bid. LePatner says this can reduce the GC's cost another 15 to 20 percent. This second-round bid exercise represents a hidden profit center that often equals more than the contractor's general conditions.[17] The next round of recovering is about change orders. There is actually a $268.20 book subtitled *The Art of Finding, Pricing, and Getting Paid for Contract Change*. It is obviously well worth the price; there's at least one boat out there lovingly named *Change Order*. Again, most contractors seek a fair profit for

the work and risk they manage. Buying out and change orders are two tools contractors have at their disposal, and mostly invisible to owners, that stack the cards in favor of the contractor.

Myth #9: We will Buy Our Equipment and Materials Through the Sub-Trades Performing the Work

This is a widely held, general assumption. However, sub-trades are hired for their labor expertise, not their buying clout. A good project manager or larger general contractor can usually buy direct from the manufacturer and cut out several layers of markup.

In one example, a national project management firm secured a higher grade lighting solution that cost $55 per lineal foot. This price was the result of layers of mark-up that began with the manufacturer, the distributor, the subcontractor, and continued with the general contractors before it even gets to the client. Once these layers were removed, however, the client ended up paying $22 per lineal foot.[18] In addition, this lighting system had a quick connect feature that reduced the necessary labor. The initial fee reflected a traditional lighting system. The project manager spotted the discrepancy, which brought the labor cost down by 15 percent. Since materials make up 40 percent of the cost of the project and labor approximately 50 percent, it is worth the owner's time and effort for to take a closer look at these expenses.

Myth #10: If We Hire a Third Party, They will Protect Our Interest

Well, that's the theory. In the 1980s architects moved away from their traditional role overseeing construction to lessen risk. Contractors also began to shed overhead and risk by moving away from self-performing the construction to hiring subcontractors and independent contractors. These shifts created a gap in coordination and accountability. Third parties emerged as a new layer that was meant to advocate for the client and oversee the coordination between the architect and contractor.

The skills and qualifications for independent brokers provided to project managers and construction managers vary greatly, which makes it hard for owners to discern or compare. What further complicates the process is that brokers who provide this service may bundle the cost into their fee—again shifting the owner's focus to price instead of outcome.

There are many excellent project managers, but there are many more who are not so good, and owners need *exceptional*—not just good—project managers to stand in the gap. Many experienced and professional project managers voice a general lack of respect for their less effective counterparts. It's too easy for someone to claim to be a project manager, and there are too many clients who can't tell the difference. Some criticisms of project managers are that they:

- Are nothing but expensive checklist makers, spreadsheet managers, and schedule maintainers.
- Have an incentive to actually *add* conflict and *find* problems, because it supports their value.
- Are after-the-fact reporters and do little to anticipate problems or develop solutions when they arise.[19]

Project managers are a necessary bridge in a broken system. Principal of Construction Audits and Consulting (CCM) Vince Chapman[20] describes their role bluntly: "If you have outlaws, you need a sheriff."

BOTTOM LINE

After a while, the stories begin to sound similar: a lot of time invested in a selection process that fails to account for the team formation, creating links of accountability, and early coordination and planning needed to make the job successful. The process also frustrates suppliers who have to play one game to win a project, find ways to recoup the sunk cost, and then invest new time—if they win—to revise plans on how to implement the project.

Even this brief review makes it hard to miss the obvious: The system is broken. Bidding leads to cutting corners, so-called teammates who work against each other, and buildings that come in over budget, over schedule, and under quality. Clearly, we need to look at construction through a different frame, one that discourages fragmentation and adversarial relations in favor of a cohesive building and design team whose members are all working together to bring in sustainable projects in the best—and most cost-effective—way possible. And that requires a mind shift. In the next chapter, we'll begin to see how that might look.

Notes

CHAPTER 2

1. John Paul Newport, (2008, September 27). Team USA's Management Victory. Wall Street Journal. Retrieved September 30, 2008. The article provides a timeless example of the value of crafting a team with disciplined forethought. The U.S. Ryder Cup team had lost the last five out of six competitions with the Europeans. Azinger left off most of the marquee players and instead selected six rookie and changed all of the previous protocols for team selection. The story is very instructive for team selection in construction.
2. U.S. team managing director Jerry Colangelo said that simply throwing together a collection of NBA stars doesn't cut it anymore. He noted that the nucleus of this team was assembled in 2006. ''The core players have been together for the last three years,'' he said. ''In the past, all-star teams were selected. That was good enough, but that's not the case any more.'' http:// www.nydailynews.com/sports/more_sports/2008/07/28/2008-07-28_confident_ team_usa_arrives_in_china_lebr.html.
3. Paul Hawken, Amory Lovins, and L. Hunter Lovins. Natural Capitalism: Creating the Next Industrial Revolution. New York: Back Bay Books, 2000, p. 275.
4. Barry Lepatner, (2008). Broken Buildings, Busted Budgets: How to Fix America's Trillion-Dollar Construction Industry. Chicago: University of Chicago Press.
5. McGraw-Hill Survey 2008. The AIA Integrated Project Delivery Guidelines list additional delivery methods, pp. 44–49.
6. Reed Business Data told us that the actual numbers were far higher than our estimates. The average number of general contractors involved in a bid is 15. The number of product manufacturers—air compressors, lighting, security, etc.—will double the total number of contractors and subcontractors.
7. One architect told us that the cost for developing a bid response for a $350 million project was $500,000. If they lose, that cost will need to be made up somewhere in the future. The design partner had already spent more than $1 million to make it to the shortlist stage.
8. Buying out the contracts is a process that most owners are unaware of. When the contractor submits their quote, it is a number without reference to any particular subcontractor. Once contracts are awarded, the general contractor will often use that leverage and renegotiate to see if any of the subs will lower their quote. The contractor also has to make sure that the sub is still available to do the work. It is possible that the sub was selected for another project that came in before this one.
9. Clive Thomas Cain, Profitable Partnering for Lean Construction, (Malden, MA: Wiley-Blackwell, 2004).
10. Successful efforts to rein in cost seem to be the outcome of well-formed, highly competent teams that display ''above and beyond'' behavior. The success comes in spite of the system. One executive for a national real estate firm commented on a chip fabrication facility that started late due to the fragmented decision process. Each hour the facility was late cost the company $1 million. The facility was completed on schedule due to individual heroics, a large financial incentive, and some high-level red-tape cutting with the local government. In this case, speed and quality were accomplished with a high premium and the political muscle of several executives.
11. LePatner points out that ''fixed price'' contracts are not truly fixed price and allow for change orders. He points to the design-build model as strategy for controlling costs, but with several other trade-offs giving the contractor virtually total control over design, quality, and schedule.

12. Owners have a hard time making the connection that paying more up front actually lowers the overall cost of the project and shortens the schedule. Many projects in their initial phases are speculative (planned before there are identified tenants). Developers will ask architects for ''free'' concept drawings to secure contractor quotes and then seek funding, with the promise of using their firm if the project gets funded. In this case developers walk the fine line of not including enough cost to properly build the project hoping to secure funding or building in too much buffer so that there is enough to build what is needed and pricing themselves out of the market. Owners also minimize front-end planning to respond to pro formas that minimize early cash outlay and then demand faster delivery to get the building operational and producing as quickly as possible.
13. Steven Levy, ''We Should Build Our Own,'' Wired, October 2008, 150.
14. Arizona State has developed a vendor assessment process called ''Performance Based Procurement'' that offers institutions and public entities an alternative due-diligence process for selecting a best value supplier. Companies like Nortel and institutions like Harvard have used it with successful results.
15. Great Britain, (2000). Modernizing Construction (House of Commons Papers). London: Stationery Office Books.
16. As part of the background on John McCain's use of ''Joe the Plumber,'' several media outlets researched his professional plumbing credentials. One Toledo Blade article stated, ''Mr. Wurzelbacher said he works under Al Newell's license, but according to Ohio building regulations, he must maintain his own license to do plumbing work. He is also not registered to operate as a plumber in Ohio, which means he's not a plumber.'' Wikipedia, http;//en.wikipedia.org/ wiki/Samuel_ Joseph_Wurzelbacher.
17. Once a contractor sets their Guaranteed Maximum Price (GMP), they now take on the risk for keeping costs below that level or eat into their profits. They will use the buy-out process and change orders to protect that GMP.
18. Mike Wolff, Principal for Project Solutions Group.
19. Several different stakeholders in the industry, including project and construction managers, expressed these opinions.
20. CCM Consulting Group was organized in January 1992 for the purpose of providing construction project auditing and consulting services for construction project owners. Since 1992, it has reviewed more than $16 billion in construction contracts.