Chapter 1 The $500 Billion Black Hole

About 60 percent of the office space that companies pay so dearly for is now a dead zone of darkened doorways and wasting cubes.

—Mark Golan, vice president of real estate, Cisco Systems

In 2007, U.S. construction was estimated at $1.288 trillion—with more than 50 percent of that cost attributed to waste.[1] If you're skeptical, join the club. Some Mindshift members initially expressed the same skepticism. "There's no way half the cost of building is waste!" But under the skepticism of owners and builders and contractors lies a real concern: I have no clue how to cut out 50 percent of my cost for a building.

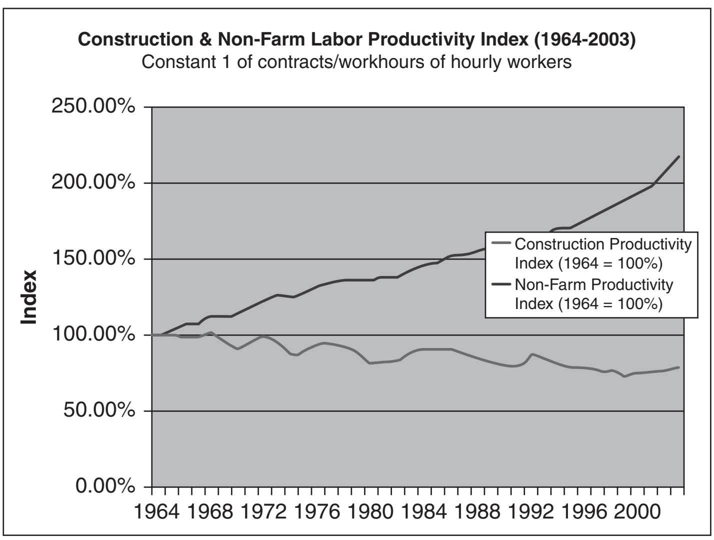
The numbers are consistent, available to anyone who wants to take a close look,[2] as we did. Because the first step to unlocking the mystery is to take a systematic look at the categories of waste. On virtually every construction project in the United States, we can trace this $500 billion black hole in the American economy back to two root causes: simple inefficiency and not-so-simple bad behavior.

WHY THE DESIGN-BUILD MODEL IS DEAD

The industry's traditional model for building—"design-bid-build (DBB)," solidified in the 1950s with the American Institute of Architects (AIA's) establishment of distinct phases for a project: schematic (concept), design development, construction documentation, and construction administration. The process follows a logical linear progression: design a building, assemble a team to build it, and implement the plans. Sounds like a reasonable idea, and for many years it was. The DBB delivery method began to falter in the 1960s with serious cracks by the 1970s. These cracks are evidenced by the introduction of alternative delivery models each attempting to remedy one of DBB's shortcomings.

Construction paralleled manufacturing gains in productivity right up until 1964, when it hit a roadblock. From that date forward manufacturing consistently improves, but construction productivity slowly declines. By 2003, the Bureau of Labor Statistics measured a 275 percent gap between manufacturing gains and construction declines (Figure 1.1). What happened?

Figure 1.1 Department of Labor Productivity Gap Between Construction and Manufacturing



Source: US Dept. of Commerce, Bureau of Labor Statistics

A number of factors explain the divergence, including fundamental changes in the economy.[3] The post-World War II expansion and baby boom peaked, and the information economy began to surpass manufacturing. Beginning in 1973, the recession pushed architects and engineers to move from a craft practice model to a professional services model, adopting fee structures similar to lawyers and accountants. Emphasis shifted away from the master-builder role, where the architect not only designed but supervised construction, to a specialist mentality that focused on the architect's unique business capability in design.[4] Contractors also began to deal with shrinking margins and higher risk by migrating away from performing the work with their own employees to becoming labor brokers.

Way back in the 1970s, Alvin Toffler's *Future Shock* was prescient in identifying the factor most responsible for the decline of the design-bid-build delivery method: a need for speed. Back in the days before cell phones and personal computers, Toffler described a new world that would be qualitatively different from past eras. This new economy would be based on information and driven by change. It would require speed and flexibility. This way of doing things would be like a Ferrari, hugging the road and taking the turns with ease. Unfortunately, the design-bid-build process was a Lincoln Town Car—built for quality and a comfortable ride, but not much good on the hairpin turns and switchbacks of the brave new world that we live in today.

The paradigm has changed, and the building industry is scrambling to catch up. The speed-to-market business driver has forced a conflicting trade-off between quality, cost, and time.[5] During the last 30 years or so, we have experimented with several variations of the design-bid-build model, looking for better ways to address the speed-to-market demand without sacrificing quality, compromising the owner's intent, inflating costs, or putting the project or a key stakeholder at undue risk. Owners have a choice of the first two variables, but they must allow the construction team to control the third. In addition to process waste there is waste in the end product. According to Mark Golan, vice president of worldwide real estate, Cisco Systems,[6] "About 60 percent of the office space that companies pay so dearly for is now a dead zone of darkened doorways and wasting cubes." This is not the result we want.

Mindshift took a close look at all of the different delivery models and concluded that most are variations of DBB that seek to bring harmony to the three variables of cost, schedule, and quality. They take the same familiar approach—assembling fragmented collections of companies, selected independently and most often based on low bids. These solutions not only do not solve the problem, they compound it, resulting in more of what we don't want: waste.

WHERE THE WASTE COMES FROM

A very visible form of waste comes from inaccurate information that creeps into projects with multiple specialties gathering and regathering the same data during a project.[7] But less visible and much more ingrained sources of waste come from the structural components that govern our industry:

- lack of time
- silos (vertically organized departments or organizations that work without consideration of other interdependent entities)
- boilerplate planning
- sub-trade coordination
- hierarchical dilution
- phase-induced ignorance
- problems that come with fielding a new team with every project

Robert A. Humphrey said, "An undefined problem has an infinite number of solutions." Before we go any further, then, let's see if we can define the problem.

LACK OF TIME

"Haste makes waste" in a system designed to function as a sequence of distinct phases. DBB no longer reflects the fluid reality of a project. Most buildings commence construction before architectural plans are completed. One colleague attributes the majority of the problems he has experienced with projects using this phased approach to the lack of time invested in the design phase. We will see in the third section of the book the need for owners to bring their team on board even prior to design to assist with the business plan for the project. Architect Paul Adams sums it up: "All the big mistakes are made in the first day."[8]

Rushed implementation ranks as the next most common complaint after the bid process itself. Brokers are key contributors to the lack of planning time given to the design and construction process. They are trained to get the best deal on a new building or a lease, and often they do not appreciate the details and time necessary to plan and coordinate construction and the move. The commission brokers are paid for the transaction has no tie to the success of the transition. Some brokers see their role in the larger context. Those brokers are often essential team makers and team leaders. These are individuals who rise above the industry's fragmentation and go against a compensation structure that narrowly rewards completing the lease transaction.

The owner of one national project management firm noted that the narrow role and incentive of the broker affects more than single-transaction accounts. His firm works side-by-side with a brokerage firm on a multi-year, multi-site account. The project management firm has documented the need for five weeks to design and deliver a space once the lease is signed. Despite several mutual meetings with the client and broker, the average time allowed is three weeks. Contributing to this lack of coordination are the different departments that the broker and project management firm reports to. The results are predictable. Each project requires more time, experiences errors and cost overruns, and creates a high level of conflict. When projects run into problems, the broker is long gone working on the next transaction, and the project management firm is front and center taking the criticism. Fragmentation is the true culprit and reason the client has yet to make the connection that the handoff from the broker determines if the project is successful or problematic.

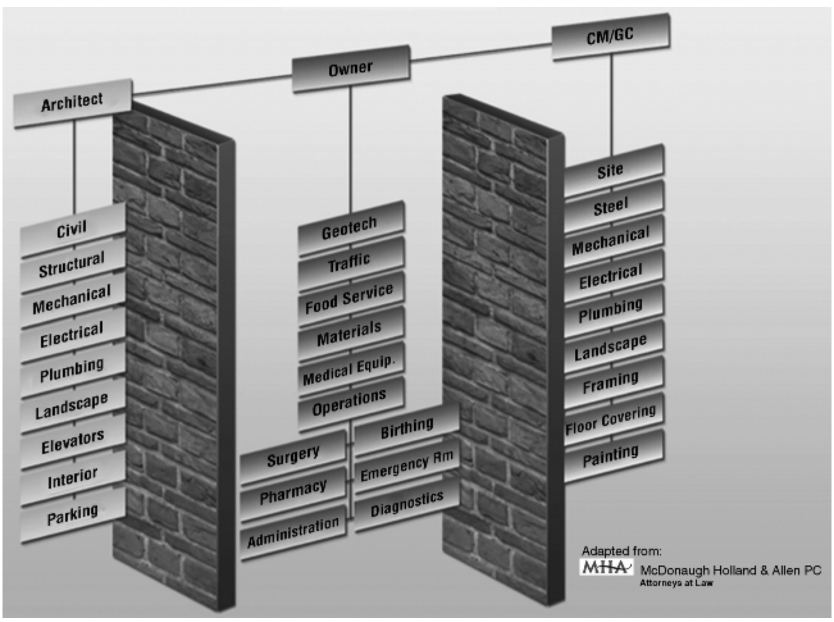
A general contractor noted another common omission: Capital equipment and long lead-time items are commonly overlooked by the owner and not factored in to the bid schedule. In one case, the contractor won a project requiring several chillers. The owner expected and counted on a four-month construction schedule based on the architect's estimated timeline. What they did not consider was the five-month lead-time to purchase and produce the chillers, and the additional month to connect the piping and make them operational. The general contractor commented that had they used the five-week bid process for intense pre-construction analysis and planning the owner could have achieved the desired outcome and saved several million dollars due to delays and fixing errors on the job.

SILOS

If you've ever been to the Midwest, you know what a silo is: a vertical storage facility dedicated to protect one product and one product only, with only one way in or out, and with no connection to any of the other silos that dot the land. Sadly, this also describes the building industry (see Figure 1.2).

Planning a new facility involves many stakeholders, all narrowly focused on their different interests. In general, the user groups focus on how much space they need and their budget, the real estate group focuses on optimizing the capital they have allocated and on ways to lower operational costs. Other departments—including information technology, tax department, human resources, and marketing—also have an interest in the new facility, and may contribute to the final solution. Unfortunately, few companies have a defined process for sorting through all of these different and, usually, competing interests; and few consultants have the expertise to sort through this complexity in a rapid or cost-effective way.[9] The result is an awkward analysis

Figure 1.2 Silos



and business planning process that ends up with little more than a head count, a wish list of desired features, a capital budget, and a timeline.

Now it's the architect's turn. He or she must reconcile a broad wish list with an inadequate fee for the services required to provide a thorough assessment, an insufficient capital budget to fulfill the wish list, and a project that is already behind schedule.

If the silos inside the owner's company produce a plan based on speculative assumptions, unreconciled conflicting demands, floating priorities, and wishful expectations, it must then augur through additional silos—including the interests of the owner, the architect, the general contractor, and their agents. Those interests are separated by walls governed by legal and insurance concerns and filtered through different business cultures, methodologies, and missions.

The owner's mission is to get a facility that meets their needs as close to the budget and schedule as possible. The architect's mission is to get the most bang for the buck with the budget and parameters the owner sets. The general contractor will attempt to build what the architect and owner design, while managing the many variables that impact construction and increasing their fee to cover potential unknowns.

There is a built-in tension between the three parties. The owner will adjust as much as they can to take into account changing business needs. The architect will wait as long as they can to lock into a final plan responding to owner adjustments or contractor suggestions to lower cost or improve constructability. The general contractor will attempt to secure earlier decisions or increase their contingency fee. These separations restrict the flow of information, delay decisions, create conflict, end in adversarial relationships, and turn natural allies into enemies.

This adversarial behavior is better understood by looking at the larger system.[10] When teams work well, each member works toward the success of the other. That success, however, is the result of more than good rapport. Reinforcing positive behavior is a feature of a well-designed system. Members first understand the different processes others use to get their work accomplished and therefore understand how their actions can aid or detract from that work.[11] Secondly, members have a clear understanding that the benefits of team success outweigh individual success. In fact, members see clearly that a narrow focus on individual success not only limits but also can derail team success. Even casual sports observers see how this dynamic plays out.

The term for this among systems theorists is "accidental adversaries." Kyle Davy explains, "When our mutual success depends on one another we unwittingly work against each other and become adversaries further eroding our mutual chances for success." One contractor described this as "three ticks and no dog."

During a Mindshift retreat, our facilitator, Kyle Davy, walked us through a common scenario of accidental adversaries. Architects and mechanical, electrical, and plumbing engineers (MEPs) should be natural allies. Their mutual work should lead to tighter alignment and cooperation. Instead, if you ask MEPs which entity creates their greatest turmoil, they point immediately to architects. If you ask an architect the same question they immediately point to the MEP.

The problem occurs when each follows an internal success logic creating unintended impacts on their partner. The architect, for example, sees design as a constant search integrating new information to improve the design. Constant change and searching for a better solution becomes an exercise in futile rework for the MEP. The MEP views change not as an improvement in design but as a partner who can't make up their mind or control their client.

MEPs are impacted because they have to scrap their work and start over. The internal logic for the MEP is to protect the time quoted and their profit margin. To do so they respond with a strategy to hold off with estimates as long as possible until the architect has finished making changes.

This strategy creates an unintended impact on the architect. They now view their partner as continually late with work, uncooperative, and creating last-minute fire drills for the architect to complete their work. This creates a feedback loop that reinforces this vicious cycle. These loops are common in complex systems that are not well integrated or are dramatically fragmented like the construction industry.

Several forward-thinking architectural and engineering firms seek regular training in system dynamics through organizations like the Senior Executive Institute and Peter Senge's Society of Organizational Learning. As good as this training is, however, leaders still have to swim against the tide of a much larger dysfunctional system. Our education has trained us to be more competent as compartmental thinkers rather than systems thinkers. (In Part Two, we'll look at the move toward whole system thinking from those who recognize this root problem as a natural byproduct of sustainable practices and the use of technologies like Building Informational Modeling.)[12]

Liability concerns further make the external silos harder to cross. ‘‘Architects and engineers are guided by their lawyers and insurance companies to back away from responsibility in the name of risk management and avoiding lawsuits,’’ one architect told us. ‘‘Example: Providing an owner a ‘Cost Estimate’ is now an ‘Opinion of Probable Cost.’

‘‘Architects cannot walk onto a job-site and point out conditions that appear to be unsafe, because if it is and someone gets hurt, they have just become liable.

‘‘The construction industry has also responded to the fear of liability,’’ he continued. ‘‘Many contractors appear to be unable or unwilling to fulfill the coordination role and lead the project through the means and methods of getting the work built. They hold back their input on implementation expressing frustration that the drawings are not complete enough for them to plan their work adequately. In my opinion, they are mistaking coordination for design. This can result in poorly scheduled and staged efforts across job categories, requiring costly tear-outs that lengthen the project schedule.

‘‘I believe both industries are at fault here and need to do better at meeting in the middle to close the responsibility gap,’’ he said.[13] I heard the same general complaints from owners and builders.

The siloed mindset works against cooperation and coordination and usually prevents parties from meeting each other halfway. The remedy for silos is a structure of collaboration with tools promoting collaboration.

BOILERPLATE PLANNING

Lack of time and lack of collaboration leads to finding the easiest solution when setting parameters: boilerplate planning that relies on industry standards or rules of thumb rather than innovative, custom solutions that actually fit the needs of the project.

Each entity creates its own spreadsheet to plug in parameters that set the size and budget for their portion of the job. It results in large amounts of underused space or dead zones and projects that too often miss the mark, perhaps this too should be called into question.

The broker takes their portion and translates head count into a square foot requirement and then a lease rate. The landlord provides an allowance to build out the space based on factors used to amortize that cost over the life of the lease. Architects calculate a fee based on the square footage of the lease. Relocation is estimated at a cost per head, technology at a cost per drop, dry wall at a cost per lineal feet, cabling based on how many pulls and connections, and the list goes on. When all of these are added up they become the sum total of the cost of a job. The problem with this math is that it reinforces superficial problem solving and maintains a process where, as Patrick MacLeamy earlier stated, ‘‘People are paying too much for their buildings, and the buildings are just not that good.’’

When a company wants to consider a sustainable solution and the numbers are plugged into these boilerplates, the results say it will cost a premium. When a company wants to consider a non-standard but more efficient underfloor air solution that also houses data and electrical cabling, the boilerplate calculates that it will cost more. When a company wants to consider a more natural lighting solution conventional wisdom says it will cost too much. When a company wants to use a prefabricated interior wall solution, the standard planning process presents a higher front-end cost for the product. In each case and others these better solutions don’t have to cost more—unless they are run through the gauntlet of boilerplate spreadsheets.

A Fortune 50 company planned a new regional headquarters. Their business model projected uncertainty and the need for a flexible solution. One company proposed a raised floor solution for their data and electrical wiring and a prefabricated interior wall to accommodate that change. The CFO and Vice President of Real Estate requested a site visit to another large company using the solution to address possible concerns for how it might look. They came away from the trip both comfortable and impressed with how the space looked. The next issue was cost. The CFO made it clear that if the solution cost more the company was not interested. The fact, however, is that these solutions are traditionally more expensive because they are priced and planned within a conventional construction boilerplate. The construction manager for the developer had prior experience with this approach during the telecom boom. He had the confidence to challenge conventional wisdom. He did so by forming a team commissioning the general contractor to pull the key subs together along with the floor and wall supplier and invest three weeks in preplanning. They learned that the subs, unfamiliar with the solution, were pricing their labor the same way they would for standard construction. The front-end coordination reduced the initial cost estimates by more than 15 percent, and the final cost was almost one dollar a square foot less than conventional dry wall construction including installing the data and electrical under a raised floor for the 130,000-square-foot first phase. The client expressed enthusiasm with the result, and the team that developed the pricing recognized the value that could be brought to future jobs through early coordination.[14]

The first hurdle had been overcome, but a second would almost scrap this unconventional approach. This time the landlord weighed in when they realized the extent of the raised floor on the project. Even though the raised floor was part of the signed lease, the landlord claimed they had the right to require the tenant to leave the space in its original condition when they moved out—the boilerplate requirement. Everyone knows what a typical lease space looks like; the electrical and data are installed above the ceiling and the carpet sits on a slab, not a raised floor. That meant that the raised floor would need to be removed and the electrical and data placed back into the ceiling. The cost to do that was estimated at $500,000. This curve ball created a series of stressful negotiations. Again, the landlord was operating out of unfamiliarity and boilerplate thinking.

Then a curious thing happened. The landlord made an unannounced visit to the manufacturer's showroom to see the floor and research their case. When the negotiations reconvened, the landlord had a 180-degree reversal. Instead of resisting the solution, they now saw the raised floor as an asset and negotiated to have the floor left in place when the lease was up. Without key people willing to risk their positions and challenge the system, a project like this would never have happened.

Companies eager to build sustainable buildings typically participate in a process called LEED® certification. LEED stands for Leadership in Energy and Environmental Design through the United States Green Building Council (USGBC). LEED provides a checklist (boilerplate) to guide companies in their efforts to achieve different rungs of recognition. The conventional wisdom is that to receive a Gold or Platinum level of recognition a building will cost more. Depending on who you talk to and in what part of the country it is built, that front-end premium can range from 10 percent to 30 percent.

Aardex, a developer in Golden, Colorado, took a different approach. They designed a 190,000-square-foot speculative office building (it was not built for a particular client) with a philosophy of "doing the right thing." They were 75 percent through working out the design details when their director of marketing commented that it might be worth comparing the plan of the building against the LEED criteria. Anyone LEED certified would immediately cringe anticipating a costly and difficult effort to convert a standard design this far along in the process. However, when Aardex made the comparison they discovered the design was only three points away from the highest rating, Platinum. Achieving those additional three points required no design changes, simply a reformatting of how the information was submitted.

In addition, with the Platinum LEED rating, Aardex fully pre-leased the building at a 21 percent higher lease rate than neighboring buildings. They also used a raised floor to handle their HVAC, electrical, and data, which lowered the operational costs by 45 percent compared to neighboring buildings. Their prefabricated interior walls improved the build-out schedule and now allowed them to reconfigure office space in days compared to weeks if they had used conventional drywall. In this case it took a developer who ignored conventional wisdom and was willing to take on the risk of breaking the rules.

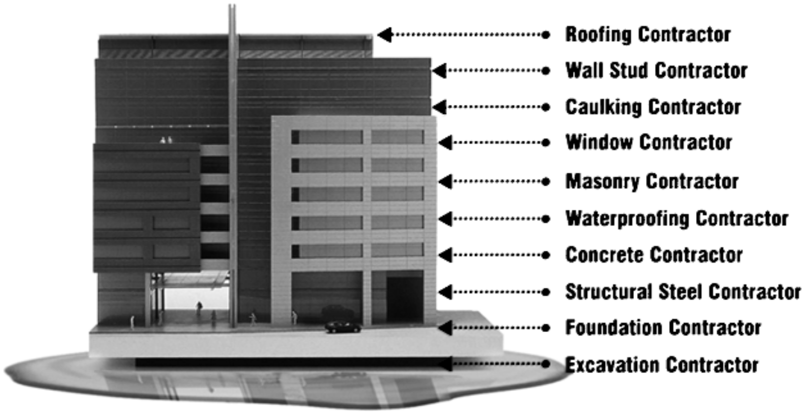
SUB–TRADE COORDINATION

"Leaks happen at the intersection of contracts" according to Will Lichtig with McDonough, Holland, and Allen PC (see Figure 1.3). Scope-based contracting reinforces silos—and in fact creates *more* silos—and provides a disincentive for cooperation and coordination. It further produces an intricate dance of risk-shifting. Each trade responds to the explicit requirements within their contract and disclaims any responsibility if they are unable to integrate their work with adjoining trades.

Canned specs and scope-based contracts create coordination problems in the actual construction that end up in change orders or quality problems. One example is the coordination between the structural steel and the curtain wall (outside wall). Standard specification for the structural steel allows for a ½-inch tolerance, whereas the curtain wall may require a ¼-inch tolerance. To resolve the possible gap, either the structural contractor will issue a change order to add splice plates (wall anchors) to attach the curtain wall or the curtain wall contractor will have to add attachments back to the structure.

These kinds of tolerance disconnects can also create problems with insulation. Common coordination problems occur between the foundation and the structural contractor, the concrete slab and the floor

Figure 1.3 Leaks at the Intersection of Contracts



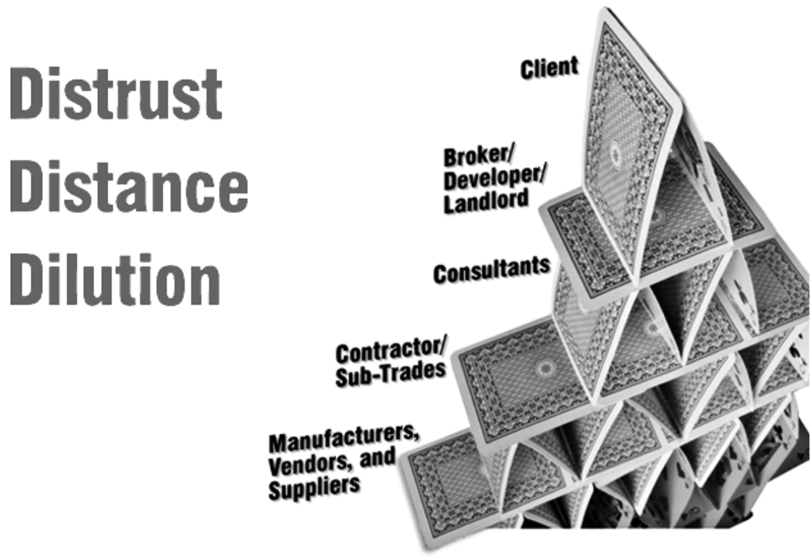
Adapted from: Todd Zadelle, Strategic Project Solutions.

laid on top of the slab, and the exterior caulking that seals creases between trades: the list includes any two trades that intersect. Drawings and specifications do not typically detail the means for trades to coordinate, but expect that the trades will work that out. However, the result of tightly defined contracts means that each intersection can turn into a jump ball that the owner must decide and pay for.

HIERARCHICAL DILUTION

- Construction is a hierarchical structure with the client at the top and the vendors at the bottom (see Figure 1.4). This separates the primary source of knowledge and cost from those making the initial important decisions that set the course for the entire project. Eighty percent of a project's cost lies within the specialty sub-trades who are only brought into the project once all of the design decisions are made.[15]
- In a typical bid process a general contractor will compete against a dozen or more other general contractors. The architect sends them a large set of blueprints; a bid document that explains the requirements of the project; the expectations of the owner along with the rules for the bid submissions. The general contractor assigns an estimator to assemble a bid quote. The architect will then hold a meeting with the bidders to answer questions and address any omissions that are in the document. The owner may or may not be present at this meeting.

Figure 1.4 House of Cards

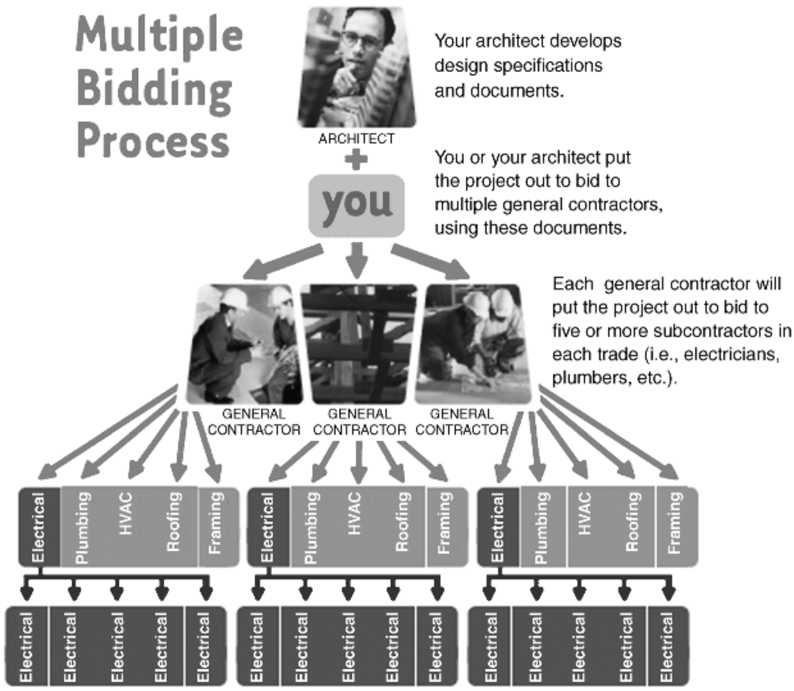


Adapted from Haworth.

One contractor noted that those meetings are often a game to make sure each contractor keeps the other honest.

- The estimator then determines which sub-trades are required and sends invitations to review the plans and submit pricing. There can be 100 or more sub-trades required for a project. Each sub-trade is then bid against a half-dozen subcontractors. That means the estimator will compile several hundred quotes and sift through those to assemble his final estimate.
- Typically what the estimator receives is a price with little or no explanation of how it was arrived at. If one party submits a number that deviates widely from the others, they might get a call to double-check the submission. The bid response is more like a mechanical assembly of price quotes than an examination of the design of the architect's proposed solution for the owner. The subcontractors have little incentive to invest much effort thinking through how best to perform their scope of the project. If the general contractor has a one in twelve chance of winning the project, the subcontractor must then factor that their chances of winning are further reduced by the number of firms they are competing with (see Figure 1.5).

Figure 1.5 Vendor Dilution of Interest



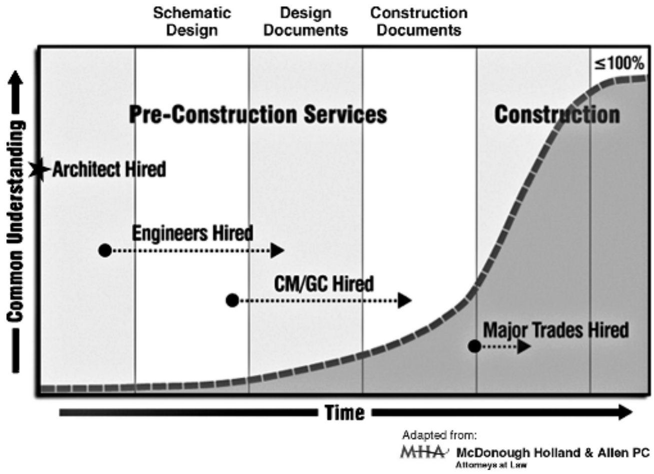
Courtesy of Solidus.

- The general contractor and subs know that most of the assumptions used to bid the job will change as the design proceeds and more clearly defines the scope and conditions for each trade. That fact provides another disincentive to spend a lot of time working through the details and to submit a proposal with rule-of-thumb costs.[16]

PHASE-INDUCED IGNORANCE

- As Figure 1.6 illustrates, the current model engages the major stakeholders, leaving out input from those who actually do the work. Every sub-trade and vendor we talked to says they walk away from construction meetings shaking their heads. And they all say the same thing: ‘‘If only I was brought in when they were considering this solution, I could have saved them a bundle.’’ The waste is twofold: unnecessary costs due to poor or uninformed decisions and lost opportunities for innovation.

Figure 1.6 The Lag of Intelligence Curve



NEW TEAMS FOR EVERY PROJECT

Construction teams—designers, contractors, subcontractors—are put together anew every time a building goes up. Different actors bid on the design, the general contracting, and the subcontracting—from pouring the concrete to installing window glass to carpeting the floors. Final choices are generally made on the basis of lowest cost. This process virtually ensures that no matter how sound the original vision, it will become fragmented almost as soon as the building process begins.

Often these players are working together on a project for the first time. With no history together, lack of communication is built in to every project.

Worse, each firm signs a contract with the building owner or other key stakeholders containing clauses aimed at protecting both parties from liability and litigation. So, from the beginning, the construction process is based on distrust.

The bottom line? Instead of playing toward a common goal, each party is playing to finish their part and get out unscathed. Imagine the chaos that would result if any sports team had to put together a new set of players every time they wanted to play a game!

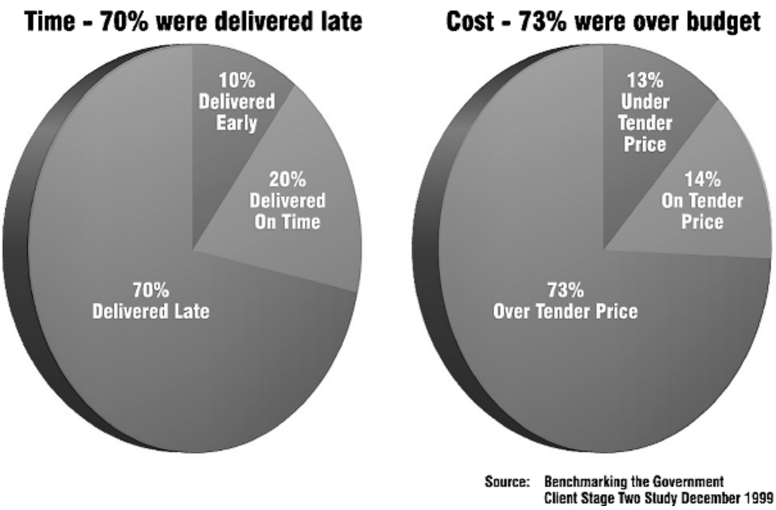
IT'S TIME TO CONNECT THE DOTS

The cumulative effect of the current model produces buildings that cost almost twice as much as they should, and more than half of that space is considered a dead zone. The current model is wasteful in other ways: constructing buildings that create 48 percent of carbon dioxide emissions, the highest single contributor to green house gases.[17] Business owners cannot rely on promised results laid out in their contracts when more than 72 percent[18] of projects are completed over budget and 70 percent[19] run beyond schedule. In one study, 75 percent of those late projects were 50 percent over the initial contract price (see Figure 1.7).[20]

So it should come as no surprise that construction continues to decline in productivity while other industries show dramatic gains.[21] That loss of productivity is further reflected in an 8 percent to 12 percent annual cost escalation. Both architecture and construction professionals express an inability to attract new talent to their spheres.[22]

Construction workers are 2.5 times as likely to die compared to other occupations.[23] Some have estimated that 50 percent of a construction project is comprised of labor, with average labor efficiency measured at 30 percent.

Figure 1.7 Projects Over Budget and Late



Source: Adapted from Cain, Clive Thomas. *Profitable Partnering for Lean Construction*. Malden, MA: Wiley-Blackwell, 2004.

Materials are estimated at approximately 40 percent of the cost of a job. Material waste is estimated at 30 percent.[24]

Arol Wolford, founder of Construction Market Data, says that 10 percent or more of the cost of a project is consumed with counting, measuring, pricing and transporting documents. These are almost all avoidable costs.

Poor planning misses 3 percent to 7 percent (and often more) in project cost reduction because construction tax planning is either overlooked or not brought into a project early enough.[25] Up to 10 percent of the cost of a project is lost because of rework and avoidable collisions between trades in the field with plans that show both trades building in the same place. When taken as a whole, and taking out overlap, these exceed 50 percent.

These numbers do not fully account for inflated costs that firms price into their quotes to cover the unknowns and anticipated inefficiencies. It also does not include overcharging by those who take advantage of the current system.[26]

A system that does not fit current business realities first produces high levels of inefficiencies. Attempts to resolve those inefficiencies within the same system produce convoluted solutions that spiral downward into dysfunctions. Ultimately they lead to incentives for each player to game the system, hedge their positions, and/or engage in adversarial practices. Stephen Covey quotes in his book *The Speed of Trust* that mistrust increases the cost of doing business by 50 percent.[27] The industry has reached the same crossroad that others have over the past 40 years.

- Emerging industry trends include Integrated Project Delivery, Lean practices,[28] sustainability, virtual design and simulation, and interoperability between software platforms, methods, and regulations.[29] At the center of these solutions are teams of trust. Yet, as the rest of the business world is heading toward tightly integrated organizations that are increasingly flatter, the construction industry imposes one that is vertically and horizontally rigid, fragmented, and inherently distrustful.
- The current conventional model is structured to pull apart both the team and its trust. This chapter explored those forces. Part Two examines the industry's current crossroad where the pressure to change has reached a breaking point and the new opportunities and tools for change represent great promise and potential if we can

collectively release our current mindset and shift to one that puts the focus once again on the interests of the owner with strategic teams formed and enabled by principles of trust.

The industry is attempting to reform itself, but it is hampered by a piecemeal approach based on years of fragmentation and sharply honed adversarial instincts. The nature of the reform at this point is highly tribal. Each tribe has coalesced around one of many trade silos: technology, sustainability, methodology, standards, legislation, contracting, liability, and conflict, to list a few.[30] Although a real insurgency and effectiveness underlies each effort, fragmentation makes it difficult for them to coalesce. Dan Gonzales, corporate manager of virtual design construction at Swinerton commented, ''If we can just connect all of these efforts into one project, the results could be incredible.''

Connecting the dots—synthesizing common elements, making the business case, and enlisting cooperation—represents the challenge. This is where owners wield the power as catalysts for industry transformation. Owners have the potential to bring together the tribal leaders. They can focus these leaders to coordinate efforts that bring immediate business value, while still allowing the innovators to continue pushing the boundaries of transformation. Institutional, cultural, and legal barriers within the building industry resist integrated supply chain approaches, collaborative design, and collective versus individual contracting tools. Owners who want to act as catalysts for change will need conviction and information.