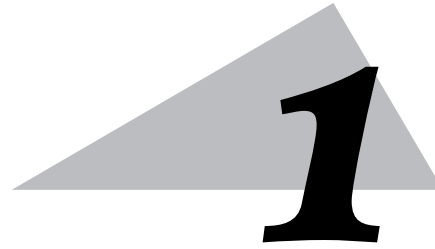


Introduction to Design-Build



An Overview of Design-Build

Martin Sell, AIA

RKETEK.COM, LLC

Juneau, Wisconsin

Construction project delivery is changing before our eyes. Design-build—once known as only one of many forms of alternative project delivery—may now be the most preferred method. Some estimates suggest that in 2002 nearly 40 percent of all buildings were being produced using the design-build method. There are many opportunities for architect-led design-build, but architects have not yet assumed a strong leadership role in the delivery of design-build projects.

Engineering News Record (ENR)¹ reported a 5.8 percent overall growth rate for construction in 2001. An earlier ENR report² suggested that design-build project delivery grew by 16 percent—nearly three times the rate of construction growth in general. As shown in Figure 1–1, construction volume for both construction management at risk and design-build increased rapidly for several years before 2002, and this trend is expected to continue well into the future. Design-build, as a leading form of construction project delivery, is not a passing trend. It is here to stay.

The tremendous growth in the acceptance of design-build delivery in the United States has occurred only since the late 1980s. Before then, design-build was viewed as a method of delivery suitable primarily for agricultural and utilitarian buildings. The American Institute of Architects (AIA) Code of Ethics and Professional Conduct³ suggested that architects should not be permitted to participate in the construction aspects

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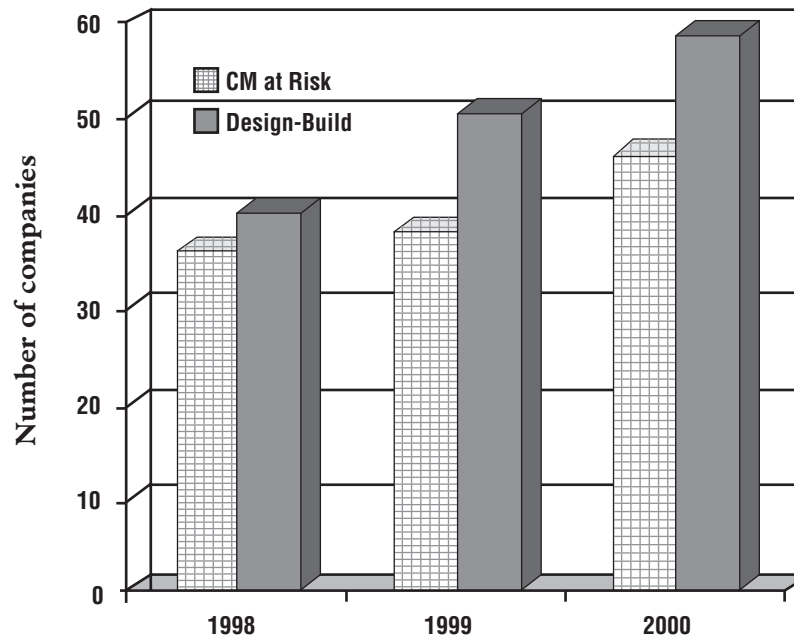


FIGURE 1-1

Increase in Use of CM and Design-Build (among ENR Top 100 Companies)

of any project, including design-build project delivery. That ethical prohibition was not repealed until 1978.

By 1996 design-build had grown to nearly 20 percent of the project delivery market. In the five years after that, the market share for design-build project delivery doubled, and the rapid growth is expected to continue. Many industry analysts forecast that design-build will exceed 50 percent of the construction market between 2005 and 2010.

First-century Roman architect and builder Marcus Vitruvius Pollio created ten handbooks on architectural practice. His works were rediscovered and disseminated during the Renaissance, and today architecture schools accept his notions of firmness, commodity, and delight⁴ as the defining elements of good architecture. Over the last several decades, however, architects have tended to focus on the notion of delight⁵—the design aspects of architecture—often to the detriment of the notions of firmness and commodity. In response, building owners are demanding that all three aspects of Vitruvius's good architecture come back into play. What characterized good architecture in Vitruvius's time still makes good sense to building owners today. Firmness (sound construction), commodity (functional design), and delight (appealing and at-

The Role of the Architect in Design-Build 3

tractive design) are the attributes of architecture owners are still looking for and thus are the attributes that architects still need to deliver. Design-build is growing in popularity because it makes it possible for architects to answer this call.

THE ROLE OF THE ARCHITECT IN DESIGN-BUILD

A race is on for leadership in design-build project delivery, and most architects are off to a slow start. As in the fable of the tortoise and the hare, the competition has taken an early lead. For the health of the architecture profession, architects need to increase the pace and work toward taking the lead. Architects must decide what their role in project delivery will be. Will they lead the design-build process? Will they partner with others? Or will their role as design professionals be one of subcontractor to others who lead the project delivery process? The choice is one each firm must make, and the time to decide is now.

Some of the founding principles of the AIA set the framework for the situation in which the profession currently finds itself. A primary goal of the AIA⁶ was to establish a distinct profession of architects, separate from “the trade of carpenter-builders and the game of gentlemen-amateurs.” A second goal was to separate architects from “package dealers,” the term used for designer-builders in the mid-nineteenth century. The AIA was successful in both goals. For well over 100 years, the traditional method of construction delivery was design-bid-build and the architecture profession clearly led the process. But since the 1970s, the marketplace has changed, and design-build has become a leading method of project delivery. In this approach, contractors and others have taken the leadership role in many markets. Even though a dramatic change in the industry is taking place, many architects still fail to accept design-build as a legitimate method of project delivery. This refusal to recognize the need to change even after the industry has changed around us leaves architects in a very vulnerable position.

Observations from both contractors and architects accentuate the state of design-build leadership at the turn of the twenty-first century. Ralph Johnson, then president of the Associated General Contractors of America (AGC), speaking at the 2001 AGC national convention stated, “The leadership dynamic in the [AEC] industry is changing; moving away from the architect and toward the constructor.” He went on to say, “AGC’s position on design-build has been that the designer is a part of the builder’s team, with the contractor leading the way.” Rosemarie Buchanan,⁷ in an April 2002 article on design-build for the AIA Chicago newsletter *Focus*, wrote, “Forty percent of all new construction in the United States is produced using design-build delivery, yet less than ten percent of the forty percent is led by architects.”

For architects who have felt this loss of leadership, design-build presents a way to get back in the race and retake the lead. An independent study by the construction program at Penn State University⁸ reported that design-build projects can be produced in less time, with better quality, for less cost than other forms of project delivery. This is music to the ears of project owners. Owners are moving toward design-build delivery for a variety of reasons, including benefits such as these:

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- ▲ Single source for design and construction
- ▲ Quicker project delivery
- ▲ Guaranteed project pricing
- ▲ Minimized claims and damages
- ▲ Extended product warranties

The United States is a free market society, with incredibly strong market forces constantly at work. Because of the benefits owners receive from design-build, the market is moving away from the traditional process of design-bid-build, in which the owner usually contracts with two entities whose relationship could become adversarial, to a process in which the owner has only one point of contact. Perhaps this view was best stated by Rob McManamy, then editor-in-chief of *Design-Build* magazine, when he stated, “As a project delivery method, design-build may be as old as the Pyramids, but its return seems particularly suited to the needs and pressures of our time.”

Architects who take the lead in the design-build delivery process find it has many benefits. By becoming a single source of design and construction, architects take on a role that allows better control of project budgets, schedules, and overall project quality, including the quality of design. Design-build delivery makes it possible to produce projects more quickly, and shortened overall project time can translate to better profit margins than most architects can realize with traditional delivery methods. Furthermore, by getting involved in the construction aspects of projects, architects can add revenue sources—in the form of construction fees and general conditions—to the firm’s bottom line. Added risks go along with taking the lead role, however, and proper consultation with legal and insurance advisors is essential. Nonetheless, most architects have found that with risk comes reward, both in job satisfaction and financial benefits.

The stakes are high in this battle for control of the design-build market. In the end, the architecture profession will either reclaim its leadership position or find its role reduced to that of a subcontractor, subject to the desires and demands of others who are leading the process. Each architecture firm needs to ask the question where do we want to be in the design-build process? and then take steps to get there.

TRADITIONAL MODELS OF DESIGN-BUILD PROJECT DELIVERY

Traditionally, the AIA and the AGC have defined project delivery through their independent and joint development of contract documents. Both organizations have a series of design-build documents, and both have been careful to allow for flexibility in the organizational structure and leadership issues related to design-build. Nonetheless, contract documents are always designed with project leadership issues in mind. For many years, the AIA did not take a strong stand on the design-build leadership issue, and consequently its documents remain very flexible, permitting contractors or

Integrated Design-Build Project Delivery 5

designer-builders to hold the prime role. Within the various AIA documents, the architect can play a variety of roles on design-build projects, ranging from leader to partner to subcontractor. While the AGC design-build documents allow for some flexibility, they clearly suggest the contractor or “constructor” leads the design-build process. In contrast, both the AIA and the AGC design-build contracts through the 1996 AIA and 1999 AGC editions always set up the architect as a subcontractor. Some architecture firms establish a separate design-build entity to hold the prime contract and then subcontract the design services back to their firm. Either set of documents permits this arrangement.

Both the AIA and AGC allow for partnering in the form of joint ventures or other partnerships. As inviting as a partnership arrangement may sound, forced marriages between architects and contractors seldom work well. The study of 351 design and construction projects conducted by Penn State University⁹ ranked various factors in design-build project delivery. The study found that “forced marriage design-build jobs ranked last in quality among all project types.”

A basic assumption of the standard form contracts is that there are now—and will remain in the future—separate and distinct industries for the design and construction of buildings. With the growth in design-build delivery, this assumption should be challenged. The marketplace will continue to define its most desired form of project delivery and eventually will determine if separate design and construction industries are necessary.

INTEGRATED DESIGN-BUILD PROJECT DELIVERY

Separation of design and construction is not the standard in other industries. The airline industry, for example, combines design and production in a single industry and produces very expensive, very complex, and very safe products. Similarly, there is no separation of design and production in the automobile industry, the computer industry, the heavy equipment industry, or even, for the most part, in the home-building industry. Only in commercial construction is there such a clear separation of the design and production functions. Why is this the case?

History may give us some clues. Although separate industries for building design and building construction are the norm today, the two industries have been separate only since the early nineteenth century. In ancient times, Hammurabi’s Code of Laws¹⁰ placed absolute accountability on the builder as a single source of design and construction. This concept of a master builder remained commonplace through the Middle Ages, and some of the most recognized architecture in the history of humankind, including the great cathedrals of Europe and the pyramids in Egypt, was created under this system. During the Renaissance this began to change as architects and artists desired to separate themselves from the common tradespeople. With this change, the role of the master builder slowly began to disappear.

The AIA was founded in 1857, and as mentioned previously, some of the founding principles of the Institute were intended to define the separation between the design

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and construction professions and to enhance the status and value of the architect. Into the 1970s, the Institute's commitment to maintaining separate design and construction industries remained strong. This attitude is reflected in the following statements, taken from various pre-1969 editions of the AIA's *Architect's Handbook of Professional Practice*:

The Architect, as agent for the Owner, is there to protect the Owner's rights."

"The Architect is not the Owner and cannot make the Contractor make changes."

"The Architect cannot guarantee or insure the results of a building project."

The Associated General Contractors of America was formed in 1918 during the presidency of Woodrow Wilson.¹¹ In helping organize the AGC, President Wilson recognized construction as a separate industry with national importance. He also considered the industry a potential ally in discussing and planning for the advancement of the nation. Coming 60 years after the establishment of the AIA, the establishment of the AGC helped further distinguish the design and construction industries. Beginning about 1970, however, the marketplace began to call for a return to the master builder concept. Since that time, the rapid growth in design-build delivery reflects strong market forces attempting to reunite design and construction into a single source. Historically, the industry has come nearly full circle from the concept of a single master builder to the design-build form of project delivery.

In response to the marketplace's call, both architecture firms and construction companies are choosing to move to a more integrated form of project delivery. While partnering may be a short-term solution to meet market demands, it is clearly not the long-term answer to producing design-build projects. That most likely lies in the new model of an integrated design-build firm, which combines the best elements of good design firms and the best elements of good construction companies. The new model combines design and construction processes to achieve the efficiencies and effectiveness of single-source responsibility the market demands.

Such a change in approach to design and construction will not come easily. Traditions die slowly, and those who have helped establish traditional processes and procedures—within firms and within associations—may fight long and hard to retain the status quo. But if architects are to reclaim leadership in project delivery, they must begin to embrace this type of change. In this author's view, architects should lead the way and move toward the model of a firm that successfully integrates both design and construction. Beyond the question of whether architects or contractors will lead the design-build process, architects must begin to challenge the basic assumption that separate design and construction industries are necessary.

As architects explore these questions, some difficult ethical questions must be ad-

Integrated Design-Build Project Delivery 7

dressed. (See the “Ethical Issues” section in Chapter 11 for more discussion of this topic.) Architects have been trained that one of their primary functions is to protect the owner’s rights. If this remains a primary function of the architect, new processes will be needed to make it possible for architects to protect owners as they move toward integrated design-build project delivery.

In the past, opponents of design-build have advised that architects may cross a dangerous line by getting involved in design-build. A common question architects ask about design-build is “How do we keep the fox out of the henhouse?” Architects sometimes forget that the traditional design-bid-build process can be ripe with conflict of interest issues as well. Unfortunately—and all too often—the construction change order method in the design-bid-build process becomes nothing more than professional gamesmanship between architects and contractors. Often the owner’s best interests are not protected as architects and contractors strive to protect themselves from liability, resulting in finger-pointing that frustrates owners.

While design-build presents design professionals with absolutely critical ethical questions, architects must not be quick to reject design-build as immoral or unethical as a construction delivery process. Ethics and morals relate to individual decisions, not to the process of project delivery. Owners can exert as much pressure on an architect in a traditional project as a contractor might in a design-build setting. An ethical architect can withstand that pressure in either model. However, architects who elect to practice “closed book” accounting or to self-perform construction trades may, in fact, cross a dangerous line and not be able to protect the best interest of the owner. To overcome this concern, some architects choose to deliver professional-quality design services using “open book” project accounting and competitively bidding the construction work. This is one way in which architects can protect the owner, perhaps even better than in the traditional design-bid-build process. By being a single entity that manages both the design and construction process, architects neither compromise their ethics nor give an owner less protection on a project. The ethical and moral decisions are personal ones for the architect to make.

Other factors help retain checks and balances in design-build project delivery. Communication technology has changed dramatically. It is increasingly possible to practice project management and open book accounting in real time. With the use of e-mail, voice mail, dedicated project Web sites, cellular technology, real-time site photography, and the like, architects can expose aspects of project management that were, until recently, a mystery to many building owners. With this improved technology, information sharing is not only possible, but expected. Open sharing of information further promotes the checks and balances in the process that architects desire.

Finally, architects should not underestimate the power of the free market in which they operate. In the long term, the marketplace rewards honest, ethical business practices and exposes and eliminates deceptive, unethical behaviors. Free market forces protect almost every industry—short of monopolies—that exists in the United States. The design and construction industries are no different.

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PSYCHOLOGY OF DESIGN-BUILD

As designer-builders, do architects deliver products or services? The product versus service question has traditionally been the basic difference between the design and construction professions. Architects offer professional design services to owners. Contractors, on the other hand, traditionally price a product in the form of a completed building. Successful design-build delivery needs to combine both. This is a psychological change to our traditional architectural thinking, and a change we need to consider carefully.

With the growth of design-build in the marketplace, owners are saying they desire a finished product—a product that looks good, functions well, and provides good value for the money invested. Of course, a building is not the same as a manufactured “product,” and the law treats these two concepts very differently. Nonetheless, to meet a client’s expectations, architects need to combine services with a finished product that meets the client’s goals.

Combining design services with a finished product is not a revolutionary idea. To produce good automobiles, airplanes, or computer software, products and services are efficiently combined. Therefore, the question of product versus service is truly a psychological one. Only our thinking—our psyche—can keep architects from effectively combining products and services in design-build project delivery.

Another psychological component of design-build is the architect’s level of risk aversion. Many of the traditional risks of the design-bid-build process—risks that result from disputes between architects and contractors—are eliminated in the design-build process. But with design-build come different risks, from guaranteeing project pricing to management of trade contractors and material suppliers to working through construction challenges such as adverse weather and labor disputes. However, with risk comes reward.

Clearly, design firms that take on a construction component and learn to manage their business and their added risk are rewarded with growth and profitability. A simple analysis of the top 500 design firms in 2000 and 2001, as ranked by *Engineering News Record* (ENR),¹² shows that most of the highest-producing design firms have a construction component. Eight of the ten largest firms have a construction component, while more than 50 percent of the top 50 firms are involved in construction in some way. This risk/reward factor is further accentuated as architects consider that the top 2 percent of the ENR 500 list produced nearly 30 percent of overall revenue of the top 500 firms.

BUSINESS AND FINANCIAL ASPECTS

By embracing design-build project delivery, architects can dramatically increase bottom-line profits. With the addition of construction fees, allowances for overhead and profit, and general conditions, the architects’ sources and amount of revenue—their slice of the project pie—increase substantially.

With the ability to control more of the pie comes the responsibility to professionally manage the financial aspects of construction. Accounting rules and regulations are different for architectural service firms than they are for construction companies. Likewise, the quality of accounting skills needs to be substantially higher in firms managing day-to-day construction billings than in those that manage once-a-month professional fee invoicing. Firms transitioning to design-build should not underestimate the need for high-quality accounting skills in the firm's financial management staff and project management teams.

Likewise, good construction accounting practices require that projects be kept separate and distinct. There are numerous examples of construction companies getting into trouble—and eventually going out of business—after making the fatal error of mingling funds from various projects.

Architects can help ensure good design-build business practices by sticking to a single family of contract documents. While any series of documents may have problems associated with it, using a family of documents that includes owner agreements, contractor and subcontractor agreements, general and supplementary conditions, and so

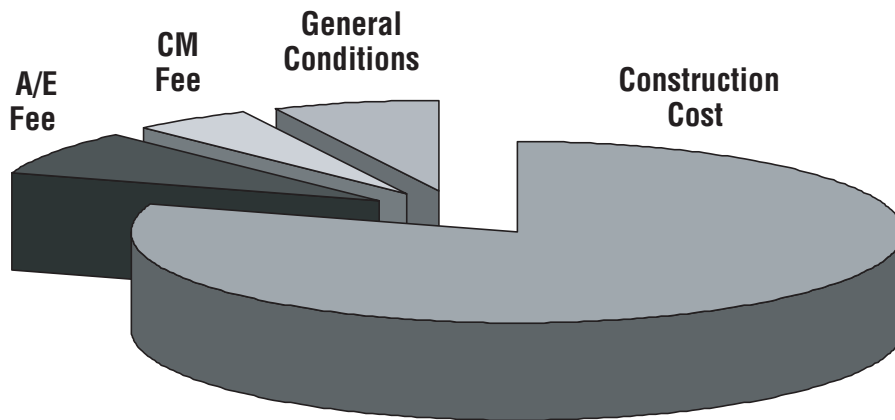


FIGURE 1-2

Potential for greater profits. In the traditional design-bid-build-delivery approach, the architect's profit comes from project costs associated with design services (e.g., A/E fees). In design-build, the architect takes on more risk and the potential for profit increases with that risk, which is associated with pieces of the project cost pie (e.g., construction cost, general conditions, construction management, etc.).

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on will always be better than attempting to pull together documents from a variety of sources.

Finally, how architects handle insurance and bonding needs can make or break a design-build firm. Architects know the importance of errors and omissions insurance, but as architects move into the construction arena, they find that their errors and omissions insurance needs change. In addition, the importance of general liability insurance, banking, and bonding lines of credits may increase dramatically, depending on the types and size of projects architects choose to take on.

While the accounting, finance, insurance, and legal aspects of design-build project delivery can sometimes be daunting, they are no more complex or difficult to grasp than many aspects of building design and construction that architects have already learned. Architects should not underestimate the importance of following sound business practices, but they should not be afraid to take on the additional business responsibilities necessary to develop an architecture firm into a successful design-build practice.

PREPARATION FOR DESIGN-BUILD PRACTICE

For architects reading this book and wondering how to get into the design-build market, there are several questions to answer. What type of staff is required to run a design-build firm? What equipment must the firm rent or buy to act as contractor? Does the firm's staff have the education and experience to manage a design-build project? The following sections address these questions.

Education

The architecture, engineering, and construction (AEC) industries have traditionally focused on the specialization of the disciplines. Consequently, many individual schools of architecture, engineering, and construction management exist, but few schools combine design and construction. As design-build becomes the preferred method of project delivery, architecture schools must begin to provide a more integrated educational approach. Design and construction should be taught together, and hands-on experience in the building trades should be as important as classroom-based study and exercises on paper.

As industries change, education often struggles to keep pace. Faculty members may have no experience with this new form of project delivery and may be resistant to changing curriculum. Until a clear business model of design-build delivery emerges, formalized education will struggle to develop a strong and consistent design-build curriculum. Design-build business models vary and include architects and contractors teaming, contractors subcontracting for architectural services, architects serving as construction managers, integrated design-build companies, program managers, turnkey developers subcontracting both design and construction, and more. While change in academia can be slow, it is time for traditional academic institutions to embrace a

Preparation for Design-Build Practice 11

design-build emphasis in order to equip new graduates with skills to compete in the changing marketplace.

In the meantime, architects have a number of choices for training. Almost always when structural change comes to an industry, pioneers of the change exist. The early leaders of the design-build movement have done exceptional work, and architects can learn from their trailblazing experiences. Architects should learn how these leaders successfully implemented design-build operations in their businesses. Programs at AIA National Conventions and at jointly sponsored meetings of the AIA and the Design-Build Institute of America (DBIA) are another source of knowledge from experienced firms.

Architecture firms can implement internal training programs to introduce their employees to design-build. Best practices, processes, and procedures—developed both in their own firms and the firms of others—can be documented and used in training. An often-overlooked advantage of an integrated design-build firm is its ability to cross-train employees, encouraging them to learn from others. Unlike traditional architecture firms, it is easier for a design-build firm to staff a construction site with the same architect who drew the construction details. Unlike a traditional construction company, a design-build firm can involve field staff in early owner meetings related to programming and design studies. Great knowledge and experience can be gained from such on-the-job cross-training experiences.

As architects who want to practice design-build delivery strategically plan the future for their firms, they need to commit to and prioritize internal training processes and procedures. To accomplish this, firm leadership must first embrace the change to design-build and then make a commitment to educating the firm by assigning adequate financial and personnel resources to the effort.

Finally, architects must continue to press their professional organizations to develop products and tools that will help them adapt as a profession to the design-build method of project delivery.

Experience

A key to building a successful staff in an integrated design-build company lies in the ability to recruit and retain two skill sets that are somewhat unique to the design-build setting: comprehensive team leaders and conceptual estimators. As with any process-driven business, project management skills are critical, but neither architectural management skills nor construction management skills alone are effective in running a successful design-build operation. The ability to manage a project consistently from the early stages of design through the final stages of the construction warranty period is crucial. This comprehensive set of team leadership skills is seldom found within traditional architecture firms or construction companies.

Conceptual estimating skills are also crucial to a design-build firm's success. The ability to accurately price a project—even before there are lines on paper—will determine the long-term business success of a design-build firm. Many architecture firms rely on square foot estimates or past project pricing for early estimates, but these lack

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the accuracy needed to guarantee pricing in the design-build arena. Many construction companies rely on quantity take-offs and subcontractor pricing for accurate estimates, but in design-build operations, accurate estimates need to be completed long before detailed drawings and specifications exist. Fortunately, conceptual estimating is growing as a discipline as design-build grows in popularity.

Other than these two skill sets, most necessary skills exist within the traditional design and construction professions. The skills of programmers, designers, project architects, construction managers, project accountants, field superintendents, and the like are very necessary for successful design-build operations. Found in traditional architecture firms and construction companies, they are readily adaptable to the design-build firm.

Staffing

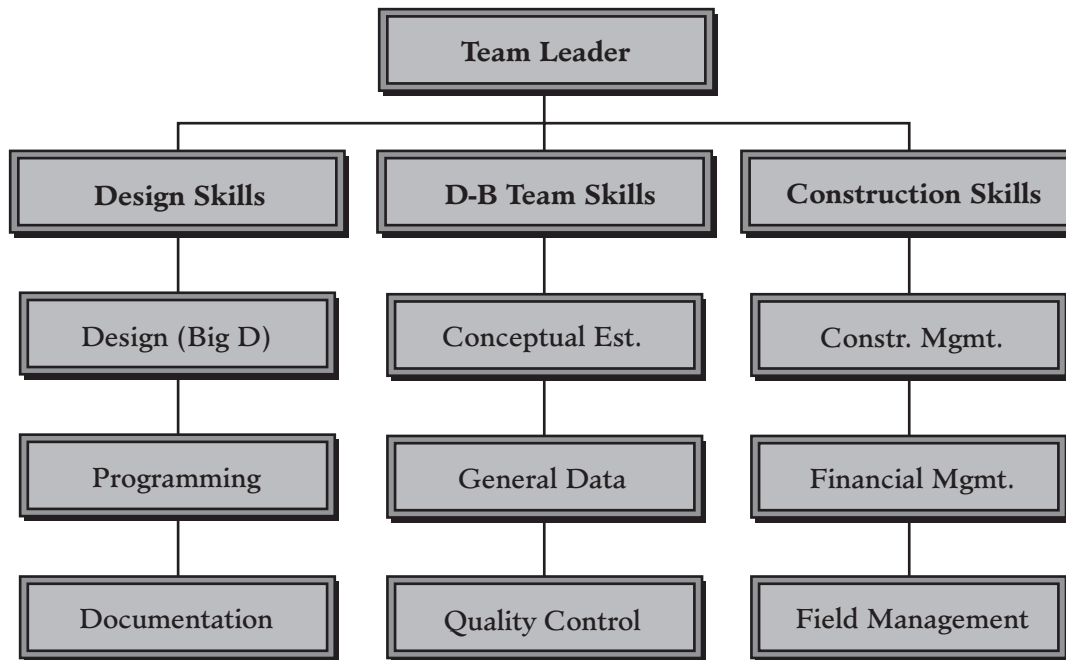
Three areas of expertise are needed for an integrated design-build team: the design skills of traditional architecture firms, the construction skills in traditional construction companies, and the team leadership and financial skills necessary to combine the two.

The diverse and complementary set of skills needed to develop a solid design-build team is often accompanied by a diverse set of personality traits. Consequently, team building can be more difficult in design-build companies than in more traditional design or construction firms. Left-brain characteristics—analytical and linear thinking—can produce great results in managing the day-to-day aspects of complex construction projects. Right-brain characteristics—creative and nonlinear thinking—can produce exceptional results in programming and designing a building. A successful design-build team must include both types and characteristics, and a successful design-build team leader must know how to manage communication and interrelationships among different personality types.

A first step in developing a strong design-build team should include the use of personality assessment tools. Many types exist for analyzing personality types, creativity, and a variety of other personal characteristics. To create strong and functional design-build teams, architects must first understand the characteristics of the individual team members. To do so, architects can embrace the use of a variety of psychological and analytical testing techniques, such as the Myers-Briggs Type Indicator test, developed by Isabel Briggs Myers with Peter Myers and widely used by the business and clinical communities to match individual characteristics with job skills.

Strong and consistent team communications are especially important in design-build delivery. The use of formal and informal meetings, e-mail, voice mail, memos, and notes needs to be part of a regular team routine. For successful teamwork, architects should always err on the side of overcommunication. The role of socialized communication and “nonwork” socialization of the team also plays a role in successful team building. Often the most successful teams not only work well together, they play well together. Consequently, some nonwork activities should be included in any team building exercises.

Architects all realize that developing roles and goals are important in establishing

**FIGURE 1-3**

Integrated design-build team

a successful business; the same holds true for successful design-build teams. First, architects need to establish clear roles for each of the individual team members; then, the team should work together to set goals for both the team and the projects they are taking on. Goals should be reviewed and monitored as part of regular team communications. Finally, the team and the individual team members should be rewarded based on their success in meeting their goals.

Equipment

When a traditional architecture firm transitions to a design-build mode of operation, new equipment needs arise. If the firm elects to self-perform trade work, the equipment needs are obvious—scaffolds, cranes, trucks, trailers, and miscellaneous construction-related items that skilled tradespeople need to function.

Communication with the field staff is critical for successful management of a construction project. Field staff requires office space equipped with, at minimum, computers, printers, telephones, fax machines, cellular or digital phones, and pagers. In addition, photography and video equipment is necessary to document and record

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progress of the project in the form of record photography or real-time digital video, or both. Safety and security bring additional equipment needs in the form of barricades, fencing, gates, and the like. Special conditions, such as cold-weather construction, may require some temporary heat and cold-weather protection materials and devices. For a variety of reasons, field staff may need to have trucks (or similar vehicles) to allow access to all parts of the construction site and to serve some materials delivery and moving needs.

To facilitate the good communication needed for successful design-build project delivery, additional computer networking and storage devices, communication software, and Web-based project management tools are required for design-build firms. Often, field staff may need to access computer-aided design and drafting (CADD) drawings via the Internet or a dial-up network, not only in the field office but in the home office as well. The use of handheld computing devices is on the rise in the construction industry, and the development of combination handheld devices that include cellular phones, pagers, Internet access, digital cameras, and time management and project management software will continue to help improve communication links between offices and field staff.

Architects have the skills to be successful in the design-build market. Whether they have the will, energy, and personality to undertake the lead role in a design-build project has to be determined on a firm-by-firm basis. History shows that architects have successfully served in the lead role of master builder. Many firms have found success retaking that role through the design-build method of delivery. Though the risks are certainly greater in some areas, the rewards are also greater financially and, for some architects, personally. The rest of this book will give readers solid guidance in forming, running, and growing a successful design-build practice.

The Integrated Design-Build Firm

David L. Engdahl, AIA

The Haskell Company

Jacksonville, Florida

Throughout most of the history of civilization, both design and construction were accomplished under a single person or entity—the master builder. This early form of “integrated” project delivery prevailed in the great historical civilizations of ancient Egypt, classical Greece, the Roman Empire, and the Renaissance. It wasn’t until the mid-fifteenth century that the idea of separating design and construction was advanced,

when Alberti suggested separating what he considered the *art* of architecture from the *science* of engineering and the *craft* of construction. The idea did not take hold, however, until the Industrial Revolution in the nineteenth century, when design and construction were predominantly accomplished by separate entities. It was in the mid-nineteenth century that professional organizations were established in both England and the United States to advance the profession of architecture, including the American Society of Civil Engineers and Architects, formed in 1852, and the American Institute of Architects, formed in 1857, followed by numerous engineering societies in the 1870s and 1880s. Most of these groups frowned on integrated firms that provided both design and construction, regarding this as an unethical practice.

Despite the widespread practice of one entity providing design while another did the construction, some firms still offered both design and construction in a more singular process well into the late nineteenth century. One of the most notable design-build projects of that era is the Brooklyn Bridge, accomplished from 1870 through 1883 by the Roeblings. Through the twentieth century, a sprinkling of firms continued to push design-build as an integrated process, despite ethical restraints. In 1978 the AIA lifted its ethical prohibition on integrated design-build, and in 1980 the Portland Office Building by architect Michael Graves, FAIA, put design-build delivery in the spotlight. The establishment of the Design-Build Institute of America in 1993 increased public awareness and popularity of the ascending delivery method. Today professional and contracting firms *not* engaged in design-build in some form are in the minority. Many firms offer both design and construction as one firm, in an integrated practice.

Consolidation is taking place in virtually all service industries in the United States, and the construction industry is no exception. The march has started toward fewer, larger firms. Consolidating large design and construction firms into integrated design-build firms is a logical extension of this trend, as evidenced by the mergers of large design and construction firms like Kiewit and Bibb. Steven T. Halverson, president and CEO of The Haskell Company, an integrated design-build firm, notes, "Everywhere there is a move toward further integration of design and construction processes. Major engineering companies are adding construction capabilities. Specialty contractors are combining. Foreign firms, with a history of integrated project delivery, are making large acquisitions in the U.S." Many of the integrated design-build firms of the future may not be led by architects, engineers, or contractors but by large financial, development, or accounting firms. Accountants worldwide are offering facility management and other construction-related services, including design. It has been reported that one large U.S. accounting firm hired more architects in 1999 than any design firm that same year.

Very few architecture firms in the United States consider themselves integrated design-build companies, that is, companies that maintain both in-house design and in-house construction staff. Of the integrated firms, perhaps only a third have significant in-house resources. Creating a competitive integrated design-build firm requires investment in staff, infrastructure, and time for development. For this reason, the number of new integrated design-build firms with significant in-house resources can be expected to increase slowly.

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The advantages of linking both design and construction into a singular process accomplished by a team are obvious. Ted Pappas, FAIA, Jacksonville, Florida, architect and AIA president in 1988, said recently that “all architects, regardless of the delivery process used, are teaming with contractors earlier.” In response to the widely held notion that design-build is appropriate only for simple projects, Harold L. Adams, FAIA, chairman of the Baltimore-based architecture firm RTKL, notes that buildings today “are so complex that one cannot afford not to bring on all team members from the very start.” Many advantages of the design-build process are advantages whether or not the team is an integrated design-build firm, but the integrated firm develops those advantages to a higher level. The ultimate potential of an integrated design-build firm is achieved through long-standing relationships, which encourage and foster communication and, as a result, trust. Trust is the foundation of design-build delivery. If design-build is the preferred project delivery method of the future, and all indications are that it will be, the integrated design-build firm is the quintessential optimizer of these services.

THE CULTURE OF INTEGRATED DESIGN-BUILD

Integrated design-build is founded on trust and teamwork. In order to excel, an integrated design-build firm should have equal strength in both design and construction, as well as common values and common objectives—a common culture. As a first step, the firm needs to define the culture and values that guide all operating units. Each employee must have an understanding of the firm’s culture and values and be able to apply these to his or her daily work. It is this commonality of purpose that provides the greatest advantages to the integrated design-build firm. The advantages of an organization that shares these attributes include enhanced communication, greater synergy, more efficiency, and, ultimately, better client service.

More than just a process, design-build is a mind-set and must leverage the relationship between design and construction. Truly integrated design-build blurs the lines between design and construction into one continuous and fluid process. In the integrated design-build firm, there is no finger-pointing—all are responsible for design quality, construction quality, project profitability, schedule performance, safety, risks, a satisfactorily completed project, and a satisfied client. Organizing to accomplish projects as an integrated design-build firm but proceeding in a “business as usual” manner is a sure formula for failure. Toggling between integrated design-build delivery and traditional design-only/construct-only services reduces the likelihood of success at either delivery process. All parties in an integrated design-build firm must be focused on the end result, viewing the end product as a finished building and a satisfied client.

Truly integrated design-build does not follow the traditional project phases of design-bid-build. Integrated design-build phases can be defined as (1) marketing (identifying a potential project), (2) sales (making a proposal, executing an agreement), (3) delivery (integration of all design and construction activities in the optimum manner for the particular project), and (4) post-construction (warranty and follow-up, ostensibly leading to the next project).

The Culture of Integrated Design-Build 17

In integrated design-build, designers can leverage more resources and have better knowledge of the cost effects of their design decisions. Through integrated delivery, designers and contractors share both the risks and rewards. There is no benefit in assigning blame and finding a “fall guy.” The mutual goal in an integrated practice is solving the problem and moving ahead. Any problem that arises is not a design or construction problem—it is a firm problem.

An integrated project team can use communication shortcuts, work with a just-in-time mentality, and engage in incremental decision making. Some items may be designed and constructed with minimal documentation because an integrated design-build firm can more readily establish standard documentation for repetitive items (such as consistent wall type designations for all projects), use standard components (such as closely designed and fully detailed standard stairs for routine applications), and direct feedback from lessons learned into company standards.

Creating an Integrated Firm

The large investment in infrastructure and time required to start a new integrated design-build firm makes creating such an entity from scratch difficult. More likely scenarios for creating an integrated firm follow one of two paths, either joining two existing firms or adding the needed resources to an existing firm.

A formidable integrated design-build firm can be created quickly by joining a design firm and a construction firm. Preferably, these firms would have worked together successfully in the past and share similar cultures and values. Merging the firms into one location provides the greatest opportunity to be competitive in integrated design-build services. A less desirable alternative is for two firms to form a permanent joint venture arrangement wherein the firms maintain their separate organizations and agree to work together exclusively on design-build initiatives. Firms using this arrangement may operate in many respects as an integrated design-build entity, but a joint venture lacks the potential of a single integrated firm.

Integrated design-build firms may also be created when either a design firm or a construction firm adds the requisite complementary resources. An advantage to this approach is that the entity can add the resources slowly while transitioning its original services business into integrated design-build. Obviously, entities developed in this manner are most likely to be strongly design led or construction led. Building a firm that meets the ideal of equal balance between design and construction is more difficult with this approach.

Legal counsel must be consulted to find the best structure for the integrated design-build firm. Options include business corporation, professional corporation, professional association, limited liability company (LLC), joint venture, partnership, and sole proprietorship. For various legal reasons, design-build firms tend to gravitate toward the business corporation or LLC model. Some state licensing laws establish limitations on corporate ownership and structure, particularly with respect to offering and providing professional architectural and engineering services. Such limitations applied to more than half the states in January 2003. As do many architecture and engineering

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firms practicing in multiple states, an integrated design-build firm may need to have a number of legally independent subentities to meet both the letter and the intent of state professional practice laws. Before offering or providing services in a given state, design-build firms are advised to verify the requirements for licensure and legal structure in that jurisdiction. Keeping abreast of changes in the states where the firm practices is also advisable, as the statutes and rules change regularly.

Choosing an Organizational Structure

Firm administrative structure and project structure are not necessarily identical in any two firms. Many integrated design-build firms are organized around individual profit centers such as business development, design, construction, accounting, information technology, administrative services, marketing, and human resources. Design services are sometimes further subdivided into discipline-related units such as planning; architecture; interior design; and civil, structural, mechanical, electrical, and process engineering. Such a profit center structure can lead to close management and efficiency, with a greater level of administration and accounting. This approach often leads to narrow focus and divisiveness, which hinders the delivery of integrated services. However, a structure similar to this may be necessary in an integrated design-build firm that also offers separate design or construction services.

A more promising organizational approach for an integrated design-build firm is the project delivery team. Permanent project teams may include marketing, design, and construction staff within one organizational unit, which may be geographic-, market-, or client-focused. For each project, the project team should have a single project leader. In addition to being knowledgeable in both design and construction and responsible for both, this individual is responsible for business and contractual relationships with the client. The project leader should also be responsible for performance on the project and should lead the effort to integrate design and construction services.

A single integrated design-build firm may work from one location or may have a home office with multiple regional or branch offices. Decisions about the number and location of offices depend on whether the firm is primarily geographically based (working for a variety of clients within a given geographical locale), client based (working for clients wherever they have projects), or a combination of these.

Whether an integrated design-build firm is organized by functions, geographic units, or project delivery teams, it is appropriate to centralize certain support functions that bridge all firm profit centers or business units. The extent of central corporate functions depends on the size of the overall firm, as well as the size and sophistication of each budgetary unit. The larger the individual budgetary unit, the better it will be able to provide its own support functions. The amount of autonomy that each operating or budgetary unit has compared to centralized resource and support functions has a lot to do with the character of a firm. With the growth and evolution of a firm, the dynamic of this balance is apt to change. Corporate leadership and support units should share lessons learned, both good and bad, across organizationally separate and perhaps even geographically separated operating units.

Offering Client-Focused Services

Haskell's Steven Halverson believes that "clients really want solutions to facility problems. School boards don't want schools; they want to educate children. Municipalities don't want a new water plant; they want to provide clean water. Food producers don't want a new plant; they want to produce their product. A design[er]-builder must recognize the customer's true needs and provide custom-tailored services precisely defined around the customer's needs." The integrated design-build firm is positioned well to provide the array of services required to meet the client's needs.

Integrated design-build firms usually maintain resources to provide, at minimum, architectural, engineering, and construction services. Some firms provide services on both an integrated design-build basis and as unbundled stand-alone services. The rationale for offering unbundled services is to encourage clients who are more comfortable engaging services on an incremental basis and may hesitate to engage fully integrated design-build services. Stand-alone construction management and program management services are also offered by many integrated design-build firms. Larger integrated design-build firms often have in-house staff with expertise in specialty design areas such as planning, interior design, landscape architecture, and process engineering. Some even self-perform certain portions of the construction work using their own crews for such things as rough carpentry and concrete.

Clients who engage integrated design-build firms most often have a good understanding of the advantages of linking design and construction in a singular process in one firm. For these clients, it is logical to extend the value chain at both ends of design-build services, adding pre-design services and post-construction services. In addition, the breadth of services provided is often increased beyond design and construction into specialty services, which may be handled by outside companies. This phenomenon of expanding services beyond design-build has come to be known as "design-build *plus*."

Over the last decade, many public and private organizations have downsized staff with technical capabilities, making it necessary for them to engage outside entities to accomplish tasks formerly handled in-house. Pre-design services, those activities that help a client quantify needs before design begins, fall into this category and are provided by a number of integrated design-build firms. These services include supply chain and business case analysis, logistics studies, site location and selection, permitting investigations, land planning, space programming, and budget development. Services that expand the breadth of integrated design-build may include real estate; financial and development; furnishings selection, procurement, and installation; and process equipment design, procurement, and installation. Post-construction additive services can include operation, staffing, and maintenance. Full services provided by some integrated design-build firms have included program development; facilities development; management, staffing; and operation of schools, detention facilities, and retirement communities.

More and more clients are including design-build-plus services in their requirements. It is now common for a request for proposals (RFP) to require a general outline

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of project design and delivery and a lease rate in lieu of project cost. For water and wastewater projects, it is becoming common to receive an RFP that includes design, build, own, operate, and maintain, called “DBOOM” by some.

While many integrated design-build firms in the United States are organized to handle construction work primarily through subcontracting, a number of the larger firms have significant self-performance capabilities provided by in-house craft employees, who provide the firm with greater control of the construction process. Such capabilities may include earthwork, concrete, steel fabrication, carpentry, roofing, mechanical, electrical, refrigeration, and finishes.

MARKETING THE INTEGRATED FIRM

Marketing design-build services follows the principles used in marketing any service. Focus must be on the client and solving the client's issues. Marketing is about building a relationship between the service provider and the client. Trust and fair play must be the base in building a relationship between a client and a designer-builder. Usually project contracts must be signed before all the details have been developed. This involves a certain amount of risk, and a considerable amount of trust, on all sides. Thus, the client is a key participant in the design-build trust-based team.

The work of integrated design-build firms tends to be client based because of the need for trust and teaming with the client. The importance of the client relationship suggests organizing the firm into units that are market focused rather than geographically focused. A number of large integrated design-build firms have recognized that it might be best for project leadership staff in their organization, particularly from a business development standpoint, to come from the client's industry rather than either design or construction. In this way, the designer-builder's staff members who make initial contact with the client begin with an understanding of the client's issues, needs, and requirements and can discuss these with the client on a business level.

Prior to the formation of the DBIA in 1993, many designer-builders, and particularly integrated designer-builders, spent much effort marketing the design-build process rather than the designer-builder's experience and capabilities. As a result of the growth in design-build and the efforts of the DBIA and others, client knowledge of the design-build process has increased and less overall emphasis is required to market the process, allowing firms to concentrate on marketing the particular qualifications and approach of the designer-builder.

Marketing vs. Sales

Most integrated design-build firms have a central marketing unit that is responsible for general advertising and promotion, as well as for market research and provision of general corporate marketing materials. The marketing services unit is usually led by a skilled marketing person, not necessarily with a design or construction background. *Marketing* may be defined as identifying potential clients and opportunities. *Sales* may

be defined as building a relationship with the client and being selected for a project. While marketing may be done by someone with a background other than design or construction, sales most often are accomplished by design and construction staff. Therefore, in an integrated design-build firm, it is necessary to train staff, who come primarily from technical backgrounds, in marketing and sales skills.

In any case, care must be taken regarding licensing issues when marketing or selling the integrated design-build firm and before offering or providing services. Although there is no prohibition against using the term “design-build” in marketing an integrated design-build firm, certain states prohibit the use of “architect” or “engineer” in connection with a firm name unless the entity is primarily owned and led by licensed design professionals. Integrated design-build firms must take care in marketing materials and advertising to assure potential clients that the firm conforms with state licensing requirements.

Responding to an RFP

The objective of all designers and builders is to develop long-standing client relationships so they can obtain work on a noncompetitive or negotiated basis. As of January 2003, 38 states had passed some form of design-build law. Many of these laws permit public agencies to use qualifications-based selection for design-build projects. Still, however, some agencies are required by law to follow a competitive process. Responding to competitive design-build proposals is and will continue to be a primary method of obtaining work for all designer-builders. The level of detail provided by clients in a request for proposals varies significantly. In some cases, criteria are so complete the designer-builder is relegated to accomplishing a “draw-build” project, losing many of the advantages inherent in the design-build process. At the other extreme, the client may have limited or no criteria, and the designer-builder must work with the client to develop criteria for the project.

Whatever the level of criteria and method of selection, responding to a competitive request for proposals may require significant expense and time. A greater portion of this investment is usually concentrated in the design effort. Because of the need to speculate in a competitive RFP environment, designer-builders must evaluate each opportunity carefully. Factors such as the probability the project will proceed at all, the number of competitors, the current staff workload, the magnitude of the investment, and the firm’s expertise in the project type and relationship with the client should be considered in making the go/no go decision. If the decision is to proceed, the team should establish a clear strategy for winning the project and communicate it to everyone. This method of acquiring work is quite different from being selected on a qualifications basis to provide professional services for a single project or bidding competitively as a general contractor. The key to success in design-build is to generate solutions through integration of design and construction that meet the client’s performance needs in a creative and efficient manner. In short, this can be referred to as “outsmarting the competition.” An integrated design-build firm has the best potential to leverage this integration to its advantage.

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MANAGING IN-HOUSE STAFF

By definition, an integrated design-build firm is one that has in-house design and construction staff. As is true in most service industries, its people make up the vast majority of the resources of an integrated design-build firm. The benefits of having in-house staff include the development of trust, the ability to standardize methodologies and efficiencies, management control, and the promulgation of a consistent culture.

Challenges in maintaining in-house staff include the risk of having idle production staff during a downturn and the constant need to balance design staff with construction staff and staff workload across operational units. If an integrated design-build firm provides services other than design-build, staff balancing may be even more difficult. Taking on a large design-only engagement may create an imbalance and render a portion of the in-house construction resources unproductive, and vice versa. In balancing workload, consideration must also be given to the timing of design and construction tasks. The design staff will be working on proposals and production of design documents months ahead of significant engagement by construction production staff. Whatever the organizational structure, integrated design-build firms, particularly larger firms, will have their project staff subdivided into operational units. It is possible to have a balance of staff within the overall firm and at the same time have an imbalance within individual units. A system must be devised to balance the staff across these units.

Recruiting Employees

Integrated design-build is a unique culture. Each firm must define its culture and values and seek staff who fit them. Recruiting and attracting design and construction staff with the right mind-set is a difficult undertaking. The resources from which experienced integrated design-build staff can be drawn are limited. Only a minimal number of firms are training in the integrated design-build culture, and few colleges and universities concentrate on this subject in their educational programs. Some schools are beginning to offer design-build courses, and others have plans to do so. However, virtually all of these schools offer such courses through construction management programs rather than design degree programs. Finding design staff with integrated project delivery orientation will continue to be a challenge.

Because of the lack of available trained staff, integrated design-build firms have been forced to create their own training and mentoring programs to teach the design-build mind-set. A growth-oriented integrated design-build firm will need to recruit both entry-level interns and experienced mid-career staff. Much of the experience of the mid-career hires, as well as a large portion of the education of interns hired directly from college, will have focused on management of design or construction in separate entities. Thus, training in an integrated design-build firm must first “unteach” more adversarial management styles in favor of trust and teamwork.

Teaming to Acquire Specialists

Smaller design-build firms tend to have staff who are generalists, unless the firm is in a niche market. Larger firms often organize staff into teams that develop and maintain specialties such as a specific client or market. It is nearly impossible for an integrated design-build firm to maintain all the expertise it is likely to need in both design and construction through in-house staff. Teaming with “outside” firms for a specific project is a regular occurrence. Adding outside resources to the design-build team may be necessary to provide a design specialty such as acoustics or to deal with staff overload conditions. Often, design-build subcontractors or vendors are brought onto the team for their knowledge and experience, as well as to assume a portion of the risk in their area of expertise. All of these outside resources must be carefully selected for their ability to work in a team environment. The in-house staff must work comfortably in partnership with outside firms to achieve the best results. Subcontracting portions of the work to drawing production shops, design-build subcontractors, or specialty consultants without significant participation and oversight from the integrated designer-builder’s staff will result in less creativity, less synergistic solutions, and less leveraging of the inherent advantages in integrated design-build.

A number of large integrated design-build firms maintain in-house construction staff consisting of foremen, journeymen, and skilled laborers. These staff members are moved from project site to project site to perform their expertise, usually supplemented through the local labor force. Having key permanent construction staff on the job site makes it easier to maintain efficient operations and schedule conformance, as well as quality consistency from project to project. Maintaining such a skilled in-house construction force does require considerable administrative effort in training, scheduling, and assigning these staff members.

Choosing Systems for Tracking Performance

From a pure revenue standpoint, construction services may constitute 90 percent or more of the cash flow of an integrated design-build firm, with design services representing the remainder. Thus, overall firm management and accounting systems tend to be industry-standard construction accounting and project management systems, relegating design services management and accounting to a secondary position. A single, customizable central accounting system will make it possible for an integrated design-build firm to properly account for both design and construction services. Current technology is moving toward integrated systems that bridge both design and construction processes and needs, so future industry accounting systems are likely to be more sympathetic to the needs of integrated design-build firms.

It is important to measure overall company performance as well as project performance in any firm, and an integrated design-build firm is no exception. Prime metrics to measure include financial performance, schedule performance, safety performance, quality, and client satisfaction. However, normal industry metrics are of nominal value

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to an integrated design-build firm because it combines design and construction services in a single firm. New metrics for integrated project delivery and design-build firms have yet to be clearly established, but may include such measures as construction dollars per architect/engineer (A/E)-hour and construction fee earned per construction project manager month. Since integrated design-build firms tend to rely heavily on repeat clients, a system of measuring client satisfaction is also highly desirable.

If a firm is organized around various profit centers, a method of allocating corporate overhead to these units will provide performance information for proper management. If some or all units are managed or accounted for as cost centers, a virtual profit center accounting process should be established to assess performance of each unit.

Individual performance should be measured and rewarded in an integrated design-build firm. Developing a system for measuring project team performance as well as individual performance and contributions on a project basis makes it possible to reward outstanding contributions from both design and construction staff.

KEEPING TECHNOLOGY CURRENT

Technology is expanding at an increasingly rapid pace, and all firms must constantly research and keep up with the latest developments and applications. Technologies also tend to merge into each other, creating new technologies that are common to more than one area of business and allow crossover and leveraging of information between previously separated disciplines. A good example of this phenomenon is computer-aided design and drafting. In the early 1980s, CADD began emerging as a practical use of technology for design, creating a tool to make the production task of hand drafting more efficient. It was also correctly believed at that time that CADD, when properly used, would give more reliable and accurate results. What was not widely understood then is that CADD, through relatively simply manipulations, could allow easier consideration of alternative designs and detailing options, ideas that would not even have been pursued or considered using hand drawing. Further, potential links to developments in related technology and communication systems such as the World Wide Web could not have been anticipated. CADD is now more than just a drafting efficiency tool; it is an information and communication tool, linking design directly to manufacturer's data and details on the Web, construction cost-estimating systems, and full project scheduling systems. If any firm is best positioned to leverage this advancement in technology, it is the integrated design-build firm.

The next evolution of technology applicable to design and construction is in three-dimensional (3D) modeling systems and databases. Processes for conceiving, communicating, and executing building designs have been relatively static for centuries. Generally, a designer has conceived a building design in three dimensions and communicated that design through two-dimensional documents to a contractor, who has constructed the building in three dimensions. Three-dimensional technology will allow a building to be conceived, communicated, and executed consistently in three dimensions. A single 3D data system, then, can be used by architects, engineers, spe-

cialty consultants, construction contractors, subcontractors, vendors, and field personnel for their portions of the work. All will work from the exact same database, which will become interactive and mutually influential. As with CADD, the integrated design-build firm is in the best position to leverage 3D technology to the maximum.

Other technology advantageous to integrated design-build firms includes project Web sites, continuous project scheduling systems, and company intranets. A common Web site can serve as a communication system and a file system for use by all project team members, including the client, from the proposal stage through completion of construction, warranty, and postoccupancy services.

Overall scheduling of proposal, permitting, design, and construction activities from the beginning of a project through completion can be managed in a continuous project scheduling system. Planning starts with a milestone schedule, which is developed in detail incrementally as the project progresses. Use of a computerized continuous project scheduling system allows all team participants, including client, subcontractors, and vendors, to instantly assess the impact on their work of a change in any other part of the schedule.

Most firms now have a company intranet containing company policies, standards, and reference materials to facilitate communication and maintenance of these items. It is perhaps even more important to have such technology in an integrated design-build firm because of the probable variety of interests and geographic locations of its staff.

ESTABLISHING QUALITY

The three pillars of a building project are *cost*, *schedule*, and *quality*. In its rebirth during the early twentieth century, design-build delivery was touted as excellent in the cost and schedule components of the triangle, but it was perceived to produce low-quality products. Recent history, however, has proved that design-build can reliably deliver the most sophisticated, high-quality projects. In design-build, quality is often measured in performance rather than by a prescriptive quality level. Architects, as in traditional design-bid-build delivery, are often called upon to render quality judgments. In doing so, they are expected to be impartial in regard to the client's interest, the contractor's interest, and their own interest. Many state licensing boards require that design professionals be positioned to make these judgments impartially in any delivery process and require majority firm ownership, control, or vesting by the firm with this authority. This professional independence and responsibility must be maintained in the design-build firm.

Quality Standards

An integrated design-build firm can effectively leverage companywide quality standards. Standards can be characterized as having two primary purposes: to facilitate the work and make it more efficient, and to embody the collective knowledge of the firm

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throughout its history, thus sharing lessons learned across the company. It is particularly important for an integrated design-build firm to establish quality standards and communicate them. A number of design-build firms address the need to maintain professionalism, corporate standards, and quality assurance by creating a separate entity or independent corporate function responsible for this activity. This arrangement results in a matrix organization in which staff members report to their team for operations and to “corporate” for quality and standards.

Quality Assurance

The required quality level is not the same for all projects and may not be consistent for all aspects or areas of a particular project. A level of quality appropriate to each component of the project must be established during communication with the client, development of criteria and a proposal, and initiation of design. This quality level can be communicated through a quality plan. Expectations can be outlined, and modes for achieving the defined quality level and methodologies for quality verification can be included in the plan and communicated to all team members. Quality expectations can also be communicated in preconstruction conferences held on the job site and attended by designers, subcontractors, trade supervisors, and craftspeople for each facet of the work. Such conferences present an opportunity to confirm quality expectations and quality assurance processes. The relationship between design and construction in an integrated design-build firm makes it particularly easy for these firms to facilitate such conferences.

THE INTEGRATED DESIGN-BUILD MIND-SET

In the integrated design-build mind-set, all parties participate in and are jointly responsible for all aspects of a project. Everyone shares the risks and rewards. Integrated design-build firm culture is founded on trust. Clients naturally leverage the combination of design and construction services laterally into predesign and postconstruction services and expand the breadth of additional services during the process. These design-build *plus* services become part and parcel of most integrated design-build firms.

Care must be taken in marketing an integrated design-build firm to ensure compliance with state licensing laws. Staffing the firm requires careful “cultural” screening and a significant training program. Technologies and metrics inevitably require adaptation of systems created for project delivery under old paradigms. Balancing of quality with cost and scheduling may be handled best as an independent corporate function.

For most of human history, design and construction have been a single process under a single responsible person—the master builder. Today, an increase in interest in design-build delivery is restoring this concept. Integrated design-build firms provide the most promise for a return to the master builder approach and point to a bright future for this form of project delivery.

NOTES

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