

Integrated Design Studio: Integrated Design Process Benefits of an Architectural & Engineering Design Studio

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Abstract

The current emphasis on sustainable design has led to a greater degree of collaboration between architects and engineers. While improved communication clearly benefits the design of sites and buildings, there are limitations inherent to the typical, arms-length relationship between prime consultants and subconsultants. Consequently, a new breed of sustainability specialists has emerged to compensate for the collaborative difficulties often encountered by multi-firm design teams. However, the addition of another member to the design team does not realize a truly integrated design process.

An alternative is to combine the skills of architects, engineers, and cost estimators under one roof, incorporating the principles of integrated design directly into the team's culture. Working together in constant contact on a variety of projects, team members gain experience in a shared environment. This environment enables the firm to approach new projects with minimum orientation time and maximum collaborative energy. Coordination is greatly simplified from design through construction; project leaders have quick and easy access to all design practices and team members interact based on existing interpersonal relationships.

Beyond the fundamental integration of design, this approach emphasizes a strong commitment to the client; the client benefits from a single source and direct access to all design resources. The members of the design team do not compete for resources (neither fees nor budget), instead they collaborate and the whole project benefits. This paper describes the evolution of an integrated design process within an integrated design firm, exploring the potential benefits for sustainable-design initiatives.

INTRODUCTION

Traditionally, structures were built for their sites and climates, taking advantage of the natural features and existing infrastructure of the surrounding areas. With the widespread introduction of mechanical cooling systems and improved lighting, considerations such as solar azimuth and prevailing winds became less relevant toward the design process. With newfound freedom, architects designed facilities that highlighted form, relying on engineers to make those facilities functional. Active engineering systems became far more important than the passive strategies that previously informed the building process. This led to a generation of energy-intensive buildings with little regard for energy or environmental design (Todesco, Efficiency 52).

As building-system technologies have evolved, the relationship between architects and engineers has changed dramatically. This shift has resulted in a sequential design process that minimizes the latter group's input on the overall design: "the traditional un-integrated design process is one that creates pressures (and even incentives) for participants to act essentially in isolation, working independently on the parts of the project they can control" (Lewis S22).

In contrast, an integrated design process (IDP) balances and optimizes parameters that affect multiple design participants; IDP encourages stakeholder interaction to understand the full effects of possible options in terms of whole systems. As Lewis notes, “by definition, optimized green buildings are designed as whole buildings in which all of the elements of the project are designed together, with full consideration of how they affect each other. [...] All of [the] major environmental impact areas must be integrated to achieve the most sustainable and cost effective design. If different elements are designed without regard to the other elements, the result will be less efficient and more expensive” (S24).

An enthusiasm for energy efficiency forms the core of the ideal, symbiotic relationship between architects and engineers contributing in an IDP. The best solutions are achieved by minimizing brute-force engineering systems through optimization of all building systems.

The principles of IDP can be realized by a project team consisting of multiple consulting firms, but only in the broadest sense. We believe an integrated architectural and engineering studio can attain a greater degree of collaboration through the operation of a cohesive and responsive design team. The integrated studio provides a sound basis for the IDP. It contains the potential for optimized results and improved efficiencies in the design of sustainable buildings.

PROFILE OF AN INTEGRATED DESIGN FIRM

Established in 1951, The Walter Fedy Partnership (TWFP) has grown to provide architectural, structural, mechanical, electrical, and civil design from a single source. A strong desire to enhance the client experience by offering comprehensive design expertise led to the firm discovering the benefits of the IDP in 1971, long before the concept was articulated (Todesco, Integrated S42).

By 2006, TWFP had expanded into two offices, which hampered the IDP when project-team members were split between the two buildings. Recognizing this drawback, TWFP reorganized its staff, creating an Integrated Architecture and Engineering Design Studio at one location and a separate Engineering Services Group at the other.

Through this evolution, TWFP’s Integrated Design Studio has recaptured the collaborative principles of the IDP and enabled the firm to expand its focus on sustainable design. The team is almost completely harmonized, with architects, engineers, and cost estimators working side by side. Only civil-engineering services—which are not required for all of the Studio’s projects—are separate, provided by the Engineering Services Group on an as-needed basis.

IDP IN A TRADITIONAL PROJECT TEAM

While it is possible to produce an integrated design via the traditional consultant/subconsultant arrangement, the extent of collaboration is limited by the lack of a shared workspace. Although the design firms and individual team members may have worked together on previous projects, the relationship is—at the root—contractual

in nature. A new breed of sustainability consultants has emerged to compensate for the collaborative and contractual difficulties encountered in this arrangement. However, while these specialists provide much-needed expertise, they have limited ability to affect a team's basic cohesion when members are unfamiliar with each other or, in extreme cases, antagonistic.

The experience shared by members of a traditional project team is also a concern. Although architects generally seek to work with specific engineering firms, there is no guarantee that a firm or an individual will be available when the architect secures a new project. In this case, an element of the shared experience from past projects is lost, and the team must incorporate a new member.

IDP IN AN INTEGRATED DESIGN STUDIO

An integrated team offers distinct advantages when compared to the traditional project team. If, as Zimmerman says, “the future of building design is found in IDP” (6), then a better future for the IDP is found in the activities of an integrated design studio.

Benefiting From Shared Experience

The IDP in an integrated design studio is organic and constant. Coworkers share a physical workspace on a daily basis, developing strong interpersonal relationships and approaching projects with a shared motivation to serve the client. The success of a completed project is enjoyed by all—as are the lessons learned—and this experience is put to use by the team on subsequent projects.

Working on a number of similar facilities located throughout Ontario, TWFP employed the same team members on all of the facilities. In addition to maintaining continuity for the client and maximizing the efficiency of design and production, this approach enabled us to leverage the knowledge gained from previous work and determine the most appropriate methods for meeting sustainable goals at new project sites given the client's requirements and preferences.

Impromptu Charettes

The collaborative spirit of an integrated design studio is furthered by the ability to quickly solicit opinions. Going beyond scheduled meetings with specific agendas, this continuous state of cooperation enables designers to seek discipline-specific input on a moment's notice. In one case, TWFP team members identified an issue that impacted numerous aspects of the design—within moments, a group had gathered to determine a solution. The net result is that the issue was resolved smoothly and with no administrative overhead.

We believe that these impromptu charettes are crucial to the IDP. They provide designers with perspectives that may not otherwise be appreciated. A broad and inclusive approach to building-system knowledge provides engineers familiarity with

architectural parameters, materials, and options. Similarly, architects gain a deeper understanding of engineering processes and system options.

Assisting Clients in Understanding Sustainable Goals

It can be difficult for clients to understand the costs and benefits of individual credits within sustainable building rating systems such as Leadership in Energy and Environmental Design (LEED®). An integrated design studio is able to make revisions on short notice so that clients can see the impacts of changes with respect to individual credits and the overall LEED® scorecard.

During a meeting at TWFP's office, a client wanted to consider adding a second floor to their building design. Within two hours, our team was able to fully explore the impacts on design time and project schedule, prepare a cost estimate, and identify potential issues with respect to completed work and sustainable-design goals. This outcome would be difficult to achieve without the advantage of the integrated design studio.

A related benefit is the ability to modify budgets with ease. A client request or cost overrun may require an increase to one budget and a corresponding decrease to another. In an integrated design studio, budgets can be reallocated with minimal friction between different designers as the team focuses on the end result.

Maximizing Efficiency in Process and Sustainability

"Integrated Design Process (IDP) is essential for effective management of the sustainable design process to ensure that efficient co-ordination is maintained and that overall project and design costs are minimized" ("Succeeding by Design" 41).

Unlike traditional project teams, who must coordinate their disparate schedules to gather information in a timely fashion, an integrated design studio is able to commit all of the required designers at the outset of a project and schedule multi-disciplinary site visits. This ability drastically reduces the time spent acquiring information and—more importantly—ensures that the necessary information is secured.

During the initial stages of a large-scale expansion project, TWFP's architects and engineers conducted on-site user interviews to determine facility requirements, and then jointly surveyed the existing building systems. As a result, our early design concepts for the expansion benefited from both architectural and engineering perspectives, accounting for elements such as optimum orientation and potential energy-saving strategies for the building envelope. In this case, the efficiency of our holistic information-gathering process directly served our goals for sustainability. The schematic design progressed quickly, and easily satisfied our client's program requirements within the constraints of the site, existing building, and sustainable building targets.

CONCLUSION

Whereas traditional consultant/subconsultant teams function at arm's length on a per-project basis, an integrated design studio promotes continuous involvement between

designers, significantly enhancing communication and collaboration. With a full understanding of the people and personalities within a team, architects and engineers are able to function as a unit to test major environmental impact areas such as building orientation, envelope selection, structural systems, and water efficiency.

As TWFP's studio grows and evolves, we hope to establish a new standard for integrated project teams and realize the full advantages of sustainable design within our built environment.

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