

A Better Approach



The most ambitious project I've ever worked on is a spectacular, über-green home in the foothills west of Silicon Valley. The owners, Linda Yates and Paul Holland, contacted me in May 2006 to request that I brief their project team on LEED for Homes, then in its prepilot stage. Six years later, in November 2012, I had the pleasure of leading a tour of the house as part of the U.S. Green Building Council's Greenbuild conference. I invited *Fine Homebuilding* editor Brian Pontolilo to tag along. Brian heard a lot that day about how an integrated process enabled us to achieve extremely high performance goals while building a very complicated house—without sacrificing sanity or our professional relationships. He asked me to share my insights here.

Off on the wrong foot

Not long after that initial conversation, I met with the project team at Hill-Glazier Architects (now HKS/Hill Glazier Studio) in Palo Alto. In attendance were architect Bob Glazier, a builder, a landscape

architect, a lighting designer, and an interior designer. I delivered the requested spiel about LEED for Homes, responded to questions, and was out the door in 90 minutes.

A few days later, Linda called to tell me they wanted their new home to be a model of sustainability—as green as possible in every conceivable aspect. She also wanted to reach for LEED Platinum. She asked me to arrange for expert guest lectures to help their team members—who had been selected for their design excellence rather than green expertise—achieve these goals. Recalling the set of plans I had seen in Hill-Glazier's office, I realized that these goals would be extremely difficult to achieve with a design that was well downstream.

"You don't need guest lectures," I told Linda. "You need triage."

I followed that diplomatic opener by explaining that optimizing green performance required an integrated approach that viewed the house as an assembly of interdependent systems, much like the human body. To integrate these systems successfully, we would have to revisit the design. Linda agreed immediately.

to Design/Build

How integrating design and construction made a really, really complicated home doable

BY ANN V. EDMINSTER



Next step in the right direction

Integrated project delivery (IPD), is an approach by which the design and construction phases of a project are concurrent and intertwined. Unlike the traditional approach, in which a project is designed on paper by one person and built later by another, IPD recognizes the interdependence between design and construction.

My prescription for Paul and Linda's project started with a two-day workshop, or charrette, in which the entire team would collaborate on setting concrete performance goals, scrutinize the current design, identify challenges, and set the course for the remainder of the project. I called upon Bill Reed of Regenes Group to run the charrette, and rounded out the existing team roster with structural engineer Bruce King and permaculturist Penny Livingston of Regenerative Design Institute in Bolinas, Calif. By the end of the charrette, our



Building on a good foundation. Through integration, general contractor Mike Martuscello and structural engineer Bruce King arrived at a pier-and-grade beam foundation that reduced carbon impacts by an estimated 30 tons and resulted in less environmental impact than that of the lighter mat foundation previously considered.

THIS TAKES PLANNING

The integrated approach played a significant role in the construction of the great room (photos right), where hydronic in-floor heating had to be routed around the large kitchen island, and a cathedral ceiling and massive range hood had to be reconciled with energy goals. Communication was also critical in the Girls' Lounge (photos below), where complications included huge retractable doors and a TV that disappears into the floor. Making this room work necessitated diligent communication not only between the architect, interior designer, and general contractor, but also between the structural engineer, the window manufacturer, the electrical engineer, the electronics consultant, the electrician, and the mechanical consultants who designed the radiant-heating system.





group of about 15 developed a set of specific performance goals for the project. Among many others, these included achieving net-zero energy; using only natural and nontoxic materials; creating a durable, long-lasting home; minimizing waste; and minimizing use of municipal water (see “Multiple goals complicate a project,” right).

We then assessed the existing design with respect to these new goals. Thumbnail calculations revealed an immediate challenge: With more than 14,000 sq. ft. of conditioned space, achieving net-zero energy was going to be all but impossible.

This realization, however, led us to our first gain from the collaborative approach: Working with the homeowners, we created a “family use” timetable that convinced them that not every activity required a separate, dedicated space. This led to a dramatic shift in the design and, with subsequent integration efforts, reduced the footprint to about 6500 sq. ft. We also oriented the building for better solar exposure and dramatically improved the enclosure design, resulting in a house that produces about a third more energy than it uses on an annual basis.

The team makes it work

Except for Bob Glazier, the entire cast of characters present at that first meeting in 2006 had been replaced by the time construction began in 2009. This happened gradually, and for different reasons, but most of these changes were by-products of the integrated process.

Communication and teamwork are vital in an integrated process. When one individual can't effectively communicate with the others, it can stall the entire project. If this problem can't be resolved, that team member needs to be replaced. Another red flag is a team member's unwillingness to buy into the project goals, including budget.

I used to believe that if the integrated process were effectively run, the desired outcomes would be pretty much automatic. Looking back on this project, I would add that this is true if the right team is assembled. That means that each member is experienced in high-performance projects, is creative, and most important, is fully committed to the integrated process. If a team member is found not to play well with others, he or she must be replaced.

Integration in action

Also critical to the success of IPD is having someone designated to orchestrate the process. You can call this person the integration facilitator, guru, ombudsman, or den mother (that's what they called me). It may be someone already on the team, such as the architect, owner, or builder. If none of those individuals have prior experience in this role and adequate time to handle it, assign someone else the task.

Here's how it worked: As the builder, the architect, or a consultant on the project identified an integration problem, that person would notify me. After deciding who should be involved, we'd convene a meeting (often by phone or computer; see “Online tools enable collaboration,” p. 78) to resolve the issue.

Facilitating these meetings, particularly when they're over the phone, is a learned art. Everyone needs to be heard, so it requires both setting a pace, so that people don't talk over each other, and drawing out those who may be inclined to hold back. Bystanders are not allowed; if they're in the meeting, they're there for a reason. This can mean calling on someone: “Ron, we haven't heard from you. What's your view of the approach we're discussing?” I've found that silence often indicates some level of disagreement, so the silent person's input

Multiple goals complicate a project

The project's initial planning meeting in May 2006 produced an exhaustive list of ambitious goals that directed the project.

BIG PICTURE: OFF SITE

- Potential best in class
- Inspirational to others
- Bringing green to mainstream

BIG PICTURE: ON SITE

- Net-zero annual energy (primarily passive)
- Minimize mileage for services
- Minimize flows of food and tank fuel
- Hydrological invisibility (no input/output pipes)
- No irrigation
- No chemicals on site
- Shoe-free environment (storage space at entrances)

ENERGY CONSUMPTION

- Net-zero energy
- 100% passive space heating, domestic water, air movement, and pool load
- Minimize plug load
- Limit lighting to 1w per sq. ft. indoors, ¼w per sq. ft. outdoors

TOXICITY

- Life-cycle consideration of all materials
- Minimize VOCs in adhesives and coatings
- No wall-to-wall carpeting
- Radon mitigation
- Zero-VOC paint
- Nontoxic pipe and conduit

GENERAL PRINCIPLES

- Durability
- Adaptability
- Efficiency
- Optimum-value engineering

continued on p. 79

Online tools enable collaboration

Getting three or more busy people in the same room at the same time can be an impossible challenge. Luckily, cloud-based collaboration software represents a vast and growing resource to help IPD-team members collaborate effectively even when they're working from multiple locations. Here are a few of the programs and platforms I use.

SCHEDULING

Especially for large teams, the logistics of scheduling meetings or calls can be a major barrier to collaboration. Online utilities such as Doodle, a free app that enables you to quickly poll participants for their availability, can simplify this task greatly.

NOTE TAKING

The leader here is Evernote, a cloud-based repository for notes, websites, images, and even voice recordings, that makes them available across all your devices and (for a small fee) to your team.

FILE SHARING

Platforms such as Google Drive, Dropbox, Basecamp, Central Desktop, and All-In ensure that team members have access to the same ver-

sions of key files. Basecamp is my favorite. Although there are things I like better about Central Desktop, Basecamp is inexpensive, is glitch free, and has enough functionality without being too complicated.

VIRTUAL MEETINGS

Virtual meetings are useful supplements to in-person gatherings. I use GoToMeeting for large groups, and Google Hangout for small, informal chats. JoinMe is another option.

IMAGE LIBRARIES

For simple photo-sharing, I'm a fan of Smugmug. For additional features such as tagging, organizing, and displaying images from a wide variety of sources, I'm partial to Pinterest.

BRAINSTORMING AND DATA MAPPING

A host of cloud-based applications enable remotely located team members to work more visually, and sometimes in real time. Two examples are MindJet, a "mind mapping" package, and Gliffy, a diagramming tool that allows users to collaborate through visual tools such as floor plans, flowcharts, and technical diagrams.



is required to iron out the kinks. It's a consensus-based process rather than a democratic one. We don't move on until everyone is reasonably comfortable with the solution.

One characteristic of the integrated-delivery process worth noting is that design issues have a tendency to pop up repeatedly, a point I like to emphasize in my talks by comparing the process to a spiral staircase that circles back on itself repeatedly as it moves upward. The reason issues resurface is that they haven't been fully resolved. It's a natural and desirable phenomenon, because as understanding grows, new questions arise. I encourage teams who are tackling integrated delivery for the first time to cultivate a tolerance for déjà-vu. It means the system is working.

High performance demands IPD

It's my belief that if you don't adopt an integrated approach on an ambitious project, you're wasting your team's expertise. Skilled professionals will produce their best work only by integrating the insights, experience, and creativity of their fellow practitioners; IPD provides the fertile ground for that to happen. Whether your project

is a relatively modest Passive House, a deep-energy retrofit, or an über-green home on the scale of Linda and Paul's, an integrated process can yield major benefits.

A project doesn't have to be bleeding-edge, however, or involve this large a team roster to benefit from an integrated approach. I've engaged numerous teams in various degrees of IPD, always with tangible benefits that were acknowledged readily by the owners and other players involved.

Does the process scale down for a smaller or less involved project with fewer experts on board? Yes, as long as you don't also scale down your commitment to an approach that engages the whole team. Just as no design is ever complete until someone declares it so (not because there are no further aspects to perfect), so is integration never perfect. That said, it is crucial to enter a project with the desire and intention to pursue integration to the greatest possible degree. If you set a less ambitious goal, you'll fall short of that, too. Isn't all of life that way? □

Ann Edminster is an environmental and energy-design consultant, lecturer, and author.

continued from p. 77



Not so simple. The visual simplicity of this broad opening, which transforms the living room into an open-air entertaining pavilion, belies the complexity of the underlying design.

- Least surface area for volume enclosed
- Structure as finish
- Maximum benefit with minimal impact
- Multiple functions in spaces and materials
- Keep materials and assemblies simple; minimize processing
- Replace conventional products and materials with better alternatives
- Local sourcing

WASTE/RECYCLING

- Divert 90% of construction and demolition waste
- Recycling stations throughout house

SITE WORK

- Balance cut and fill
- Reduce retaining walls

WATER

- No water runoff from site
- Use no more water than falls from sky
- Super low-flow fixtures
- Limit use of municipal water for potable water
- No irrigation except by cistern, drip irrigation, and infiltrators
- Treat black water on site; charge bog with outflow
- Minimize pipes
- Recirculating water system

MATERIAL

- FSC or reclaimed wood
- High-fly-ash concrete
- Green roof (rejected later)
- High-performance doors and windows

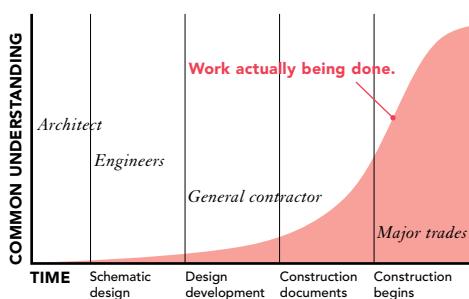
HABITAT MAINTENANCE

- Wetland as filter for pool (rejected later)
- Increase biodiversity
- Permaculture zonation
- Edible landscape

IPD at a glance

One of the best explanations I've seen comparing IPD to the typical design-and-then-build process is presented in these two graphs by lawyer Will Lichtig. As the second graph shows, common understanding is achieved early in an integrated process and is maintained at a peak throughout the project—in contrast to the conventional approach, in which the team arrives at a common understanding about the same time they're moving on to the next job.

TRADITIONAL PROJECT DELIVERY



INTEGRATED PROJECT DELIVERY

