Build as One

A practice methodology for the building industry

by Huw W. Roberts, AIA, CSI
Global Marketing Director,
Bentley Building

The building industry has long delivered projects in a very fragmented value chain. This fragmentation divides the various project stakeholders, which include multiple design disciplines, constructors, and facility owners and operators. Fragmented practices in all these domains are reflected in the technical services provided as well as the business models adopted for delivery of those services.

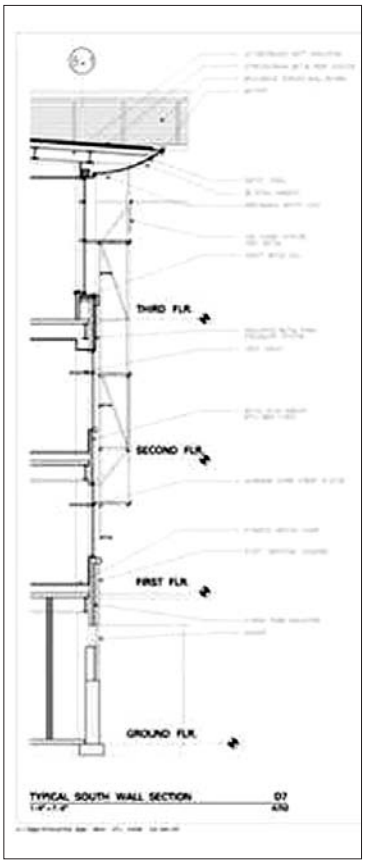


Image courtesy of Morphosis
All drawings are fully coordinated.

This fragmentation falls into three categories:

1. Teams are fragmented into disconnected people

The people within a building enterprise have trouble performing as a multidisciplinary team throughout the design, construction, and operations phases of the building's lifecycle.

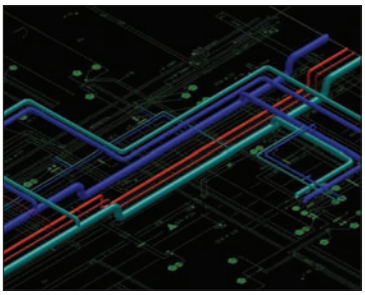
2. Processes are fragmented into disparate tasks

Practices, management, measurement, and activity are aimed at optimizing individual tasks within the project endeavor, rather than at optimizing the entire process. Typically, the best that can be hoped for is optimization of the aggregation of tasks within one fragment of practice.

3. Fragmented tools are applied in lieu of integrated solutions

The fragmentation is reflected in the disconnected tools and technologies that have arisen within these silos of practice

This fragmentation prevents integration of critical project information that needs to be shared among stakeholders, resulting in significant inefficiencies, errors, and lost opportunity. According to a recent U.S. National Institute of Standards and Technology report **(www.bfrl.nist.gov/oae/publications/gcrs/04867.pdf)**, this lack of integration costs the U.S. building industry nearly $16 billion each year.

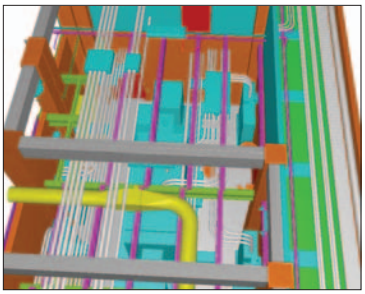


Drawings and the model are always synchronized

In large part, these costs come about because the disciplines, companies, and phases that make up major building projects traditionally operate in business structures that manage liability relationships and compartmentalize benefits - rather than fostering project optimization. The processes and technologies that support this traditional approach typically aren't integrated, making it difficult or impossible to synchronize the efforts of people working on the project. As a result, many of these projects:

- Waste time
- Risk quality
- Limit profitability and competitiveness

Time is wasted



Coordinate the work of multiple disciplines.

When decisions are made as a result of numerous serial information exchanges, rather than in a shared and mutually informing environment, duplication of effort is inescapable. That's why fragmented teams of engineers and architects often waste a great deal of valuable time reentering each other's data. Likewise, fragmentation can require design teams to wait for information to move among widely dispersed team members, and force all disciplines to check and double-check documents to make sure the most up-to-date version is used. Of course, all of this wasted time is spent in lieu of productive design time, limiting design iterations that might have produced better or more cost-effective design options.

Quality suffers

Managing conflicting design requirements across multiple disciplines always presents challenges. However, poorly coordinated information results in mis-communication, redundancy, conflicts, errors, and omissions - any of which can corrupt or obscure design intent. In some cases, changes made in one discipline simply aren't well communicated to other disciplines affected by the changes. And in all cases, when multiple disciplines aren't working from the same information, quality suffers due to poor coordination.

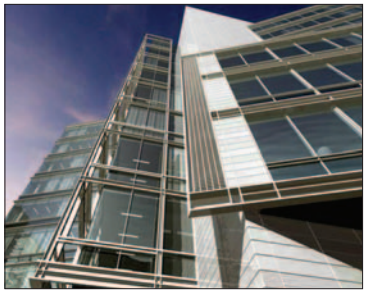
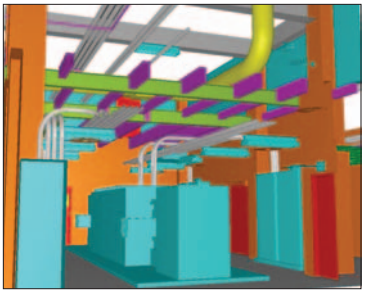


Image courtesy of Burt Hill Kosar Rittelmann
Effectively communication design intent before construction.



Comprehensive mechanical, electrical and plumbing design.

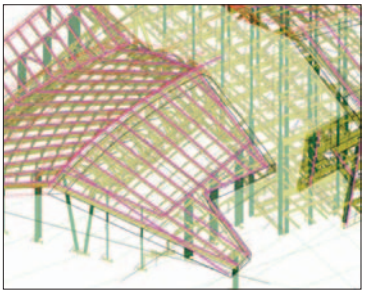


Image courtesy of Morphosis.
Coordinate structural models, drawings, and engineering analysis.

Needless costs

Time is money. So is quality. Fragmentation wastes time and puts quality in serious jeopardy. Frequently, project-hours are wasted as a direct result of quality issues - spent, for example, in the remediation of errors and omissions. Or the culprit might be nonproductive efforts, such as rechecking that design intent is properly documented. Fragmentation can also lead to slower delivery of service, less efficient deliverables, lower quality of work - and ultimately, to higher costs and less competitive bids for design and construction.

Put simply, inefficient and costly fragmentation throughout the building lifecycle makes it difficult for people, organizations, tasks, and tools to be integrated across the design/ construct/operate value chain. Because of this, time is wasted, quality suffers, costs increase, and profitability and competitiveness are put at risk.

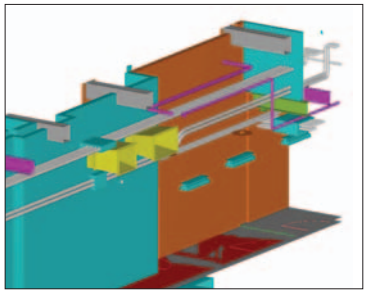
What if there were a better way to build?

However, what if there were a way to enable architects, engineers, contractors, and owners to work in unison throughout the building lifecycle? What if there were a unifying platform that provided integrated applications for multiple disciplines, all in an environment that managed information, its distribution, and its availability?

Such a condition would unite rather than divide. Tools would connect to each other. Information would be confidently shared, synchronized, and secured. People, regardless of location or discipline, would have the right information to make the best decision for their task at hand. They could easily navigate project information in the most appropriate context, to most effectively design and deliver buildings of the highest quality, and do so profitably. Building owners could reuse this project design knowledge and AEC content throughout the building lifecycle for operations and management of the completed building.

Image courtesy of Morphosis. Quickly and efficiently present design on screen, on paper, or in models.

Image courtesy of Morphosis. Understand the building in its context.



Analyze part of the building in detail.

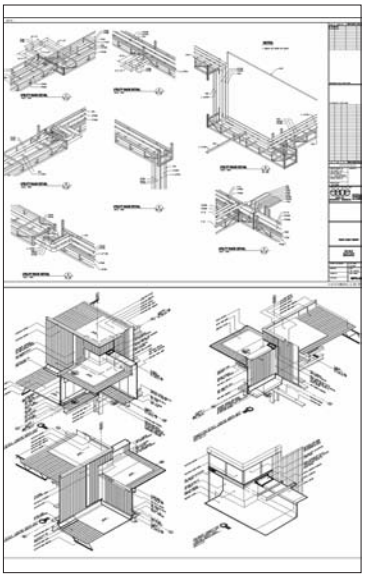
People and organizations would be empowered as teams - teams that manage and refine processes rather than micromanaging tasks. Redundancy, data loss, miscommunication, and design errors would be reduced. Project schedules would be optimized, project costs would be properly managed, and project quality would increase. Thus, business initiatives would be advanced and problems associated with fragmentation would be avoided.

Less time is wasted

With this unifying approach, less time would be wasted on design, documentation and construction, increasing the opportunity for design iterations. The pace of information exchange between disciplines would be accelerated, making it possible for team members to quickly get the information they need from others - when they need it - in order to make sound decisions. Architects, engineers, and contractors wouldn't have to spend valuable time reentering each other's information, giving them more time to devote to productive tasks. And all members of the project team would be empowered to consistently coordinate late design changes, saving still more time and, ultimately, money. Equally important, reducing the amount of time wasted would enable construction fast-tracking, well-managed schedules, and design-build approaches.

Increase the quality of work

The quality issues that come with fragmentation would be effectively addressed in a unified, managed environment. There would be improved coordination among documents, disciplines, and teams, ensuring that all disciplines are working with the same information. There would be fewer errors and omissions because layouts and configurations would be effectively coordinated among multiple design disciplines. Consequently, changes made in one discipline could be immediately communicated to other disciplines that might be affected by the changes. Likewise, conflicting design requirements across multiple design disciplines would no longer pose as great a challenge, since everyone would always be on the same page and design intent would always be captured effectively. In general, the entire design process would be enhanced through an informed design environment, and the end result would be increased quality.



Images courtesy of SSOE
3D details effectively communicate complex conditions

Enhance project profitability and competitiveness

Time and quality are money. Improving performance on both improves a project's financial performance. Goals include effective use of hours worked, providing efficient deliverables, lowering error and omission remediation costs as well as contingencies and insurance premiums, speeding delivery service, providing a more competitive quality of work, and implementing tighter bidding for design construction.

Build as One

Imagine multiple disciplines working together as a team throughout the building lifecycle, integrating their tasks into effective processes, applying solutions that support their objectives, and synchronizing the project information to make more informed decisions on the way. The result: better buildings.

'The future is already here — it's just not very evenly distributed' [1]

There is a better way to build. Today, building enterprises around the globe are applying these practices and the technology solutions that enable them.Bentley is proud to provide these solutions, and to support these enterprises as a trusted provider. Architecture, engineering, construction, and building operation practices would be well-served to learn about these successes and the technology solutions that enable them, and evaluate how these successes and solutions relate to practices, challenges, and aspirations as firms move to build as one.

Footnotes:

1. William Gibson, "Talk of the Nation," National Public Radio, Nov. 30, 1991.
2. See www.be.org for information on highly successful projects and firms applying the practices and technologies to build as one.
3. See www.bentley.com/bim to learn more about the benefits, methods, and technologies that empower architects, engineers, constructors, and operators to build as one.