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Integrated Project Delivery: Case Studies



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For more detailed background information on IPD, visit www.ipd-ca.net and refer to *The Integrated Project Delivery Guide*, jointly developed by the AIA’s Integrated Practice Discussion Group and AIA California Council, and *Integrated Project Delivery: A Working Definition*, published by AIA California Council.

For information on existing project delivery methods, see the AIACC’s *Handbook on Project Delivery*.

Table of Contents

Introduction

PAGE 5

Case Study Scorecard

PAGE 9

Case Study: Autodesk Inc. AEC Solutions Division Headquarters

PAGE 10

Case Study: Sutter Health Fairfield Medical Office Building

PAGE 17

Case Study: Cardinal Glennon Children's Hospital Expansion

PAGE 25

Case Study: St. Clare Health Center

PAGE 31

Case Study: Encircle Health Ambulatory Care Center

PAGE 38

Case Study: Walter Cronkite School of Journalism, Arizona State University

PAGE 45

Conclusions

PAGE 53

Glossary

PAGE 57

About the Researcher

PAGE 58

Acknowledgements

PAGE 59

CASE STUDY: CARDINAL GLENNON CHILDREN'S HOSPITAL EXPANSION

St. Louis, Missouri

Project Description

The project is a 138,000 square foot, \$45.5 million children's hospital expansion consisting of a surgical suite, a 60 bed neonatal intensive care unit (NICU,) a central sterile unit, 10 new surgical suites, 10-bay post-anesthesia recovery rooms, a video integration system, and shell space for future relocation of radiology and laboratory functions. The operating rooms are designed to be reconfigured without demolition to accommodate future needs and may be reassigned among surgical specialties as service volumes increase or decrease.

Owner:	SSM Healthcare	www.ssmhc.com
Architect:	Christner Inc.	www.christnerinc.com
MEP Engineer:	McGrath Inc.	www.mcgrath-inc.com
Builder:	Alberici Constructors, Inc.	www.alberici.com



Early Involvement of Key Participants

This was the first IPD experience for owner, architect, MEP engineer and builder. The decision to use IPD was made after architect, engineer, and builder were on board and design work had begun. Christner, McGrath and Alberici had prior working relationships with SSM and with each other. Christner had designed the Phase I bed tower for the hospital. Structural engineering was provided by Christner's consultant.

Shared Risk/Reward

SSM, Christner, McGrath, and Alberici were on board and the project was well into design development when the decision was made to switch to IPD. Christner was engaged under a typical owner-architect contract and Alberici was anticipating a typical CM-at risk arrangement.

SSM had conducted a "lean seminar" with guests from the Lean Construction Institute and partners from the St. Louis design and construction community. The Cardinal Glennon team was there and they challenged each other to try these ideas on their project. Tim Gunn, Project Director for Alberici, said "we raised our hand and said: this is a small project, let's try it." Donald Wojkowski, SSM's Executive Director Design and Construction, quickly agreed.

An Integrated Form of Agreement, (IFOA) based on the Sutter Health model, was negotiated by the team with assistance from SSM's attorney, Tim Thornton of Greensfelder. It is planned to be a model document for all future SSM work. Because the project was already under way with a traditional structure, it was too late to use some of the early steps encouraged by IPD. Nevertheless, and in contrast to the later St. Clare project, financial incentives for achieving project targets were used with the money funded from unspent contingencies. Tom Van Landingham, Christner's principal in charge, said "financial incentives are absolutely the key to the success we had. "

About \$400,000 was saved out of the approximately \$1 million contingency. The incentive pool was distributed as follows:

40% to owner

20% to design team

40% to builder and lean partners (MEP/FP and drywall)

With respect to incentive pools, attorney Will Lichtig observes, "There will always be carrots and sticks in the way we deliver projects. We can't always be smart enough to know that what we offer as a carrot or a stick will not have unintended consequences. We want to make sure that whatever economic system we put in place will not prevent a person from always doing what is best for the project and not any individual participant."



Multi-Party Contract

The IFOA is a four-way contract among the owner, architect, MEP engineer and builder. Each party is held accountable to each other as equal partners. Architect and builder combine their contingencies and are jointly responsible for construction errors and design omissions. All books with regard to the project were open. “Lean partners” (i.e. subcontractors inside the risk pool) included MEP, wall and ceiling framing and finish, and fire protection subcontractors. Smaller pieces of the work were bid out with fixed prices.

Collaborative Decision Making/Control

The IFOA established an IPD Field team and a Core Team to manage the project. The Field Team brought together a rolling cast of mid-level project participants at frequent intervals to resolve routine issues. The Core Team, made up of the owner, architect, engineer, and builder, plus the “lean partners” who had a stake in the incentive pool, met weekly to resolve issues and make most decisions. Above the Core Team level, however, decisions were made by the owner’s management team at their discretion, albeit infrequently and with great restraint.

Christner’s Tom Van Landingham felt that the Core Team was highly motivated to find the optimum solution for the project. “We supported each other and looked out for each other. ‘I win-you lose’ was not an acceptable outcome for this project.”

One interesting example tested the collaborative management concept and showed its validity. During concrete placement, the builder proposed that concrete maturity testing (CMT) be used to measure strength as opposed to the traditional method of successively testing cylinder samples. With CMT, sensors are embedded in the concrete and data is read from the outside. The advantage is that forms can be stripped earlier and time saved. Although this technique has long been used for pavement testing, it was a relatively new concept in structural concrete. Owner, architect, structural engineer, and builder discussed it, weighed the benefits and risks and ultimately decided against it. As Tim Gunn of Alberici said, “With this process, it’s important to reach consensus. You just can’t push people beyond their comfort level!”



Liability Waivers Among Key Participants

There was not a “no-sue” clause in the IFOA. Each party carried typical general and professional liability insurance.

Jointly Developed/Validated Targets

The budget and scope had been established by the same project team as part of an earlier campus master plan. Since IPD was implemented after the project was well into design, this criterion does not strictly apply.

Narrative

Donald E. Wojtkowski, SSM Healthcare’s Executive Director Design and Construction, first learned of IPD and lean construction by attending the Sutter Lean Summit in 2004. After a long career developing healthcare projects he was particularly attracted to the notion of relational contracting. He felt that healthcare projects in particular were not well served by the traditional design-bid-build process due to their complexity, lengthy schedules and the need for flexibility. He felt that the traditional process was too much about risk-shifting to the detriment of project value. To that end, in late 2004 he invited lean construction advocate Greg Howell of UC Berkeley to come to St. Louis for a two-day seminar involving SSM and its partners, including architects, engineers, general and specialty contractors.

SSM Healthcare as an organization was already committed to Continuous Quality Improvement and it was a natural transition to apply “lean operations” principles to its capital programs. In 1989, CEO Sister Mary Jean Ryan began to adopt methods derived from the Baldrige Healthcare Criteria for Performance Excellence to apply whole systems thinking to hospital operations.

The NICU project needed to transition from a 44-bed open ward to 60 private patient rooms without increasing the existing staff. Christner led a highly interactive process with NICU staff to better understand the implications of this new nursing configuration. The design team built a full-scale room mock-up and simulated staff working conditions to be certain that everything in the unit would function as planned.



BIM was not used extensively in design. In 2004, Christner and McGrath were still working in 2D AutoCad. There was a desire to use BIM to model building systems but there were incompatible software platforms all around the table. Much of the coordination was done by experienced field personnel and engineers poring over light tables. In spite of the low-tech approach, the incentive system gave the contractors nothing to lose and everything to gain by finding and fixing clashes as early as possible.

Lessons Learned

Christner is looking for the opportunity to use IPD again, but according to Tom Van Landingham “You need scale and sophisticated management. You need a self-selected team. You’re challenging the owner to get deeper into their own project. In the field of healthcare there is a nice synergy between lean operations and IPD.” Christner has since transitioned to BIM and expects it to support future IPD projects.

The owner felt that “relational” contracts based on the Sutter model try too hard to dictate behavior. SSM felt that similar results could be achieved through the use of standard contracts but with addendums spelling out expectations with regard to collaboration and lean methodologies.

Challenges that arose during construction could be dealt with more effectively with open and transparent, cooperative management. After the first elevated floor deck was in place, the field crew discovered a serious conflict between rebar in the flat slab and plumbing sleeves that needed to penetrate the slab to serve the NICU rooms. In the course of a “huddle” aimed at finding a solution it was realized that the conflict could be avoided by shifting the entire plan 3 1/2” with respect to the column grid. “How likely are architects and engineers going to volunteer to make that kind of design change in the middle of construction?” asks Tom Van Landingham. But because the designers were incentivized to be part of the larger team they were able to make the necessary design and coordination changes in just three days. In the end, the project was occupied six weeks earlier than planned.

Photograph by Sam Fentress



Project Data

Project name and location	SSM Cardinal Glennon Children's Medical Center Surgery and NICU Expansion St. Louis, MO	
Building type	Hospital expansion	
Project description	The expansion included a central sterile unit, 60 neo-natal intensive care unit (NICU) rooms, 10 surgical suites, 10-bay PACU, PACs and a video integration system. 10 new operating rooms, an all-private room Neonatal Intensive Care Unit, new Central Sterile and shell space for future relocation of Radiology and Laboratory.	
Owner	SSM Health Care	
Year begun	October 2004	
Year completed	August 2007	
Form of agreement	Multi-party contract	
Architect	Christner, Inc	
Structural	Christner, Inc	
MEP	McGrath, Inc.	
Landscape Arch	N/A	
Other designer	N/A	
Builder	Alberici	
MEP	Corrigan Co (M&P) Kaiser Electric.	
Major subs	TJ Wies (Walls and Ceilings) Engineered Fire Projection (Fire Sprinklers)	
Initial schedule		
Design	Design information not supplied	
Construction	August 2005 to October 1 2007	
Achieved schedule		
Design	Design information not supplied	
Construction	August 2005 to August 2007 (NICU moved Sept 11, 2007)	
Programmed GSF		
Final GSF	138,000 SF	
Budget cost		
Design ¹	Design information not supplied	
Construction ²	\$47,000,000	
Contract cost		
Design ¹	Design information not supplied	
Construction ²	\$45,572,449	
Final cost		
Design ¹	Design information not supplied	
Construction ²	\$45,572,449	
Change orders		
Owner-initiated	0	
Other	0	
RFIs	63	
Sustainability Goal	N/A	
Sustainability Achieved	N/A	

¹Total design fees including all subconsultants and owner-selected consultants.

²Construction hard costs excluding furniture, fixtures, and equipment (FF&E) but including general conditions, CM fees including preconstruction services.