UCSF Medical Center at Mission Bay

Implementing Change Without Making Sacrifices

Today's fast-paced, highly competitive marketplace requires both the flexibility and the ability to incorporate and adapt to change quickly for success.

That was abundantly clear with the $1.5 billion UCSF Medical Center at Mission Bay in San Francisco, an 878,000-sq.-ft. facility comprised of three hospitals:

- Benioff Children's Hospital,
- Bakar Cancer Hospital and
- Betty Irene Moore Women's Hospital.

The planning, design and construction of a large, complex healthcare facility from the ground up may easily span a decade, especially in California that has a state agency responsible for reviewing and inspecting the construction and renovation of hospitals and skilled nursing facilities. During that time, medical and technological advancements will change equipment and systems, as well as patient treatment and recovery, which all can impact a project.

One major scope change was reprogramming 175,000 sq. ft. of the outpatient building for a change in patient services. "Everything we were building was with the patient in mind," said J. Stuart Eckblad, Executive Director of Major Capital Projects for UCSF Medical Center. "About halfway through construction, we had $55 million worth of changes as a result of how healthcare services, patients' needs and equipment had changed over the many years of planning, design and construction. We were able to make those changes without impacting the budget or schedule. And we improved the quality of the facility."

The final results were $200 million in savings, improved quality, and completion eight days ahead of schedule for an on-time Feb. 1 opening.

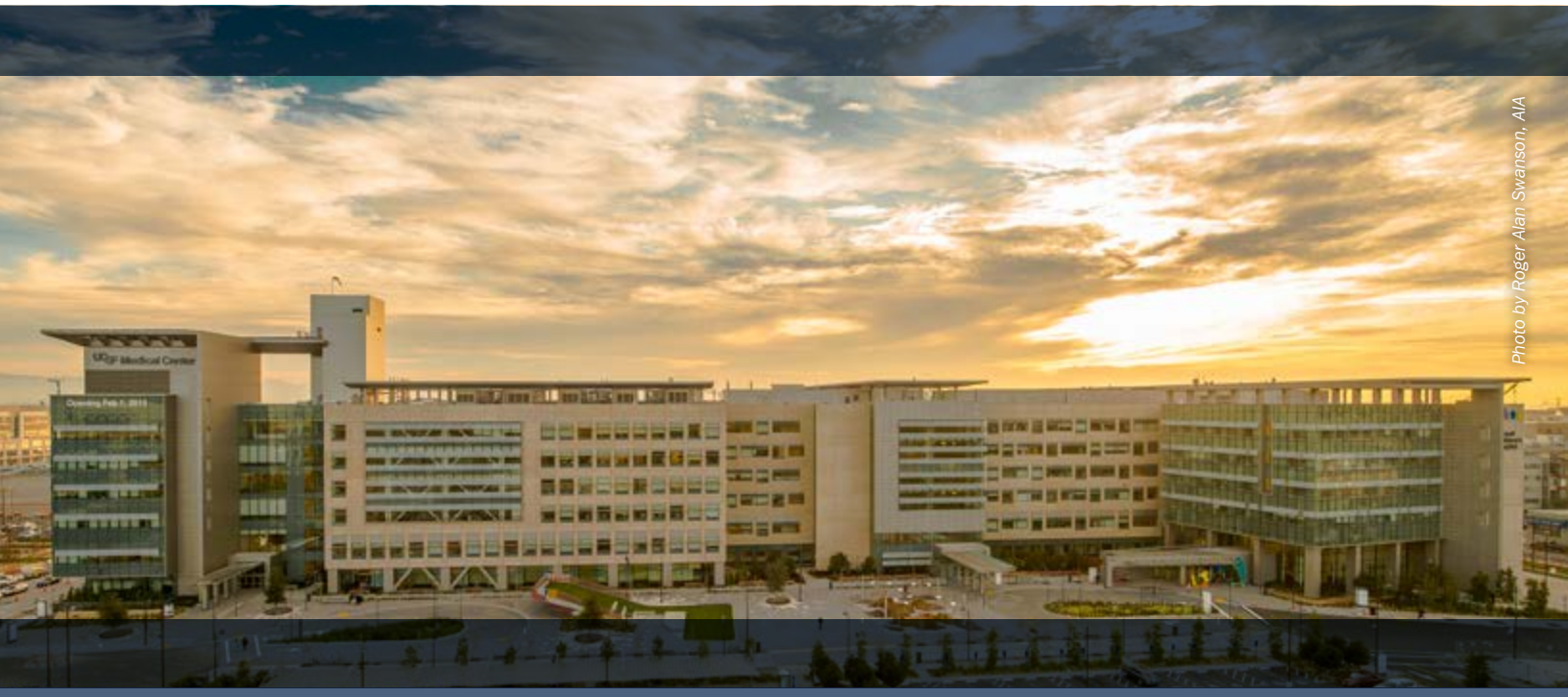
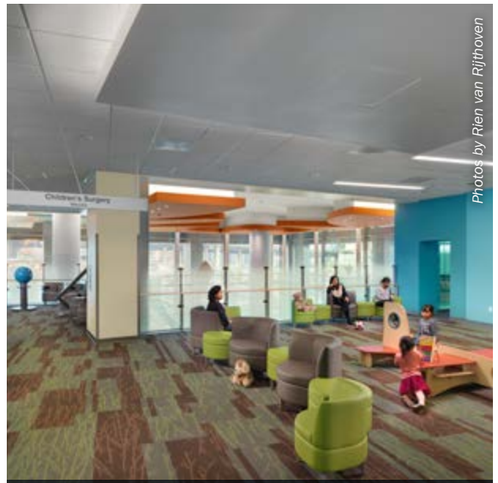
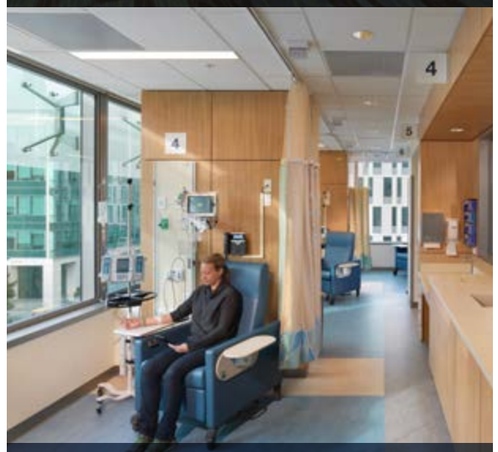


Photo by Roger Alan Swanson, AIA

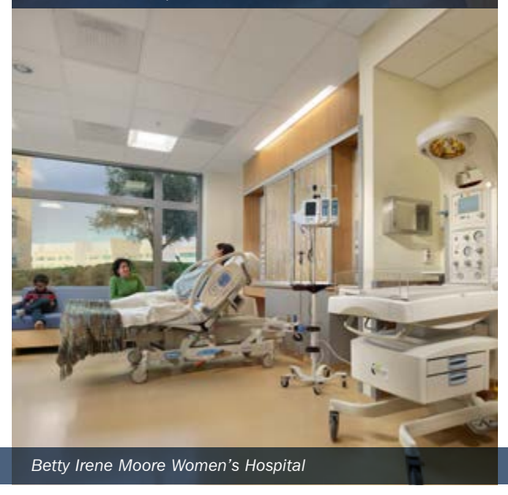


Photos by Rien van Rijthoven

Benioff Children's Hospital



Bakar Cancer Hospital



Betty Irene Moore Women's Hospital

Collaborative Behavior: Building the Integrated Approach

Because the UCSF Medical Center is a public-sector project, UCSF was unable to adopt a multi-party contract where the risks and rewards are shared among the owner, designer and contractor. Such a contract is often considered crucial to creating an integrated team equipped to accommodate change, reduce cost and schedule while maximizing scope, quality and performance—all the things UCSF sought.

"One of the major elements in being able to be flexible for change is having a collaborative team, an integrated team," said Eckblad.

UCSF was able to create the integrated team and extraordinary results focused on the best interest of the UCSF Medical Center project without a tri-party agreement. Creating the team required defining the rules of engagement, setting expectations, communicating vision and co-locating in the Integrated Center for Design and Construction (ICDC).

One of the most effective ways to build collaboration and enhance communication among the 250 key owner, architect, consultant, engineer, contractor and subcontractor participants was to have them co-locate in the ICDC months starting in the design phases.

At first, "people, who were sitting 50 feet away from each other, were [electronically] pinging people with questions," recalled Jack Poindexter, DPR's project executive. "You had to get up out of your seat, grab them, and say, 'Come on. We're going to talk about this and figure this thing out.'"

The project team formulated rules of engagement, aimed at fostering collaboration and efficiency. These "rules" were reevaluated and updated throughout the project. Among the core rules were:

CO-LOCATING

Making the Big Room Better

Co-locating teams in an "integrated big room" has already paid off on projects, but recent research shows that strategic collaboration can further enhance productivity and potentially garner even greater savings. "Making the Integrated Big Room Better," a whitepaper by DPR's Atul Khanzode, examines the flow of information within an integrated big room to better understand team interactions. Using data from a large-scale hospital projects revealed interdependencies and complex workflows between team members. Following are some recommendations for success based on experience and research:

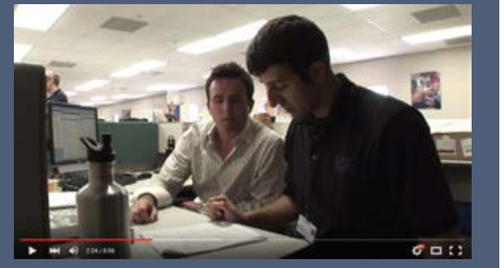
10 INSIGHTS TO BIG ROOM SUCCESS

1. Right technology: Build a technology infrastructure to support needs (i.e., Smartboards, collaboration platform such as Projectwise, etc.).
2. Organize by clusters: Arrange people not by company but by production team or clusters (i.e., MEP team for particular scope sits together).
3. Well-planned meetings: Develop detailed agendas that include topic, time, primary facilitator and required attendees for all hands meetings. Not everyone has to sit through every part of every meeting. Use models as much as possible during meetings.
4. Time to work: Schedule time for production work…a no meeting time!
5. ICE, ICE, ICE!: Encourage integrated concurrent engineering (ICE) sessions and plan them.
6. Daily huddle: Gather every day to address any latency issues and adjust teams accordingly.
7. Respect time: Recognize team members who have a smaller role and align meetings to take advantage of their expertise when they are in the big room.
8. Be practical and tactical: Allow for tactical organizational issues to be considered. For example, update numbers for target value design one week and MEP another week to facilitate rapid cost feedback but not every week to give teams time for production work.
9. Use a parking lot: Park items to stay on track and tackle later.
10. Plan the space: Provide lots of open wall space for process planning and displaying of public metrics. Have small rooms available for smaller meetings (4-6 people) and larger conference rooms for all hands meetings.

MULTIMEDIA

Building of an Integrated Big Room

On the UCSF Medical Center at Mission Bay project, the integration of different firms in one location played a pivotal part in the project's success. By having access to everyone involved with the project, issues that would normally take days to be resolved could now be addressed within minutes. Watch to learn more about how the team co-located:



- No emailing until documenting
- No remote participation
- Resolve simple issues at the lowest possible level in 30 minutes or less
- Resolve more complicated issues in 2 days or less
- Set metrics for measuring accountability

"As people changed, as the project grew, as the issues we were dealing with grew more complex, we had to evolve with it," explained Laurel Harrison, Stantec's project director. "But because we had this culture established and we were using the information that we were gathering to monitor it, it was relatively easy to make those adjustments."

In addition, laying out expectations from the beginning was crucial, particularly the fact that changes are certain to occur, and that the best interest of the project is everyone's goal.

"What's best for the project is what's best for the patient, what's best for the visitor, what's best for the staff," said Eckblad. With that viewpoint, "you can actually get people really lined up to think differently about change."

To keep the project team motivated, milestones and challenges were set and woven into the schedule. For example, in 2012—a couple of years into construction—UCSF Medical Center boldly set such a milestone by hanging a huge sign on the side of the facility that read: "Opening February 1st, 2015."

"Three years before we're supposed to open the building, I walk out of the trailer and see the date on the side of the building," said Poindexter. "That's pretty exciting."

And, it "was a key to our success to get people focused," said Eckblad.

Effective Processes

The project team together developed formalized processes to encourage a working environment conducive to collaboration and creative ideas, resolving issues and making decisions quickly, dealing with changes efficiently and effectively, and devising a needs-based assessment strategy.

One of the most effective processes, which removed a big stumbling block to decision making, was mandating that all discussions about a change or an issue be separate from the discussion of entitlement and have people focus on what is best for the patient. That "was the catalyst for our team to be able to adapt and work together on changes," said Eckblad.

The project team implemented several other formalized processes to align the team members to work collaboratively.

Specialists within the project team would evaluate so-called project modifications and innovations (PMIs), which provided

PROJECT MODIFICATIONS/INNOVATION (PMI)

Design Modifications within Budget

610 PMIs

- STRUCTURE
- **ELECTRICAL**
- SKIN
- **MECHANICAL**
- INTERIORS
- PLUMBING

REDUCED CONDUIT, WIRING AND CIRCUITS BY 3,000 LINER FEET

$500K IN SAVINGS

REDUCED DUCTWORK BY 100,000 POUNDS AND PIPING BY 7,000 LINEAR FEET

$2M IN SAVINGS

TIMELINE

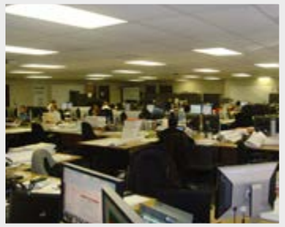
May 2007
UC Regents approve fundraising campaign for UCSF Medical Center at Mission Bay

Sept 2008
UC Regents approve design, budget and environmental plans for UCSF Medical Center at Mission Bay.

May 2009
Team co-locates on the site and begins virtually building the UCSF Medical Center at Mission Bay

Oct 2010
A groundbreaking ceremony celebrates a future "iconic landmark of healthcare, built from the ground up."

Oct 2011
A topping out ceremony celebrates the last bar of steel placed atop UCSF Medical Center at Mission Bay.



TIMELINE

Dec 2012
The exterior skin of the building and a rooftop helipad are completed.

Jul 2013
Rough in work is completed on levels one through four.

Aug 2014
Construction is finalized, on schedule and under budget.

Sep 2014
Equipment installation and testing begins to ensure hospitals are ready for service.

Feb 2015
UCSF Medical Center at Mission Bay is open.

Photos by Rien van Rijthoven, Matt Pranzo and courtesy of UCSF Medical Center

a way for anyone to suggest a change or an improvement that could enhance scheduling efficiency, cost savings or sustainability, but not at the expense of the project's scope, functionality or quality. The aim of PMIs was to reduce costs or schedule by finding more efficient ways to meet the scope of the design, rather than reducing costs by reducing design scope.

"It's a process that allowed those decisions to be aired and vetted by a huge cross-sectional team so that everyone was committed to executing those decisions and appreciating the improvements we were making to the project, not grumbling about change," explained Harrison.

Groups within the project team came up with 610 PMIs, saving $200 million in the process. PMIs ranged from those working in the areas of structure, electrical and skin saving $500,000 by eliminating 3,000 linear feet of conduit, wiring and circuits to the mechanical, interiors and plumbing group saving $2 million by eliminating 100,000 pounds of ductwork and 7,000 linear feet of piping.

Although the project came in $200 million under budget, "we had many things that actually increased the cost," said Eckblad. "We in fact improved the quality through this process."

The Project Solutions Group, comprised of all disciplines and trades, convened daily to listen to ideas and requests for changes to make the project or the process of building it better. The goal was to resolve issues and implement solutions and/or change as quickly and efficiently as possible for the good of the project. Direction was given solely on the basis of value and good for the project regardless of the funding source.

The Dialog Alignment Meetings provided a forum for frank discussion on how to pay for changes, disputes and entitlement issues, sharing savings, contract issues, risk allocation and other big issues. The discussion focus was solely on resolution. Finger pointing was not allowed. "In the end, we didn't have any claims," noted Eckblad.

RESULTS

By the Numbers

$200M

By using collaborative behavior, effective processes and efficient tools, the integrated team saved $200 million while improving quality and schedule on the $1.5-billion UCSF Medical Center at Mission Bay.

8 days

Even with a $55 million change, the team's adaptable philosophy helped them rework 18 months of design decisions in a matter of weeks and ultimately complete the project eight days ahead of schedule.

4+ years

See more than four years of construction—taking the structure from bare dirt to a functioning medical center—in just over three minutes:

Efficient Tools

Building Information Modeling (BIM) not only enabled changes to be made more efficiently, but also removed uncertainty from the project schedule, saved time and reduced waste. BIM allowed the project team to test that proposed changes really added value before making them. BIM also allowed the 1,200 people working in the field to implement changes easier and quicker.

"When we started construction, we had a really well-detailed, coordinated model that had a lot of information on it, and it allowed us to create workflows in the field that really worked," said Poindexter. "You can then implement change without being in scramble mode."

Getting the right people to look at the model was also crucial. UCSF's facility engineers and the chief information officer were included in the project team, constantly reviewing the model for access and usability. That, said Eckblad, "created a very powerful opportunity for us to reexamine change and improve quality."

$55 Million Change

Due to the efficiency and effectiveness of the culture and processes it developed and the tools it used, the project team decided to treat large changes like a new project. So when the project team was confronted with the challenge of almost completely changing the entire layout of the six-story, 200,000-sq.-ft. outpatient building when construction was already underway, a new team and a new schedule was quickly created, but the same behaviors, processes and tools were used.

The result: The outpatient building project team revised 18 months of design decisions for the building in a matter of weeks.

Those behaviors, processes and tools "are not all required," said Eckblad, "but they are all extremely useful to be able to adapt to change." ■

TOOLS

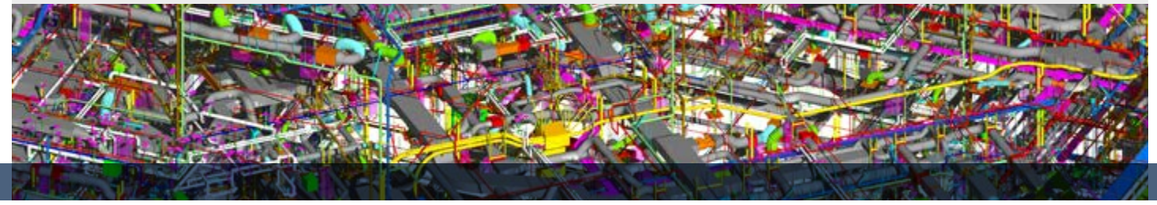
Building Information Modeling

COORDINATION BEFORE PERMITTING: Clash Detection Coordination Modeling began at 25% CD design phase so constructability inputs from subcontractors could be included in the permit drawings.

MODEL-BASED SHOP DRAWINGS, FABRICATION AND INSTALLATION: The 3D models used for coordination were also used to create fabrication and installation drawings. In addition, models fed directly into Trimble Total Station units for accurate layout and installation. 99% of the 150,000 MEP hanger inserts in the decks were installed accurately the first time using the coordinated models and Trimble.

FACILITIES REVIEW OF ACCESS TO ABOVE-CEILING EQUIPMENT: UCSF Medical Center's facilities managers reviewed the models to ensure adequate access to valves and VAV boxes. These reviews resolved more than 250 access issues, involving multiple trades, and preempted more than $2.5 million in rework if detected after installation.

AS-BUILT DOCUMENTATION AND FACILITIES MANAGEMENT: Subcontractors committed to updating 3D models with any deviations due to field coordination and installation to provide the customer with accurate 3D models.



UCSF Medical Center at Mission Bay

3 hospitals: Benioff Children's Hospital, Bakar Cancer Hospital and Betty Irene Moore Women's Hospital

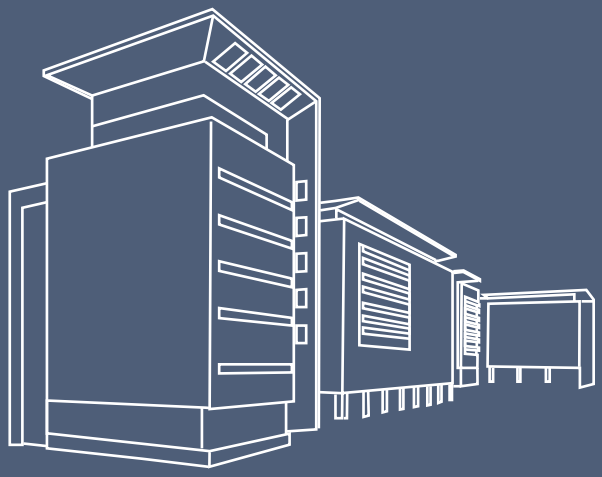
878,000 gross sq. ft.

Almost **8** years in the making

289 total beds

1,200 designers and builders; **250** of those co-located in the ICDC

$**1.5** billion investment



10,000

The medical center will employ approximately 2,600 faculty and staff and will handle close to 10,000 inpatient and outpatient surgeries in its first year.

No. 8

UCSF Medical Center is ranked as the eighth best hospital in the country in the 2015-2016 Best Hospitals survey from *U.S. News & World Report*.

CUSTOMER: UCSF Medical Center at Mission Bay

ARCHITECT: Stantec Architecture

BUILDER: DPR Construction

CONSTRUCTION MANAGER: Cambridge CM

OTHER KEY PLAYERS:
Rutherford & Chekene, ARUP Engineering, Teecom, Acco Engineering, Broadway Mechanical, Southland Industries, Rosendin Electric, Redwood City Electric, Cosco Fire Protection, Schuff Steel, Enclos, Willis Precast

DPR CONSTRUCTION

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