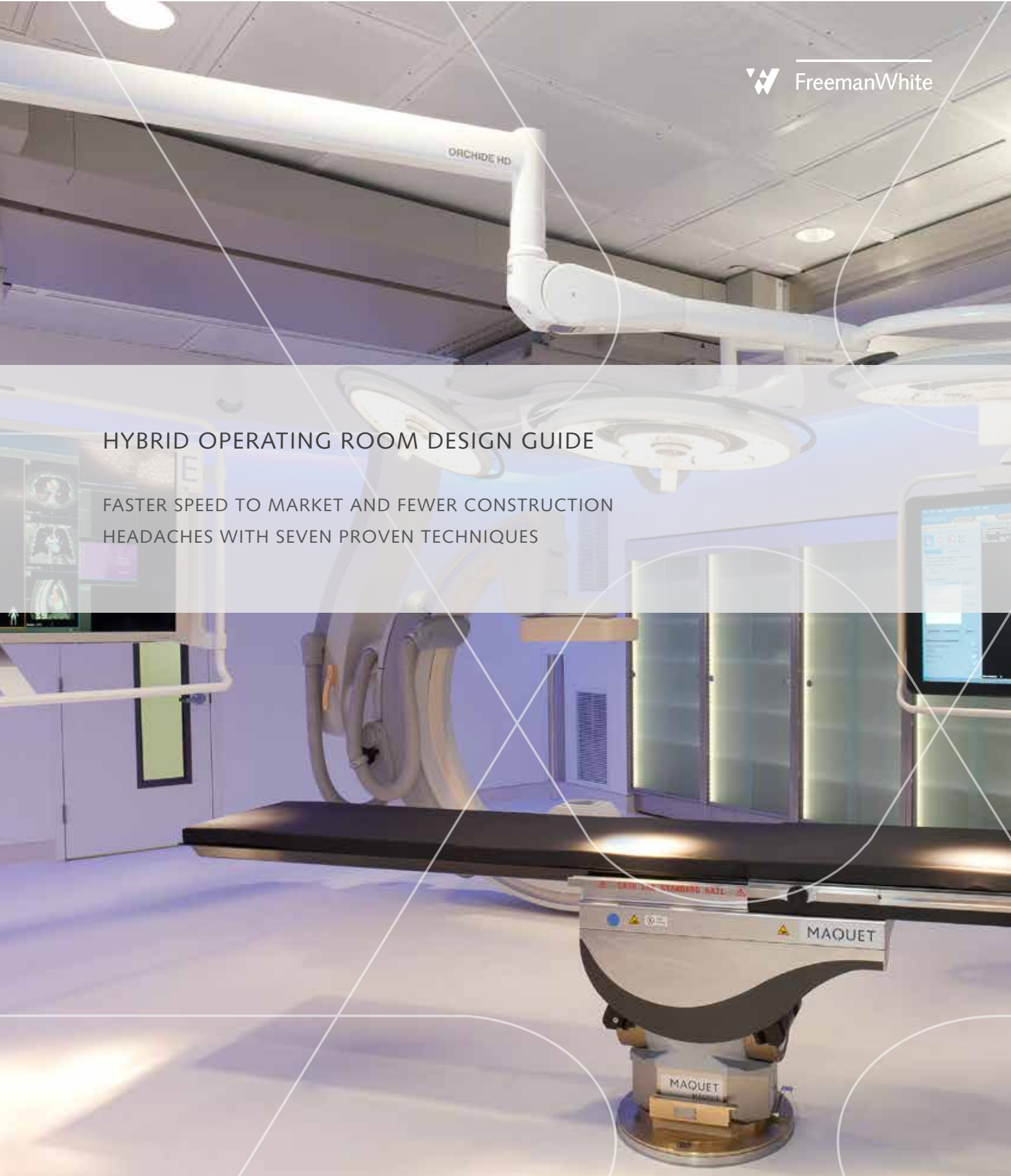
FreemanWhite

HYBRID OPERATING ROOM DESIGN GUIDE

FASTER SPEED TO MARKET AND FEWER CONSTRUCTION HEADACHES WITH SEVEN PROVEN TECHNIQUES



Carondelet Heart and Vascular Institute
St. Mary's Hospital
Tucson, AZ

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One reason hybrid operating room renovations are so challenging is the number of consultants and vendors involved.

Inside we discuss techniques we have found to be effective in bringing a project to market quickly with minimal headaches.

Choose design team leaders who take a hands-on role in equipment coordination.

Establish a dual-track user group meeting schedule.

Develop a full scale mockup room.

Secure equipment vendor decisions from the clinical team at the start of Design Development.

Consider the benefits of redundancy.

Facilitate interdisciplinary coordination by working in Revit.

St. Peter's Hospital - Albany, NY

CHOOSE DESIGN TEAM LEADERS WHO TAKE A HANDS-ON ROLE IN EQUIPMENT COORDINATION

Simply inserting equipment vendor drawings into the project construction documents often means the overlap between vendors on ductwork, conduit runs, data, and other utilities isn't coordinated until construction is underway. Sorting through these items during construction leads to schedule delays, change orders, and additional costs.

To prevent this scenario, we recommend that Owners choose an A/E team leader who takes a hands-on role in equipment coordination and has previous experience with hybrid OR projects. The owner benefits from an architect who can translate clinical and functional needs into an appropriate technical solution. Architects with a working knowledge of the interface between vendors, equipment, and design disciplines are able to ask the right questions and include the right decision makers. While equipment, wiring, and data may not fall within an architects' scope per se, as the prime consultant on the project they serve as "air traffic controllers" to direct the aspects of the project that fall between silos. This coordination ultimately affects the success or failure of the job.

To illustrate, we are aware of a recent hybrid OR project where the design team did not provide proper ventilation to the tall storage cabinet housing the computer integration system. The equipment generated an excessive amount of heat which shorted out the IT system and rendered the OR unusable, costing thousands in lost revenue. An architect with the ability to anticipate the potential repercussions of design choices would have the team investigate ventilation and a designated supply diffuser to cool the equipment, avoiding downtime and additional cost.

ESTABLISH A DUAL-TRACK USER GROUP MEETING SCHEDULE

While some would assert that it's better to have all parties participate in every meeting, we find that speed of delivery improves when there are separate clinical and technical meetings.

In the clinical meeting track, users determine the layout of the room and its basic parameters and uses. In the technical track, users discuss "nuts and bolts" items - such as which boom has which gases - with the participation from one clinical team representative.

The advantage of having separate tracks is that users focus on their areas of interest, without having to spend time on discussions that are not as relevant to their roles. Streamlining user involvement improves decision-maker participation at meetings, resulting in more rapid decisions that ultimately expedite the schedule.

DEVELOP A FULL SCALE MOCKUP ROOM

During the design development phase of the project, we bring clinical and technical user groups together to vet the design in a full scale mockup room. During the mockup session, we ask all team members to stand in position as they would when performing surgery. We verify that everyone can see and access the pieces of equipment they need for their roles. As some staff move around while others remain stationary, we typically run through the entire sequence of simulated procedures in order to capture specific needs at different times.

To closely simulate the future space, we recommend using actual equipment where possible. Typically the tables, perfusion equipment, and anesthesia equipment are real, and the lights are real but mounted on stands. Actual electrical, data, and medical gas panels are mounted on a movable wall. The control room is built from cardboard, and the tall storage cabinets are drawn on cardboard.

SECURE EQUIPMENT VENDOR DECISIONS FROM THE CLINICAL TEAM AT THE START OF DESIGN DEVELOPMENT

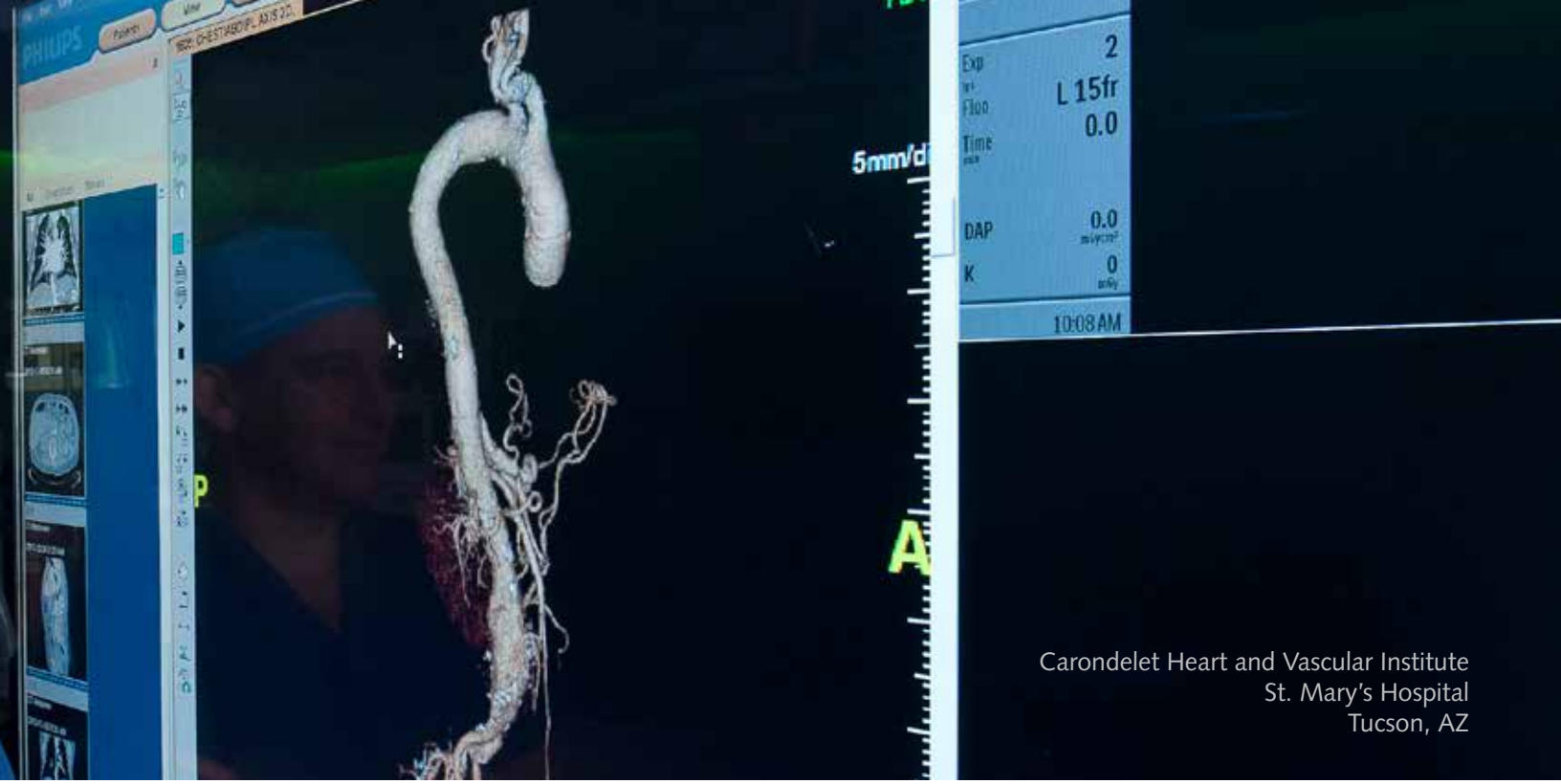
We recommend that equipment vendor decisions be made at the start of the Design Development phase, prior to the start of clinical user group meetings. This allows the design team to prepare a clear architectural response for clinical team input and to schedule joint sessions between the selected equipment vendors and users.

Because equipment dimensions, clearances, and requirements vary depending upon the manufacturer, this approach also assures that accurate measurements are used consistently throughout the design, minimizing change orders and construction delays.

CONSIDER THE BENEFITS OF REDUNDANCY

On a recent project, the dedicated HVAC unit specified for the imaging equipment electronics was replaced during construction. During the initial startup, the new system wasn't able to handle loads resulting from 100+ degree summer temperatures. As a result, the imaging system electronics shut down, delaying procedures and causing tremendous issues for the facilities director.

Given the high value of the hybrid equipment and potential revenue loss from MEP system malfunctions, hospitals should consider the cost benefit of redundant cooling and other infrastructure for the equipment and hybrid OR room itself. While redundant infrastructure affects the budget, we can help facility managers understand the many factors involved in a cost-benefit analysis.



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DETERMINE THE IMPACT ON HOSPITAL-WIDE INFRASTRUCTURE DURING THE SCHEMATIC DESIGN PHASE

Hybrid ORs can overburden existing MEP systems. If the existing building infrastructure is not adequate for the new equipment, reaching this conclusion during the Schematic Design phase enables the team to mitigate the impact of infrastructure adjustments to the schedule and budget.

In contrast, such a determination during Design Development or Construction Documentation phases can result in both cost and schedule overruns. As one example, perhaps the infrastructure simply cannot be upgraded and the only solution is to start over in another location, voiding all design efforts completed to date.

Another scenario is that the space allows for an MEP equipment upgrade, but new equipment is expensive with long lead times. In both cases, the longer it takes to reach the conclusion that the existing infrastructure capabilities are insufficient, the more backtracking is required and the greater the impact on schedule and budget.

We typically include the space above the ceiling in our assessment of existing infrastructure. Nine foot ceiling heights as were commonly installed twenty years ago will not accommodate new hybrid OR imaging equipment without sacrificing functionality. On a recent project with 8'11" ceilings, we "pushed the envelope" and the low booms have proven to be head-knockers.

The magnitude of new MEP infrastructure required to update an older space can sometimes render an "ideal OR location" significantly less so. In those instances, when the cost and difficulty of installing supplemental MEP equipment is cost prohibitive, reconsidering the entire floor plan may be more achievable than the OR location with optimal adjacencies.

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UTILIZE BIM TO FACILITATE INTERDISCIPLINARY COORDINATION

Using Revit to develop documents greatly reduces the potential for information leakage during hand-offs between consultants and vendors. Through the clash detection process, team members work together to resolve any remaining conflicts prior to construction, resolving issues that would have traditionally been addressed in the field.

This synchronization effort begins during the A/E design phase and continues through contactor coordination, shop drawings, and construction. Because "a change anywhere is a change everywhere," discrepancies and cost anomalies can be addressed in real time, minimizing errors and creating better, more predictable project outcomes.

Equipment vendors often excel at 3-d modeling. Using Revit, they can incorporate final fabrication details and convert the model into shop drawings, streamlining the documentation process and saving significant amounts of time.

Revit facilitates above-ceiling engineering coordination, saving significant time in the overall design/construction schedule. By detailing the coordination between the conduit, support structure, mechanical, and lighting systems for the selected equipment, it is possible to expedite shop drawings, coordination, and ultimately the construction and installation.

While no project seems to cruise through the construction phase, design teams and owners can work together to make installations run more smoothly. In our experience, facilities directors feel as though they are set up for success when our coordination efforts minimize change orders and account for future conditions. The more the design team can do to lessen the potential that the facility director must report a schedule delay or cost increase to administration, the better.

Healthcare providers currently face a dizzying array of strategic and facilities challenges. At FreemanWhite, our approach integrates data, research, and best practices into our architectural solutions to help you balance cost and value.

ABOUT THE AUTHORS

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For Brian Adams, solving clients' problems starts with the ability to listen and to ask the right questions to deliver appropriate solutions. Brian is deeply experienced in practical implementation, recognizing that while each client is unique, all face an evolving healthcare industry that requires providers to do more with less.

As a proven leader of more than five complex surgery projects, Brian is constantly seeking innovations that enable clients to lower costs while improving service.

Allen Smith PE
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Allen Smith is a natural problem-solver. His blend of experience and expertise enables him to evaluate physical spaces; conceptualize ideal heating and cooling systems; and create appropriate designs. His creative approach has led him to develop spreadsheets and other design tools to better analyze building systems such as air-handler psychrometrics and more accurately design equipment. He has more than 15 years of healthcare mechanical design experience including multiple OR and Hybrid OR projects.

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