National Institute of BUILDING SCIENCES

The Academy for Healthcare Infrastructure

Collaborative Research Program

RESEARCH TEAM 1:

Owner Organization for Successful Project Outcomes

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An Authoritative Source of Innovative Solutions for the Built Environment

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Team 1
Owner Organization for Successful Project Outcomes

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Foreword

In 2013, the National Institute of Building Sciences established a collaborative research program to bring leading healthcare professionals together to address industry challenges at a national level. The Academy for Healthcare Infrastructure (AHI) would focus on improving the processes to create and maintain the complex built environment required to support America's healthcare mission. It would serve as a collaborative network with the purpose of exploring large, comprehensive ideas.

Upon establishing its charter and selecting Research Governors, AHI began the process of setting up Interdisciplinary Research Teams to identify current best practices; envision the future of the healthcare infrastructure industry; and engage appropriate industry leaders to develop new approaches for solving critical problems. Each of the resulting five teams consisted of leaders from the healthcare facilities industry and related subject matter experts, as well as an academician to facilitate the process who would be responsible for compiling the data and developing a white paper for publication.

The Academy's research methods were formulated to utilize the power of interdisciplinary collaboration to actively break traditional professional boundaries. Each of these small, focused teams of industry experts have committed to envision materially improved approaches to a specific critical industry issue. The structure is designed to result in breakthroughs in the creation, management and repurposing of healthcare infrastructure.

Each team focused on a specific topic: Owner Organization for Successful Project Outcomes; Developing a Flexible Healthcare Infrastructure; Speed to Market Strategies; Defining the Next Generation's Focus; and Reducing Initial Capital Costs.

Over the course of 2015, the facilitators coordinated with the healthcare facilities industry leaders and related subject matter experts, and began the process of compiling white papers with their findings.

This paper, "Owner Organization for Successful Project Outcomes," is the result of Team 1's efforts.

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Introduction

There are times when systemic incremental improvement is desirable. This is not one of those times. Affordable, quality healthcare is essential to sustaining a vibrant society. And yet, the American healthcare industry is facing overwhelming uncertainty in almost every segment.

The Academy for Healthcare Infrastructure (AHI) was established to materially improve the processes used to create and maintain the incredibly complex built environment required to effectively support America's healthcare mission. This collaborative research program is designed to focus on issues that are vital to improving the performance of the healthcare facilities industry, while avoiding the temptation to repeatedly address the same old issues.

By far, the most important stakeholder in the process of shaping healthcare infrastructure is the owner. And yet, most owners don't effectively exert the project controls available to them. How owners organize their internal decision and accountability structure is perhaps the single most critical element in producing successful project outcomes. AHI's Interdisciplinary Research Team 1 set out to document those strategies that have proven to be effective.

Project success is the result of multiple factors, including the original conception of the need for a project and the subsequent performance of the design and construction components of the team. Especially important, however, is the owner's commitment and organization of the project. Healthcare construction is complex, expensive and usually represents a significant segment of an organization's capital investment. Predictions suggest healthcare construction completed in 2015 should exceed $1.04 trillion (Silvis, 2015). This white paper seeks to shed light on the strategies adopted by successful owners and identifies 12 themes that consistently arose from interviews with industry experts.

Methodology

Between May and July, 2015, the facilitator, D. Kirk Hamilton, MSOD, B.Arch, FAIA, FACHA, EDAC; Professor of Architecture at Texas A&M University, individually interviewed 12 experts by telephone for 45 to 60 minutes, and recorded the conversations using an Olympus VN-702PC digital recorder. The recordings were then professionally transcribed. The facilitator made notes during the conversations and replayed the recordings to clarify content and identify quotations. The facilitator used the following questions to guide the discussions:

1. Please provide information about yourself and your experience with major healthcare projects.
2. Tell me about your experience with different ways in which the owner managed the design and construction process. Focus especially on the differences that appear to have contributed to successful projects and things you would choose to do differently.
3. Please list what you believe to be the key success factors associated with effective management and control on the part of the owner with regard to major design and construction projects.

4. Are there specific values within the organization associated with successful projects, and are they expected from external consultants?
5. Describe the ideal relationship, based on your experience, between trustees or governance and successful projects.
6. Describe the ideal relationship, based on your experience, between the C-suite (CEO, CFO, etc.) and successful projects.
7. Describe the ideal organizational position for the owner's project leader and his/her preferred qualifications.
8. Describe your ideal internal team and the team members' associated expertise for project delivery.
9. Describe your ideal external team and the team members' associated expertise for project delivery. How are the external consultants selected?
10. How does the design team interact with the actual and intended users of the spaces being designed?
11. Can you please e-mail me a copy of your typical or preferred project organizational chart?
12. In what way does a successful project team effectively communicate?
13. How does the owner know what is actually happening on the project?
14. On successful projects, how do the internal and external teams respond to unanticipated problems?
15. Is there anything else you would like to tell me about the owner's organization for a successful project?

AHI identified the interviewees, which included leaders in the field of healthcare administration, design and construction. Not all questions were asked of every participant. Additional information not covered by the questions was gathered via topics of interest raised by the participants. Rough biographical data of each participant was gathered. The participants were:

- John Becker, MHA, FACHE, FHFI; Director, Facilities Division, Defense Health Agency.
- William R. Calhoun, Jr.; Vice Chairman, Clark Construction Group.
- Peter R. Dawson, AIA; Senior Vice President, Facilities Services, Texas Children's Hospital.
- Patrick E. Duke; Managing Director, CBRE Healthcare.
- Sam Gioldasis, PE; Vice President, Walker Engineering.
- Doug Harper, PE; Senior Program Manager, Gilbane.
- Brian Holmes; Senior Vice President, Facilities Development & Real Estate, Texas Health Resources.
- John Kouletsis, AIA, EDAC; Vice President, National Facilities Services, Kaiser Permanente HealthPlan, Inc.
- Judy Quasney, RA; Director, Office of Workplace Solutions, at the National Institute of Allergy and Infectious Diseases (NIAID) within the National Institutes of Health (NIH)
- Bruce Raber, MAIBC, MRAIC; Vice President, Practice Leader Health + Wellness, Stantec.
- John H. Rich, MHA; Senior Vice President (retired), Intermountain Health Care.

- Stephen Wooldridge, PhD, PE, FACHE; Vice President, Integrated Real Estate & Facilities, MedStar Health.

Each semi-structured interview was conducted using the methods described in James Spradley's *The Ethnographic Interview* (1979), and analyzed using the methodology described in Kathy Charmaz's *Constructing Grounded Theory* (2006), which involves the coding of interview content and the categorization of these codes into themes, until saturation is achieved and no new concepts are raised. Using a method described as 'member checks' by Yvonna Lincoln and Egon Guba in *Naturalistic Inquiry* (1985), the participants were given the opportunity to comment on and edit the interview transcripts and themes that emerged from their interviews, as well as given an opportunity to review and comment on a draft of the paper. A conference call allowed them to discuss a draft document. The following is a summary of the opinions expressed by the participants.

Discussion

Organizing for Project Success: A Dozen Principles and Some Observations

A collection of consistent themes emerged from the interviews with these industry experts. The group produced a number of compatible suggestions and had no disagreements or minority reports.

Different organizations may define project success in their own way. The classic statement of 'on time and in the money' refers to budget and schedule success. Real success may more often be related to delivery of the desired scope at the desired quality level. Texas Children's Pete Dawson suggested that striving for a dependable outcome is distinct from trying to define a successful outcome in the face of shifting priorities and circumstances.

John Kouletsis of Kaiser Permanente identified several indicators of project success. It will be on or below budget, and delivered on schedule or early. More importantly, he said, the finished project will "align with the organization's strategic vision, fulfill or exceed the intended scope, meet or exceed the needs and aspirations of the key stakeholders, enhance work flow efficiency, allow for the provision of the highest quality of care provided at an affordable price, and operated at the lowest total cost of ownership." It would be "flexible and adaptable to future changes" in technology and delivery models. Such a project would be an "outcomes-based design" that delivered shorter lengths of stay; no hospital acquired infections; no workplace injuries; and higher satisfaction scores. He went on to suggest success may be indicated by transformative experiences for patients, families, clinicians and staff.

John Becker, the Defense Health Agency's Director, offered some thoughts on defining successful project outcomes. Plan, develop and operate the **right facilities** – "appropriate and fiscally responsible infrastructure to meet the Military Health Service (MHS) readiness and mission requirements;" **right quality** – "assure world-class standards are developed and applied to provide a safe, reliable, timely, responsive and efficient MHS environment of care;" and **right resourcing** – "balance requirements and resources to optimize MHS cost and time investment in facility life-cycle capital management, operations and shared services infrastructure."

Dawson talked about putting in place “a control structure to effectively manage the project scope, budget and schedule” on behalf of the owner. He indicated that capital projects consist of seven steps: 1) pre-design or planning which others call strategic planning and functional space planning; 2) funding or development of the business case; 3) design; 4) bid or purchase; 5) construction; 6) occupancy; and 7) close-out.

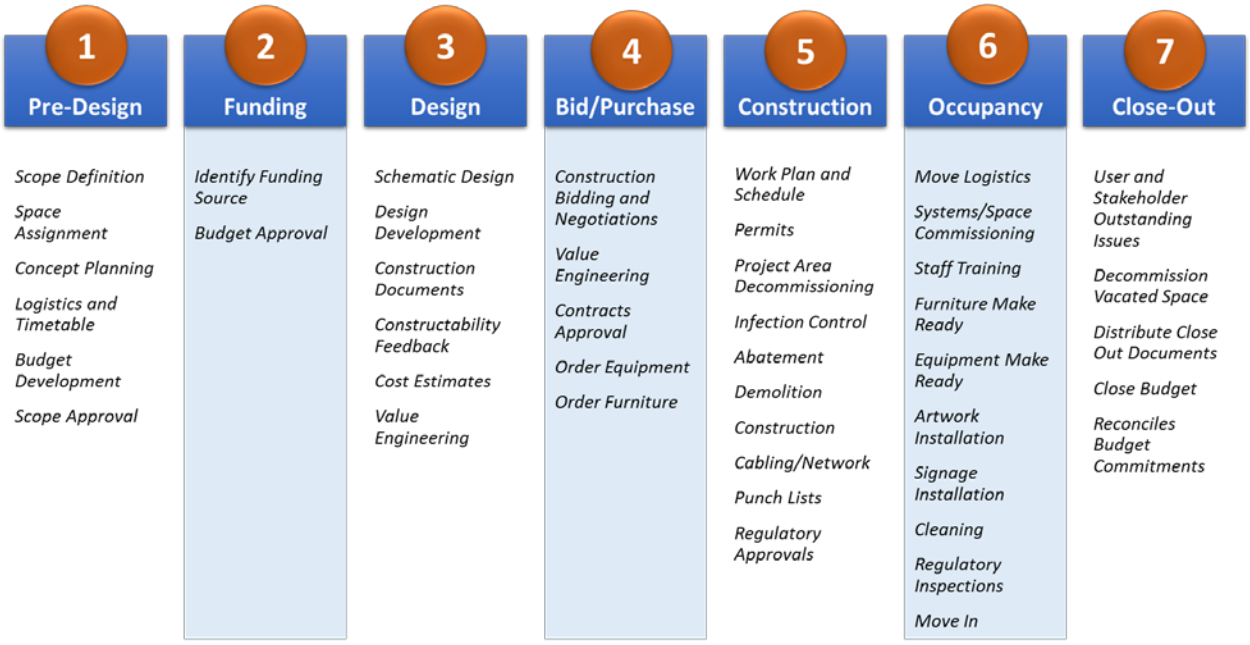

Figure 1: Capital Project Management Process

Adapted from Texas Children’s Hospital

A number of the participants discussed an effort to strategically align the vision, merits and anticipated outcome of the project internally within the leadership team of the owner prior to commencement of pre-design. This effort, called Step 0, establishes the opportunity for internal endorsement from all facets of the owner’s organization to ensure alignment and support for the project. During Step 0, within the owner’s organization, project priorities can be defined and operational and organizational boundaries established, which cannot be readily illustrated by merely funding, scope or time parameters. The concept, especially for government projects, is critical to ensure transparency to all interested parties. Through careful review of strategic alignment and congruence with the organization’s health delivery model, Step 0 sets the foundation for commencement of Pre-Design in Step 1.

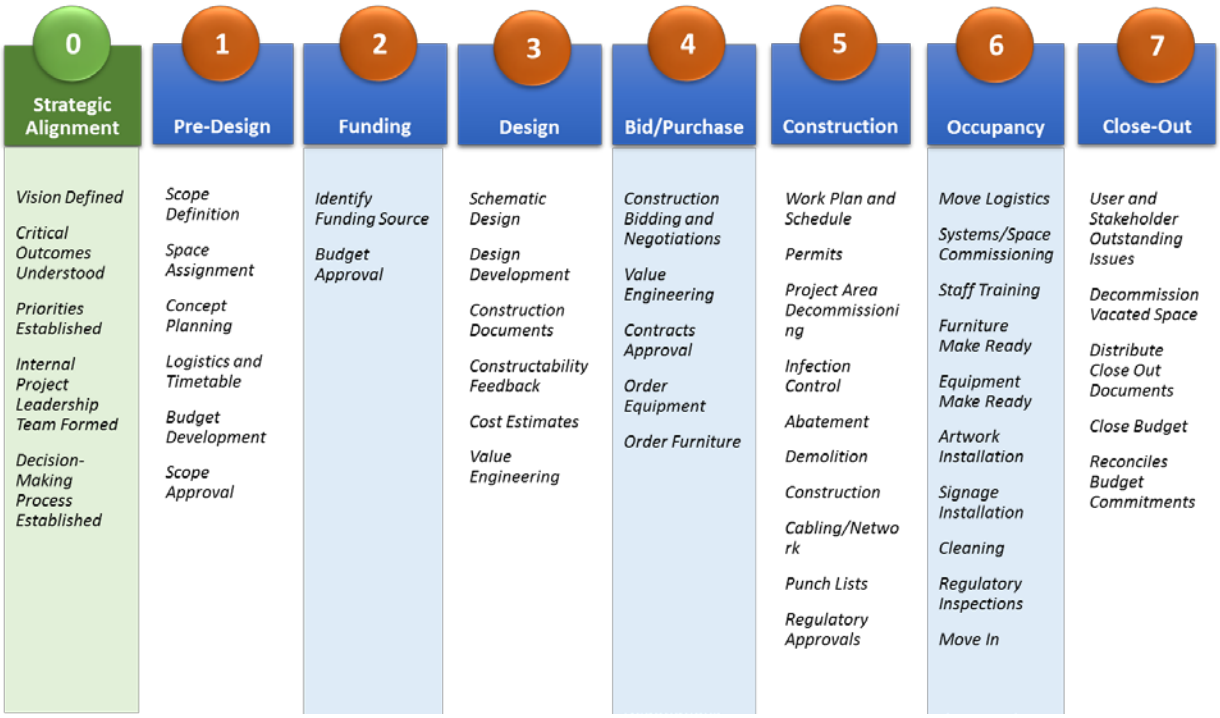

Figure 2: Enhanced Capital Project Management Process, with Step 0

Courtesy: Judy Quasney

Judy Quasney, Director of the Office of Workplace Solutions for the NIH Institute of Allergy & Infectious Diseases, pointed out the need for this sort of early effort (see Figure 2). Becker provided the slide shown in Figure 3 to explain the organization's review process, which precedes detailed planning. Getting into the budget stream of large organizations or government entities requires considerable formulation and the setting of thorough groundwork.

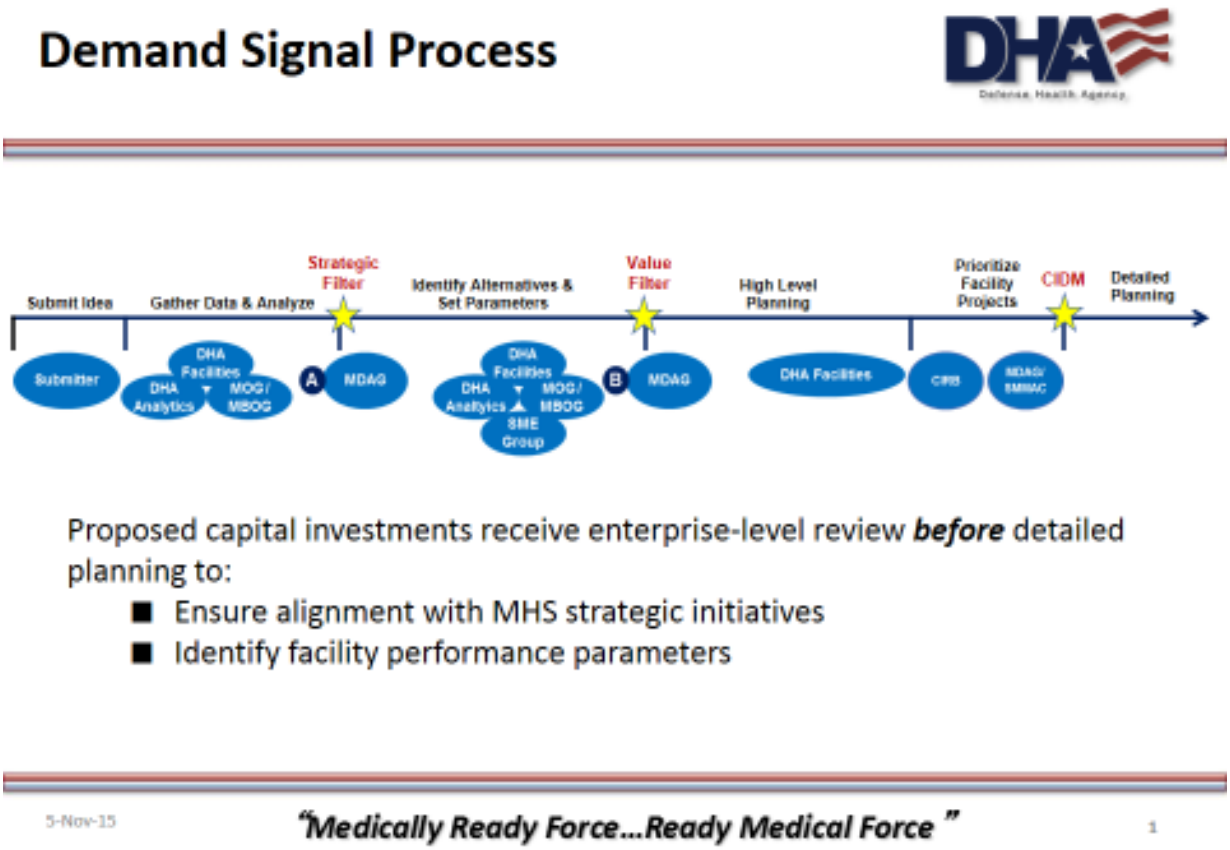

Figure 3: Demand Signal Process for Enterprise-Level Review

Courtesy: Defense Health Agency

Kouletsis and others felt that post-occupancy evaluation 9 to 12 months after beneficial occupancy should be Step 8. It is difficult to get maximum benefit from the potential lessons upon completion of any major project without some sort of internal or independent external review of the results. If performed for the purpose of research, an independent, third-party review removes most of the potential for bias in the report.

Evaluation of a project after occupancy can provide important feedback that can benefit subsequent capital projects, and if shared, can benefit the field. Shepley (2011) called it health facility evaluation and noted the shift from the language of 'post-occupancy evaluation' to building-performance evaluation (Preiser, 2002). Quasney provided Figure 4, which adds Step 8 as Operational Readiness.

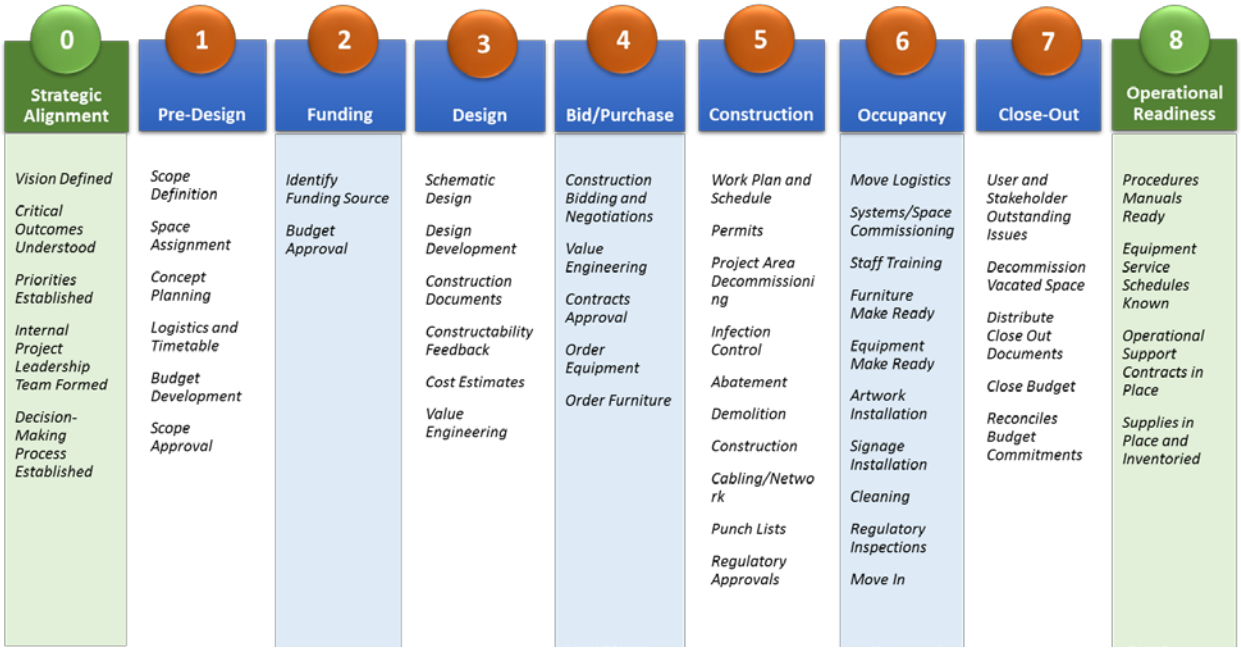

Figure 4: Enhanced Capital Project Management Process, with Step 8

Courtesy: Judy Quasney

It is reasonable to say that the participants in this process felt strongly that the owner must be organized around a clear and consistent process that can be managed. A collection of guiding principles emerged from the interviews and group conversations.

Principles

The themes listed below as principles represent the combined opinions of the participants about these steps, as expressed during the interviews. A few relevant observations about the design and construction process are also included.

Principle 1: Vision on the part of the owner is shared

The owner must have a vision for the project. Different visions for the schedule, economy and quality of the project, and of the care delivered, value or desired outcomes of the project should produce different project results. A project vision is therefore needed to clarify the intentions of the owner before any work on specific design can begin. It is important to note that with a multi-headed owner, the owner may not have a single vision and the visions could, and often are, in conflict with one another. These issues must be resolved, at least on a conceptual level, before the project can effectively move forward. Making known the expectations and desires of key players in the delivery of the project is of critical importance so that proper momentum, support and overall focus can be maintained by the owner's team. The design consultants and the constructors need to be clear about what project success looks like from their respective perspectives. Unless these expectations for success are clear, and there is general agreement that they are achievable, the project will be hampered from a misaligned owner's team.

Kouletsis declared, “The owner’s vision must be in writing and open to adjustment as the owner and other team members encounter challenges and opportunities in the project.” He saw the owner’s vision as a living document that is refined as the project evolves. It will grow and adapt as the project goes though real-world adjustments and changes.

The owner’s vision must be clear and explicitly understandable. The vision of the owner’s leadership should be stated simply in a fashion that leaves no room for multiple interpretations. John Rich, retired from Intermountain Health Care (IHC), said, “A project is no better than how well its owner articulates it, because if they cannot articulate it accurately, precisely and have definite vision about it, it won’t come off the precise way that the owner envisioned.” Bill Calhoun of Clark Construction, declared, “The owner’s vision must be associated with clear metrics defining measures of success.”

The owner’s vision must be understood by everyone at every level. The owner’s vision should be shared with every member of the team and must be clear and understandable. This vision will ultimately guide project decisions at many levels. It will also serve as the ‘true north’ of the project and should be consulted frequently to ensure the project remains true to its vision and goals. This is particularly critical if the project encounters difficulties that could result in a change in project scope or budget adjustment. Each system has its own complexities and multiple stakeholders who need to focus on the shared vision and goals.

Steve Wooldridge, recently retired from the Army’s Health Facility Planning Agency and now a Vice President for real estate and facilities with the MedStar Health system, reported, “Where we have the greatest success is if we come to a common understanding and a common goal. The goal is not about the building so much as appreciating that we’re about to bring a functioning hospital online.” He went on to declare, “If you can get alignment around that singular idea with the whole project delivery team, that paves the way because then you have a true partnership. That’s really where it starts.”

Envisioning the future begins with a strategic plan. A project vision should be in alignment with the organization’s overall strategic plan and care delivery plan. Patrick Duke, managing director of CBRE’s healthcare practice, believes that organizations and systems need to “utilize real estate and facilities as a tool to carry out their mission,” with the first step being development of a solid strategic plan. The master plan must suit the intended strategy, and the specific project proposal must be supported by a well-crafted business plan.

NIH’s Quasney explained how she works to get all the internal and external parties involved in order to have some shared vision and acceptance of what is to happen. She involves herself, “to make sure that the vision and the agreement by the senior leadership in the strategic planning phase is not compromised.” She said the vision, “needs to be comprehensive and lasting.”

Beware of resistance to change. Doug Harper, Senior Program Manager for Gilbane, pointed out how individuals and cultures may often be resistant to change. If major projects are subjected to new and different delivery methods, or involved with significant innovation, there may be open or hidden roadblocks to overcome. Sharing a compelling vision may require hard work to drive it down to the lowest levels of the internal and external project teams.

Harper described an example in which the leadership vision required a big change, but "the enterprise just couldn't turn on a dime" and results were less than ideal. John Becker of the Defense Health Agency explained, "Change management in particular requires intensive owner involvement and obviously effects cost and schedule."

Principle 2: Clear, documented project objectives

There must be specific objectives for the project. The internal and external project teams should have explicit goals and objectives for their work, with metrics for most of the objectives that permit objective performance evaluation. Quasney said, "Critical project decisions and milestones are the foundation of meeting objectives." The design and construction team cannot be effective without clear objectives that provide guidance about what the owner expects from their work. Calhoun mentioned the need for a major decision timeline to guide the owner and user leadership.

The project team must be given clear statements of the measurable objectives. The objectives must be provided so that team members can be treated fairly, as they work to accomplish them. "This clearly documented scope of work and range of expectations for success," Kouletsis reinforced, "must be a living document that the team comes back to again and again during the course of the project." He pointed out that it is good to have an understanding that the document will be revisited on a regular basis so the entire team can verify that the project continues to adhere to the principles and objectives laid out at the start. "Such a document can serve as a 'guardrail' when the project encounters difficulties. It will guide the setting of new priorities in response to a crisis and help determine what is 'in bounds' and what is 'out of bounds' when engaging in value engineering."

The project team must share a common language about their objectives. Harper described ways in which each participant may have their own way of seeing the task. He likened it to different players describing the same elephant while limited in their view because none could "back off far enough or not look through their own straw to see the whole elephant." Each team member, whether internal or external, must come to share the same language that allows a common interpretation of the owner's vision.

Principle 3: Qualified, experienced staff

Leaders may have multiple varied backgrounds. Project leaders can include those with backgrounds from architecture, engineering, construction, healthcare administration, business or from military service, among others. Some move from one role to another. Dawson and Kouletsis, for example, both were architectural practitioners working with healthcare projects before they transitioned to the owner's team. What is important is their experience and judgment.

Becker reported, "The biggest factor in success seems to depend on the people on the ground, the team and who they are, how they work and build their team." Quasney declared, "Leaders need to develop trusted interpersonal relationships with the key stakeholders."

Leaders should have had experience with healthcare capital projects. Experience with large, complex, capital projects for healthcare organizations is an important criterion for persons asked to take leadership responsibility for a major design and construction project. Harper observed that "people come to a project with what their past experience has been." Each team member with a leadership role should have the relevant experience necessary for them to make confident, responsible and timely decisions at their assigned level within the project's organizational structure.

It is useful to document roles and responsibilities for all members of the project team. It is not uncommon to have a large number of players, especially on the owner's side, who have little or no experience in the design, construction and commissioning of a significant capital project. In some cases, the owner's leadership team may have insufficient knowledge of the capital project process. The team should not move forward until these team members have been thoroughly briefed on their role, responsibilities and decision rights on the project. It is surprising how often key members of the team are new to the process.

Internal staff must be as skilled and experienced as the consultant team. Bruce Raber, the Health + Wellness practice leader for Stantec, commented that the owner "needs to have staff that are as good, honestly, as our staff, or as good as the contractor's staff." The owner's team members need experience, along with technical skills and interpersonal skills.

Raber firmly believes, "The bigger the project, the more sophisticated and skilled the owner's organization has to be." Duke pointed out that the facility management process is not a core business function of the hospital, and that "the worst thing possible is if they try to operate them like a hospital department rather than a best-in-class design and construction project management group."

Duke pointed out that the internal staff must be empowered, and must be compensated at market rates. If the economy is strong, experienced and qualified in-house staff may be lured away by offers from industry. Keeping experienced staff and developing experience in new employees in the face of looming retirements is an issue of some importance. It is good to remember that inexperienced or ineffective staff anywhere in the team, whether owner, designer or constructor, can cause profound dysfunction in the team and threaten the viability of the project.

Internal leaders must educate the owner's non-design and construction leadership. Internal education is required for an organization to become high-performing with its capital projects. Dawson said, "You have to demonstrate very effectively to individuals who are not particularly well-versed in understanding the complexities of a facilities project delivery program, and may actually have some strong misconceptions." Internal politics can negatively impact timely, effective decision making.

Dawson went on to declare, "It is essential to establish an empowered hierarchical project client structure, with designated roles, authorities and accountabilities, that can be relied upon for decisions, commitments and key information at all levels." Raber made the point that the owner's leadership must be able to act as passionate, committed champions.

Principle 4: A stable of pre-qualified consultants and contractors

Known design and construction consultants with relevant qualifications are preferred. While new relationships and combinations of external consultants are inevitable, and often desirable, the ability to work again with individuals and companies that have performed together successfully in the past is valued, especially when the past work was with the client making the current selection. Duke suggested that when selecting a team, "the owner needs to have a clear, transparent and consistent process." Collecting qualifications from candidate firms is helpful in narrowing a selection list, and thoughtful examination of the qualifications and references for the specific individuals proposed is crucial. The private, non-governmental owner has greater leeway to define the criteria for selection and procurement in any way they desire. Governmental procurement may have more regulatory boundaries, but can include creative and innovative proposals.

It may be difficult, but selecting individuals for the team that have a strong history of working together is frequently the defining characteristic of project success. Although two firms may have a long history of working together, ultimately it is about the individuals on the team far more than it is about the individual companies participating in the team.

Brian Holmes of Texas Health Resources explained, "It is very helpful to have a general contractor and an architect who are familiar with the facility and become, for all intents and purposes, an extension of our staff." These firms, together, may serve over time on all projects for a single campus. Holmes describes a way to keep adding new companies to the pool. "We continually try to refresh the group by regularly introducing new people on projects that may be a little less risky, so they can get more familiar with the campus," he said, "We're infusing new blood because if we don't, then our costs tend to drift upward. We've got to continually bring in hungry subcontractors to keep everybody honest."

Holmes recognizes that the big contractor on the big job may not be able to secure competitive bids for the simultaneous smaller project, so they bring in smaller contractors for smaller jobs. "We get to know people, and it keeps everybody else honest." These smaller projects would be handled by the same internal project manager responsible for the campus. "Everybody needs to know they can be replaced," he declared.

Rich described the IHC interview process, which included a full day at the office of the short-list teams. IHC consistently used a stable of experienced firms pre-qualified by the system, from which local units could make a selection, often deciding on the basis of perceived culture compatibility. Calhoun, who believes in detailed interviews, described a selection process in which the prospective consultant team is given a problem to solve during the interview, providing insight into the way the team works and accelerating the learning curve related to working together.

Evaluation criteria should extend beyond lowest first cost and shortest timeline. The owner's decision about contractor selection should, of course, include cost and schedule, but the participants were clear that limiting evaluation to these criteria is short-sighted. All too often the claim is that a bid offers the best value, but in reality it is only if the bid is low. Becker recommends that "the level of acceptable quality in materials and construction should be a

known factor, along with the lowest total long-term cost of ownership, and the desired level of sustainability (LEED Certification, Silver, Gold or Platinum level)." The owner should be certain that the proposals address the project objectives with measurable commitments. Becker suggested the expression of the owner's brand is just one factor to be considered.

"I think a lot of success of the job," Calhoun contended, "starts with the procurement and the evaluation factors used, and the behaviors those evaluation factors compel." He pointed out that selections that only consider lowest first cost compel behaviors not in the owner's long-term best interest. "You want a procurement process that compels the behavior of openness, of decision making on the best perceived value, not just lowest price." He made the point that best value for the owner, as a measure of life-cycle cost, is rarely calculated and used to compare competing proposals in the world of lowest first cost.

Choosing efficient systems can lower total cost and total cost of ownership. Calhoun said the construction procurement community is not set up to ask this kind of question. Kouletsis recalled the warning, "If you want it cheap, you'll get it cheap."

Evaluation criteria should include subjective factors. When making evaluations of proposals from candidates for the design team or the construction team, not all factors can be measured objectively. The personal chemistry between proposed team members and the owner's staff cannot be measured, for example, but it can be sensed. There are intangible factors that may have a profound influence upon the team's performance.

"Subjective factors and past performance are superior predictors of successful project outcomes," said Calhoun. They are more important factors in team selection than first cost or fee.

On some projects, success criteria might be operational in nature, such as fewer slips/trips/falls or a reduced rate of nosocomial infections in the new building. These outcomes may be influenced by the selection of the team, yet the link from team selection to outcomes may not be obvious during the interview process. Increasingly, reported Kouletsis, Kaiser Permanente is looking at operational quality as benchmarks for success.

Principle 5: Standards that simplify decisions and do not stifle innovation

Standards simplify some decisions and reduce variation. Standards should help set the level of quality or performance that is considered the minimum acceptable to the project team or the owner. Standards for types, sizes, configuration, equipment and so forth can simplify the decision process. The full-scale mock-up process allows large numbers of users and consultants to refine the specifics for standardized spaces. According to Duke, standards for the design and construction process can act as a "clear playbook" for the internal team, and the external team, to follow so that they can be "oriented, integrated and eased into the process."

Standards can be in a variety of areas. Organizations may have standards at a system-wide level for things, such as electronic health records, the food service model, laundry operations or local and regional clinical laboratory services, that govern decisions for individual projects. There may be standards for room sizes, equipment layouts, allowable furniture and finishes, as well as

protocols for who is allocated an office and who is not. Many of the equipment and furniture decisions may be associated with the system's purchasing agreements. Standards may be in place for the quality of preferred mechanical and fire safety systems or other important engineering components. An owner may have project delivery preferences that standardize project communication, submissions and approvals.

Standards may be prioritized; some are more important than others. Some standards are essential, while others should simply serve as guidelines. Following standards based on differing values, or that may be inappropriate in a specific circumstance, requires judgment on the part of project leadership. Rich reports that the IHC system examined general principles of standards and basic components that lent themselves to standardization and, although approved by the board, they were not considered automatic. Standards were flexible enough to allow for local adaptation.

Duke said, "You can't standardize every nut and bolt" on a project. He suggested owners evaluate where the most risk lies in the absence of a standard. Harper said, "The owner's vision eventually gets boiled down into project documents. We can lose some of the owner's focus when we boil the problem down" for documentation. In some cases, standards can defend against loss of focus.

Standards must not be allowed to become stale or outdated. Standards documents need to be continuously reviewed, updated and improved. They must be documents capable of adaptation and responding to new project requirements or conditions, as in the case of changing technology or medical practice. It is critically important that the standards are always in strict alignment with the owner's vision and objectives. Those standards that do not align might be eliminated. Duke recommended a person or small group be dedicated to reviewing and revising the organization's standards. It might also be reviewed by external consultants.

Principle 6: Hierarchical command structure for the team

Complex projects often require complicated team structures. Each member of the team should recognize the authority which directs the course of the work. The hierarchy within each firm or company engaged to work for the owner must be clear and understood. The owner's organization must have a clear structure for guiding the project, from the trustees to the administration, and on to the project director to whom the external team reports. Dawson talked about how the owner needs "a top down governance structure involving the different constituencies in a particular project." Kouletsis explained, "Creating a brief document that states the roles and responsibilities of every member of the team is key. Everyone should understand the RACI diagram (Responsibility Assignment Matrix) for the project. It should be a living document—changing as necessary over the course of the project and as the project team encounters challenges."

Multi-headed owners with overlapping responsibilities must clarify lines of authority for the team. Projects with complex ownership structures, such as government or system projects where different players only have portions of the owner's role, must be able to provide rational ways for the external team to make sense of the way in which instructions will be received and decisions will be made. Duke suggested the need for a steering committee. Holmes described

how Texas Health Resources viewed the work for a particular hospital. “The authority to spend the money, the authority to do anything on the project, to approve change orders; the entire authority structure for the project doesn’t go through the local hospital,” he said. “Representatives of the hospital and departments are treated as customers, and we take that very seriously.” Wooldridge described how a government project may require a collective leadership team as a result of the complicated contractual authority of the multiple entities involved, but “every senior executive wants to know who the go-to person is, and they want one person.”

Organizations each need an identified single point of responsibility. Calhoun suggested that the most important success factor is for each organization within the team to have a responsible person in a leadership position. “Each team member,” he declared, “must have one individual with the ***authority***, the ***experience*** necessary to make informed and timely decisions, and the ***attitude*** that recognizes the need to make timely decisions.” When the person doesn’t have authority to make a decision, and it involves a bureaucracy that requires too many approvals and justifications, Calhoun said, “the costs go up and the relationship disintegrates.” Rich declared, “It is owner decision making, more than any other factor that delays the course of a project.”

Contractors are accustomed to a hierarchical structure. Subcontractors prefer to receive orders from a single person, recognizing a chain of command with a single point of responsibility. Conflicting instructions from multiple sources create confusion and can lead to problems and delays. Gioldasis, speaking for subcontractors, said “The hierarchy is in place for a reason. We can’t have multiple masters.” Calhoun concurred, “We have to be careful that we don’t have multiple heads giving multiple orders” to the same subcontractors. The sub needs to believe the person giving the orders is empowered, and will not be countermanded. At the same time, if the owner skips levels of authority to make direct requests of the sub, problems can arise.

Principle 7: Timely, effective communication is crucial

Team communication is fundamental to project success. Complex projects demand constant, effective communication among the various elements of the internal and external team. Rapid response to messages is expected, and rapid turnaround for replies to requests for information or decisions is required. Messages must be simultaneously copied to all concerned so that time-consuming strings of sequential messages can be avoided.

Everyone should be aware of project status and emerging issues at the same time. This is especially true when the owner is a ‘multi-headed’ entity where communication and decision-making protocols, and acceptable time frames for decision making must be crystal-clear. Quasney reminded, “Whenever there’s a handoff, there’s always the risk of some vital information or intention getting lost.”

“Good communication creates good working relationships between people,” pointed out Raber. “The better the relationships, the easier it is to resolve problems.” Wooldridge suggested there should be daily or weekly huddles involving all the contract entities, and bi-weekly supervisory-level meetings, “At a monthly or quarterly level,” he said, “We bring in the executive teams.” When it is working well, the participants can sit together and have “open, candid issue discussions without having a control.”

It doesn't work where one or more of the entities puts a filter on shared information. Wooldridge commented that sometimes this communication transparency can be enhanced by outside facilitation.

Some aspects of communication should be controlled at specific levels. Open communication doesn't require an overload. Holmes indicated that information must be controlled, so some upper-level players get information that has been "boiled and condensed" to explain the status of schedule, budget and key issues, including "the key decisions we need from you." He said, "This is like making sausage, and you have to keep the sausage-making hidden. You can't have people who don't have a strong stomach observing this."

Principle 8: Constant attention to cost and schedule control

Budget and schedule are universal factors by which projects are measured. It comes as no surprise that the experts interviewed were unanimous in recognizing that every project requires continuous monitoring of both budget and schedule. Dawson explained, "There are three basic components of every project, consisting of scope, budget and schedule. One of those must be designated as the most important, and thus becomes the primary driver for all project decisions. The other two will follow in a declared order and are secondary." Duke declared the process of budget and schedule management should be "visible to the higher-ups," and transparent about the metrics used. Management best practice suggests that the multiple project managers on various parts of the delivery team should, based on their relevant experience, be able to anticipate what is yet to occur, and plan to avoid potential problems.

MedStar's Steve Wooldridge considered the tool of an integrated master schedule as a way of forcing a process in which "each of those actors at each of those levels must come together and work through the nuances of assembling a master schedule." Duke pointed out that there are now collaborative project management software systems that may help the coordination.

Developing reliable budgets begins early in the process. Duke said, "It all starts with an organized capital submission process," that includes how project requests are submitted and a transparent process by which they are evaluated for approval. There must be clarity about the criteria by which a project is selected for funding. Becker described changing from a planning model for the military, in which service components prepared extensive documentation for projects that stood little chance of full funding given the volume of projects and a limited budget. Wasted time and effort has been reduced by revising the submission process to be streamlined and simplified, allowing projects to be given an enterprise review before detailed planning to ensure alignment with Military Health System strategic initiatives and identify facility performance parameters before investment of the extensive planning effort required to seek formal approval. "We're trying to be more agile, and spend less money up front until we really know it's an important requirement that senior leadership wants to fund," he said.

Kaiser Permanente typically has a placeholder budget until the completion of schematic design, at which time the business case, including the ultimate project budget and schedule, is finalized and approved. Kouletsis offered the concept of Target Value Design (Zimina, Ballard &

Pasquire, 2012) as, “one way to reduce the likelihood of the traditional and devastating design-estimate-redesign-estimate-redesign-estimate ‘cycle of death’.” There is also the notion that the design team can be given specific cost targets for all major Construction Specifications Institute (CSI) line items as a way of designing to the budget.

Accurate estimating is mandatory. It is not possible, Rich observed, to have confidence in the scope and budget without highly reliable estimating from the earliest stage of a project. Such estimating can be part of the external project team, usually from the chosen contractor, or from a professional estimating consultant to the team and the owner.

Controlling budget and schedule is an everyday activity. Discovering where a project scope stands against the intended budget and schedule is not an activity restricted to the project’s major milestones. Each member of the project team has a responsibility to consider cost and schedule implications of all decisions along the way, from project initiation through completion. If attention to cost control is part of each decision along the way, there will be fewer surprises. Calhoun pointed out, “Time is a killer,” and lack of timely decisions can fester, causing increased cost and other major issues.

A contractor must continuously manage the schedule. The initial schedule is subject to numerous unexpected forces that require adjustments. Sam Gioldasis, Vice President of Walker Engineering, pointed out how the intended schedule is subject to “uncounted things that change,” so weekly meetings of the superintendent and all of the subcontractors must “constantly modify and keep that schedule as a living document.”

Understanding of the role of users and control over their requests is vital. While the input from users of the space is desirable, important and sought, it must be timely. Calhoun observed that when the project is nearing completion, it may be 3-5 years after the equipment was selected and specified. User requests for later models and newer equipment can negatively impact the completion schedule. There must be a consistent policy announced early in the process on how this issue will be addressed and the users need to have shared accountability for budget and schedule. In one example, the owner declared a six-month moratorium on changes, required the staff to occupy and ‘shake down’ the space, and collected fewer change requests at the end of the period. “Where you can create some accountability in the user group,” Calhoun explained, “you have everybody collaborating to solve issues.”

Controlling budget and schedule requires early and consistent involvement of the construction elements of the team. Early contractor involvement should mean that the designers can incorporate pricing information from the start and stay closer to the target budget. Holmes talked about how he identifies problems in a team if he sees design work followed by pricing that forces redesign to reduce cost, and further cycles of design-pricing-cutting. “That’s a signal for me to either get involved or start questioning the project management because that team’s not working.”

For many, value engineering (VE) has taken on negative connotations. While cost control is mandatory, the way it is accomplished makes a difference. In some models, the program manager is given a strong financial incentive to reduce project cost, with no requirement to retain

value for the client, and invariably unproductive, adversarial conflict arises with members of the design team. In some cases, project quality suffers unreasonably and some of the owner's objectives remain unmet.

A shared savings model does not give the owner full value of the savings and incentivizes the contractor to make any and all cuts, regardless of ultimate value to the owner. Changing the incentives to finding any way to reduce cost rather than providing maximum value for every dollar in the budget alters the way the design and construction team performs. Holmes described a complex project with a broad-based shared savings structure and said, "I'm not sure I'd ever do that again."

A hot team-cold team model offers second opinions from trusted partners. Intermountain Health Care (IHC) has long used a stable of pre-qualified firms for both design and construction. Because there are multiple approved firms in each category, IHC can select one as the 'hot team' engaged to produce the project, pairing them with a 'cold team' only responsible to review the design development plans and offer alternatives (Rich, 2010).

At a review workshop, hot and cold representatives from the architects, mechanical engineers, electrical engineers, structural engineers, civil engineers and contractors are in the same room with the owner's team for lengthy meetings to carefully examine literally hundreds of alternatives and their financial and operational impacts. Alternates are examined, and high-priority options are fully developed by the discipline-based groups suitable to be fully estimated. Ultimately, some 50-100 alternatives would be incorporated into the project. Because both firms are on the accepted list, and will be paired in other ways next time, there is no incentive to treat the review as an adversarial process. Intermountain Health Care has found the method to be "an effective, orderly method to optimize value and reduce cost" (Rich, 2010, p.135), which has produced savings of 8% on a capital expenditure of $1.3 billion. John Rich noted that this seems to be unique to IHC, but believes it could work as an effective evaluation process for any system or project.

Principle 9: Everyone in the same room

As project planning is occurring, and decisions are made, everyone must be present to participate. Leadership and decision-makers for the owner; the design consultants; the construction team; and important advisors must all be in the same room. They must hear what is happening at the same time, and be able to fully contribute to the exchange. All voices on the team must be heard as important decisions are considered. Wooldridge said, "That's how you can sort out who needs to do what." If the process leaves out key players, and direction is sent out from a partial group, there always exists the possibility that the best decision may not have been made, and, in some cases, the subsequent adjustment required may mean confusion and delay.

Duke reported, "Our best projects have the core team, construction manager, engineer and architect all on board at the same time, working together to develop the design," with a parallel

costing process. Gioldasis favorably described early involvement of contractors and subcontractors in which key sub trades “are often selected before the first line is drawn.”

Harper talked about having “the architect on the builder’s side” as a means to help the contractor understand the design constraints, but cautioned against a situation in which the architect/engineer is treated “like another sub to be pushed around.” “There’s got to be a partnership,” he declared, “regardless of the contractual relationship or the acquisition strategy.”

Duke believes managing the risks on a major project cannot be done in day-to-day management meetings. “There has to be a separate and dedicated process,” he said, “and a meeting cadence established to manage these game changers.” The big-room concept, according to Kouletsis, is more than just getting all the key players together for major decision making. Co-locating the owner's team, the design team, the general contractor and the subs is enormously helpful. It is often the day-to-day conversations and the millions of tiny decisions that help with team cohesion and good decision making.

The LEAN process is a proponent of the big room decision model (Jørgensen & Emmitt, 2009), but getting everyone to be together for major decisions and guiding principles is useful for any project delivery model. Gioldasis suggested that most large projects are being done in some formal or informal variation of a LEAN process. Raber noted that most big projects have joint project offices for the team members. Becker reported, “Solving the problem is not sequential. We’ll call all of the stakeholders together and have project folks on the phone.” Regardless of project delivery type, Calhoun said he would prefer to gather all players for the planning, because it results in “a huge improvement to the outcomes.”

One recorded concern was the frequency with which information technology is not integrated into the design and construction process. CBRE’s Patrick Duke observed that perhaps it is because the construction process usually reports to a COO, and the IT systems report to the CFO or CIO, and there is not an automatic assumption that they should have early involvement in the process.

Principle 10: Everyone needs to have skin in the game

Project success must be personally relevant to the participants. Major multi-million dollar projects cannot be treated as ‘just a job.’ Quasney suggested that “team members need to share ownership of each facet of the effort.” There need to be explicit tangible and intangible rewards and consequences for performance. Recognized performance on a successful, huge, complex, costly project should have important career advancement potential for internal and external participants. At the same time, with stakes so high, unsatisfactory performance should be quickly resolved.

Project delivery is a team sport. No single individual’s performance is sufficient to ensure success. Kouletsis said, “There should be the sense that the whole team succeeds or fails, rather than a single part of the team succeeding or failing. All team members need to be invested in the combined success of all other team members.” Alignment of incentives is important for aligning collaborative performance.

Risks should be allocated to the party best able to manage or control them. Calhoun suggested incentives and contingencies should be considered for identified risks. He declared, “All major stakeholders must share some risk.” Gioldasis emphasized the need to “create a safe work environment” for everyone on the job.

The owner’s role is crucial. Kouletsis said, Tthe more the owner is aware and accepts their own accountability and responsibility in the project, the more likely the project will go well.” Holmes seeks architects, engineers and contractors “who are smarter than me,” but suggested owner behaviors can harm the project. “If you want to really screw up a project, it requires the owner to screw up. It’s the owner not making decisions on time; micromanaging and questioning; and creating an environment of fear or retribution with the architects and contractors, so those people can’t do their jobs. If I go to the table thinking these people are trying to cheat me, or these people have to be controlled like children, then I’m basically just limiting them, and I’m not going to get the best from them.”

Principle 11: Personal relationships

People working with other people deliver complex capital projects. Team members need to be skilled at interacting with others. People with a history of working together and a shared history of previous success will find it easy to continue to build on a solid relationship. New team members should be able to fit into a productive set of fresh relationships. Kouletsis suggested, “More than a firm’s history of work with each other, the individual’s connections to others on the team is critical.” Circumstances in which people are not effective in working together must be avoided and discord addressed if it arises.

Quasney described her method: she always meets with participants individually “to optimize awareness and understanding” before calling group meetings. She uses integration management as a way of bringing together and connecting team members, and blending them into the project. She said, “It is not really fair to have an architect come in and start from scratch.” Instead, she develops a framework, “so they can target their focus and talent appropriately, and not waste time. It’s about getting the right people talking and sharing ideas.”

Participants must believe in the benefits of collaboration. Calhoun suggested that you can’t get the most from collaboration if the organizations, or the people representing them, aren’t collaborative by nature. Harper said everyone has “got to be collaborative and be able to work together.” He proposed that a desirable team trait is for people who can think more collaboratively. Gioldasis reported, “A project of any significance starts off with some sort of team building event.” Since there are always new faces on any project, efforts to encourage development of personal relationships can be productive. Wooldridge added that there must be celebrations of the team’s wins along the way.

Principle 12: Trust is key

People who work together need trust with each other. A non-adversarial climate is required for collaboration. When one must rely on the work of another, or the word of another, trust is required. Harper declared, "Everybody has to have trust. That's the non-negotiable rule… rule one. If you don't have that, you're not going to get very far." Dawson said, "We believe there is an added value when working with trusted partners." He declared that contractors are pre-qualified "on the basis of demonstrated trustworthiness." Maister, Green and Galford (2000) define trustworthiness as credibility plus reliability and the degree of intimacy in the relationship, divided by the perception of the person's self-interest. (Trust goes out the window when I think you are in it for yourself, and not genuine in doing something to serve my best interest.)

Organizations must trust their representatives. Permission for authority and responsibility to explore new paths must come from higher levels of the organization. "With the credibility comes the opportunity to establish officially sanctioned project management processes and structures," reported Texas Children's Pete Dawson, in describing his implementation of a more sophisticated delivery model. As trust increases, there is more leeway and control over the process, which can contribute to greater success.

Organizations must trust the partner organizations in the process. Holmes commented that everyone signs the inadequate standard contract forms because negotiating new language would be complex and prohibitive, with lawyers representing each party and challenging every word. Instead, he contends, the signed contract goes in the drawer and is not seen again. "We actually put together a much simpler teaming document on how the team is going to work together in the process, and everybody signs onto that, and that's the way the team behaves," he said. "If we ever went to court, I don't know what would happen, but that's the way we actually work." Trust is clearly at the heart of this model, as it is in work for the military. Becker talked about the "triangle of trust" between the Defense Health Agency, the Corps of Engineers (or NAVFAC), and the users of the facility (Service Medical Departments).

An escape valve when all else fails is a trust relationship at the top. Leadership of the various project team's components should have built a strong relationship of trust with the party or parties at the very top of the client organization. In a crisis, this trust may rescue a relationship in jeopardy.

Observations

In addition to the areas of broad consensus treated as **Principles**, a few additional **Observations** were made. There was some variation among the participants in terms of user involvement, conflict resolution, potential evaluation metrics and variations in the models of project delivery.

Observation: Conflict resolution

Conflicts must be resolved quickly, with fairness. The participants voiced support for complete communication transparency, yet some felt conflicts need not be aired across the entire team.

Calhoun declared, “Little problems just get bigger, and they age like milk, not wine.” The interview participants spent little time addressing conflict resolution, perhaps because successful projects encounter fewer conflicts. It is expected that wherever possible, the parties will rapidly

resolve their potential conflicts at their own level, without turning to arbitration or instruction from above. Conflicts between user groups at one institution are resolved by the project’s steering committee.

Conflicts do not need to be widely broadcast. Holmes said about conflicts, “We don’t handle them in front of the customer.” Most issues are handled by the owner’s project manager, and the general contractor is held responsible for resolving disputes with subcontractors. “I shouldn’t hear it 90% of the time,” he said, “and the hospital president and administration should never hear it.” Gioldasis confirmed that most conflicts are resolved by the general contractor without reaching the owner’s representative.

Observation: User involvement in decision-making

There is a tradition of internal and external teams involving the users of space in the design process. The participatory planning model involves the intended users of the building to help the design team make decisions about function and process. A participatory process to include the people who will ultimately occupy the space being designed has been widely utilized since the 1960s, but large healthcare systems, such as the Memorial Hermann Health System headquartered in Houston, have sought to achieve greater consistency from one site to another. There has been a shift in the level of participation offered to the end users. The participants offered variations in their descriptions of methods for involving the local or system users in the project decisions.

It appears that the participants’ organizations have taken steps to reduce the variation in input from users. Texas Children’s appoints ‘ambassadors’ to represent the peer stakeholders and user groups. They bring topics to the design table, assure they are fully discussed, and return to the users to communicate decisions and their reasons in a transparent process. Others have committees of ‘super users’ at a system level to represent other users at the local level. Texas Health Resources retains the authority structure at the system level and treats the representatives of the local hospital as customers.

Kouletsis pointed out it is also critical to remember that, in general, 20-30 percent of the content experts from the owner's side will never actually move into the completed project. Promotions and job changes within the owner's extended team mean that introducing new members to the vision and the task of change management is never-ending.

Observation: Multiple delivery models can be effective

Successful projects have used several delivery models. Multiple delivery models have been effective for large and small projects, private or public. The interview participants mentioned experience with traditional design-bid-build (DBB) projects, along with negotiated bid,

construction manager (CM) at risk; design-build; and the increasingly seen public-private partnership (P3) process.

Raber noted the P3 process requires a well-organized client, along with well-organized architecture/engineering and construction teams to take advantage of the speed of the process. Kouletsis mentioned two versions of integrated project delivery (IPD), including a contracting structure linking all of the partners, and an IPD-like structure where the spirit is the same, but done under a more traditional "hub" of contractual relationships with the owner at the center. The Defense Health Agency's John Becker noted that the U.S. Department of Defense uses early contractor involvement (ECI); integrated design-build-initial outfitting (DBIO); and integrated design-bid-build (IDBB), among other models. Calhoun mentioned the VA's integrated design and construct (IDC) method.

Gilbane's Doug Harper described how DBB, in which the owner had major input "to customize what they wanted," had been the "tried and true method" for the government. He contrasted that with design-build, which provided "a little bit more price certainty," and suggested that the government's IDBB was modeled on the civilian CM at-risk method, but that the Federal Acquisitions Regulations (FAR) "did not have the language to allow an at-risk type contract." His conclusion was that design-build might be the best tool for government systems, as long as they understand the level of advance documentation required.

Owners have tried holding design competitions among selected firms paid nominal fees. The NIH's Judy Quasney believes, "An iconic building which is deemed worthy of a creative flair is worth acquiring through a design competition." Holmes described projects in which the owner negotiated directly with some of the subcontractors. Walker Engineering's Sam Gioldasis pointed out the general tendency to bid projects when there is little work and competition is high; and the opposite tendency to prefer negotiation when work is plentiful. The major lesson here is that any of these project delivery models can produce a successful project, but Calhoun cautioned, "No one project delivery type is right for every organization." IPD and P3 methods, for example, may be more suited to larger projects.

Responsibility and liability is changing. Holmes responded to a question about treating the mechanical/electrical/plumbing (MEP) systems as an identified design-build element within a conventional contract. "The idea of having design-build MEP is actually pretty appealing to me from an owner's standpoint," he said. He wondered, however, for whom they would work. The architect is today the keeper of the Revit model used by the entire team, but Holmes believes the contractor will eventually have that role. He pointed out that the contractor has the contractual right to rely on the accuracy of the drawings, yet "nobody thinks they are accurate." Holmes contended that contracting processes have not caught up with reality.

Some methods offer the potential for an emphasis on life-cycle costing. The P3 process, as an example, has the potential to be seen as the total cost of ownership since it includes an operational component for a period as long as 30 years. Clark Construction's Bill Calhoun believes there is potential for great value when total life-cycle cost is considered, and is hopeful that governmental owners will eventually change the legal/financial constraints preventing selection based on total cost of ownership.

Observation: owners' delivery models are not static

Continuous improvement and constant change is normal for most owners. The participants described multiple types of change in their evolving processes, and multiple reasons for change. Texas Health Resources' Brian Holmes described the influence of new technologies for documenting projects, including three-dimensional models that allow for discovery of system conflicts before the project reaches the field.

Delivery is an important measure. Stantec's Bruce Raber said, "Delivery is key for everybody. The owner wants his building. The contractor wants to get out of there quickly. And the architectural and design staff wants to get their work done and get out without losing money. "If it goes right, everyone is happy," he said. "If it gets done wrong, there are lots of unhappy people for many years."

Observation: Evaluation metrics

You can't manage what you can't measure. The different organizations represented by the participants have different metrics for tracking and managing aspects of their capital projects, yet they all manage to address key issues of importance to their own project delivery structure. Becker explained, "Codifying the roles and responsibilities, having open transparent communication and having project performance metrics in place that get reported and reviewed on a recurring basis have enhanced our ability to deliver the project that we thought we were buying." He described putting processes and metrics in place to instill accountability at each level of the complex organization.

Conclusion

This white paper addresses the future of the owner's role in project organization for healthcare design and construction. The 12 participants, who are each recognized leaders in the industry, were quite consistent in their responses to the various questions. The owner plays a central role in the project's success. John Kouletsis reported, in the Kaiser experience, "The more that the owner is aware and accepts their own accountability and responsibility in the project, the more likely the project will go well. "

- An owner's vision, goals and objectives must be clear, well-documented and fully shared at every level of the project team.
- A set of expectations for quality and standards or guidelines that have not become outdated or stale help guide the planning, design and construction process.
- The owner must have an experienced set of internal leaders, or hire them externally.
- The owner may wish to work consistently with a group of pre-qualified firms and companies that have a history of strong performance, who each offer specific experienced individuals with proven performance as project leaders.
- The assembled team must have direct incentives for everyone's performance, and all must recognize that the organizations succeed or fail as a group, not as isolated players in a competitive setting.

- A successful project will, of course, have accurate and reliable estimating, usually from a qualified external consultant or team member.
- Constant monitoring of cost and schedule, with timely and transparent feedback to the team, is required.
- The participants stated their preference for a hierarchical structure of responsibilities in which everyone takes direction from a single, unambiguous source.
- The project organizational model requires effective and timely communication.
- Rapid communication is a hallmark of our time, and is required to keep a project moving in its planned trajectory.
- A valuable method for accelerating quality decision making is to ensure that all the appropriate players are in the room at the same time, so all perspectives can be considered as decisions are made.
- Each component of the larger project team is composed of individuals who must continuously interact with one another. Their personal skills associated with human interaction, facilitation and conflict avoidance will be important.
- Team members should have integrity, be empathetic, understanding and genuinely care for others associated with the project.
- In the end, trust and respect amongst individuals who must work together is crucial to project success.

The participants developed a consensus that these elements may be the minimum required for project success, but did not rule out other possible considerations. Further, they found it important to state that these principles were not restricted to large, complex capital projects for healthcare facilities. They can be shown to play a vital role on smaller, less-complex projects, as well as projects from other industries.

Project success is neither random nor accidental.

Success requires hard work on the part of many. Success requires the full focus and consistent attention of the experienced players over the entire course of the project's duration. Working together to achieve the owner's vision, though difficult, can be enormously satisfying when success is realized.

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Appendix A
Research Team 1

John Becker, MHA, FACHE, FHFI; Director, Facilities Division, Defense Health Agency. John spent 29 years as an Army officer with a background in healthcare administration, facility planning and served as a medical evacuation helicopter pilot. The Army sent him to earn a master's degree in healthcare administration at Baylor. He served as the COO of a military hospital and then CEO of a 400-bed deployable military hospital. Past facilities-related positions include Deputy Commander of the Army's Health Facility Planning Agency and Vice President of Facilities for the Army Medical Department. After retiring as a Colonel, he went on to become the Director of the Defense Health Agency Facilities Division.

William R. Calhoun, Jr.; Vice Chairman, Clark Construction Group. Bill has been with Clark for 32 years. His civil engineering degree is from Georgia Tech, after which he began in estimating and purchasing with a contractor in Florida. He moved to Bethesda to work for George Hyman Construction, which became Clark Construction. His assignments moved him around, including construction of a hospital in Texas. More recently, he was involved in major projects at the Brooke Army Medical Center in San Antonio, and the Walter Reed National Military Medical Center.

Peter R. Dawson, AIA; Senior Vice President, Facilities Services, Texas Children's Hospital. Pete began his career as a traditional architect and consultant serving healthcare clients; 30 years ago he began to be employed by the owner, first for a single major project at Houston's Methodist Hospital. He stayed on to develop a sophisticated program of facility planning, design, construction and project delivery to address multiple projects of differing types. He has taken the lessons learned along the way to his position with Texas Children's Hospital and its significant capital program.

Patrick E. Duke; Managing Director, CBRE Healthcare. Patrick earned a civil engineering degree from Auburn while working through school for a construction management firm with hospital projects in Texas and Virginia. He wanted to be on the owner's side and later earned a master's degree in land development. He became an owner's onsite representative for a large project in New Jersey. His smaller firm ultimately partnered with CBRE and he developed his specialization in healthcare.

Sam Gioldasis, PE; Vice President, Walker Engineering. Sam has been in the Dallas-Fort Worth area since college, and has had a variety of engineering roles associated with hospital design and construction. Early in his career he served as electrical engineer of record at Children's Medical, and has had experience working in firms of consulting mechanical, electrical and plumbing (MEP) engineers; MEP contractors; and currently works for an electrical contractor. The majority of his career has been in electrical contracting.

Doug Harper, PE; Senior Program Manager, Gilbane. Doug earned a civil engineering degree from Virginia Military Institute (VMI) and joined the Air Force where he served for 22 years in the Air Force Health Facilities program. The Air Force sent him to N.C. State where he earned

dual master's degrees in construction management and business administration. Doug worked on the 2005 Base Realignment and Closure (BRAC) medical facilities planning. His last major military assignment was the $1 billion recapitalization of the San Antonio Military Health System. He joined Gilbane in 2015.

Brian Holmes; Senior Vice President, Facilities Development & Real Estate, Texas Health Resources. Brian earned a degree in civil engineering and entered the Navy Civil Engineering Corps. His last tour of duty involved renovation of the Naval Hospital in Corpus Christi, Texas. When Brian left the Navy, he became a project manager for the Presbyterian Health System in Dallas, which has evolved through mergers and acquisitions to become Texas Health Resources, a major regional system. Brian's role has evolved to become the leader of the system's facility and real estate activity.

John Kouletsis, AIA, EDAC; Vice President, National Facilities Services, Kaiser Permanente HealthPlan, Inc. John is a licensed architect who began his career with healthcare projects in private practice with multiple firms, including work in Japan. He was invited to become a project manager at Kaiser and transition to the owner's side in 1993. He became the standards architect, putting together regional design standards to become national standards. John has eventually become a national vice president in charge of planning and design for Kaiser Permanente.

Judy Quasney, RA; Director, Office of Workplace Solutions, at the National Institute of Allergy and Infectious Diseases (NIAID) within the National Institutes of Health (NIH). As a classically trained architect, Judy began her career in traditional architectural firms within the United States and Germany. Since 1992, she has been a federal architect at NIH responsible for leading a team dedicated to renovations within the research hospital complex of NIH. In 2003, she shifted her focus to assist NIAID leadership with developing high containment laboratories as part of a national campaign to prepare the American public for a potential bioterror public health threat. Her experience includes biomedical laboratory planning, design/construction and facility operations. She is well-versed in patient care, diagnostic and specialty areas within a research hospital setting.

Bruce Raber, MAIBC, MRAIC; Vice President, Practice Leader Health + Wellness, Stantec. Bruce is a Canadian architect who has specialized in healthcare design since 1988. He is the practice leader for Stantec's international practice in Health + Wellness which includes over 800architects, engineers, designers, planners and strategists in multiple offices in Canada, the United States and overseas. Many of Bruce's largest and most complex projects have been Canadian Public Private Partnership (P3) efforts, as in the major $600 million North Island Hospitals project for the Vancouver Island Health Authority.

John H. Rich, MHA; Senior Vice President (retired), Intermountain Health Care. John earned a master's degree in hospital administration from UCLA and went to work as a facility and system planner with Intermountain Health Care (IHC). He continued with IHC in multiple roles over the years, including stints as the administrator of a couple of hospitals, time developing the health maintenance organization now known as Select Health, and starting the IHC physician division. He spent the last years of his career as the senior person responsible for facility planning and development.

Stephen Wooldridge, PhD, PE, FACHE; Vice President, Integrated Real Estate & Facilities, MedStar Health. Steve was in the Reserve Officers' Training Corps (ROTC) in college and became an officer in the Army's Medical Service Corps. Serving as a medical planner, he became one of the first brigade engineers in a medical brigade, where he was involved in the replacement Womack Army Medical Center at Ft. Bragg in North Carolina. After a doctorate in construction engineering and management from Massachusetts Institute of Technology (MIT), he oversaw medical facilities in Europe, and leadership of a clinic in Germany. Returning stateside, he was involved with the insurance side of military health, deployed to run a combat hospital in Iraq and returned to command the Army's Health Facility Planning Agency. Steve recently retired as a Colonel and joined MedStar as a vice president with facility responsibility.

Facilitator: D. Kirk Hamilton, MSOD, B.Arch, FAIA, FACHA, EDAC; Professor of Architecture at Texas A&M University. Kirk teaches healthcare design at the graduate level. His academic research is about the relationship of evidence-based health facility design to measurable organizational performance. He is a founding principal emeritus of WHR Architects, and has received the Lifetime Achievement Award from American College of Healthcare Architects (ACHA). He is co-editor of the peer-reviewed, interdisciplinary *HERD Journal*. His most recent books include *Rigor & Research-Informed Design: A Decade's Advocacy* (2013), *Design for Critical Care: An Evidence-Based Approach* with co-author Mardelle Shepley (2010), and *Evidence-Based Design for Multiple Building Types* with co-author David Watkins (2009).

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