PRELIMINARY DRAFT

# A Guide to Creating High-Value University Buildings

***Background***

Why do university buildings typically cost so much more than other comparable buildings? In some ways the question itself is unfair. Universities operate in profoundly different ways when compared to other sectors, so the buildings and open spaces are inherently different. The American campus is often held up as a model as an idealized collaborative environment. However, there is no question this environment comes at a price. Most universities spend a large percentage of its total budget constructing, maintaining, servicing debt, and occupying its facilities. With so much focus on the cost of higher education, it is imperative that we re-examine these costs and find ways to reduce them. The challenge will be to enhance the qualities that make each campus special but spend less doing it. To make this challenge even more difficult, the design and construction industry has lost 20% in terms of productivity over the last five decades, while nearly every other industry has shown triple digit increases in that time. This suggests a fundamental shift is necessary in the way university buildings are conceived, planned, and executed. Higher education capital project delivery can - and must- become a leader in efficient and value-added planning, design, construction, and operations and maintenance.

To help seed this effort, the State of Washington's two research universities are collaborating to find more effective ways to maximize the value of their buildings. With state funding for capital projects declining sharply, and NIH funding dropping, it is absolutely critical that the value of construction be maximized. In a series of roundtables with local industry leaders, best practices were identified and a model for more effective project delivery was developed.

The total capital cost of any construction project consists of hard construction costs and a variety of soft costs such as equipment, furnishings, land acquisition, fees, sales tax, etc. The group divided the conversation and recommendations into two segments, *what we build* and *how we build*. Drawing on both experience from actual projects and a number of research studies, conversations focused on the choices that are made during the process and how they can affect the overall value of the project.

*What we build* is the most significant determinant of the capital cost. It is widely recognized that different types of buildings vary in cost, and most studies carefully segregate building types. However, there are many nuances within each of these building types. Issues such as building standards, floor to floor height, maintenance goals, the level of customization, redundancy, environmental sustainability, design details, etc. can have significant impacts on the cost of the same type of building. To make it even more complicated, some of these factors add to the long-term value of the project while others do not. The question is; how are these choices made? What is the decision-making structure within the University? How are relationships among University, designer and builder defined? What is the governance structure within the project team? How are the goals and key performance indicators for the project established and applied? Are they aligned for all members of the team? What assumptions lead to these decisions? The answers to these questions set the direction for the project from the outset.

*How we build* is the other determinant of cost. Many people point out the design and construction process has not seen fundamental change in the last 100 years. While there are examples of more efficient design and construction methods leading to better quality for less cost, higher education (and public higher education in particular) has been relatively slow to embrace these methods. Finding the

most appropriate methods to maximize the value of each project is the key, and this is almost exclusively the owner's role. Beginning with the solicitation for services, the owner sets the course for how the project is delivered and at what cost.

In order to significantly affect the value of the projects universities undertake, a very careful examination of both *what we build* and *how we build* is necessary. Many decades of experience, policies, and public works procurement requirements often push us to do things the same way as we have always done them - this seemingly reduces our individual risks - but we must challenge these assumptions and rethink the way we do business if we are to make a significant impact on the outcomes.

***What we build***

Decisions about *what we build* can be the most important decisions in the life of the project. Roughly 50-60% of the total project cost is labor and materials, and it drives the other 40-50% as most of that is calculated as a percentage of the hard costs. While different types of buildings inherently cost different amounts, projects need to be set up in advance to make choices that focus on the value the building brings to the institution. The most critical stage of project with regard to *what we build* is the initial formation of the project. If done well, it aligns the interests of all of the parties involved and focuses the efforts on the overall objective. If done poorly, it can lay the seeds for dysfunction that will continue until the end of the project and sometimes for the life of the structure. Unfortunately, many of the most important aspects of the project setup are often overlooked, as owners and designers rush to move forward with the things they know best. Detailed programming and analysis, site selection, conceptual design, etc. are often required by funding authorities, but they can take the focus away from the critical issues that will drive the project. This often results in wasted effort when the true project drivers are discovered along the way. Instead, the early focus should be on the following, to help determine *what we build*:

- Defining Institutional Objectives - This simple step is often overlooked by university project teams. A clear statement of the institutional objectives along with key performance indicators can and should drive all of the major decisions about the project. The institutional objectives are not about the size of the project, the budget, the aesthetics, or many of the things that often end up driving decisions. Ensuring that everyone on the project team has a clear idea about why the project is being done will help focus the thousands of decisions that are made through the course of a project. While this may seem simple, it merits an entire phase of work – writing the objectives and goals, identifying key performance indicators, testing them to make sure they are specific enough to help make decisions, vetting them with the entire team to be sure they are well understood, and preparing the team to be guided by them throughout the project. The time spent doing this well will pay dividends later. During this "problem definition" phase, it is critical not to focus on floor plans, detailed programs, cost estimates, life cycle costs, etc. because without a full understanding of the problem that is being solved, these more detailed examinations can create their own set of objectives that often are of little consequence in achieving the overall institutional objectives, blocking the "line of sight" that connects every

aspect of the project to the objective. For example, a key objective of a project might be to create instructional space for a certain number of new students. By the time design begins and the full team is engaged in the process, this has typically been translated into a specific square footage that must be provided, eliminating the possibility of creative alternative approaches that a full team might come up with that utilize less space. Rather than a hunt for precise square footage, the first hunt is for an option that best achieves all of the project objectives.

- Establishing Project Governance - The function of a good project governance structure is to make solid and timely decisions that allow the institution to achieve its objective while ensuring that the project takes full advantage of the resources around it. In a complicated organization like a university, this usually requires a variety of perspectives including the primary proponent of the project, a broader institutional perspective often provided by the Provost's office, a "portfolio view" of a broad set of projects and a longer range view of the financial investment. It is too common for university projects to be driven only by the primary proponent of the project. The energy and focus this person brings is often inspiring and contagious. However, they can also lead to highly customized buildings that may be quickly dated. An appropriate governance structure should balance this enthusiasm with the long-term goals and realities of the institution. The governance structure should be developed at the very beginning of the project and remain in place throughout the project, as important decisions are made through construction and the transition to operations.

- Integrating into the Campus Context - Each project needs to be understood as part of a larger whole. One of the primary advantages universities have over the private sector is the fact that our campuses are interconnected networks of shared resources. Individual projects can benefit from sharing spaces, utilities, equipment, loading docks, parking, etc. Taken together, they can also leverage buying power with any number of contracts and services. They also become part of the overall budget for the institution. Savings in one area can help pay for other areas - true on both the capital and operating sides of the budget. All of these connected resources need to be identified early in the process because most forces within the project will try to segregate it rather than integrate it.

- Benchmarking - While people in the industry are fond of saying each project is unique, there are important lessons that can be learned from similar projects. Thorough benchmarking of both private and institutional buildings can help the team create a common understanding about the project and the key trade-offs others have made previously. This gives the project team a head start on determining expected outcomes, costs, and choices. To accomplish this, benchmarking needs to be more than a simple list of similar projects and their cost. It should be a careful analysis broken down by building system so that information can be mixed and matched to align with the project at hand. This type of analysis is much more informative to the establishment of a budget than an early stage cost estimate.

- Budgeting - Because most projects are approached as if they are unique, budgets are often the result of an early cost estimate done at early stage of design. Unfortunately, this simply represents the cost of one particular solution which will almost certainly not be the final solution. The budget should be the amount the institution is willing to invest to achieve the identified objectives - informed by benchmarking and testing done during pre-design and built

into a business plan that factors in sources of funds, potential income streams, and the total cost of ownership. Too often the project budget is isolated from the business case, and it becomes a goal of the project, rather than simply one of the project parameters. This prevents the project team from truly understanding the trade-offs they make as part of the project.

- Separating the Shell & Fit-out - The character of most college and university campuses are defined by their heritage buildings- historic buildings that have stood the test of time and maintained their architectural beauty. However, few if any of these buildings are still being used for the activities they were designed for. Although it is unlikely these buildings were conceived of as shells with changing fit-outs, they were nevertheless built in the same manner - strong and wonderfully designed exterior envelopes with interiors that inevitably change over time. Our current buildings should also be designed this way – exteriors with high design integrity, generous floor to floor heights, standard column spacing, and flexible layouts suitable for the changing pedagogies and research needs. Focusing on the second and third generation costs as much as the initial costs can add clarity to the long-term decisions about the shell of the building, while interior decisions can be made in a more short-term manner. Separating these issues, and the groups who have influence over them, allows many more activities to proceed in parallel, saving time and money. It also helps avoid the customization that can often drive the cost of a project.

- Applying Building Standards - While there are many good reasons to apply building standards to institutional buildings – taking advantage of buying power, standardizing replacement parts, capitalizing on specific maintenance skills, additional safety measures, sustainability goals, etc. most tend to include a litany of "lessons learned" that inappropriately focus on the products rather than the process that led to their installation – adding cost but no value. Care needs to be taken to ensure that the standards being applied to each project really do add value. In a recent study, the University of Washington found that its building standards were adding roughly 5% to the hard construction cost as well as unnecessary time and associated costs to the process.

***How we build***

With the project direction firmly established, it is now important to decide *how* to execute the project. There is no question that university buildings are becoming more and more complex. The same heritage building mentioned earlier likely had a very simple heating and plumbing system and none of the electrical, data, security, audio visual, or controls systems that are standard in today's buildings. In addition, today's regulations require a carefully balanced approach to a variety of considerations, including energy use, accessibility, historic preservation, storm water run off, etc. This added complexity requires more and more expertise and therefore larger teams. We simply cannot rely on one or two parties to possess all of the knowledge and to come up with the best solutions. Therefore, larger and more collaborative multidisciplinary teams must be created and nurtured to maximize the value of any project. A great deal of attention needs to be paid to the dynamics of the project team and the way it communicates. In fact, a growing body of research suggests this is one of the most important indicators of project success. *(see bibliography)*. While other industries have embraced this notion, the

construction industry has been slow to adopt this methodology, sticking with standard contracts and communication mechanisms. To make this fundamental shift, critical consideration of the following is required:

- Assembling the team - An effective team begins with having the right people at the table. Very careful attention needs to be paid to the individuals who will be executing the work (not just the companies). Effective team members must have the right combination of knowledge, skills, and abilities, as well as the desire to truly collaborate. It can be extremely difficult to select the best people in a low bid procurement method, but in a qualifications-based method the owner can focus the appropriate amount of attention on having highly qualified people involved. In fact, in most cases it is possible to build your team successively with input from the other team members all the way down through the subcontractors. This ensures that a full complement of skills is assembled for the project.

- Fostering the Team - After the assembling the team, the university must focus on creating an atmosphere in which that team can thrive. It is often beneficial to conduct partnering sessions and/or enlist the help of consultants to help lay the groundwork for effective collaboration. Again, the dividends this effort pays in the future can be enormous. The team must learn how to effectively communicate between the various members, and the university, in particular, must pay careful attention to managing its communications with the team to ensure consistent direction is provided. The university's primary role throughout the life of the project is to make sure the team is motivated and focused on achieving the project objectives and goals. It is easy for even the best team to lose motivation and/or shift their focus to budget or other design aspects that begin to emerge. It is also important to keep the team together. Appropriate incentives need to be in place to help the teams stay intact.

- Resilience - In the dynamic environment of a research institution, no project goes completely as planned. Research needs, pedagogies, and personnel change at a rate faster than construction can. The most successful teams overcome these challenges by working together to come up with even better solutions. However, a foundation needs to be built. Team members by nature have competing loyalties: to themselves, to their company, and to the project team. The goal of the owner is for the loyalty to the project team to be primary. This requires a team culture based on a level of trust and respect not often seen on a typical jobsite. Activities typically established as check and balances (shop drawing review, schedule analysis, invoice auditing, punch-listing, field tests, etc.) are important, but they should be treated as trust and verify exercises emphasizing transparency and openness, rather than a search for mistakes. This needs to be true from top to bottom of the project team and their organizations.

- Balancing Risk & Reward - Typical procurement strategies are intended to shift nearly all of the risk away from the owner and onto the architect or contractor. The architect and contractor then shift much of this risk to the consultants and subcontractors, resulting in a situation where much of the project risk is carried by team members who don't actually have much control over the project. Consequently, they tend to price their work to cover the risk and behave defensively with a lack of transparency that erodes the team culture described above. Alternatively, it is possible to shift the risk/reward to the team as a whole rather than to the individual parties through shared contingencies, shared savings, and sliding fees tied to overall

performance. These techniques should be analyzed carefully with an eye toward encouraging an innovative and collaborative team culture. It also important to recognize that the university itself is one of the biggest risks to the project – due to changing processes, directions, scope, or priorities. These risks should be appropriately borne and managed by the university rather than the project team.

- Eliminating Redundancy - Traditionally, designers produce one set of drawings used to set the price and then subcontractors produce a second set (shop drawings, fabrication drawings, etc.) that is used to build from. Each set is passed back and forth numerous times and in numerous formats in an effort to reconcile the design intent and the price that was set earlier. Alternatively, an integrated team can "draw it once" as the development of drawings can flow seamlessly from design intent to fabrication. This can reduces the level of effort producing and checking drawings and it can increase productivity in the field. This also opens the door to prefabrication of building systems by multiple trade contractors which offers further elimination of redundancy.

- Choosing the Contract Arrangement - The overall goal of all of these recommendations is to create and nurture a collaborative team. Contract arrangements such as Integrated Project Delivery (IPD) and Progressive Design Build are clearly more conducive to the development of fully integrated teams. They are not only a means to select an integrated team, but they also create a variety of incentives that encourage the development of a productive team environment. However, it is possible to achieve many of the same aspects with a GC/CM contract or competitive Design Bid Build. It requires a significant shift in language and incentives to encourage more effective collaboration, but it is possible.

***Conclusion***

In order to have a significant impact on the cost of building projects and the value they provide to the university, a paradigm shift is required. In an industry largely built on the idea of checks and balances (distrust), it is becoming more and more difficult to effectively deal with the complexity of today's projects and the large team of experts that is required to complete them. The paradigm shift that is needed is to create truly effective collaborations built on mutual respect. This will enable the university to focus on its primary goals and objectives for the project rather than a detailed accounting of square footage and enable project teams to take a multidisciplinary approach to coming up with truly creative solutions. This is a cultural shift that will require continuous leadership from the universities and deeper involvement in every aspect of the project. If successful, and we believe it will result in significant value added to every project. "Business as Usual" is simply not a viable delivery model for higher education.