THE POLITICS AND PROCESS OF CHANGE: INSTITUTIONAL BUILDING-PLANNING TEAMS

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Introduction

Planning and building a new building for STEM is a complex, time-consuming and expensive undertaking for any institution. What is being undertaken is the planning, design, and construction of a permanent addition to a campus that will, in all likelihood, outlive even the youngest participant in the process. Even major renovations to existing buildings will have a life that will be measured in decades, not years. Thus, it is essential that good decisions are made as the consequences of poor decisions can be far-reaching in time, money, and impact on the institutional mission.

So the stakes are high when an institution embarks on a project to invest in its physical facilities in such a permanent way. In order to ensure that good decisions that serve the diverse, and sometimes, apparently contradictory needs of the several interests within the institution, it is important to involve many different individuals in the process. This is particularly so if the building is to serve the interests of twenty-first-century science, with its need for merging and overlapping disciplines and open-ended exploration, even in the teaching labs. Faculty from many disciplines must collaborate with trustees, administrators, students, student life staff, physical plant personnel, architects, engineers, and construction professionals to make the project a success. Sharing the vision, challenges, and evolution of a building design among this wide group of people engenders a strong sense of shared understanding, accomplishment, and institutional loyalty. It also brings richness to the design of the building that would be impossible to achieve without the systematic consultation and input from the many interested parties.

For all but the smallest project, this endeavor will last for several years and the team must develop the spirit of collaboration and flexibility to deal with the inevitable changes that will evolve during the course of that time. The development of this team spirit can be hugely rewarding both for the individuals and the institution. Individuals can learn about an entirely new process and the complexity of design and construction, which incidentally, includes many practical applications of scientific principles. Institutions can benefit from the sense of teamwork, shared decision-making, and compromise that is required by anyone participating in such a process.

This essay discusses the organization of the institutional team and how different groups are typically involved in the process. A brief description of a project's evolution from an idea or a perceived need to a finished working building is also provided. In addition, the subject of finances, a vital consideration in any construction undertaking, is discussed.

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Project leadership

In thinking about leadership, it is important to understand that a project goes through many phases. Throughout these phases, leadership roles often change. Key players often include, but are not limited to, faculty members, deans, senior academic leadership, finance and administration officials and the board of trustees. An explanation of what each party contributes throughout the life cycle of a typical project appears below.

Emerging project

- **faculty members and deans:** An emerging project is often led by a faculty member or dean. This is frequently triggered by recognition that the existing building simply cannot meet the needs of the institution and needs either radical renovation or replacement. An existing building's initial shortcomings are often handled by small renovations, frequently completed during the summer recess. This practice slowly "cannibalizes" space (especially social spaces) until one day it is impossible to create space for a new faculty member's research or to accommodate a new instrument or an interdisciplinary initiative. Frustration inevitably builds, acting as the catalyst that brings a new project to its next phase. We have found that at this point during successful projects, a motivated faculty member or group of faculty members usually emerges that pushes change from the ground up.

The opportunity to make a real difference is critical at this point. An institution can limit change by implementing a limited renovation for a small amount of money. Ideally, however, the need to rethink space fundamentally and to build a stronger alignment with an institution's mission is recognized. At this visioning stage, it is important to focus both on institutional strengths and how to build on them and on institutional weaknesses and how to strengthen them.

A powerful tool to lubricate the wheels of change is the mission statement created by each department. Guided by a dean, or other supra-department authority, who can use one department's creativity to inspire another, mission statements offer the opportunity for early broad-based input and support from the faculty.

- **senior academic leadership:** At this point, senior academic leadership is required to see that the project aligns with the institution's strategic plan (e.g. growth of student body, commitment to student research, commitment to science, etc.). For example:

  at the University of Richmond, the strategic plan called for the student body to stay the same, but to shift the faculty from a 4/3 teaching load (4 courses in the fall semester and 3 courses in the spring semester) to a 3/2 (3 courses in the fall semester and 2 courses in the spring semester) teaching load. The new plan freed up faculty members' teaching loads and allowed for more research time. This new emphasis on faculty and student research required more space for research labs and new faculty hires. The science building project needed broad faculty support for the commitment to research and a simultaneous commitment by the administration to provide the extra staff and space required.

- **finance and administration offices:** The dean, faculty members, and facilities team must then work with the offices of finance/ administration, development, and the president to frame the "science case" and make recommendations as to the priority of the project in relation to other capital projects being considered by the institution. Typically, science buildings are quite expensive, impacting the funding, and therefore, the timing of other projects.

- **board of trustees:** Often, key board members (and sometimes key members of the president's staff) have been part of framing the story to this point. Now, discussion of the project and priorities must occur among the trustees in order to develop a clearly defined rationale to support the project. Frequently, it takes discussions at several meetings of a board of trustees to move a science project from incubator to the top of the list of projects.

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Feasibility study and design phases

Once a decision is made to actively proceed with the project, a more detailed feasibility study must be done to confirm the program and to test the initial assumptions that were made at the visioning stage. These include assumptions regarding site selection, use of existing buildings (if any), phasing and, perhaps most importantly, cost. When this feasibility study is complete and approved, the project is well defined and design can begin.

- **project leadership team or project executive committee:** During the feasibility study, design and construction stages, the project is frequently led by this leadership team, typically made up of one representative of administration, one representative from facilities, and one faculty member representing those who will occupy the completed building. The faculty member in this small group has a particularly important role. This person, called the "project shepherd" (in PKAL parlance) has a special responsibility to represent the academic mission of the building, to actively communicate to his/her academic colleagues, and to represent their views at the team leadership level. The leadership team works closely with the architects and design engineers (the design team) who will prepare the feasibility study and ultimately design the building.

- **core programming group:** This group includes representatives from every department that may be included in the building. It is important that these individuals are able to represent the needs of their department but that they can also think beyond their own space and teaching style. Faculty that have a good understanding and/or interest in what their colleagues are doing and who are good communicators, comfortable passing along information and making decisions for their peers, are the best candidates for membership of this group.

- **building committee:** This committee includes the core programming group as well as several other members representing groups that might have an interest in the project. These would include the provost's office that would probably control any classrooms in the building, the IT department that would control the IT infrastructure, and some students as well as representatives of other academic departments and of the larger campus community.

The process: how the institutional team is involved

Feasibility study

During the feasibility study stage of a project, decisions about the appropriate size and location of the new building are discussed. If renovation is a possibility, the study explores the renovation options and compares them with new construction, and possibly, a combination renovation and addition. Also, during this stage of the project, it is also appropriate to examine the need, if any, for phased construction and some of the options for phasing. All of these discussions will tie invariably into the programming process and can greatly affect the requirements for space. Requirements for program adjacency (what rooms of the building are close to other rooms) will also be greatly affected about decisions concerning building/project location and size.

- **programming:** The purpose of the programming process, which is normally part of the feasibility study, is to define and confirm the quantity and quality of the spaces that will make up the building. It is done, usually by an architect, by gathering information in writing and through meetings with the core programming group about the specific needs of the people and departments that will use the building. The process is an iterative one in which the users discuss the goals and purpose of the space with the design team. Out of this dialog emerges a coherent list of desired spaces with their key characteristic in terms of size, quality, location, and special facilities.

  An interesting aspect of programming is that any two institutions that may have the same goal (e.g. to provide interdisciplinary opportunities and to provide better space for teaching and research) may go about programming their buildings in very different ways. The process depends on the people, as different as they may be. If the right ingredients and ideas are in place, the outcome is sure to be unique,

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exciting and reflective of the goals and values of the institution. For example:

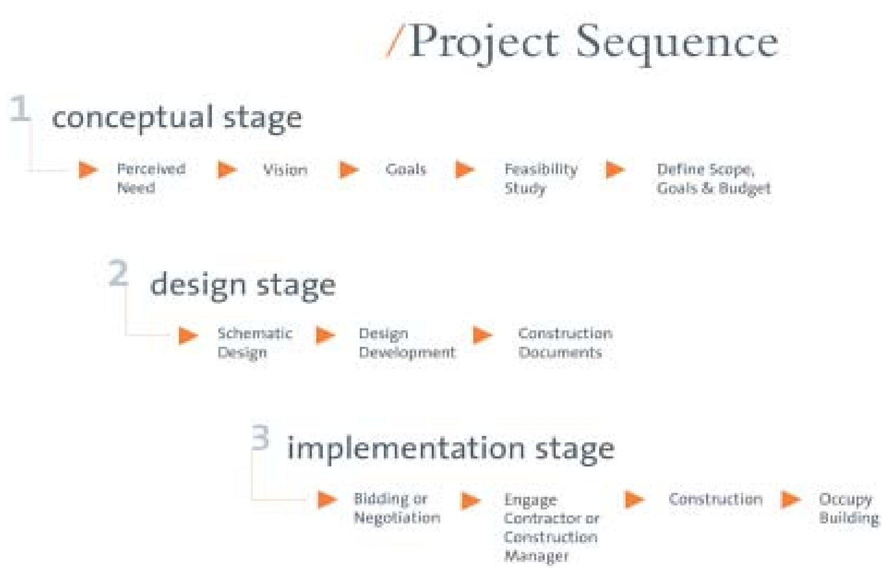
> one institution might have 3 months to determine the program for their new STEM building, while another may take 9-12 months to determine the appropriate program. Both schedules can be appropriate, depending on the process and the people involved and the decision-making culture of the institution.

- **possibility of renovating existing facilities:** As the idea of the project begins to gel, it is important to ask, Should the project be a renovation, a renovation and addition, or an entirely new building? A good feasibility study can help answer this question. As part of the study, the strengths, weaknesses, and capabilities of the existing buildings are determined and the requirements of the program are tested against the attributes of the existing buildings. This usually results in a number of conceptual options showing how the existing buildings might be adapted, renovated, or expanded to meet some or all of the needs of the program.

Design stage

Once the feasibility study defines the scope and size of the project, a decision needs to be made by the institution to proceed into the design stage and to commit the necessary funds for the building design. Each phase is increasingly more detailed and specific. The outcome of the process is a set of very detailed architectural and engineering drawings and specifications, all to be used as the basis for bidding and construction.

- **schematic design:** The project leadership team will normally be in frequent consultation with the design team. The core program group will be consulted, particularly on how the design incorporates the requirements detailed in the program. The building committee will meet, perhaps several times, to review the evolving design and comment on it. Finally, senior administration, and frequently, the board of trustees will wish to review and appraise the design to ensure that it fits with the board's vision of how the campus should develop. The board and senior administration will also be involved in reviewing the cost estimates for the project and giving approval to the design and the associated budget.



- **design development:** The design team makes decisions regarding the detailed design of the building. It is common for the core programming group to be heavily involved in the details of laboratories and classrooms. The project leadership team will continue its regular communication with the design team on matters of detail and procedure. Representatives of the facilities (also called "building and grounds") department will be providing information on products and standard designs that are commonly used on the campus and reviewing technical aspects of the design.

- **construction documents:** The design team is now preparing very detailed information on the construction of the building. There is usually less interaction with the various groups, as all major decisions should, by this time have been made. Nonetheless, the project leadership team continues to act as a liaison with the design team and involves other groups as required.

Bidding and construction stage

The institutional groups' involvement during this phase is similar to their involvement during the construction document phase. The project leadership team meets regularly to deal with the challenges and questions that inevitably arise during construction. It is also this group's responsibility to communicate with the other groups, particularly on matters of schedule and completion dates.

Understanding the costs of a project

When beginning the process of investigating what a proposed project might cost, it is important to remember that STEM buildings are frequently the most expensive buildings that an academic institution can build. No matter how wealthy an institution may appear to be, it is unlikely that there are sufficient resources to build everyone's "wish list." At first, this may seem daunting, but the challenge of working within a budget results in the undeniable opportunity to clarify vision and focus efforts.

Defining a construction project within the grasp of an institution's economic reach is a complex process that requires an artful balance between long- and short-term academic and financial goals mixed with a series of other important, and sometimes, conflicting interests. For example:

> finding a compromise between beautiful and durable finish materials or systems that are often expensive to manufacture, prepare, and install and those that are less expensive but with less desirable appeal or long-term performance.

Ultimately, choices such as "spend more on this now and enjoy it for years to come" or "spend less now, use it now but replace it before long" and other similar challenges await those embarking on the planning and design of a construction or renovation project. However, the first step in controlling costs is to control the size of the building itself. It may seem obvious, but it is important for teams involved in the programming and design of buildings to remember that a smaller building is a less expensive building and that every additional square-foot added to the program will ultimately result in a more expensive project.

Becoming familiar with the terminology and concepts used in the construction and finance fields prepares people who are not familiar with the design and construction process for the challenges associated with interpreting and understanding project costs. The appended box lists some common construction costing terms that may be helpful.

Cost comparisons among projects

It is common to compare projects, and particularly, project costs by comparing costs per square-foot. It is important when these simple comparisons are used to be sure that "apples" are being compared with "apples" and not "bananas". For example:

> a project on one campus may utilize an existing central cooling or boiler plant to provide air-conditioning and heating sources for the new project, while another may require construction of an independent source for cooling and heating for the project. These differences can dramatically change construction costs for a given square-footage of space.

Comparisons, however, are important, and many in a position of decision making find relative comparisons useful in evaluating and developing budgets and testing institutional commitment against peer institutions. We call such relative comparisons, benchmarking. Benchmarking illustrates ranges of what other institutions have done or have as a resource. Square-footage benchmarking is often used to test whether space requests are typical among peer institutions. Typically, benchmarking is done by adding the total net square-feet (NSF) for a particular program and dividing this figure by the number of Full-time equivalent faculty (FTE) to get a ratio of NSF per faculty member. In making comparisons, it's important to establish lists of institutions that are comparable in size and focus, as well as those exhibiting characteristics to which an institution may aspire.

Remember: as in the case of comparing cost per square-foot figures, institutional space benchmarking figures are also prone to considerable variations. Some institutions may be utilizing Cold War-era spaces to house their teaching and research programs, while others may have contemporary, discovery-based learning laboratories. Others have more vibrant research programs with a number of experimentalists on their faculties, while others may have more theorists and faculty who are less active in research. In addition, some institutions may support special programs requiring significant space to accommodate, and this can make figures appear much more generous than typical. As with cost comparisons, it's important to remember that benchmarking is only a relative measure and that efforts to investigate what is really needed at an institution are more effective in determining the actual space requirements. In the end, more total space than your peers may not be needed. Most likely, better space is required for an improved learning environment.

USEFUL TERMS

Construction cost is the cost of "bricks and mortar" or the materials and systems that make up a building. This term is used to describe the total amount paid by the building owner to the general contractor or construction manager for the construction of the building and any associated construction work.

Site development costs are the costs associated with preparing the site for the building. These costs can include everything from adjusting topography through grading or excavation to providing access to municipal utilities and roadways to landscaping and plantings. They may be included in the construction cost. However, as these costs are unique to the specific site, they should be excluded from construction cost when comparing the costs of one project with another.

"Soft" costs are the costs of the services and processes in addition to the construction cost that are necessary to complete the project. These expenses include professional design fees and other consultant fees; the cost of furnishings, fixtures and equipment; moving costs; and the cost of temporary space necessary to complete the project. Other "soft" costs include fees to regulatory agencies, management costs, and other miscellaneous charges that are necessary to complete the project.

Contingency costs is the money set aside from specific budgets for unexpected conditions, unanticipated changes, and corrections or other adjustments not originally planned as part of a project. Reserving funds to cover these types of expenses is essential, as all the costs cannot be known until the project is complete. At the early stages of a project, budgets should have several levels of contingencies. As the project proceeds and develops and the costs are more certain, these contingencies can be gradually eliminated.

Project cost is the sum of the construction cost and all "soft" costs, including all contingencies.

Net-square-foot (NSF) is the usable area of the building. It includes all programmed rooms and spaces but excludes ancillary spaces such as corridors, stairs, mechanical rooms, bathrooms and the area under the walls and structural elements.

Gross square-foot (GSF) is the total area of all floors of a building including all usable spaces and all ancillary spaces and area below the thickness of the walls and structural elements.

Cost per square-foot is the cost in dollars of one gross square-foot of the building. It is arrived at by dividing the gross square-footage of the building by the construction cost.

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Conclusion

The act of planning, designing and constructing a new or renovated STEM building is an exciting and inspirational one for an institution. It requires the collaboration of a diverse group of individuals to make an institutional team. By the time the project is complete, this team will have worked together for many years, sharing not only challenges and disappointments, but great triumphs as well. They will, ultimately, have made a major and lasting contribution to the institution in the form of a new structure that will stand as a living monument to the accomplishments of the team for many years to come.

The accomplishment deserves to be honored, recognized and celebrated. There are usually many milestones along the route of planning, design, and construction when a public event is appropriate to acknowledge the institutional team's accomplishments and to celebrate everyone involved. ■