EAB

Campus Design Toolkit

Guiding Design Decisions to Ensure Renovations and New Construction Meet Current and Future Needs

Facilities Forum

Facilities Forum

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Supporting Members in Best Practice Implementation

Resources Available Within Your Membership

This publication represents only one of our many resources to support members in their campus modernization efforts. Details about additional resources are provided below.

For additional information about any of these services—or for an electronic version of this publication—please visit our website (eab.com/facilitiesforum), email your institution's dedicated advisor, or email research@eab.com with "Campus Design Toolkit" in the subject line.

Campus 2025 Infographic

This poster summarizes the seven most impactful learning, technology, and space trends across the next decade.

Learn more about how to respond to each trend at eab.com/ff/campus2025.

Unlimited Access to Experts

Facilities Forum members may contact EAB researchers at any time to discuss our findings, request networking conversations, or review related resources and practices.

On-Demand Webconferences

Register for upcoming sessions to hear our latest findings or access archives of past presentations. Many members convene campus leaders and task forces to attend and share ideas on practices and implementation.

All Facilities Forum resources are available to members in unlimited quantity.

To order additional copies of this book, or to learn about our other services, please visit us at eab.com or contact us at 202-266-6400.

Executive Summary

Capital Construction and Design a Problematic Process

Even in the face of declining revenue across the past decade, funding for new construction is still one of the most accessible sources of dollars. However, the design process remains complex and sometimes politically fraught, with multiple stakeholders and interests in play. There are three main challenges hindering design and construction in higher education.

- There are often **multiple stakeholders** involved. Facilities typically owns the design and construction process, but many building occupants and other stakeholders feel empowered to add their demands to the building's design.
- Faculty have an **incomplete understanding of design and construction costs**, leading them to prioritize investments in sophisticated technology or showcase features without a clear sense of the maintenance and renewal implications.
- Lastly, institutions struggle to construct a space that **truly meets its specific needs**. Features that seem appealing on paper may not fully align with student and faculty preferences.

The Campus Design Toolkit

The Campus Design Toolkit provides six tools to support the planning and execution of design projects, whether institutions are seeking to build a new facility, convert existing space to meet new needs, or even test a design before committing to a layout. Each tool supports a unique stage in the design and construction process, so institutions can use one tool or all six depending on their needs.

The first two tools support pre-planning efforts. **Tool 1: Capital Project Charter Template** helps ensure that everyone involved in a design project—including the end users—is operating on the same timeline and with the same goals. **Tool 2: Capital Project Cost Calculator** helps institutions gauge the financial viability of a project before breaking ground.

The next two tools help institutions make decisions about classroom upgrades. **Tool 3: Classroom Technology Standards Considerations** guides institutions looking to develop formal classroom technology standards to apply across campus. **Tool 4: Learning Space Upgrade Guide** helps institutions compare and contrast how different classroom upgrades will affect teaching and learning.

The final two tools are intended for institutions seeking to bring new types of spaces to campus. **Tool 5: Space Prototyping Planning Guide** helps institutions recognize when and how to prototype a new design. **Tool 6: Prototyping Feedback Guidelines** equips Facilities departments to gather targeted, constructive feedback from end users testing a space.

How to Use This Toolkit

This toolkit is designed for anyone involved in campus design and construction efforts, and tools can be used independently or in sequence across a construction project. Each tool is available in full in this publication, as well as electronically on eab.com. Note that customizable versions of some of the tools are also available at eab.com.

Deciding Where to Start

The questions below are intended to help members identify opportunities to bolster their institution's campus planning and design efforts. Answering "no" signals an area of potential improvement, and the column on the right points to the relevant resource within this guide.

Does your institution currently…	If not, see…	Page
…employ a contract to establish the scope of a capital project before beginning work, formalizing roles and establishing a timeline?	**Tool 1: Capital Project Charter Template**	7
…ensure all project participants have a clear understanding of the costs associated with capital projects (both upfront and hidden costs, like regular landscaping)?	**Tool 2: Capital Project Cost Calculator**	14
…have institution-wide standards and requirements for classroom technology?	**Tool 3: Classroom Technology Standards Considerations**	18
…have a clear plan for converting existing classrooms into active learning spaces?	**Tool 4: Learning Space Upgrade Guide**	23
…recognize when and how to prototype spaces?	**Tool 5: Space Prototyping Planning Guide**	26
…understand what questions to ask and feedback to request from users who have tested a prototyped space?	**Tool 6: Prototyping Feedback Guidelines**	30

Tool 1: Capital Project Charter Template

Tool Objective

When institutions undertake capital projects, they often find project participants do not understand their role in the project or that disputes arise due to an unclear execution process. This tool provides institutions with a framework to articulate responsibilities, deadlines, and objectives for capital projects. It helps ensure that the capital planning team is on the same page with campus leaders and project customers before breaking ground. It is designed to clarify the roles and authority of different people involved in project planning and execution, which ensures that all participants have a common understanding of the project and prevents disputes as the project progresses.

How to Use This Tool

This tool can serve as a template for institutions looking to create a new capital project charter or a resource for those seeking to improve their existing one. An editable version of this tool is available at eab.com.

The tool consists of five sections, detailed below. Institutions can either use the template in full or pick and choose the questions or sections most relevant for their process.

Section	Description
A. Project Information	Establishes basic project goals and priorities and ensures the project aligns with the broader institutional mission. Agreeing on priorities up front is important in case budget cuts or other obstacles arise later in the process. The charter ensures that participants have agreed on their priorities and know which elements of the project are most important to preserve.
B. Project Participants and Communication Strategy	Clarifies the roles and responsibilities of everyone involved in the project and designates who will be responsible for communicating changes and updates. This avoids later confusion and ensures everyone stays informed of progress.
C. Implementation Plan	Establishes a concrete plan for implementing the project, including who is responsible for which steps and projected completion dates for each phase, helping the project stay on track. The section also calls for funding and budget information, ensuring all participants understand how the project will be funded and how money will be spent.
D. Considerations	Pushes project leaders to think about the conditions necessary for successful completion as well as how the project will impact everyone on campus.
E. Approval	Requires all participants to sign off on the charter, signaling their agreement to the defined parameters and process. While not legally binding, this step can be helpful if project focus starts to drift later in the process. Facilities can refer anyone with questions back to the guiding rules that they approved.

Source: Facilities Forum interviews and analysis.

Tool 1: Capital Project Charter Template

A. Project Information

A1. Project Name

Assign each project a concise but unique name that captures the nature of the project and where it is taking place. Include a project number if applicable.

A2. Project Summary

Provide a basic outline of what the project will accomplish.

A3. Background

State the problem(s) that the project seeks to solve and explain how and why the project came about to solve them.

A4. Project Goals

Establish a prioritized list of goals and objectives for the project, ensuring that goals are specific, measurable, and realistic. This list should include not only the goals for the physical completion of the project but also the broader academic and institutional objectives the project seeks to advance. List the goals in order of priority; prioritizing the goals helps the Facilities team know where to make tradeoffs if budget cuts or other obstacles arise.

Source: Facilities Forum interviews and analysis.

Tool 1: Capital Project Charter Template

A5. Project Scope

Describe what the project will include and define the limits of the project. Be sure to also flag anything the project will not address; for example, if a building renovation will not include IT upgrades.

A6. Master Plan Alignment

Explain how the proposed project aligns with the campus master plan.

A7. Strategic Plan Alignment

Explain how the proposed project aligns with the campus strategic plan.

Source: Facilities Forum interviews and analysis.

Tool 1: Capital Project Charter Template

B. Project Participants and Communication Strategy

B1. Lead Roles and Responsibilities

Identify the project manager and other decision makers who will be involved in project planning and execution. Describe each person's project responsibilities.

Role	Name	Responsibility	Contact Information

B2. Approval and Oversight

List the individuals or groups that have approval or oversight authority over any part of the project and specify the scope of their authority.

Role	Name	Authority	Contact Information

B3. Customers

List the constituencies that will use the completed project. Identify one representative from each constituency who is willing and able to serve as a point of contact.

Customer	Representative	Contact Information

B4. Interested Parties

List any other individuals or groups who have a vested interest in the project, even if they are not directly involved. Explain why they might be interested and include a point of contact for each group.

Party	Representative	Contact Information	Reason

B5. Communication Strategy

Assign responsibility for communicating updates and points of contact for questions about different project components. This section can be used to elaborate on reporting relationships among participants to avoid ambiguity about who should be communicating with whom about updates and changes.

Source: Facilities Forum interviews and analysis.

Tool 1: Capital Project Charter Template

C. Implementation Plan

C1. Project Milestones

List major project milestones and target completion dates.

Milestone	Target Completion Date

C2. Project Timeline

Map out the project from start to finish, including both major milestones and smaller progress targets. Elaborate on what should be accomplished at each stage and include information about who is responsible for approval and completion of each phase.

C3. Funding Sources

List each funding source for the project and how much funding will come from each. If additional funding is necessary, list possible sources and plans for obtaining those funds.

C4. Budget

Include the project budget as an addendum to the charter.

Source: Facilities Forum interviews and analysis.

Tool 1: Capital Project Charter Template

D. Considerations

D1. Assumptions

List and describe any conditions on which the progress and ultimate success of the project depend. Where possible, outline a contingency plan.

Assumption	Contingency Plan

D2. Constraints

List and describe current or future challenges that could impede the successful completion of the project.

Constraint	Contingency Plan

D3. Campus Impact

Explain how the project will affect campus, both during construction and after completion. List all possible negative ramifications of the project and propose plans to minimize them.

Source: Facilities Forum interviews and analysis.

Tool 1: Capital Project Charter Template

E. Approval

Charter Approval

By signing the final page of the charter, all approval authorities and stakeholder groups agree to the charter's contents.

Name	Signature	Date

Source: Facilities Forum interviews and analysis.

Tool 2: Capital Project Cost Calculator

Tool Objective

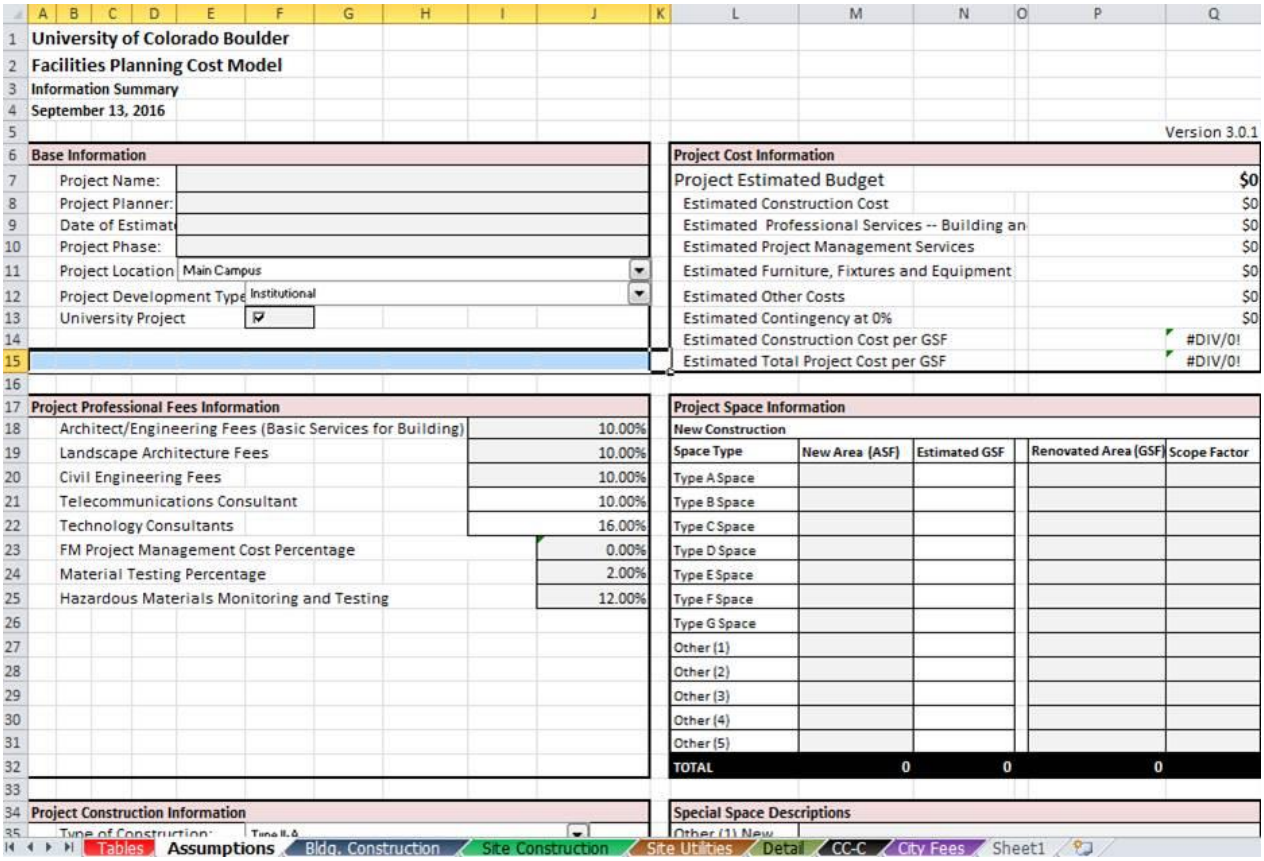
Although the Facilities unit is responsible for overseeing construction projects, they rarely have the authority to decide where and how to invest project dollars. Instead, budget allocation and investment decisions are typically made by academic or senior campus leaders, who often lack a nuanced understanding of design and construction. As a result, construction projects involving multiple stakeholders are more likely to run over budget or reallocate funding from building infrastructure to surface finishes.

To overcome these challenges, the University of Colorado, Boulder uses an interactive budget calculator to estimate project costs. This tool also enables them to communicate how decisions such as choosing to build new versus renovating an existing space will affect a project's budget.

How to Use This Tool

This tool provides an overview of the University of Colorado, Boulder's interactive budget calculator and outlines three ways institutions can use it: to generate preliminary cost estimates for proposed projects, choose between building new and renovating and existing space, and as a model for developing a campus-specific construction cost calculator. Given the tool's complexity, the Facilities Forum recommends that project managers or other staff involved with design and construction manage the tool.

Note: This tool is a downloadable Excel spreadsheet available at eab.com.



University of Colorado Boulder
Facilities Planning Cost Model
Information Summary
September 13, 2016
Version 3.0.1

Base Information

Project Name:	
Project Planner:	
Date of Estimat	
Project Phase:	
Project Location	Main Campus
Project Development Type	Institutional
University Project	☑

Project Cost Information

Project Estimated Budget	$0
Estimated Construction Cost	$0
Estimated Professional Services -- Building an	$0
Estimated Project Management Services	$0
Estimated Furniture, Fixtures and Equipment	$0
Estimated Other Costs	$0
Estimated Contingency at 0%	$0
Estimated Construction Cost per GSF	#DIV/0!
Estimated Total Project Cost per GSF	#DIV/0!

Project Professional Fees Information

Architect/Engineering Fees (Basic Services for Building)	10.00%
Landscape Architecture Fees	10.00%
Civil Engineering Fees	10.00%
Telecommunications Consultant	10.00%
Technology Consultants	16.00%
FM Project Management Cost Percentage	0.00%
Material Testing Percentage	2.00%
Hazardous Materials Monitoring and Testing	12.00%

Project Space Information

New Construction

Space Type	New Area (ASF)	Estimated GSF	Renovated Area (GSF)	Scope Factor
Type A Space				
Type B Space				
Type C Space				
Type D Space				
Type E Space				
Type F Space				
Type G Space				
Other (1)				
Other (2)				
Other (3)				
Other (4)				
Other (5)				
TOTAL	0	0	0	

Project Construction Information

Type of Construction: Type II-A

Special Space Descriptions

Other (1) New

Tables | Assumptions | Bldg. Construction | Site Construction | Site Utilities | Detail | CC-C | City Fees | Sheet1

Source: University of Colorado, Boulder, Boulder, CO; Facilities Forum interviews and analysis.

Tool 2: Capital Project Cost Calculator

Overview of the Capital Project Cost Calculator

The calculator is an Excel spreadsheet with eight tabs. The table below outlines the information provided on each page and recommends how project managers use each one. The Facilities Forum recommends that project managers start with the Tables tab, which maps out data tables that inform many of the calculations throughout the rest of the spreadsheet.

Name (Abbreviation, Where Applicable)	Description
Tables	Captures fixed construction costs that are incorporated into formulas throughout the document to inform cost estimates. (Note: the Tables tab is prepopulated with Boulder-specific data.)
Assumptions	Asks for baseline inputs about the scope of and costs associated with the project. Can also be used to generate initial project estimates based on the type and amount of space requested in the project.
Building Construction (Bldg. Construction)	Estimates costs for new construction, renovation, remodeling, and demolition projects based on the types and amount of space included in the project.
Site Construction	Outlines the total cost of purchasing and preparing a site for new construction.
Utilities	Allows for more detailed estimates of the cost of civil utility infrastructure running up to and underneath the building envelope. (Internal systems like water pumps, HVAC, and electric switchboards are not included in this section.)
Detail	Captures supplemental expenses like design estimates, site surveys, consultant fees, certifications, land purchases, human labor, construction materials, interior finishes, and room furnishings and equipment.
Capital Construction Costs by Fiscal Year (CC-C)	Calculates how annual inflation increases construction costs using the project start and midpoints. (Note: the CC-C tab is prepopulated with Colorado-specific data.)
City Fees	Estimates and tracks the cost of city fees and permits necessary for project construction and completion.

Source: University of Colorado, Boulder, Boulder, CO; Facilities Forum interviews and analysis.

Tool 2: Capital Project Cost Calculator

Three Ways to Use the Capital Project Cost Calculator

Institutions that have used the cost calculator have found it most valuable when used for one of the following three purposes:

1. **Generate Preliminary Cost Estimate for Capital Project**
   The calculator can be used to generate an early estimate for project costs. While no calculator can fully predict project costs, the University of Colorado, Boulder and other institutions report that the calculator provides a helpful starting point.

   Implementation Guidelines

   - Note: the calculator the generates most accurate estimate for projects over $3 million.
   - First, review the Tables tab to determine whether the prepopulated cost assumptions fit your region. More detail about baseline construction costs is available in the Building Construction, Site Construction, and Utilities tabs.
   - If cost assumptions appear significantly but consistently different from those in your region, update the percentage difference between costs in your region and prepopulated costs. This metric can be found in cell P6 of the Building Construction tab. Project managers at institutions across the country found they could generate accurate early estimates using this shortcut.
   - Return to the Assumptions tab and fill in the Project Construction Information, Project Site Information, and Project Space Information tables to generate a project cost estimate in the Project Cost Information table. The Project Revenue Assumptions can be used to calculate a rough estimate of the funds the institution is responsible for generating to finance this project.

2. **Compare Cost Difference of Renovating Existing Space Versus New Construction**
   The calculator can also be used to help project managers compare the cost of new construction versus renovating an existing space.

   Implementation Guidelines

   - Use the Project Space Information table in the Assumptions tab to calculate the cost of new construction versus renovation. Use the Scope Factor (column Q) to indicate the renovation intensity using one of the following five values:
     - 10%: minor appearance upgrades
     - 25%: total finish upgrades
     - 50%: total finish upgrades plus minor plumbing and HVAC work
     - 80%: total finish upgrades plus major plumbing and HVAC work
     - 90%: total reconstruction

Source: University of Colorado, Boulder, Boulder, CO; Facilities Forum interviews and analysis.

Tool 2: Capital Project Cost Calculator

3. **Source Material for Institution-Specific Capital Project Cost Calculator**
   The final way institutions have used this tool is as a model for creating their own cost calculators, with inputs customized to the prices and regulations in their region. Institutions seeking a tool that they can use frequently should take this approach.

   Implementation Guidelines

   - This is the most complex use of the cost calculator. Since many of the cells are connected to other cells through built-in equations, users may find that deleting information makes the tool fail. The University of Colorado, Boulder recommends slowly tweaking the inputs and testing throughout the process.
   - First, update the Tables and City Fees tabs to reflect city- and region-specific costs.
   - Next, review each tab and update any built-in cost assumptions. With the exception of the Assumptions tab (which pulls from cells throughout the spreadsheet but does not include any tables with regionalized inputs), each tab has built-in cost assumptions.

Source: University of Colorado, Boulder, Boulder, CO; Facilities Forum interviews and analysis.

Tool 3: Classroom Technology Standards Considerations

Tool Objective

Technology variation across classrooms exacerbates faculty preferences for certain rooms and limits the number of rooms in which certain courses can be taught. Classroom technology standards can help institutions minimize diversity across classrooms, increasing room utilization rates by enabling faculty to teach in a higher number of classrooms. In addition, knowing what technology each classroom needs allows Facilities leaders to incorporate necessary infrastructure to support classroom technology when renovating or building new classrooms. It also simplifies the design process. Finally, institutions using standardized equipment across classrooms can save money through bulk purchasing contracts while maintaining consistency in user experience.

How to Use This Tool

This tool highlights four considerations to help institutions develop classroom technology standards that effectively meet their needs. Varying priorities mean no two institutions will have identical standards, but all institutions must consider how technology can support their broader institutional aspirations and advance pedagogical goals. Good classroom technology standards ensure both students and faculty have the equipment necessary for teaching and learning.

This tool helps institutions understand how to ensure classroom technology fulfills its intended purpose and make decisions about what their classroom technology standards should include.

Considerations for Creating Classroom Technology Standards

- ❑ Articulate Principles to Guide Technology Decisions
- ❑ Determine the Scope of Technology Standards
- ❑ Ensure Technology Standards Meet Institutional Needs
- ❑ Make Technology Accessible

Source: Facilities Forum interviews and analysis.

Tool 3: Classroom Technology Standards Considerations

Consideration 1: Articulate Principles to Guide Technology Decisions

Before establishing specific technology standards, institutions should discuss the overarching goals and principles that guide classroom technology decisions. By laying out the pedagogical goals of implementing technology standards, institutions ensure that the decisions they make will support pedagogical needs and avoid making investments in flashy technology that will not significantly improve the classroom experience.

Old Dominion University's Classroom Technology Standard, excerpted below, establishes guiding principles for classroom technology before delving into the technology specifications.

Old Dominion University Classroom Technology Standard

C

C. Standards Statement

Classroom Central provides equipment, services, and support to help faculty and students take full advantage of the technology available in the University's technology classrooms and is responsible for ensuring that classrooms meet minimum standards.

General Principles

- Technology classrooms should be flexible to serve multiple users with many teaching styles and broad academic spectrum.
- The design should provide easy flow and mobility for students and teachers as well as their interaction.
- The design should provide for connectivity and networking for data, voice, and video information.
- Educational technology systems should be user friendly and easily operated by a teacher without the assistance of a technician.
- The design should be closely coordinated with lighting and mechanical systems.
- The design should contain cost without sacrificing quality.

Source: Old Dominion University, "Information Technology Standard 11.3.0," https://www.odu.edu/about/policiesandprocedures/computing/standards/11/03; Facilities Forum interviews and analysis.

Tool 3: Classroom Technology Standards Considerations

Consideration 2: Determine the Scope of Technology Standards

While technology standards are partly intended to reduce technological differences across classrooms, not all types of classrooms require the same type of technology. For instance, a large lecture hall will require a microphone while a small seminar room likely will not. Therefore, many institutions choose to organize their standards by classroom type and size.

Other institutions choose to differentiate standards based on level of technology required. For example, an institution might have a baseline level of classroom technology applicable to all classrooms and an advanced package reserved for classrooms designed for courses that require more technological resources.

These two methods for organizing technology standards are shown below. Institutions can choose one or the other or a combination of both.

Classroom Size and Function

Institutions develop sets of standards based on classroom size and function.

Classroom categories might include:

- Small classrooms (fewer than 25 students)
- Large classrooms (26-50 students)
- Small lecture halls (50-100 students)
- Large lecture halls (more than 100 students)
- Active learning classrooms
- Computer labs
- Teaching labs

Institutions can choose how to categorize classrooms based on pedagogical needs. For example, Western Michigan University organizes its technology standards using only three levels. Level 1 classrooms seat fewer than 50 students, Level 2 rooms seat 50-100 students, and Level 3 rooms seat over 100 students.

Technology Tiers

Institutions develop different standards based on different technological requirements; rooms receive a package based on the pedagogical requirements of classes taught in that room, the layout, and other considerations.

For example, the University of California, Berkeley's technology standards outline technology "tiers":

- Basic Technology
- Enhanced Basic Technology
- Webcast Full Production Technology
- Computer Facilities Technology
- Multi-Source Collaboration
- New Standard

Each tier meets a different set of pedagogical needs, but all tiers satisfy the same baseline technological level.

Considerations for Standardizing Centralized vs Decentralized Rooms

Institutions must determine which classrooms on campus will adhere to the standards. Some institutions choose to apply standards only to centrally scheduled classrooms, while others expand them to all learning spaces. Expanding standard technology to decentralized rooms can help decrease faculty preference for those rooms or even incentivize departments to turn classrooms over to a central pool, as departments want their classrooms outfitted with the latest technology.

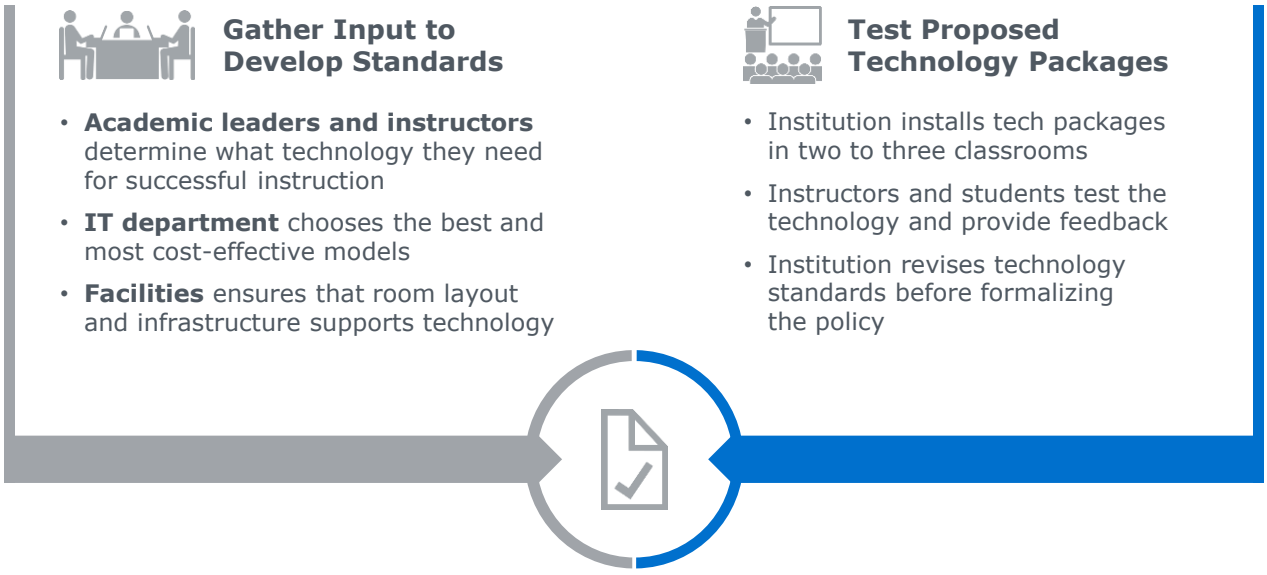
Source: University of California, Berkeley, "Classroom Technology Standards," https://classrooms.berkeley.edu/sites/default/files/ets_classroom_technology_standards_september2014_1.pdf; Western Michigan University, " WMU Classroom Technology: Standards," https://wmich.edu/sites/default/files/attachments/ct-standards_0.pdf; Facilities Forum interviews and analysis.

Tool 3: Classroom Technology Standards Considerations

Consideration 3: Ensure Technology Standards Meet Institutional Needs

The third consideration is to ensure standards meet institutional needs. There are two steps to accomplish this. First, institutions should gather input for the standards from Facilities, IT, and instructors. Academic leaders and instructors can provide guidance on what they want the technology to accomplish from a pedagogical perspective. Meanwhile, IT can suggest which technology is most cost effective and easiest to use and maintain. Finally, the Facilities team can speak to how the technology will work from a design standpoint and ensure that classrooms have the necessary infrastructure to support the technology.

Second, after developing a proposed technology package, institutions should outfit a few classrooms and test them thoroughly before making classroom technology standards a formal policy. To test technology and gather feedback from test users, institutions may find it helpful to undertake a variation on the space prototyping processes outlined in Tools 5 and 6.



Source: Facilities Forum interviews and analysis.

Tool 3: Classroom Technology Standards Considerations

Consideration 4: Make Technology Accessible

Once an institution has finalized classroom technology standards, they should distribute them widely and post them online in an easily accessible location. They must also designate responsibility for implementing the standards, maintaining equipment, and answering any standards-related questions.

Furthermore, simply installing technology will not advance institutional goals. To maximize the value of technological investments, students and instructors must understand how to use classroom technology and have the ability to check the features of a room before arriving to a class. This can be accomplished by making classroom technology information available online.

A few institutions have done a particularly good job at communicating technology standards and providing the necessary resources to make them effective. Washington State University offers in-person and online training sessions for classroom technology to help faculty understand the available options. University of Texas at El Paso posts instructions for using equipment online. Additionally, the institution has a spreadsheet available online that clearly lists the technological features of each classroom. Finally, Florida International University has a searchable online database of classrooms that allows users to filter classrooms by size, location, or features.

Train Faculty to Use Classroom Technology

Washington State University

- Offers in-person and online training classes to teach faculty to use technology and understand tech options
- Posts instructions for using technology online and in each classroom

Make Classroom Tech Information Accessible

UTEP

- Posts a spreadsheet online to show which classes have which tech features
- Has downloadable instructions for how to use classroom A/V equipment

Provide Searchable Classroom Tech Info

FIU

- Provides online classroom database searchable by size, location, or technology features

Source: Florida International University, "Classroom Search by Feature," http://asm.fiu.edu/classroom_search_n_features.php; University of Texas at El Paso, "Classroom Technology," http://admin.utep.edu/Default.aspx?tabid=74338; Washington State University, "General University Classroom Training," http://www.ams.wsu.edu/ClassroomTech/Training.aspx; Facilities Forum interviews and analysis.

Tool 4: Learning Space Upgrade Guide

Tool Objective

Because active learning emphasizes student and faculty interaction, active learning classrooms require specific design and technology upgrades that facilitate collaborative learning. There are a number of different design and technology upgrades that achieve this, many of which are expensive. As a result, institutions creating active learning classrooms may face tradeoffs. This tool serves as a resource for anyone seeking to understand how different classroom design and technology investments will impact the active learning experience. It can also help decision makers compare the costs and benefits of different upgrades.

For more information about active learning spaces, please see Active Learning Spaces: Cost-Effectively Reconfiguring Classrooms to Support Evolving Pedagogy, available at eab.com.

How to Use This Tool

This tool helps institutions understand which classroom upgrades will best achieve their desired objectives. The first table in the tool focuses on classroom design modifications, while the second details technology upgrade options. The tables detail each upgrade and allow the reader to compare the relative cost of different upgrades. In addition, four columns are dedicated to active learning objectives: fostering student collaboration, improving learning outcomes, supporting pedagogical needs, and enhancing classroom efficiency. A check in the column indicates that the upgrade will advance that goal. This allows institutions to choose the upgrades that will achieve the objectives most important to their campus.

Indicates which active learning objectives the upgrade will achieve.

Upgrade	Details	Relative Cost	Fosters Student Collaboration	Improves Learning Outcomes	Supports Pedagogical Needs	Enhances Classroom Efficiency	Implementation Considerations
Movement Space	Leave sufficient space between fixtures to allow students and faculty to circulate comfortably.	$	✓		✓	✓	Active learning classrooms typically require 35% more space than typical classrooms.
Whiteboards	Install dry erase boards around the room. Include multiple boards so that separate student groups can work on projects simultaneously.	$	✓	✓	✓		Install storage for markers and erasers to prevent them from going missing. Custodians should check and replace any missing supplies every few days.

Key

$: Small investment
$$: Moderate investment
$$$: Large investment

Indicates relative cost of different upgrades. If known, Facilities leaders can add actual cost estimates to this column.

Flags important details or background for institutions considering the upgrade.

Source: Facilities Forum interviews and analysis.

Tool 4: Learning Space Upgrade Guide

Classroom Design Considerations

Upgrade	Details	Relative Cost	Fosters Student Collaboration	Improves Learning Outcomes	Supports Pedagogical Needs	Enhances Classroom Efficiency	Implementation Considerations
Movement Space	Leave sufficient space between fixtures to allow students and faculty to circulate comfortably.	$	✓		✓	✓	Active learning classrooms usually require 35% more space than typical classrooms.
Moveable Tables and Chairs	Select easily movable tables and chairs (either lightweight or on wheels) that allow students and faculty to reconfigure the layout to accommodate different teaching and learning methods.	$	✓	✓	✓	✓	Establish norms for students and faculty to return furniture to a set location when class ends. Mark these set locations on the floors or post a room layout map.
Whiteboards	Install dry erase boards around the room. Include multiple boards so that separate student groups can work on projects simultaneously.	$	✓	✓	✓		Install storage for markers and erasers to prevent them from going missing. Custodians should check and replace any missing supplies every few days.
Non-tiered Floors	Reduce or eliminate tiered flooring in favor of a flatter layout. Even in larger lecture halls, reducing the number of tiers can improve collaboration.	$$	✓				Seating students on the same level facilitates more face-to-face conversations.
Rubberized Flooring	Students tend to move around more during active learning classes, increasing the risk of food and drink spills. Rubberized flooring makes spills much easier to clean.	$$				✓	Because rubberized flooring absorbs less sound than carpeting, institutions installing rubberized floors should consider installing acoustic panels as well (see below).
Acoustic Panels	Install acoustic panels to absorb excess noise. Given that active learning inherently involves more conversation, acoustic panels help ensure that chatter is not distracting.	$$	✓	✓			Improper acoustics can inhibit collaboration that leads to better learning outcomes.
Personal Storage	Students' backpacks and coats can get in the way as students and faculty move about the classroom. Install coat hooks and choose chairs with baskets underneath to allow students to store their belongings during class.	$				✓	Personal storage helps prevent trip hazards as students and faculty move around during class.
Classroom Equipment Storage	Include lockable cabinet or closet storage for faculty and staff to store expensive technology and specialized equipment only used by certain classes.	$			✓	✓	Storage space is critical to allow multiple disciplines to use the space and to accommodate diverse pedagogical styles.

Source: Facilities Forum interviews and analysis.

Tool 4: Learning Space Upgrade Guide

Technology Upgrade Considerations

Upgrade	Details	Relative Cost	Fosters Student Collaboration	Improves Learning Outcomes	Supports Pedagogical Needs	Enhances Classroom Efficiency	Implementation Considerations
Power Outlets	Run electricity through the floor to allow for multiple power outlets around the room. Because most students will bring laptops, this prevents students from crowding around a few outlets near the walls and computer cords from creating trip hazards as they stretch from the wall to tables.	$$		✓	✓	✓	Plan to have an outlet within easy reach of every student table.
Monitors with Screen-Sharing Technology	Install screen-sharing technology that will allow students or faculty to project their laptops onto a screen on the wall or onto a smaller screen situated at collaborative table. This allows students to share their work and for multiple people to view and collaborate on the same document.	$$$	✓	✓	✓		It is important to note that students and faculty may require training to use the equipment. Furthermore, technology can become outdated quickly and is expensive to repair if it breaks.
Large Monitor or Projector for Instructor	A monitor visible to the entire class allows the instructor to present information to the entire room.	$$$		✓	✓		Because the instructor will likely circulate around the classroom, the monitor should have wireless controls that the instructor can use throughout the room.
Student Table Microphones	Table microphones ensure that everyone can hear student voices in large class discussions.	$$$		✓	✓	✓	Microphones are most important in larger active learning classrooms. Note, this technology is expensive and easily broken, and many members report that it often fails.
Mobile Microphone	In larger active learning classrooms, it can be difficult for the instructor to address the entire class. A mobile microphone allows the instructor to address the class from anywhere in the room and helps the instructor recapture the class's attention when students are conducting their own conversations.	$$		✓	✓	✓	Like anything not anchored to the classroom, a floating microphone is more likely to go missing than one installed at a podium.

Source: Facilities Forum interviews and analysis.

Tool 5: Space Prototyping Planning Guide

Tool Objective

Prototyping is a process where institutions pilot new furniture or layouts with a subset of end users to ensure the final layout meets their needs. Leaders formally gather feedback and incorporate appropriate modifications into the end design, thereby avoiding costly mistakes such as making significant investments in the wrong features. Additionally, involving end users in the process has the added benefit of including them in potentially dramatic changes on campus.

How to Use This Tool

This tool is organized into three considerations that help institutions decide whether to prototype a space, predict how long prototyping will take for different types of space, and understand the basic steps of the prototyping process. This tool helps institutions determine whether, where, when, and how prototyping can benefit them. The tool is divided into three parts based on the steps in the prototyping decision process.

- Consideration 1: Decide whether prototyping is the right approach for a given space
- Consideration 2: Determine time and effort needed for successful prototyping
- Consideration 3: Develop a prototyping timeline

Consideration 1: Decide Whether Prototyping Is the Right Approach for a Given Space

Given the resource- and time-intensiveness of prototyping, Facilities leaders must take several factors into consideration before pursuing prototyping. As a general rule, institutions should pursue space prototyping if the design features of the space in question cannot be adequately tested without building a complete prototype *and* the consequences of making the wrong investment are greater than the cost of developing and testing a prototype. Institutions will benefit most from prototyping when it tests specific features in a new design that will be replicated in multiple spaces across campus.

This table shows scenarios where an institution may find prototyping useful.

Type of Space	Prototyping Scenario
Active Learning Classrooms	Institution hoping to outfit many classrooms for active learning starts by converting just two classrooms. After a few courses are taught in the rooms across one semester, leaders gather feedback from the students and faculty to identify any problems, suggestions, and improvements before expanding the upgrades to all classrooms.
Shared or Flexible Research Labs	Institution converts one existing lab into a shared layout to test the design for a new building. Researchers from various disciplines test the prototyped lab over the course of a year and identify any flaws before the new labs are constructed.
Residence Halls	Institution tests two designs for residence hall common areas by renovating two floors of an existing building. After testing the spaces and gathering student feedback over the course of a year, they choose the more popular design for all floors of the hall.
Administrative Office Space	Institution converts one floor of an older administrative building into an open-concept floorplan and invites Accounts Payable to test the space and provide feedback before converting all Finance units to the new layout.

Source: Facilities Forum interviews and analysis.

Tool 5: Space Prototyping Planning Guide

To more fully evaluate potential spaces, the Facilities Forum has developed the following diagnostic. We recommend prototyping spaces that yield six or more yes responses; however, institutions can establish their own threshold before completing the diagnostic. These questions can also be used to guide discussion about the pros and cons of prototyping among decision makers.

Prototyping Questions	Yes	No
1. Is the prototype for a specific of space (like a lab, classrooms, offices, or dorms) that will be replicated across campus with similar design and layout?	☐	☐
2. Are the consequences of failure more costly than the cost of developing and testing a prototype?	☐	☐
3. Will failing to deliver an optimal user experience substantially hinder the institution from achieving strategic goals?	☐	☐
4. Is the prototype for a new type of space?	☐	☐
5. Is the space intended to deliver a different user experience than other spaces currently used to meet programming needs?	☐	☐
6. Is the design concept previously untested?	☐	☐
7. Are end users skeptical of the new space's ability to produce a positive user experience?	☐	☐
8. Do end users and designers have conflicting ideas about which features will lead to the best space?	☐	☐
TOTAL		

Source: Facilities Forum interviews and analysis.

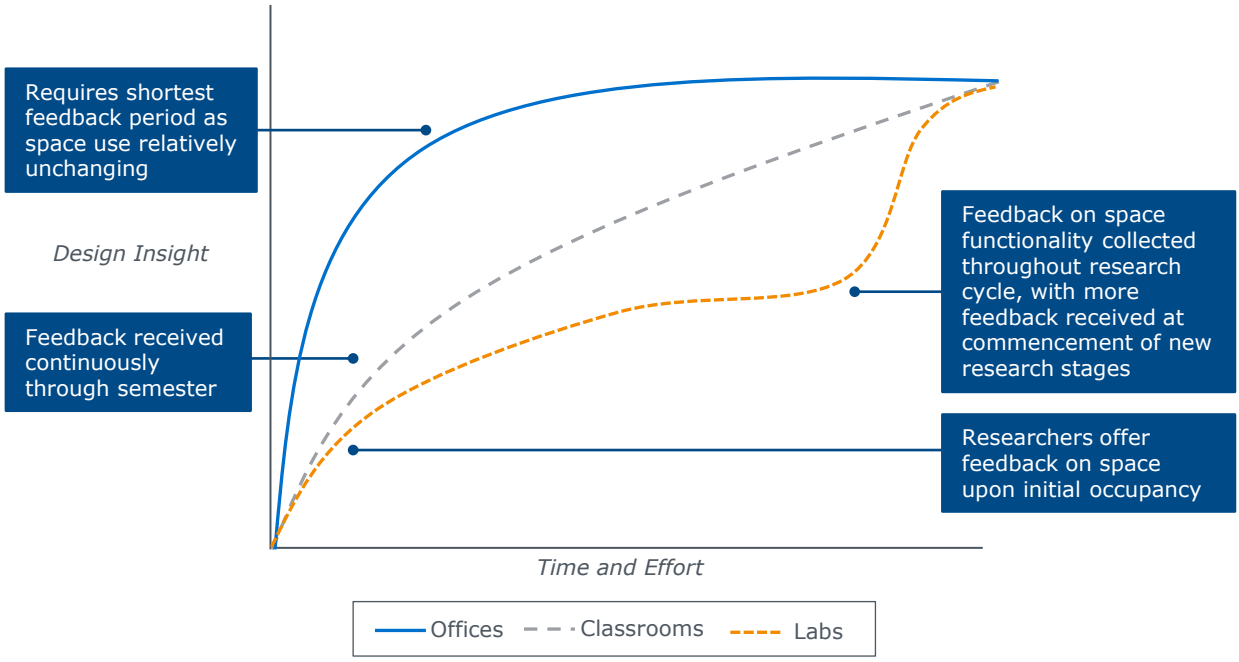
Tool 5: Space Prototyping Planning Guide

Consideration 2: Determine Time and Effort Needed for Successful Prototyping

The amount of time needed to adequately test a prototype varies widely based on the type of space. On the graph below, time and effort are plotted on the x-axis, and design insight is plotted on the y-axis. Each type of space has a different curve.

With offices, because people use the space the same way most days, feedback changes less over time and the curve levels off quickly. Meanwhile, the middle classroom curve grows steadily. Classroom prototypes should be tested over a full semester to see how different activities like lectures, group work, debates, and exams work in the space. Finally, labs require the longest amount of prototyping time, as the way researchers use the lab will fluctuate dramatically through the different stages of the research process. Feedback tends to fluctuate, with more design insights coming at the beginning and end of each new research stage.

Time and Effort Needed to Generate Positive Returns, Maximum Impact



Institutions planning to prototype should leave adequate time to fully test the prototype before broader implementation. Failing to leave enough time for testing could nullify the benefits of the process.

Source: Facilities Forum interviews and analysis.

Tool 5: Space Prototyping Planning Guide

Consideration 3: Develop a Prototyping Timeline

Prototyping can be a time-consuming process, particularly for classrooms and labs. However, the steps of the process are the same for most space types. The timeline below shows the basic steps of the prototyping process. The Facilities Forum recommends that institutions customize the timeline below with an estimated time frame for each prototype they pursue.

Plan	Supporting Resources
1. Determine whether the prototyping process will help make crucial design decisions for the new space in question.	Decide Whether Prototyping Is the Right Approach (pp. 26-27)
2. Convene a small focus group to discuss project goals.	
3. Determine which groups of students, faculty, and/or staff will test the space based on who will give the most valuable feedback.	Tool 6: Prototyping Feedback Guidelines (pp. 30-35)
4. Establish a project charter to clarify roles and outline a timeline.	Tool 1: Capital Project Charter Template (pp. 7-13)
Design	
5. Develop a blueprint for prototyped space, including furniture, layout, and technology.	
Test	
6. Procure and test furniture and technology samples for the new space.	
7. Construct the prototype.	Determine Time and Effort Needed for Successful Prototyping (p. 28)
8. Test the prototype, leaving sufficient time to gather insight.	
9. Gather feedback from everyone who has tested the space.	
10. If feedback recommends major design changes, implement those changes in the prototype and repeat steps 8 and 9.	Tool 6: Prototyping Feedback Guidelines (pp. 30-35)
11. Collect feedback from custodial and maintenance staff to evaluate design and operations.	
Build	
12. Incorporate user feedback into the design.	
13. Build out the space to finalized design specifications.	

Source: Facilities Forum interviews and analysis.

Tool 6: Prototyping Feedback Guidelines

Tool Objective

Gathering feedback is an important step in the prototyping process, allowing users to flag potential design flaws so that designers can make appropriate modifications before replicating the space. However, institutions often struggle to identify the right groups to include in the design and feedback process, as well as which questions they should ask to generate valuable information.

The number of people who provide feedback on a prototype should vary based on the stage of the prototyping process, as demonstrated in the graphic below. During the design phase, solicit input from only the most important sources, including senior academic and administrative leaders and design experts. When too many people are involved early in the process, the discussion tends to turn into an argument over competing interests. Limiting involvement in the initial prototype development process prevents unnecessary conflict.

Conversely, once the initial prototype is developed and assembled, allow as many users as possible to vet the design and give feedback. Testing the prototype on a large scale maximizes the opportunity to identify dysfunctional design elements. Additionally, the more people who respond positively to the new space, the more likely campus leaders are to see its value. Finally, soliciting feedback from all users gives them a sense of ownership in the design and the changes happening on campus.

1 Involve a limited number of space users on the front end to learn about essential elements needed in prototype while maintaining order and control over initial design

2 Provide forums for large-scale feedback on back end (e.g., focus groups, surveys) to obtain comprehensive insights into space functionality and get buy-in from space users, who feel ownership over designs to which they contribute

How to Use This Tool

This tool helps institutions effectively solicit feedback on space prototypes. It provides guidance on choosing a survey method, determining the respondent pool, defining the scope of the survey, and choosing the right questions.

- Step 1: Choose a Method for Soliciting Feedback
- Step 2: Determine the Respondent Pool
- Step 3: Select the Right Questions

Source: Facilities Forum interviews and analysis.

Tool 6: Prototyping Feedback Guidelines

Step 1: Choose a Method for Soliciting Feedback

There are two primary methods for soliciting feedback from users on prototyped space: convening focus groups or sending a survey. Institutions can pursue one or both approaches, depending on the timeline. Whichever option they use, institutions should limit the number of questions to avoid making participation a time burden for respondents. In addition, offering incentives for providing feedback—or even making feedback mandatory for anyone testing a prototype—can drastically increase the response rate.

Option 1:
Convening Focus Groups

- Allows for open discussion of problems and potential solutions
- Takes more time and effort than completing a survey
- Likely yields lower participation rates than a survey; self-selected participants most likely to be passionate about space

Option 2:
Sending a Survey

- Easy to disseminate survey and catalog responses, especially with online survey tool
- Requires little staff time to administer
- Mostly limited to multiple choice or Likert scale[1] questions; open-ended questions will yield lower response rates and less targeted information

Tips for Increasing Participation

- Offer incentives like a raffle entry or small gift card for all participants.
- Make focus group participation a mandatory requirement for anyone testing the prototype. For example, professors who teach in a prototyped classroom could require their students to participate in one focus group.
- Keep the survey brief. The more time it takes to give feedback, the smaller the number of participants will be.

Some institutions may wish to conduct a survey multiple times over the course of the testing period to see how users' views on the space change over time. Institutions who choose this strategy should be sure to keep the surveys as short as possible to maximize participation.

1) Likert scale questions include response options of Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree.

Source: Facilities Forum interviews and analysis.

Tool 6: Prototyping Feedback Guidelines

Step 2: Determine the Respondent Pool

After the prototype has been tested, Facilities should solicit feedback from as many people as possible to surface potential design flaws. The respondent pool should include anyone who has used the space over the course of the testing period.

Potential users include faculty, students, researchers, staff, and custodial and maintenance workers. While most people do not think of custodians and maintenance workers as traditional users of a space, their feedback is also vital. If a space is particularly challenging to clean or maintain, it will require increased time from Facilities staff. Given the cost of operating and maintaining the entire campus, it is important to surface any special requirements before committing to the final design.

The table below indicates which groups should be included in the respondent pool for the types of spaces most likely to be prototyped.

	Students	Faculty / Instructors	Business Administration Staff	Researchers	Custodians	Maintenance Staff
Classrooms	✓	✓			✓	✓
Faculty Offices		✓			✓	✓
Administrative Space		✓	✓		✓	✓
Labs		✓		✓	✓	✓
Residence Halls	✓				✓	✓
Common Areas	✓	✓	✓	✓	✓	✓

Source: Facilities Forum interviews and analysis.

Tool 6: Prototyping Feedback Guidelines

Step 3: Select the Right Questions

The following pages list sample questions that institutions could include in their survey or focus group. Institutions should select the questions that they feel will yield the most valuable information for making design changes to their space. The list is intended to be a starting point for developing a survey, not an exhaustive list of potential survey questions. An editable list of questions is available at eab.com.

Institutions should keep three things in mind when selecting questions:

- **Target questions to type of space.**
  Institutions will likely want different information based on the type of space. The questions bank provides sample questions for a few space types.
- **Target questions to audience.**
  Similarly, institutions want different information from different constituents. Custodians, for example, will provide different feedback about a classroom than students or faculty. Select questions with the audience in mind. Each section provides questions for specific groups. (On that note, institutions will likely need to deploy multiple surveys or run multiple focus groups for different constituents.)
- **Target questions to new or innovative design or technology elements.**
  Most institutions choose to prototype because the space is different from others on campus. Single out the elements that make the space different in the survey to gather feedback that will help designers determine whether these new (and likely more expensive) elements are worth implementing at a broader scale. These elements may include new technology (hardware or software), lighting arrangements, furniture characteristics, and room layout.

Considerations for Adapting Questions to an Online Survey

- Strike a balance between multiple choice and open-ended questions. Multiple choice questions provide easily comparable answers across respondents, while open-ended questions can surface concerns that the designers may not have foreseen.
- When framing questions to be answered on a uniform response scale (such as the Likert scale, ranging from "strongly disagree" to "strongly agree"), ensure all questions are written consistently. This means all questions must be all be written positively (or negatively) and use identical language to describe identical concepts.

Source: Facilities Forum interviews and analysis.

Tool 6: Prototyping Feedback Guidelines

Classroom Questions

Questions for Instructors

Likert Scale Questions[1]:

- I can teach effectively in this space.
- This space supports my preferred pedagogy.
- I can easily interact with students in this space.
- The technology in this space meets my instructional needs.

Open-Ended Questions:

- What is your greatest challenge in working in this space?
- What do you enjoy most about being or working in this space?
- What changes would improve your experience teaching in this space?
- What changes would improve the student learning experience?
- What would make you want to spend more time in this space?

Questions for Students

Likert Scale Questions:

- I can easily see the instructor and class presentations no matter where I sit.
- I can easily hear the instructor during lectures.
- I can hear my classmates clearly when working in small groups.
- The furniture in the classroom lends itself to group work.
- My classmates and I can rearrange classroom furniture as needed.
- I am comfortable in my seat for the duration of class.
- The technology and software in the classroom meet my needs.

Open-Ended Questions:

- What is your greatest challenge to learning effectively in this space?
- What do you enjoy most about being in this space?
- What changes to this space would improve your learning experience?
- What changes would improve your experience of the lecture or instructor?
- What would make you want to spend more time in this space?

1) The Facilities Forum recommends using a five-point Likert response scale of Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree.

Source: Facilities Forum interviews and analysis.

Tool 6: Prototyping Feedback Guidelines

Office Space Questions

Likert Scale Questions[1]:

- The chair(s) in the space are comfortable and meet my needs.
- My computer/technology is conveniently located and/or I can reposition it to meet my needs.
- My workspace includes sufficient space for me to store personal items.
- The types of spaces and equipment in my office enable me to complete my assigned tasks easily and efficiently. For example, there are meeting spaces for groups that are expected to work together, private areas for those who are expected to do focused work, easily accessible printers, and storage areas for files or important documents.

Open-Ended Questions:

- What is your greatest challenge to working effectively in this space?
- What do you enjoy most about being or working in this space?
- Are there any elements missing in this space that you think would improve your comfort or productivity?
- What would make you want to spend more time in this space?

Questions for Custodians (all space types)

- On average, how much time do you think this space would take you to clean compared to other similar spaces on campus? (significantly more, slightly more, about the same, slightly less, significantly less)
- Are there any cleaning requirements for this space that differ from other similar spaces on campus?
- Do you have any suggestions for making this space easier to clean?

Questions for Maintenance Staff (all space types)

- On average, how much time will this space take for you to maintain compared to other similar spaces on campus? (significantly more, slightly more, about the same, slightly less, significantly less)
- Are there design features or pieces of equipment that would be more difficult or expensive to maintain than design features and equipment in existing campus spaces?

1) The Facilities Forum recommends using a five-point Likert response scale of Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree.

Source: Facilities Forum interviews and analysis.