CANNONDESIGN

University of Washington, Center for Advanced Materials and Clean Energy Technology (CAMCET)

MARRYING DATA WITH SOUL: DESIGNING THE FUTURE OF ENGINEERING SCHOOLS

With an ever-expanding emphasis on the importance of advancing scientific explorations in education, there is a growing need for institutions to invest in their engineering programs and facilities. Schools of engineering are poised to be the socioeconomic generator that fosters both institutional and economic growth, while improving education and fostering campus identity. In order for these unique schools to be successful, there are fundamental drivers that should be considered during the planning process.

The development of a roadmap for future development starts with a framework of measureable goals, aspirations and outcomes. Utilizing institutional data from facility assessments, surveys and research analyzed through a series of lenses that shapes meaningful value begins to create the foundation of the plan. However, this data should be paired along with the "soul" of the unique place and people as captured by collaborative visioning that involves students, faculty and administration and is challenged with a national perspective on trends in teaching, learning, and research. The optimal methodology is a rigorous blend of the concrete and the abstract — with a series of conceptual explorations, iterative studies and actionable scenarios.

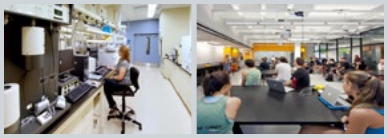
Data Gathering/Sorting/Analysis

A central component of every design plan is a thorough analytical approach to existing academic units along with a comparison/contrast against peer and aspirant benchmarks. Gaining access to accurate information is vitally important. A robust internal database of institutional metrics — including experience with peer institutions — enables the design team to provide the necessary research and analysis for informed decisions and a comprehensive roadmap for a school of engineering's future.

Utilizing resources such as internal database, building tours, facility assessments, validation meetings, web-based research, and surveys/phone interviews, the design team can benchmark a variety of selected metrics, which may include:

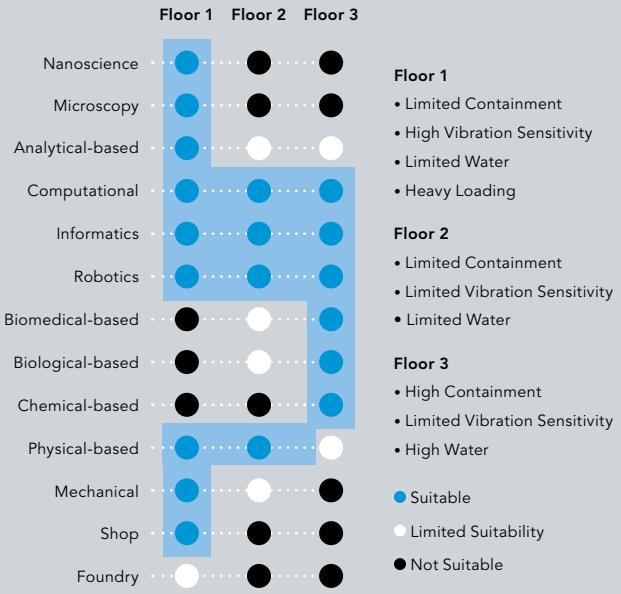
- Class/lab section size
- Classroom/class lab utilization
- Space per student station
- Students (undergrad/majors/graduate) per faculty (faculty/instructor)
- Student credit hours per faculty/instructor
- Grants per faculty/researcher
- Publications per faculty/researcher
- Research revenue per faculty/researcher
- Research team size
- Lab space per faculty/researcher
- Laboratory to lab support ratios
- Core and shared use facilities
- Office space per faculty/researcher/staff
- Collaborations (internal/external) per faculty
- Organizational structure
- Energy consumption per gross square foot (building)
- Age of facility

SCENARIO #1: LEARNING & RESEARCH



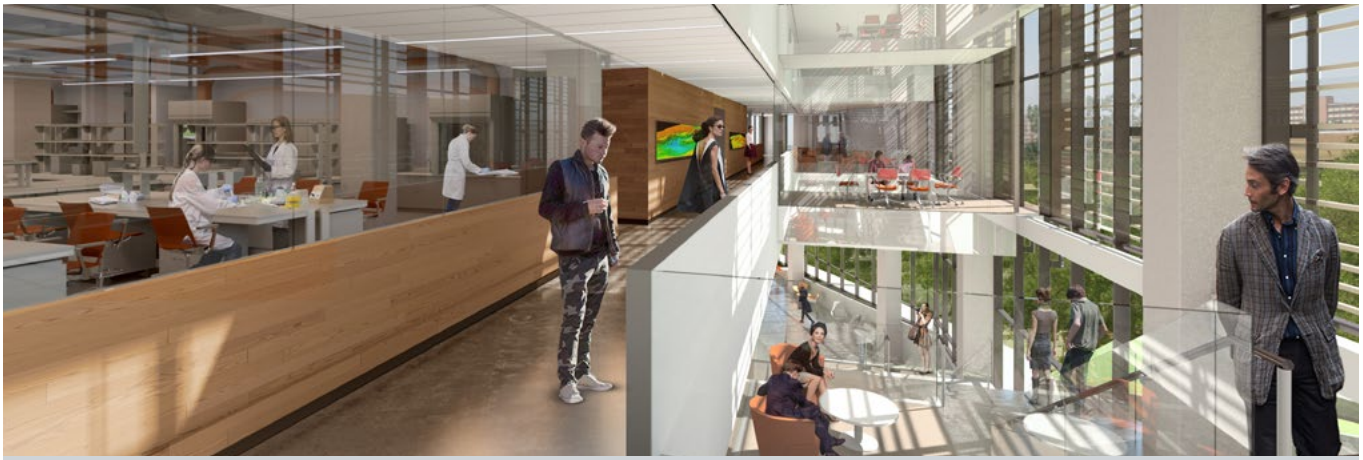
SCENARIO #2: RESEARCH

SCENARIO #3: LEARNING



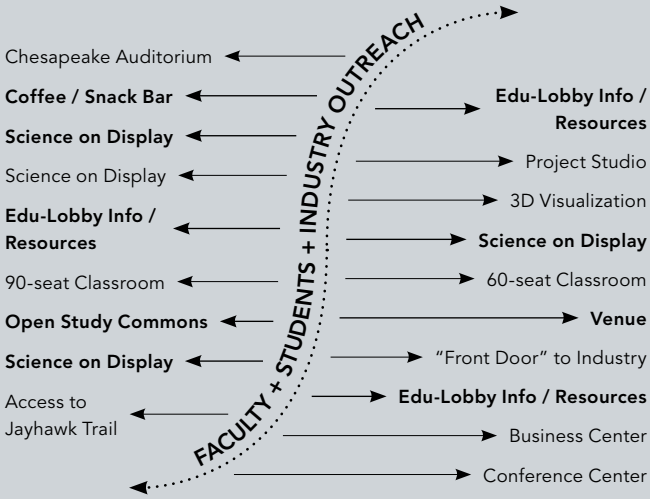
Preparing for a Transformative Future

CannonDesign created an adaptive framework to synchronize the optimization and reuse of existing facilities with strategic priorities at the University of Michigan College of Engineering. The first phase of a vision of interdisciplinary clusters, integrating teaching and research around real life solutions, was tested with the feasibility study for repurposing the Herbert H. Dow Building. After a full physical assessment, including building systems and space utilization, multiple scenarios were developed which maximized the building's capabilities to align with the College's new student and faculty experiences and requirements. Transformative programming and planning strategies ranged from a new undergraduate innovation hub to an adaptable advanced materials research center.



Public Face of KU's Energy and Environmental Research

The University of Kansas's vision for the new Earth, Energy and Environment Center is to be a central rallying point for energy and environment research and teaching on campus. Located at the prominent intersection of Naismith Drive and Jayhawk Boulevard, the EEEC is the figurative and literal convergence of engineering with natural sciences; nanoscience with field research; and academia with industry. Designed as a facility without boundaries the flexible research laboratories, offices and instructional spaces are bounded with glazing; supporting a seamless transition between learning, research and industry while inspiring future scientists and engineers.



The "Soul" of Collaborative Visioning

A critical component of data gathering and analysis is to then marry it with considerable knowledge, experience, and understanding of the social, cultural and discovery landscape of the university. In addition to the wide range of departments, engineering schools at major research institutions are consistently navigating a variety of internal and external pulls, including:

- Theoretical vs. physical
- Wet vs. dry laboratories
- Learning vs. research
- Undergraduate vs. graduate
- Departmental vs. interdisciplinary
- Public vs. private

With a diversity of stakeholders, it is critical that the process addresses these topics individually and collectively. An organizational structure including multiple working groups is recommended to conduct deep dives through a series of interactive workshops. Traditional Departmental Focus Groups along with expanded perspectives of outside stakeholders and facilities management/operations, identifies and validates the current state and future needs. However, to investigate and optimize synergies associated with future state scenarios, Thematic Focus Groups with representatives from multiple departments and academic units are recommended.

Departmental Focus Groups to Consider:

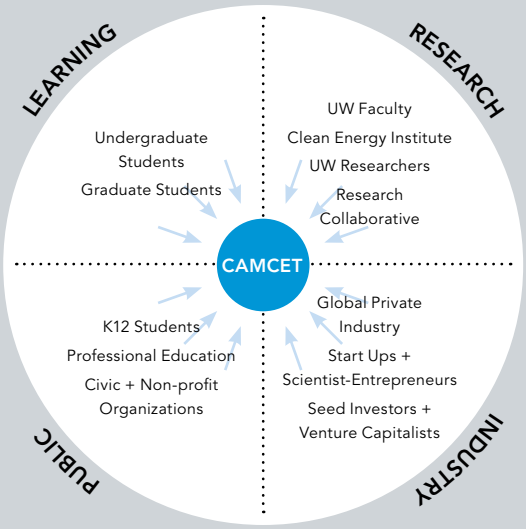
- Aerospace Engineering
- Biomedical Engineering
- Chemical Engineering
- Civil and Environmental Engineering
- Computer Science and Computer Engineering
- Electrical Engineering
- Industrial and Operations Engineering
- Materials Science and Engineering
- Mechanical Engineering
- Other Engineering Disciplines

Thematic Focus Groups to Consider:

- Learning (including students)
- Research (including Office of Research)
- Core/ Shared Use Facilities
- Community/ Collaboration
- Administration
- Outside Stakeholders
  - Other Academic Departments
  - Industry
  - Institutional Planning and Operations

There are major benefits of incorporating the unique perspectives of internal and external stakeholders, including students, faculty and staff. Several methods are recommended to engage and collect information from this diverse group in the early phases of the study, including web-based surveys or open town hall voting boards. As the planning scenarios are refined, the design team can continue to engage these stakeholders through social media or open house/town hall presentations.

Through this structure and meaningful collaborations, the team will be able to immerse themselves in the particular community and collect, analyze and prepare holistic planning scenarios which address the dynamic and diverse needs of engineering schools.



Partnerships Stimulate Cutting Edge Innovation District

Taking advantage of University of Washington's leadership role in clean technologies, the Center for Advanced Materials and Clean Energy Technology (CAMCET) will be instrumental in an ecosystem catalyzing multi-disciplinary solutions to the greatest environmental challenges facing our planet. The facility will serve as a nucleus of clean energy technology for the UW campus and state — providing a network of high-tech maker spaces while being a publicly visible innovation hub for centered collaboration. The CAMCET responds to a growing need uniting academic research and industry innovation. Transparency of activities and fostering maximum intellectual collaboration are design influences of great importance.