

WASHINGTON UNIVERSITY MCKELVEY SCHOOL OF ENGINEERING
STRATEGIC PLAN TO ACHIEVE LEADERSHIP THROUGH EXCELLENCE

CULTURE, OPERATIONS & PARTNERSHIPS

Creating a Front Door to Industry



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Executive Summary

Vibrant institutional partnerships strengthen every aspect of our mission as an engineering school, in teaching, research, and service to society. Seven strategic goals have been set out for SEAS institutional partnerships:

1. **Education.** Increase our students' exposure to engineering in practice.
2. **Professional Education.** Enhance SEAS visibility, reputation, partnerships and educational impact through Professional Education.
3. **Research.** Grow multi-faceted, long-term strategic partnerships that enliven intellectual dialogue and collaboration, and increasingly offer research funding and philanthropic support.
4. **Career Development.** Prepare students for quality internships, fellowships, and jobs at graduation through collaboration with institutional partners.
5. **Diversity and Inclusion.** Form partnerships that embody a shared commitment to diversity and inclusion.
6. **University-wide collaboration.** Collaborate across all of WashU to optimize partnerships for both the university and the external partner.
7. **Communications and infrastructure.** Develop accessible communication pathways and effective organizational infrastructure to advance partnerships. Use campus facilities to foster engagement with external partners.

Key tactical steps SEAS will take to impact the next three to five years include:

- Creating a new advisory board focused on institutional partnerships.
- Creating a new professional staff position in SEAS focused on students' career development and internship and job opportunities.
- Modifying student schedules to make it possible to use spring semester of the junior year to pursue co-ops, extended internships and study abroad.
- Increasing corporate engagement with SEAS research and pursue an increase in corporate-funded research from \$1.5M to \$5M per year.

Our target is a vibrant, visible presence of strategic partners on campus, regular presence of our students and faculty at partners' facilities, and a shared commitment to use the discoveries and tools of engineering to help solve some of society's greatest challenges.

1. Strategic Goals for Institutional Partnerships.

For the purposes of this whitepaper, institutional partnerships are defined as partnerships with private-sector companies, governmental agencies, and nongovernmental organizations. Vibrant institutional partnerships strengthen every aspect of our mission as an Engineering school, in teaching, research, and service to society.

Seven strategic goals for SEAS institutional partnerships are as follows.

1. **Education.** We aspire to improve the quality of the student experience on the undergraduate and graduate level in academics and post-graduate opportunities through high-quality institutional partnerships. Input to the strategic planning process consistently identified a need to offer students increased exposure to engineering in practice.
2. **Professional Education.** We aspire to continue to grow the effectiveness and impact of Professional Education (PE). PE plays a major role in SEAS' relationship with industry and government organizations by identifying and meeting needs for education, training, and development. Led by Associate Dean Ed Borberly, the PE program has developed a plan for growth that was presented to the SEAS Executive Committee in September 2016. It includes a recently launched master's in Health Care Operational Excellence.
3. **Research.** We aspire to form multi-faceted, long-term strategic partnerships that involve mutually informative dialogue about engineering problems and research, offer potential partnered applications for research funding from government or other sources, and in some cases, offer corporate research funding and philanthropic support. The scope of partnerships will differ depending on needs and interests of both parties. See the Partnership Continuum, Appendix 1.
4. **Career Development.** We aspire to help our students prepare for and gain access to highly desirable internships, fellowships, and jobs at graduation through collaboration with institutional partners.
5. **Diversity and Inclusion.** We aspire to leverage partnerships to make the School environment one that increasingly demonstrates a commitment to diversity and inclusion.
6. **University-wide collaboration.** We aspire to make institutional partners' interests our shared priority across schools and programs university-wide, thereby optimizing the partnership for both the university and the external partner.
7. **Communications and infrastructure.** The robust, productive institutional partnerships that we aspire to develop are sustained by effective, easily accessible communication pathways, both internally and externally. Effective organizational infrastructure, including faculty roles and staff teams, are also a key ingredient for our success. Finally, where there are opportunities, SEAS will benefit from considering how the design and use of our physical infrastructure can help to facilitate the participation of partners in the teaching, research, co-curricular and service activities.

2. Our greatest and most compelling opportunities; factors we can leverage.

- **Education.** The academic strength, exceptional motivation, and broad interests of our undergraduate students. Given the opportunity to serve as interns or co-op students, WashU students can demonstrate their abilities and help open doors for themselves and students that come behind them.
- **Education.** Less well recognized strengths, graduate students.
- **Professional Education.** The Professional Education program is continuing to grow as a driver of progress for SEAS as a whole. The program is playing an important role in enhancing SEAS' visibility, reputation, and impact; improving the quality of graduate education; strengthening industry relationships; collaborating across disciplines; increasing the size and diversity of the faculty; and contributing to facilities planning.
- **Research.** Areas of exceptional, well-known research strength. Research thrusts. E.g., Mechanobiology, Aerosols, Imaging.

Common subject matter interests are a key factor, though not the only factor, in identifying candidates for mutually beneficial partnerships.

- **Career Development.** Companies that are not necessarily co-located, but identify WashU Engineering as a top school for interns and new hires can be candidates for a productive partnership. (e.g., Epic, Capital One, Accenture)
- **Cross-cutting.** Co-location in the St. Louis region with leading companies, governmental institutions, innovation districts, and regional initiatives.

BJC; Cortex; Boeing Defense, Space & Security; Monsanto/Bayer; MasterCard; Express Scripts; NGA West/ The National Geospatial and Intelligence Agency; Smart City/Innovation Neighborhood; 39 North/AgTech Innovation; Mercy Virtual Care Center. The rise of St. Louis as a hub for innovation is an achievement that WashU has contributed to and can continue to catalyze and benefit from.
- **Cross-cutting.** Historical ties to leading engineering organizations; concentrations of alumni, highly placed alumni, parents and friends. Two such institutions include the MIT Lincoln Lab and the Johns Hopkins Applied Physics Lab.

3. What resources should we invest in or leverage to capitalize on opportunities?

To achieve our strategic goals for institutional partnerships, the School will need to make certain investments of new resources and better utilize some existing resources.

- **Career Development.** To better equip our students to compete for highly desirable internships, fellowships, and positions after graduation, we need to supplement the work of the central Career Center with a professional staff member within the School of Engineering.
- **Communications and Infrastructure.** CRM/Industry/Partner Database. To improve our capacity to offer personalized, effective engagement opportunities, we need to continue to develop a state-of-the-art CRM and database system for institutional partners.
- **Communications and Infrastructure.** Facilities. There is an opportunity to assess remaining opportunities for facilities design and development in terms of the objective of fostering engagement of partners from

outside the university, in addition to our educational and research objectives. The planned makerspace in Jubel Hall is one example where this is taking place. This could include actual design features as well as interior art/signage/displays.

Two relevant media stories include;

Where Halls of Ivy Meet Silicon Dreams, a New City Rises. NYT, 3/22/2017

The Innovation Campus: Building Better Ideas. NYT, 8/4/2016

4. What are the activities that we can carry out / who will be entrusted with implementing the activities?

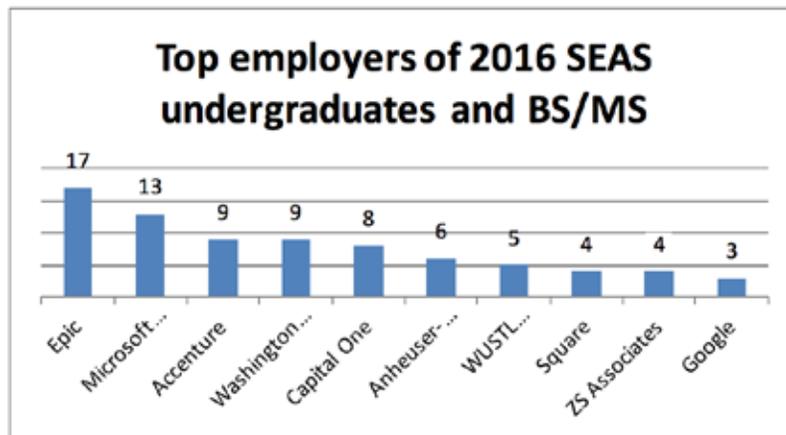
The starting point for these activities will in most cases be the Dean's Office.

- **Education.** Overcome scheduling and logistical hurdles that make it difficult for institutional partners to become part of the campus experience.
- **Education.** A plan under development identifies spring semester of the junior year as a time for opportunities such as extended internships, co-ops, and study abroad. Curriculum offerings will be adjusted to make this feasible. Currently, approximately 10 SEAS students per year do a co-op. SEAS' target is to expand that to 100 students per year.
- **Career Development.** On the Career Center website, there is quality information geared toward companies with hiring interests in Engineering. On the SEAS website, there is no clear pathway for a potential hiring partner. A project that a new Career Development staff member could undertake is to create a presence related to internships and hiring on the SEAS website.
- **Cross-cutting.** To serve the needs of department chairs and the School as a whole, assess the makeup and use of the departmental advisory boards. In addition, a new advisory body should be created focused exclusively on institutional partnerships. This body is envisioned as a source of ideas and contacts for many of the tactical projects that will help achieve our strategic goals and would work in concert with the faculty and staff team noted in the bullet below.
- **Communications and Infrastructure.** Form a faculty-staff working group on institutional partnerships and hold regular internal meetings, e.g. quarterly, of these key faculty and staff from within and outside of SEAS, who are involved in institutional partnerships. This could include, e.g., the Vice Dean for Research, Industry Relations Manager, A&D Corporate Relations staff, a member of the Engineering A&D staff, a staff member from WU Tech Management. Having an internal forum that drives progress will enable SEAS to improve effectiveness with external partners and take in new ideas that arise internally or externally. This team could also carry out an assessment of communications and reporting practices related to partnerships. The working group would consider the full range of industry partnership opportunities, including academic engagement, talent recruitment, philanthropy. See Appendix 2, Industry Partnership Opportunities.

5. What challenges will be faced, in resource acquisition or in implementation?

- **Research.** We are a small Engineering school, in our faculty size and our number of students. Within our faculty, only a small number truly have the availability, inclination, and professional readiness to play a significant role in institutional partnerships. This operates as a limiting factor in terms of the number and type of engagements that are pursued. Plans to grow the size of the faculty will help.

- **Education and Career Development.** As a small Engineering school, we do not offer partners the large numbers of classes ripe for partnership involvement, or large numbers of potential hires that some universities can offer. In 2016, there were just two companies that hired 10 or more graduates; data for other years shows similar outcomes. It will serve us to consistently convey the distinctive strengths of our graduates. At the undergraduate level, students are engaged in an Engineering education within a liberal arts university, and many have minors or second majors outside of Engineering. Alumni routinely note the value that they found in having a broader range of academic experience than they might have had at other institutions.



- **Career Development.** A factor that is both an asset for SEAS and a limitation to some degree in institutional partnerships is that a large number of the graduates of the BS and BS/MS program go immediately on to graduate or professional school rather than the workforce. In 2016, 100 of 384 graduates, or 27 percent, went directly to graduate or professional school.
- University-wide collaboration. Activity on institutional partnerships is in flux within the university. While this creates uncertainty, for the time being, we need to define and implement an agenda within the existing framework. Experiences that we are gaining now can help inform the changes.

6. What are the target outcomes in three to five years?

What are key performance indicators that make it possible to track progress?

Seven key targets are listed below.

- **Cross-cutting.** Campus spaces that foster engagement with partners, signage/art that depicts partnered activity.
- **Education.** Improved undergraduate student satisfaction with exposure to engineering in practice, within classroom experience and co-curricular experience. Consider assessing this within the advising system using a survey tool. Graduate student satisfaction could also be assessed as to exposure to career paths that use the PhD outside of academia.
- **Professional Education.** Growth that enhances SEAS' visibility, reputation and impact, improves graduate education and research, contributes to institutional partnerships, and expands the size of the faculty and the diversity of the faculty. See Professional Education SEAS Executive Committee presentation for further explanation.

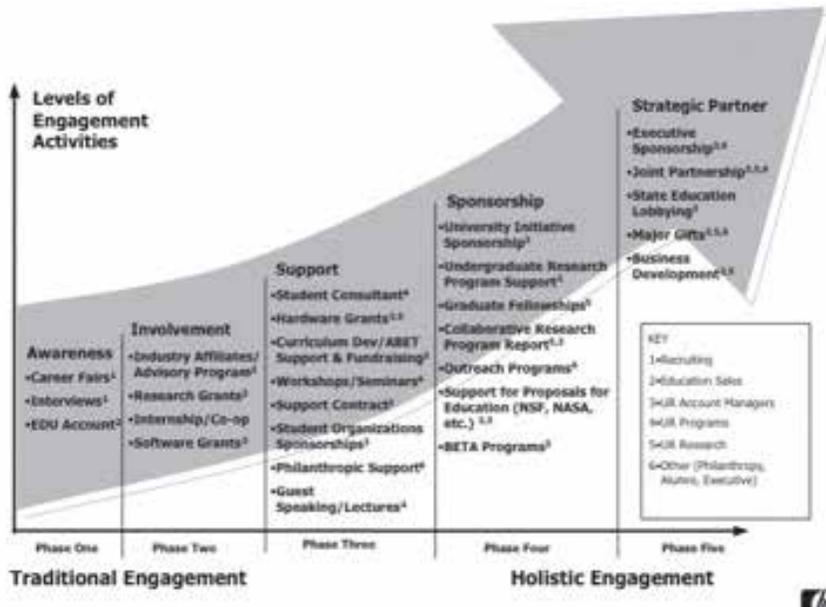
- **Research.** Increased corporate engagement with SEAS research and increased level of corporate funding of research. Currently, the School has a \$30M research portfolio, and in three to five years the objective is that it will be \$50M. Currently, corporate funding makes up 5% of \$30M (\$1.5M); the objective is that in three to five years it will make up 10% of \$50M (\$5M). A critical factor in achieving these targets lies in the selection of corporate partners with whom the alignment of interests and potential mutual benefits are strong.
- **Career Development.** Documented increase in internships, fellowships, co-ops, and jobs with companies and organizations that are highly desirable to WashU students and students at peer institutions. These include smaller, advanced engineering companies, such as Tesla Motors and SpaceX, as well as established companies such as Boeing and Exxon Mobil. It also includes consulting and financial services firms such as Accenture, Deloitte, Capital One, and MasterCard.
- **Diversity and Inclusion.** A presence on campus of partnerships that involve engagement with underrepresented groups, or other group representing a distinctive set of experiences, such as the WashU Veterans.
- **Communications and Infrastructure and University-wide Collaboration.** A faculty-staff working group on institutional partnerships will drive success through regular internal meetings, e.g. quarterly, to share ideas, receive input from across the university, and measure progress. The working group will provide project management for the development of a communications system, and reporting system for institutional partnerships.

Appendix 1. The Partnership Continuum

The University-Industry Demonstration Partnership (UIDP) was convened by the National Academies and launched in 2006 to promote university-industry partnerships that benefit both parties.

A 2012 UIDP paper, “Partnership Continuum; Understanding & Developing the Pathways for Beneficial University- Industry Engagement,” presented the graphic below which illustrates a continuum of university and partner engagement. The model origination with HP and is known as the HP model.

The continuum begins with awareness, progressing to strategic partner.



Appendix 2. Industry/University Partnership Model

