

# Strategic Plan

**WHITING  
SCHOOL OF  
ENGINEERING**

JOHNS HOPKINS UNIVERSITY

**Nicholas P. Jones, Dean  
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## ■ Vision Statement

Leadership through Innovation

## ■ Mission

The mission of Johns Hopkins University's Whiting School of Engineering (WSE) is to provide:

- Knowledge for the world through innovative research that leads to improved quality of life and enhances the safety and security of future generations,
- An education, grounded in fundamental scientific principles, that prepares students to solve the complex, technology-based problems of the 21<sup>st</sup> century, and
- The world's next generation of engineering leaders through creative curricula and programs that instill ethical values, an appreciation for the importance of diversity, an entrepreneurial spirit, and a love of learning.

The school's ability to realize this mission will be derived from the accomplishments and support of our people—the very best students, faculty, alumni, and staff who share our vision and commitment to excellence.

## ■ Introduction

As the first academic research university in the United States, Johns Hopkins University has, for the past 130 years, been dedicated to a single purpose—expanding knowledge and putting that knowledge to work for the betterment of humanity.

Although engineering has been taught at Johns Hopkins since 1914, the Whiting School of Engineering has existed as a separate, named academic division for only 27 years. Fully committed to the research model of an academic institution, we recognize that today, in a much more interconnected world than existed when the university was established, we must adapt our approach and harness the tremendous potential offered by new technologies and a global society if we are to achieve our mission.

Further evolution of the Whiting School will require us to embrace new opportunities and establish and expand areas of research and learning while maintaining our considerable strength in traditional areas of focus.

Consistent with our vision and mission, the new strategic priorities for the Whiting School encompass four primary themes. We will:

- Provide a supportive, entrepreneurial, and collaborative atmosphere that encourages and rewards innovation in selected areas of excellence;
- Enhance and broaden our position as the preeminent center for bioengineering education and research in the world;

- Educate future leaders by providing students with an innovative and distinctive education of the highest quality, both at the undergraduate and graduate level, in a diverse and inclusive environment; and
- Expand our role with respect to international and corporate programs and other partnerships in order to mobilize, as never before, intellectual and technical resources from around the world in both education and research.

These four interconnected priorities capitalize on the school's strengths and its role within the larger university while acknowledging areas in which untapped potential can be realized through additional resources and support. The plan, which will be evaluated annually and will continue to evolve, expands upon each of the four themes and outlines investment principles, near-term \* goals, strategies necessary for success, action items, metrics, and timelines.

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\* "Near-term" goals stated in the Strategic Plan refer to five-year goals, to be accomplished by 2012, unless otherwise noted.

## ■ Strategic Priorities

### ■ Collaboration and Innovation

We will provide a supportive, entrepreneurial, and collaborative atmosphere that encourages and rewards innovation in selected areas of excellence.

Johns Hopkins Engineering includes a remarkable mix of expertise, disciplines, and interdisciplinary ventures and our faculty members have always embraced the important opportunities that exist at the intersection of disciplines.

While there are nine departments in the School of Engineering, there are more than twice that many research centers and institutes. In this environment, solving problems of common interest, rather than those coming from a department or discipline, provides the inspiration for research. The school's faculty and students frequently form interdisciplinary partnerships and work collaboratively. Examples of these collaborations abound in bioengineering, but also exist in environmental engineering, robotics, nanotechnologies, fluid mechanics, information security, and materials engineering, to name a few. A critical component of these collaborations is the Whiting School's strong relationship with other Johns Hopkins divisions. The schools of Arts and Sciences, Medicine, Public Health, and Nursing, the Peabody Institute, the School of Advanced International Studies, and the Applied Physics Laboratory are recognized internationally as leaders in their respective fields. Access to these invaluable resources provides our students and faculty with knowledge and expertise that enables them to look beyond the traditional boundaries of engineering, draw upon the university's diverse strengths, and accomplish tasks that can only occur in this environment of collective talent and knowledge.

Our ability to collaborate is premised on the fact that we have tremendous strength in our departments and core disciplines. Our history of successful collaboration has led to the construction of the Computational Science and Engineering building—the first building on the Homewood campus dedicated to cross-disciplinary work. This new facility represents a commitment to the critical role we believe multidisciplinary, collaborative research will play in the future of engineering, ensures that we have the facilities necessary to continue cutting across traditional boundaries to solve problems of common interest, and showcases some of the Whiting School's greatest strengths.

The Whiting School must continue to foster an environment in which our faculty and students can be bold and innovative and are encouraged to reach out to tackle difficult and challenging problems in any technical areas of focus. Possible areas for focus and investment include, but are not limited to, areas (or sub-areas) identified in the last strategic planning exercise: environmental engineering, science and policy, information technology; materials engineering; and computational science.

### Near-Term Goals

- Establish three new centers/institutes with WSE as a lead partner with another Hopkins division or external partner (in addition to those for bioengineering, below).

- Obtain core (naming) funding for one of these centers/institutes from foundation or private philanthropy.
- Aggressively build Whiting School pre-eminence in five selected areas that span traditional disciplines outside of bioengineering.
- Establish a permanent “Dean’s Leadership Fund” which will provide \$500,000/year discretionary seed investment for new academic ventures conceived by WSE faculty.
- Fully fund the new Computational Science and Engineering building, including a naming gift.

## ■ Bioengineering

We will enhance and broaden our position as the preeminent center for bioengineering education and research in the world.

Nowhere has the School of Engineering’s facility with collaboration across disciplines and divisions been better demonstrated than in bioengineering. Students and faculty at Johns Hopkins have firmly established the school as an international leader in all bioengineering disciplines and today we stand at the cusp of major discoveries that will have an enormous and positive impact on people’s quality of life. Increasing collaborative research and education school-wide and building upon our considerable strengths in bioengineering will allow us to realize our promise in this critical area.

Advances in technology have enabled us to examine, model, and manipulate biomolecules, cells, tissues, organisms, and systems of organisms with greater facility than ever before. As a result, significant opportunities now exist to build upon these developments and advance the practice of medicine in ways that were previously considered impossible. In biomedical engineering, improved scientific understanding of and the creation of interventions for the treatment of disease and improvement of human health are now within reach. In biotechnology, engineered processes are being used to develop organisms, tissues, and enzymes that will result in quality of life improvements through the production and delivery of pharmaceuticals and chemicals, the treatment of environmental wastes, and the development of novel materials. Together, biomedicine and biotechnology form the core of bioengineering.

Johns Hopkins University is recognized around the world for its achievements in bioengineering, the life sciences, medicine, and public health. The Whitaker Biomedical Engineering Institute, the Engineering Research Center for Computer-Integrated Surgical Systems and Technology, the Institute for Computational Medicine, the Center for Imaging Science, and the Institute for NanoBioTechnology are bold new ventures tackling a variety of challenging problems and opportunities within bioengineering. These efforts occur across disciplinary lines, involve faculty and students from multiple WSE departments and collaborators from other Johns Hopkins divisions, other institutions, and industry.

In order to maintain our preeminence in the field of bioengineering, we must build upon our history of successful collaborations and build new, mutually-beneficial relationships with Johns Hopkins’ world-renowned schools of Medicine, Public Health, Arts and Sciences, and Nursing. We will continue to facilitate and expand these activities through the establishment of multi-

disciplinary, multi-departmental, and multi-divisional research centers and institutes allowing faculty to reach easily across traditional boundaries and reap the collective benefits that come from shared resources and knowledge.

### **Near-Term Goals**

- Expand the Whiting School's leadership in biomedical engineering more broadly to one of preeminence in bioengineering through investment in people, facilities, and programs that strengthen all of our bioengineering efforts.
- Establish three new major centers/institutes in bioengineering-related areas with WSE as a major partner with other Hopkins divisions.
- Obtain core (naming) funding for two of the bioengineering centers/institutes from foundations or private philanthropy.

### **■ Education for Leadership**

We will educate future leaders by providing students with an innovative and distinctive education of the highest quality, both at the undergraduate and graduate level, in a diverse and inclusive environment.

Our students will continue to have not only a depth of technical education in the fundamental principles of science and engineering but, through the strength and breadth of the university's other divisions, will have opportunities to broaden their education through formal and informal education and research in the humanities and social sciences, entrepreneurship, and the arts.

We will further develop and encourage activities outside of the classroom that provide intellectual growth and complement the educational experience and will continue our tradition of providing undergraduate students with research experiences, opportunities to interact with industry, and international experiences. We will provide master's degree offerings to working engineers and applied scientists at several locations in our geographic region and expand our degree offerings around the world through our growing online programs.

Johns Hopkins Engineering has produced legions of leaders. It is clear that leadership in the future, no matter what specific careers or fields of interest our graduates pursue, will demand this combination of technical depth and an appreciation for the broad education that we can – and do – provide at Johns Hopkins. National and international leadership in engineering requires that we balance our emphasis on our strategic research priorities with a strong foundation in engineering's core disciplines.

### **Near-Term Goals**

- Continue to work with Hopkins academic divisions, especially the Krieger School of Arts and Sciences, to develop educational programs of the highest quality that combine the depth of a technical education with the breadth of a liberal arts education in a signature Hopkins degree. Improve mentoring and, in collaboration with Krieger, continue to enhance student life and build a stronger sense of community within and around the student body.

- Establish the five-year bachelor's/master's degree as the standard Hopkins engineering degree combination, with a goal of enrolling the majority of Whiting School students in this program.
- Building on the strength of the Engineering Programs for Professionals and working with the School of Professional Studies in Business and Education, develop a comprehensive suite of contemporary master's degree offerings, for full-and part-time students, with flexible formats that respond to the needs of industry in both the domestic and international markets. Expand the number of master's graduates to 900 annually.
- Create a comprehensive and structured extracurricular program for WSE undergraduates with a goal of two-thirds of the student body participating in industrial/corporate or international experiences.
- Develop mechanisms to encourage undergraduate participation in research, including placement opportunities, with a goal of at least two-thirds participation.
- Secure a total of \$35 million in undergraduate scholarship support by December 2008.

## ■ Strategic Partnerships

We will expand our role with respect to international and corporate programs and partnerships in order to mobilize, as never before, intellectual and technical resources from around the world in both education and research.

Engineering today is conducted in a global arena and if we are to engage and succeed in this rapidly evolving environment, solving problems of global importance, we must mobilize as never before intellectual resources from around the world. Strategic alliances with key partners, facilitating creative collaboration with peers around the world, and offering international research and study opportunities for our students will be the keys to our success. We also have a responsibility to use our expertise and “intellectual philanthropy” to help other institutions and populations as they build their programs, especially in the developing world.

Our relationships with corporations, both in the US and abroad, offer much to the school, ranging from internships, philanthropic support, sponsored research, employment opportunities, equipment donations, graduate program enrollments, and research collaboration. In order to take advantage of these opportunities, the Whiting School must manage more strategically a select number of key corporate relationships to benefit the school broadly.

Ensuring a robust supply of future students and professionals requires us to redouble our efforts to develop effective K-12 outreach programs as well as aggressively promote the inclusion of traditionally under-represented groups in engineering across the nation. Closely related to our efforts in K-12 outreach, we must continue to build relationships with institutions in the Baltimore region. The long-term viability of the Whiting School is linked to the health of our city, and we must look for opportunities to assist city educators and students, offering our resources and intellectual capital for the betterment of our community.

## Near-Term Goals

- Establish productive and sustainable formal partnerships with no fewer than five universities and research institutes worldwide. A measure of success in these partnerships will be our ability to obtain substantial funding for the collaborative endeavors at the school, department, or institute level. We envision that these relationships may have both research and teaching components.
- Establish more informal relationships with no fewer than five educational institutions in countries with which the Whiting School can help raise the standard of engineering education and ultimately help establish a research program that is consistent with WSE interests.
- Develop a strong, productive and collaborative relationship with the Applied Physics Laboratory. The initial five-year phase will be supported through seed investment of \$500,000 per year with the expectation that successful collaboration will generate additional resources for continued seed investment.
- Implement a visionary corporate strategy that effectively addresses the spectrum of relationships (from research collaborations to internship opportunities to philanthropy) that can exist with individual companies. By 2008 have a core complement of at least ten actively managed relationships with major partners with a matrix of defined results that directly benefit the school.
- Commit to invest in developing the pipeline for future engineering talent by building support for the Baltimore Scholars Program and similar efforts in the City of Baltimore and across the region.
- Raise additional funds to secure and expand our K-12 programs and activities, including at least \$1 million over the next three years to provide scholarship support for high school students and outreach programs.

## ■ Guiding Principles for Resource Allocation

Strategic evolution of the Whiting School will require us to embrace opportunities in order to expand and establish centers of activity. Simultaneously, we must recognize our role as a broad-based school of engineering and maintain our strength and distinctiveness in areas of traditional focus. In this context, the following research and education investment principles have been developed.

- Investment of the School's discretionary resources will be guided by the strategic priorities described above. Requests for faculty positions, space, discretionary dollars, and other resources will be evaluated primarily on this basis.
- Our “academic venture capital” will be carefully committed on the basis of sound “academic business plans” submitted by members of the faculty.
- Opportunities for the Whiting School of Engineering to rise to a recognized position of leadership will be supported.
- The ability to leverage strengths currently existing within the Whiting School or across divisions of Johns Hopkins will be viewed as a positive attribute.
- Innovative and beneficial collaborations with external partners, including other academic institutions and corporations, both domestic and international, will be encouraged.

## ■ Supporting Strategies

The activities summarized below are essential for accomplishing the near-term goals and priorities established in the Strategic Plan. These items represent a commitment on the part of the Whiting School leadership to ensure that necessary conditions are satisfied for moving the school in directions identified.

- With a goal of recruiting and retaining the very best faculty, staff, and students, and promoting a culture of excellence among Whiting School personnel, we will explore innovative and flexible mechanisms for recruitment to ensure that the Whiting School remains an attractive venue for talented individuals with diverse interests coming from a wide range of backgrounds.
- Communication and marketing of School activities and strategic priorities will be emphasized to carefully focus recruitment efforts, augment fundraising activities, and ensure that information about accomplishments and opportunities at the School are broadly and effectively disseminated.
- The Dean’s office will work with departments/institutes/centers and university administration to ensure that necessary state-of-the-art advancements in business practices and operations are implemented to facilitate the efforts required to implement the Strategic Plan.
- The School will provide full support for technology transfer, licensing, and business incubation activities for opportunities derived from faculty efforts.
- The Dean’s office, in collaboration with Whiting School faculty, will place a high priority on fundraising efforts to raise discretionary investment for programs that are to be supported under this strategic plan.

- The School will obtain funding for ten named fellowships, three endowed full professorships and three endowed faculty scholars within the focus areas of Bioengineering, Collaboration and Innovation, and Education for Leadership.

## ■ Conclusion

The Whiting School of Engineering, after its first quarter-century, is at a critical juncture in its history. Taking advantage of the agility and ability to adapt that our small size allows, we have quickly and firmly established ourselves as one of the nation's leading schools of engineering. It is now time to rethink and reconsider our strengths, explore new opportunities, and make changes that will ensure the School's continued success over the next 25 years. We will continue to strengthen our reputation by building and empowering world-class, collaborative research institutes in bioengineering and other selected areas that take full advantage of our faculty's areas of excellence. , We will also develop innovative and distinctive educational programs at the graduate and undergraduate levels and forge strategic alliances, domestically and internationally, with key partners in academia and industry.

This Strategic Plan lays out our vision for the Whiting School over the next decade and articulates near-term goals consistent with that vision. Our discipline in adhering to these goals, while remaining flexible in our view of the Strategic Plan, will be critical to our success. This requires dedication at all levels: from the Dean's office, the faculty, staff, students, and alumni, as well as the commitment of other external constituencies. We are confident that we will succeed.

## ■ Appendix

Beginning in the spring of 2005, the Whiting School of Engineering embarked upon a planning exercise designed to set directions and goals for the School and to devise a strategy for achieving these goals. The School had undertaken two planning efforts over the past decade under the leadership of Deans Don Giddens and Ilene Busch-Vishniac; this process was designed to take advantage of these previous efforts and revise or expand upon their recommendations as appropriate.

The development of a long-term vision and a plan for achieving this vision are crucial to the advancement of the Whiting School and to ensuring that it remains one of the leading schools of engineering in the country and the world. The School's relatively small size, the need for substantial investments in cutting-edge fields in an era of constrained availability of research funding, and the effects of globalization and increased competition for critical resources (e.g., faculty) demand that we define our objectives, and steadfastly pursue a strategy of investment in selective areas of excellence. The special role of a research-oriented university must be borne in mind as we embark upon this course. A plan is needed to prudently guide resource allocation into areas of existing potential, strength, and opportunity.

The development and adoption of an effective plan was considered a matter of some urgency. The Whiting School is at a critical juncture for a number of reasons including a transition in leadership, financial challenges associated with external factors, and leadership opportunities in a number of important technical areas that require investment, as well as the need for the development of a shared vision for all the School's constituents: faculty, students, staff, alumni, advisers, collaborators, and friends. Given that two planning exercises were conducted over the last decade, the decision was made to conduct a focused process that built upon those prior efforts.

The current strategic planning process involved all members of the faculty in the Whiting School, exercising the department and center/institute structures. Additionally, emerging themes were shared with internal and external partners and friends of the Whiting School for comment and suggestion.

In February, 2005, every department chair and center/institute director was contacted and asked to set aside some time for planning with a view toward preparing a succinct two-page summary of their strategic vision and direction. A long-term strategic view was requested: thinking where the unit would like to be five to ten years from now, what will be seen as its key strengths, and what resources it would take to get there. Resources would include investment in tenured and tenure-track faculty, non-tenure-track faculty, students, staff, space, infrastructure, etc. Chairs/directors were encouraged to keep resource expectations realistic, to build the vision on suitable objective data wherever needed and/or possible, but at the same time to be bold in their thinking.

In April, 2005 a series of dinner meetings were held where each unit representative had the opportunity to complement their two-page submission with a brief presentation to the other chairs/directors and the associate deans, followed by discussion. Based on these submissions, combined with relevant information from the recently conducted external review, recent academic council reviews, and strategic planning documents from other institutions, the strategic principles presented herein were developed in draft form. These ideas have been shared with a cross section of key constituencies, including Whiting School leadership, individual faculty members, several

departments and advisory boards, selected alumni and alumni groups, the National Advisory Council, and the Board of Trustees. Ensuing discussions led to the affirmation and honing of the principles presented herein and the expansion of the initial concepts.

The developed plan, while building on the preceding plans, takes a different approach in articulating the strategic priorities for the School. The current plan outlines four priorities that are considered critical to our future: collaboration and innovation, bioengineering, educating for leadership, and strategic partnerships. These four priorities together embody the strengths and opportunities that are evident across the School's units, while remaining cognizant of areas that currently require greater attention and investment and threats to which we must also respond. The plan expands upon these themes and outlines investment principles, near-term goals, and strategies necessary for success.