Rationale and Characteristics of a Proposed Engineering Program at IUB

The Need for Engineering at IU Bloomington
- Engineering at IU Bloomington is vital for future economic development in Indiana as emphasized by recent Battelle Technology Partnership study funded by the Lilly Endowment.
- The technological integration of our modern society and economy continues to rapidly accelerate, permeating all areas, and reinforcing the importance of STEM-based education and applied innovation at all major universities.
- IU Bloomington is the only university among AAU's 62 member institutions that does not have any type of engineering program.
- IU Bloomington can no longer fulfill its mission to its students, faculty, state, and nation without engineering, both for its own sake and to realize the full potential of a broad spectrum of its existing, ongoing research and education.

IU Bloomington: Ready for Engineering
- IU Bloomington already is engaged in a significant amount of engineering-related work; over 100 faculty members, research scientists, and post-docs across a wide range of disciplines have engineering degrees.
- Engineering would fortify IU Bloomington's current research programs in computing and information technology and the sciences, including biology, chemistry, environmental science, physics and psychological and brain sciences.
- Engineering also would build on many IU strengths including supercomputing and cyberinfrastructure resources, entrepreneurship and business, law, international studies, and humanities and social sciences, and help attract new, high quality faculty and students.
- Establishing a new engineering program from the ground up affords IU unique advantages, enabling development of a multidisciplinary curriculum with emphasis on building and design, diversity, information technology integration, international experiences, and societal impacts (more difficult aspects to retrofit at existing programs).

Characteristics of Proposed Engineering Program
- Predicated and built around campus research strengths in science and technology.
- Focused on physically smaller, mobile, personal/consumer technologies and devices as opposed to large-scale artifacts such as buildings, air/space craft, or chemical/power plants.
- Integrates modern information technology approaches, including big data, computational modeling and analytics, intelligent systems, and user interface design.

Proposed Initial Areas of Engineering Focus
- Focus on six overlapping areas sharing characteristics specified: bioengineering, computer engineering, cyber-physical systems, environmental engineering, molecular and nanoscale engineering, and neuro-engineering.

- Underlying foundational elements common to these focus areas include: sensors/ instrumentation, mobile computing devices/hardware, signal processing, control theory, information theory, intelligent systems, big data, computational modeling, and user interface design.

Proposed Engineering Degree Programs
- *B.S. in Engineering* – vital to economic-development goals and to integrating engineering into fabric and culture of IU Bloomington.   Single general engineering degree with concentrations in computer engineering/cyber-physical systems, bioengineering, nanoscale systems engineering.
- *Ph.D. in Engineering* – essential to enable student research partnerships and to attract appropriate faculty. Single degree with program tracks in all six areas of specialization.
- *M.S. in Engineering* – provide potential for combined B.S./M.S. programs and professional masters resource to area engineering employees and employers.
- *Engineering Minors/Certificates* – could be offered over time to undergraduates majoring in STEM fields or business.

Proposed Engineering Program Needs
- Requires 20-25 new, dedicated core engineering faculty members to provide sufficient teaching coverage and depth/breadth of research areas.
- Includes significant number of affiliated appointments from current IU faculty in related fields, instrumental to program development as core faculty being hired.
- Requires adequate student assistant, staff, classroom, and laboratory support resources; approximately 25,000 sq. ft. needed to house program during its early years.
- Configured to encourage collaboration and affiliation with existing campus STEM and professional units; housing as department in School of Informatics and Computing allows it to leverage key shared services including career services, entrepreneurship and development.
- Possibly consider name to provide differentiation from traditional engineering schools, such as "*Intelligent Systems Engineering*" or "*Convergent Technologies Engineering*."

Proposed Timetable and Developmental Milestones
- To maintain momentum in response to growing external demand, aim to launch new engineering program at IU Bloomington in fall 2016 with initial cohort of faculty and enrolled B.S. and Ph.D. students. Professional masters would follow one year later.
- Requires hiring of new engineering faculty to commence in 2015-2016 academic year and appointment of affiliated faculty to occur in 2015.
- Recommend using cluster-based hiring approach of two to four faculty partnered with current IUB faculty, aimed at creating research/academic centers at IU Bloomington that build on current strengths and can attract significant research funding.
- If approved by IU Board of Trustees, new degree programs would be submitted to Indiana Commission on Higher Education Spring, 2015.
- No new state funding will be requested to support this program.