Transforming Engineering:
Improving the Landscape Through Research Based Practices & Systems Thinking

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In 2004 and 2005, the National Academy of Engineering published the *Engineer of 2020: Visions of Engineering in the New Century* and the *Educating the Engineer of 2020: Adapting Engineering Education to the New Century*. The intention of the first publication was to identify attributes and abilities engineers needed to perform well in a world driven by rapid technological advancements, national security needs, aging infrastructure in developed countries, environmental challenges brought about by population growth and diminishing resources, and the creation of new disciplines at the interfaces between engineering and science. The second publication provided recommendations to guide engineering educators, employers, professional societies, and government agencies as they reengineer the "system of systems," the engineering education process.

A main takeaway from the first publication was the Engineer of 2020 would need “the ingenuity of Lillian Gilbreth, the problem-solving capabilities of Gordon Moore, the scientific insight of Albert Einstein, the creativity of Pablo Picasso, the determination of the Wright brothers, the leadership abilities of Bill Gates, the conscience of Eleanor Roosevelt, the vision of Martin Luther King, Jr., and the curiosity and wonder of our grandchildren.” To foster the development of such engineers, colleges and universities need to reexamine engineering teaching and learning. The nascent, yet complex, field of engineering education sits at the epicenter of this reform and must lead this reexamination.

When the Engineer of 2020 arrived on our campuses in the Fall of 2016 what types of learning experiences, curriculum, pedagogical approaches and professors met them? It is well-documented that change occurs slowly in educational settings; a pace that lags significantly behind technological changes. Yet we as academics continuously strive to create experiences for our students to prepare them for global competition. If we are to be successful in this endeavor we must adapt to new trends and educational approaches so that our students are armed with the necessary tools needed for the world they will inherit and lead and not the one that exists today.

This presentation will describe: 1) a vision for the role of engineering educators, 2) the purpose research fulfills in transforming the overall educational experience, 3) ideas for faculty embedded within traditional departments to partner with engineering education researchers to shape the future of the field and transform students’ educational experiences, and 4) how systems thinking can be used to transform engineering education.