



# EDUCATING ENGINEERS TO MEET THE GRAND CHALLENGES



## U.S. Engineering School Deans' Response to President Obama on Educating Engineers to Meet the Grand Challenges

March 2015

Responding to the Presidential call for our nation to lead the way in addressing 21<sup>st</sup>-century Grand Challenges, we, the undersigned deans of engineering schools across the United States, commit to educate a new generation of engineers expressly equipped to meet societal challenges identified through national initiatives including the White House Strategy for American Innovation, the National Academy of Engineering Grand Challenges for Engineering, and the United Nations Millennium Development Goals. These challenges include complex yet vital aspirations such as reverse-engineering the brain, making solar energy cost-competitive with coal, engineering better medicines, providing access to clean water for nearly a billion people who lack it, ending extreme poverty and hunger, securing cyberspace, and advancing personalized learning tools that deliver better education to more individuals.

We affirm the importance of such aims as a reflection of our core values, as a source of inspiration for drawing a generation to the call of improving the human condition, as a driver for our national and world economies, and as essential to U.S. and global security, sustainability, health, and joy of living in the decades ahead.

We further note that achieving these Grand Challenges requires technology and engineering, but that none can be solved by engineering alone. Hence, there is a crucial need for a new educational model that builds upon essential engineering fundamentals to develop students' broader understanding of behavior, policy, entrepreneurship, and global perspective; one that kindles the passion necessary to take on challenges at humanity's grandest scale.

Recognizing the urgency to prepare engineering students with the skillset and mindset to meet Grand Challenges over the course of their careers, the undersigned colleges/universities commit to establishing at each of our institutions a program that integrates the following key elements:

- **A creative learning experience connected to the Grand Challenges** such as research or design projects
- **Authentic experiential learning with clients and mentors that includes interdisciplinary experience** in fields such as public policy, business, law, medicine, ethics, and communications
- **Entrepreneurship and innovation experience** such as the start-up of a new venture, dissemination of technology, or coursework in entrepreneurship
- **Global and cross-cultural perspectives** gained through experiences that promote involvement with globally complex issues in unfamiliar environments, such as a semester abroad
- **Development of social consciousness through service-learning**, such as problem-based community projects that foster an appreciation of the impact of engineering and its role in serving human welfare and the needs of society

We will ensure that students in this program have *expertise* in one or more of these areas and *exposure or experience* in each of the others, providing opportunities for them to reflect on how such combined capabilities can empower them to become leaders in addressing societal challenges in the U.S. and abroad.



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We also commit to development and sharing of open educational resources that will inspire and empower more students to address Grand Challenges.

A measure of success will be the flourishing of hundreds of successful projects across the nation and globe, each benefitting a community while ultimately leading to solutions for the Grand Challenges themselves.

Over the course of the next decade, we commit to graduating from each of our institutions a minimum of 20 students per year who are prepared with this unique combination of skills, motivation, and leadership to address the Grand Challenges for Engineering of the 21<sup>st</sup> century. These 20,000-plus formally recognized “Grand Challenge Engineers” will produce a “halo effect” that benefits the education of *all* students, engineers and non-engineers alike, and ultimately *all* people. Like “the 300” of ancient Sparta, whose special training and motivation saved a civilization, we envision the power of the 20,000 Grand Challenge Engineers to change the course of our civilization.

Finally, in order to facilitate an exponential expansion of this revolutionary movement in higher education, we are committed to sharing information with each other and the Administration about new and existing initiatives on our campuses in order to nurture development of Grand Challenge Engineers and ultimately address the 21<sup>st</sup> century’s Grand Challenges for Engineering.

Signed:

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