NABIE 2015 ANNUAL MEETING

The Invisible, Professional Engineer

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National Society of Professional Engineers

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Is Engineering Licensure still relevant in today's economic world?

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The Dichotomy of Engineering

Engineers focus on tools and solutions that help people to help themselves.   In other words, engineers must ask themselves, "How can I make myself irrelevant?"

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The Non-Engineer Perspective

- **Non-technical or technologist can be as qualified or suitable substitutes**
- **Higher cost for licensed professionals**
- **Turf protection**
- **Certifications are sufficient**
- **Codes, standards and regulations provide acceptable protection**

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The Professional Engineer

- **Licensed engineers continue their commitment to protecting the health, safety, and welfare of the public through demonstrated competency and subjecting themselves to a code of conduct backed by the force of law.**

- **To a client, it means you've got the credentials to earn their trust.**

- **To an employer, it signals your ability to take on a higher level of responsibility.**

- **To the regulator, it means competency.**

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What does your license mean to YOU?

The Professional Engineer

- To yourself, it's a symbol pride and measure of your own hard-won achievement.
- BUT IT IS MORE
- Willingness to accept risk
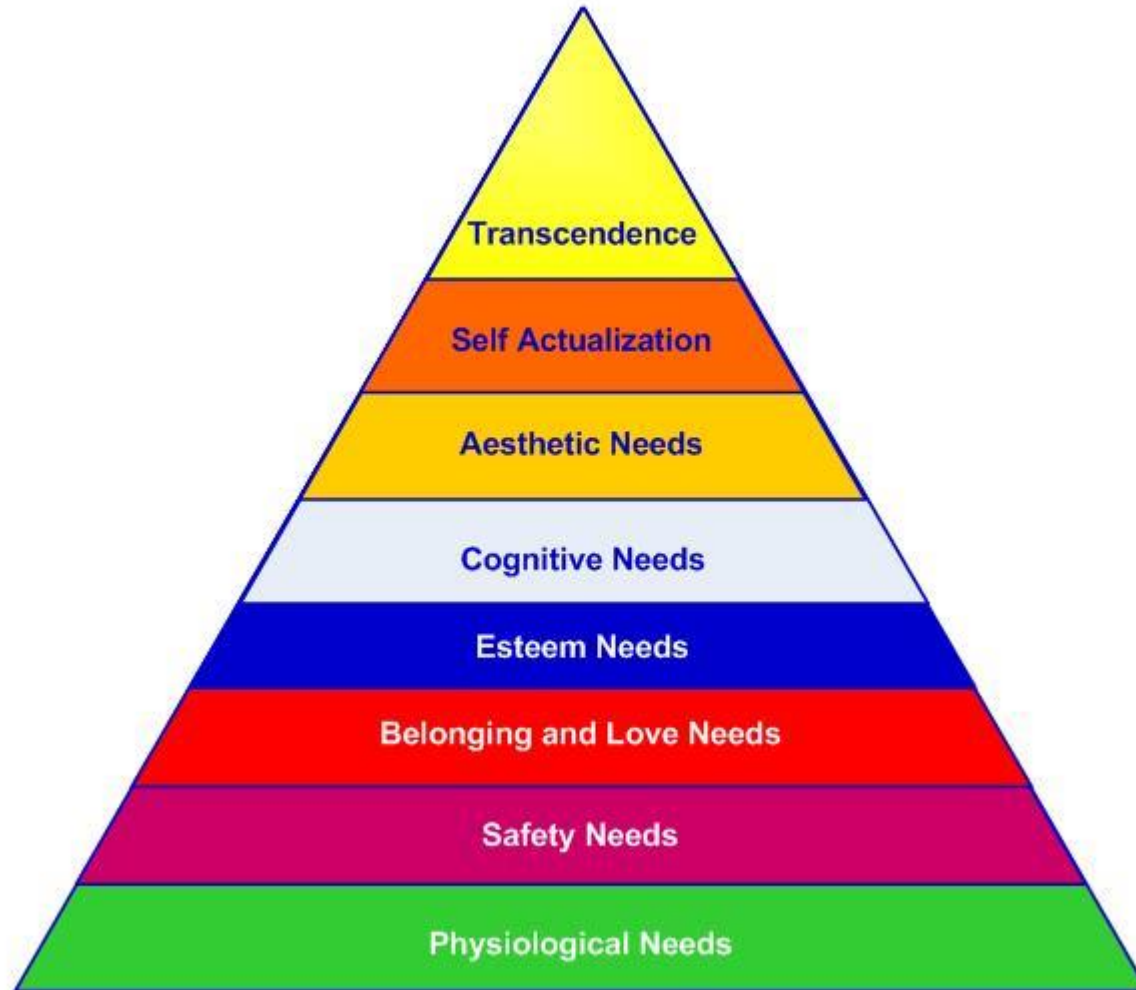- Willingness to be subservient
- Willingness to be accountable

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PE is our badge of honor. It symbolizes personal pride, integrity, responsibility.

But does it mean even more?

MASLOW'S MOTIVATION MODEL

Transcendence

Self Actualization

Aesthetic Needs

Cognitive Needs

Esteem Needs

Belonging and Love Needs

Safety Needs

Physiological Needs

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Transcendence -

That is, such individuals seek a benefit beyond the purely personal and seek communion with the transcendent, perhaps through mystical or transpersonal experiences; <u>they come to identify with something greater than the purely individual self, often engaging in service to others</u>.

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NSPE Code of Ethics

Preamble

Engineering is an important and learned profession. As members of this profession, engineers are expected to exhibit the highest standards of honesty and integrity. Engineering has a direct and vital impact on the quality of life for all people. Accordingly, the services provided by engineers require honesty, impartiality, fairness, and equity, and must be dedicated to the **protection of the public health, safety, and welfare**. Engineers must perform under a standard of professional behavior that requires **adherence to the highest principles of ethical conduct**.

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Have "we" given everything?

Growing chorus that engineers are not doing enough for *humanity*.

Chronicle for Higher Education

"Fools for Tools",
by John Kaag and Sujata Bhatia.

"We worry that the many conveniences delivered by modern engineering makes citizens loath to interrogate the moral implications of technological progress."

NSPE Code of Ethics

I. Fundamental Canons
Engineers, in the fulfillment of their professional duties, shall:

1. **Hold paramount the safety, health, and welfare of the public.**

*"If we take this canon seriously, it implies something counterintuitive about the skill set of tomorrow's engineers, namely **they should be experts in discussing and determining what constitutes the common good."** ~ Ibid*

NSPE Code of Ethics

III. Professional Obligations

2. Engineers shall at all times strive to serve the public interest.

a. Engineers are encouraged to participate in civic affairs; career guidance for youths; and work for the advancement of the safety, health, and well-being of their community.

*"Encouraged? That tepid suggestion **fails to reflect the nature of the obligation** that engineers should have to their fellow citizens". ~ Ibid*

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NSPE Code of Ethics

I. Fundamental Canons
Engineers, in the fulfillment of their professional duties, shall:

6. Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

"The call to conscience of the final canon…might be regarded as a moment of wishful thinking or as the lynchpin that ensures that all of the other, more specific tenets of its ethical code will be followed". ~ Ibid

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"Engineers bear a responsibility to consider both nontechnical and technical solutions to societal challenges. Because engineers have the skills to bring their visions to fruition, the engineer is both an arrowsmith and archer, shaping the future direction of society. The key question for the engineer is: **What kind of society am I creating?***"*

~ Ibid

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The Great Reversal

- How We Let Technology Take Control of the Planet
By David E. Tabachnick

"the occasion for the writing this book is the related concern that the increasing technological character of the world is somehow threatening the future of humanity".

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"On the surface it makes sense that only those who fully understand the complexities of a technology – who know what it can and cannot do – are qualified to make decisions about its larger health and societal effects. In turn, legislators and regulators should heed the advice of the technologists and develop and enforce appropriate laws and prohibitions."

~ Tabachnick

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"For Aristotle, to be ethical was more than simply knowing right from wrong, but also meant the capacity to act upon the knowledge."

~ Ibid

As technological advances increase, it seems increasingly apparent, more than ever before, that engineers both providing public services and those that work in industry should be licensed.

EXAMPLE

ARTIFICIAL INTELLIGENCE

Bill Joy, co-founder Sun Microsystems

"We have yet to come to terms with the fact that the most compelling 21st century technologies pose a different threat than the technologies that have come before".

∼ *Why the Future Doesn't Need Us, Wired Magazine, 2000*

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Stephen Hawking, physicist

"The development of full artificial intelligence could spell the end of the human race."

~ *As reported by the BBC, December 2014*

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Bill Gates, co-founder Microsoft

"I am in the camp that is concerned about super intelligence. First the machines will do a lot of jobs for us and not be super intelligent. That should be positive if we manage it well.
"A few decades after that though the intelligence is strong enough to be a concern. I agree with Elon Musk and some others on this and don't understand why some people are not concerned."

~ *As reported by the BBC, January 2015*

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Elon Musk, founder Tesla Motors and SpaceX

Musk who was speaking at the Massachusetts Institute of Technology (MIT) Aeronautics and Astronautics department's Centennial Symposium said that in developing artificial intelligence (AI) "we are summoning the demon."

"I'm increasingly inclined to think there should be some regulatory oversight maybe at the national and international level, just to make sure that we don't do something very foolish". *~ Elon Musk*

Applied Artificial Intelligence

Google Self-Driving Cars

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One of the clear automotive technology trends at CES this year is cars that drive themselves. From Audi to Lexus to Ford, the world's largest car companies are beginning to follow Google's lead in an effort to produce cars smart enough to drive themselves. The thought is that autonomous cars will reduce the number of traffic deaths— more than 100 people per day, currently -while simultaneously allowing car owners to do more productive things on their car trips, like work or read.

- Gizmodo, Why You Shouldn't Be Too Quick to Cheer Self-Driving Cars, 1/10/13

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Further complicating things is who will be at fault in the likely event that autonomous cars are imperfect and get into accidents.

~ Ibid

"This experience also hinted at the biggest challenge for increased vehicle automation: how to merge human and machine abilities effectively."

~ Technology Review, Proceed with Caution toward the Self-Driving Car, April 2013

How to make sure autonomy meshes with human behavior is a topic that Don Norman, a cognitive scientist and product design consultant, argues that autonomy also needs to be more attuned to how the driver is feeling. "As machines start to take over more and more, they need to be socialized; they need to improve the way they communicate and interact." ~Ibid

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Unfortunately, despite the huge number of very serious questions people have about what sort of laws will eventually govern autonomous cars, some politicians refuse to even acknowledge such issues exist. When California Governor Jerry Brown signed the bill paving the way for legal self-driving cars in California (2012), a reporter posed the question of who would be held responsible if a robot car indeed ran a red light. The governor dismissed the question as being stupid and simple. "I don't know—whoever owns the car, I would think. But we will work that out," he said. "That will be the easiest thing to work out."

~ Gizmodo

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"People are philosophizing about it," Ron Medford, the director of safety on Google's self-driving car project, told The Associated Press last month, "but the question about real-world capability and real-world events that can affect us, we really haven't studied that issue."

~ Huffington Post, Google Doesn't Want to Go It Alone With Driverless Cars, December 2014

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So, Where does that leave us?

NSPE values:

"Protection of the public health, safety, and welfare above all other considerations"

~ NSPE Strategic Plan

What Must NSPE do?

Transcendence

Increase Advocacy

Take Active Leadership

Increase Public Education

Exercise Stewardship

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As technological advances increase, it is apparent more than ever before that professional engineers need to take a leadership role in the *ethical* development, application and use of technology.

How will you transcend as a Professional Engineer in your industry?