LICENSURE CHALLENGES IN THE FOURTH INDUSTRIAL REVOLUTION

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What are we here to talk about?

- How to license new and emerging disciplines of engineering
  - To do so, we need to do more than look at process.
  - We need to look at this from a more foundational perspective.

What are we here to talk about?

- The future of engineering and regulation
  - What does “new” or “emerging” discipline of engineering even mean?
  - What is engineering in the context of technology and rapid technology changes?
  - What is the purpose of regulation?
  - What is the “right way” to do regulation?

What are we NOT here to talk about?

- Not here to prescribe a specific process to add a new engineering discipline to the current NCEES model
  - That exists. We have one already.
  - Does it work? Not necessarily.
  - We WILL talk about that…

What are we here to talk about?

- Change
  - It is happening in education.
  - It is happening in regulation/legislation.
  - It is happening in public opinion.
  - It is happening in technology.

The Problem: Technology and Change

- The world is experiencing an unprecedented and growing wave of change.
- Accelerating technological progress, rapidly evolving societal needs and expectations, and growing environmental imperatives all present significant, fundamental challenges and opportunities.

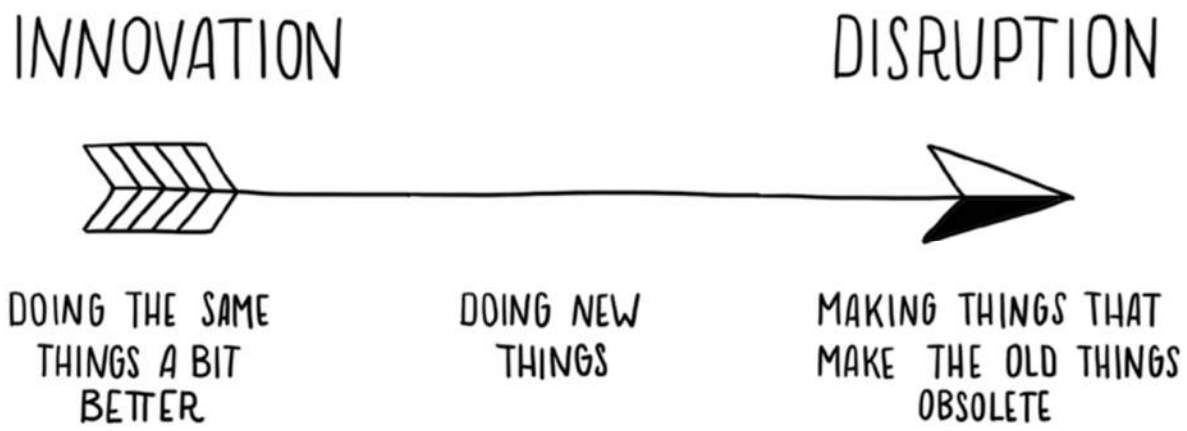
Courtesy of ECL-USA 2019

The Problem: Technology and Change

- Status quo of engineering is no longer an option
- Engineers as stewards of technology, the natural and built environments, and the public health, safety, and welfare as an uncertain future unfolds.
- The time is now to drive the system-wide changes that will support the engineering community in execution of this vital role.

Courtesy of ECL-USA 2019


Future everyon
thinks
Actual
future
You are here
Courtesy of Black & Veatch



NCEES Records Program—Mobility
Credentials Evaluations
CBT—Exam Delivery

???

Courtesy of Black & Veatch

“We can’t expect for the same things we’ve done for the last 100 years to work for the next 100 years.”

- STEVE EDWARDS, CEO BLACK & VEATCH

Courtesy of Black & Veatch

Change: Technology and Engineering

- What are some technology and engineering trends that will be coming in the next 5 years?
- 20 years? 50 years?
- What are the things we see as normal today that could be completely gone or in retreat in the next 20 years?
- Education—We are teaching students for technology and jobs that don't exist yet.

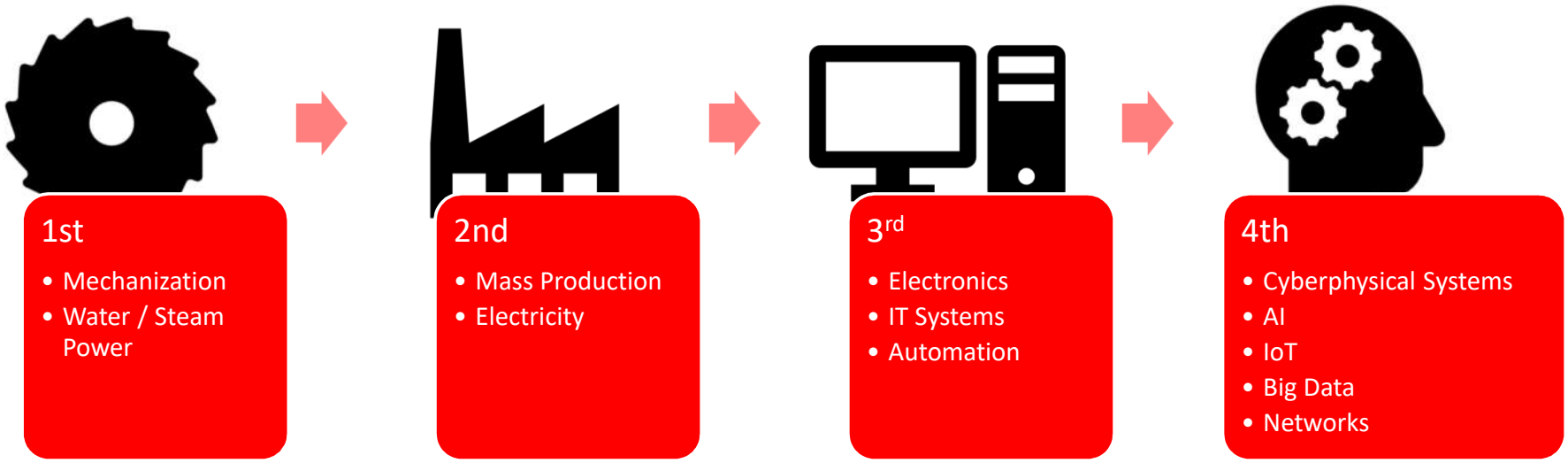
Change: Perspectives

- Real, transformational, revolutionary, disruptive change
- Be open to new thoughts
- Ideas of others
- "**Regulatory Blasphemy**"
- Change for the future, not for us in this room
- GOAL: How to best protect the health, safety, and welfare of the public in a changing world

Changes in Technology

- *The Fourth Industrial Revolution*—Klaus Schwab (2016)
- *Shaping the Fourth Industrial Revolution*— Schwab (2018)
- *The War on Normal People* – Andrew Yang (2018)
- World Economic Forum—www.weforum.org
- *Agile Governance: Reimagining Policy-making in the Fourth Industrial Revolution* (April 2018)
  - www.weforum.org/whitepapers/agile-governance-reimagining-policy-making-in-the-fourth-industrial-revolution

Fourth Industrial Revolution



1st
- Mechanization
- Water / Steam Power

2nd
- Mass Production
- Electricity

3rd
- Electronics
- IT Systems
- Automation

4th
- Cyberphysical Systems
- AI
- IoT
- Big Data
- Networks

Licensure Over Time

- Licensure started during the 2nd Revolution
- Expanded during 3rd Revolution
  - *But has it really kept up?*
  - Software Engineering?
  - Integration of computer systems within engineering practice
- Licensure is not ready for the 4th Revolution

Fourth Industrial Revolution

- Unprecedented advances in technology transforming the way individuals and groups across society live, work, and interact.

- New principles, protocols, rules, and policies are needed to accelerate the positive and inclusive impacts of these technologies, while minimizing or eliminating their negative consequences.

www.weforum.org

Fourth Industrial Revolution

- The institutions that have traditionally had the responsibility of shaping the societal impacts of these technologies—*including governments*, companies, and civil society organizations—*are struggling to keep up with the rapid change and exponential impact*.

- There is an urgent need for a more agile approach to governing emerging technologies and the business models and social interaction structures they enable.

Regulation in Fourth Revolution

- Who checks the systems?
- Do they have ethics? (individuals / system?)
- What happens if/when they fail?
- Do they need to be regulated?
- Do they need to be licensed?
- By whom?
- And how?

Regulation in Fourth Revolution

- BIM
- AI
- Software that designs for you
  - Roadbotics, OPTICS
- Blockchain
- Autonomous Vehicles
- Smart Cities
- MEMS
- Mechatronics

Regulation in Fourth Revolution

“Tech Giants' New Appeal to Governments: Please Regulate Us”

WSJ – Jan 27, 2020

“Top executives of big technology companies are presenting global policy makers with an unusual message from an industry once antagonistic to government intervention: Regulate us.”

“There is no question in my mind that artificial intelligence needs to be regulated,” Alphabet CEO Sundar Pichai said in a policy speech. “The question is how best to approach this.”

Question

What do these challenges mean
for the future of engineering regulation?