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Cultivating the wicked… in all of us

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Lori Parrott
Advanced Concepts Group
Sandia National Laboratories

Sandia National Laboratories

What is a “wicked” problem?

From Rittel and Weber, 1973

- There is no definitive formulation of a wicked problem.
- Solutions to wicked problems are not true-or-false, but good-or-bad.
- There is no immediate and no ultimate test of a solution to a wicked problem.
- Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan.
- Every wicked problem is essentially unique.
- Every wicked problem can be considered a symptom of another problem.
- The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem’s resolution.
- The planner has no right to be wrong.

We are using the term “wicked problems” to characterize the types of problems we envision engineers addressing in the future: highly complex, highly dynamic, and involving not only technology but political, social, and economic considerations.

What are examples?

- Designing a proliferation-resistant, terrorist-resistant portable nuclear reactor.
- Designing border security systems
- Reducing humans' impact on global climate change
- Defeating IEDs

Many problems are hard, complex, but not wicked

- **Some examples:**
  - **Designing a new component for the space shuttle**
  - **Developing a new heart monitor**
  - **??**
  - **??**

The opposite of wicked is tame.

Thought leaders on the convergence of engineering and liberal arts

- ***Equip technical professionals to help define, not just solve, problems***
- ***Increase their ability to think critically across domains***
- ***Increase creativity, innovation, and impact***

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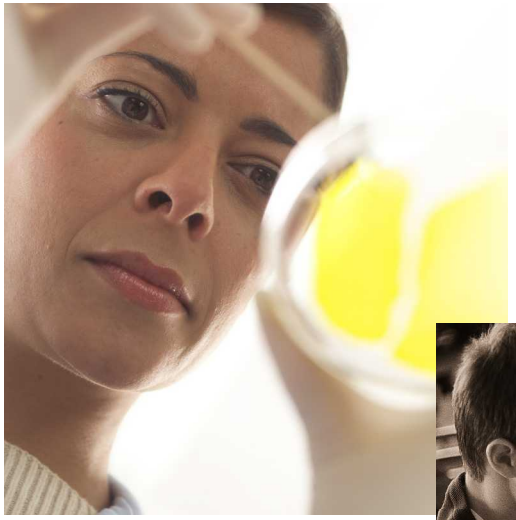
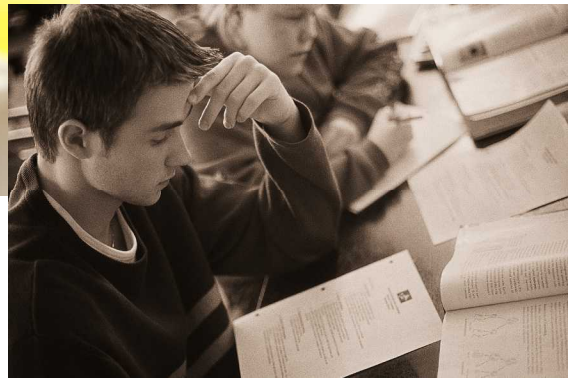
Our goal: lead a revolution in educating the professional engineer*

- **Lead a revolution in educating the professional engineer to solve problems in complex, adaptive systems ("wicked problems") involving**
  - ***technological,***
  - ***social,***
  - ***economic, and***
  - ***political factors.***





**loosely defined*

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Innovative education can enable engineers with “wicked” problems

- *“Enrich and broaden engineering education so that technically grounded graduates will be better prepared to work in a constantly changing global economy.” (NAE, Educating the Engineer of 2020.)*
- *Enable S&T professionals to recognize wicked problems sooner and address them with more sophisticated understanding and tools*
- *Enhance diversity, creativity, and interdisciplinary thinking*

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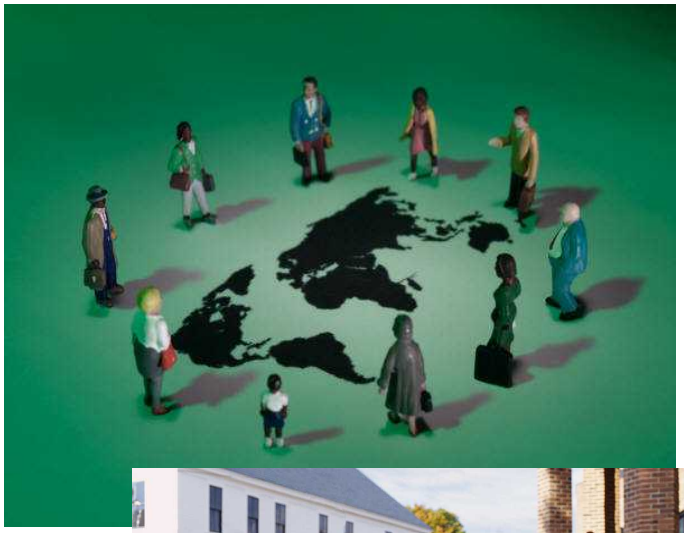
What would a wicked engineer look like?

- Able to recognize a wicked problem when she sees one.
- Able to call upon various tools, techniques to approach.
- Able to articulate the problem (and its burden of solution) to stakeholders, funding agencies, public.



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Now, you're the experts:

- ***What is your role in helping professionals address wicked problems?***
- ***What skills or knowledge would you see as necessary?***
- ***Can these skills be developed in the workforce? How?***
- ***What existing resources or other opportunities could you leverage?***

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