Societal Impact of Engineering
Class 1

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What is an Engineer and What Does She or He Do?

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- *An engineer applies the principles of physics and the tools of mathematics to nature and materials to produce devices and systems which serve mankind. In other words, an engineer is an applied scientist.*
- *What we do as engineers has an extensive impact on society.*

Examples of Engineering Solutions with Significant Societal Impact

- Problem: Need for instantaneous, ubiquitous communication
  Partial Solution: The Internet
- Problem: Dwindling energy supplies
  Partial Solution: Nuclear power

Examples of Engineering Solutions with Significant Societal Impact (cont.)

- Problem: Disease and human suffering
  Partial Solution: Biomedical advances, genetic engineering

Group Exercise #1

Provide three (3) real-world examples of proposed engineering solutions which have had a significant impact on society. Briefly discuss the original problem which inspired each proposed solution and the positive and negative impacts of each of the solutions. You cannot use the specific examples which the instructor has just discussed.

Examples of Proposed Engineering Solutions with Significant Societal Impact

Kudzu and the Law of Unintended Consequences

Kudzu and the Law of Unintended Consequences (cont.)

- Original Problems:
  - * Soil Erosion
  - * Need for inexpensive food for livestock

Kudzu and the Law of Unintended Consequences (cont.)

- Proposed Solution:
  - * ***A fast growing, hearty vine from Japan. First introduced to the US in 1876 at the Centennial Exposition in Philadelphia***
  - * ***High protein - used as livestock forage in the 1920s and touted as "the miracle vine"***
  - * ***Strong root structure - promoted by the US Government during the Great Depression for erosion control (planted by the Civilian Conservation Corps)***

Kudzu and the Law of Unintended Consequences (cont.)

- NEW PROBLEMS:

Kudzu grows TOO WELL in the Southern U.S. (up to 60 feet per year), covering trees and plants, blocking their sunlight and choking them out.

The Law of Unintended Consequences

No matter how good a proposed solution seems to be, it will have some unintended side effects.

Why Weren't the Problems with Kudzu in the Southern US Anticipated?

- Problem didn't exist in Japan
  - * Japanese climate wasn't as good for growth
  - * U.S. didn't have Kudzu's natural insect enemies
- Populace was not environmentally aware
- Scientists were not as well trained to anticipate unintended consequences

Group Exercise #2

Before the next class, develop a set of specific procedures which practicing engineers can use to ensure, as best as possible, that unintended consequences are limited, that society is informed of the tradeoffs involved in an engineering solution, and that society gives approval before the solution is implemented.

NOTE: Make a copy of your list for your group to keep and use. You will turn in the original to the instructor at the end of next class.