

Prepared and Presented by:
Ricardo A. Case PMP, P.E.
SCADA/EMS Manager, JPSCo Ltd.

Professional Responsibility and the Role of the Engineer in Society

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What is the role of the engineer to society?

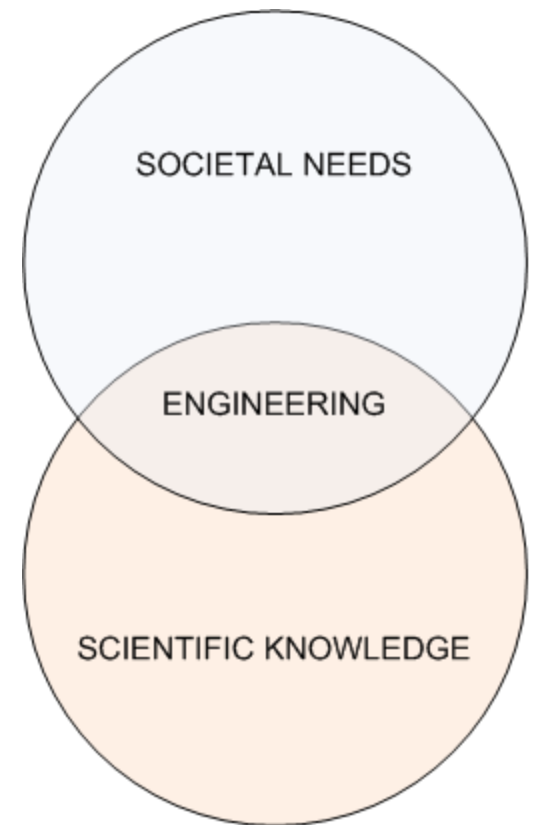
- Do we need them?
- Why not scientists?
- Are engineers professionals?
- Is there a relationship between the society and the engineer?
- Is society better from engineering?

Let's examine the relationship

- “Scientists study the world as it is, engineers create the world that never has been”
(Theodore Von Karman)
- “Engineering is the application of science to the common purpose of life” (Count Rumford)
- The main focus of the scientist is to develop knowledge and understanding of the physical universe. Science is the pursuit of knowledge in its purest sense without any concern to the needs of society, whereas engineering is the combination of both.

What then is engineering?

- The central focus of the engineering profession is the application of scientific knowledge to meet societal needs.
- Engineering connects pure science to society
- Engineering therefore has a social responsibility



What does “having” social responsibilities mean?

- It means a commitment from the engineering profession to place the public safety and interest ahead of all other considerations.
- It means that engineers take into account and show due regard for the consequences of their conduct for the well-being of others as well as for the impact of their work on society and the citizenry.
- This requires the engineer to make determined efforts to discover all of the relevant facts concerning the design, development, and deployment and all of the possible outcomes of the choices available that may positively and negatively affect/impact society and the citizenry

Social Responsibilities of Engineers (Some Examples...)

- Ensure the safety and well-being of the public
- Ensure that society's funds and resources concerning technology are well used
- Refusing to work on a particular project or for a particular company
- Speaking out publicly against a proposed project
- Blowing the whistle on illegality or wrong-doing
- Professional Societies' obligation to provide protection for whistleblowers
- Individual and organizational concern about the impact of engineering projects on society
- Contributing one's services to worthy, non-profit groups and projects
- Engineering schools' commitment to educating future engineers about their social responsibilities

Social Responsibilities of Engineers (Some Examples)

- Commitment of risk assessment experts to ethical risk/safety assessments
- Voluntarily assume the task of educating the public about important consequences of various technological and scientific developments
- Commitment of engineers to design and develop sustainable technologies
- Provide expert advice to non-experts
- Explicit care and concern about technology's impact on Nature and the Environment
- Abiding by the principles of sustainable development when thinking about engineering designs
- Abiding by the "precautionary principle" when thinking about engineering designs
- In engineering design, engineers have practiced social responsibility by applying factors of safety to their designs and by building in redundancy

Engineering is not a stationary profession...

- The 21st century will be defined by some of the huge challenges now facing humanity.
- These are energy and food security, competition and scarcity of natural resources, and climate change.
- This year's engineering graduates will face these issues throughout their working careers.
- The demand for engineering skills is likely to be higher than ever before in order to deliver sustainable engineering systems, low-carbon energy technologies, and robust physical infrastructure to protect against geophysical hazards such as sea-level rise and extreme meteorological events

Engineering Social Responsibility

- Why do engineers have the responsibility to think about the interaction of technology and society?
- Aren't they supposed to implement the goals of their employers and clients.., not decide what those goals should be!?!?
- Answer: Because engineers are the ones who create all of the technology and
- Responsible moral beings are supposed to think about the effects of their own actions and creations especially if they impact others.

Engineering and Society

- “Engineering is a great profession. There is a fascination of watching a figment of the imagination emerge, through the aid of science, to a plan on paper. Then it moves to realization in stone or metal or energy. Then it brings jobs home to men. Then it elevates the standards of living and adds to the comfort of life. That is the engineer's high privilege....To the engineer falls the job of clothing the bare bones of science with life, comfort, and hope...”

--Herbert Hoover

(US mining engineer & 31st President of the US) (1874 - 1964)

Defining Engineering

- “ Scientist discovers that which exists. An engineer creates that which never was”

▮ Theodore von Karman (1881-1963)



The Intrinsic Nature of Engineering

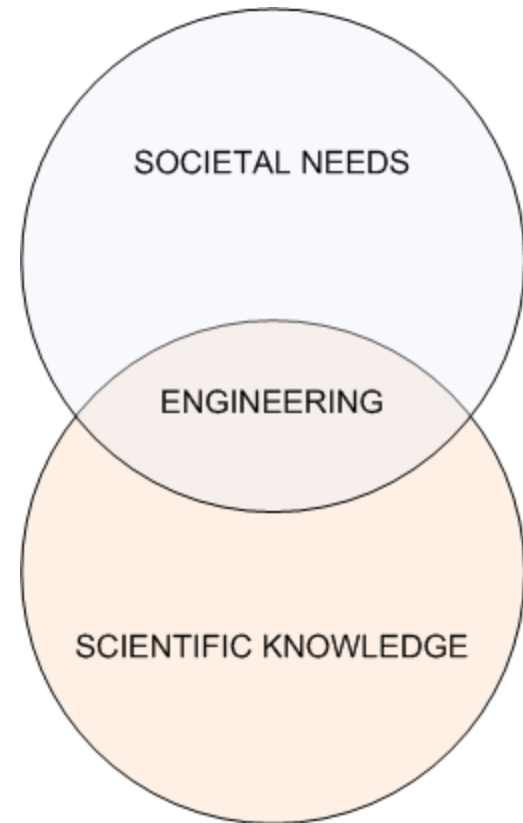
The Broad Definition

- *The engineer is the key figure in the material progress of the world. It is his engineering that makes a reality of the potential value of science by translating scientific knowledge into tools, resources, energy and labor to bring them into the service of man ... To make contributions of this kind the engineer requires the imagination to visualize the needs of society and to appreciate what is possible as well as the technological and broad social...understanding to bring his vision to reality.*

The Intrinsic Nature of Engineering

**The Broad Definition :
Focus on the key words**

- material progress of the world..... service of man
.....the needs of society
....broad
social....understanding



Engineering and Ethics

- If we accept these definitions of engineering, it is crucial to realize the centrality of ethical concerns at the core of the engineering enterprise
- Concern for social well being and humanity are part of the very definition of engineering
- Assuming the intellectual rigor of these definitions, the need of ethics in engineering is nothing superfluous or added, but it is the essence of the engineering profession

Rationales for Social Responsibility of Engineers

■ IEEE Code of Ethics

- We, the members of the IEEE, in recognition of the importance of our technologies in affecting the quality of life throughout the world, and in accepting a personal obligation to our profession, its members and the communities we serve, do hereby commit ourselves to the highest ethical and professional conduct and agree:
 - 1. to accept responsibility in making decisions consistent with the safety, health and welfare of the public, and to disclose promptly factors that might endanger the public or the environment;
 - 5. to improve the understanding of technology, its appropriate application, and potential consequences

Examples of Engineering Codes of Ethics

- ASCE Code of Ethics

- **Fundamental Canon 1.** Engineers shall hold paramount the safety, health and welfare of the public and shall **strive to comply with the principles of sustainable development** in the performance of their professional duties.

- Software Engineering Code of Ethics

- **Principle 1.03.** Approve software only if they have a well-founded belief that it is safe, meets specifications, passes appropriate tests, and **does not diminish quality of life, diminish privacy or harm the environment.** The ultimate effect of the work should be to the public good.

IEEE Code of Ethics for Engineers

ARTICLE IV

- Engineers shall, in fulfilling their responsibilities to the community:
 - Protect the safety, health and welfare of the public and **speak out against abuses in these areas affecting the public interest;**
 - Contribute professional advice, as appropriate, to civic, charitable or other non-profit organizations;
 - Seek to extend public knowledge and appreciation of the engineering profession and its achievements



Exercise... Acting as an Engineer

- Rank these engineering criteria in order of importance
 - Economics
 - Security
 - Safety
 - Reliability



Exercise... Acting as a Consumer

- Rank these engineering criteria in order of importance
 - Economics
 - Security
 - Safety
 - Reliability



The Dilemma

■ Engineer View

- Safety
- Security
- Reliability
- Economics



■ Consumer View

- Safety
- Economics
- Reliability
- Security



An Engineer is a Professional

- A **professional** is a person who is paid to undertake a specialized set of tasks and to complete them for a fee
- Due to the personal and confidential nature of many professional services, a great deal of **trust** is placed them.

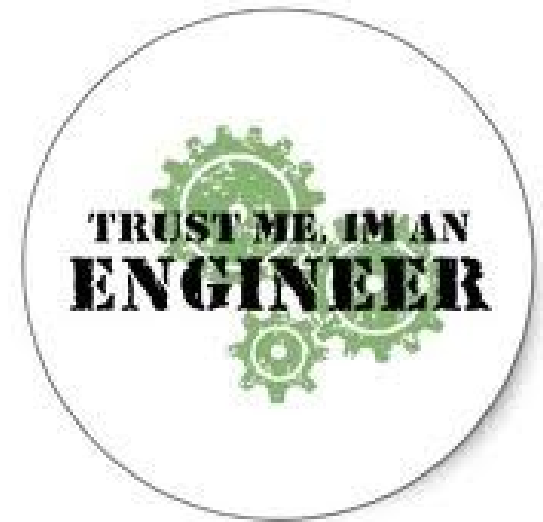


Image is important!

Your image is what people will remember



How you carry yourself is a statement of who you are

Main criteria for professionals

- Expert and specialized knowledge in field which one is practicing professionally.
- Excellent manual/practical and literary skills in relation to profession.
- High quality work in (examples): creations, products, services, presentations, consultancy, primary/other research, administrative, marketing, photography or other work endeavours.

Main criteria for professionals

- A high standard of professional ethics, behaviour and work activities while carrying out one's profession.
- Reasonable work morale and motivation.
- Appropriate treatment of relationships with colleagues.
- A professional is an expert who is a master in a specific field.
- They accept responsibility and accountability for the decisions they make.

Benefits for being Professional Engineers

- Job satisfaction
- Variety of career opportunities
- Challenging work
- Intellectual development
- Benefit society
- Financial Security
- Prestige
- Professional environment
- Technological and scientific discovery
- Creative Thinking

Thank you.... Any Questions?

- Ricardo Case PMP, P.E.
- rcase@jpsco.com
- 876-878-3738