



FEDERATION OF MYANMAR ENGINEERING SOCIETIES

ENGINEERING ETHICS AND SUSTAINABLE DEVELOPEMENT

Knowledge Sharing

By

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13-8-2022

Saturday





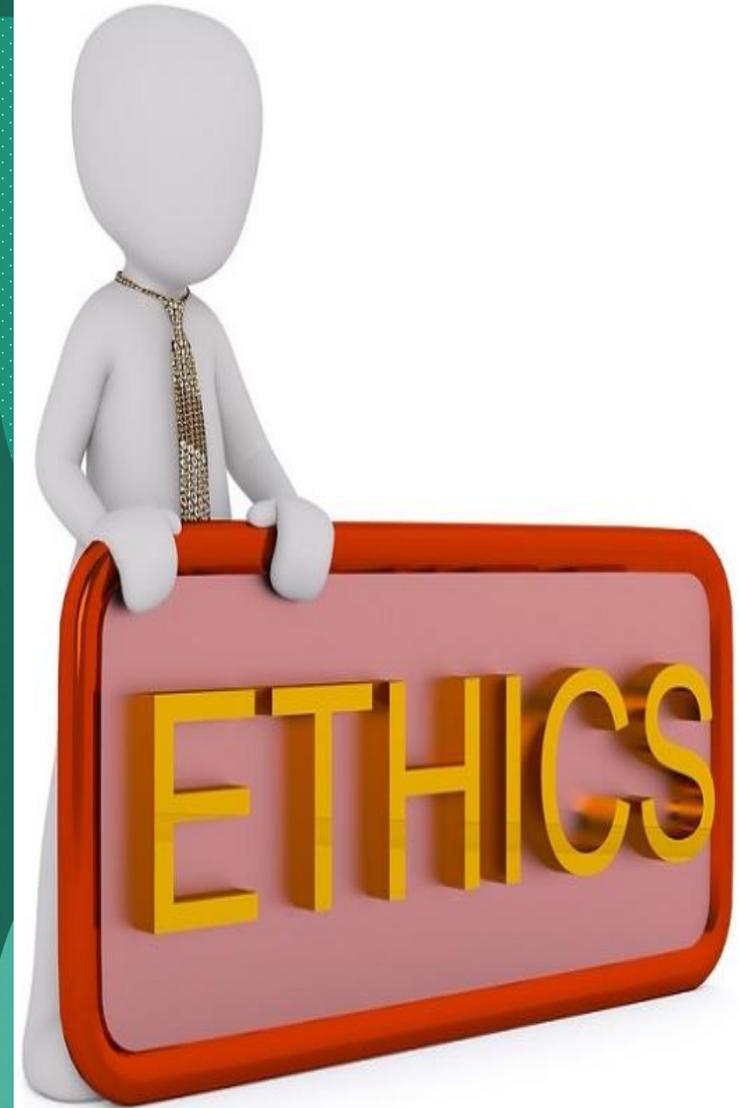
Engineering Ethics



Engineering ethics

- Engineering Ethics is the study of **moral issues** and decisions **confronting individuals and organizations engaged in engineering.**
- The Study of related questions about **moral ideals, character, policies** and relationship of **people and corporations involved in technological activity.**

Mike W. Martin and Roland Schinzinger, Ethics in Engineering, Second Edition, McGraw-Hill, 1989.



Engineering ethics

- Teaching engineering ethics can achieve at least four desirable outcomes:
- a) increased ethical **sensitivity**;
- b) increased knowledge of **relevant standards of conduct**;
- c) improved ethical **judgment**; and
- d) improved **ethical will-power** (i.e., a greater ability to act ethically when one wants to).

Davis, M. "Teaching ethics across the engineering curriculum." Proceedings of International Conference on Ethics in Engineering and Computer Science.

Available online at:

<http://onlineethics.org/essays/education/davis.html>

Engineering ethics

- “Ethical responsibility...involves more than leading a decent, honest, truthful life. . . . And it involves something much more than making wise choices when such choices suddenly, unexpectedly present themselves. Our moral obligations must . . . include a **willingness to engage others in the difficult work of defining the crucial choices that confront technological society**”

Langdon Winner, 1990. “Engineering ethics and political imagination.” pp. 53-64 in Broad and Narrow Interpretations of Philosophy of Technology: Philosophy and Technology 7, edited by P. Durbin. Boston: Kluwer. Cited in Joseph R. Herkert, “Continuing and Emerging Issues in Engineering Ethics Education,” The Bridge, 32(3), 2002.

Examples of Engineering Codes of Ethics

- **Accreditation Board for Engineering and Technology (ABET)**
- **National Society of Professional Engineers (NSPE)**
- **Institute of Electrical and Electronic Engineers (IEEE)**
- **American Society of Mechanical Engineers (ASME)**

Some ideas for this lecture was based on the work of Dr. Jerry C. Collins
Department of Biomedical Engineering, Vanderbilt University

**ABET (Accreditation Board for Engineering and Technology)
Code of Ethics**

The Fundamental Principles

Engineers uphold and advance the integrity, honor, and dignity of the engineering profession by:

- I. using their knowledge and skill for the enhancement of **human welfare**;**
- II. being honest and impartial, and serving with fidelity the **public, their employers, and their clients**;**
- III. striving to increase the competence and prestige of the **engineering profession**; and,**
- IV. supporting the **professional and technical societies of their disciplines**.**

ABET Code of Ethics of Engineers

The Fundamental Canons

1. Engineers shall **hold paramount the safety, health, and welfare of the public** in the performance of their professional duties.
2. Engineers shall **perform services only in the areas of their competence**.
3. Engineers shall issue **public statements only in an objective and truthful manner**.
4. Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall **avoid conflicts of interest**.
5. Engineers shall build their professional reputation on the **merit** of their services and shall **not compete unfairly** with others.
6. Engineers shall act in such a manner as to uphold and **enhance the honor, integrity, and dignity of the profession**.
7. Engineers shall **continue their professional development** throughout their careers and shall **provide opportunities for the professional development** of those engineers under their supervision.

Ethics in ABET Program Outcomes

Engineering programs must demonstrate that their graduates have

- Ability to apply knowledge of mathematics, science, engineering
- Ability to design and conduct expts, analyze and interpret data
- Ability to design system, component, or process
- Ability to function on multidisciplinary teams
- Ability to identify, formulate, and solve engineering problems
- **An understanding of professional and ethical responsibility**
- Ability to communicate effectively
- **Broad education necessary to understand engineering impact in a global and societal context**
- Recognition of need for and ability to engage in life-long learning
- **Knowledge of contemporary issues**
- Ability to use techniques, skills and modern engineering tools necessary for engineering practice

Engineering Ethical Education Issues to be Considered

- **Ethical implications of public policy relevant to engineering:**
 - Sustainable development
 - Risk to people and environment, product liability
 - Ethical treatment of the other
 - Information technology
- **Culturally embedded engineering practice (institutional and political aspects of engineering, such as contracting, regulation, and technology transfer)**
- **Macroethical issues (e.g., overconsumption)**

Herkert, *The Bridge*, 32(3), 2002

What is engineering ethics and why are ethics important to engineer?



Ethics are the principles accepted by the society, which also equate to the moral standards of human beings. **An engineer with ethics, can help the society in a better way.** Hence the study of Engineering ethics, where such ethics are implemented in engineering by the engineers, is necessary for the good of the society.

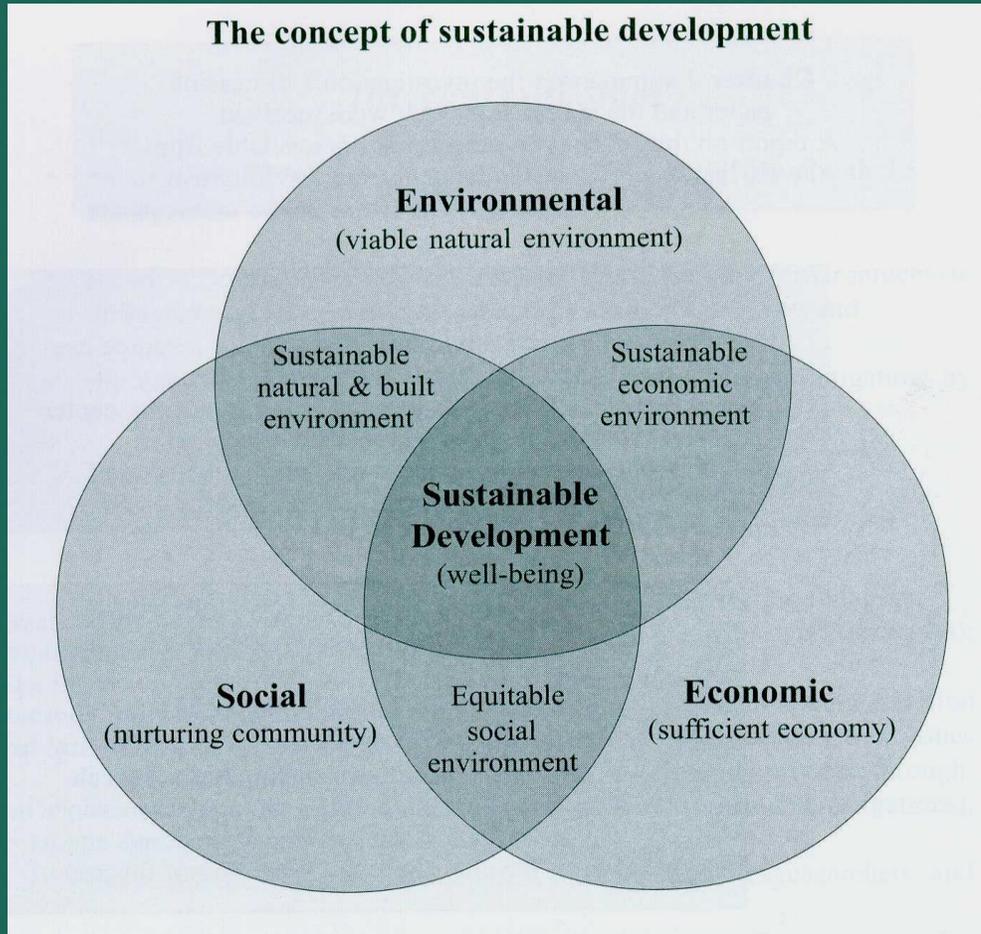
Sustainable Development

The guiding principle of sustainable development is development **that meets the needs of the present without compromising the ability of future generations** to meet their own needs. Sustainable development recognizes the interdependence of environmental, social and economic systems and promotes equality and justice through people empowerment and a sense of global citizenship. Whilst we cannot be sure what the future may bring, a preferable future is a more sustainable one.

Encyclopedia of Sustainable Development

<http://www.doc.mmu.ac.uk/aric/esd/menu.html>

Sustainable development aims to balance three elements:



- **Economic:** what things cost - and how to make a business out of providing infrastructure, goods or services
- **Environmental:** what impact those things have on nature and the earth's support systems - which are finite
- **Social:** how those things serve the needs and quality of life of people and their communities

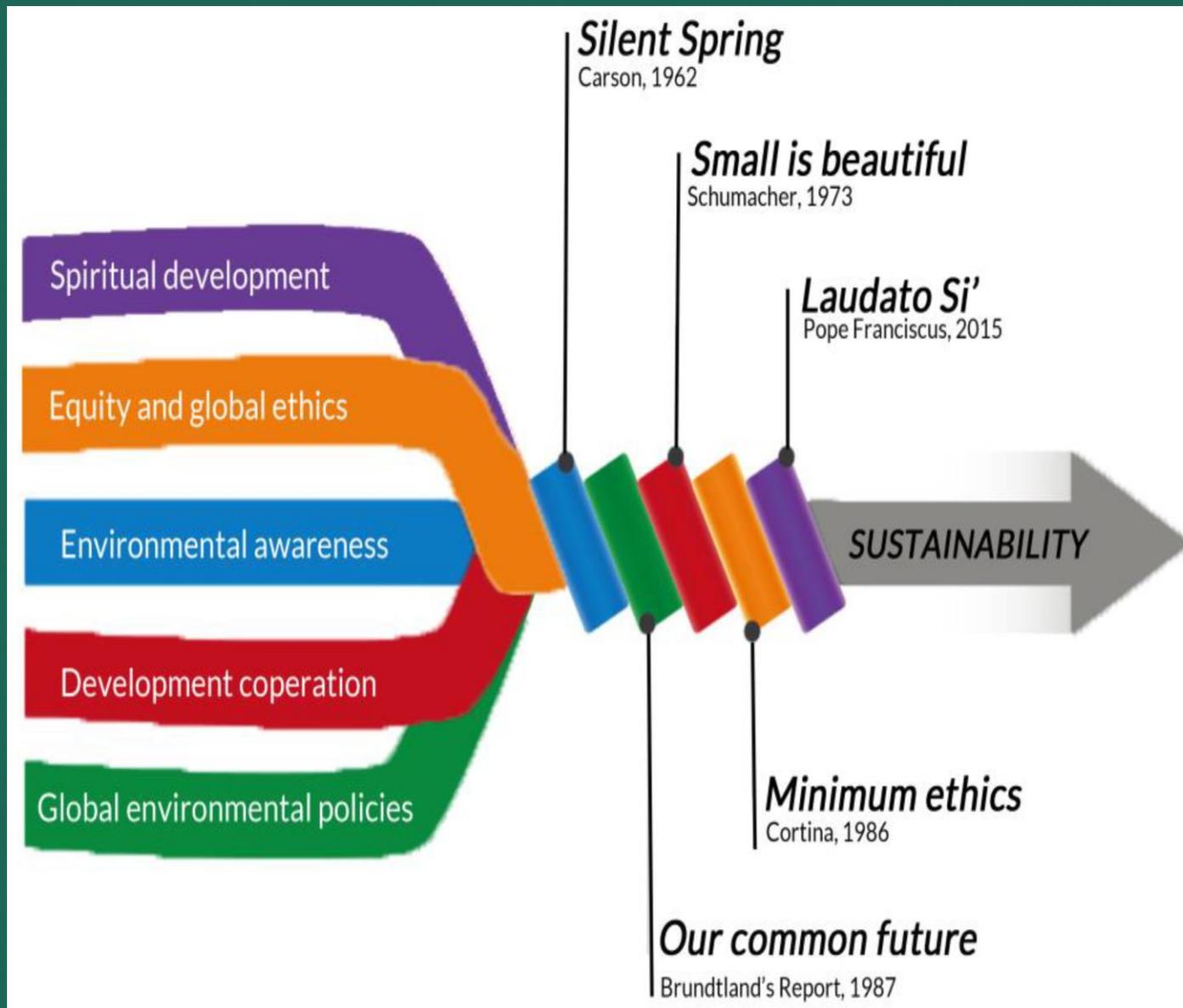


Figure 1. Construction of sustainability construct.

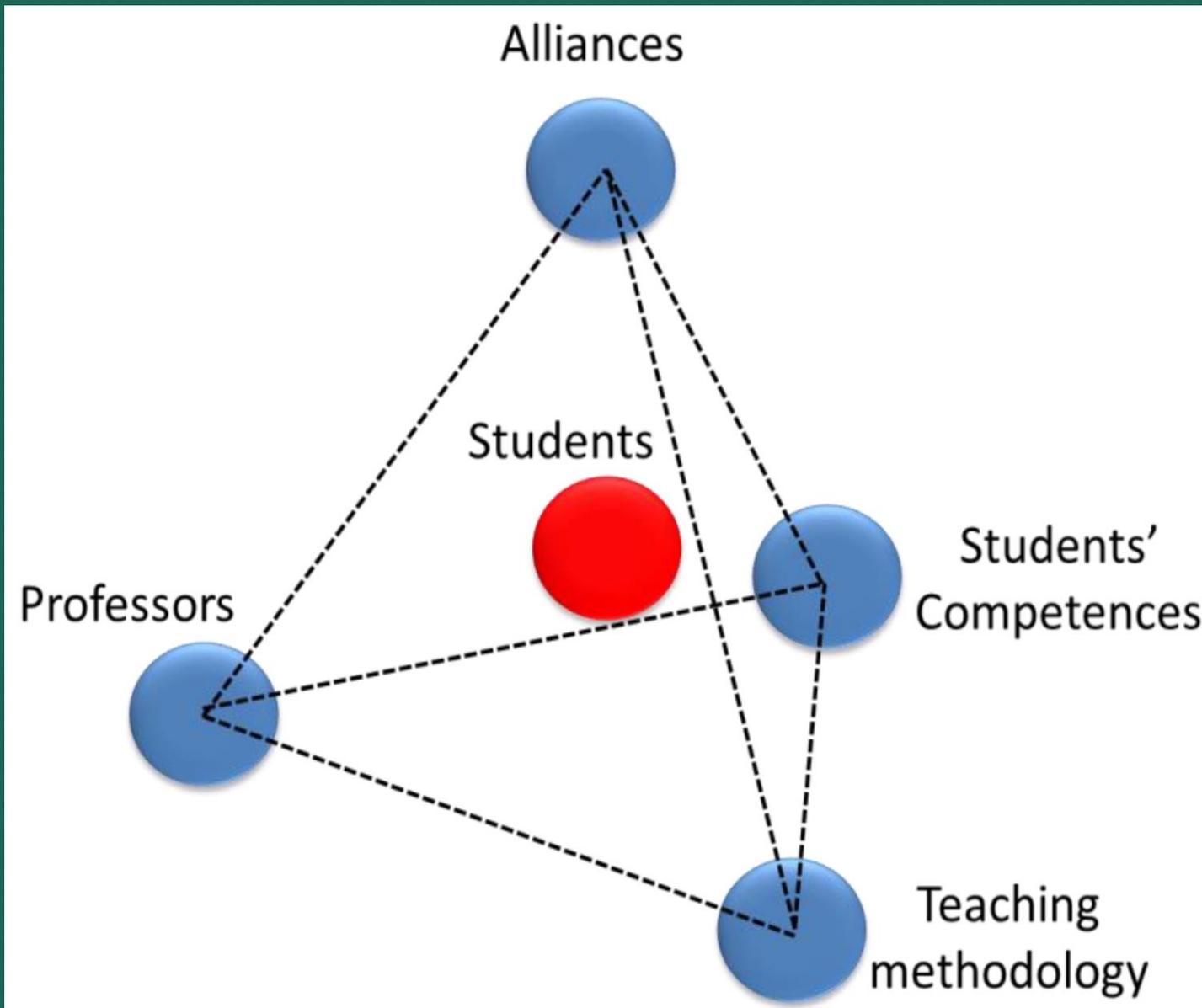


Figure 2. Proposed framework to teach SDGs at the university.

Sustainable Development Challenges

- Sustainable Development is not only about protecting the environment.
- It requires us to find solutions to other development needs of people. These include:
 - Economic development
 - Health and sanitation
 - Education
 - Equality
 - Rights of Children

Sustainable Development Challenges

Three key challenges:

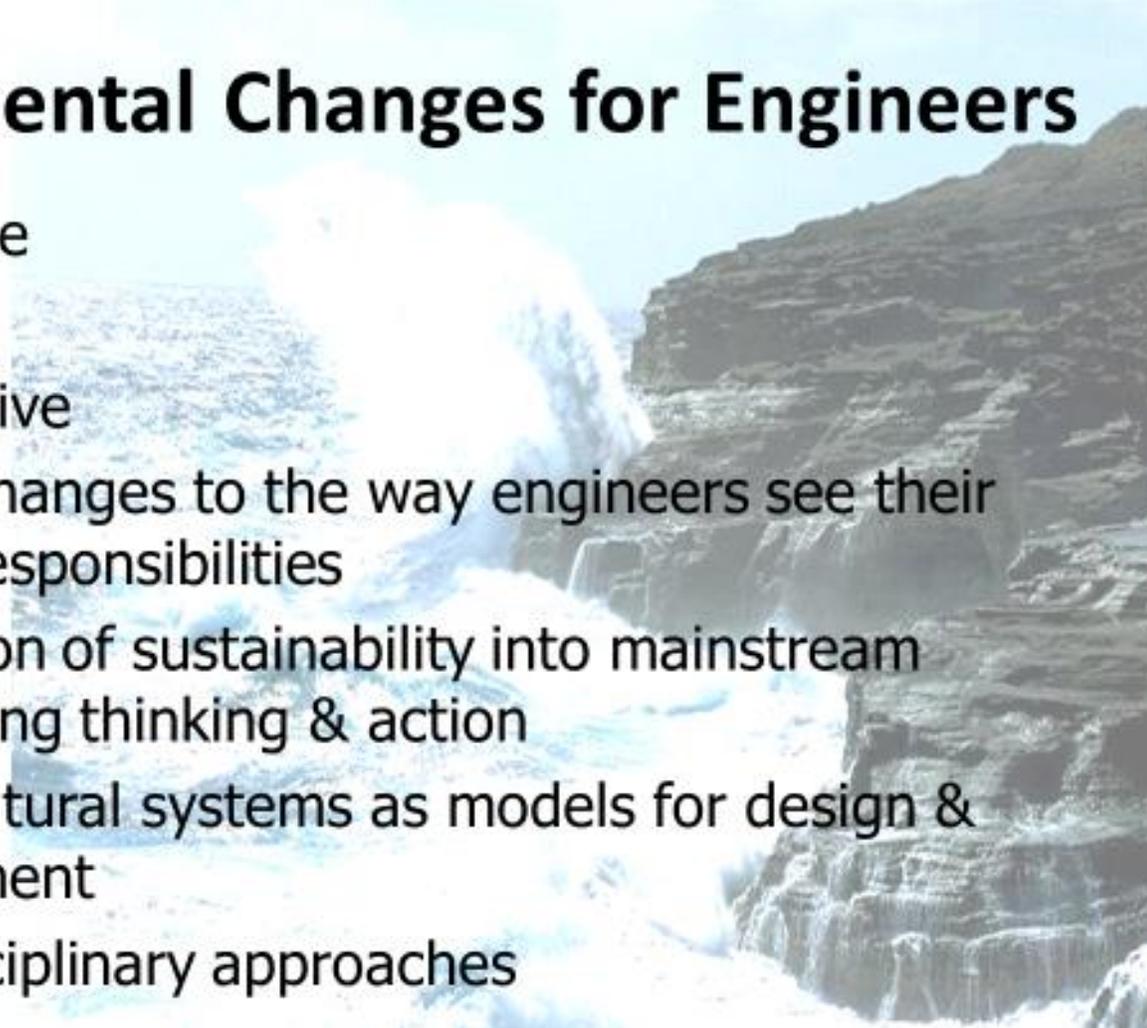
1. Overpopulation in the developing world.
 - The developing world has 80% of the world's population and consumes 20% of its resources.
2. Overconsumption in the developed world.
 - The developed world has 20% of the world's population and consumes 80% of its resources.
3. Striking a balance between competing challenges
 - E.g. Conflict between dealing with Climate Change and Eradicating Poverty

Sustainable Development Challenges - let us not loose focus

- **Climate change is real.**
- **We need to deal with it.**
- **It is perhaps the biggest (environmental) challenge the world is facing today, but not the only one.**
- **There are a number of other development issues** that are more immediate:
 - hunger and malnutrition
 - Poverty
 - Health
 - local environmental issues

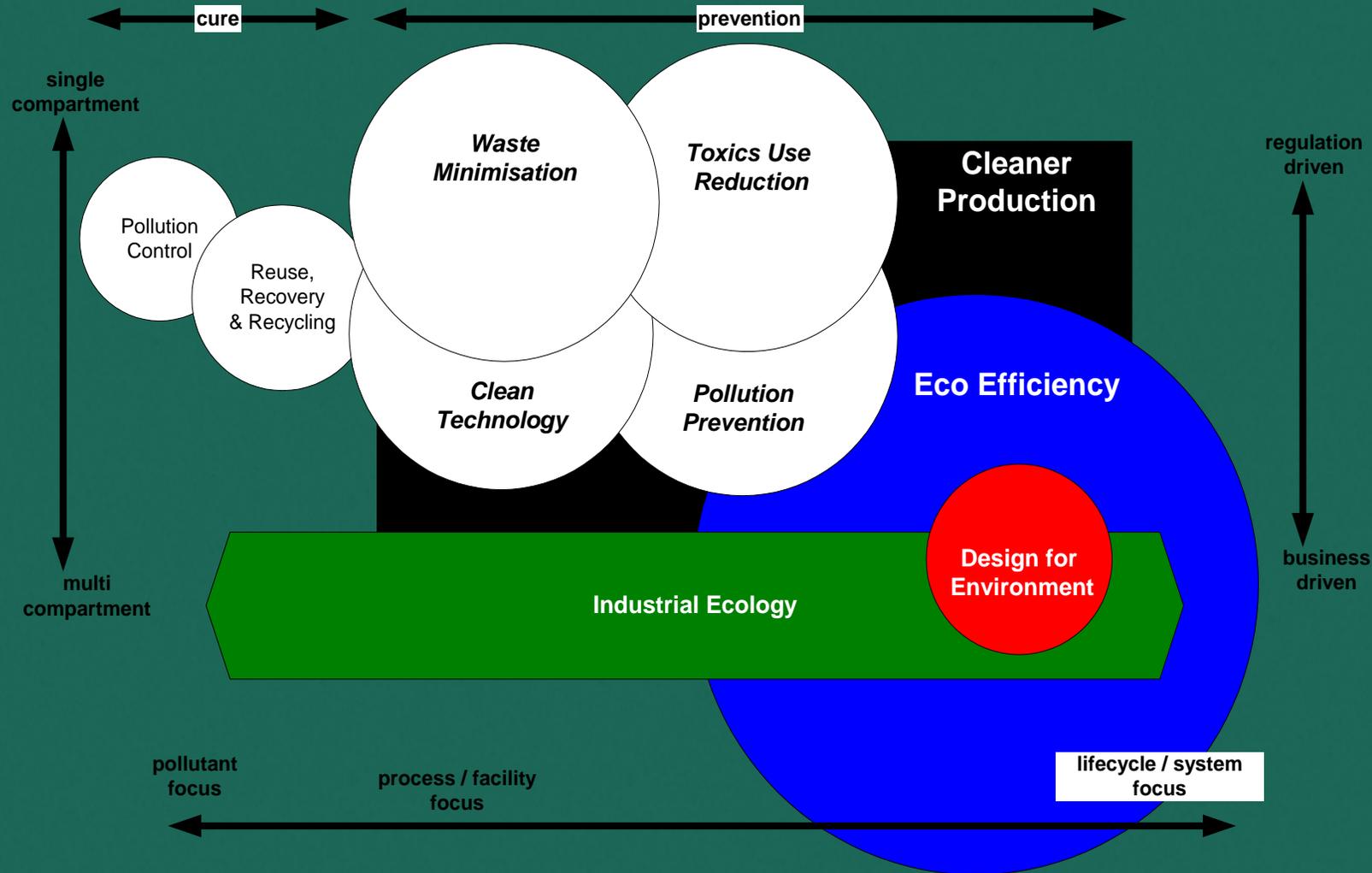
Fundamental Changes for Engineers

- Preventive
- Proactive
- Pre-emptive
- Radical changes to the way engineers see their roles & responsibilities
- Integration of sustainability into mainstream engineering thinking & action
- Use of natural systems as models for design & development
- Inter-disciplinary approaches



Implementing Sustainable Development

There are a number of complementary tools and approaches that can be used by Engineers to aid their implementation of sustainable development as shown below.



Other useful tools and concepts to assist in implementing sustainable development included:

- Life cycle assessment and management
- Environmental management systems
- Green Chemistry
- Green Engineering, and
- Biomimicry / biomimetics

New technology and innovation will be needed to achieve significant progress towards sustainable development.

Engineers have a significant role in developing and using this new technology, and doing so in a responsible manner.

Conclusions

Engineering Ethics and Sustainable development now influences government, business and economic activity at all levels - it can't be ignored.

Achieving its goals and objectives presents great challenges for all parts of society and requires creativity at every level; social, economic, institutional and technical.

Engineers, because of their pivotal role in society have a major part to play in achieving sustainable development.

Environmental issues, and sustainability DO matter for Engineers - they are now an inseparable, integral part of Engineering.

THANK YOU SO MUCH

The background is a dark teal color. On the right side, there are several abstract geometric shapes. A large, rounded rectangular shape is filled with a lighter teal color and a fine white dot pattern. Above it, a smaller, solid teal rounded rectangle is visible. To the right of the patterned shape, there is a small, solid red circle. Below the patterned shape, another large, rounded rectangular shape is filled with a solid teal color. The overall composition is modern and minimalist.