



Sustainability in Engineering

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The many facets of Sustainability



THE SHIFTS

Sustainability: The Word/The Concept



The dynamic state of planet Earth

anthropocene

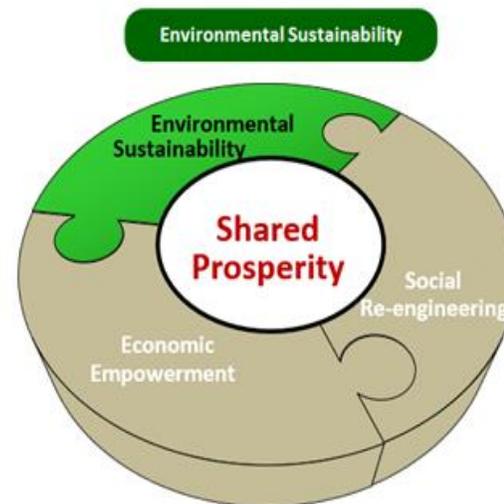
global risk maps

planetary safe limits

Planetary health

biogeochemical cycles

1. Climate change mitigation and adaptation
 2. Carbon Tax
 3. Sustainable Consumption & Production
 4. Disaster risk management
 5. Disaster risk insurance scheme
 6. Green technology
 7. Green economy indicators
 8. Biodiversity conservation
 9. Renewable energy
 10. Energy efficiency
 11. Integrated water resource management
 12. Marine litter
 13. Valuing ecosystem services
 14. Waste as commodity
- (list is not exhaustive)



Holocene	→	Anthropocene
Silo	→	Integrated
Linear	→	Circular
Few data	→	Big data
Slow	→	Disruptive
Manual	→	IoT/AR

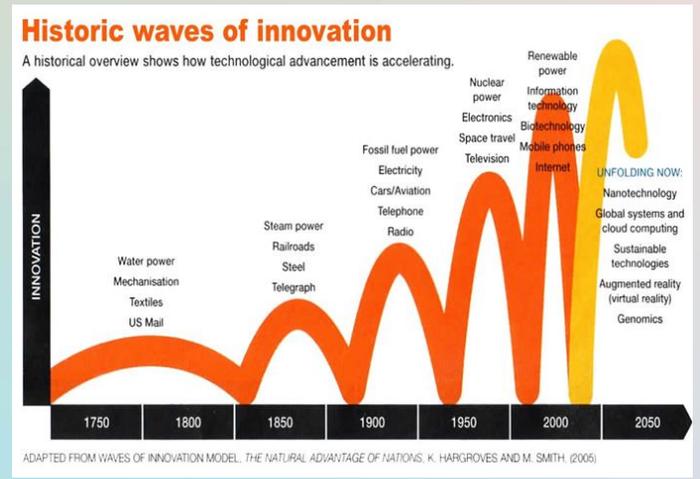
Sustainability & Engineering



Key UN SDGs for engineers

- Access to affordable, reliable sustainable and modern energy.
- Resilient infrastructure.
- Inclusive and sustainable industrialisation.
- Foster innovation.
- Inclusive, safe, resilient and sustainable cities.

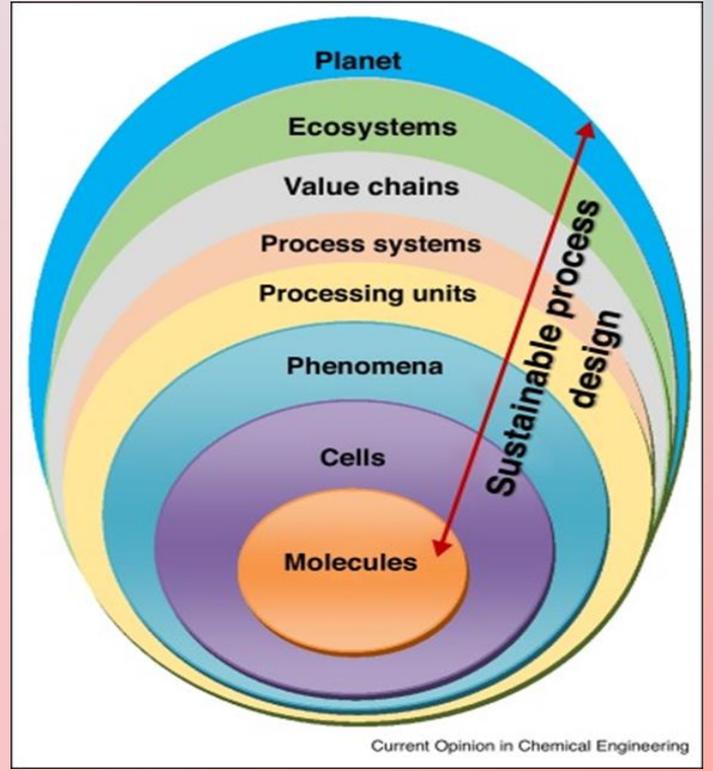
- Making the right materials and process choices for any engineering applications is challenging, particularly with the expanding range of possibilities offered by new manufacturing technologies and materials generated by research. Additionally, current and future engineers have to be aware and embed requirements to reduce supply chain risks, embrace product resilience and favour sustainable development practices



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Corporate Sustainability & Environmental Management

Corporate sustainability constitutes an organization's efficient use of its share of natural capital. Natural capital is perceived as the stock of natural ecosystems that yields a flow of valuable ecosystem goods or services into the future, providing the raw materials and clean up services that would otherwise require artificial stimulus from social and economic sources.



Sustainable engineering education



Specialists, who solve problems



Integrators, who operate and manage across boundaries and with different stakeholders



Change agents, who provide creativity, initiative, innovation and leadership



Ref: Goggins, J.; Hajdukiewicz, M. The Role of Community-Engaged Learning in Engineering Education for Sustainable Development. Sustainability **2022**, 14, 8208.

- The **Washington Accord** : 'comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the professional responsibility of an engineer to public safety; the impacts of engineering activity: economic, social, cultural, environmental and sustainability'.
- The **Sydney Accord** : 'comprehension of the role of technology in society and identified issues in applying engineering technology: ethics and impacts: economic, social, environmental and sustainability'.
- The **Dublin Accord** : 'knowledge of issues and approaches in engineering technician practice: ethics, financial, cultural, environmental and sustainability