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Design and Professional Practice 2

Sustainability

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Aims and Objectives

The aim of this session is:

- To introduce the principles of sustainability in engineering design.
- To demonstrate how engineering decisions impact the environment and society.
- To encourage critical thinking about sustainable design solutions.

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Principles of Sustainable Design

sustainability

/səˌsteɪnəˈbɪlɪti/

noun

the ability to be maintained at a certain rate or level.
"the sustainability of economic growth"

- avoidance of the depletion of natural resources in order to maintain an ecological balance.
  "the pursuit of global environmental sustainability"

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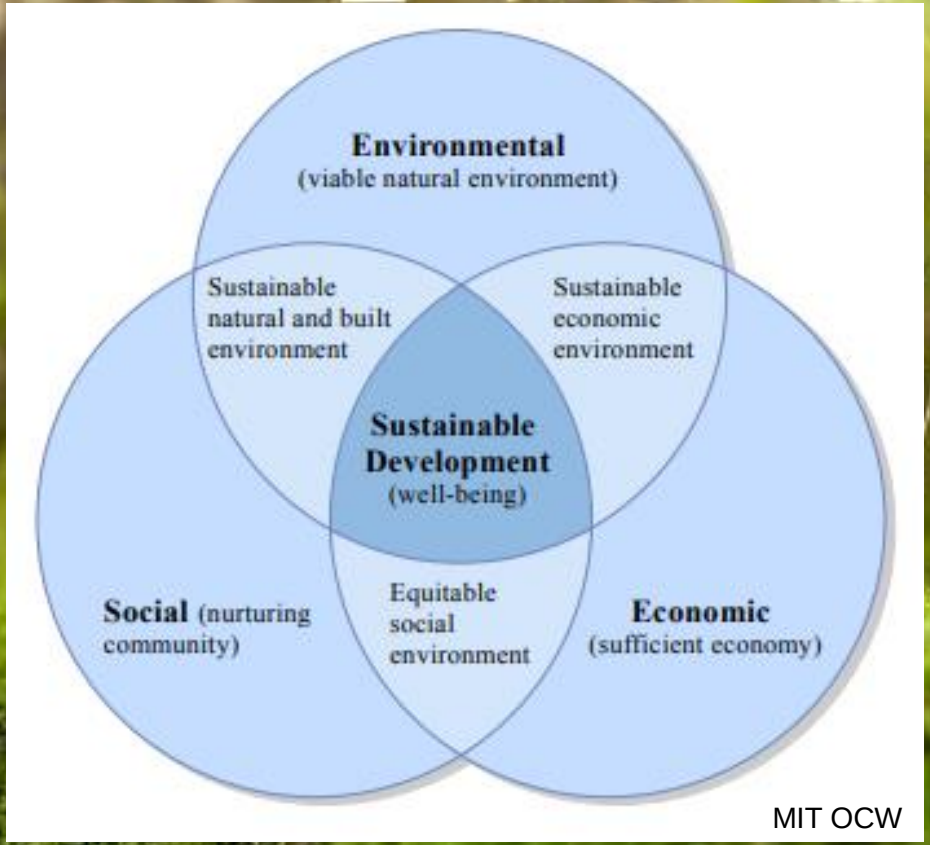
Principles of Sustainable Design



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Triple Bottom Line (three-Ps)

- Profit
- People
- Planet

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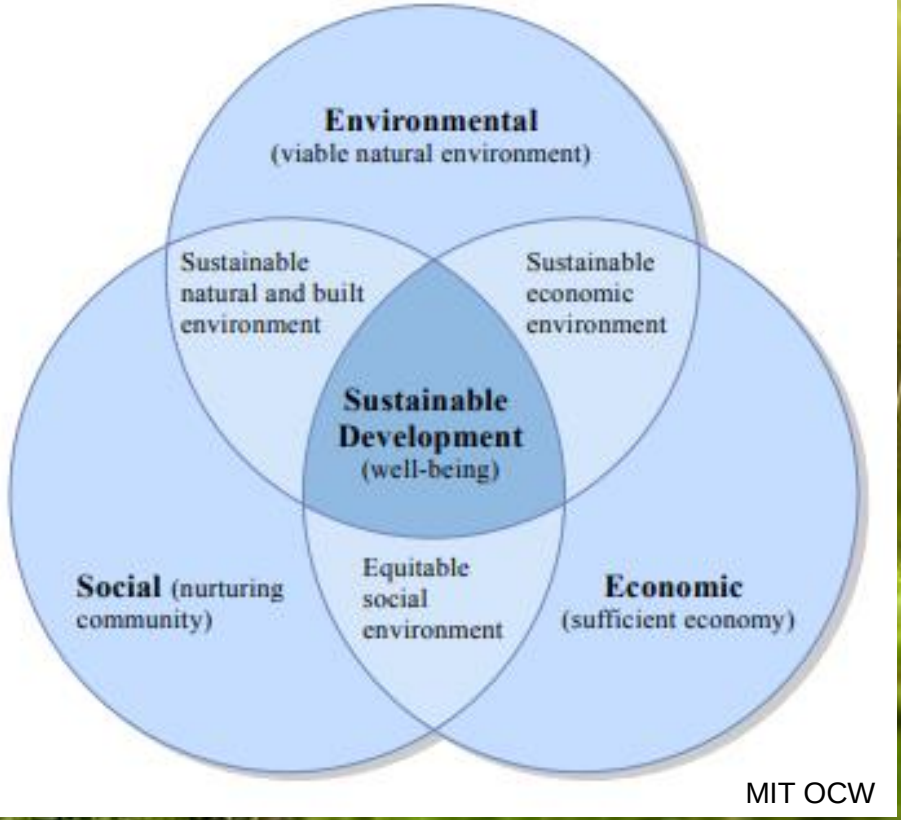
Principles of Sustainable Design



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Economic Sustainability

- Cost-Effectiveness
- Lifecycle Cost Analysis
- Return on Investment (ROI)
- Long-Term Planning

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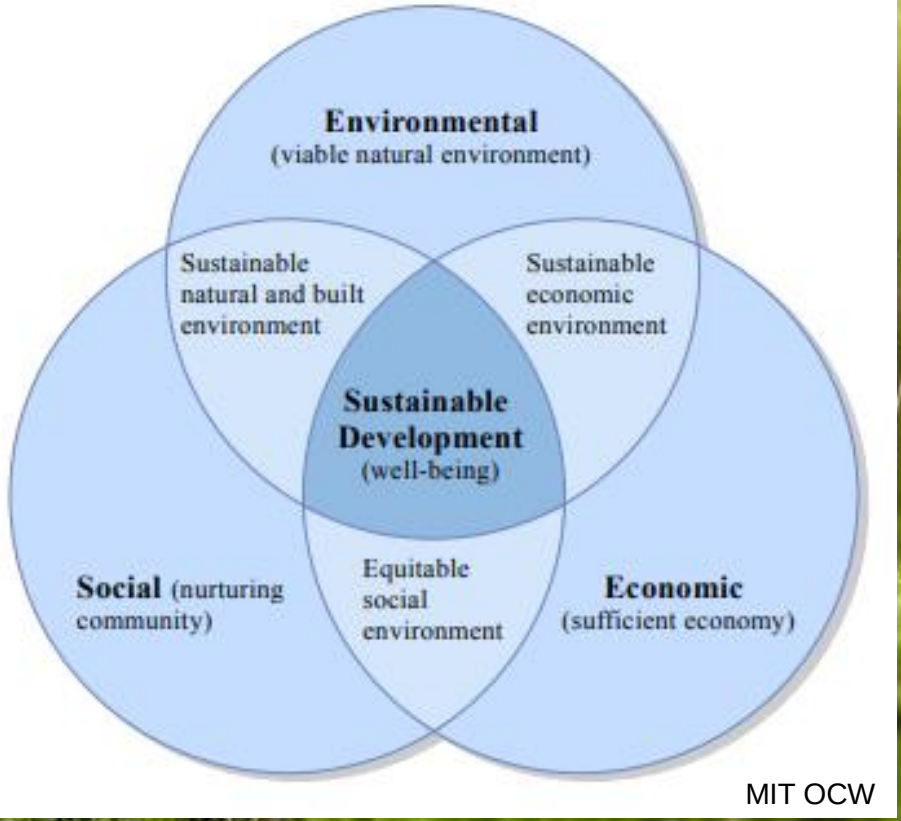

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Social Sustainability

- Community Engagement
- Equity and Accessibility
- Health and Safety
- Cultural Sensitivity
- Quality of Life

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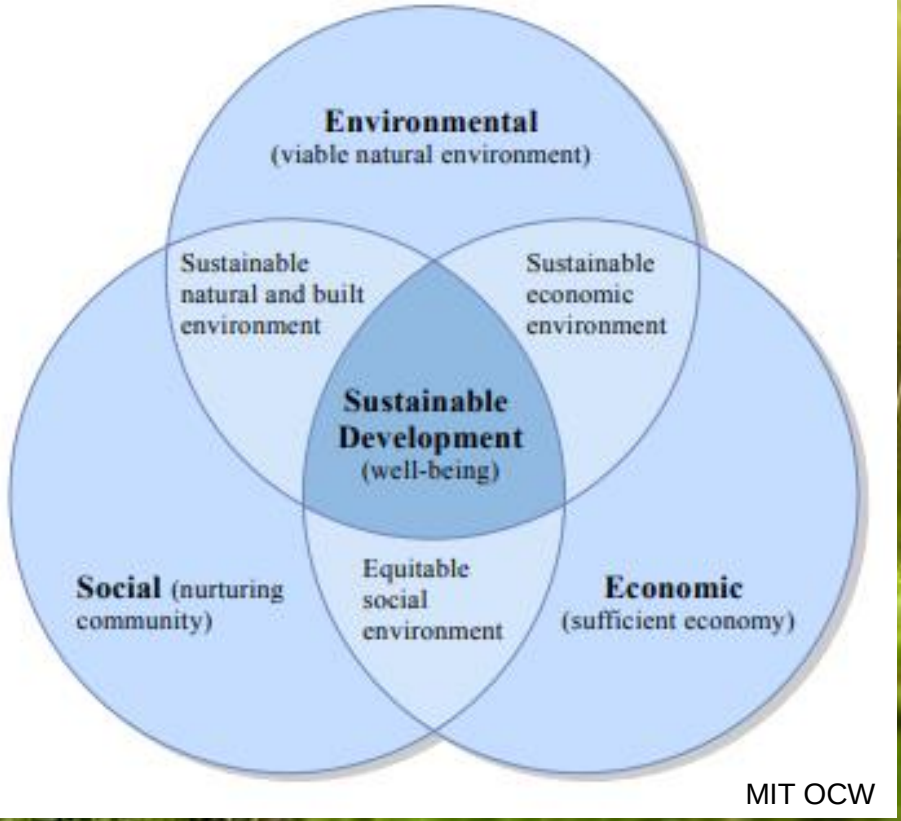
Principles of Sustainable Design



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Environmental Sustainability

- Minimize Resource Depletion
- Reduce Emissions and Pollution
- Promote Renewable Energy
- Protect Ecosystems
- Sustainable Materials

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Life Cycle Assessment

- Tool for evaluating environmental impact of a manufactured product.
- Examination of supply chain processes.
- Four phases of assessment.

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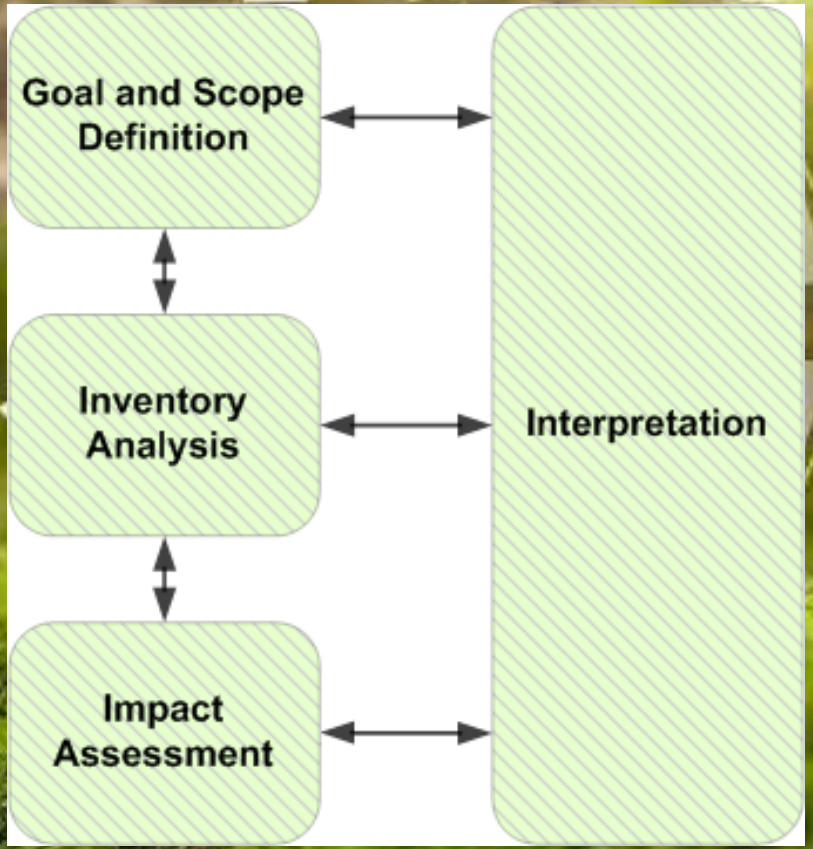
Life Cycle Assessment



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ISO 14040

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Sustainable Materials and Technology

- Natural
- Renewables
- Non-toxic
- Sustainable energy sources
- Clean technology

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Barriers to Sustainable Design

- Costs
- Awareness / Resistance
- Availability of resources
- Regulatory issues
- Lack of appropriate standards and infrastructure

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Case Study: Motivation Wheelchairs

- Readily available materials
- Simple manufacturing methods
- Local expertise and supply chain

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In Summary

- Engineers consider sustainability in the design process
- Balance the Triple Bottom Line (Profits, planet and people)
- Analyse the full product lifecycle
- Utilise appropriate sustainable materials and technology