

Sustainability and sustainable development

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Overview

Overview of Module

- Sustainability Concepts
- Sustainability Definitions and Interpretations
- Quantifying sustainability: Temporal and Spatial
- Acceptance of and Desire for Sustainability
- Development Paths and Sustainability
- Sustainable Development

Sustainability Concepts

How do you define sustainability?

Evolution of Concepts

Sustain (verb)

ca. 1250, Middle English

Sustainable (adjective)

~ 1987 (Brundtland report)

Sustainability (noun)

~ 1990 (various instances)

Can we live in a sustainable manner?



What Do We Want to Sustain?

What Do We Want to Sustain?

- Maintaining existence of human species?
- Maintaining capacity for sustainable development?
- Maintaining diversity of life?
- Maintaining aesthetic richness of planet?
- Others?

Sustainability Definitions and Interpretations

“Definitions” of Sustainability

Sustainability is a problem statement that integrates the environment and the economy in a way that both sides can live with it.

A.F. Appleton, *Technol. in Society*, 28, 3-18, 2006

Sustainability is the possibility that human and other forms of life will flourish on the planet forever.

J.R. Ehrenfeld, *Sustainability by Design*,
New Haven, CT: Yale University Press, 2008

An Interpretation



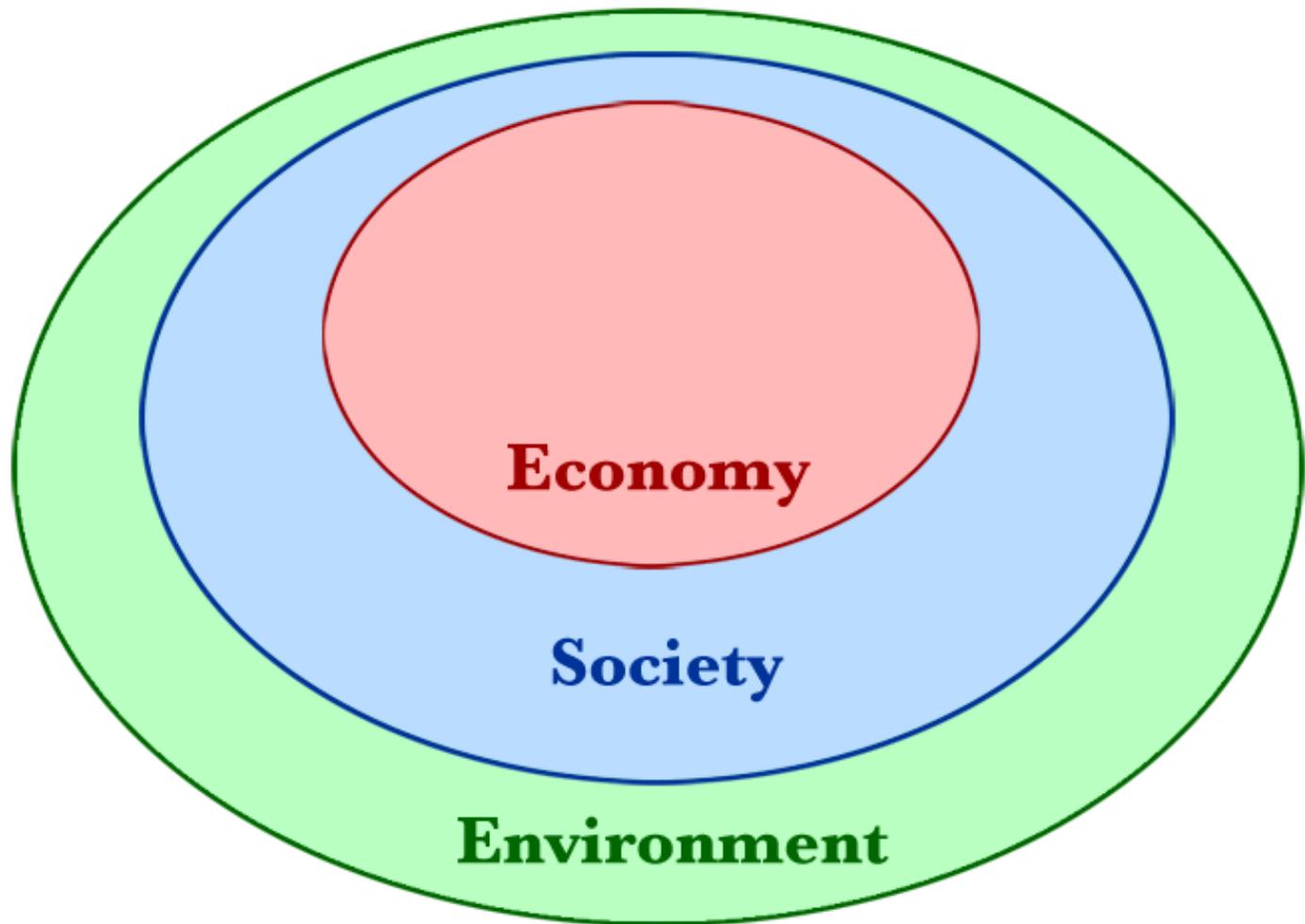
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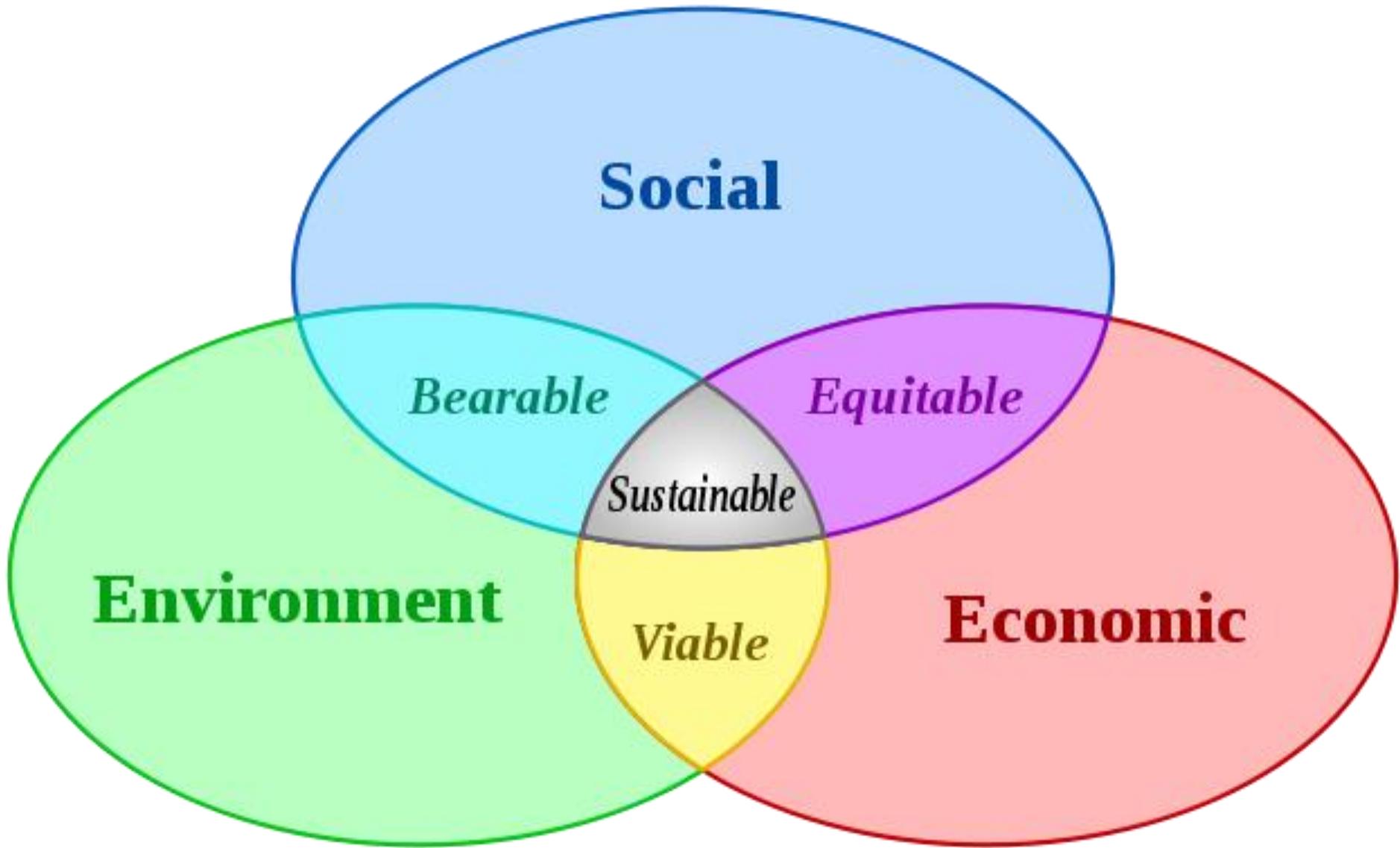






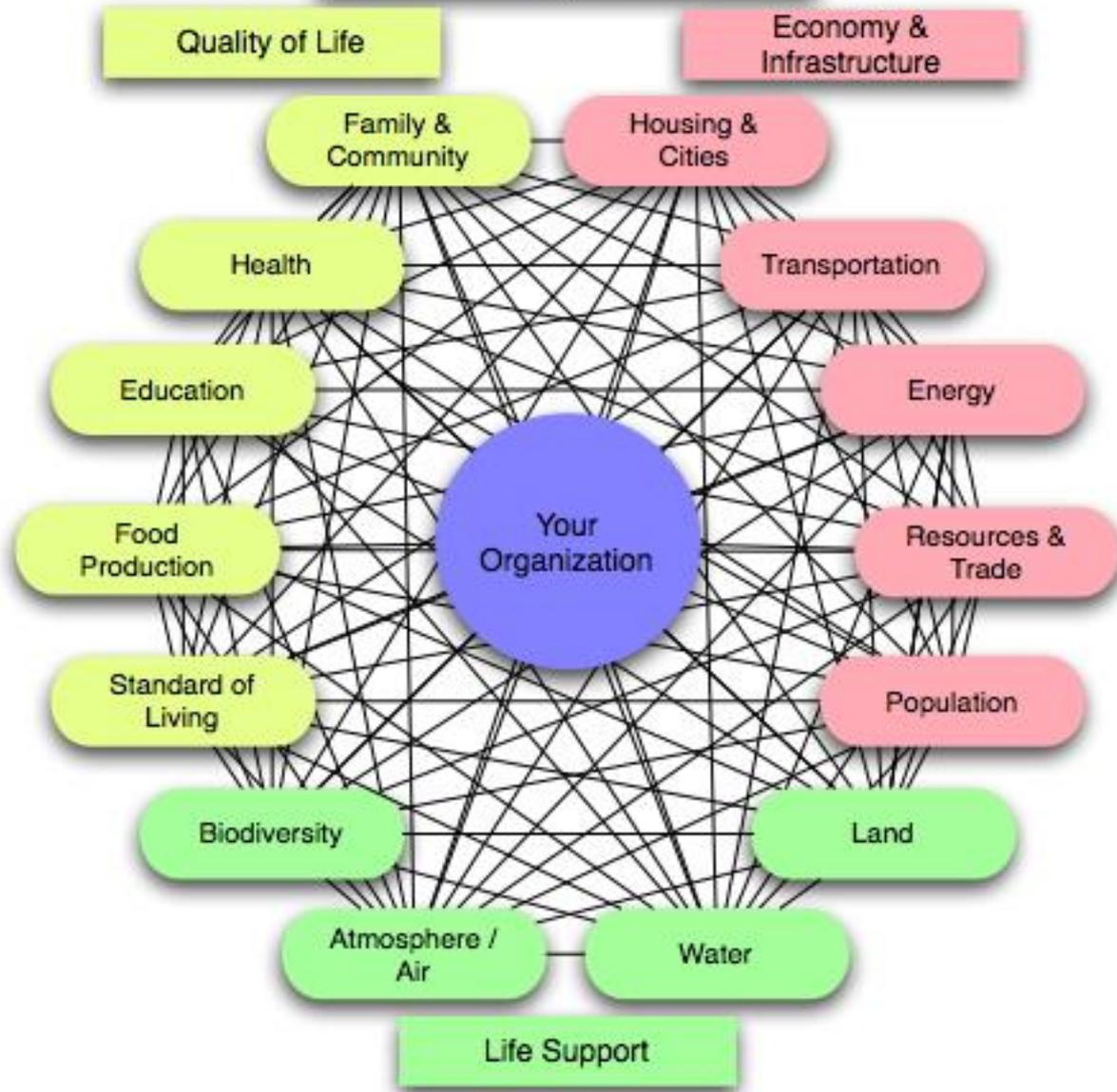
Other Interpretations





What

Sustainability Value Web



Multidisciplinary



sustainability

- International and cross-disciplinary, scholarly, Open Access journal of environmental, technical cultural, economic and social sustainability of human beings

Quantifying Sustainability: Temporal and Spatial

What is Ideal Spatial Scale for
Considering Sustainability?

Possible Spatial Scales for Sustainability

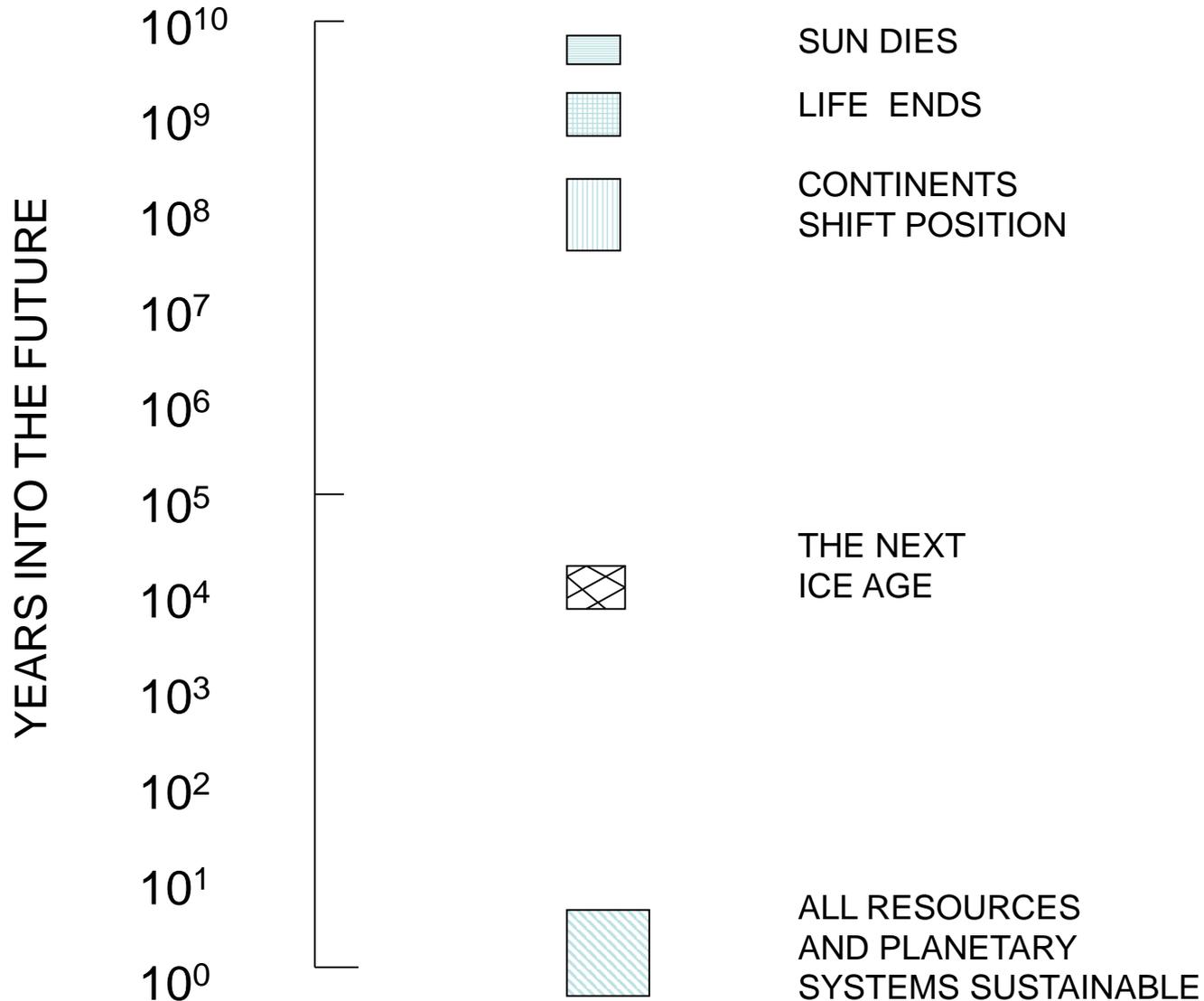
Material resources



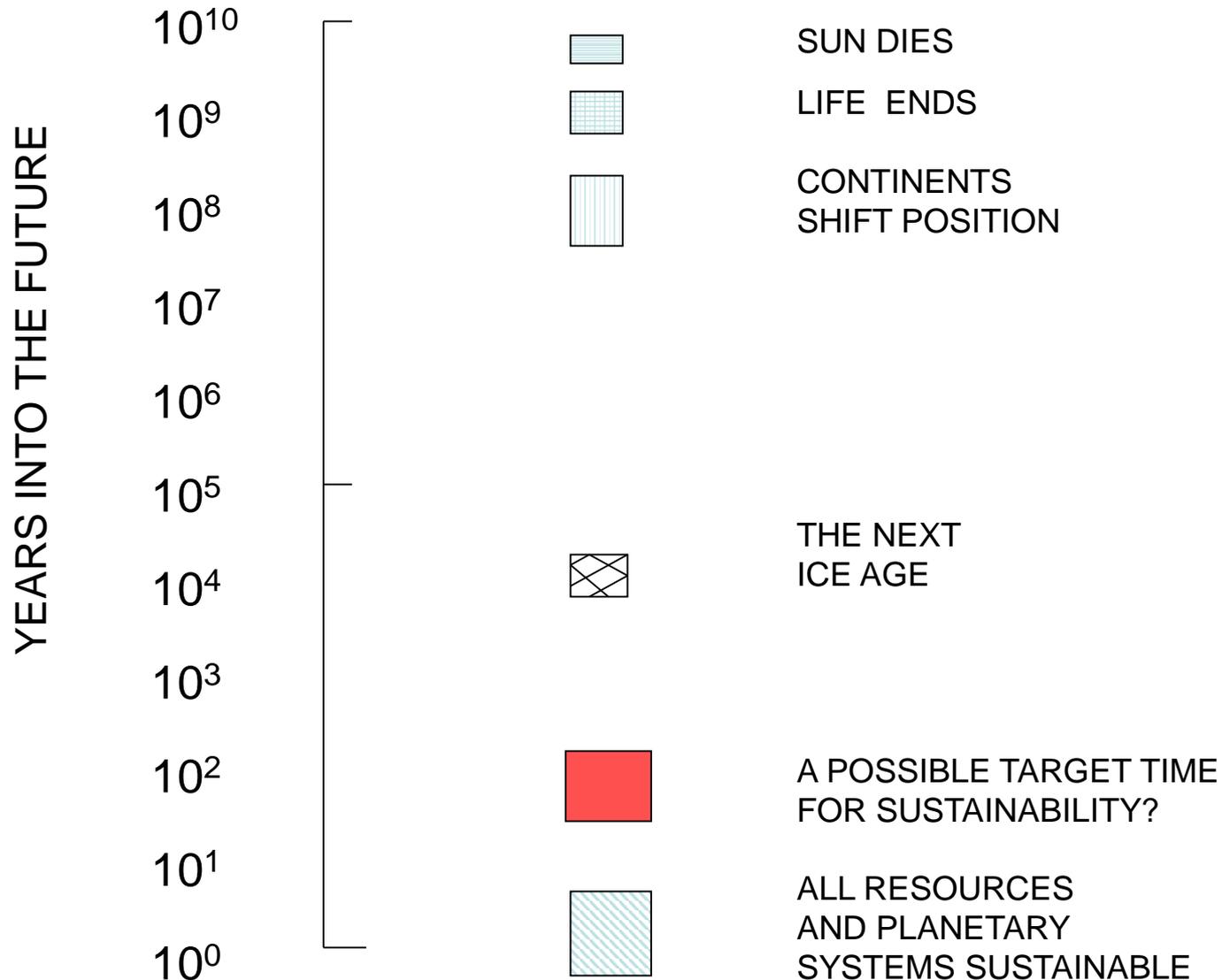
Energy resources

- Planet plus nearby solar system (sun, moon)

Time Scales for Earth



Possible Sustainability Time Scales



Example: Zinc Sustainability

- Total amount of zinc (reserve base) on Earth: 330 Tg (330×10^{12} g)
- Time over which zinc is to be sustained: 50 yrs
- Allowable rate of use: $330/50 = 6.6$ Tg/yr
- Questions:
 - How does this change with time?
 - How is this to be broken down by person/country/activity
 - How reasonable is this approach to quantifying sustainability?

Acceptance of and Desire for Sustainability

Future Importance

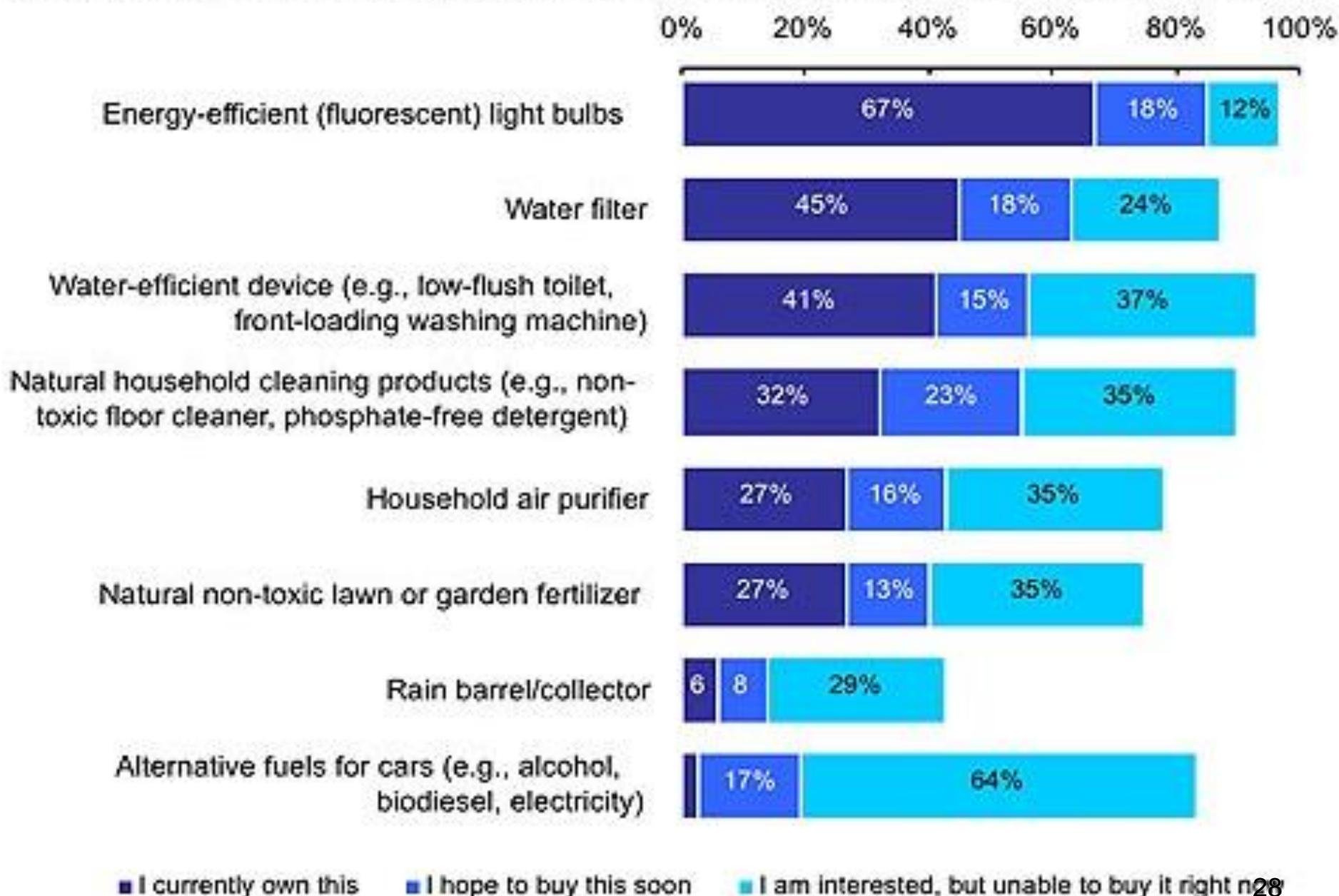


A VISION FOR THE ENGINEERING PROFESSION

REPORT OF THE VISION TASK FORCE

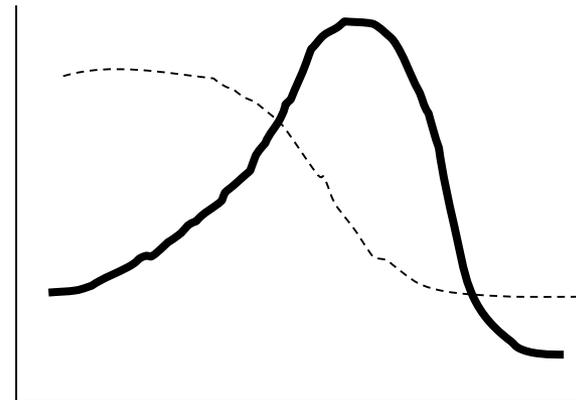
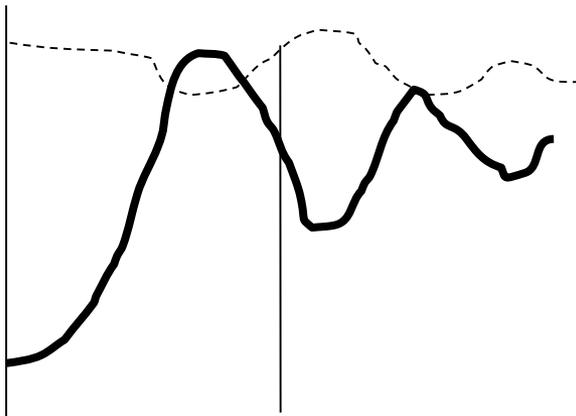
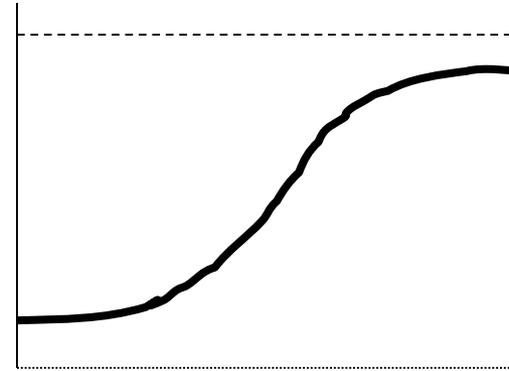
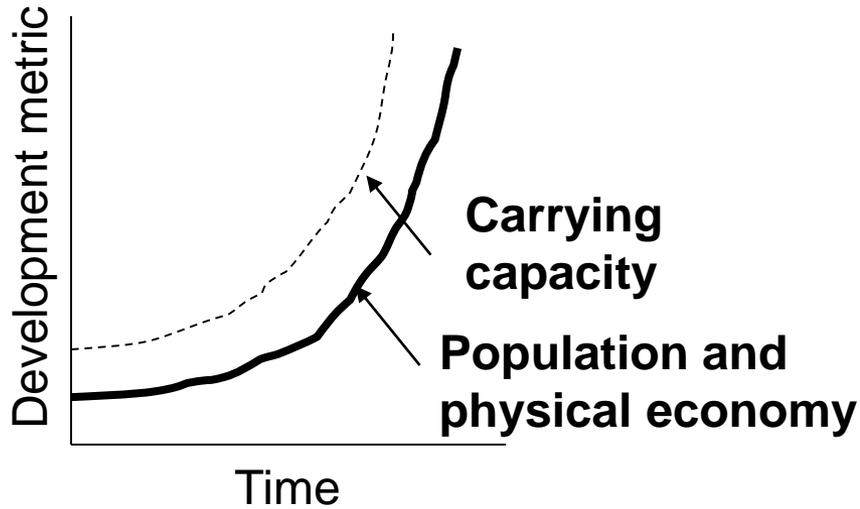
- Factors and trends for profession
 - Environment and sustainability
- Key vision areas
 - Engineering valued and known for ... helping Canada achieve sustainable prosperity here and abroad

Sustainability Products Consumers Currently Own or Might Purchase in the Future



Development Paths and Sustainability

Development Paths & Sustainability: *Which Path are We On?*



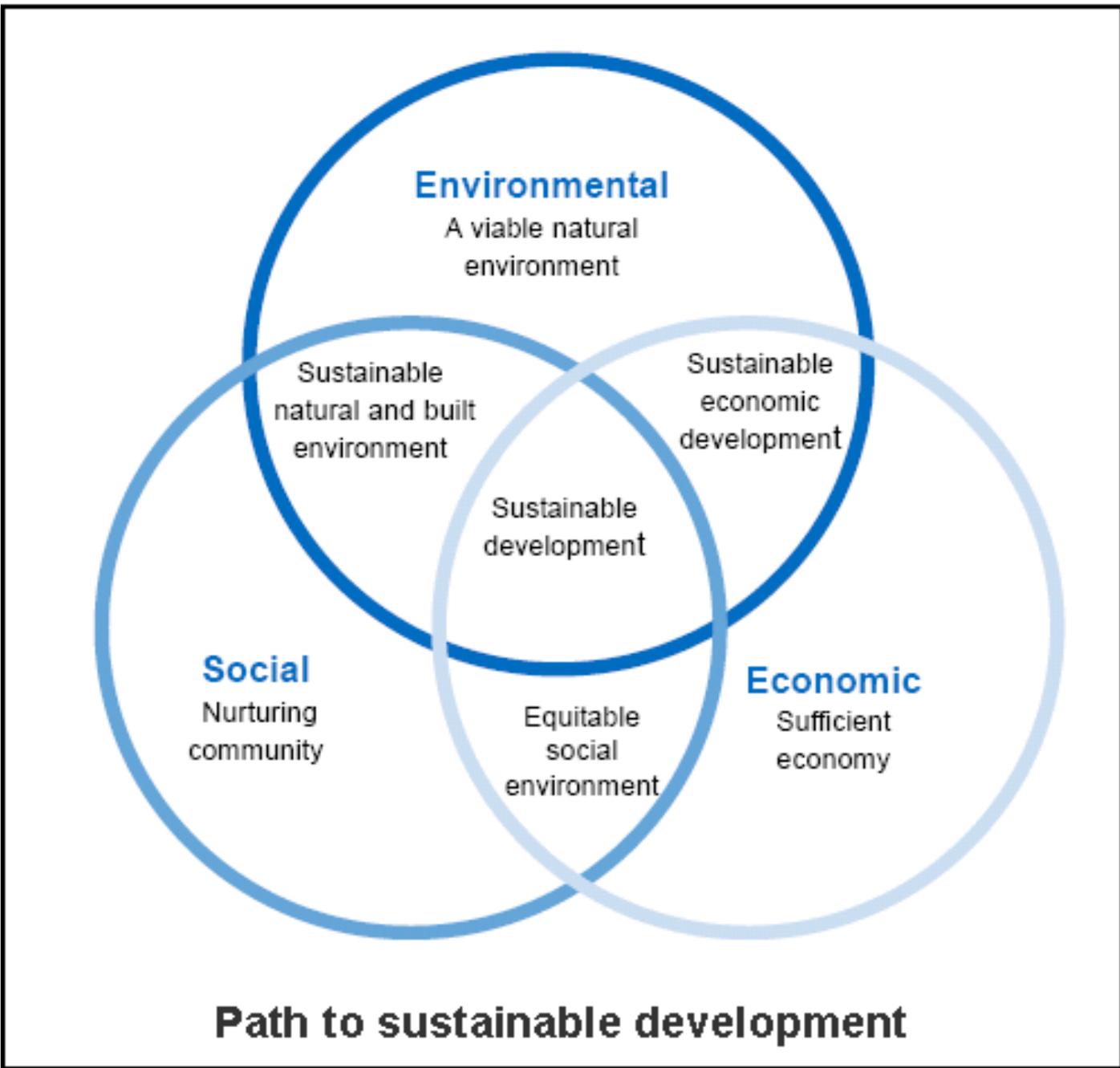
Sustainable Development

Definitions of Sustainable Development

- Sustainable development
 - “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”

Brundtland Commission report (*Our Common Future*), 1987
(World Commission on Environment and Development)

- Contains two key concepts:
 - Needs, especially essential needs of world's poor
 - Limitations imposed by state of technology and social organization on environment's ability to meet present and future needs



UN Sustainable Development Goals (2015-30)

- As part of the post-2015 development agenda, the international community is working intensely on the UN Sustainable Development Goals
- Exceed UN Millennium Development Goals (2000-15):
 - overall focus shifting away from ameliorating situation of poor and underdeveloped regions and societies toward improving sustainability of global economic and social development while concurrently protecting the environment
 - formulation and focus of goals are more encompassing, requiring active participation from wealthy and poor nations alike
- Adopted at 70th Session of the UN General Assembly in the second half of September 2015
- Details at: <https://sustainabledevelopment.un.org/sdgsproposal.html>

UN Sustainable Development Goals (2015-30)

