

Developing Innovation and Creativity for Business Advantage

**Week – 8:
Innovation & Sustainable Development**

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Recap

- Week 1 – Introduction to innovation
- Week 2 – Concepts & techniques of innovation & creativity
- Week 3 – Innovative eBusiness / eCommerce
- Week 4 – Developing Innovation and Creativity for Business Advantage
- Week 5 – Creativity, Innovation, and Entrepreneurship
- Week 6 – Innovation, Invention
- Week 7 – Innovation, SME Intellectual Property

This week – we will look “Innovation & Sustainable Development”

Sustainable Innovation

Definition: Innovations for sustainable development

Solution for unsustainable action = Sustainable innovation

- Technology, service, logistics, social aspects
- Innovation throughout the supply chain
- Cradle-to-cradle approach
- Innovation is not always something new, sometimes just forgotten (education system; Skysail)
- State programme/business support agencies/consultancies on national and transnational level
- Standard verification of sustainability of products and appropriate marketing

What kind of innovation?

- Not only results of R&D...
- But also implementation of new or greatly improved **product** (good or service), or **process**, new **marketing method**, or new **organisational method** in business practices, workplace organisation or external relations.

Why sustainable innovations is important?

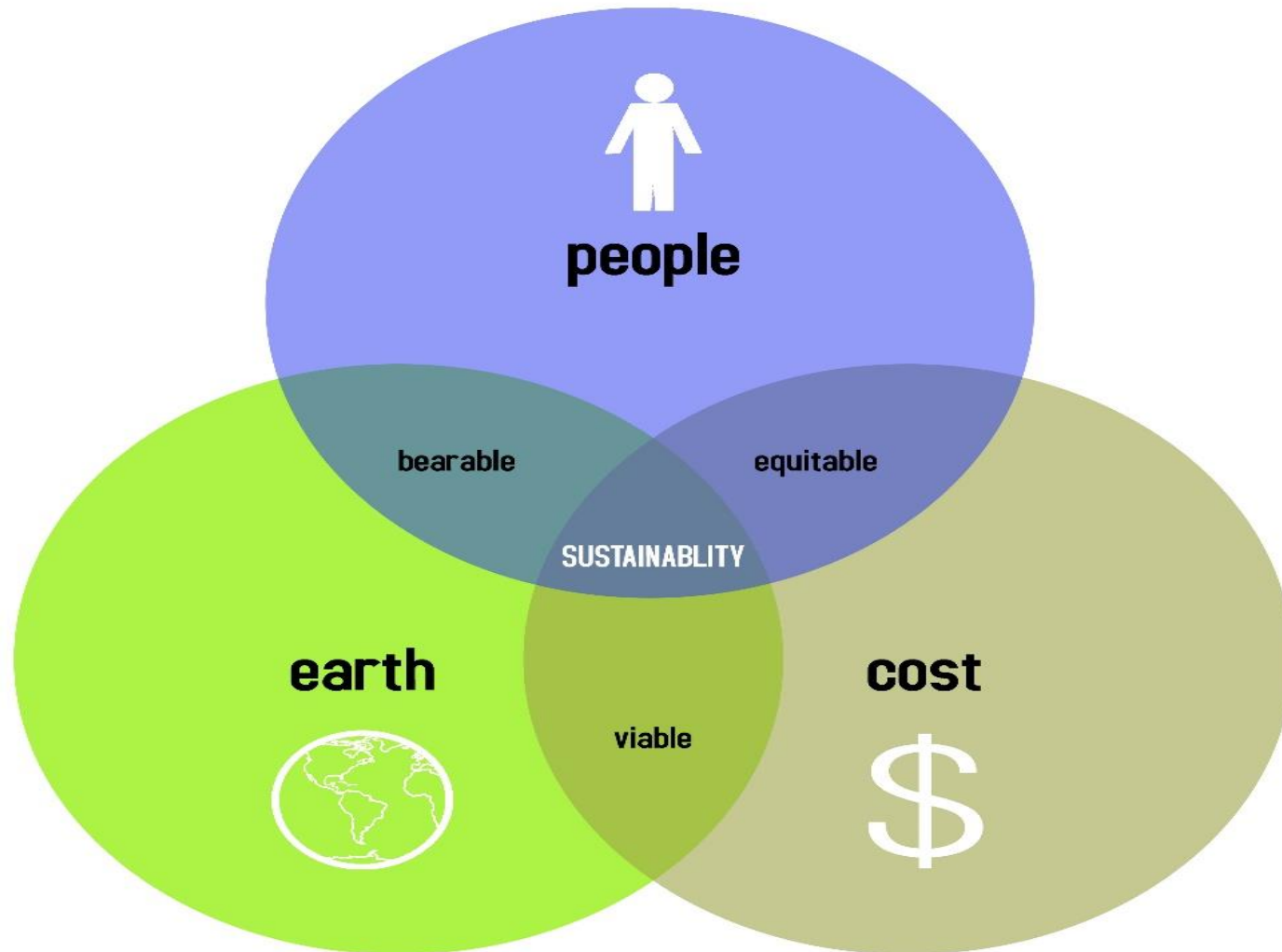
- Need for higher quality of life
- Need for more resources
- Environmental constraints/challenges

- **$1+1=2$**
- **$1+1(\text{with innovation})=3$**

- Eco-Innovation and green technologies play an essential role for:
greener economic and social development,
economic growth, improved productivity and
competitiveness, and improved quality of life.

SUSTAINABLE INNOVATION

How can it be commercially viable?



Innovation in contemporary org.

- Innovations are created to maximize profits
 - Do not take sustainability into account
 - Many products do not become more sustainable for decades (computers/mobile phones)
- What is already there/did not come to market?
- Taxation of unsustainable activities
 - Trigger for sustainable innovations/development
 - No more subsidies for unsustainable products/services (aviation)
 - Nuclear power in Germany (nuclear fuel tax)
- Innovation is “**business as usual**”: big obstacle
 - Include the staff/citizens at early stage (participation)

Behaviour/consumption side

- Bring in sustainability aspects in business development centres
- Collaboration of local SMEs for sustainable projects
- Establish sustainability early in life (elementary school)
- Take into account coolness factor“
- Positive role models for the public (acceptance of SI)

Initiative on S&T for Sustainability

- Who?

- independent scientists, development workers from around world
- gathered within the context of the World Summit on SD to ask...

- Why?

- “How can the contribution of S&T to sustainability be improved?”

- What?

- Conduct dialogues among the science, policy and development communities: Abuja, Chiang Mai, Santiago, Trieste, Ottawa, Bonn, Mexico City and at **<http://sustainabilityscience.org>**

- Conclude...

- Many kind words for S&T... But realization that contributions remain **far** below what's possible and needed.
- If science is so useful, why don't we invest in more of it?

Sustainability in Context...

“Freedom from want, freedom from fear, and the freedom of future generations to sustain their lives on this planet” are the 3 grand global challenges for the 21st Century

- The late UN Secretary General **Kofi Annan**, in his Millennium Report to the General Assembly

Innovation towards sustainability.....

- To feed, nurture, house, educate and employ the world's slowing but still growing human population, *while*
- Conserving earth's basic life support systems and biodiversity *and*
- Reducing hunger and poverty.
- Specific challenges in the “WEHAB” areas
 - Water, Energy, Health, Agriculture, Biodiversity

The role of Innovation in Science & Technology

- Growing recognition that development "is built not merely through the accumulation of physical capital and human skill, but on a foundation of information, learning and adaptation..." (World Bank, 1999)...
- Historically high rates of return on investment in S&T
 - "the dominant engine of economic growth" (Solow)
 - eg. marginal rates in agriculture >40%
- But relevant knowledge remains underproduced, underutilized, unevenly distributed (UNDP)
 - Private investments lag because of large public spillovers, property rights issues...
 - Public investments static or falling due to perceived irrelevance, inefficiency of results.

Strategic approach needed to better mobilize S&T for sustainability

- Solution-driven priorities
 - not driven by priorities of the S&T community
 - not confined to merely illuminating social problems
- “Co-production” of usable knowledge
 - through collaboration of users and producers “in place”
 - drawing on global research and innovation *systems*
- Incentive structures designed to
 - engage the private sector in harnessing S&T for the provision of public goods
 - honor scientists and engineers who focus their work on urgently needed solutions for a sustainability transition.

Priorities: Harnessing innovative S&T to action

- Accelerate trends in fertility reduction
- Reverse declining trends in agricultural production in Africa, sustain trends elsewhere
- Double historical rates of improvement in use efficiency of energy and materials;
- Design systems to accommodate 2-3x growth of today's urban population sustainably
- Major initiative to restore degraded ecosystems, while conserving biodiversity elsewhere
- Fundamental research and observations programs on interactions of society/environment

How to do it?

An International Research System for Sustainable Development

- *Target* S&T on “most pressing problems” prioritized by development stakeholders
- *Integrate* appropriate mixes of disciplines, expertise and public/private sector in support of such problem-driven R&D
- *Link* expertise and application across scales, from local to global

An International Research System for Sustainable Development

- Successful precedents:
 - *Development*: Int. agricultural research
 - *Envir*: ENSO research/applications progs
 - *Health*: WHO malaria campaigns
 - *Commons*: Stratospheric ozone protection
- Challenge for the 21st Century
 - An international R&D system for sustainability to match existing systems that have been built to help meet the other “grand challenges” of “freedom from want and freedom from fear”

Innovation Policy for Green Technologies

Introduction

Why policy for Green technologies?

1. Increasing greenhouse gases – accelerated climate change with adverse effects
2. No country is an exception
3. Sustainable development = sustainable consumption + high-level of human development
4. Transition from the industrial growth model to a green growth model is necessary
5. Green technologies/eco-innovations play important role

Special features related to eco-innovation policy

- Need for policy integration between environmental and innovation policies
- Market oriented schemes
- Regulations
- Direct support for eco-innovation
- Capacity building
- Public procurement
- Strategic planning

Sustainable Development Goals: A Universal Agenda

Goal 1	End poverty in all its forms everywhere
Goal 2	End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Goal 3	Ensure healthy lives and promote well-being for all at all ages
Goal 4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Goal 5	Achieve gender equality and empower all women and girls
Goal 6	Ensure availability and sustainable management of water and sanitation for all
Goal 7	Ensure access to affordable, reliable, sustainable and modern energy for all
Goal 8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Goal 9	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
Goal 10	Reduce inequality within and among countries
Goal 11	Make cities and human settlements inclusive, safe, resilient and sustainable
Goal 12	Ensure sustainable consumption and production patterns
Goal 13	Take urgent action to combat climate change and its impacts*
Goal 14	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Goal 15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Goal 16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Goal 17	Strengthen the means of implementation and revitalize the global partnership for sustainable development

Key Messages (1)

Science, technology and innovation (STI) policy is fundamental to implement the new UN “2030 Agenda” for sustainable development (SD)

It enables economic and environmental efficiency, fosters new and sustainable ways to satisfy human needs and empowers people to take their own future in hand.

The post 2015 sustainable development agenda calls on all countries to enhance research, upgrade technological capabilities, encourage innovation, grow the number of R&D workers per 1 million people and increase public and private R&D investment.

Key Messages (2)

STI for SD policies (STI4SD) are a vital asset for the EU to continue to be the global frontrunner of SD

STI policies should be enhanced and aligned with the universal 17 Sustainable Development Goals (SDGs). The EU should use STI results and products to inform and target its implementation of the SDGs.

Orienting public and private investments in the real economy to the SDGs will help create markets for new solutions that respond to the challenge of sustainability

SDG-aligned R&I investments will accelerate economic transformation, promote technology uptake and adaptation and strengthen governance capacities. STI policies can turn SD into a huge business opportunity for European companies and know-how.

Key Messages (3)

Achieving the SDGs is not just a political commitment or a moral imperative. It is an opportunity for promoting jobs and growth, and achieving prosperity

Three key avenues should be pursued for making the SDGs the organising framework for STI policies:

- *Switch the focus*, reorienting mindsets and behaviours towards SD, reframing the EU's STI challenges, and refocusing from technology transfer to building innovation capacity.
- *Strengthen international partnerships*, enhancing engagement with developing countries through existing EU instruments, engaging all stakeholders (especially business), and developing tailor-made international STI initiatives.
- *“Walk the talk” and establish enabling systems* identifying causes of implementation gaps, aligning domestic STI with SDGs, ensuring Policy Coherence for Sustainable Development, seizing benefits from the “data revolution”, and setting up monitoring, evaluation and assessments of STI4SD.

Historical evolution of sustainability: Concepts and Theories Outline

- Stockholm Conference on Human Environment (1970)
- World Conservation Strategy (1980)
- Natural Step (1980s)
- World Commission on Environment and Development's 'Our Common Future' (1987)
- UN (Rio) Conference on Environment and Development (UNCED) (1992)
- UN Session on Agenda 21 (1997)
- UN Johannesburg Conference (2002)
- Early focus on environmental issues; now expanding to social and economic concerns.

Sustainability initiatives

- U.N.
- MDG
- U.S. Government (DOD, EPA, DOE)
- States (Oregon Sustainability Directives)
- Cities (Portland Office of SD)
- Local communities (watershed groups)
- Non-profit organizations (Natural Step)
- Business groups (trade associations)

Sustainable development: principles & thoughts

- Brundtland Commission – Sustainable development meets the needs of the present without compromising the ability of future generations to meet their needs.
- Reconciliation of society's development goals with its environmental limits over the long term (*Our Common Journey*, National Research Council)
- Simultaneous achievement of economic prosperity, a healthy environment, and social equity for current and future generations.

What is different?

- Timeframe – inter-generational focus challenges short term planning and “discounting” future values.
- Asks us to think about connection between economic, social, and environmental issues
- Why is this difficult???
 - Think about how we are organized
 - Think about how we are educated!

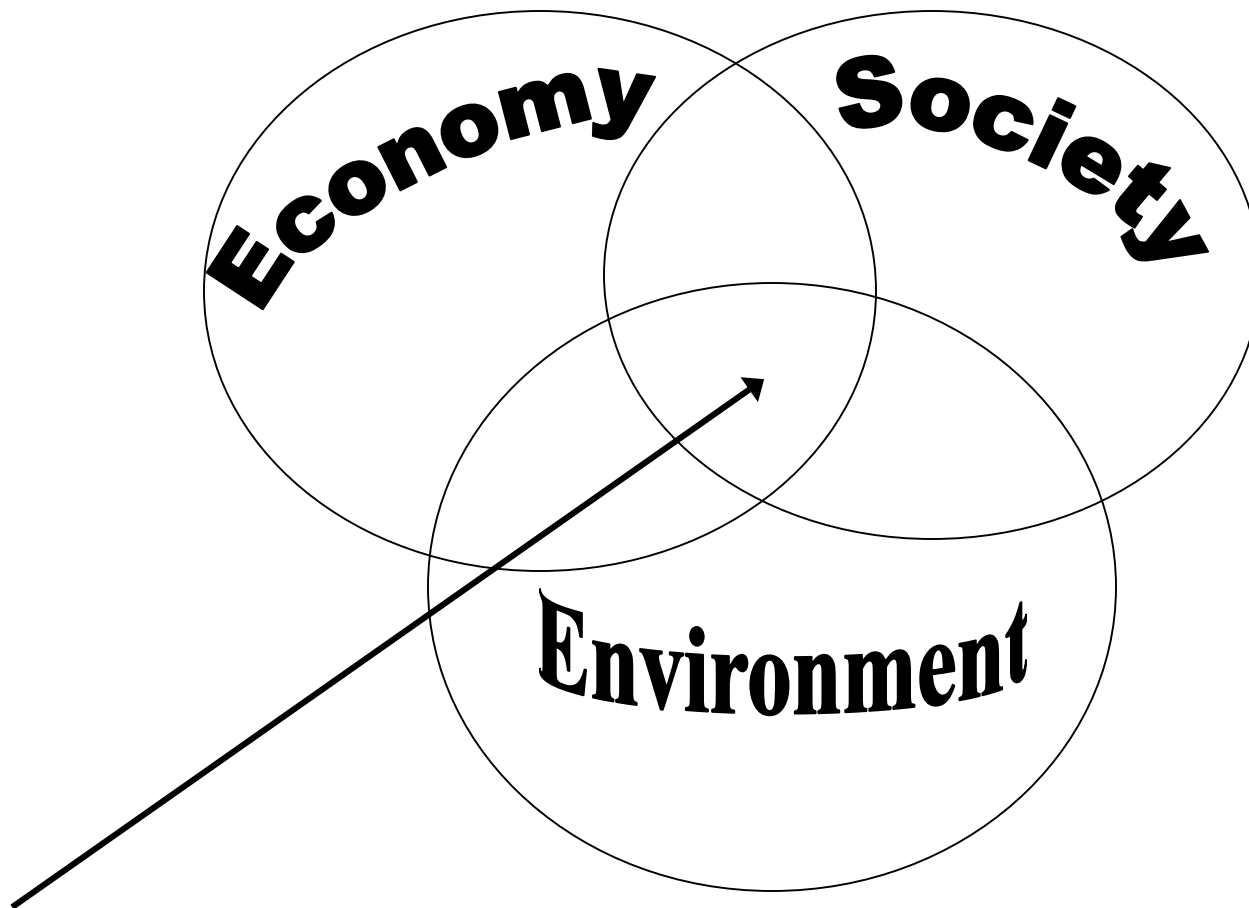
Institutional structures

- Government - Agency focus
 - Policies - Air, water, health, food, etc - all addressed separately
 - Universities, schools - Disciplinary focus
 - Businesses – Budgets often fragmented – capital vs. operating
- > Institutional and organizational issues pose major challenges

Three components of sustainability

1. **Environment** – maintaining the earth's life support system (e.g., ecosystem services such as pollution filtering).
2. **Social** – maintaining community (civic) capacity that fosters effective participation and 'equitable' treatment of all stakeholders.
3. **Economic** – maintaining an economic system that provides a non-declining standard of living for this and future generations.

Integration as Key Sustainability Principle

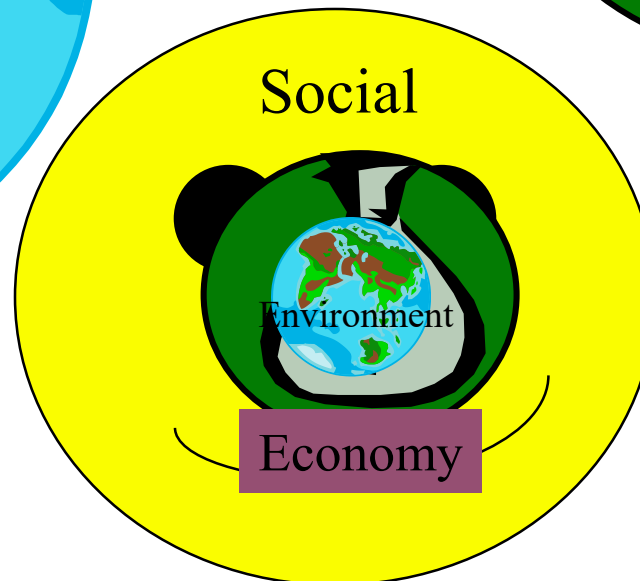


Business Worldview

Environmentalist View



Humanist View



Evolving sustainability theories

- **Early community development model** – study environment, society and economy as separate disciplines (circles of influence)
- **Popular sustainability theory** – emphasize links between environment, society and economy
- **‘Ideal’ scientific model** – three circles: largest is ‘environment’, second ‘social’ circle lies within largest, and ‘economy’ lies within social; use systems approach to incorporate linkages (dependencies) and feedback effects between all three spheres

Key concepts

- **Ecosystem stability and resilience** – magnitude of disturbance that can be absorbed before the system changes structure.
- **Systems theory** -- suggests that ecological, social, and economic systems are a group of interrelated, interacting or interdependent constituents forming a complex whole.
- **Scale and place matter.** Why?

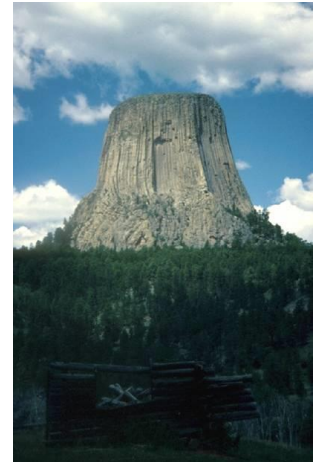
Natural Systems are diverse & complex...



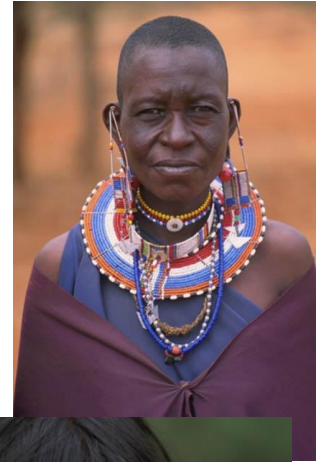
...evolving and adaptive....



The integrity of these systems is key to their resilience



Social systems are also diverse....



...complex...



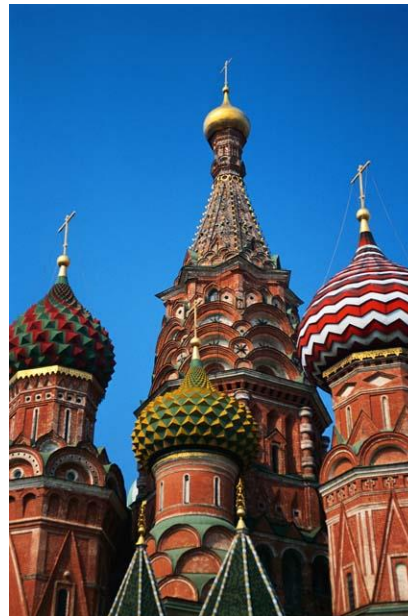
...and maintaining their integrity and diversity is key.....



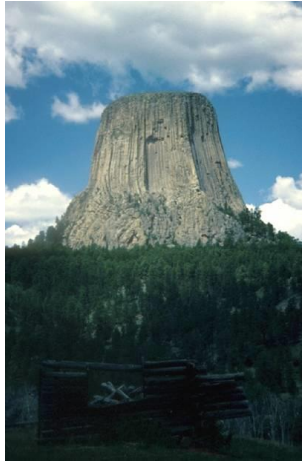
...to allow them to evolve & adapt.....



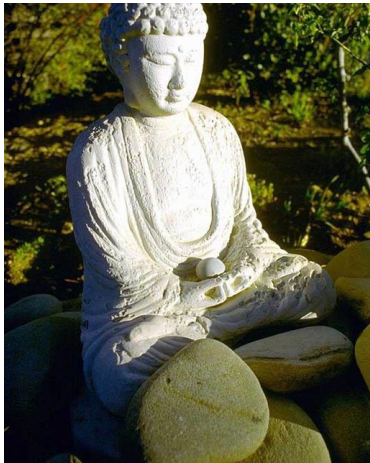
...to the changing world we live in



Different systems have different requirements...



One size does not fit all....



Key concepts cont'd.

- **Capital** – natural, manmade, financial, human, and social assets that deliver services into the future.
- **Equity** – intra-generational, i.e., current groups, and inter-generational, i.e., over generations
- **Economic viability** – maintaining firm profitability and government solvency.

Guiding principles

1. Maintain sufficient stocks of capital (natural, manmade, human and social) through use and investment such that future generations can achieve at least the same quality of life as current generations.
2. Assure equitable distributions of capital forms across contemporary groups and countries and across generations.

Key questions

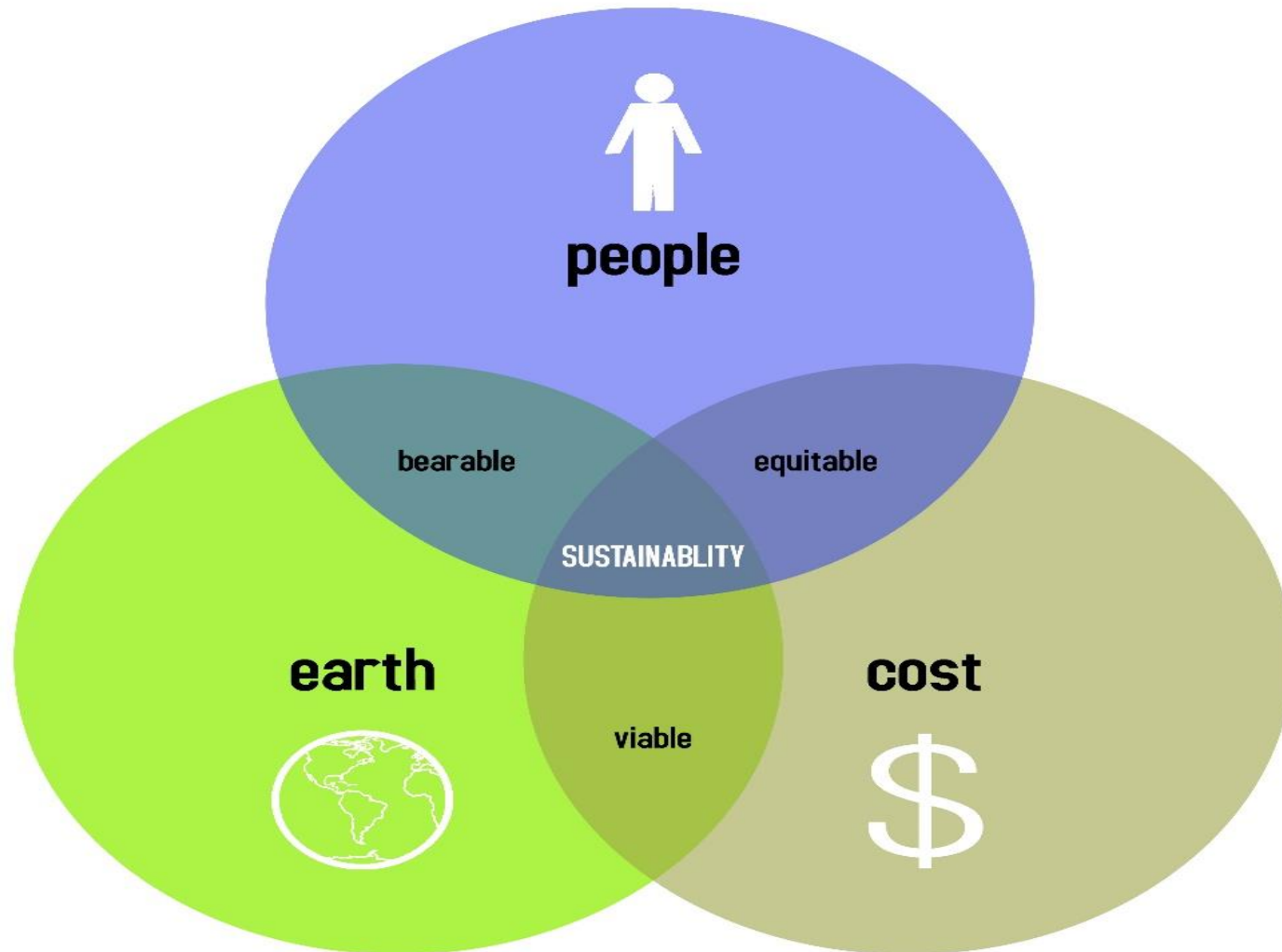
1. To what degree can manmade and human capital substitute for forms of natural capital? (strong vs. weak sustainability)
2. Will we encounter irreversible thresholds for certain 'critical' natural capital?
3. How do we engage relevant groups to identify the values that define sustainability goals and equity?
4. How can nonmarket environmental and human services be counted in market-based economy?
5. Do we have adequate science and data to assess progress?

Roles in Pursuing Sustainability

1. What roles can/should the business sector play in moving toward sustainability?
2. What changes in government programs & policy are necessary to pursue sustainability goals?
3. What roles can/should non-profit organizations play?
4. What roles can/should universities play in fostering sound decisions about sustainability?

SUSTAINABLE INNOVATION

How can it be commercially viable?



Sustaining innovation?



- **Innovation = theoretical conception + technical invention + commercial exploitation**
- Innovation is the management of all the activities involved in the process of idea generation, technology development, manufacturing and marketing of a new product or service. (Trott, 2012)

Commercial considerations

1. How can it be economically viable?
2. How to protect the idea?
3. Who would be the market for it?
4. Who can we partner with to get the product/service to consumers?

Subset of innovation

- reduces the use of natural resources
- decreases the release of harmful substances across the whole life cycle
- benefits the environment
- Can be non-technological and in non-environmental areas
- **Marriage** between **economic** and **environmental agenda**.

