Sustainability and Context

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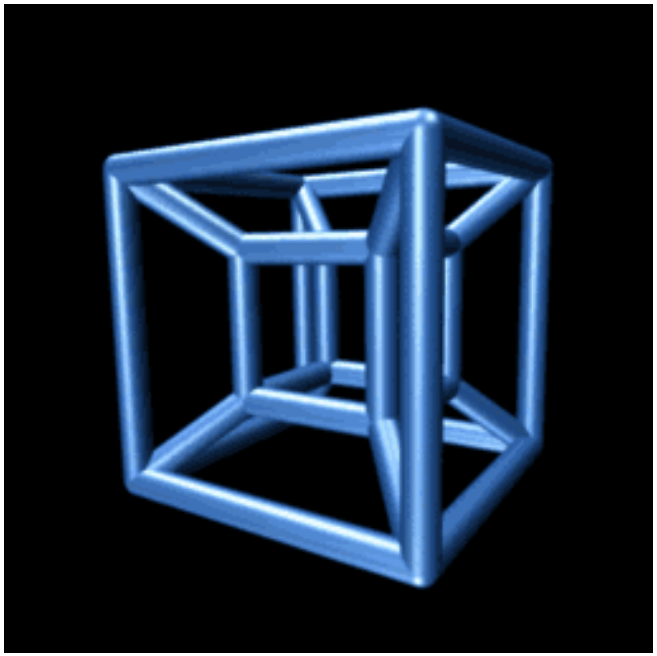


"Mother Nature --who by the bye is an old lady with some bad habits all her own."

George Eliot 1848

Jay Moynihan

UW Extension
Learning for life

What we will cover today:

The concept of sustainability

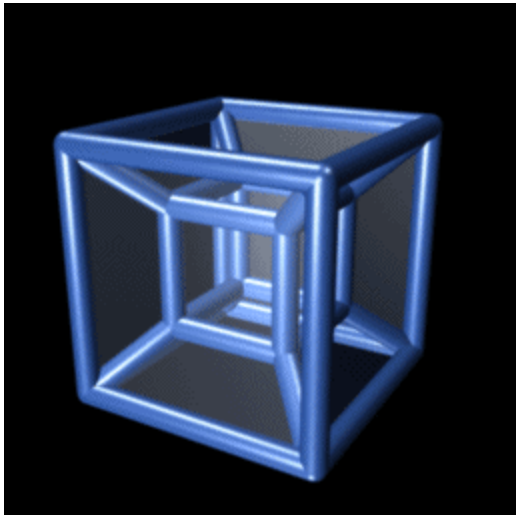
The Natural Step framework

Sustainability in context

exercise

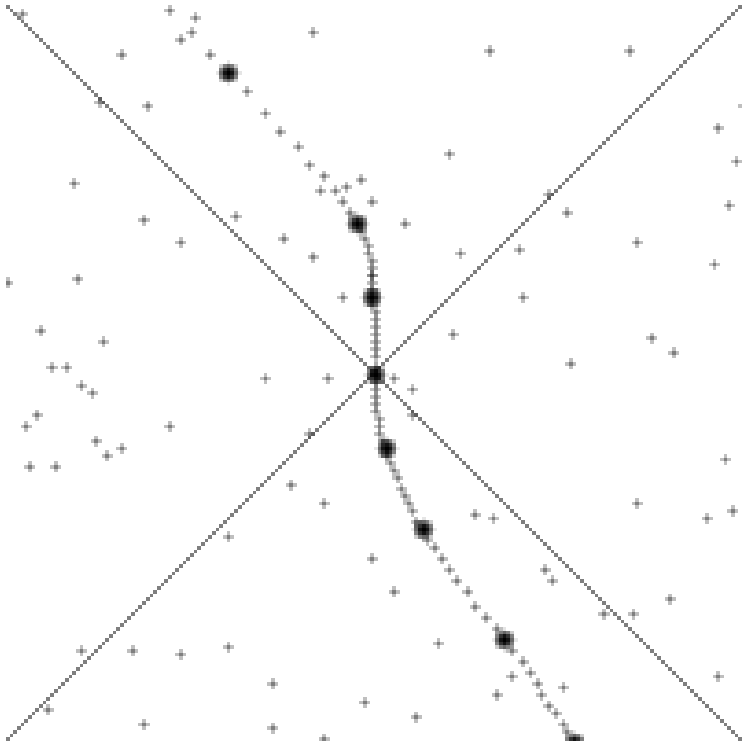
Sustainability is not thinking outside the box.

Sustainability is thinking *inside* the tesseract.



A **tesseract** is the four-dimensional analog of the cube; the tesseract is to the cube as the cube is to the square. The tesseract is the four-dimensional hypercube.

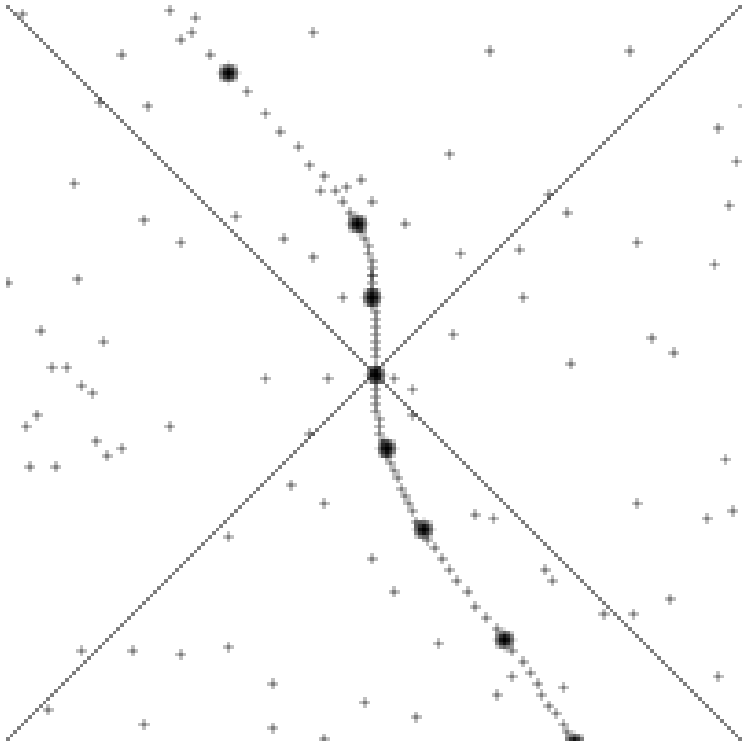
Future



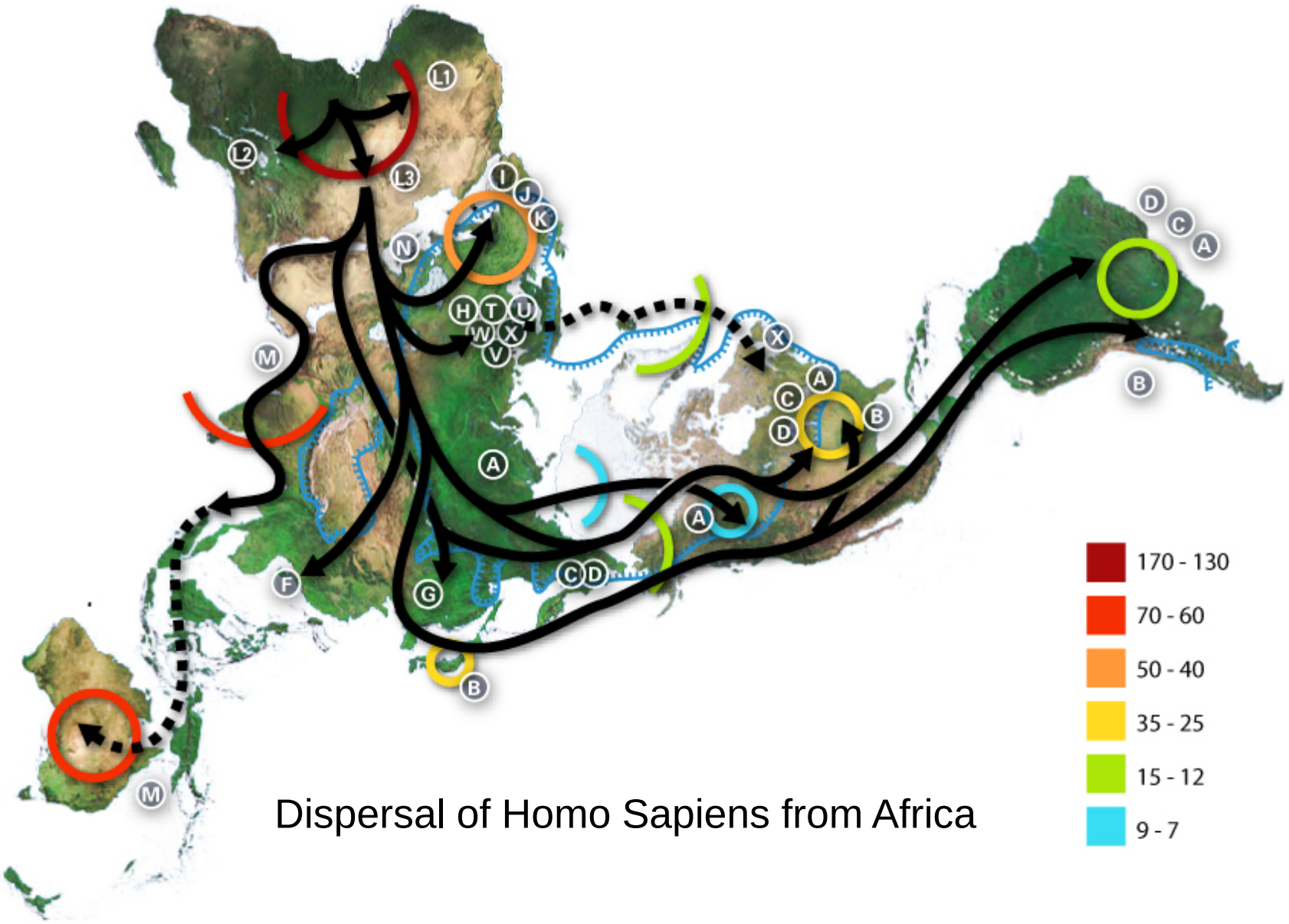
Past

Lorentz transform of world line http://en.wikipedia.org/wiki/File:Lorentz_transform_of_world_line.gif

That 4th dimension is of course, Time



Taking into account all 4 dimensions when thinking about the biogeophysical is sustainability



Dispersal of Homo Sapiens from Africa

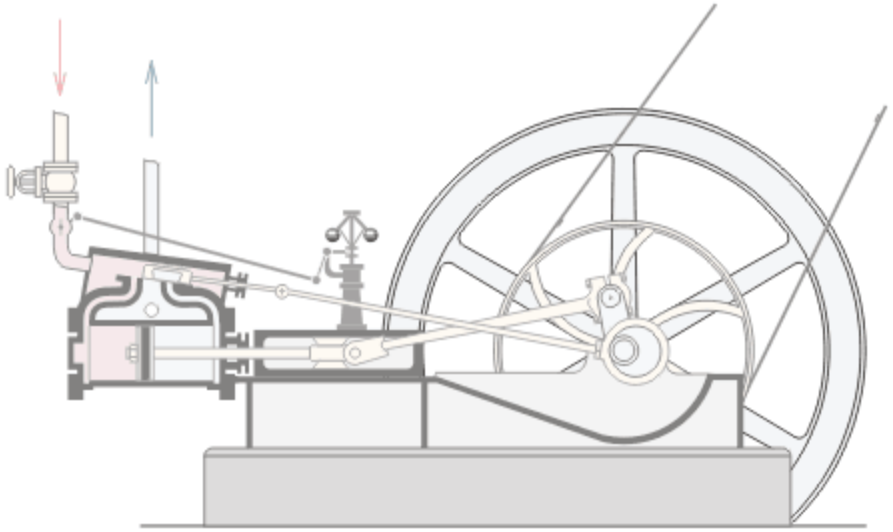
The **Holocene**

The geological epoch which began approximately 11 700 years ago according to traditional geological thinking. It has been identified as an interglacial period in what **was** to be the current ice age.

The ***Anthropocene*** is used by some scientists to describe the most recent period. Some date it from the rise of farming, some earlier or later.

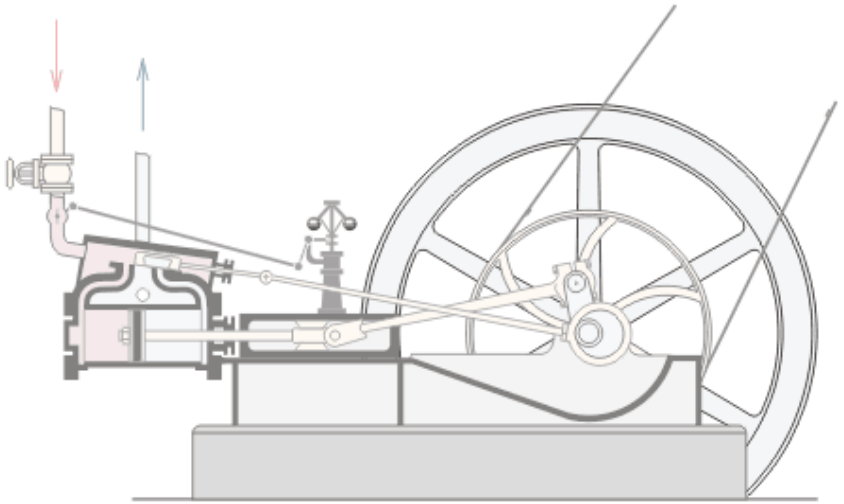
Human development of agriculture

In the early 1700's we learned to do something really amazing.

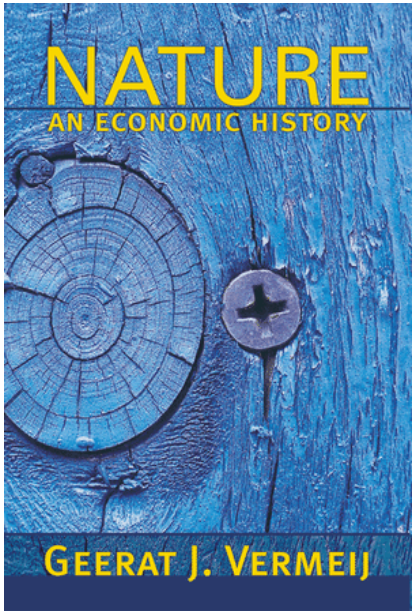


We figured out how to get that old carbon out of the ground, nearly completely processed by geology for burning, to do work!

Yesterday's solutions are often today's problems

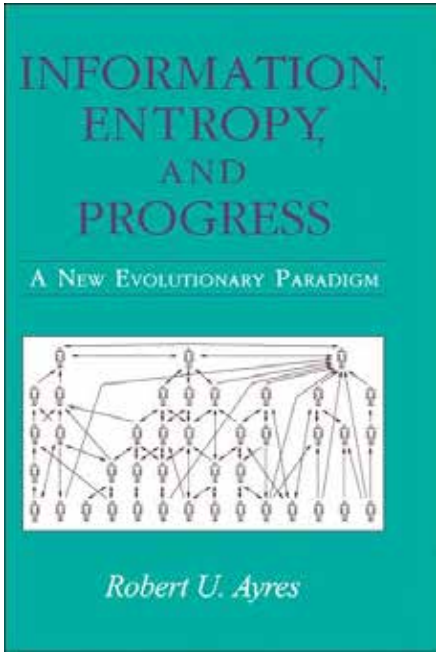


We are now facing the challenges of our species' success



Living things compete
with other species
and with conspecifics

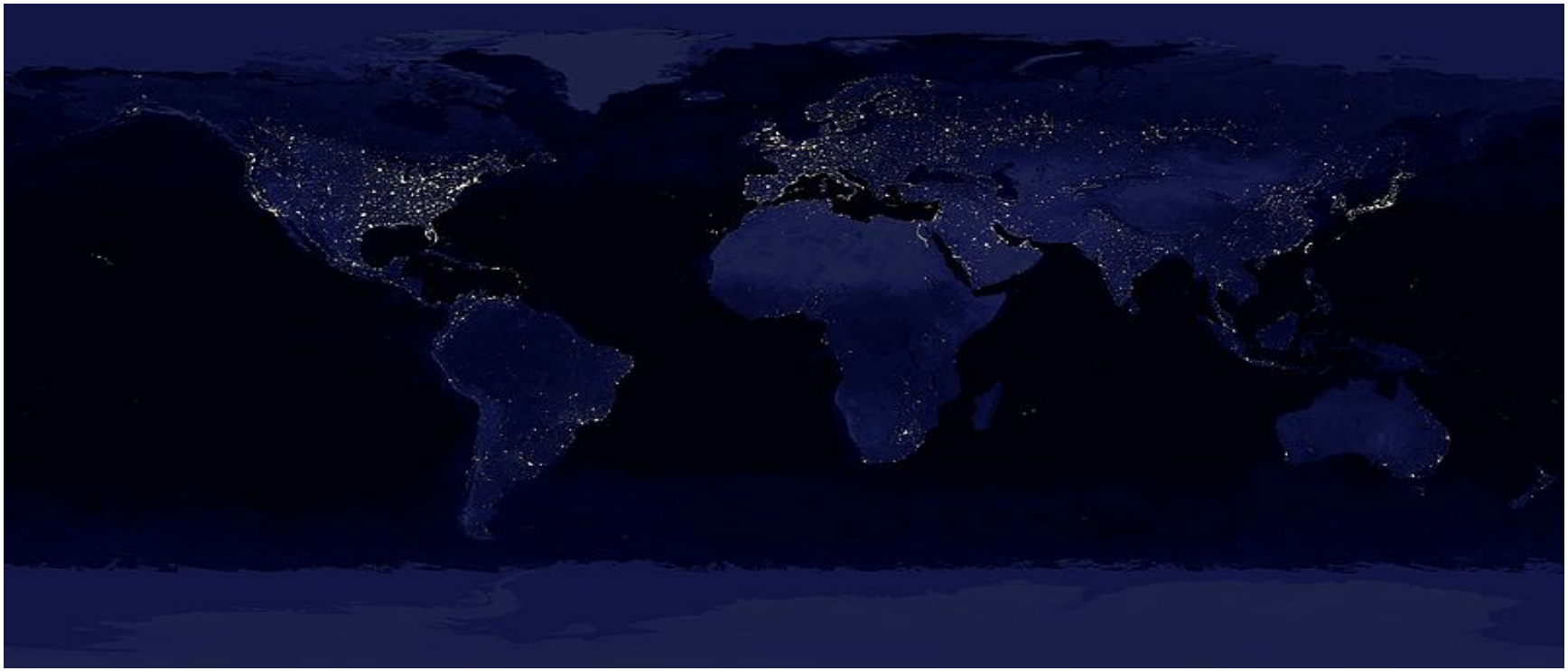
for **energy**



Estimated planetary anthropocentric energy consumption

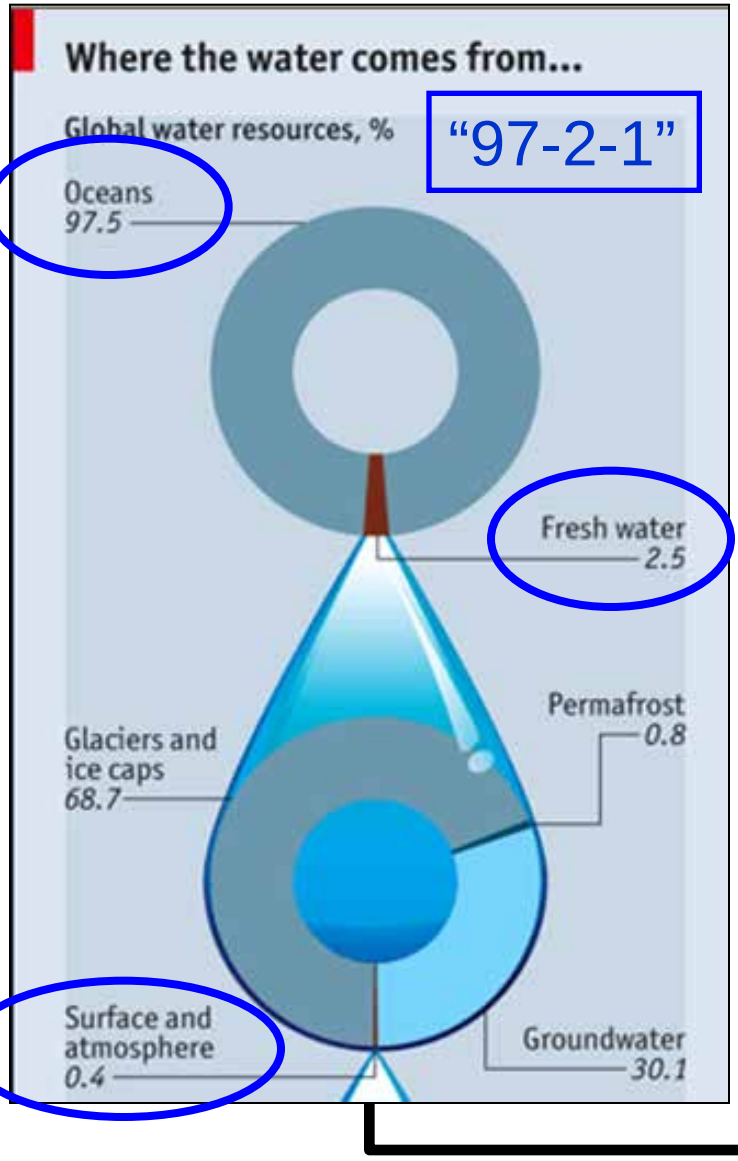
2005 rate:

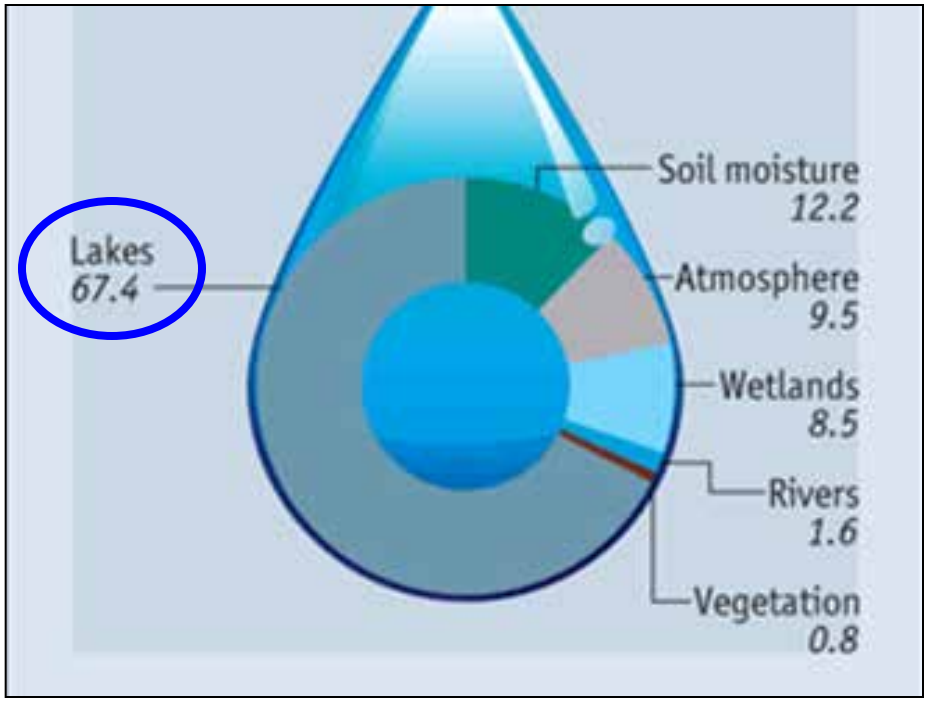
16 terawatts (1.585×10^{13} W)



85% of those terrawatts are from fossil fuels

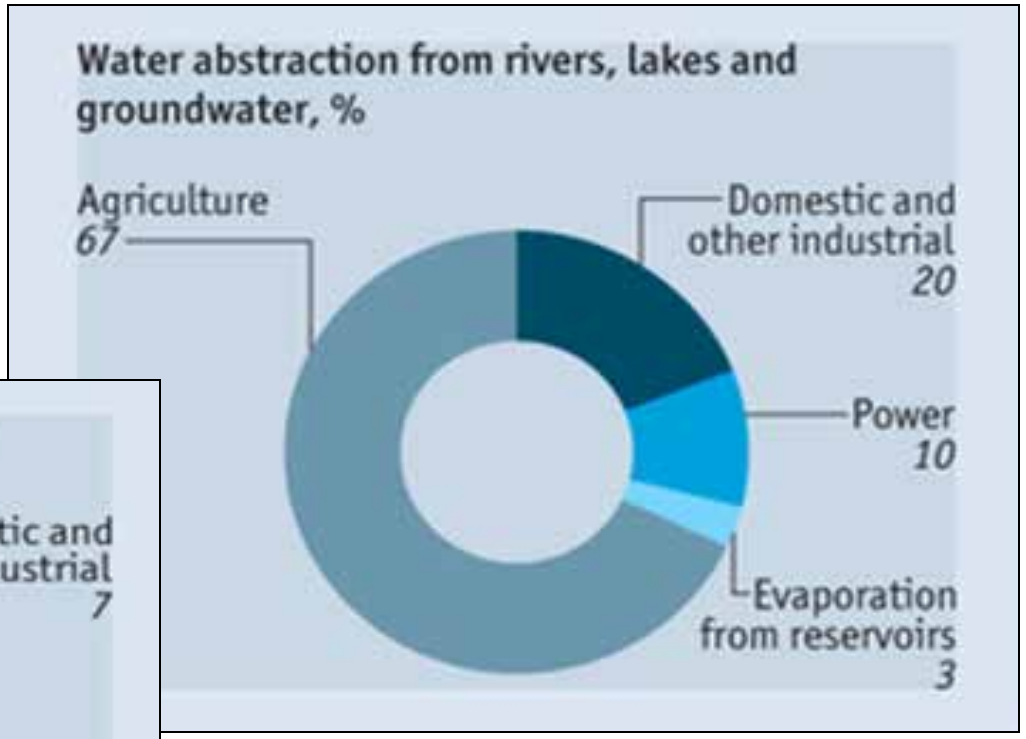
Sources of Water

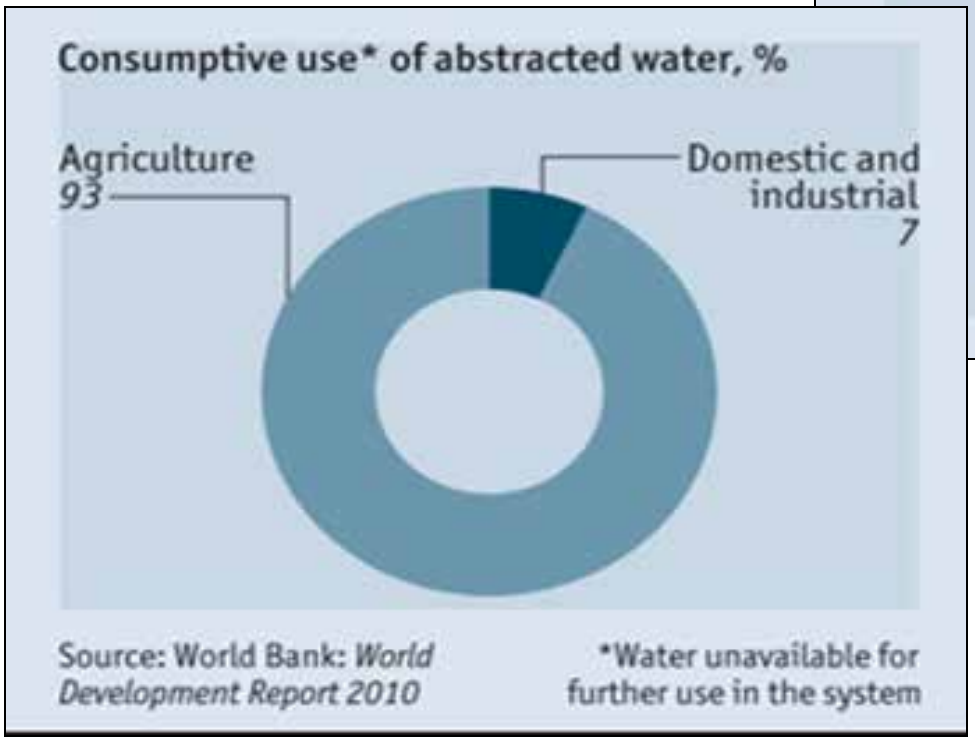




The Economist, "For want of a drink," May 20, 2010

Uses of Fresh Water





The Economist, “For want of a drink,” May 20, 2010

Sustainability 3-Legged Stool

Sustainability

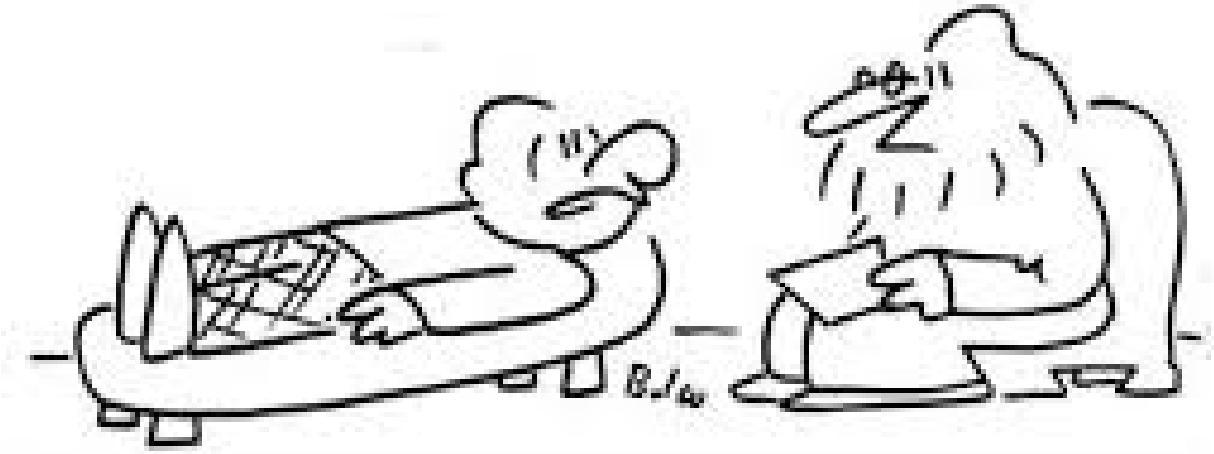
Economic Leg
Good Jobs
Fair wages
Security
Infrastructure
Fair Trade

Environmental Leg
0 Pollution & Waste
Renewable Energy
Conservation
Restoration

Social Leg
Working conditions
Health services
Education services
Community & Culture
Social justice

Quality of Life / Genuine Wealth / Genuine Progress

An attempt to think about the problems, without ruffling feathers



"I want you to put me in touch with reality, but be ready to break the connection *fast*."

3 Sustainability Reality Checks

An Important Point About Sustainability

1

"I get so tired of hearing people say we have to save the earth. Rubbish.

She is one tough bitch.

She can take care of her self thank you. What this is about, is saving our civilization."

Biologist Lynn Margullis

2

	Scientific Laws & Principles	Meaning
1	**Matter and energy cannot be created or destroyed.** 1st law of thermodynamics and the principle of conservation of matter.	It is impossible to "throw something away". It just changes form.
2	**Matter and energy tend to disperse. (2nd law of thermodynamics)** Entropy	Matter tends to simplify absent an energy input.
3	**Material quality is characterized by concentration and structure of matter.**	We never consume energy or matter-- only its quality , (the degree of order within energy and matter), purity and structure.
4	**Net increase in material quality on earth can only be produced by sun-driven processes.**	All the energy for everything we do was and is produced by the sun.

2

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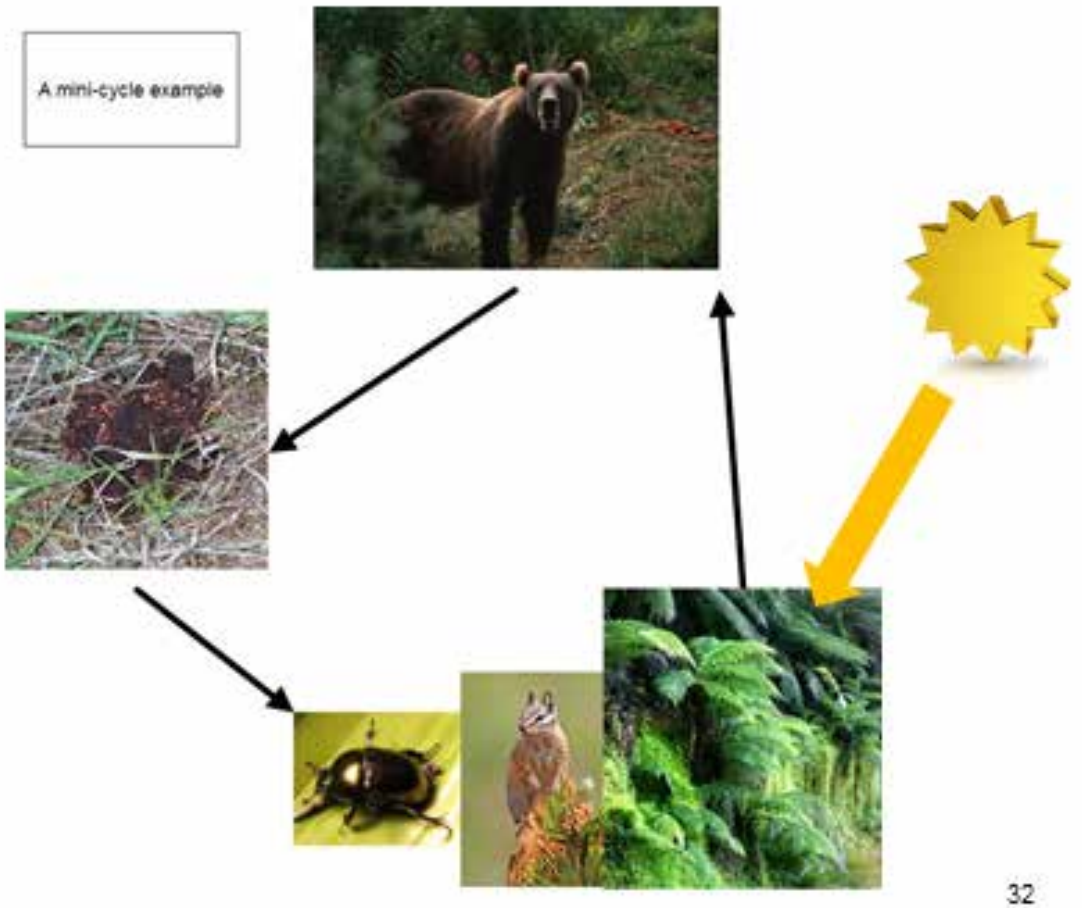
Fixed. Not negotiable

2



the NATURAL STEP

The Cyclic Principle

2

Waste must not systematically accumulate in nature, and reconstruction of material quality must be at least as large as its dissipation.

2

Supporting
- Nutrient cycling
- Soil formation
- Primary production

Provisioning
- Food
- Freshwater
- Wood and fibre
- Fuel

Regulating
- Climate regulation
- Flood regulation
- Disease regulation
- Water purification

Cultural
- Aesthetics
- Spiritual
- Educational
- Recreational

Source: *Millennium Ecosystem Assessment*. 2005. Washington, DC: Island Press.

2

System Conditions

In a sustainable society, **nature** is **not subject to** systematically increasing...

...concentrations of substances extracted from the Earth's crust,

...concentrations of substances produced by society,

...degradation of nature by physical means,

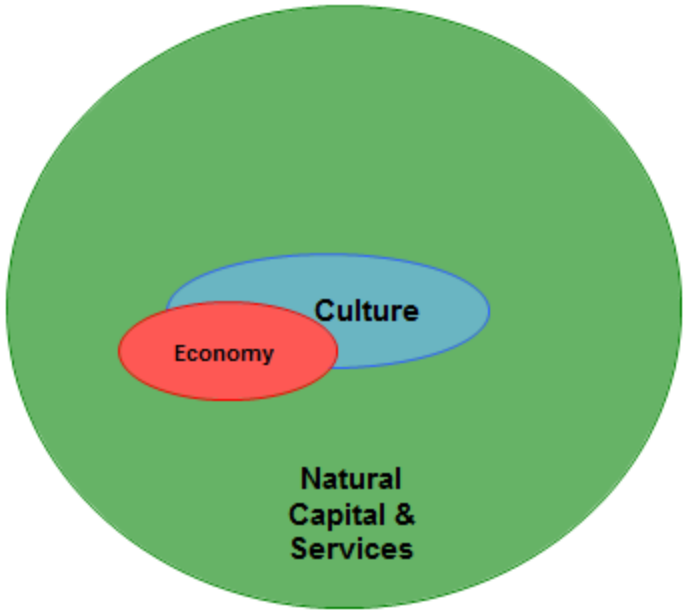
...and, in that society, **people** are **not subject to** conditions that sytematically undermine...

...their capacity to meet their needs.

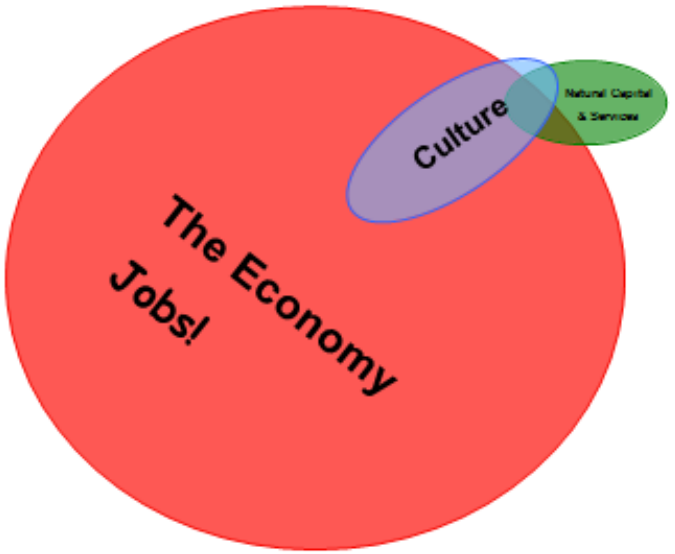
What makes applying sustainability or TNS so difficult and slow?

#3

We see this



As This



Why?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1
EURO


GOLD

Boundary Conditions

A ***"Boundary Condition"*** is what bounds a solution space. For any given problem, it is what divides what solutions are possible and what solutions are not.

Solution space:

All your possible solutions

Fixed Boundary Condition.

Of or pertaining to the composite of basic biological, geological, and physical laws/processes; that apparently do not change with time.

~~Obligate Boundary Condition~~

Less important for us due to our brains, technology etc.

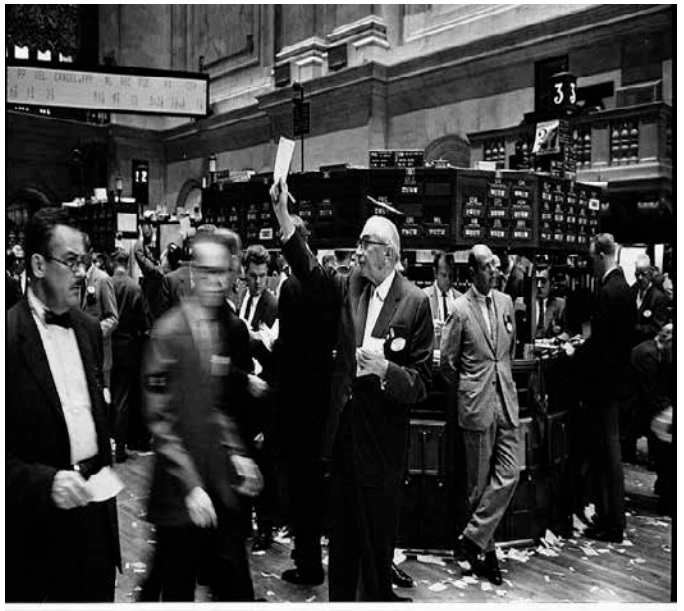
~~A set of parameters or conditions that evolved in a specie, that limits its behavior at a given point. May change in adaptation to new changing conditions.~~

Socially Obligate Boundary Condition

Big deal for us

A set of social parameters or conditions that evolved in a specie, that limits its behavior at a given point . May change in adaptation to changing conditions, including social conditions.

Boundary Condition	Relevant Description
Fixed Boundary Condition. Of or pertaining to the composite of basic biological, geological, and physical laws/processes; that apparently do not change with time.	The Natural Step science principles and first three TNS System Conditions.
Socially Obligate Boundary Condition A set of social parameters or conditions that evolved in a specie, that limits its behavior at a given point. May change in adaptation to changing conditions, including social conditions.	One of them: Economics behavior (mediated by TNS System Condition four.) 



Reciprocal Altruism:

An individual acting for, or in cooperation with, other individuals to which it is not closely genetically related, for benefit. Only found in the behavior of the most advanced social species.

Economic behaviors

Economic Behavior

An important way humans engage in reciprocal altruism virtually over space, and into future time.

Economic Behavior

Money = virtual trust

What the game is;

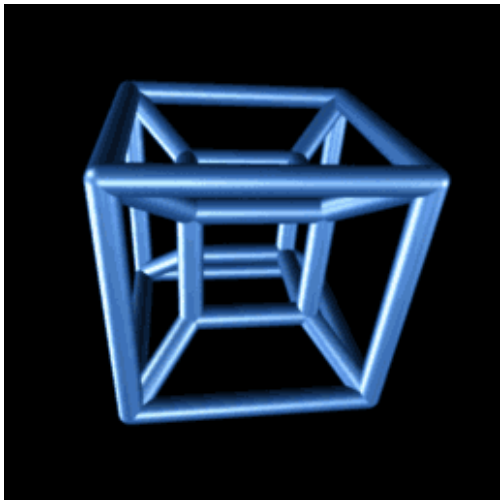
ØCharting and following a high survival value path for our species on a rapidly changing fitness landscape.

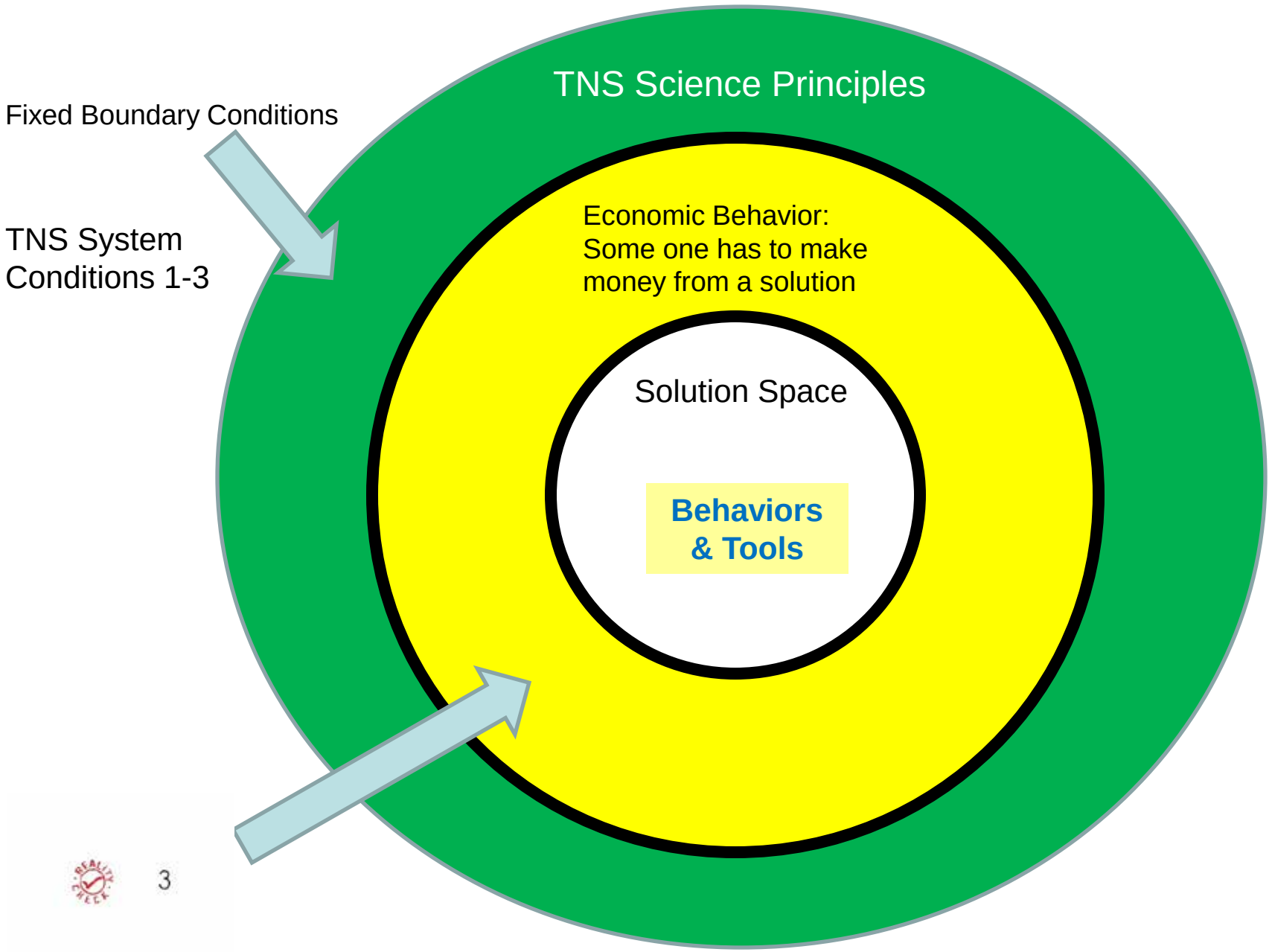
Ø Within a solution space bounded *not only by* biogeophysical conditions

ØBut also bounded by socially obligate boundary conditions

In other words....

We have to adapt to change and make money doing it.




Fixed Boundary Conditions
TNS System Conditions 1-3
TNS Science Principles
Economic Behavior: Some one has to make money from a solution
Solution Space
Behaviors & Tools

Hyperbolic Discounting

Given two similar rewards, humans show a preference for one that arrives sooner rather than later. Humans are said to *discount* the value of the later reward, by a factor that increases with the length of the delay. In behavioral economics, hyperbolic discounting is a particular mathematical model thought to approximate this discounting process; that is, it models how humans actually make such valuations.

http://en.wikipedia.org/wiki/Hyperbolic_discounting

3

Empathy Scaling

EfC

ssob c

EfC

Pseudospeciation

Market failures

Tools

Many of these are new career paths …

Rapid Climate Change Strategy

Systems Thinking

The Natural Step

Energy Efficiency

Ecological Economics

Full Cost Accounting

Life Cycle Analysis

Iterative Planning & Risk Management

Industrial Ecology

Biobased Production

Ecological, and Carbon Foot Prints

Biomimetics

Indicator design

Green Building

Sustainable Agriculture

Vertical Farming

Genetics

Nanotech

Risk + Change = **Opportunity**

$$

Resources:

www.capacitycenter.org

The UW-Extension Sustainability Team

UW Extension

Learning for life