A horizontal bar composed of several colored segments: dark blue, light blue, cyan, grey, teal, green, orange, red-orange, and yellow.

Next Level Leverage

Graham Irwin, AIA, CPHC
Kristof Irwin, PE

PhiusCon'23

A few warm-up questions*

How do systems create cultures? How do cultures create systems?

What are our values? Where do they come from? Are they universal or culturally determined?

How is it that one way of seeing the world becomes so widely shared that institutions, technologies, production systems, buildings and cities become shaped around that way of seeing?

Once a culture & system have been found lacking, does that have to change through breakdown and chaos?

How do we become so cynical about our ability to achieve our visions?

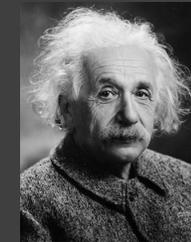
Why are we more likely to listen to people who tell us we can't make changes than we are to people who tell them us we can?

from Donella Meadows, in **Thinking in Systems*



Next Level Leverage

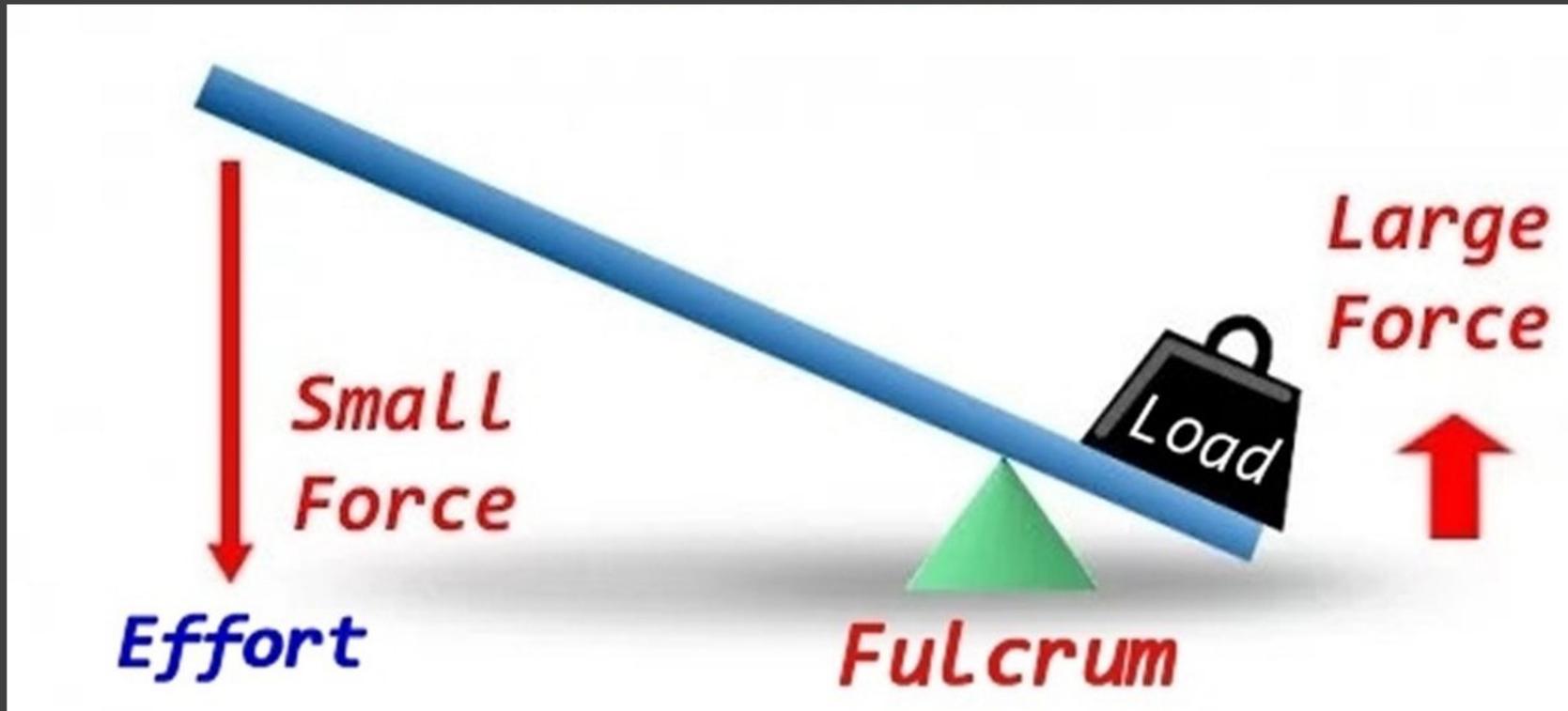
"We can not solve our problems using the same level of thinking that created them"



Graham Irwin, AIA, CPHC
Kristof Irwin, PE

PhiusCon'23

Leverage creates a large force using a small force





1. Origin Story
2. Thinking in Systems
3. Leverage points
4. Synthesis



The passive house community is building the future in the present but is this important work constrained by paradigms from the past?

The Arriving Future, **Happening Now**



The Passive House community **knows how** to design and build...

...durable and resilient homes that have exceptionally low energy usage.



The Passive House community **knows how** to design and build...

... homes that are thermally and acoustically comfortable with excellent indoor air quality.”



The Passive House community **knows how** to design and build...

...grid interactive buildings “that have exceptionally low energy usage and that are durable, resilient, comfortable, and healthy”

Origin Story PhiusCon'22

Palmer House Hotel
Chicago
October 2022



Origin Story PhiusCon'22



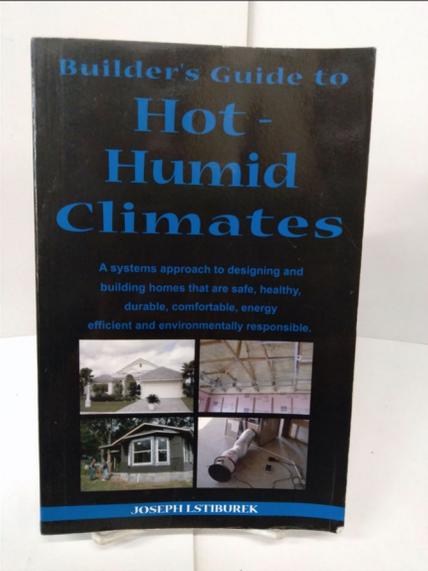
BLUEPRINT FOR BETTER

**One site.
Countless challenges.
A looming deadline.
This is the ultimate project.**

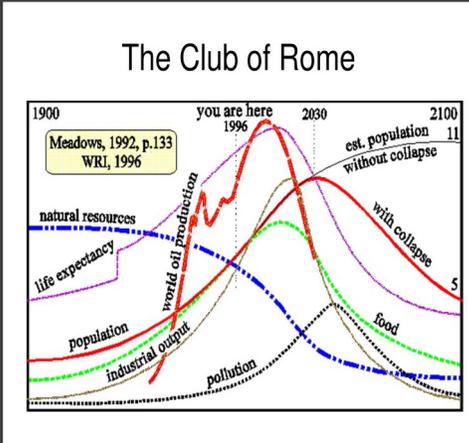
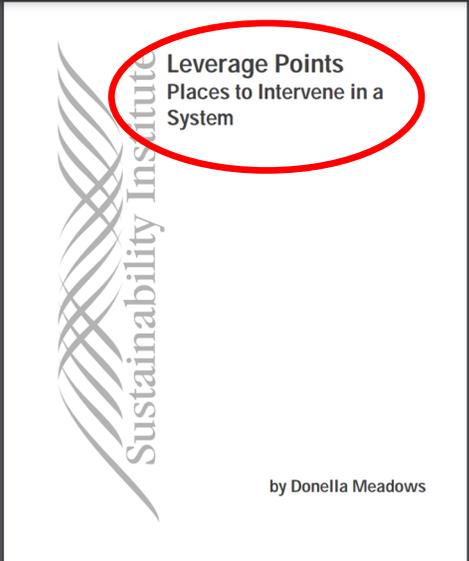
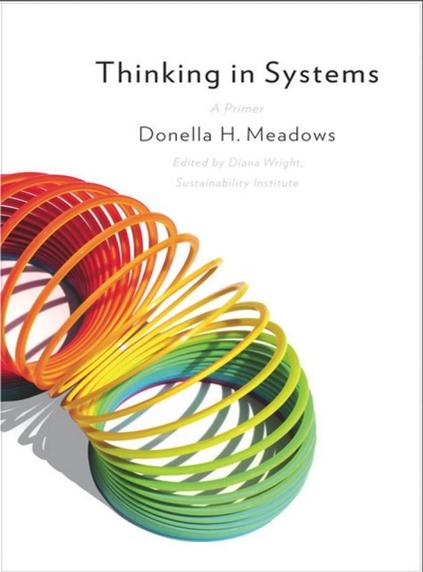
A photograph of the Earth from space, showing the Americas and the surrounding oceans, set against a black background with stars.

Origin Story, *Thinking in Systems*

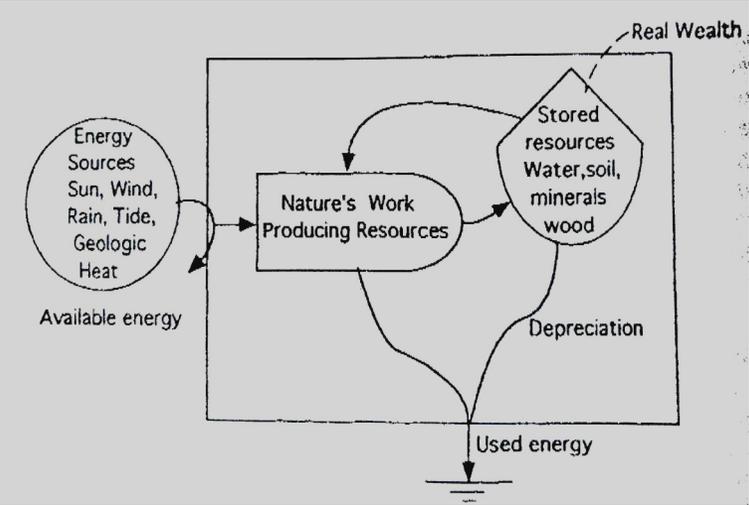
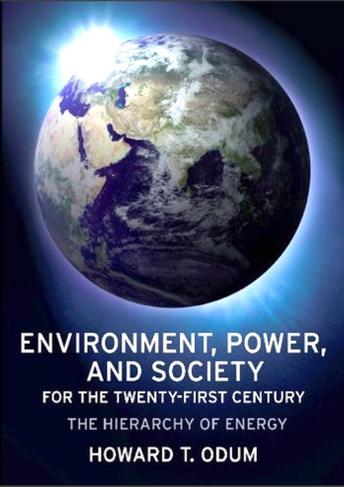
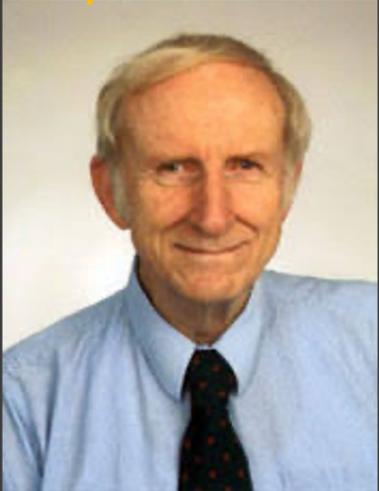
Building as a System



Society as a System



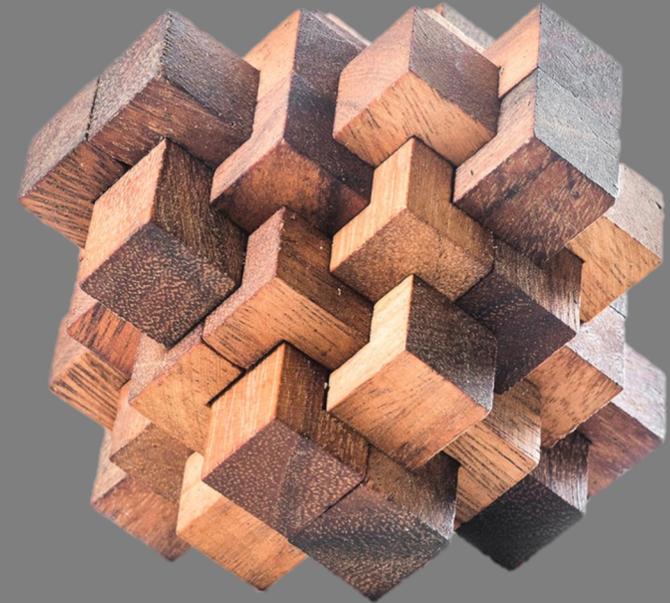
Geobiosphere as a System



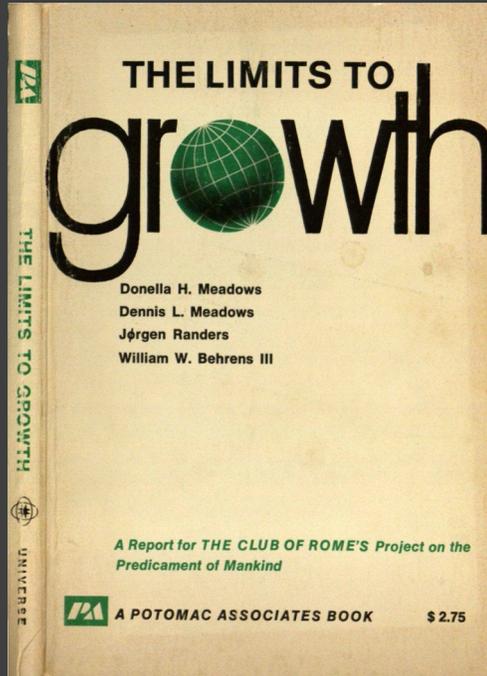
Leverage creates a large force using a small force



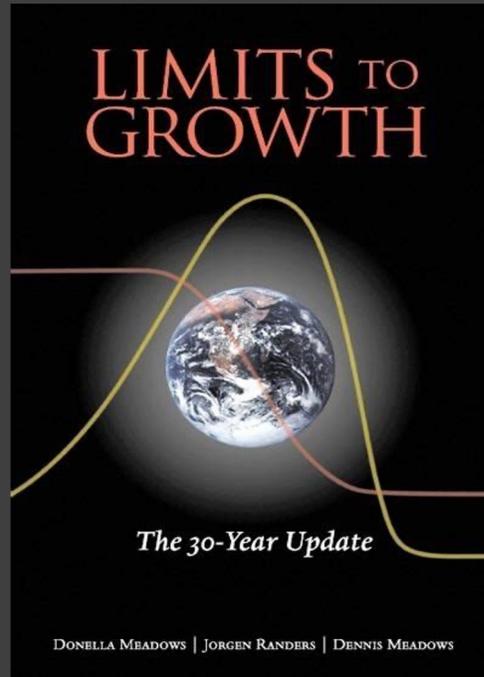
Leverage points are where a small shift in one thing produces large changes in everything.



Donella Backstory



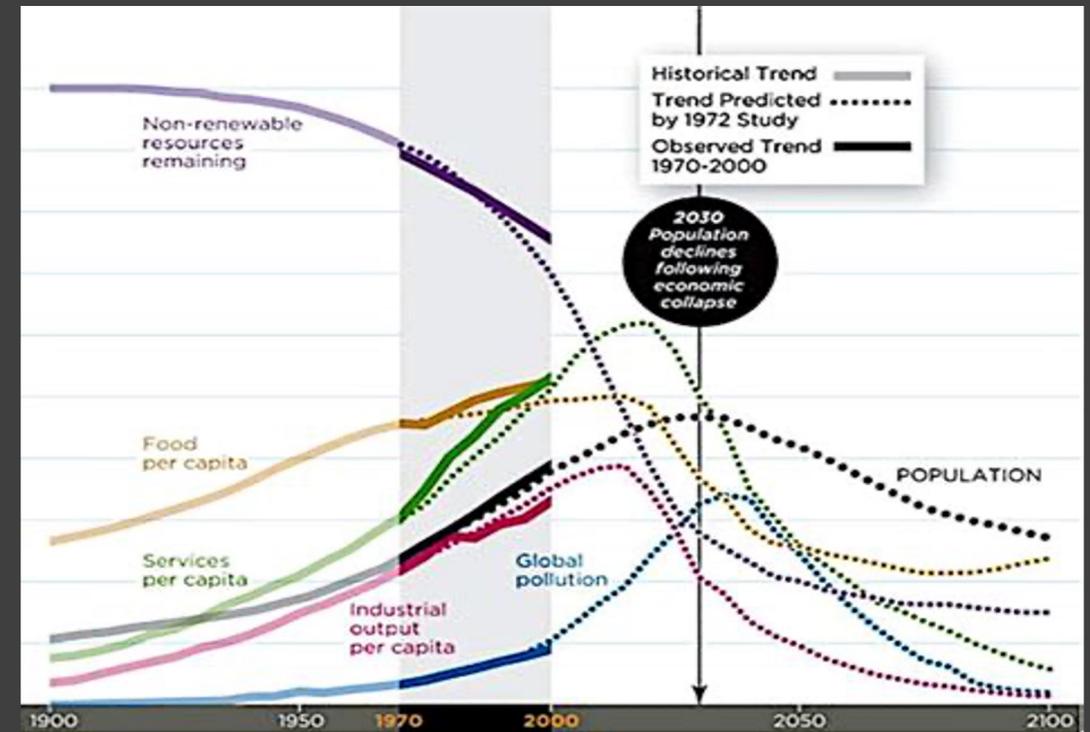
1972



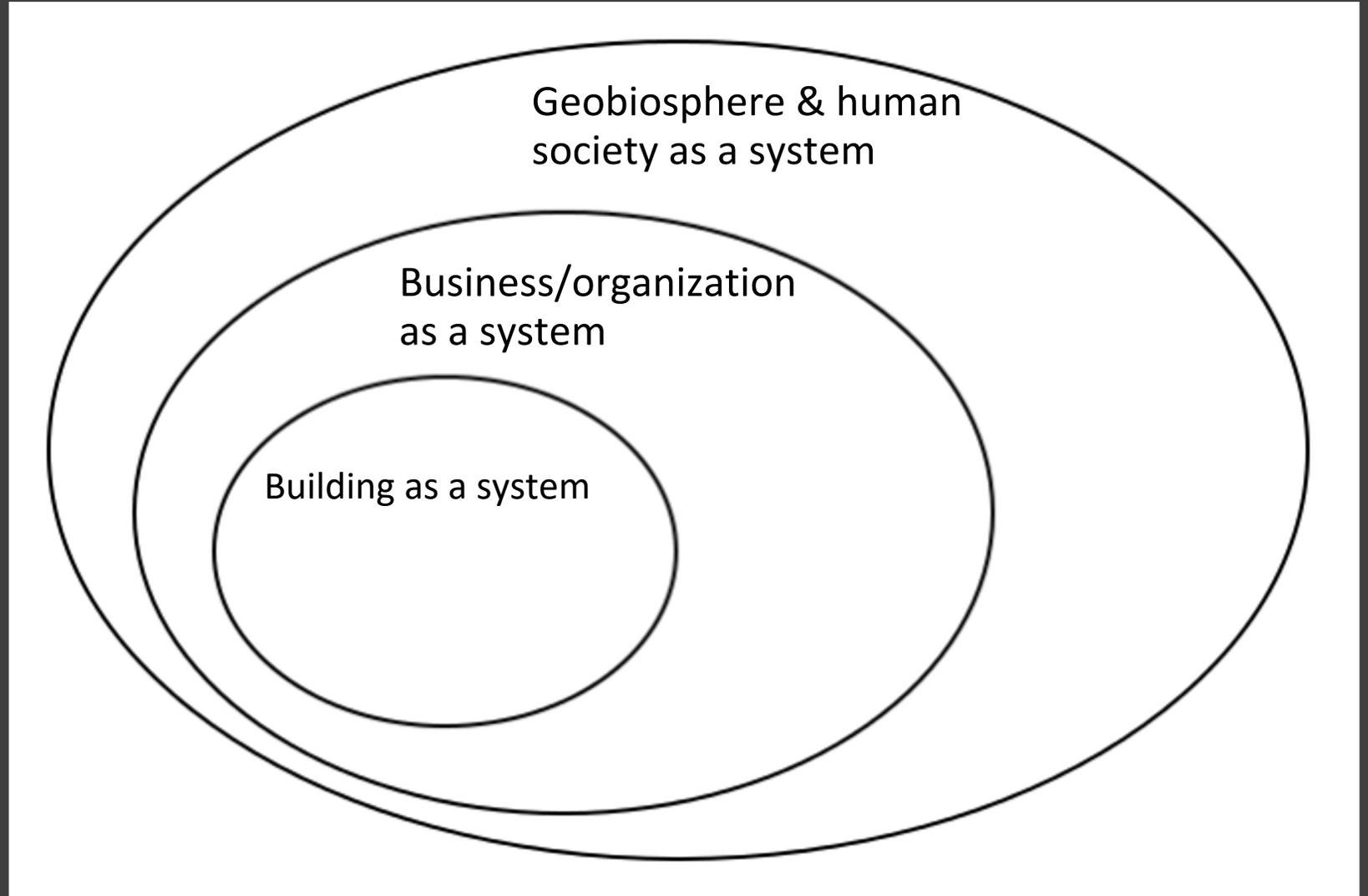
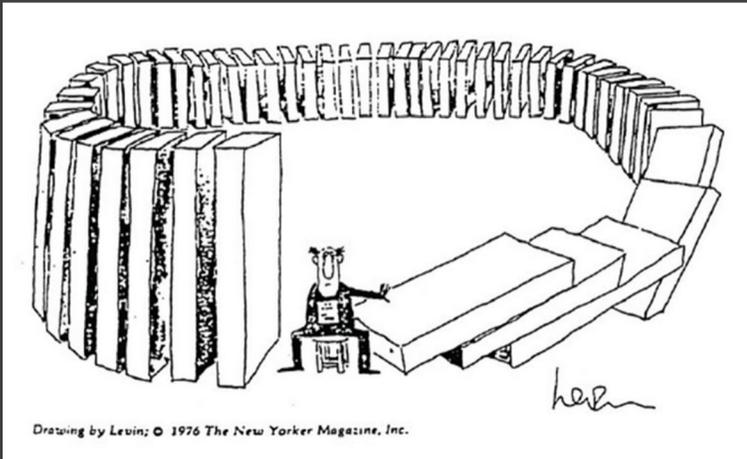
2004



- Dana Meadows, Jay Forrester, Peter Senge, MIT Sys Dyn Grp...
- Herman Daly, Albert Einstein, Vaclav Havel, Lewis Mumford...



Thinking in Systems



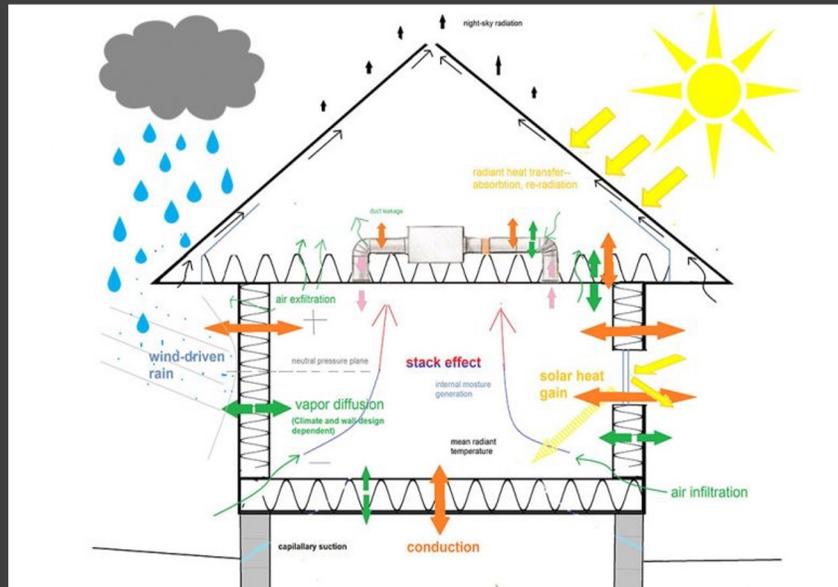
We are all, always part, of all that is.

Building as a System, Building Science

Systems of systems

- Climate Systems
- Enclosure systems
- Mechanical Systems

By understanding the building as a system we are able to select and arrange materials to achieve important positive outcomes





The **streetlight effect** occurs when we search for something where it is easiest to look





The **streetlight effect** occurs when we search for something where it is easiest to look

The constraint is not our understanding of how to build better

Business as a System

A detailed black and white photograph of a complex mechanical gear system. The image shows multiple gears of various sizes, some large and some small, interconnected by shafts and bearings. The gears are arranged in a way that suggests a complex, interconnected system. The lighting is dramatic, highlighting the metallic surfaces and the intricate details of the machinery. The overall composition is dense and technical, emphasizing the complexity and precision of the system.

Businesses & Organizations are also Systems



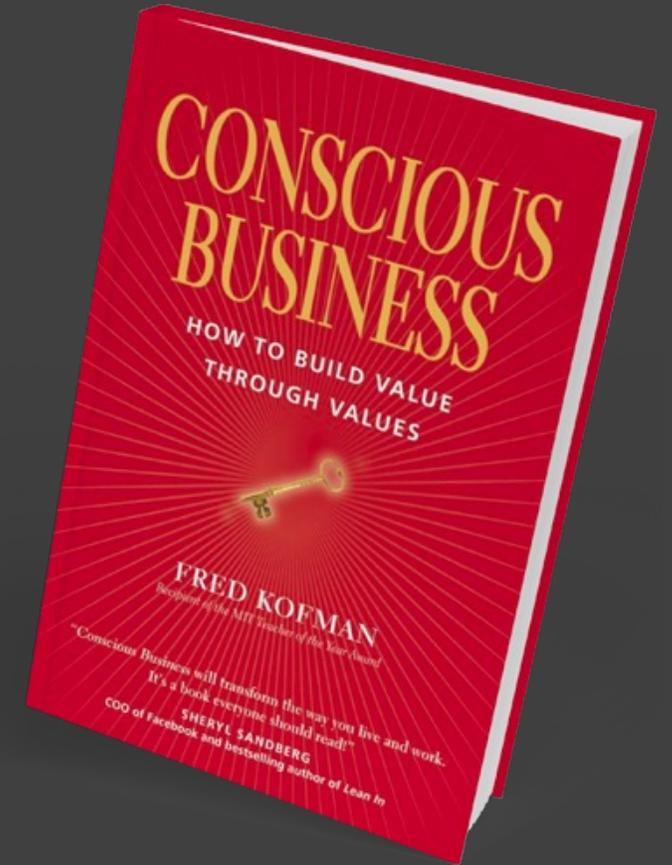
- Clever minds & capable bodies
- Skill & exertion
- Relentless human caring

- Commitment to well being of others
- Capacity to work in community toward common aims

How do we arrange these elements to achieve outcomes we want?

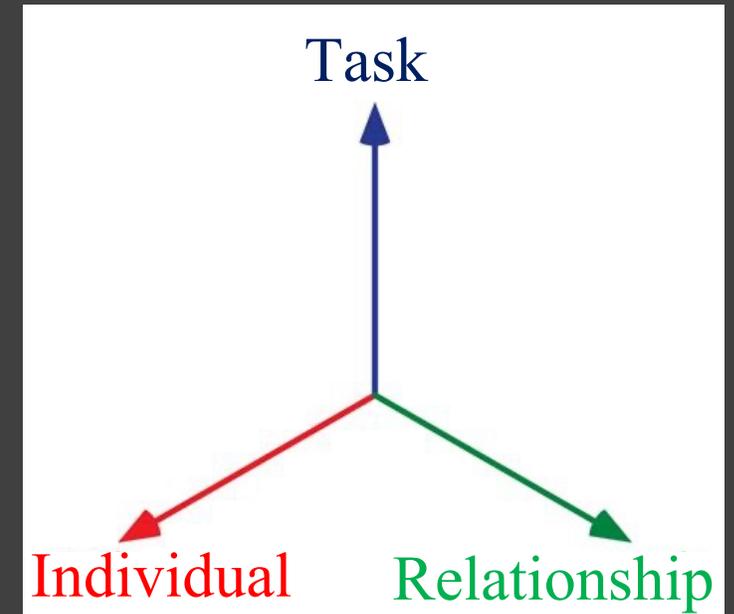
To live consciously, with purpose and intent, means to be open to perceiving the world around and within us, to understand our circumstances, and to decide how to effectively and fluidly respond to them in ways that honor our needs, values and goals.

- Adapted from *Conscious Business* by Fred Kofman



Dimensions of Human Systems (I, We, It)

- (I) **Individual** - Personal - Self
- (We) **Relationship** – Interpersonal - Community
- (It) **Task** – Impersonal - Organizational



Dimensions of Human Systems (I, We, It)

(I) In the **Individual** dimension a business will focus on its ability to foster personal well-being, meaning, and happiness. This is the basis for being cooperative with others, resilient when suffering setbacks, and enthusiastic about opportunities.

(We) In the **Relationship** realm, the goal of a business is to build a trusting network of collaborative connections with others - a community in which people feel included, respected and enabled to contribute.

(It) At the **Task** or impersonal level a business exists to achieve its goals, pursue its vision, and fulfill its societal mission in a way that enhances its ability to continue to do so in the future.



Dimensions of Human Experiences

Have – Product, Result

Do – Process, Behavior

Be – Platform, Structure



Be, Do, Have

Having or achieving desired outcomes

requires *Doing* the things that lead to those outcomes

which, in turn, requires

Being the type of person or organization capable of such behavior



	(I) Individual Personal Self	(We) Relationship Interpersonal Community	(It) Task Impersonal Organizational
Platform Structure (Be)	Mental models Personal values Ethical principles	Shared mental models Ethical practices Org culture	Capital Infrastructure Administrative Expertise
Process Behavior (Do)	Think Feel Act	Communicate Negotiate Coordinate	Selling Delivering product/service Planning
Product Result (Have)	Well-being Meaning Happiness	Mutual trust & respect Connectedness Belonging	Mission accomplishment Profitability Growth

Businesses & Organizations are also Systems

Attitudes

1. Unconditional Responsibility
2. Essential Integrity
3. Ontological Humility

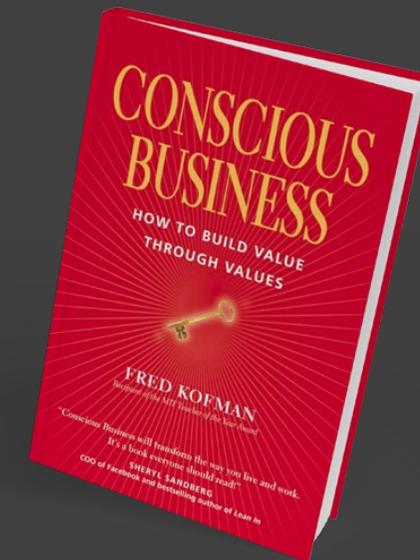
Behaviors

4. Authentic Communication
5. Constructive Negotiation
6. Impeccable Coordination

Responses

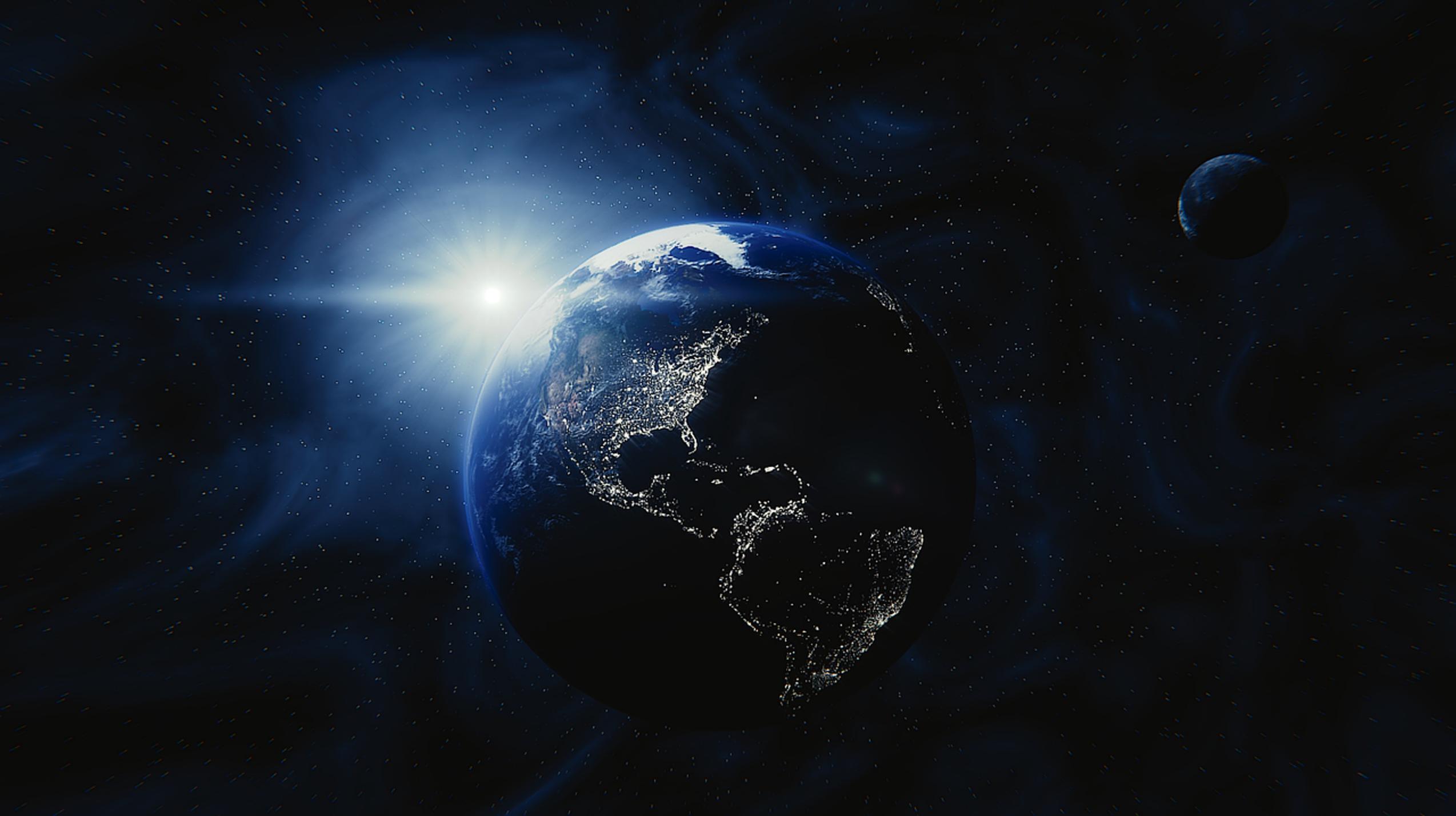
7. Emotional Mastery

These elements can also be arranged to achieve positive outcomes – finding our passion and expressing our essential values through our work



Human Systems

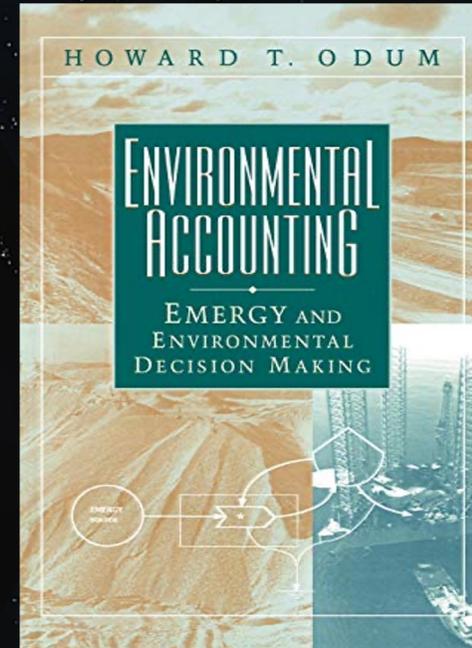
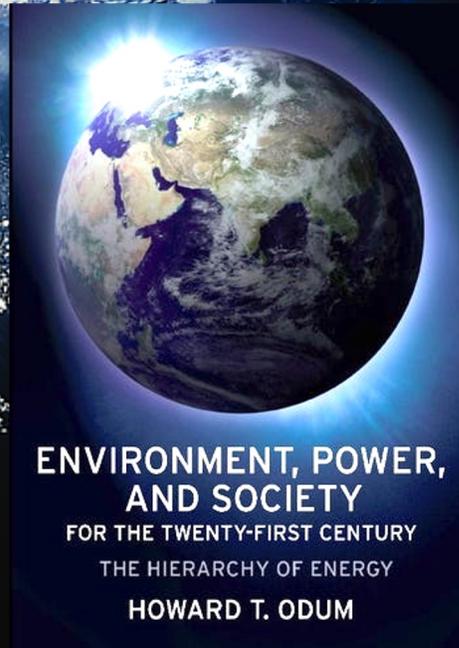
- Architects
- Engineers
- Builders
- Contractors
- Consultants
- Code Officials
- Inspectors
- Appraisers
- Underwriters
- Bankers/Creditors
- Insurers
- Legislators
- Commissioners
- Lobbyists
- Industry Associations
- Manufacturers
- Distributors
- Advertisers
- Authors
- Publishers
- Podcasters
- Bloggers
- Influencers
- Health care companies
- Allergists
- ...

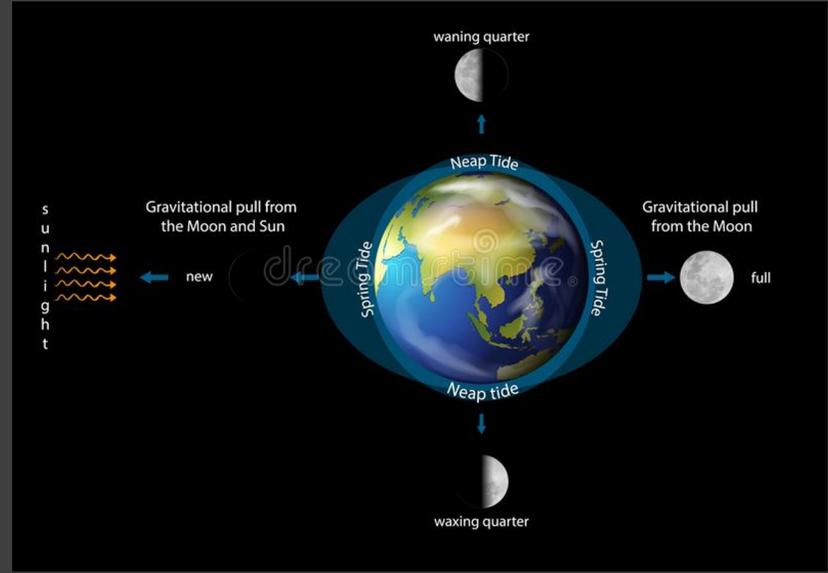
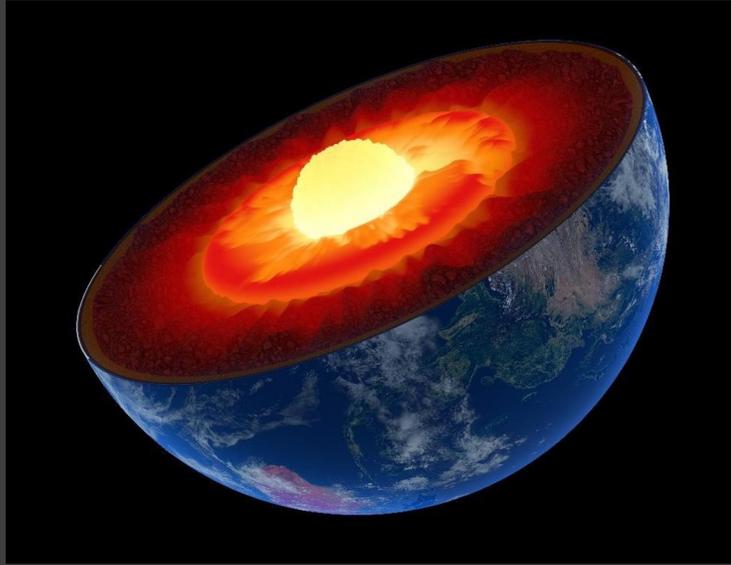
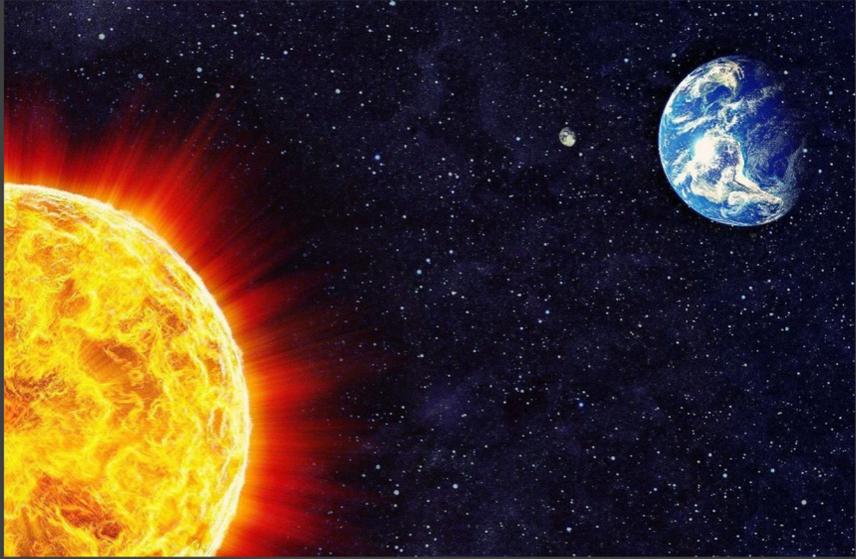


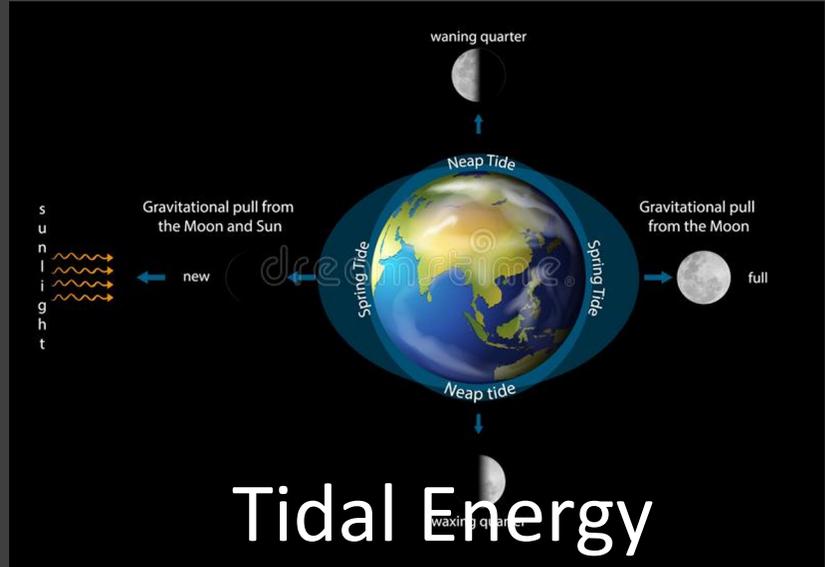
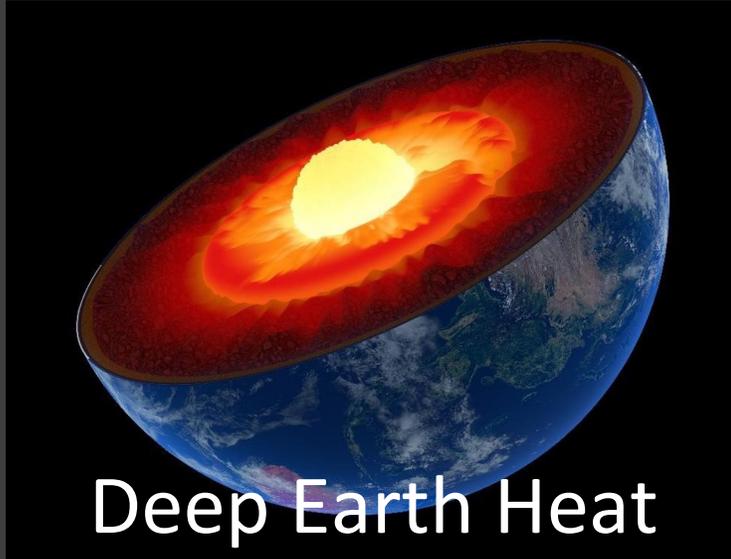
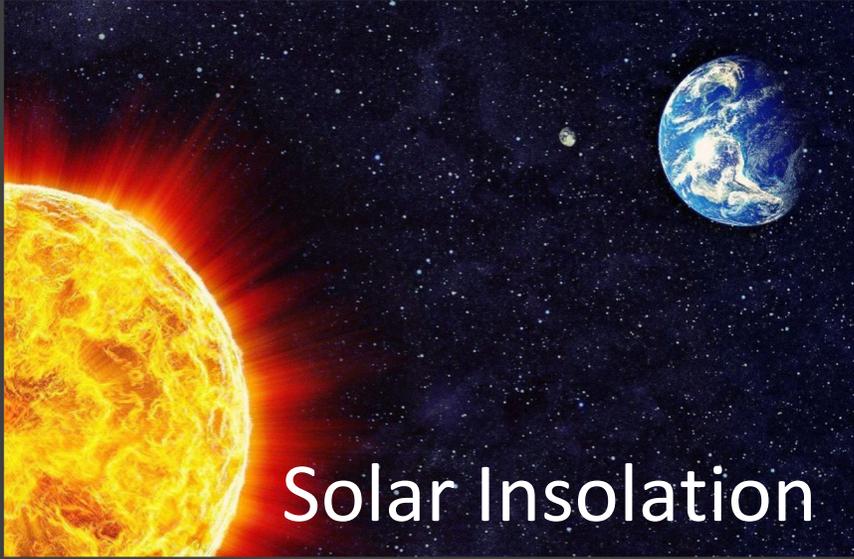
We have what we need



Earth's geobiosphere provisions our global society

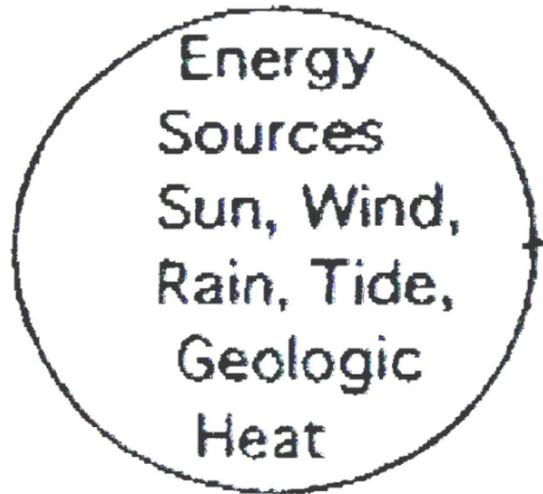






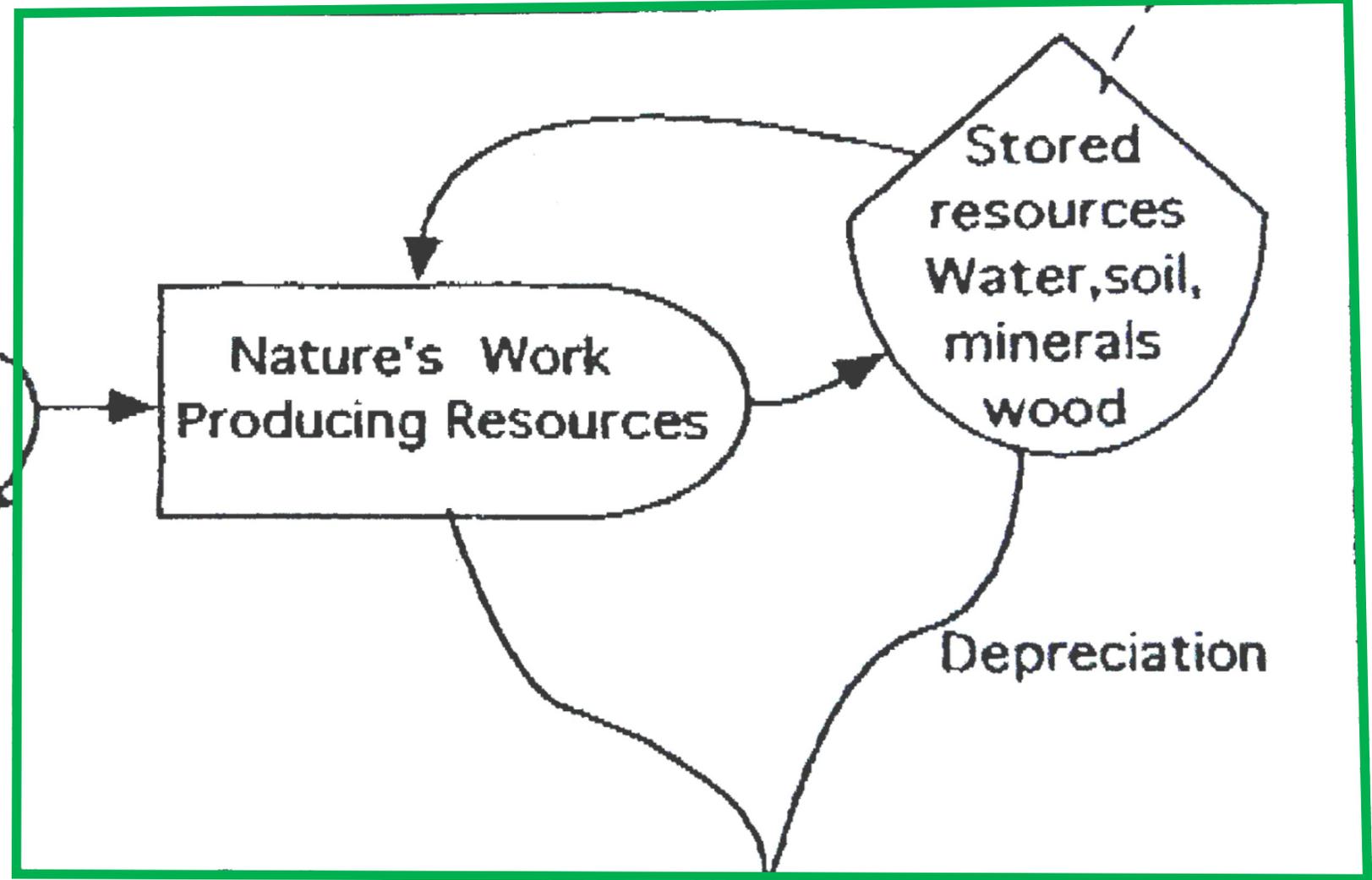
Window represents the planet's geobiosphere

Real Wealth

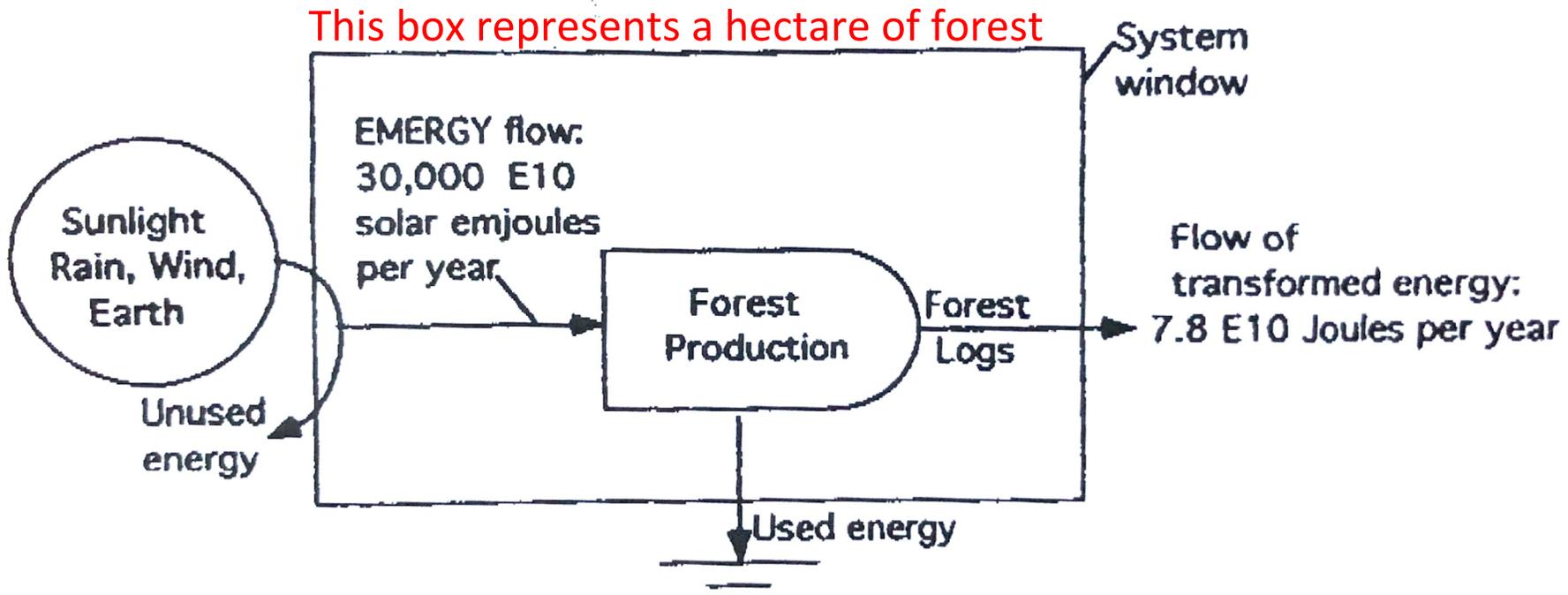


Available energy

Sources of low-grade energy active over vast spatial & temporal scales



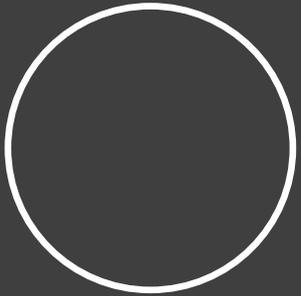
Used energy



Average wood production from 1 hectare of Swedish spruce forest (Ref: Doherty, 1995)



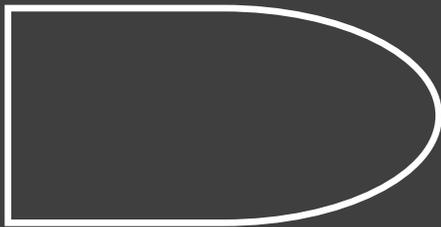
Energy Systems Language: **Basic Phonics**



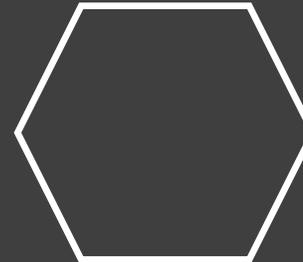
Source: Outside source of energy



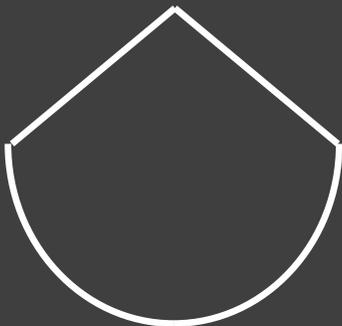
Window: Separates process from environment. Can be a home, a planet, a city, a power plant, a gold mine, a forest...



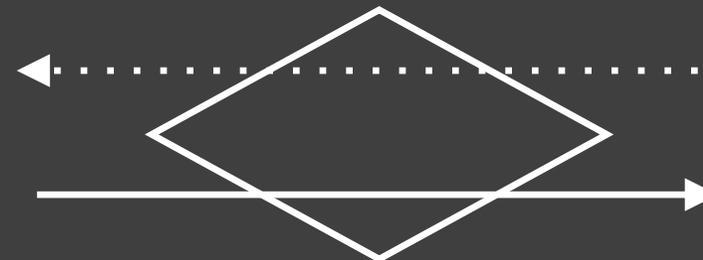
Producer: Unit that collects and transforms low-quality energy



Consumer: Transforms energy, stores it and feeds it back to inflow

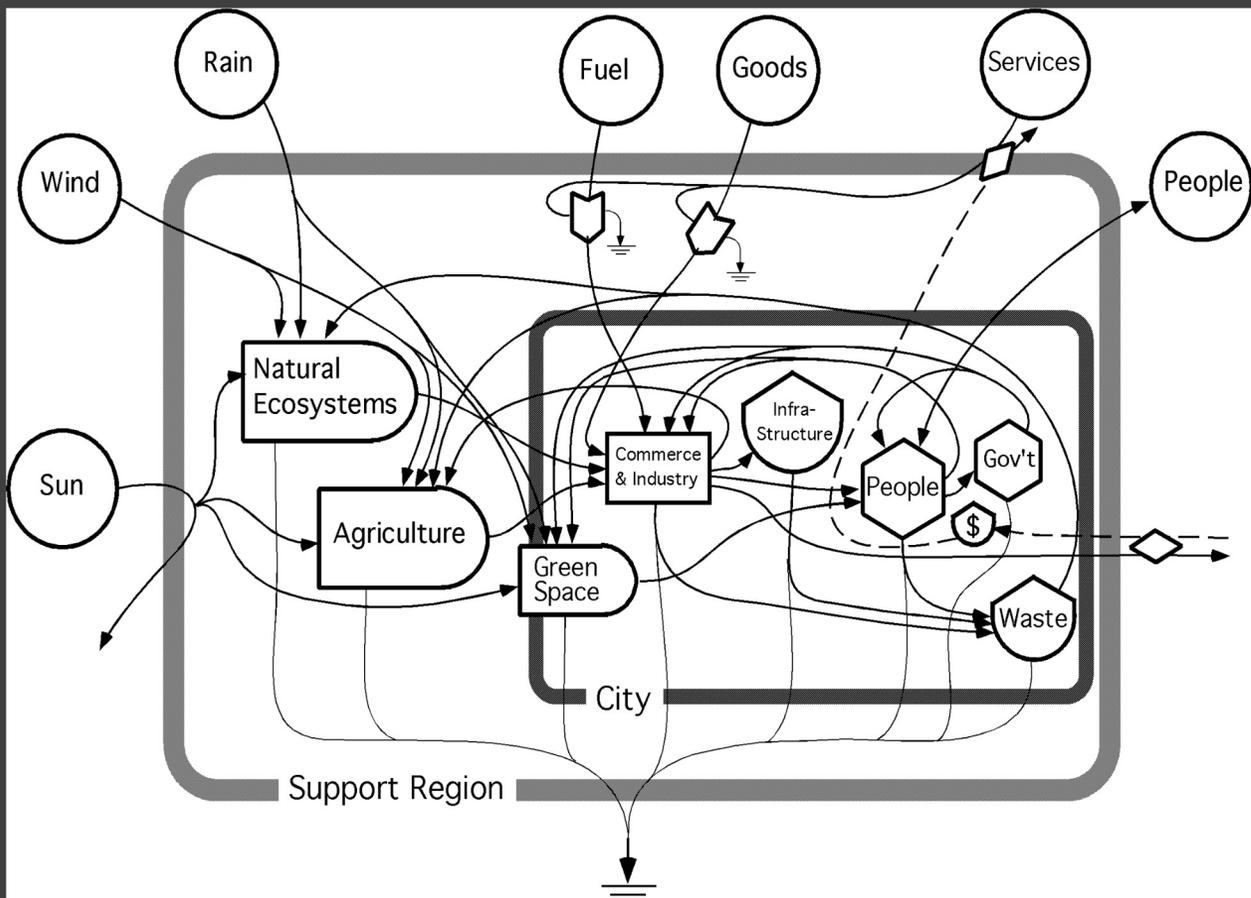


Tank: Compartment of energy storage within the system; the balance of inflows and outflows

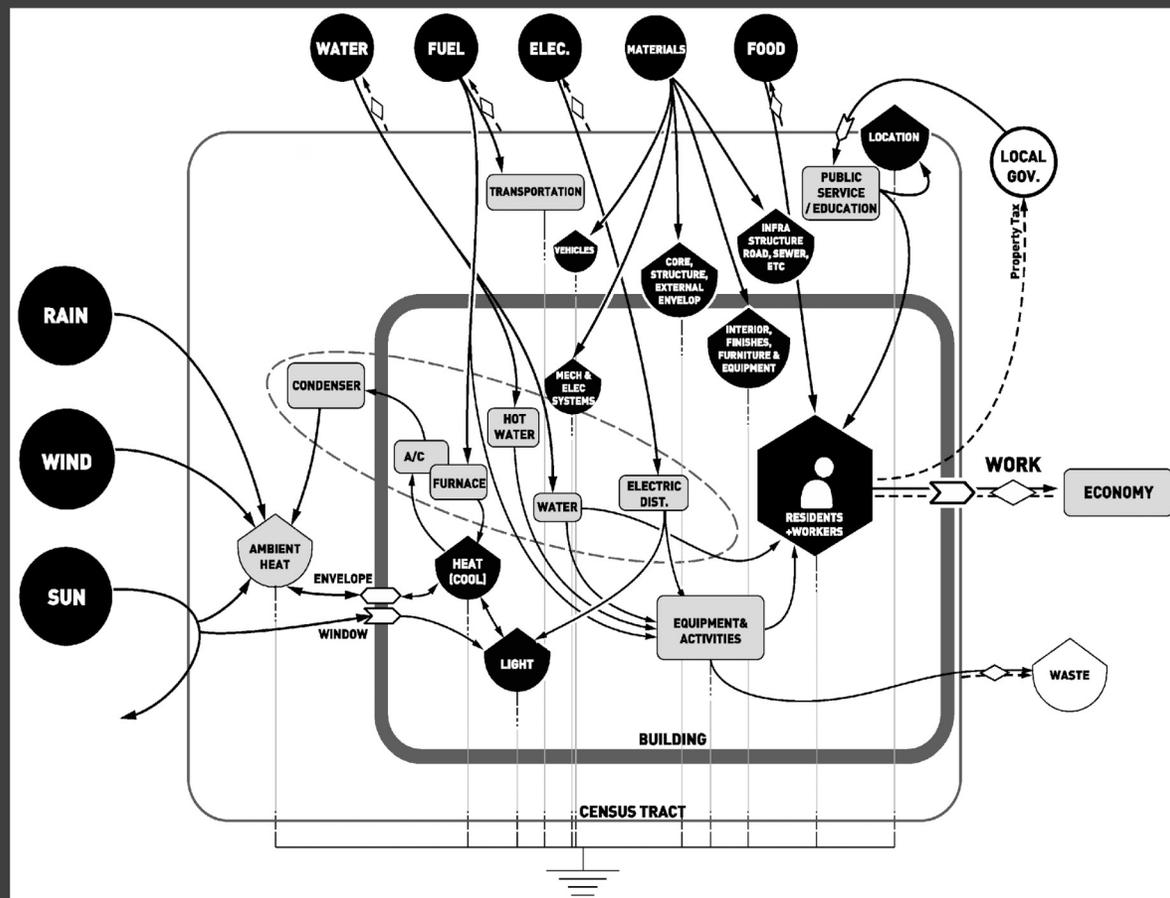


Transaction: Sale of goods/services in exchange for payment

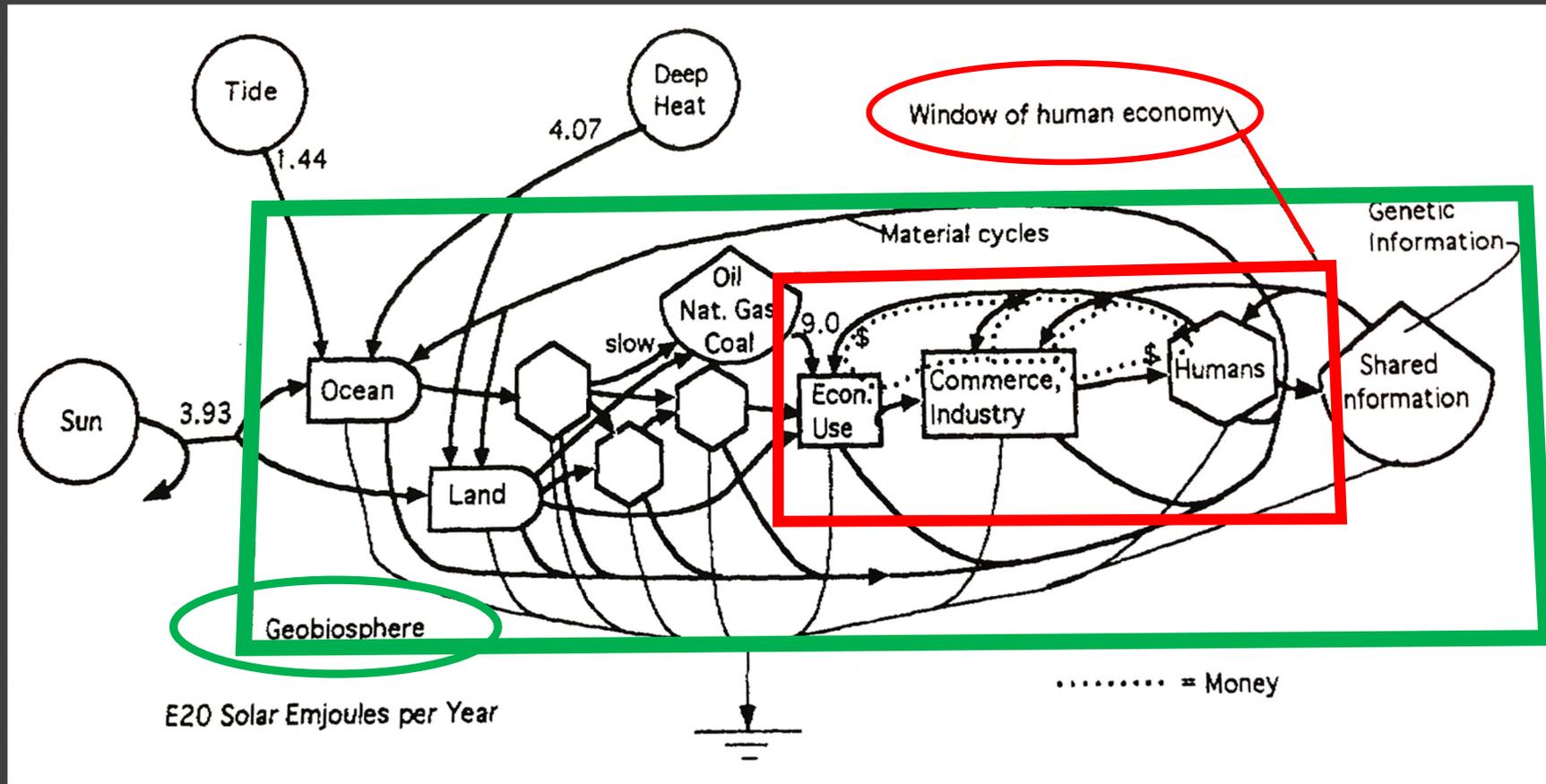
City, Support Region



Residence, Census Tract



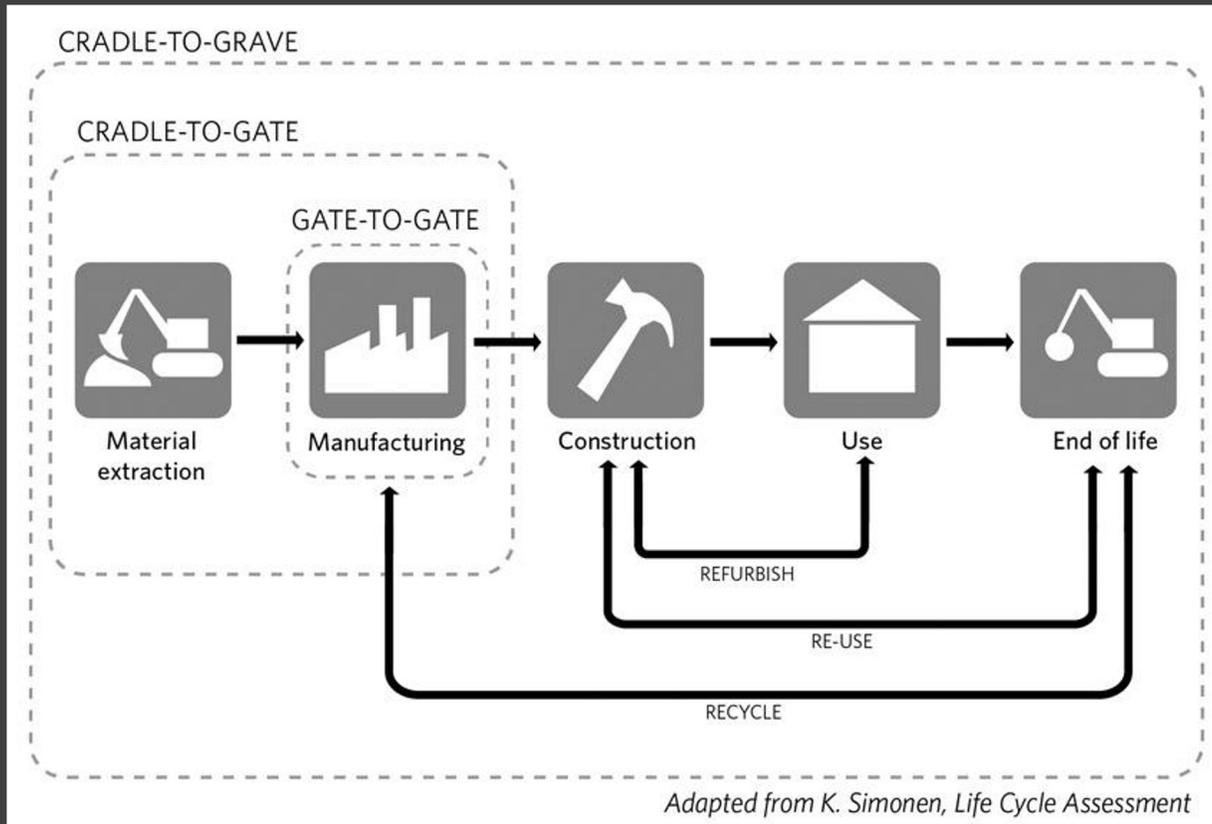
Geobiosphere & Human Economy as a System



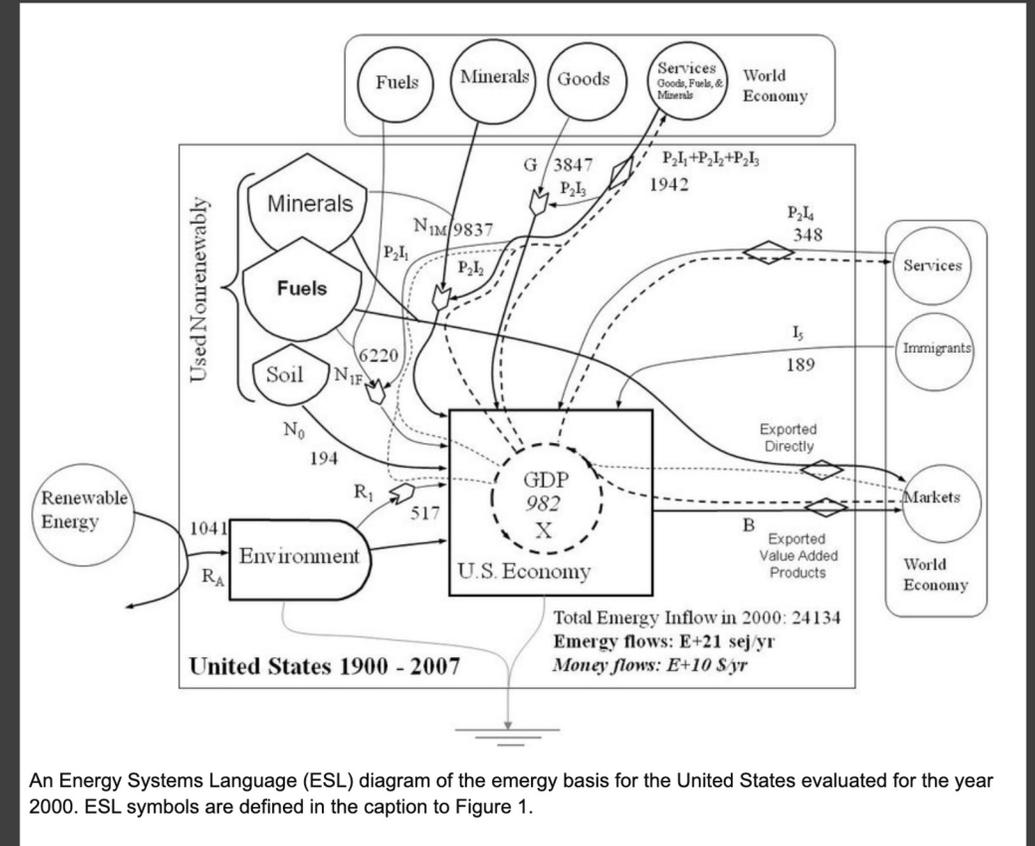
“There are no separate systems. The world is a continuum. Where to draw a boundary around a system depends on the purpose of the discussion.”

-- Donella Meadows, *Thinking in Systems*

Life Cycle Analysis (LCA) & Energy Systems Language (ESL)



Receiver side analysis
Human activity only

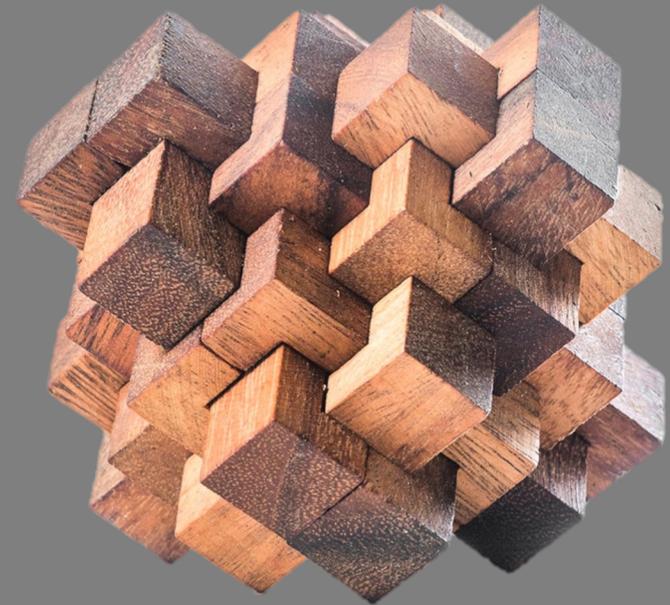


Donor side analysis
Geobiosphere participation

Leverage creates a large force using a small force



Leverage points are where a small shift in one thing produces large changes in everything.



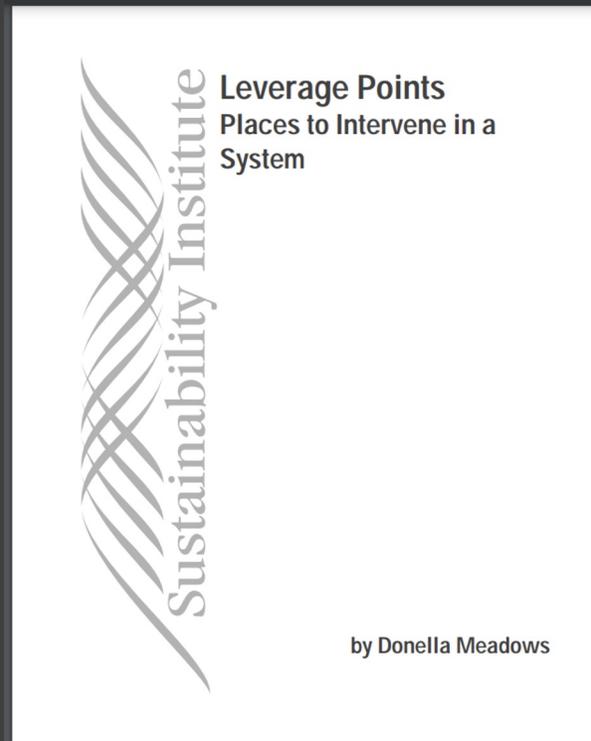
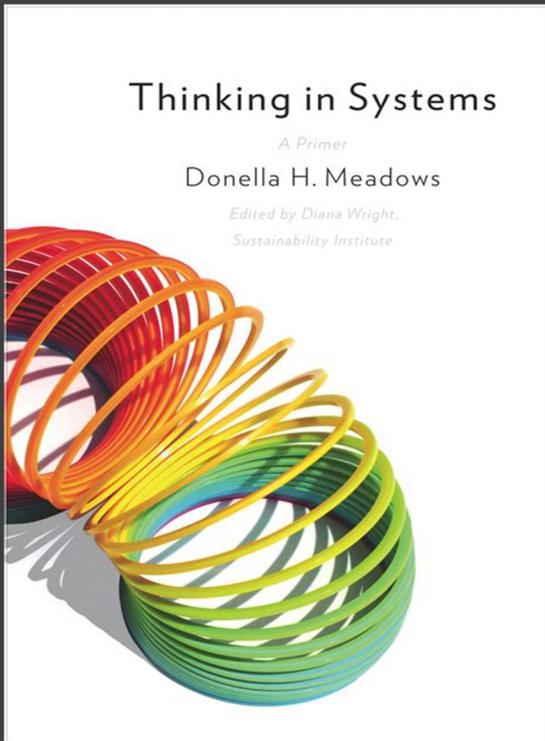


“The idea of leverage points is not unique to systems analysis – it’s embedded in legend...

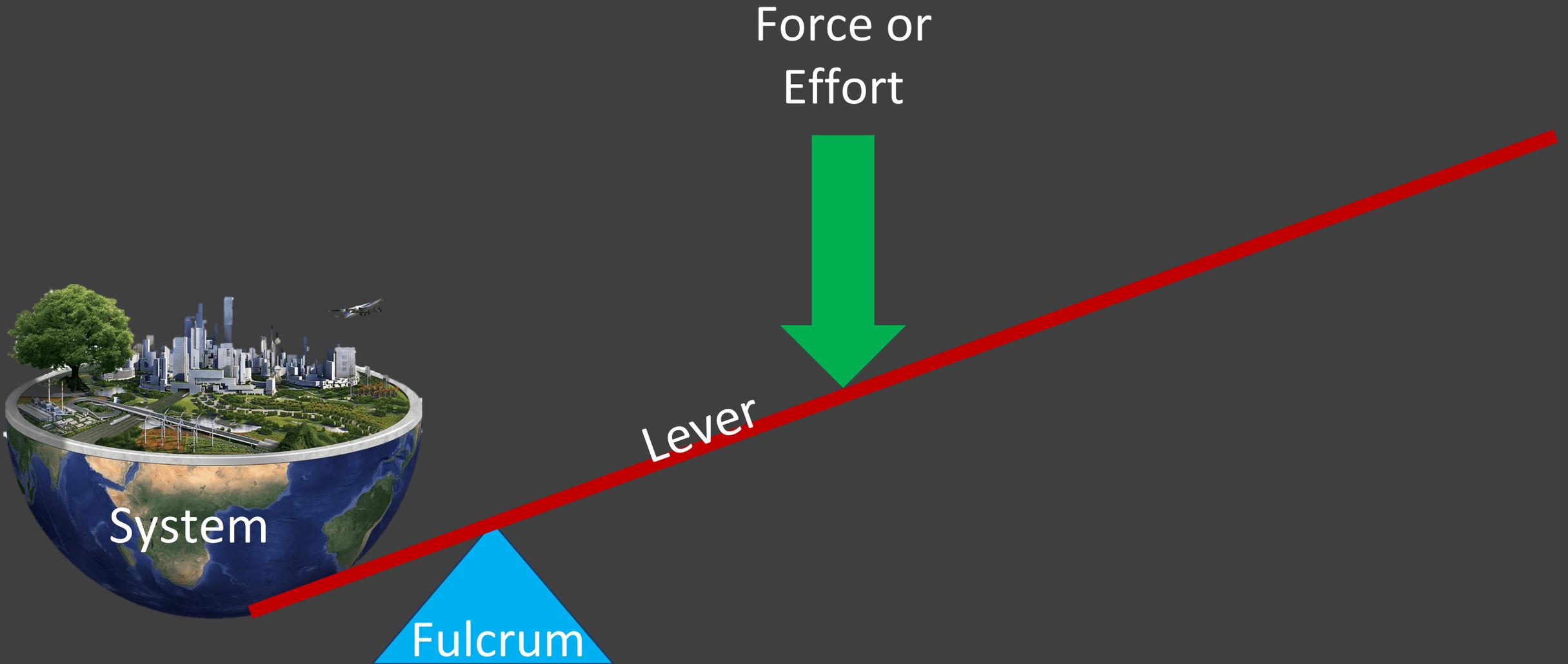
...we not only want to believe that there are leverage points, we want to know where they are and how to get our hands on them.”

Leverage points are points of power.”

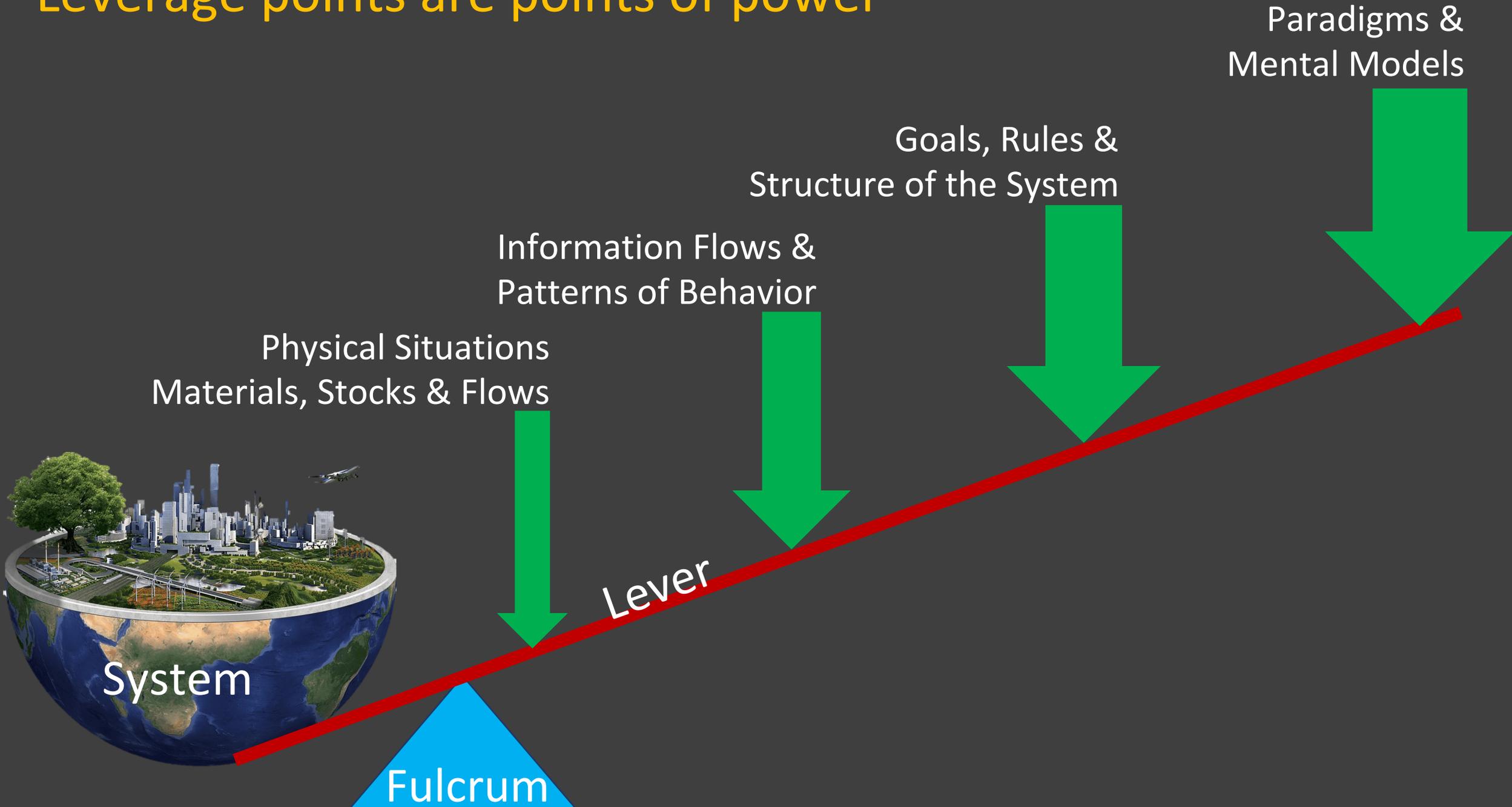
- *Donnella Meadows, Thinking in Systems*



“Leverage points are points of power”



“Leverage points are points of power”



Next Level Leverage happens by applying Phius' efforts as far from the fulcrum as possible

Paradigms & Mental Models

Goals, Rules & Structure of the System

Information Flows & Patterns of Behavior

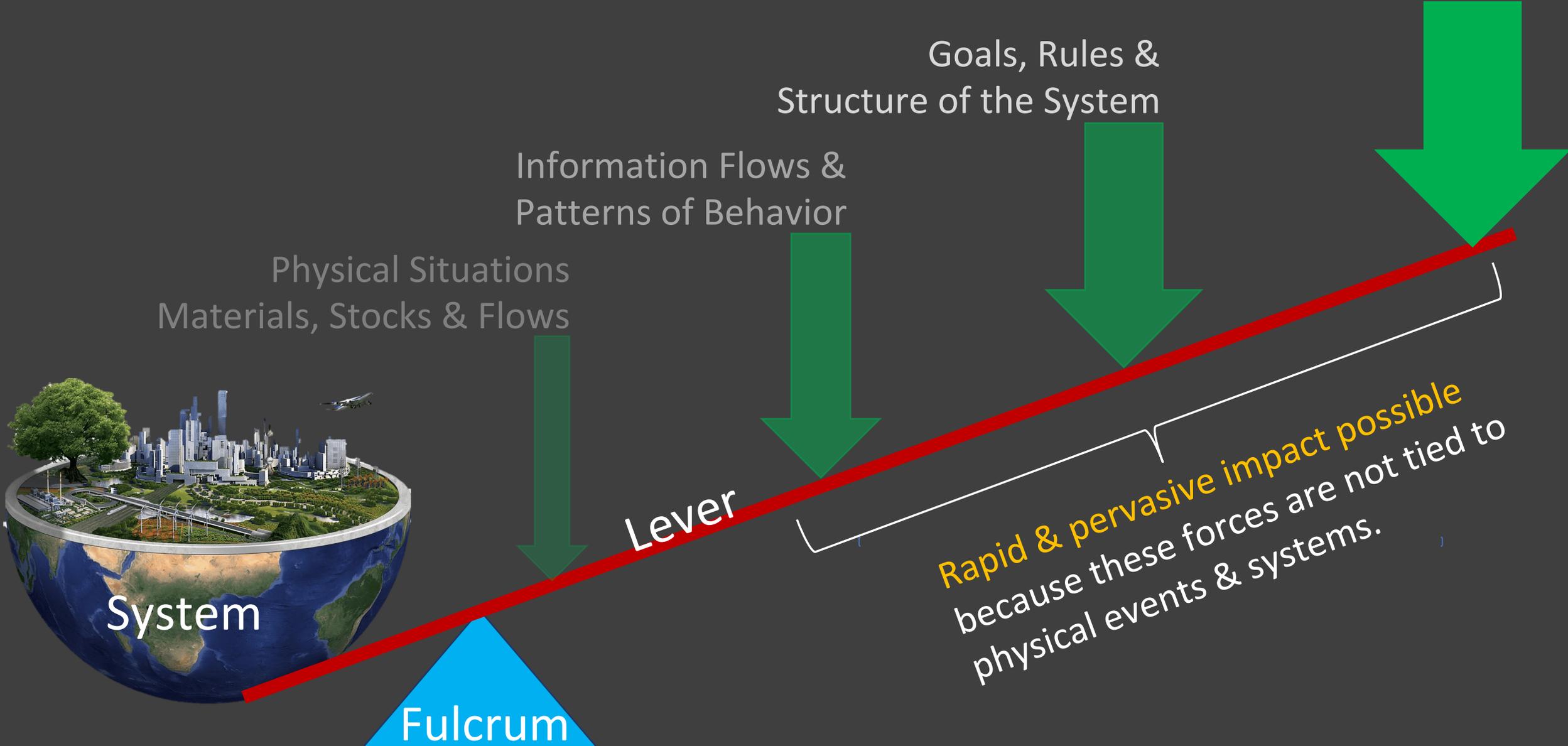
Physical Situations
Materials, Stocks & Flows



Fulcrum

Lever

Rapid & pervasive impact possible
because these forces are not tied to physical events & systems.



paradigm /pär'ə-dīm", -dīm"/

A system of assumptions, concepts, values, and practices that constitutes a way of viewing reality.

A conceptual framework—an established thought process.

A way of thinking which can occasionally lead to misleading predispositions; a prejudice.

An example serving as a model or pattern; a template.

A philosophy consisting of 'top-bottom' biases which could possibly make the practitioner susceptible to the 'confirmation bias'

Synonyms

* (example) exemplar * (way of viewing reality) model, worldview

Power of Paradigms

“If a factory is torn down but the rationality that produced it is left standing, then that rationality will simply produce another factory. If a revolution destroys a government, but **the systematic patterns of thought** that produced that government are left intact, then those patterns will repeat themselves... There’s so much talk about **the system**. And so little understanding.”

- Robert Pirsig, *Zen and the Art of Motorcycle Maintenance*

“Societal systems are **the external manifestation of cultural thinking patterns**”

– Donella Meadows, *Thinking in Systems*

All is well.
We are a
modern
rational
society.



Paradigms & Mental Models



Paradigm: A system of assumptions, concepts, values, and practices that constitutes **a way of viewing reality**



System

Lever

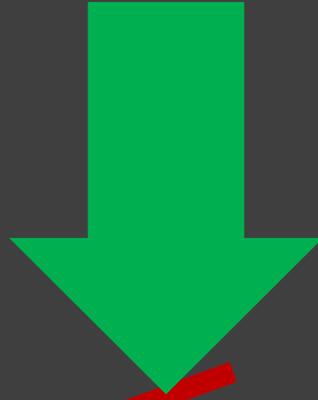
Fulcrum

To effectively engage & create change in the world
we must not fall into the trance of accepting
its dominant paradigms

Paradigms &
Transcending Paradigms

*“It is in this space of **mastery over paradigms** that people throw off addictions, live in constant joy, bring down empires... and have impacts that last for millennia.”*

- Donella Meadows, *Thinking in Systems*



Lever

Fulcrum

BLOG POST

ASHRAE 227 Passive Building Standard Released for Public Comment

Phius Senior Scientist Graham Wright provides details on the release of ASHRAE Standard 227 - Passive Building Design for public comment.

October 03, 2023

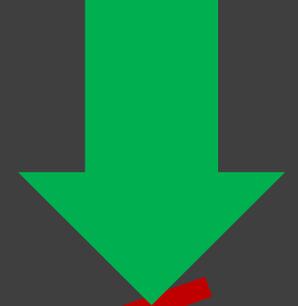
By Graham S. Wright

The Passive House community **knows how** to design and build...

...grid interactive homes
“that have exceptionally low energy usage and that are durable, resilient, comfortable, and healthy”

The PH community is the fulcrum, the lever, & the force.

Paradigms & Mental Models



System we want to influence; the coupled geobiosphere and global economy



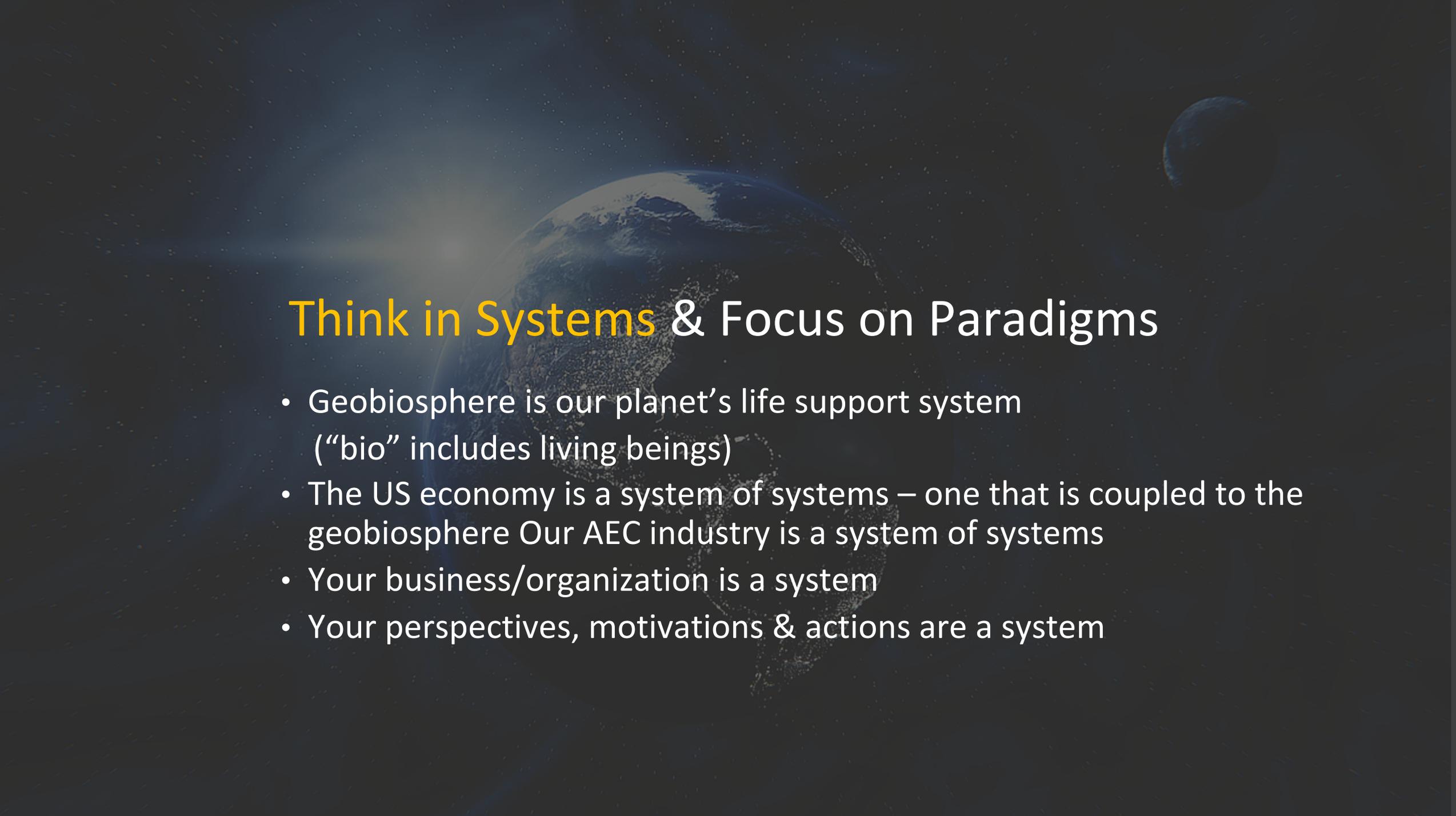
Lever

Lever bar must long and strong; PH community has proven strength - length is the breadth of our connections - from jobsites to industry leaders & gov't institutions

Fulcrum

Fulcrum must be close the system we want to influence – we are working directly with & within society

Fulcrum must be strong; it bears great pressure. emotional pressure of swimming upstream in society with a refusal to give up



Think in Systems & Focus on Paradigms

- Geobiosphere is our planet's life support system ("bio" includes living beings)
- The US economy is a system of systems – one that is coupled to the geobiosphere Our AEC industry is a system of systems
- Your business/organization is a system
- Your perspectives, motivations & actions are a system

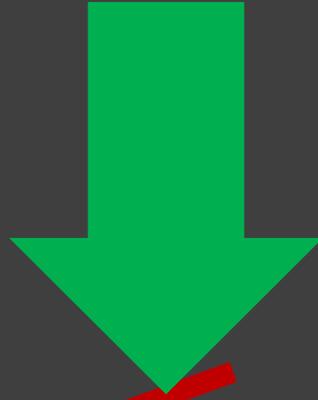


Think in Systems & Focus on Paradigms

- Speak to paradigms (not just things) whenever you can
- Paradigms have power to cause rapid and pervasive changes in a system
- Recognize paradigms in the world, your industry, your business, and your own mind
- Transcend paradigms, stay open, humble and ready to learn

Paradigms &
Transcending Paradigms

Next Level Leverage happens when we
Think in Systems & Focus on Paradigms



Lever

Fulcrum



Thank You

Graham Irwin, NCARB, CPHC
Kristof Irwin, PE

PhiusCon'23

How do we get folks to line up at the Phius restaurant?



Better Maps



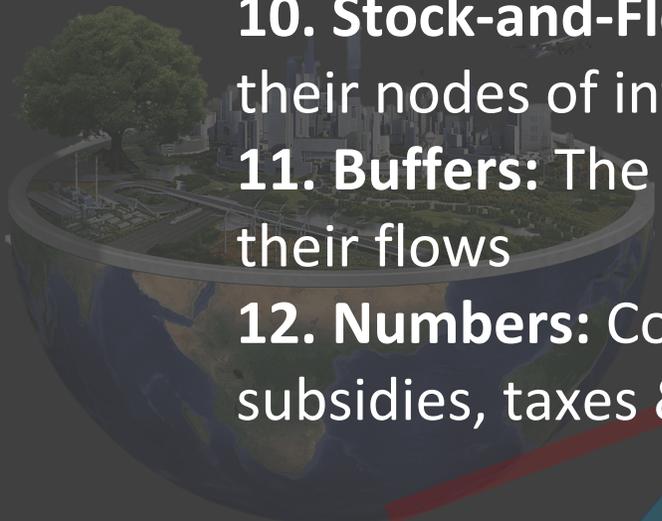
Paradigms & Mental Models

Goals, Rules & Structure of the System

Information Flows & Patterns of Behavior

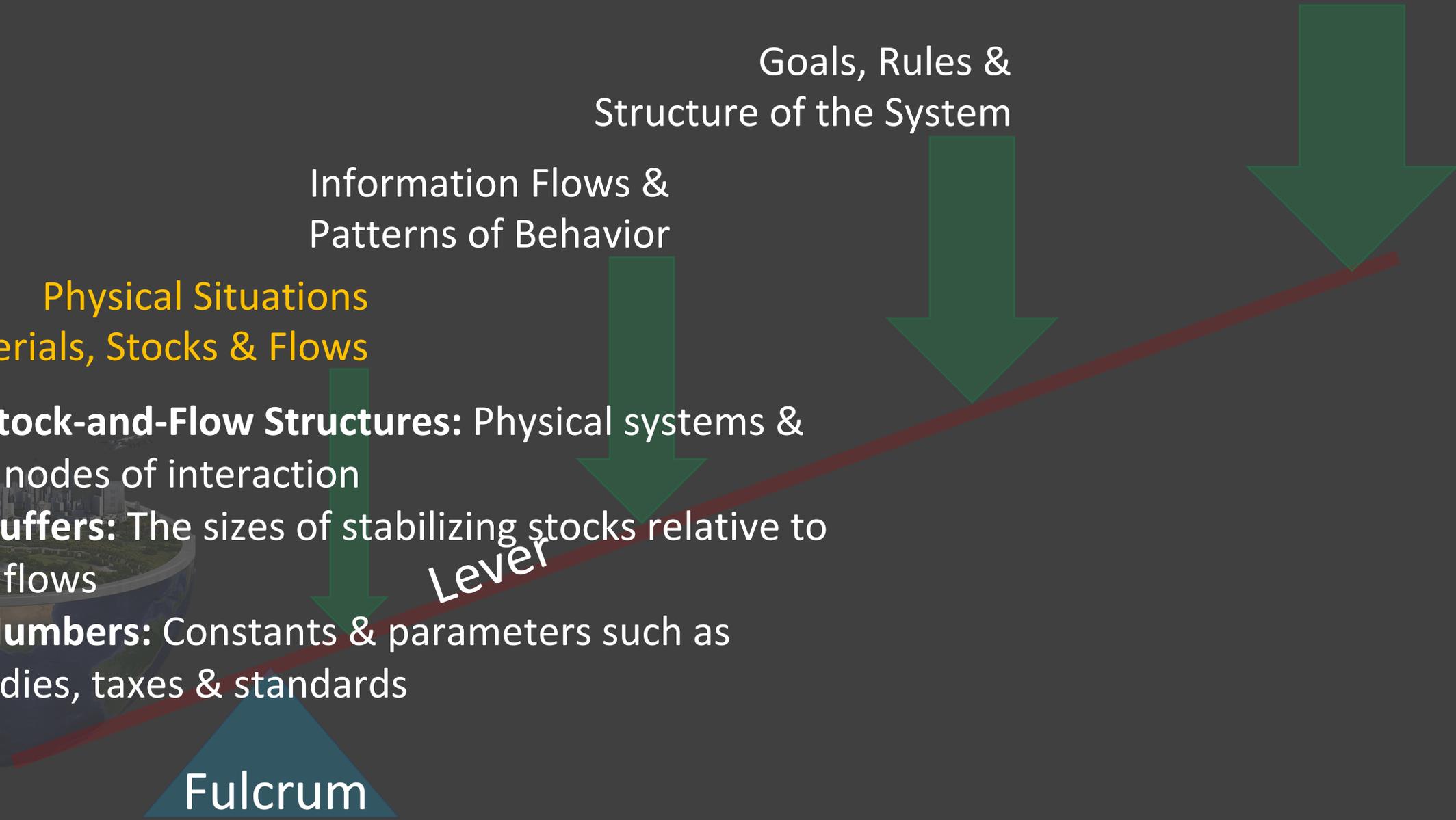
Physical Situations
Materials, Stocks & Flows

- 10. **Stock-and-Flow Structures:** Physical systems & their nodes of interaction
- 11. **Buffers:** The sizes of stabilizing stocks relative to their flows
- 12. **Numbers:** Constants & parameters such as subsidies, taxes & standards



Lever

Fulcrum



Paradigms & Mental Models

Goals, Rules & Structure of the System

Information Flows & Patterns of Behavior

Physical Situations
Materials, Stocks & Flows



System

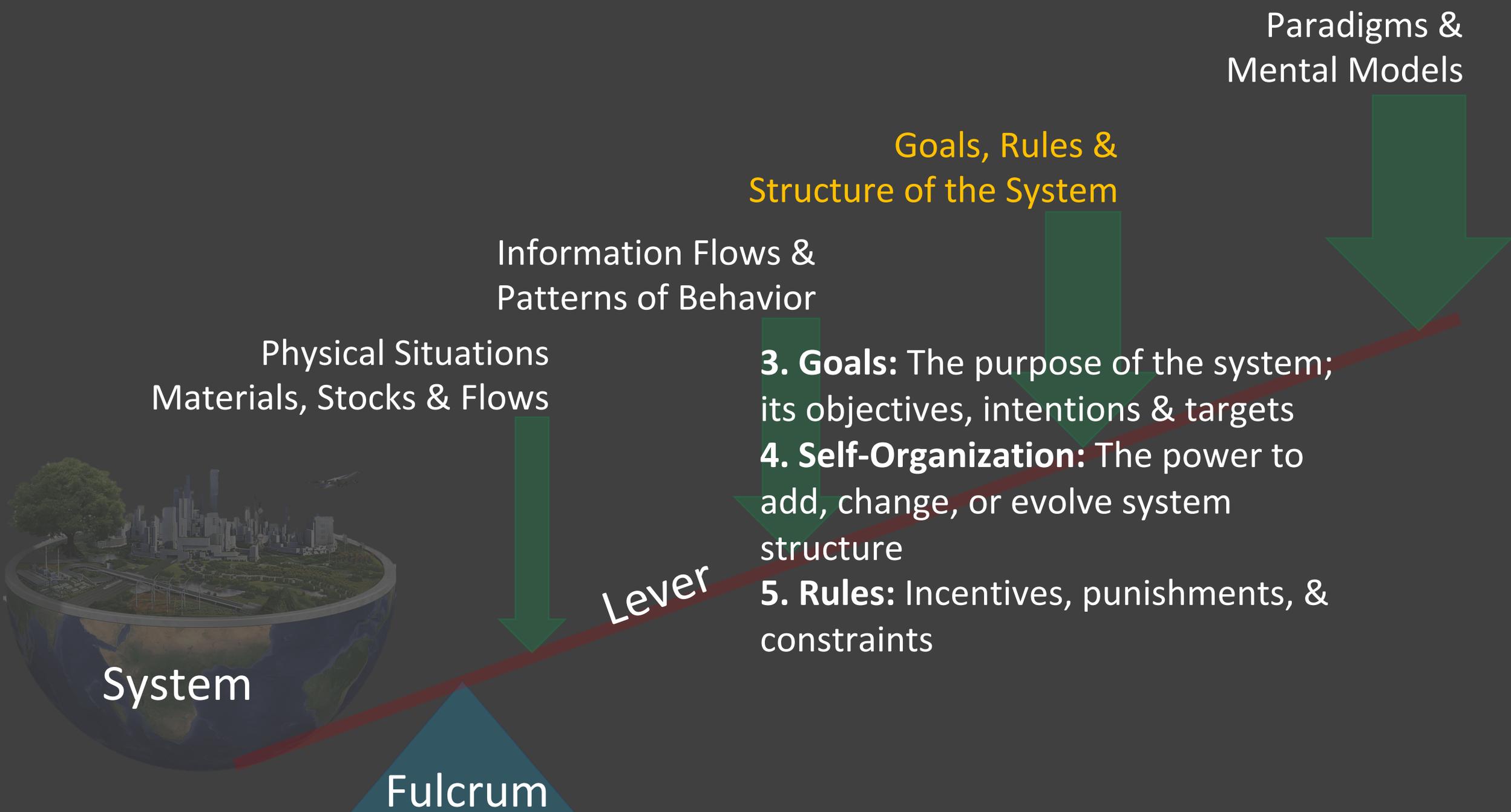
6. Information Flows: The structure of who does & does not have access to information

7. Reinforcing Feedback Loops: the strength of the gain driving loops

8. Balancing Feedback Loops: The strength of feedbacks relative to the impacts they try to correct

9. Delays: The length of time relative to the rates of systems changes

Lever



Paradigms & Mental Models

Goals, Rules & Structure of the System

Information Flows & Patterns of Behavior

Physical Situations
Materials, Stocks & Flows

3. Goals: The purpose of the system; its objectives, intentions & targets

4. Self-Organization: The power to add, change, or evolve system structure

5. Rules: Incentives, punishments, & constraints

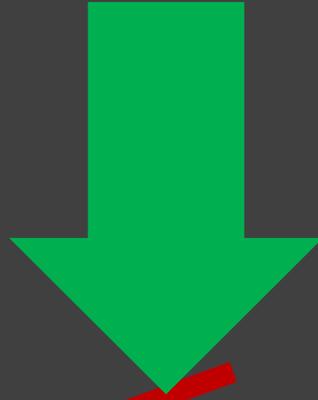
Lever

System

Fulcrum

Next Level Leverage happens by applying Phius' efforts as far from the fulcrum as possible

Paradigms & Mental Models



2. Paradigms: the way of viewing reality out of which the system – *its goals, structure, rules, delays & parameters* – arises

1. Transcending Paradigms: Stay humble, open, aware & fluid; Impacts here can last for millennia



Lever

Fulcrum