



BUILDING THE FOUNDATIONS OF SUSTAINABILITY

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GLOBAL SUSTAINABILITY – A NOBEL CAUSE
1ST INTERDISCIPLINARY SYMPOSIUM

8–10 OCTOBER 2007, POTSDAM

Potsdam Memorandum

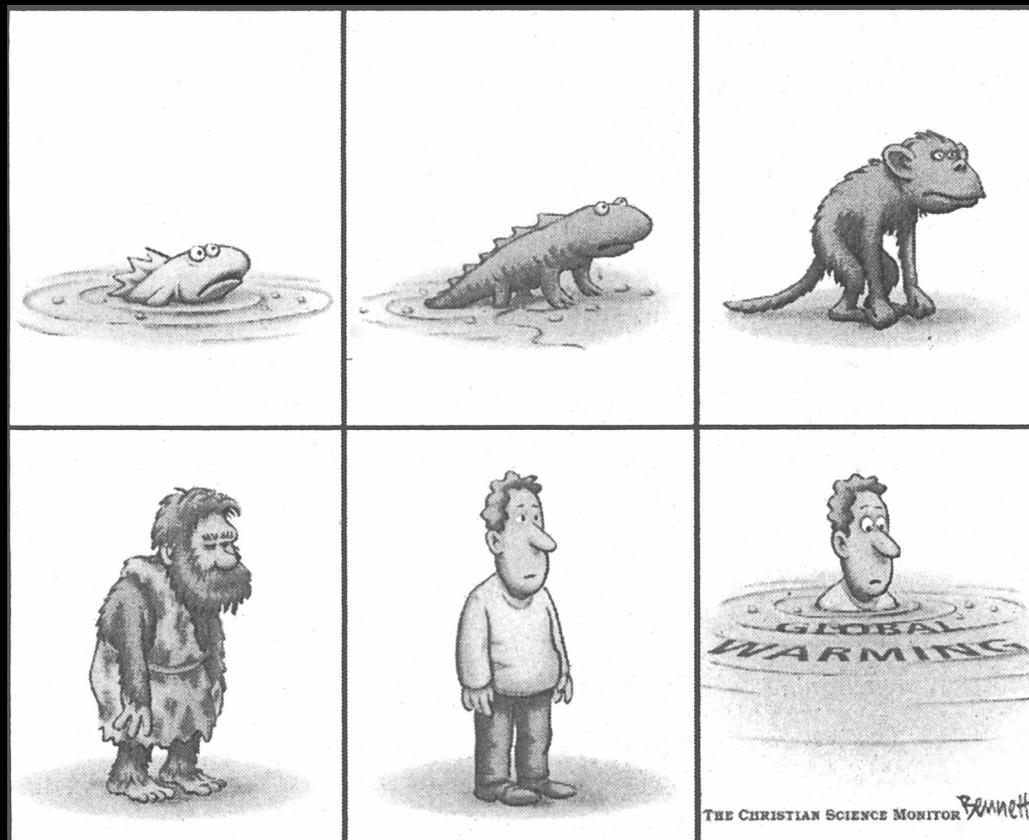
Main Conclusions
from the Symposium

“Global Sustainability: A Nobel Cause”,
Potsdam, Germany, 8-10 October 2007

We are standing at a moment in history when a great transformation is needed to respond to the immense threat to our planet. This transformation must begin immediately and is strongly supported by all present at the Potsdam Nobel Laureates Symposium.



The Evolution of Public Perception



It was only an academic symposium, to be sure, and none of the scholars claimed to have a master plan to eradicate the threat of climate change. Still, there was a whiff of validation, if not victory, in the air.

– Mark Lander, *New York Times*,
October 11, 2007

Observations

The sciences of Earth and space cannot be considered independently because:

- Earth is an open system
- Many important things are known about planetary evolution only because we direct our vision outward

Observations

Planetary evolution proceeds by an astonishingly complicated, interacting set of physical, chemical, and biological processes

- Planetary evolution lies in the intellectual realm of complexity
- Studies of planetary evolution are necessarily transdisciplinary and are not described well by traditional definitions of “earth science” and “planetary science”

Observations

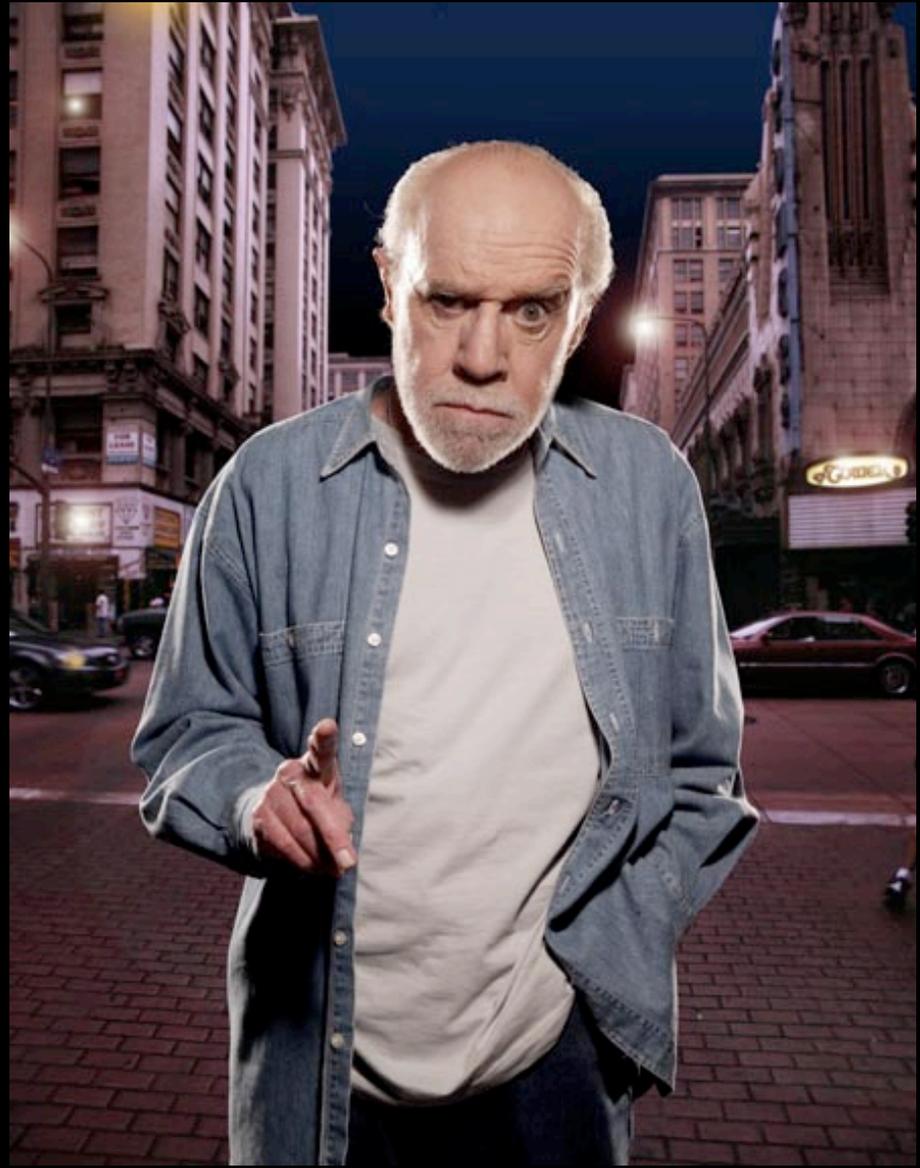
This transdisciplinary science naturally includes studies of the co-evolution of Earth and human societies

- After all, the growth and spread of human societies has been dictated by the environment
- Moreover, we have become a globally important agent of geologic change

George Carlin on the Earth System

The Planet is Fine!

“Save the planet? We don’t know how to save ourselves.”

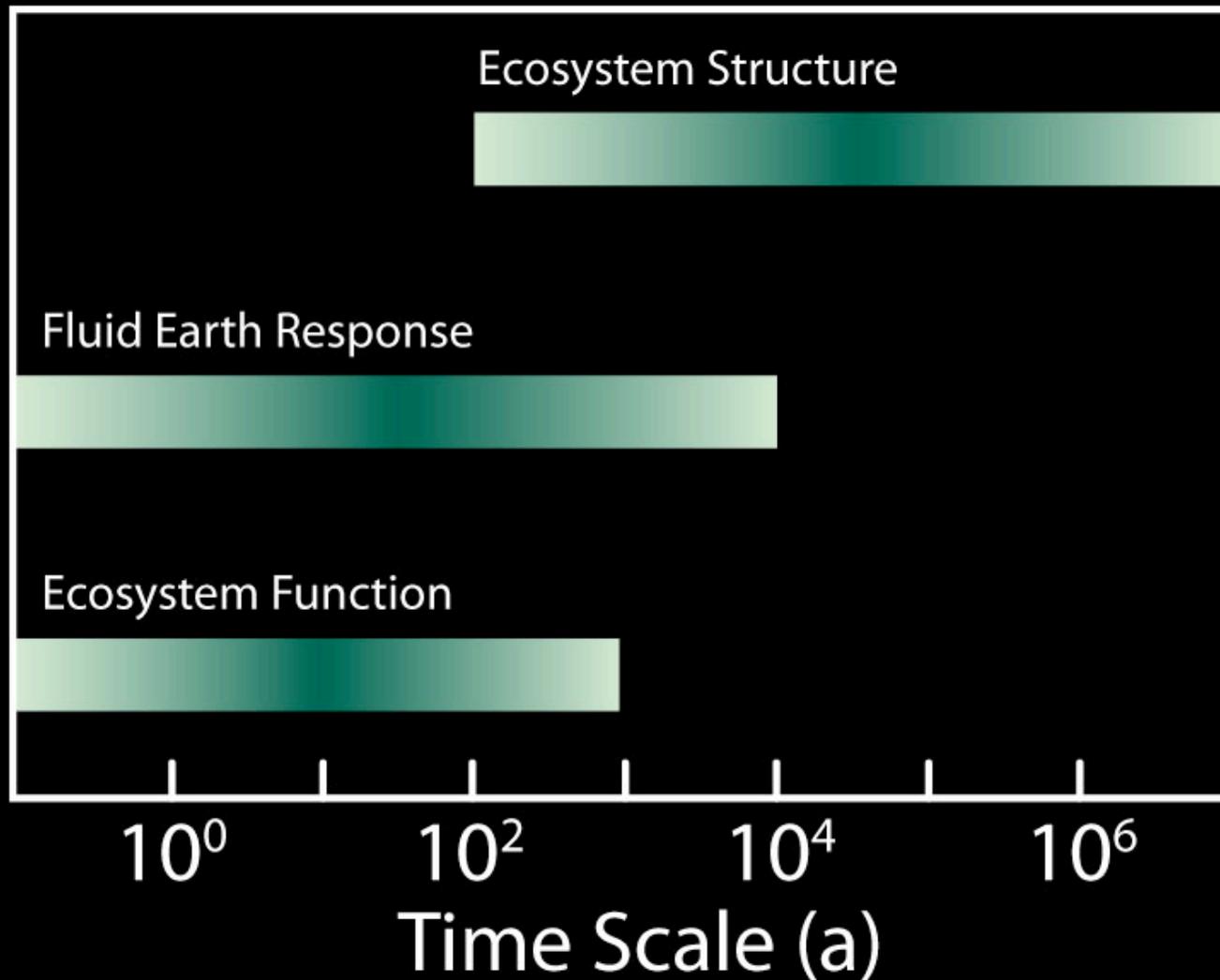


Thinking About Sustainability...

Since Earth is a complex, dynamic system:

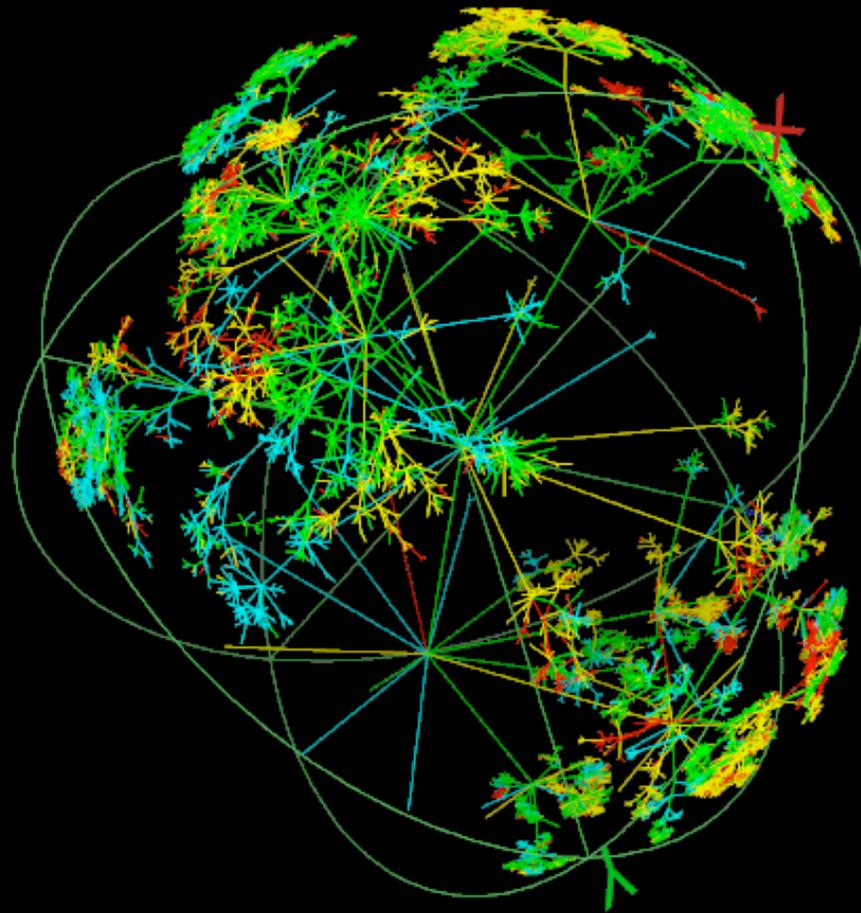
- System behavior is defined by process interactions among the solid and fluid components of the planet and the organisms that live there
- Understanding the co-evolution of these components at different spatial and temporal scales is key to successful stewardship of Earth's environment

Ecosystems and Their Services



A Pathway to Effective Stewardship

Create a theoretical framework based on emerging concepts about system dynamics



Establish the Proper Perspective

Develop an integrated knowledge base for Earth system history over timescales of billions of years to decades



Take the Pulse of the Planet

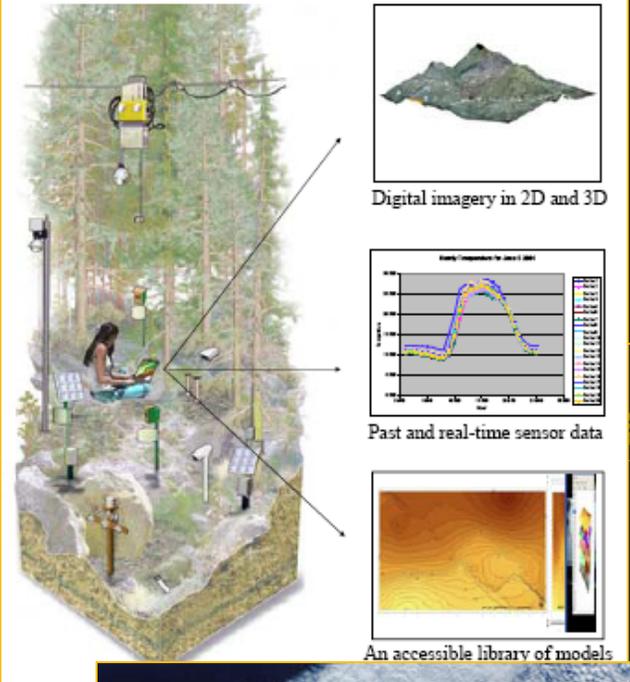
Design and build effective monitoring systems for modern Earth processes



There are major gaps in global and national monitoring systems that result in the absence of well-documented, comparable, time-series information for many ecosystem features.

– *Millennium Ecosystem Assessment*

Embrace a Fusion of Science and Technology

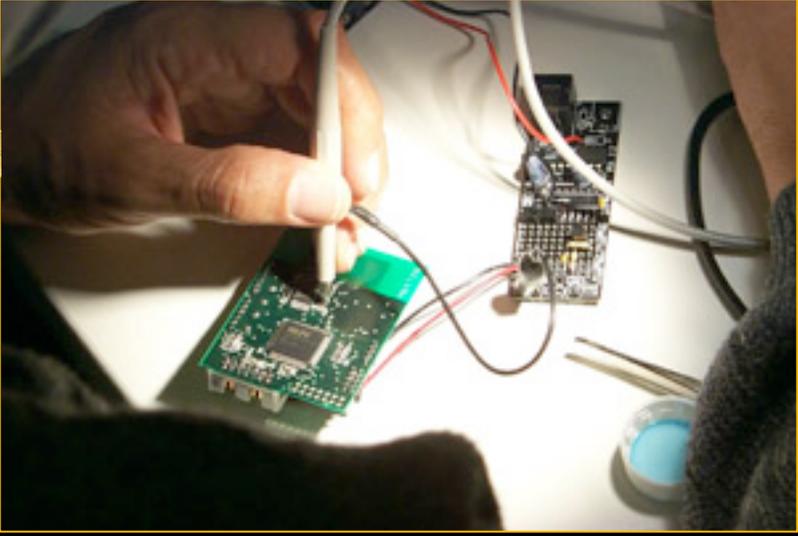
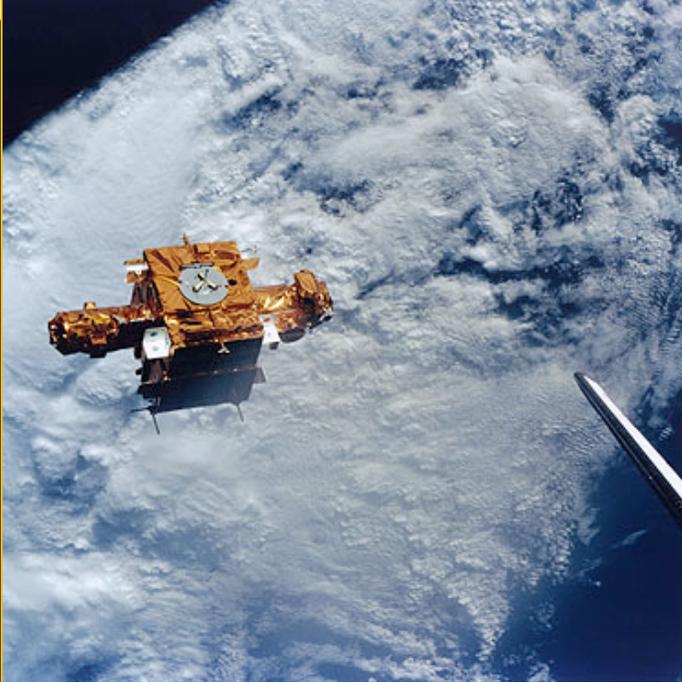


Digital imagery in 2D and 3D

Past and real-time sensor data

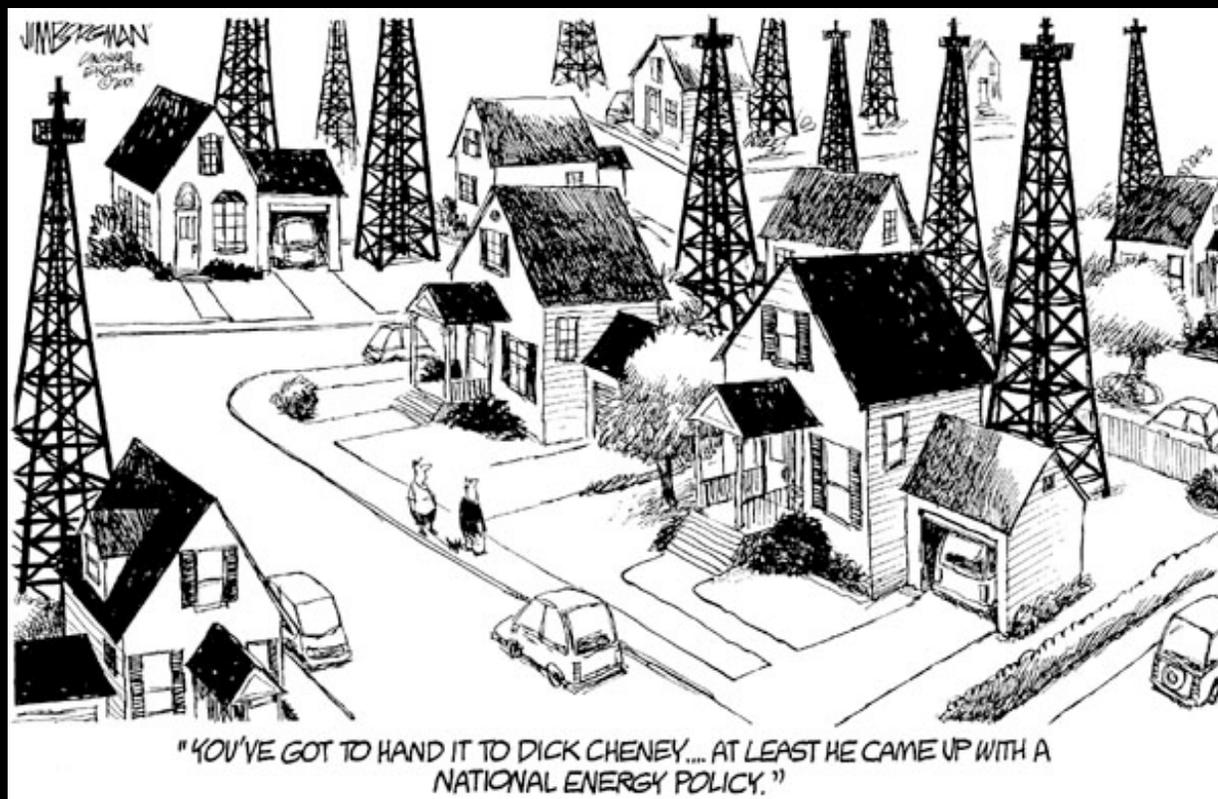
An accessible library of models

This composite image illustrates the integration of science and technology in a natural environment. On the left, a person is shown in a forest setting, surrounded by various sensors and data collection equipment. Three arrows point from this scene to three distinct data visualizations on the right: a 3D topographic map, a line graph showing sensor data over time, and a 2D topographic map with a color-coded elevation scale.



Envision the Future

Employ historical and modern data to define future “possibility space” and use the results to develop sound environmental and energy policy



Why Not Stop There?



The Case for a Broader View of Sustainability



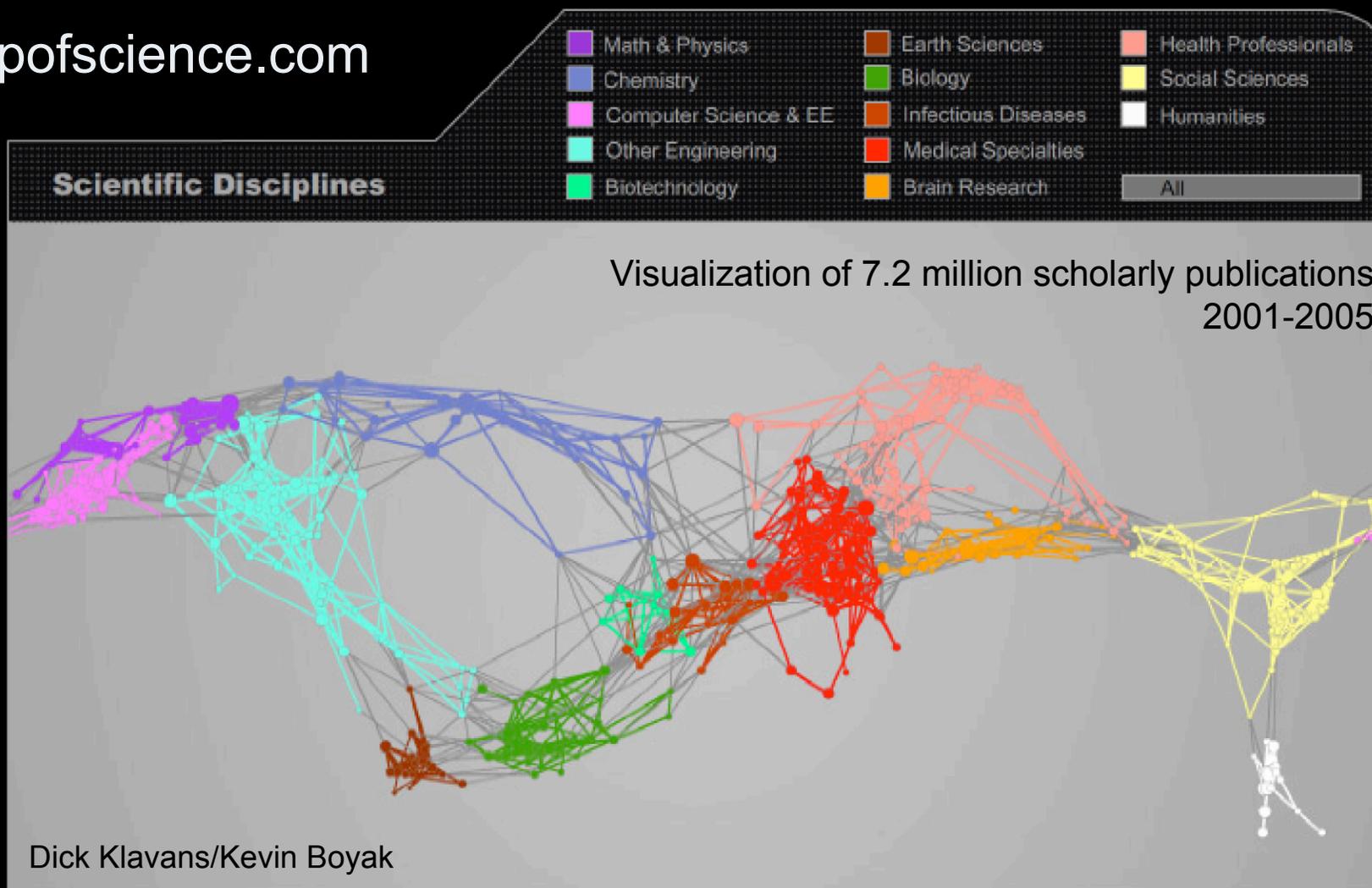
Image courtesy of NASA



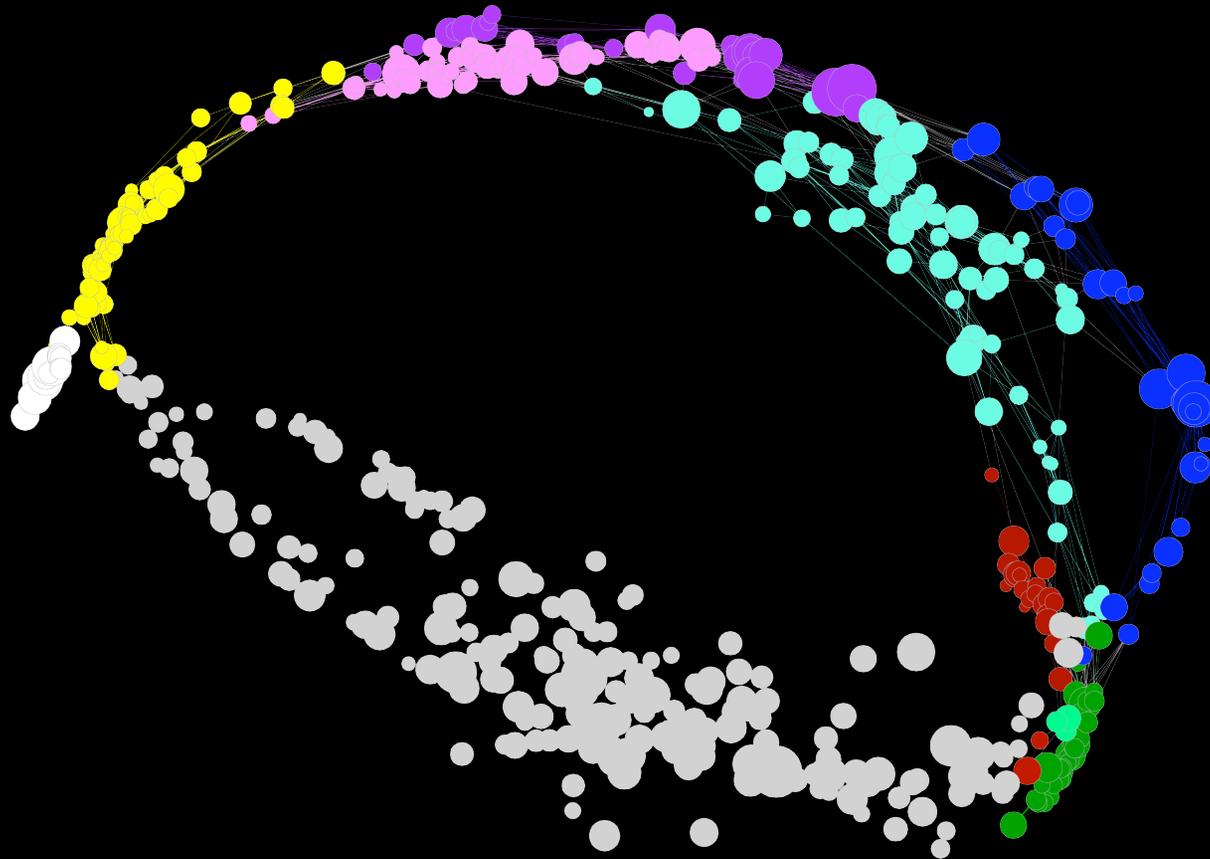
Lukas Cranach (1522)

Conceptualizing Sustainability Science

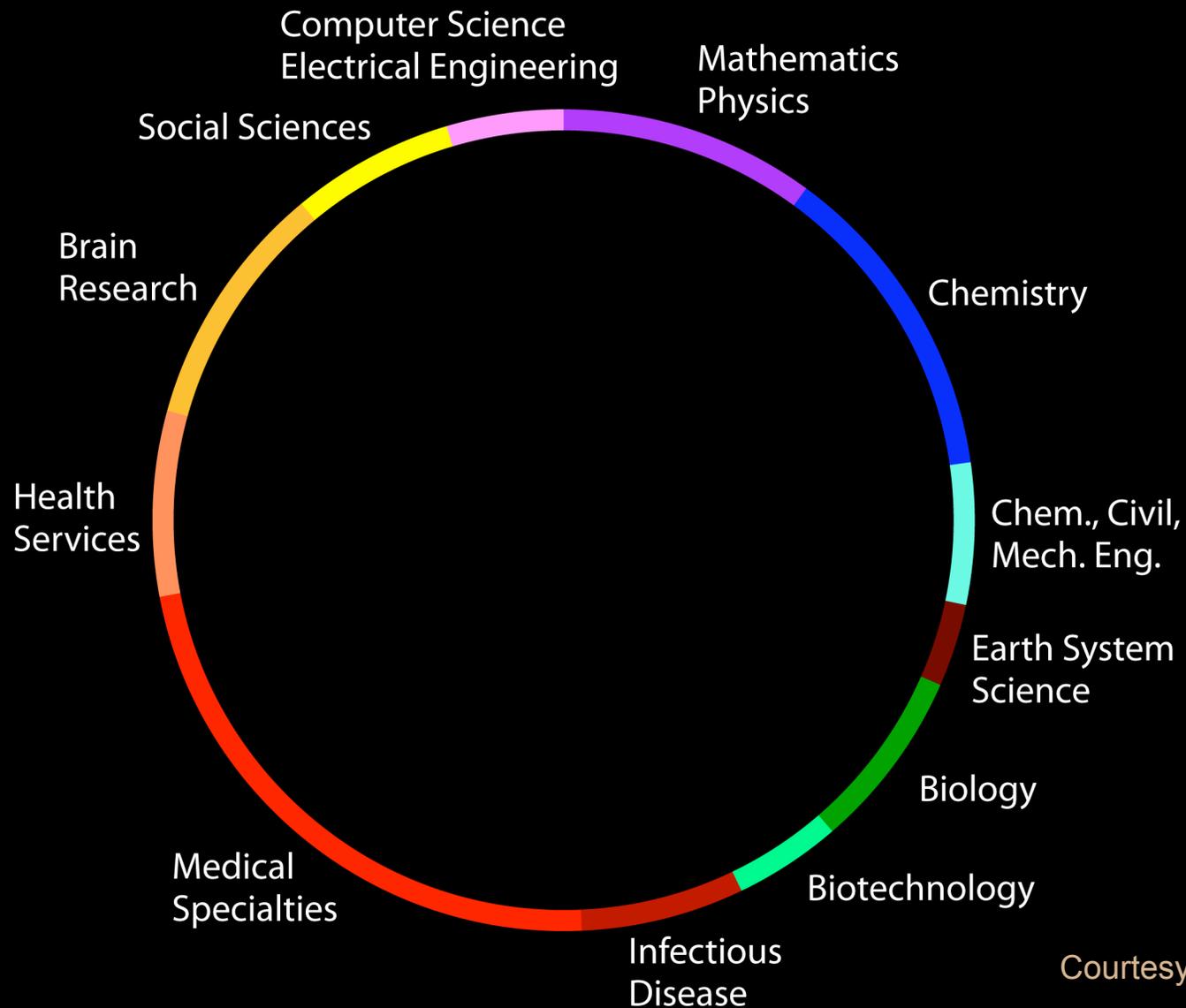
mapofscience.com



Building a Simpler View

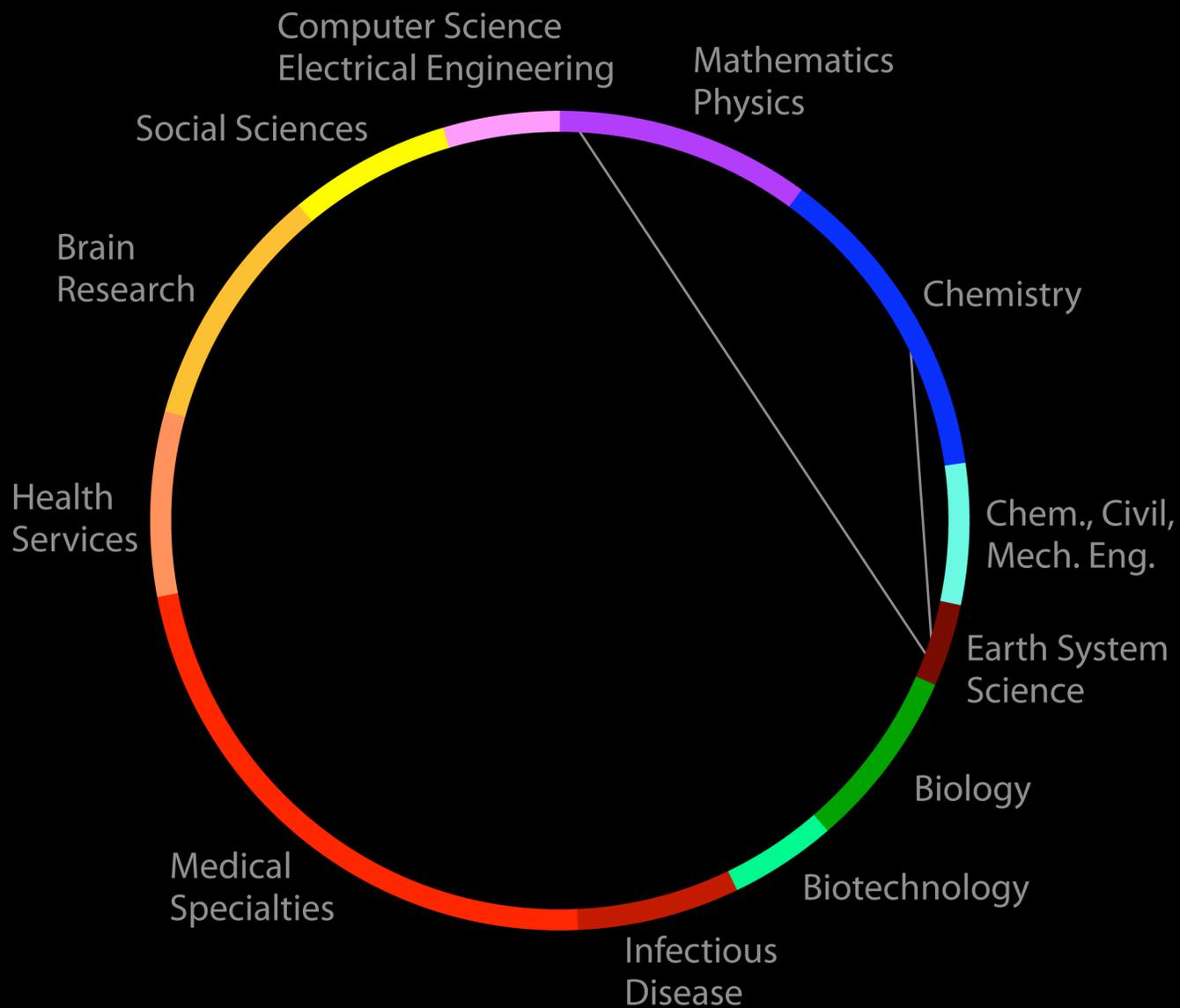


The Ring of Science and Engineering

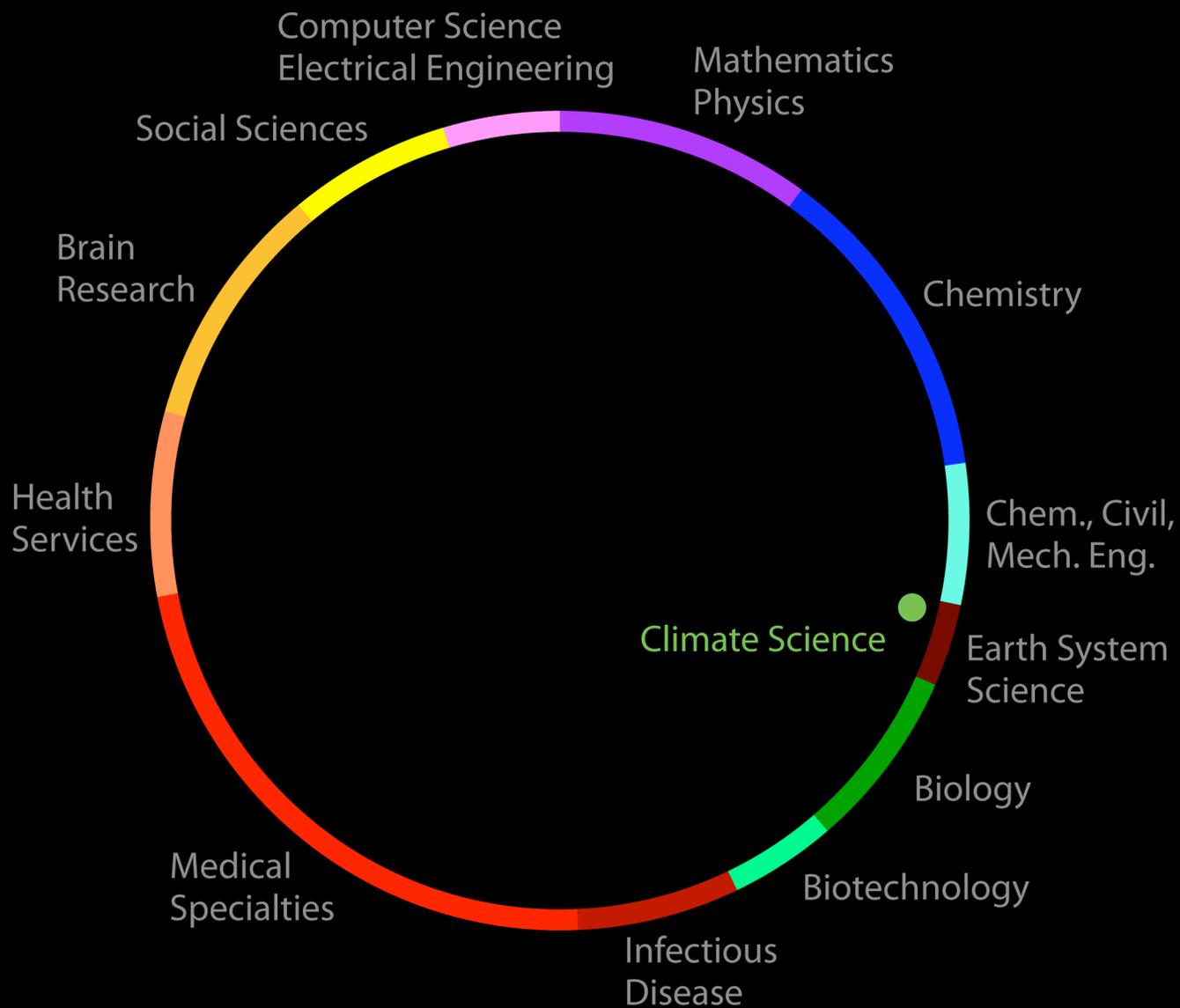


Courtesy: Dick Klavans

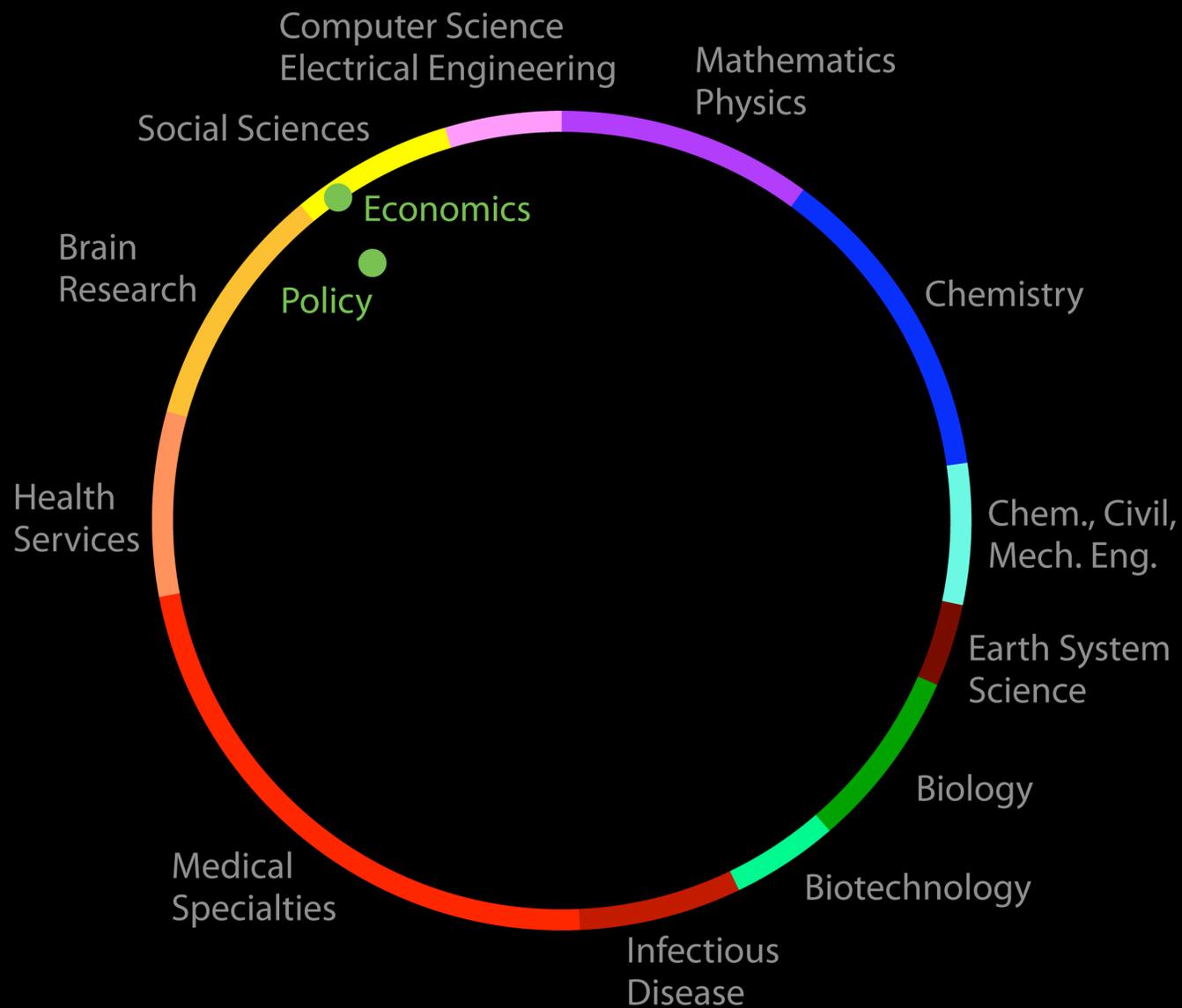
Climate Science



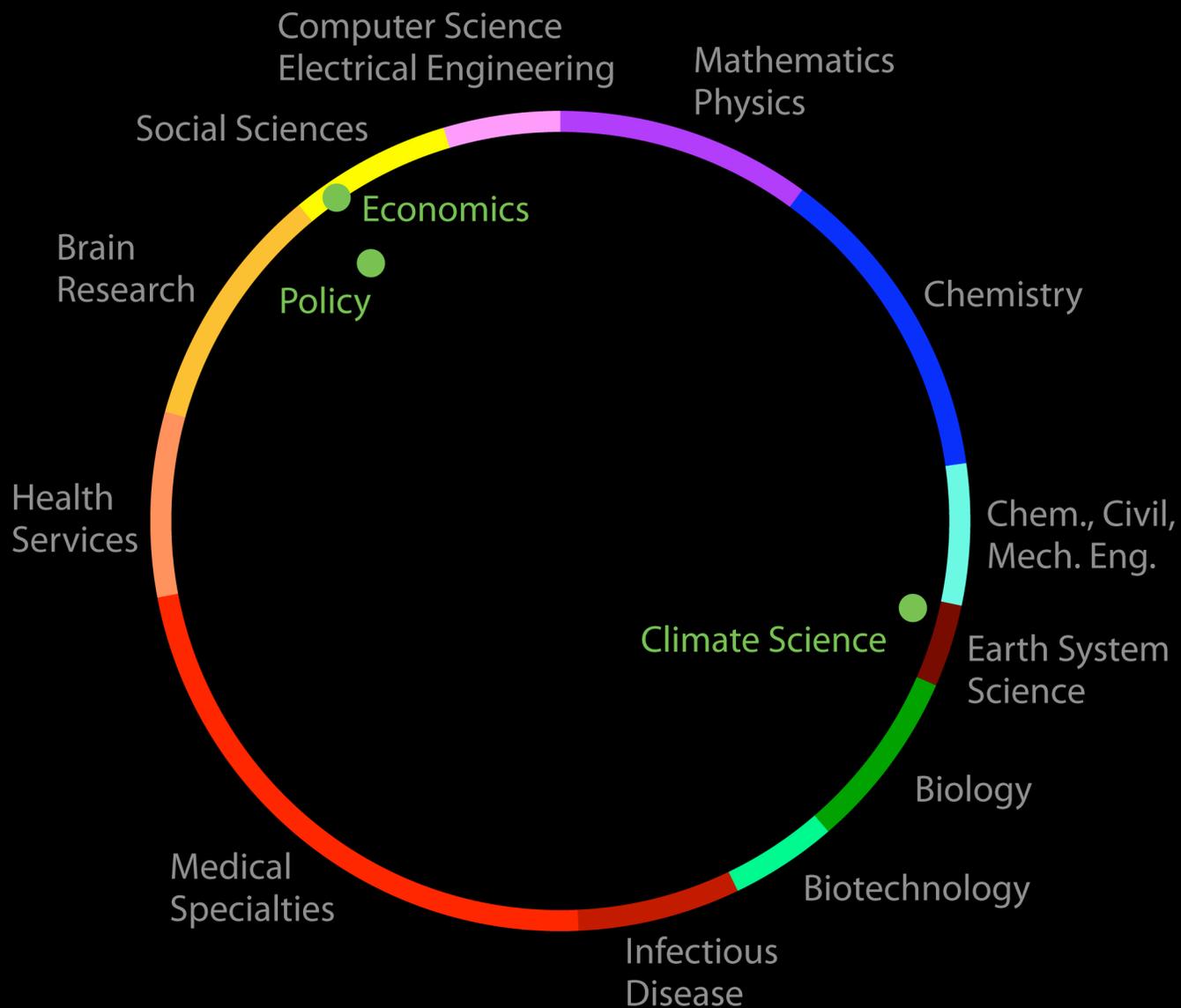
Climate Science



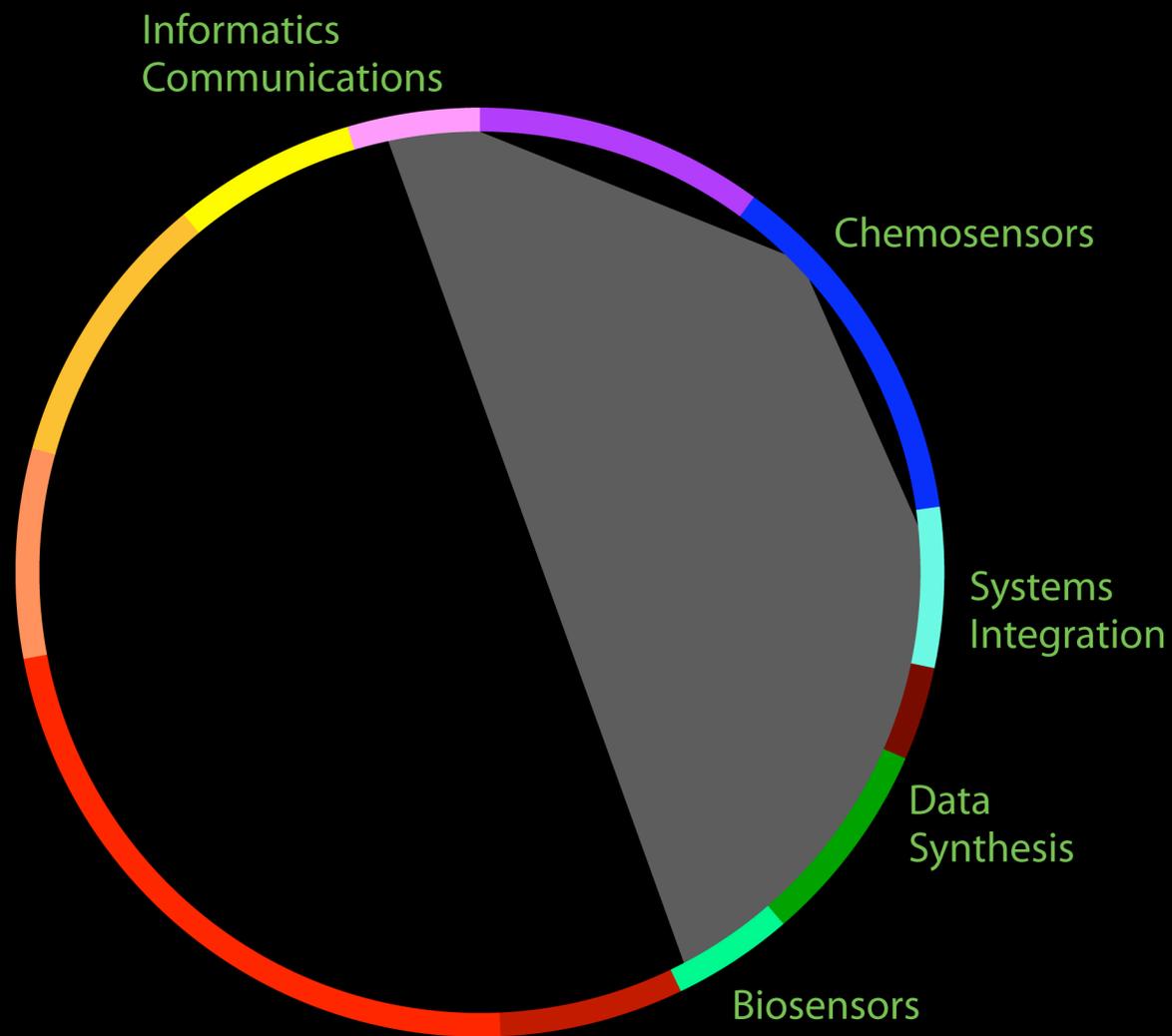
Economics and Policy



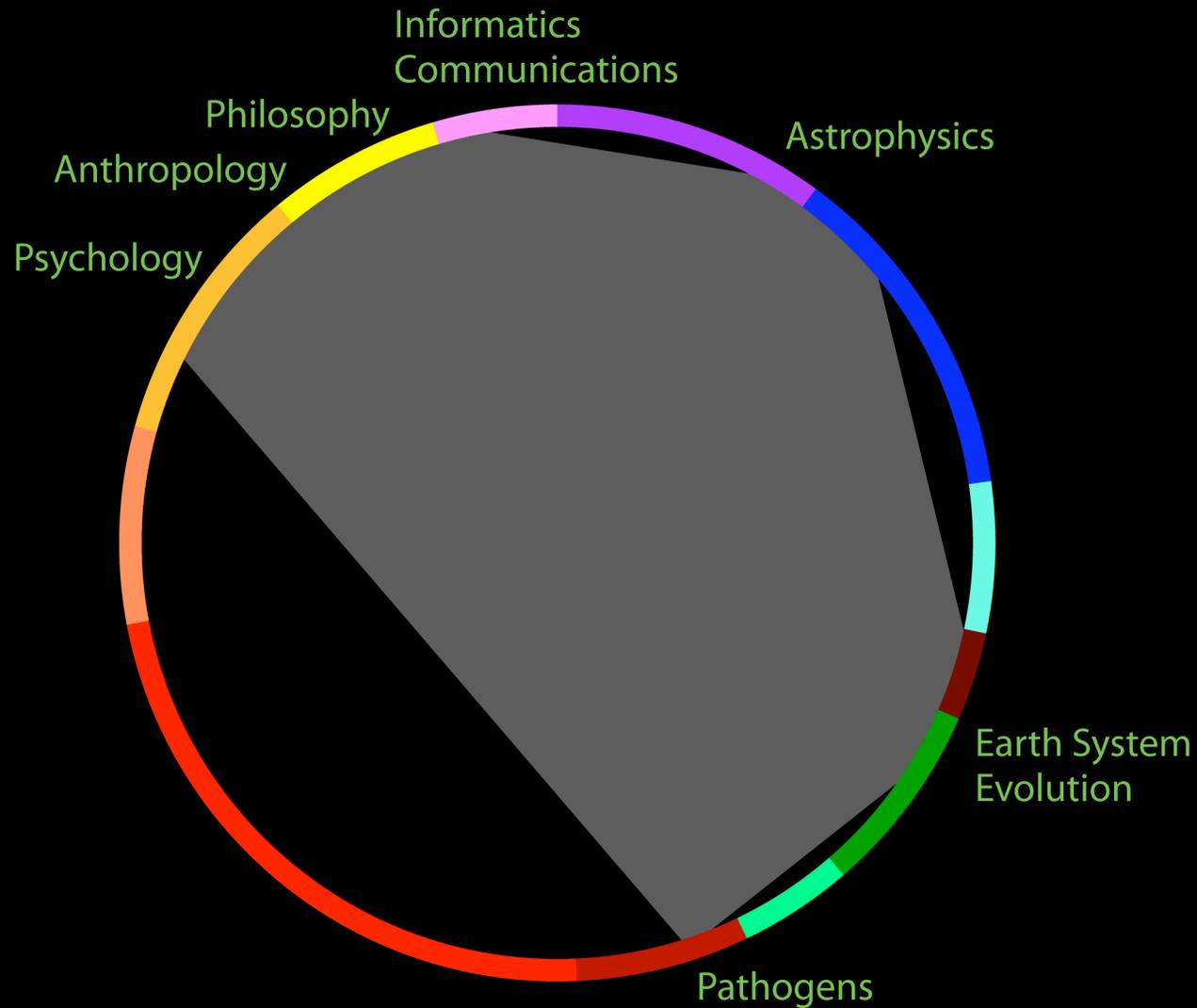
How Limited Horizons Impede Progress



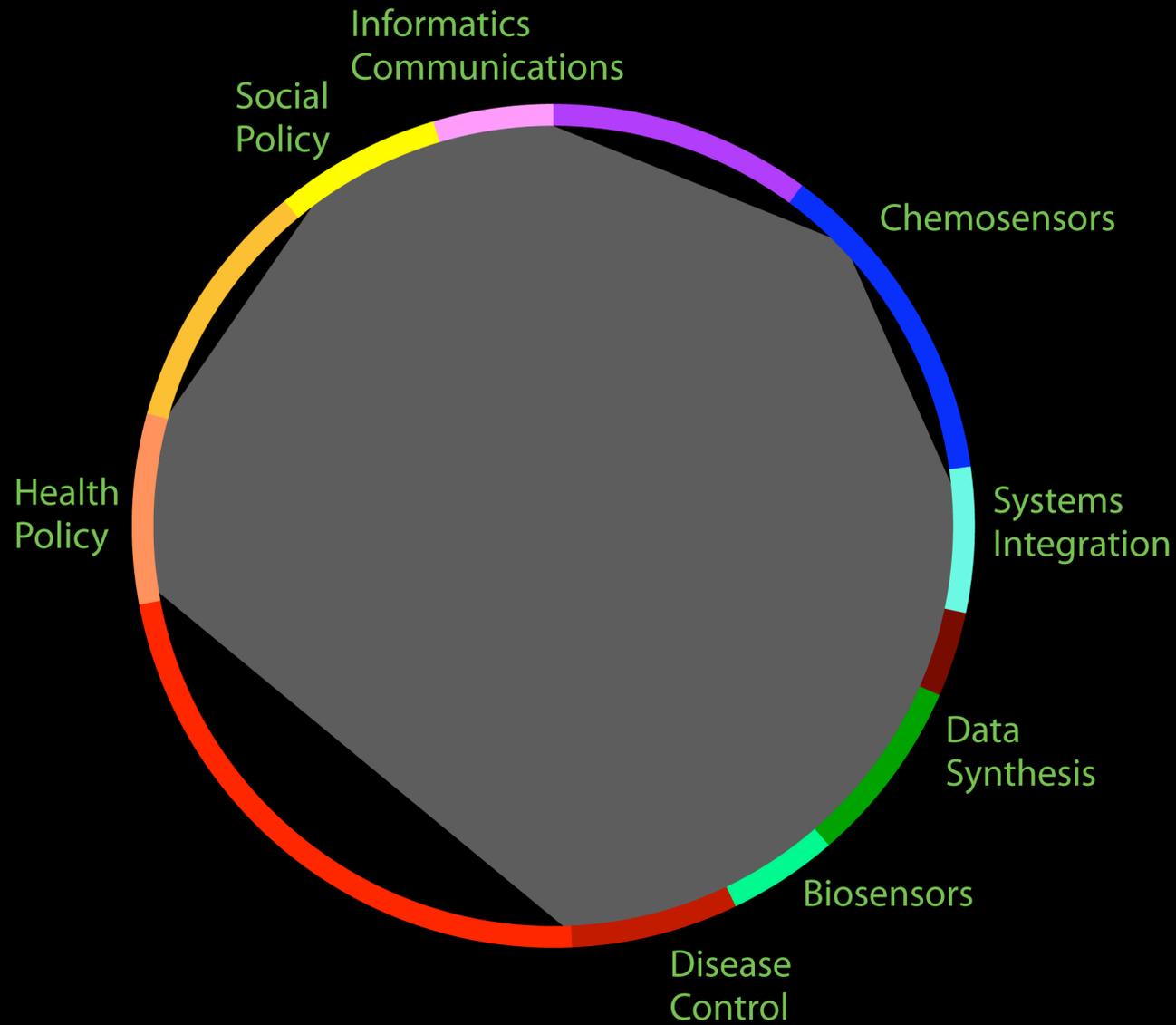
Monitoring the Earth System



A New Approach to Planetary Studies



A Safety Net for Human Societies



The Power of Universal Communication



Themes for a “New” Sustainability Science

- Emphasize basic, quantitative education in the context of Earth and space sciences
- Emphasize the co-evolution of human societies, Earth, and future frontiers
- Emphasize problem solving
- Emphasize the integration of science and engineering
- Emphasize the public communication of science