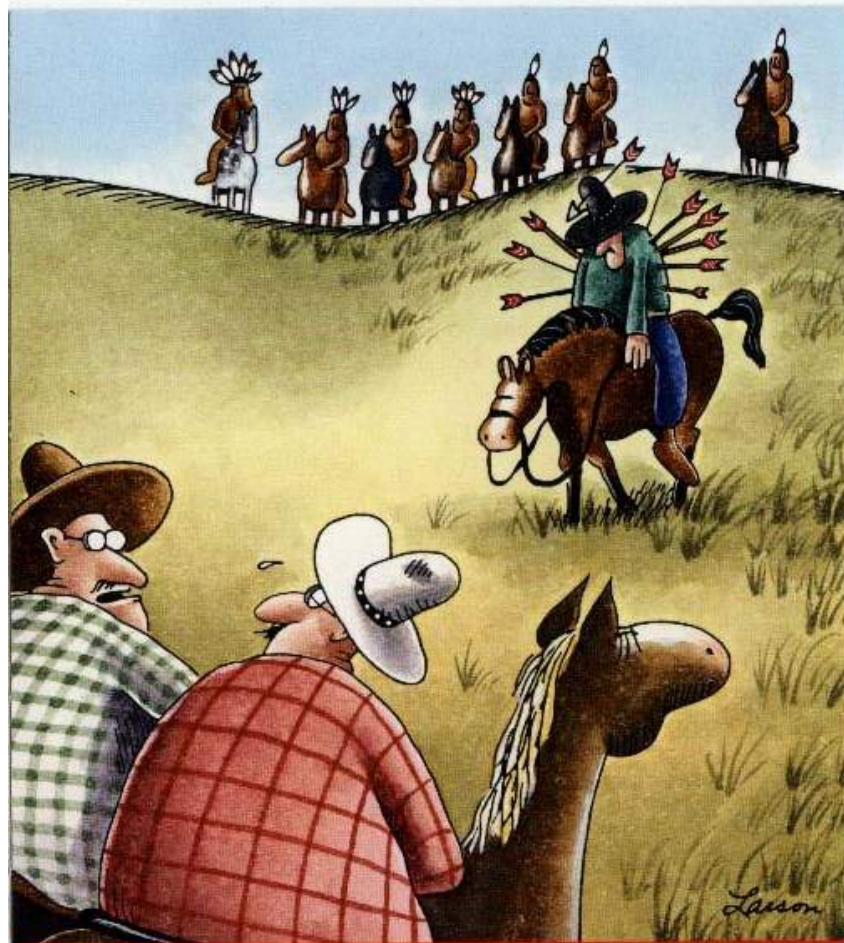




# Understanding & Addressing the Complexity of Climate Change

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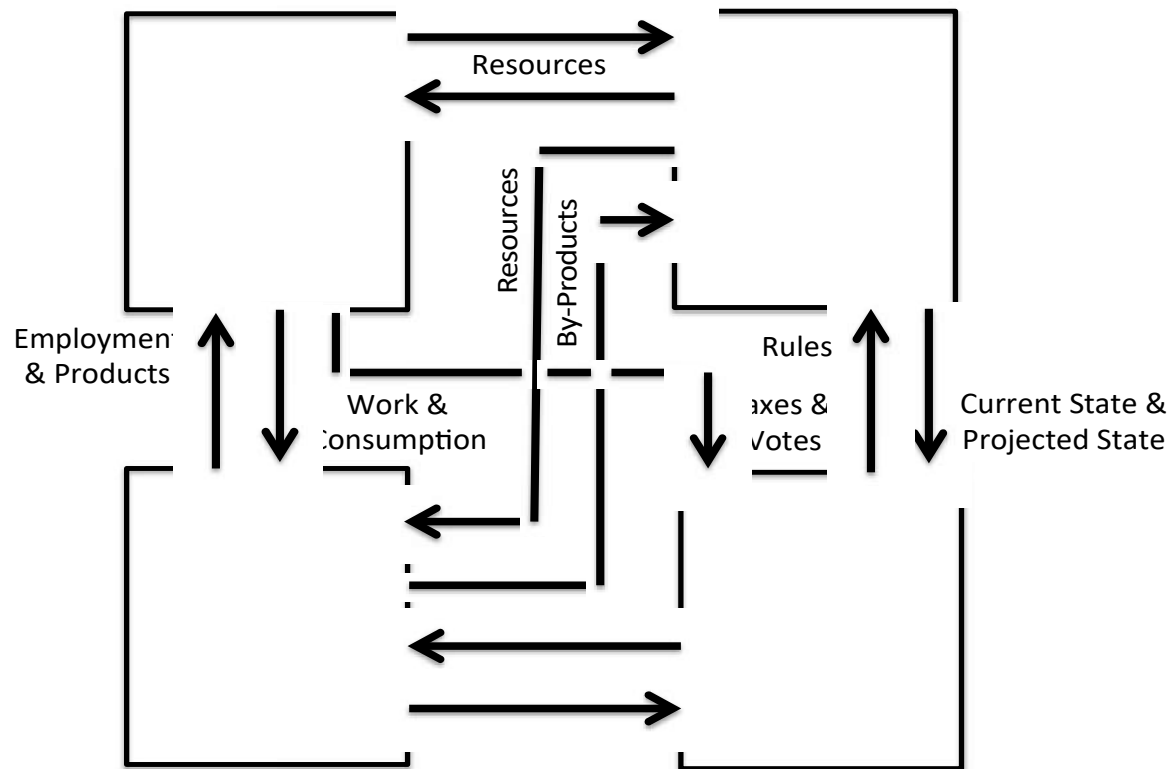


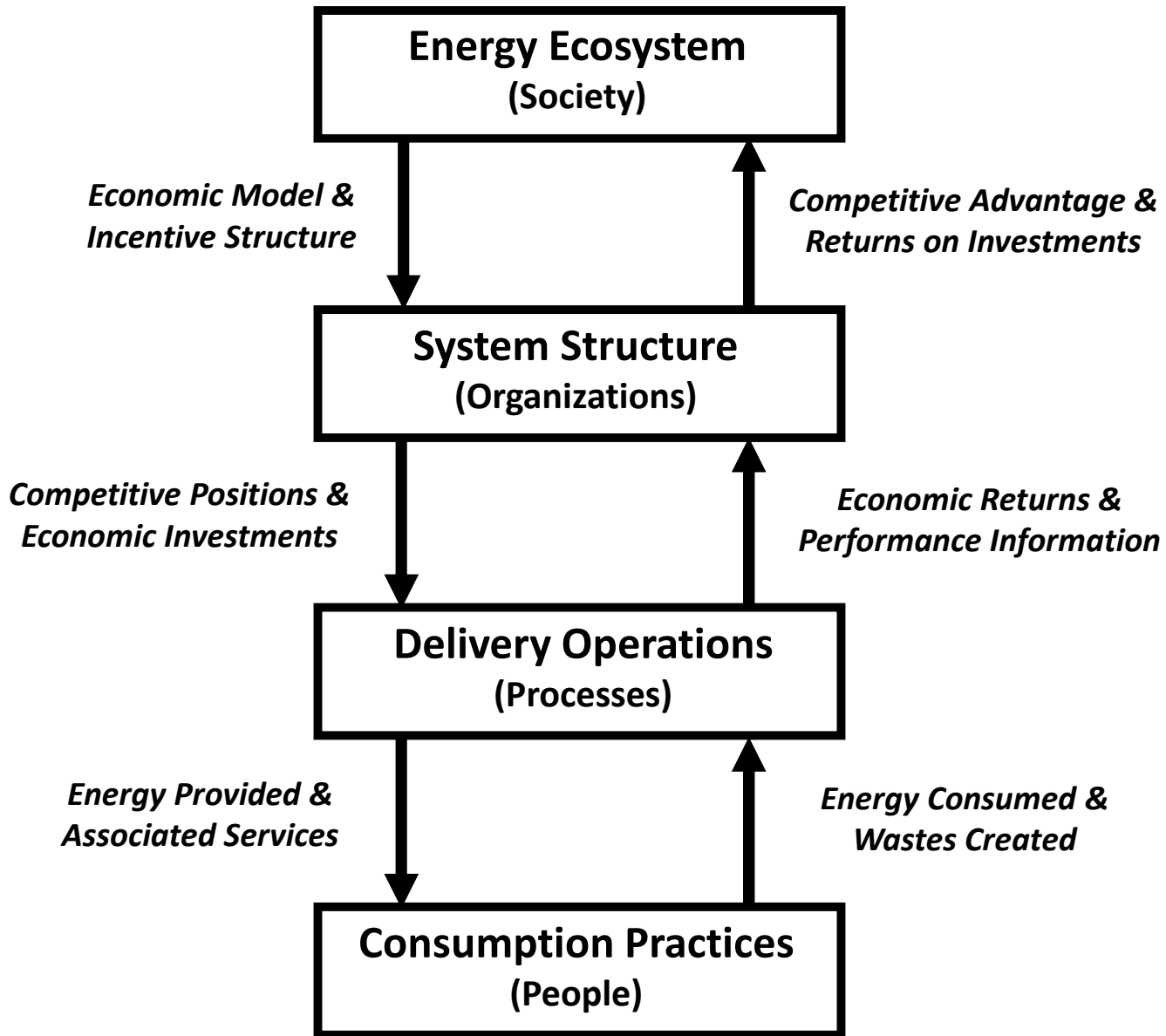
"Now stay calm. ... Let's hear what they said to Bill."

# Overview

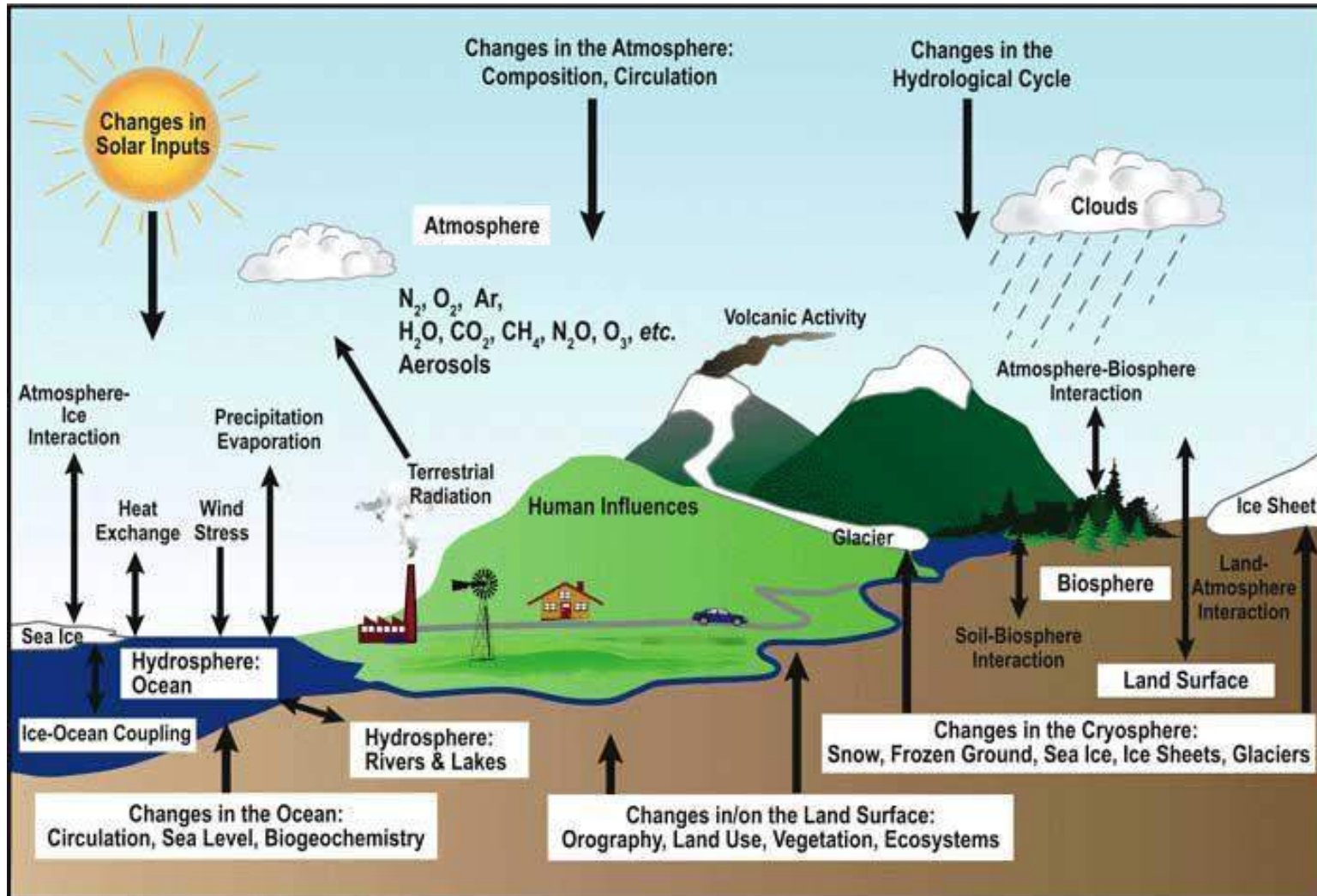
- Earth as a System
- Climate vs. Weather
- Recent Examples
- Major Stakeholders
- Stakeholders' Perspectives
- Potential Interventions
- ***Immersion Lab***
- Parting Thought

# Earth as a System





# Climate vs. Weather



# Recent Examples

- Florida Keys -- “As sea levels rise, some places can’t be saved.”
- Owners of coastal homes no longer able to get 30-year mortgages
- Owners unable to afford increasingly expensive flood insurance
- Melting roads requiring application of additional rubberized layer
- 20-30 million acres in CA need to be cleared of combustible tinder
- Fishermen catching fish that no one has ordered for dinner
- Southeastern and Southwestern US uninhabitable in 20-40 years

# Major Stakeholders

Stakeholders	Examples
Constituencies	Congress, Public
Government Agencies	Department of Energy, Environmental Protection Agency, National Oceanic and Atmospheric Administration, Federal Emergency Management Agency, States, Cities
Agencies Workforce	Employees, Unions
Industry & Institutions	Coal, Oil, Gas Companies & Related Services, Mining Companies, Renewable Energy Companies
Industry Workforce	Employees, Unions
Oversight Organizations	Government Accountability Office, Federal Energy Regulatory Commission, International Atomic Energy Agency
Advocacy Groups	Intergovernmental Panel on Climate Change, Environmental Defense Fund, Nature Conservancy, Natural Resources Defense Council, World Wide Fund for Nature, etc.



# Stakeholders' Perspectives

- ***Society***: Elected officials have great difficulty trading off short-term versus long-term costs and benefits, due to a large extent to the concerns, values and perceptions of their constituents – citizens and companies.
- ***Organizations***: The vested interests in energy extraction, refinement, and use are enormous and are naturally inclined to sustain status quo business models, and the benefits these models provide to these organizations.
- ***Processes***: Processes for extracting, refining, and utilizing fossil fuels are well developed, employ millions of people, and represent trillions of dollars of stock market capitalization.
- ***People***: People have long exploited natural resources and come to depend on the benefits of these resources in terms of both consumption and employment. Changing consumption habits is very difficult.

# Potential Interventions

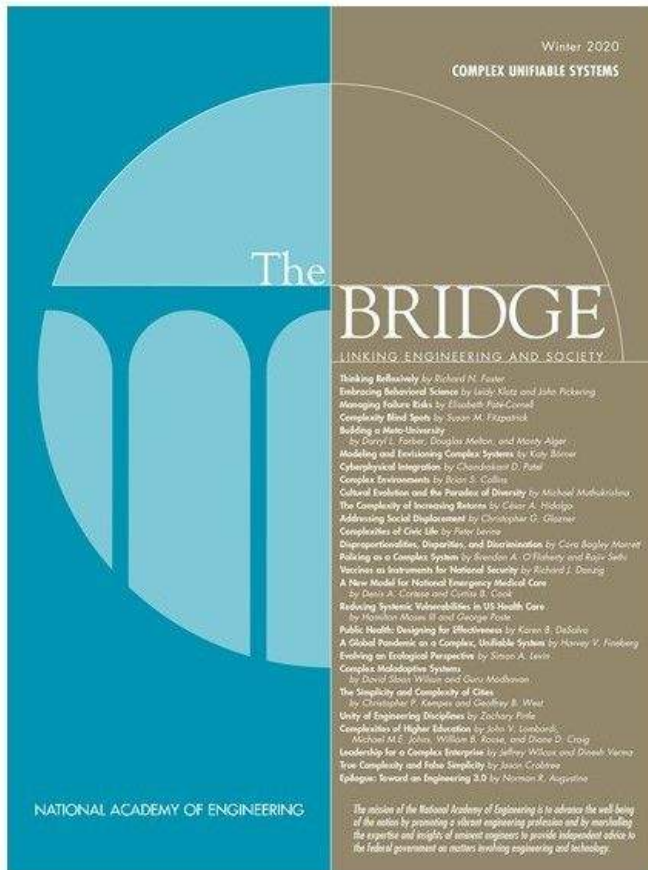
Mitigating Global Warming	Mitigating Impacts of Global Warming
Decrease use of fossil fuels	Deter building in flood plains
Decrease methane emissions	Encourage flood proofing homes
Eliminate coal-fired power plants	Encourage flood proofing businesses
Increase use of renewable energy	Invest in dikes, levees, etc.
Invest in home energy efficiency	Invest in wetlands to absorb hurricanes
Invest in clean energy public transit	Invest in means to project “where the water will be”
Transition to clean jobs	Invest in raising roads to enable continuity of access
Increase education for clean jobs	Invest in means to address high temperatures and fires
Increase consumption of plant-based food	Invest in educating K-12 and the whole population to understand threats
Invest in reforestation	Invest in developing jobs and training to respond to environmental threats and events

# *Immersion Lab*



Parting Thought

*There will be no vaccine  
for sea level rise.*



## Seven Habits of Highly Effective Systems Thinkers

- 1) Specialize less, systematize more.
- 2) Get over physics envy, try ecology envy.
- 3) Evolve logic and psychologic.
- 4) Foster discipline over disciplines.
- 5) Relate first, rationalize next.
- 6) Progress comes from participation.
- 7) Focus more on care than creation.

<https://www.nae.edu/Bridge.aspx>