Ecosystem Services and Citizen Science: A new Framework for Engagement

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Outline

1. Ecosystem Services: a Discussion of Values
2. The Importance of Biases & Our “Hidden Values”
3. Citizen Science for a “Postnormal” World

What are Ecosystem Services?

"Humankind benefits from ecosystems"

- A positive value is implied
- For the global human community

- No value implied for other species
- No explicit indication of temporal aspects of value

What is Value?

"A measure of importance" that allows human prioritization & drives motivation

Beliefs Trading Information

Learning "Unknown unknowns"

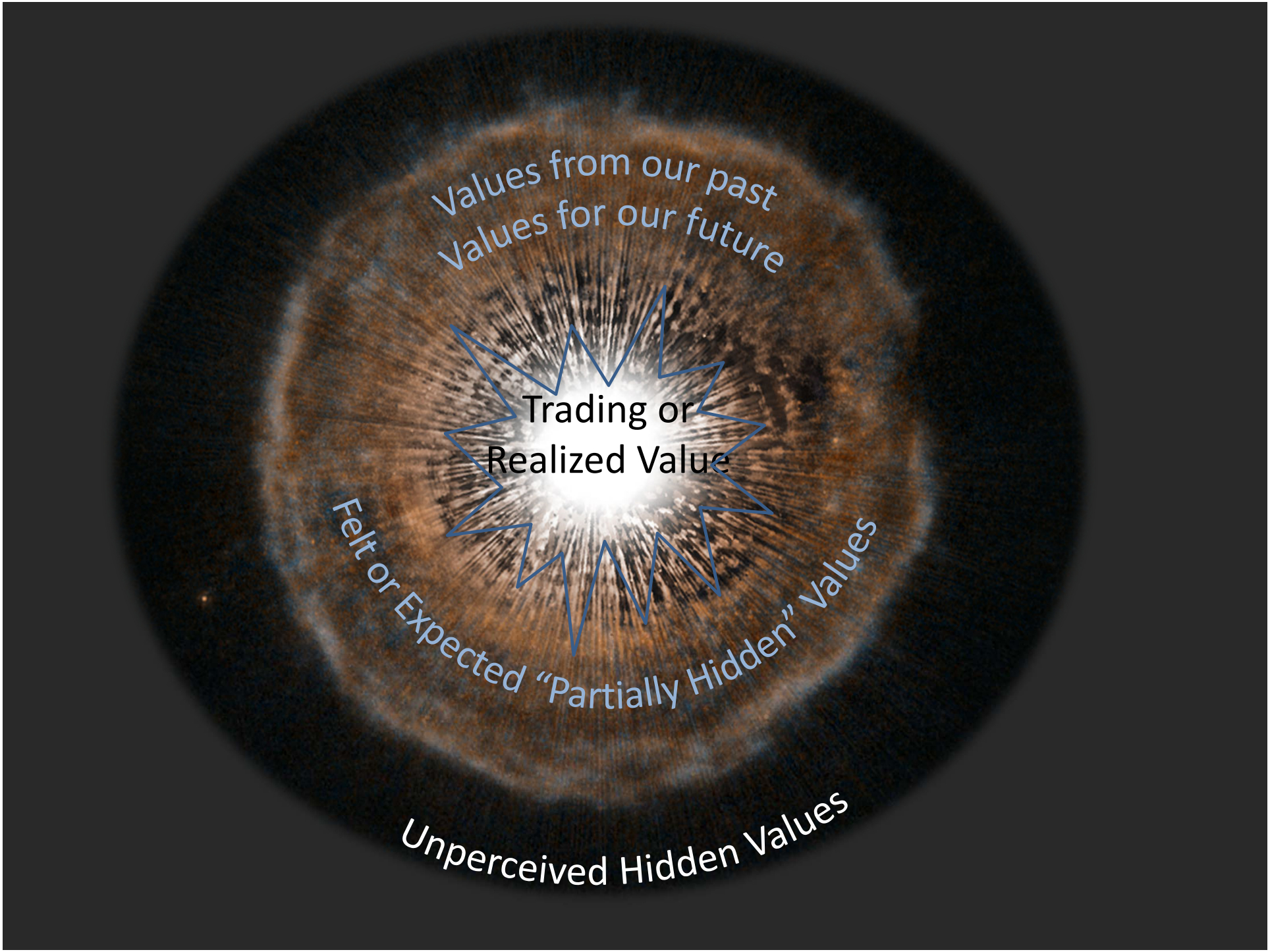
- Values from the Past (conscious or hidden)
- Present Value: "realized value" (with hidden components)
- Future Value: (expected or hidden)

Present/realized value is related to past and future!

Ecosystem Services Decisions

- Interfaces Ecology, Technology, Society, Economy & Geosciences
- Spatial Characteristics
- Multi-Objective
- Should Consider Broader Human Community! (Unrealistic?)
- Should Consider Temporal Aspects! (Unrealistic?)

- Should We Invite Other Species to the Discussion? (unrealistic?)


Values from our past
Values for our future
Trading or
Realized Value
Felt or Expected "Partially Hidden" Values
Unperceived Hidden Values

A parable of ecosystem services...

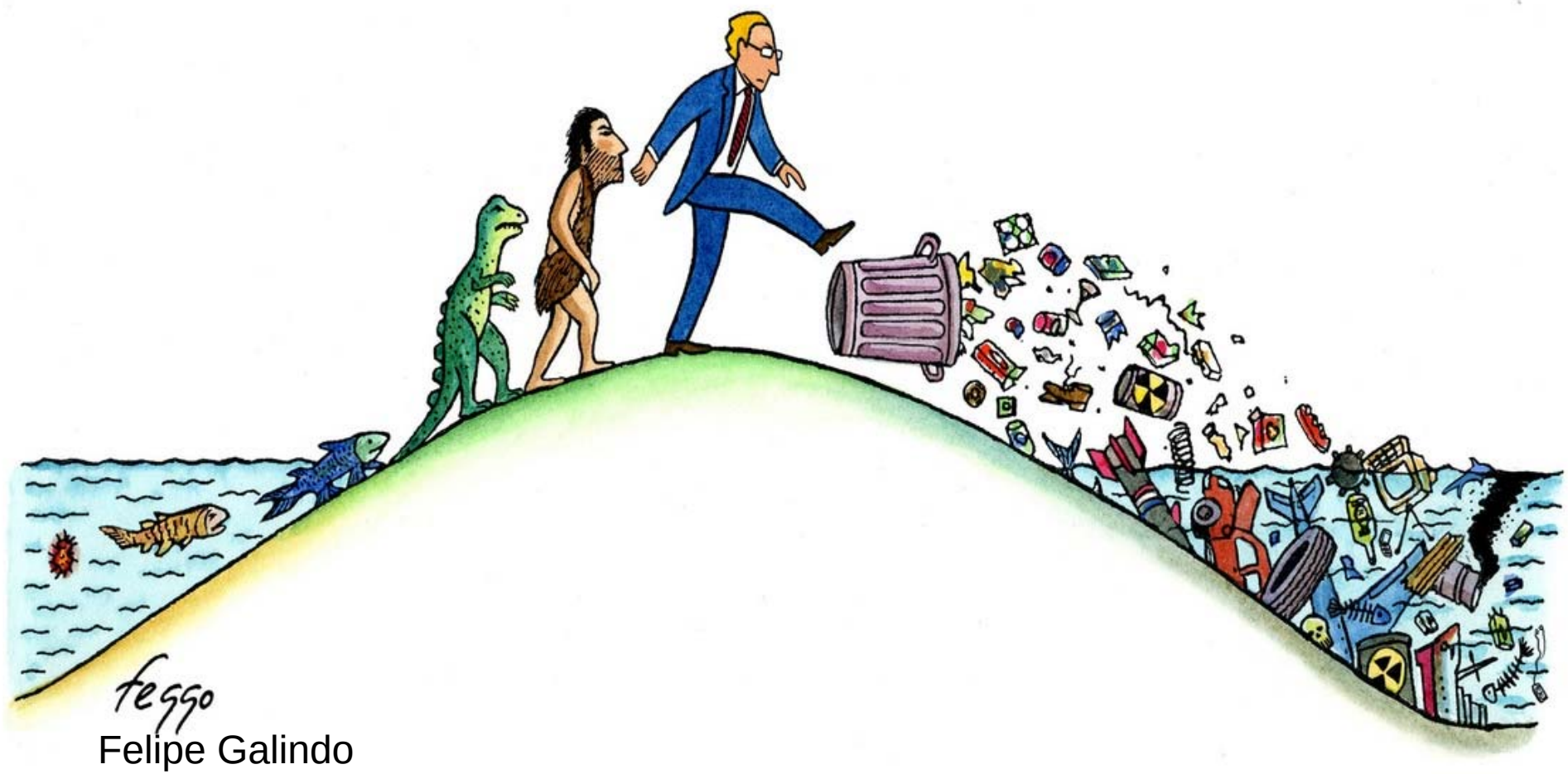
What is missing in this painting?

Hint: for the present & the future, & from the past?

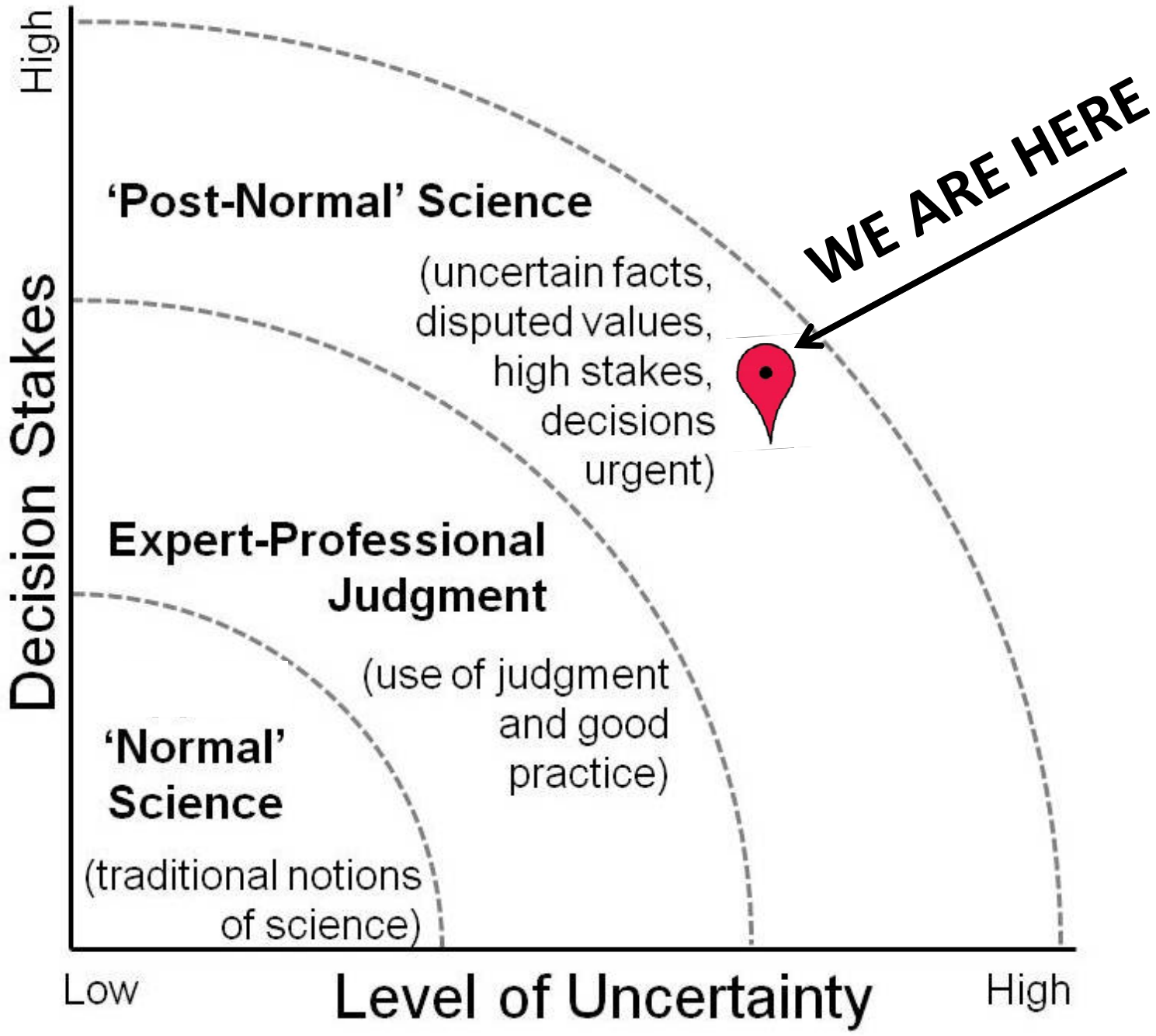
Integrated Environmental Modelling: Human Decisions, Human Challenges (Glynn, 2015)

Maurice Prendergast “Ponte della Paglia”; *reproduced with permission: Phillips Collection, Washington, DC*

Did we successfully face the issues of **Today** in our evolutionary past?



Felipe Galindo



Provided by Daniel Sarewitz; adapted from: Funtowicz and Ravetz, 1993

Post-Normal Science Characteristics
(incl. ecosystem services)

- Involves Judgment from Multiple Professionals
- No Independent Observers
- Policy Experiments Often Uncontrolled and/or Unrepeatable
- Addresses the Larger Scale, the Greater Community & the Longer Term
- Faces High Complexity and Uncertainty

- Translation to Policy Requires Stakeholder (Public) Learning & Acceptance

➢ Requires Public/Stakeholder Participation!

Some Principles for Citizen Science

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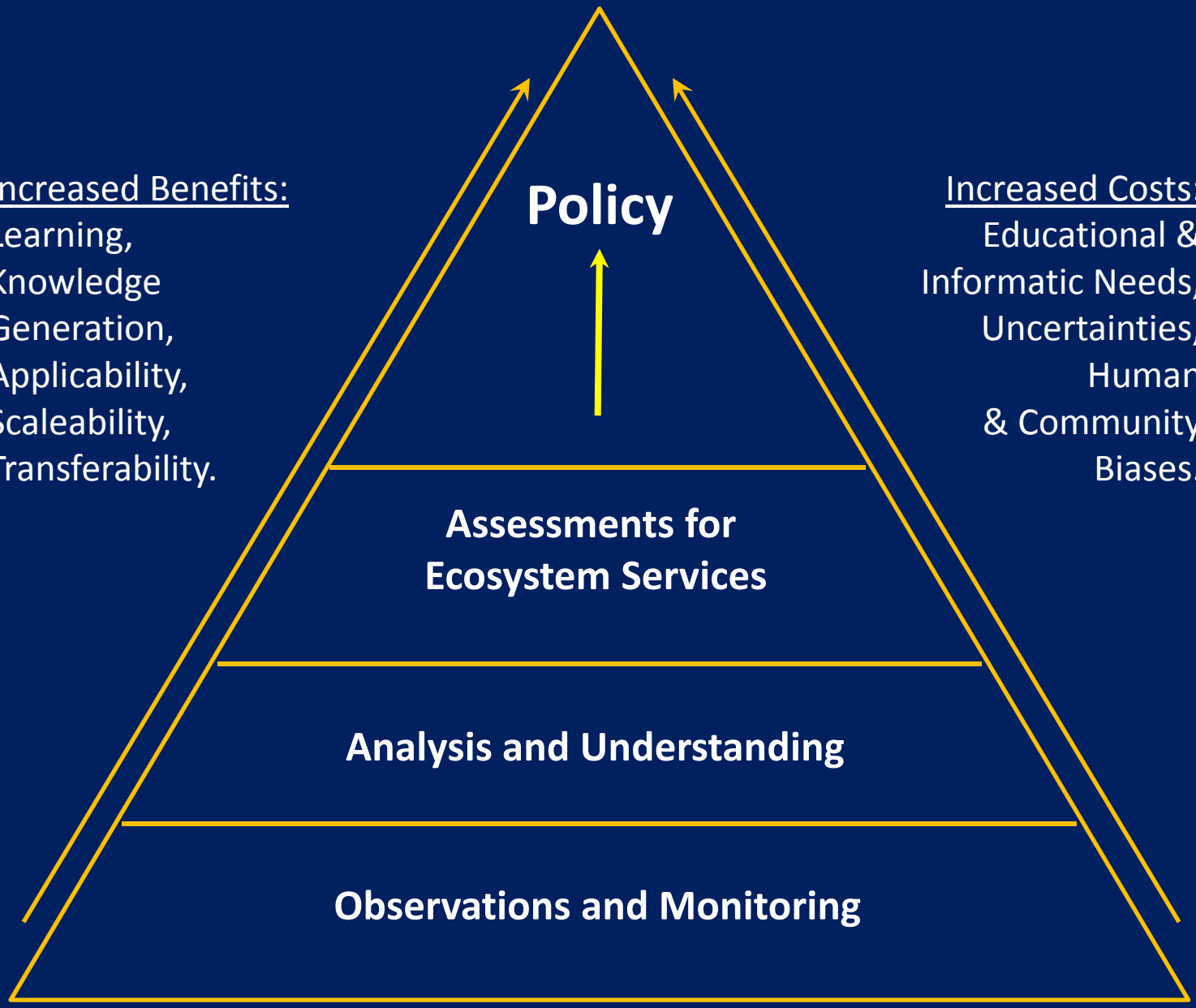
Science Needs for Societal Action



Increased Benefits:
Learning, Knowledge Generation, Applicability, Scaleability, Transferability.

Increased Costs:
Educational & Informatic Needs, Uncertainties, Human & Community Biases.

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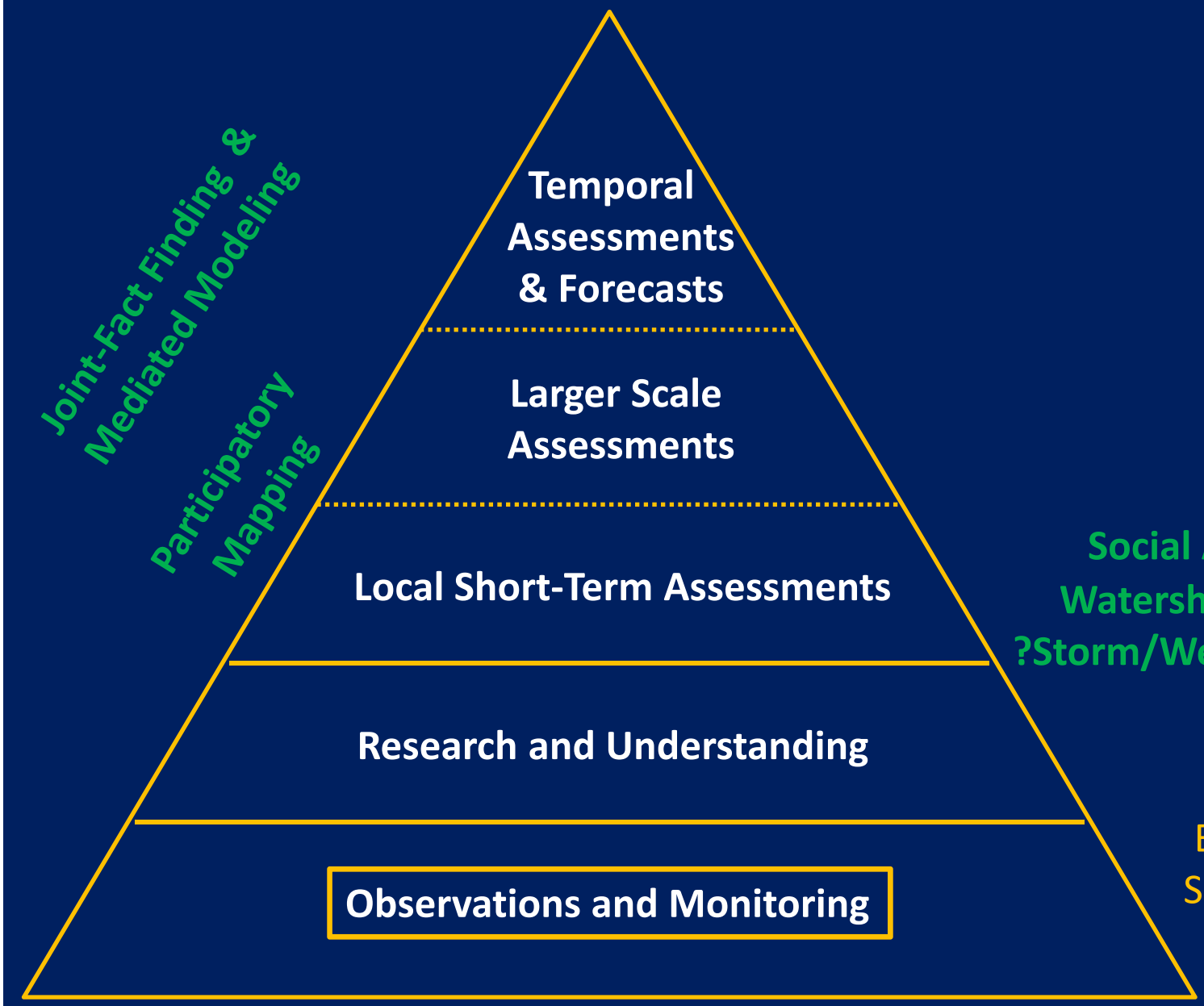
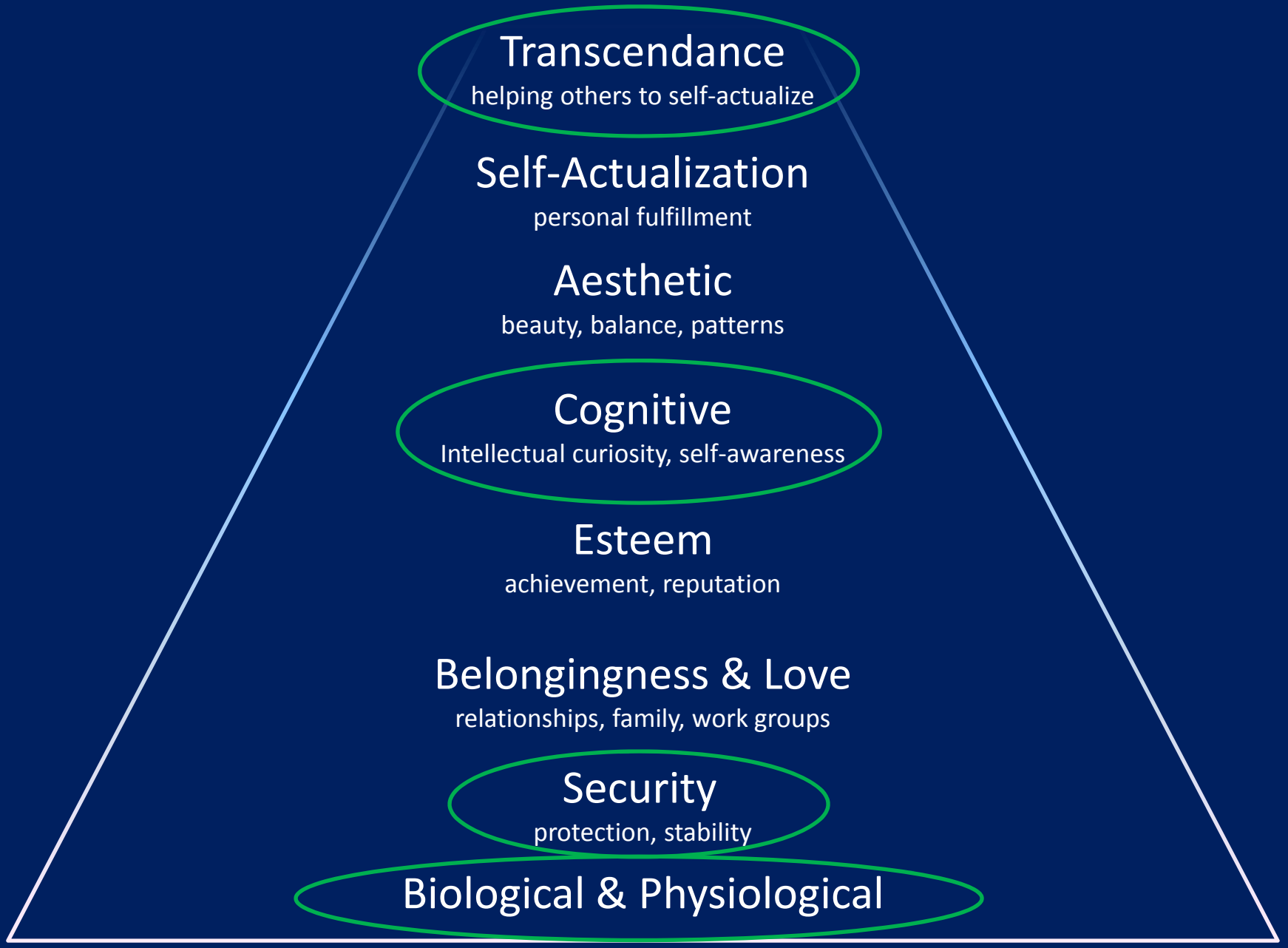
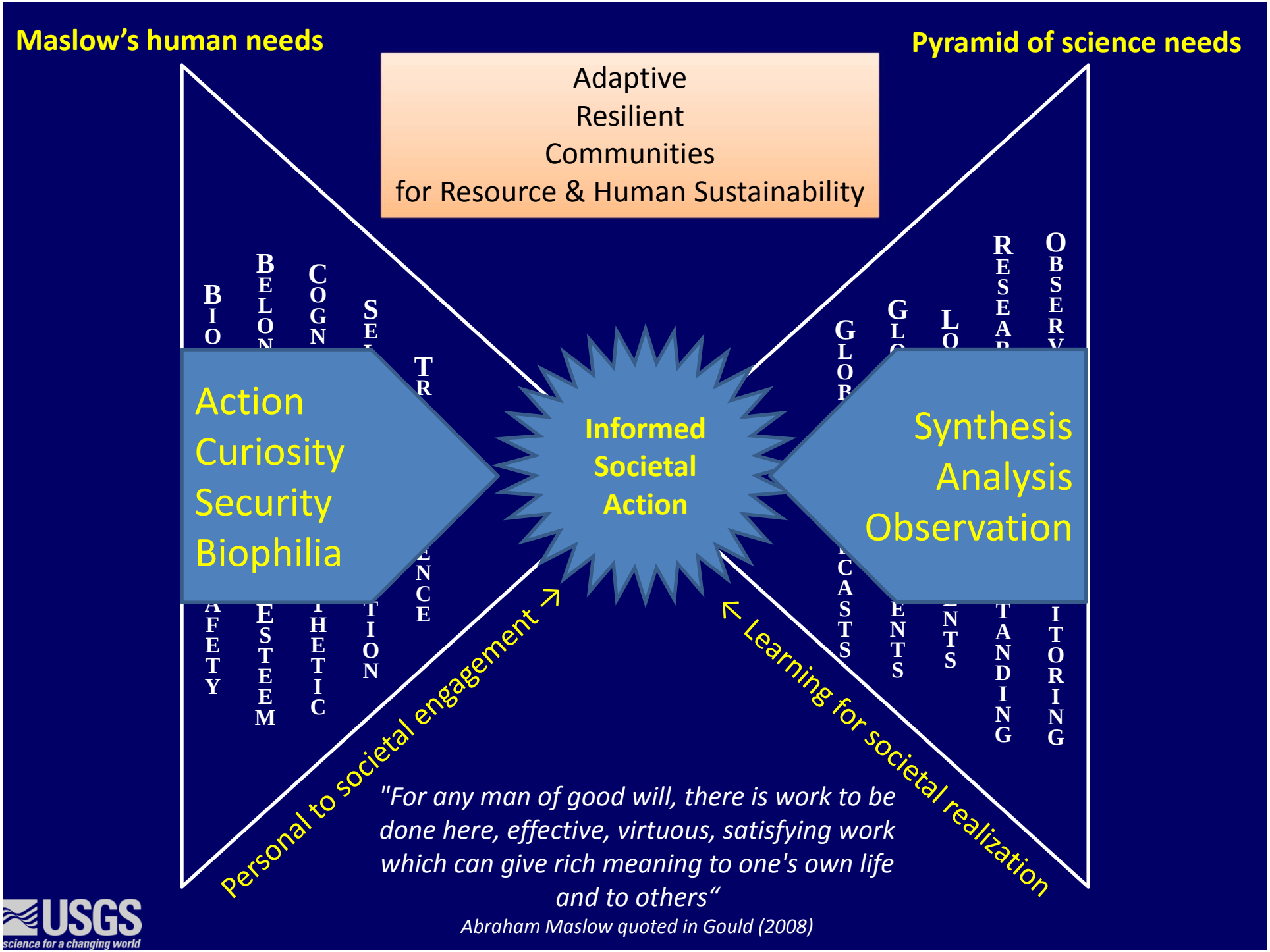
Existing Citizen Science Activities



Maslow's Pyramid of Human Needs (revised in the 1990's)




Maslow's human needs
Pyramid of science needs
Adaptive
Resilient
Communities
for Resource & Human Sustainability
Action
Curiosity
Security
Biophilia
Informed
Societal
Action
Synthesis
Analysis
Observation
Personal to societal engagement
Learning for societal realization
"For any man of good will, there is work to be done here, effective, virtuous, satisfying work which can give rich meaning to one's own life and to others"
Abraham Maslow quoted in Gould (2008)
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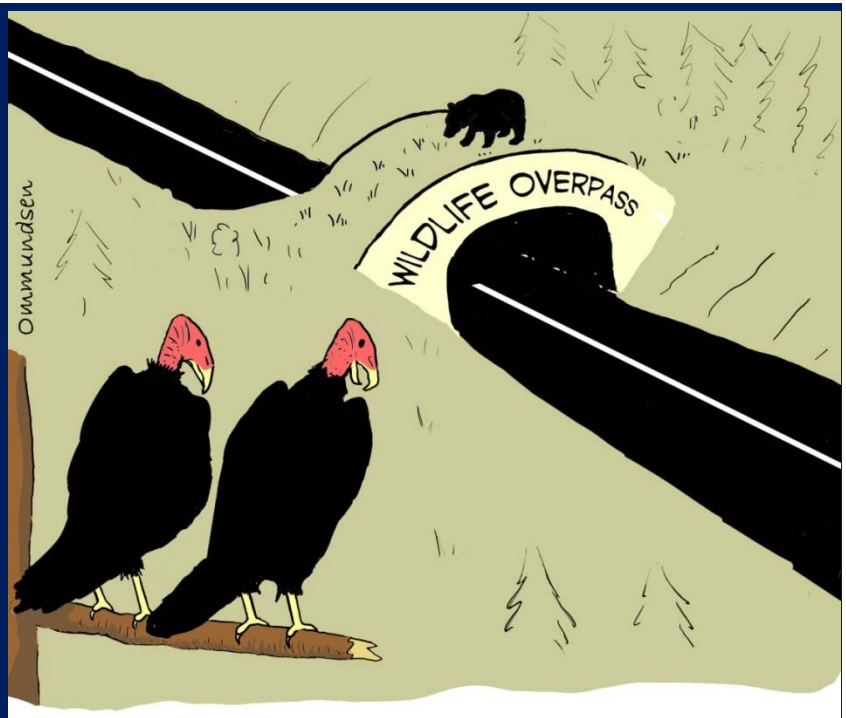
Some Critical Needs for Ecosystem Services Science

- Better Education, and Skeptical Attitudes!
- Citizen Science involving both experts & and members of the general public!
- Structured, transparent, traceable, coordinated processes that strive for honesty
- Cognizance of human biases (eg. Glynn, 2014, 2015)!

- *We should not sacrifice a complex human future in our quest for the bland, easy, simplicities of short-term, local, unexamined "certainties"*.

"On the positive side, down wood will enrich your land by providing a home for beneficial wildlife."

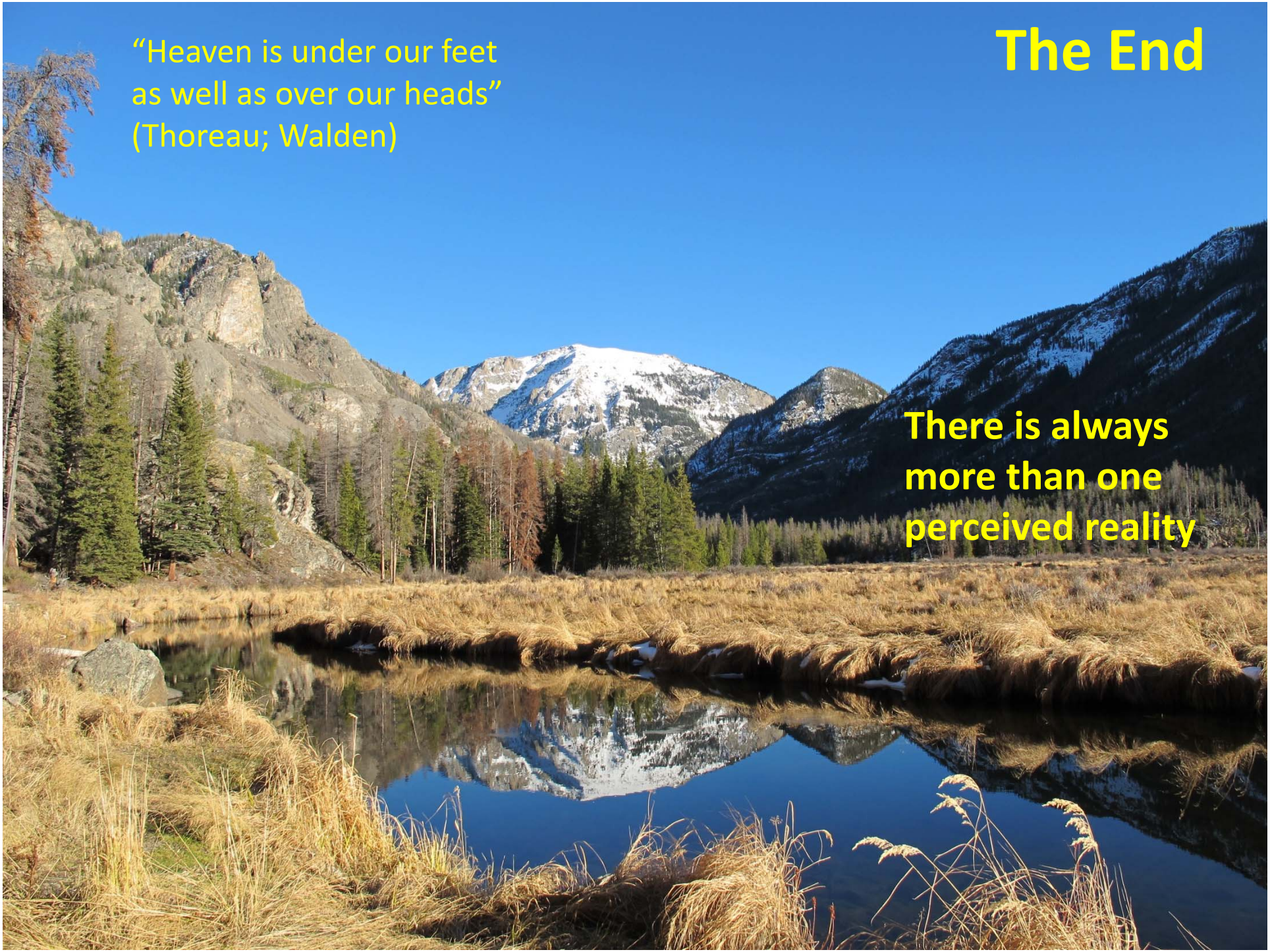


"A great blow to fine cuisine."

"The pollutant is in timed-release capsules so that cleanup costs are passed to future generations."

Perspective is important in valuation of Ecosystem Services!

Cartoons by Peter Ommundsen


"Heaven is under our feet
as well as over our heads"
(Thoreau; Walden)
The End
There is always
more than one
perceived reality

Benefits

- **Science** (monitoring, research, assessments, modeling)
  - More science and better accessibility
  - More sharing of results (& cross-system use)
  - Better sharing of science resources
- **Education**
  - Better connects people to their resources & environments
  - Challenges people & formal & informal educational systems
- **Policy**
  - Translation of scientific knowledge into improved societal actions
  - More engaging & inclusive
  - Considers an individual's view of the "here & the now", but seeks the benefit of entire communities, for the larger scale & the longer term.

Challenges

- Quality & Consistency, Archival & Access
- Study design, scientific method, assessment tests, audits, followups…

- Credibility…
- Human biases & cognitive limitations…

- Legal constraints and ethical considerations

- Costs & organizational constraints
- Recruitment & retention

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The Oracle of Delphi

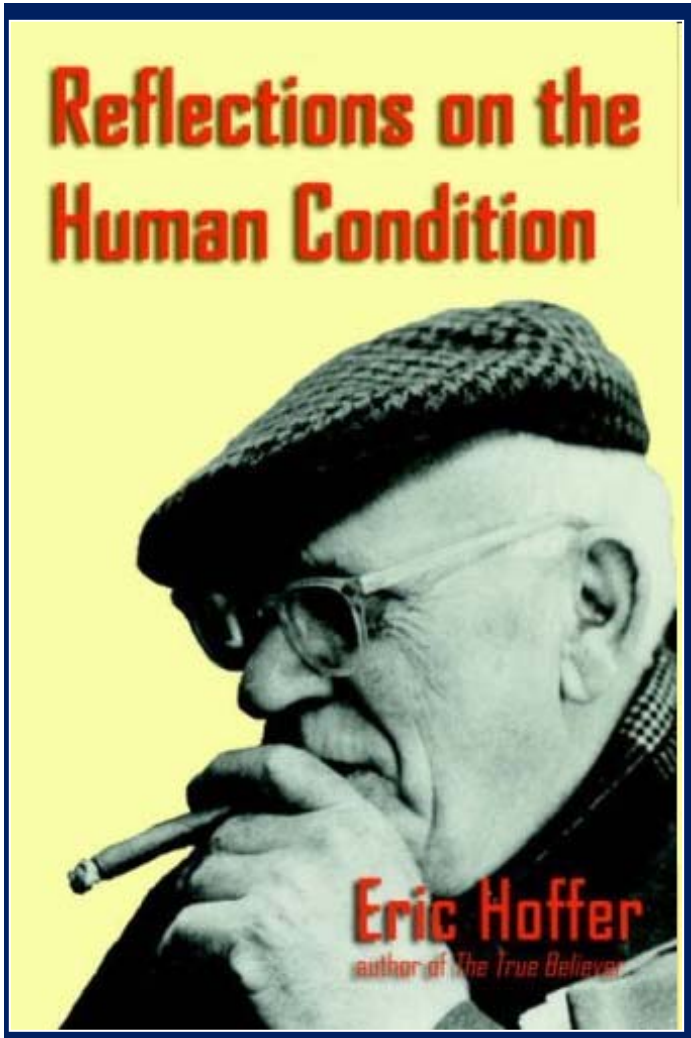
- From at least 800BCE to ~400CE.
- Sparse cryptic answers
- Restrictive Access
- Provided significant value!

❖ Today science requires:

- ✓ Less gibberish, greater transparency
- ✓ More approachability
- ✓ A diversity of perspectives

❖ Does the Oracle nevertheless provide insights for Open Data/Access?

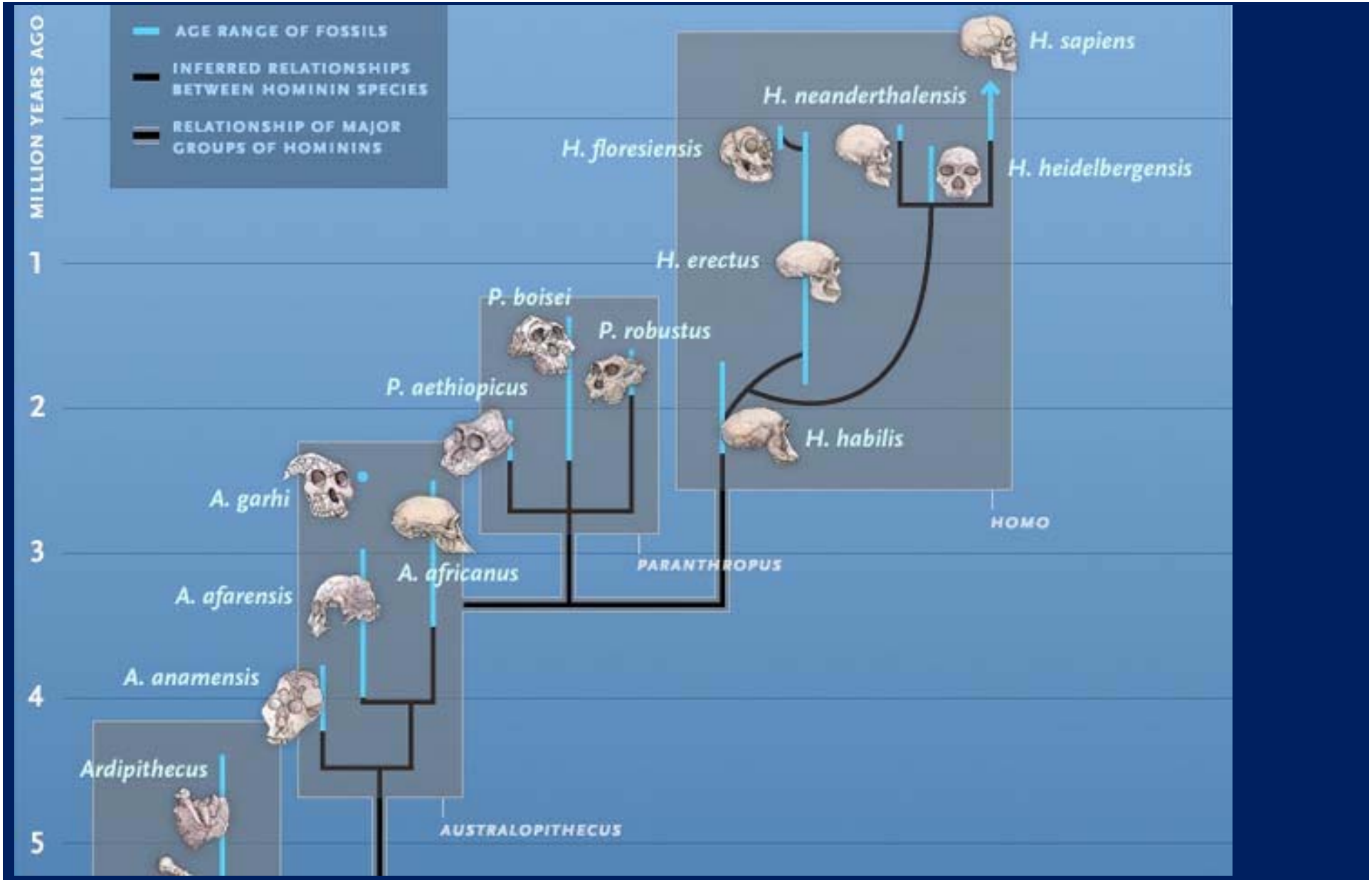
John Collier, *Art Gallery of Sth. Australia*



"In a time of drastic change it is the learners who inherit the future. The learned usually find themselves equipped to live in a world that no longer exists"

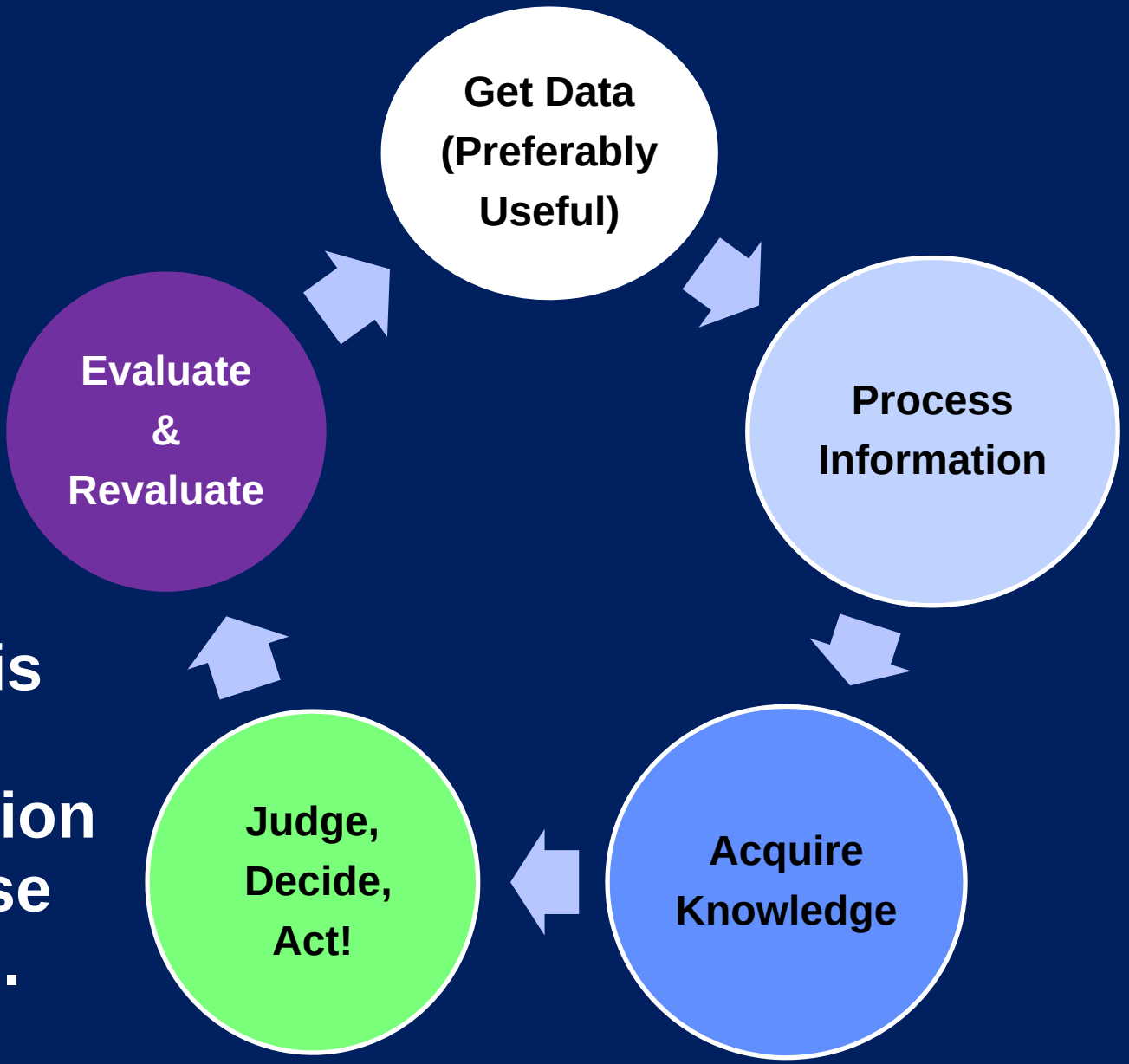
Eric Hoffer (1902-1983; migrant worker, longshoreman, philosopher)

Courtesy of Julio Betancourt (USGS scientist, co-founder of the USA National Phenology Network)

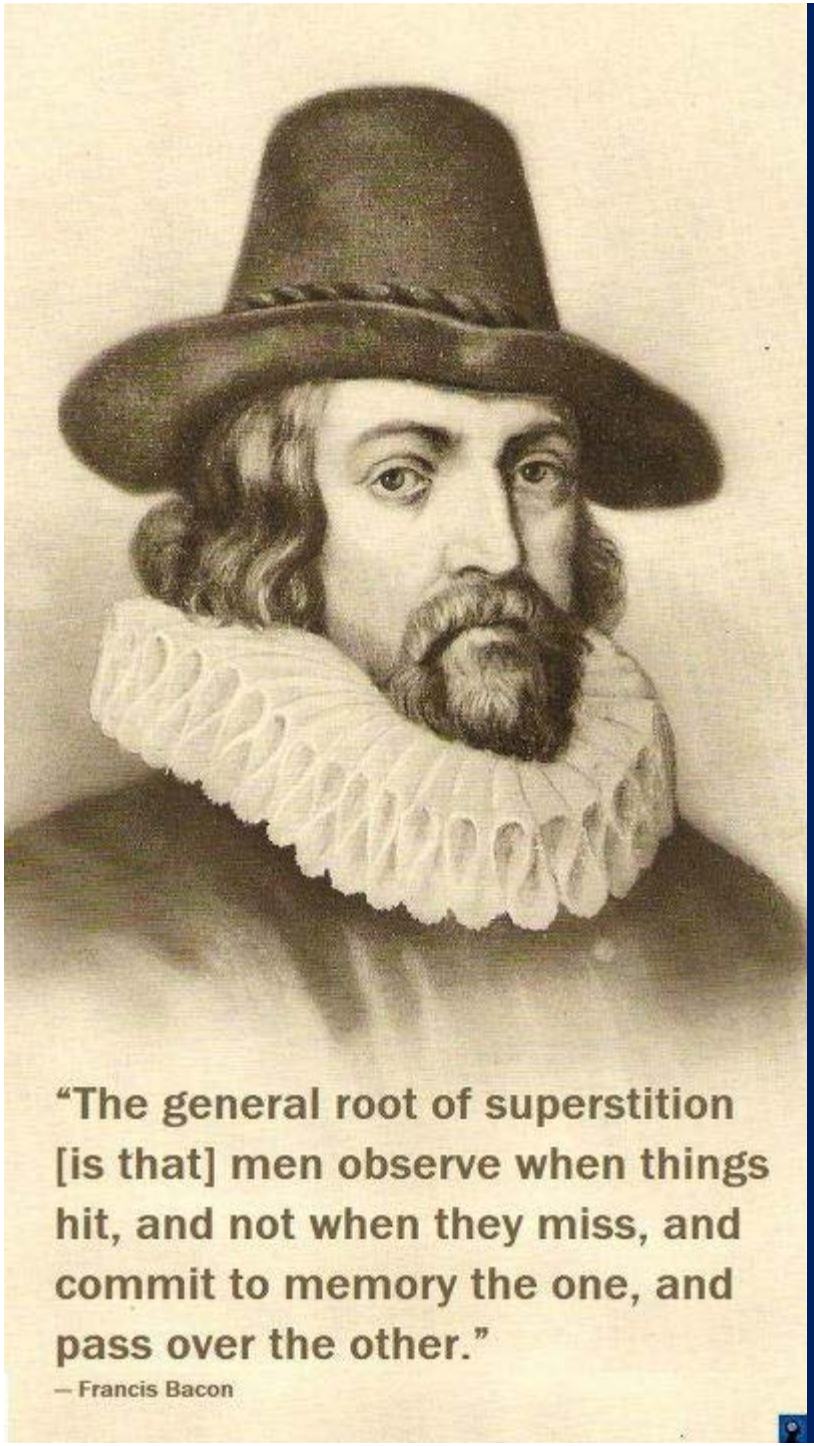


Our evolution (& experiential learning) affects our innate responses & decisions!

A Human Model for Data Utilization & Value (PG)



There is little information on these steps..



Francis Bacon (The New Organon; 1620)

The Idols (Biases) of the:

- Tribe
- Cave
- Marketplace
- Theater

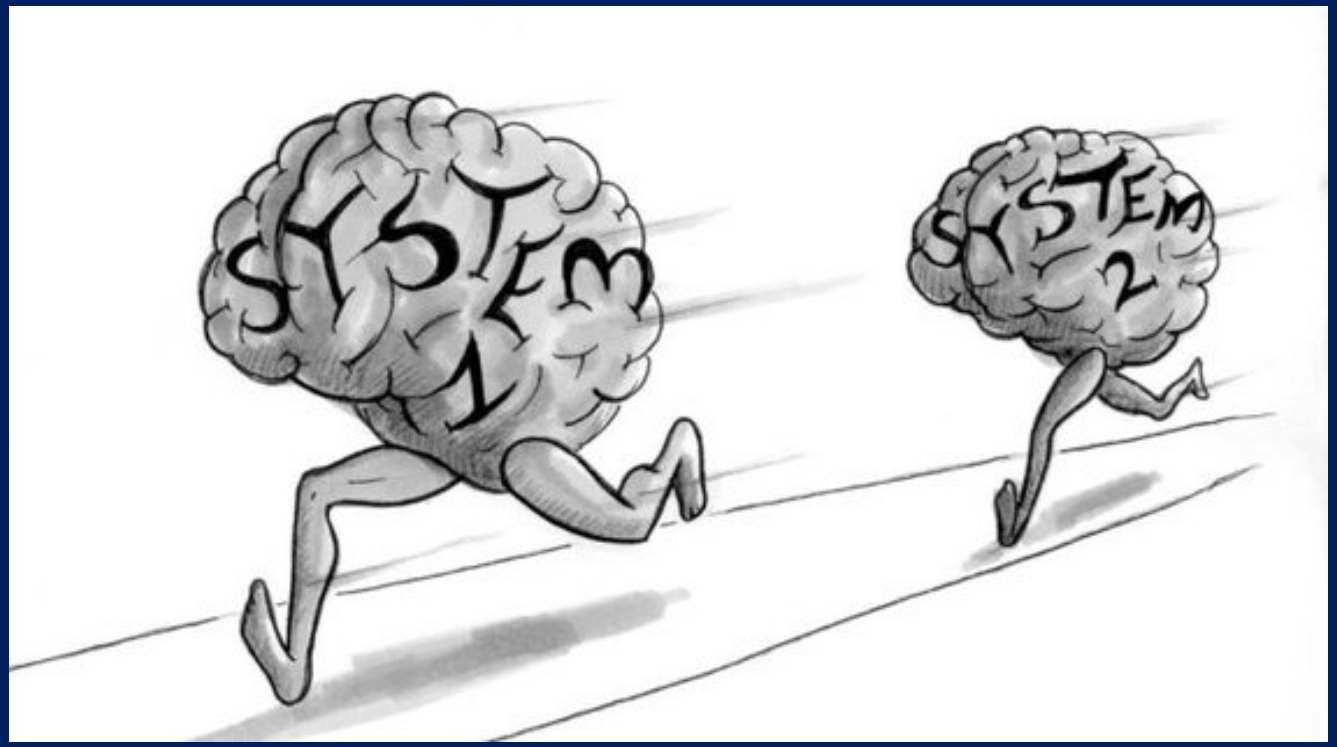
…what K. Popper calls "psychologism"

Confirmation Bias
Human Hubris
Lack of coordination
Poor Data QA/QC
....

Nobody was wiser than Socrates: he knew that he knew nothing.

By Pieter Breughel the Elder, 1563
(Kunsthistorisches Museum, Vienna)

Innate (1) vs. Conscious (2) Thinking



By Julia Suits
(New Yorker)

People assess probabilities incorrectly, they display confirmation bias…overproject their own opinions unto others, display illogical framing effects…and numerous other information processing biases.

(Stanovich and West, 2003; creators of the tripartite thinking framework)

Managing the Commons: Top-Down does NOT suffice

1987 Global Perspective

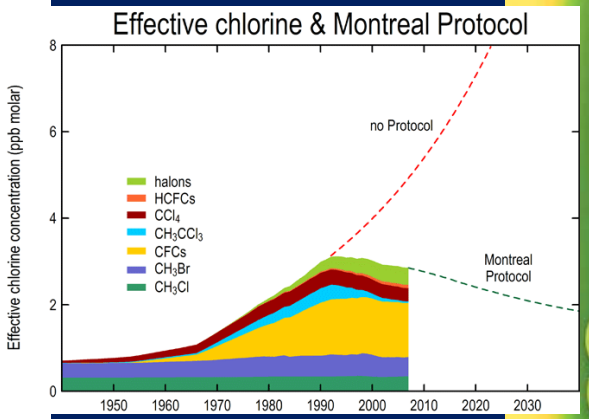
United Nations

Report of the World Commission on Environment and Development

Our Common Future

United Nations
1987

UN Documents: Gathering a Body of Global Agreements has been compiled by the *NGO Committee on Education* of the *Conference of NGOs* from United Nations web sites with the invaluable help of information & communications technology.



2013 National Perspective

SCIENCE AND TECHNOLOGY FOR SUSTAINABILITY

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

SUSTAINABILITY FOR THE NATION

Resource Connections and Governance Linkages

Engaging Society

USA npn National Phenology Network

The GLOBE Program

Alliance for Aquatic Resource Monitoring
ALLARM
est. 1986

USGS TED

Citizen Weather Observer Program
APRSWXNET

North American Breeding Bird Survey (USGS)

CoCoRaHS

River Network
Connecting People, Saving Rivers

Monarch Watch.org
Education • Conservation • Research

Center for Watershed Science and Education

children & nature NETWORK
Building a Movement to Reconnect Children and Nature

Frog Watch
Southwest Florida Amphibian Monitoring Network