Adaptive Governance with Open Traceable Accountable Cognizant Science and Policy

(for the management of natural resources & environments)

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Photo of Mills Lake, Rocky Mountain National Park, © Pierre Glynn

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Outline

1. Information, Knowledge, and Transparency
2. Science, Judgments, and Decisions: the Role of Biases, Beliefs, Heuristics and Values (BBHV)
3. A *Science-Infused* Adaptive Governance Framework.
4. Open Science is Not Enough. Open Traceable Accountable Policy (OTAP) is Needed, or Transparency about Limits on use of OTAP.

Information, Knowledge, Transparency

- Information is structured data that is potentially useable.
- Knowledge is “justified true belief”. It internalizes information, creates an alignment between information and beliefs, and potentially allows more informed decisions to be made.
- Transparency is visibility (of information, of decisions, of justifications, of beliefs, of roles and relationships…).

Is Transparency Good?

- Transparency allows knowledge (and everything therein, including beliefs, and possibly past decisions and consequences), to be shared with a broader group.
- Transparency *potentially* enables more informed decisions by the group.
- Transparency may facilitate decision follow-ups beyond the timescales and capabilities of individuals.
- It also may place *constraints* on the behavior of individuals or sub-groups.
- In economic theory, transparency reduces “information asymmetry”, reduces barriers, enhances competition, and makes markets (and their transactions) more efficient.

When is Transparency a Problem?

- Knowledge is power. Transparency transfers power: sometimes for a greater good, sometimes not (e.g. National security may preclude transparency).

- Transparency may reduce the power of an entity when the information becomes widely available (e.g. reduced ability to make a living, or to move beyond a past mistake).

- Transparency may allow information overload. Decision-making can get “frozen by complexity”. If everything is important, or if it takes too long to figure out what is most important, then nothing is important.

- In a complex, dynamic world, perfect complete information doesn’t exist. Transparency can enable distribution of filtered/biased, or wrong information, with potentially negative consequences.

Transparency May Enable Groupthink

"DELUSION DWELLERS", charcoal & pencil on paper, © Laurie Lipton, 2017, www.laurielipton.com,
(presented here by permission of the artist)

Groups offer security to individuals. And shared beliefs give power to groups.

Uncritical acceptance of information or beliefs may lead more quickly to powerfully good or bad consequences.

Alternatively, transparency may allow different perspectives, critiques, or beliefs to be considered.

Sources of Judgments and Actions

1. Evolutionary adaptation (our genes)
2. Cultural adaptation, traditions, rituals (our memes)
3. Experiential learning
4. Logic and careful reflection

(cf. Glynn et al., 2017, Earth's Future)

What Do Social Adaptation and Evolution Suggest?

- Societies have developed universities that create and transfer knowledge (information + beliefs);
- And also laws, policies, traditions, and cultural norms that place boundaries on group/individual behaviors and constrain sharing.
- Knowledge sharing and transparency are good, but there are some limits or boundaries, not always well defined, or well-evaluated, especially before a problem occurs.
- Initially, transparency about boundaries, absolute beliefs, or "sacred values" may prevent finding paths towards consensus amongst widely diverging constituencies. However, it may also eventually allow the finding of paths not initially evident.

Science Seeks Transparency (Usually)
What is Science?

My simple definition: the structured pursuit of **knowledge**

Other definitions:

- A systematically organized body of **knowledge**.

- A systematic enterprise that builds and organizes **knowledge** in the form of testable explanations and predictions about the universe.

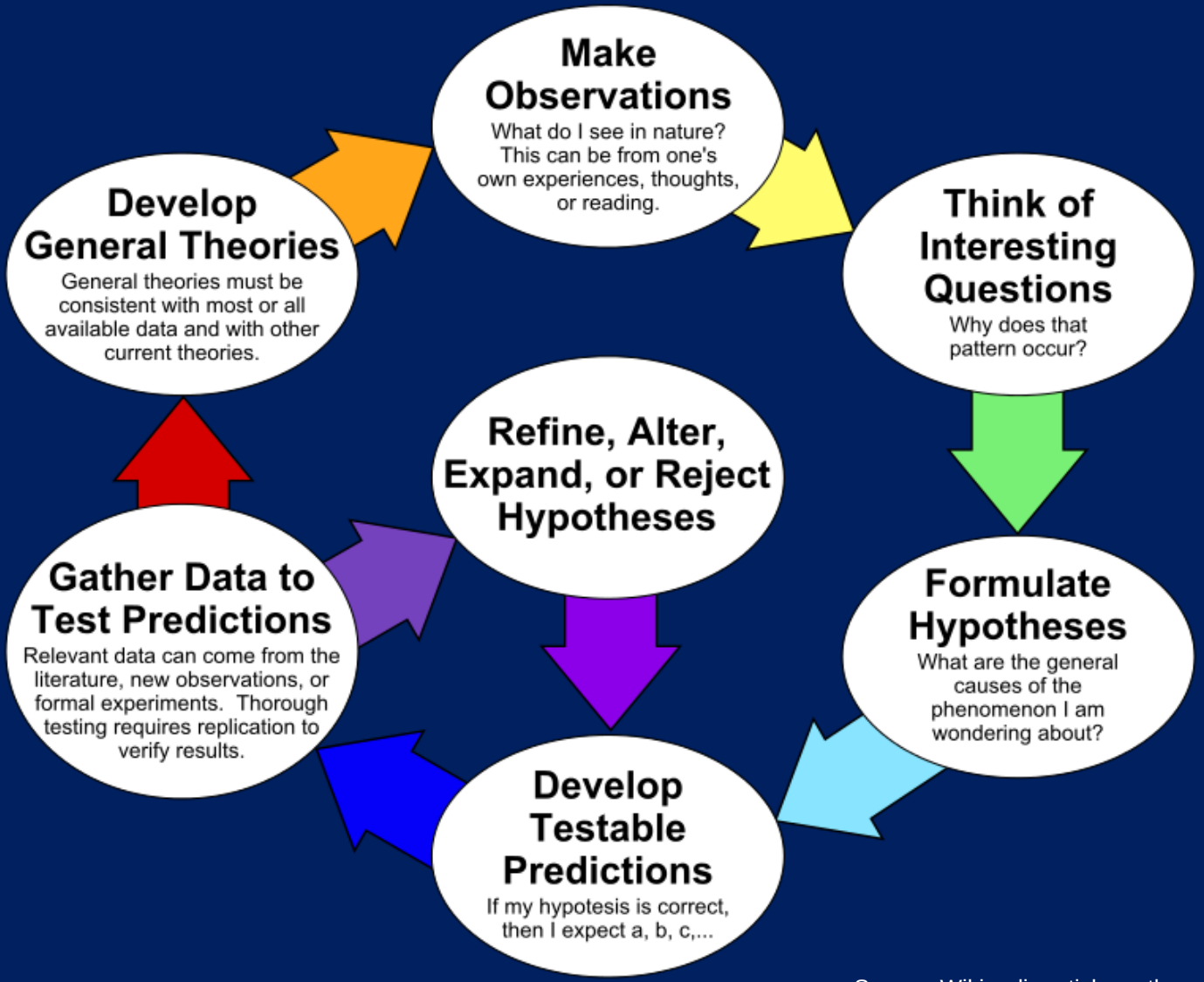
Science: an Accumulation of Truths & Tools

The Scientist *must set in order*.
Science is built up with facts, as a house is with stones.
But a collection of facts is no more a science than a heap of stones is a house.

H. Poincaré (1905)

"All Gizah Pyramids" by Ricardo Liberato, Wikimedia Commons

Science as a Process: a Structured Pursuit of Greater Knowledge



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Source: Wikipedia article on the scientific method

Science, in a Complex Dynamic World, is an Engagement of Communities & Individuals!

Pieter Brueghel the Elder: The Fight between Carnival and Lent (1559)

Valuing Tradeoffs ... Benefits & Costs ...

Messy & Chaotic Coupled Human-Natural Systems!

(Kunsthistorisches museum; Public domain digital image from commons.wikimedia.org)

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What Does "Science" Provide?

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~ Increasing Subjectivity ~

- Data and Observations.
- Process "truths" (e.g. causality relations).

- Information Analysis tools.

- Conceptual/numerical models.
- Data Synthesis tools.
- Science process guidance.

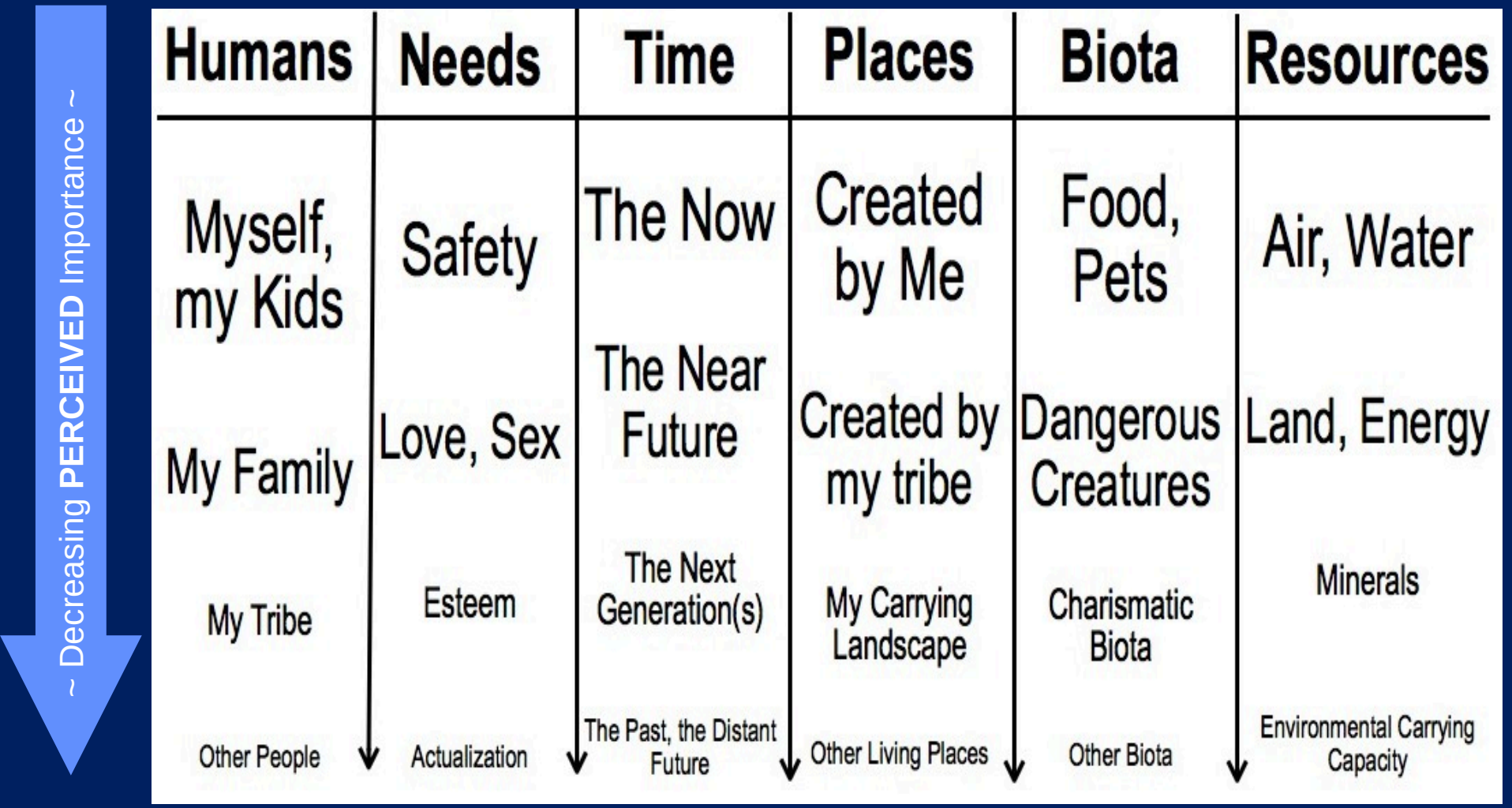
- Informed expert judgment
  or expert opinions.

~ Usefulness for Decisions ~

Beliefs, Biases, Heuristics, Values Affect Everything

(cf. Glynn, 2014; Glynn, 2015)

Some Human Values & Prioritizations (Social Wants)



Social Needs Are Not Necessarily Equal to Social Wants!

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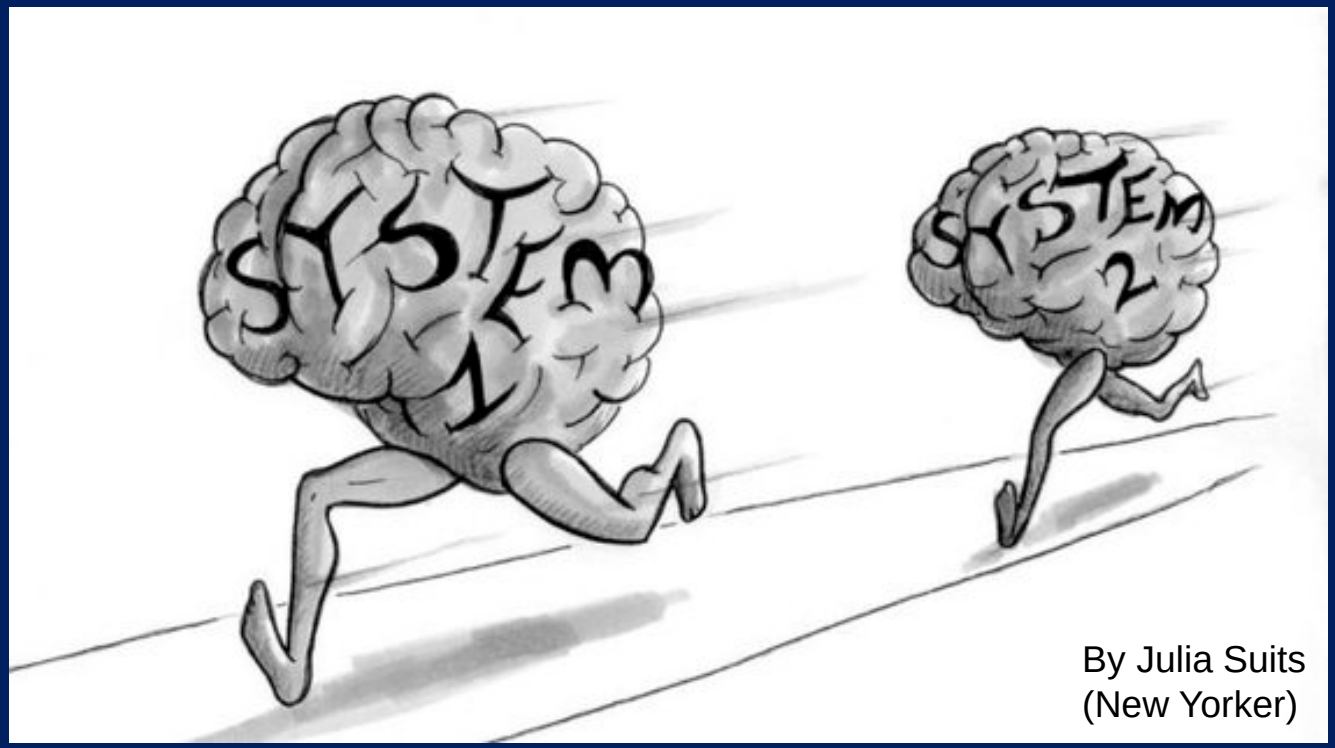
Glynn, P. D., A. A. Voinov, C. D. Shapiro, and P. A. White (2017), From data to decisions: Processing information, biases, and beliefs for improved management of natural resources and environments, *Earth's Future*, *5*, doi:10.1002/2016EF000487

Innate (System 1) vs. Conscious (System 2) Thinking



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)

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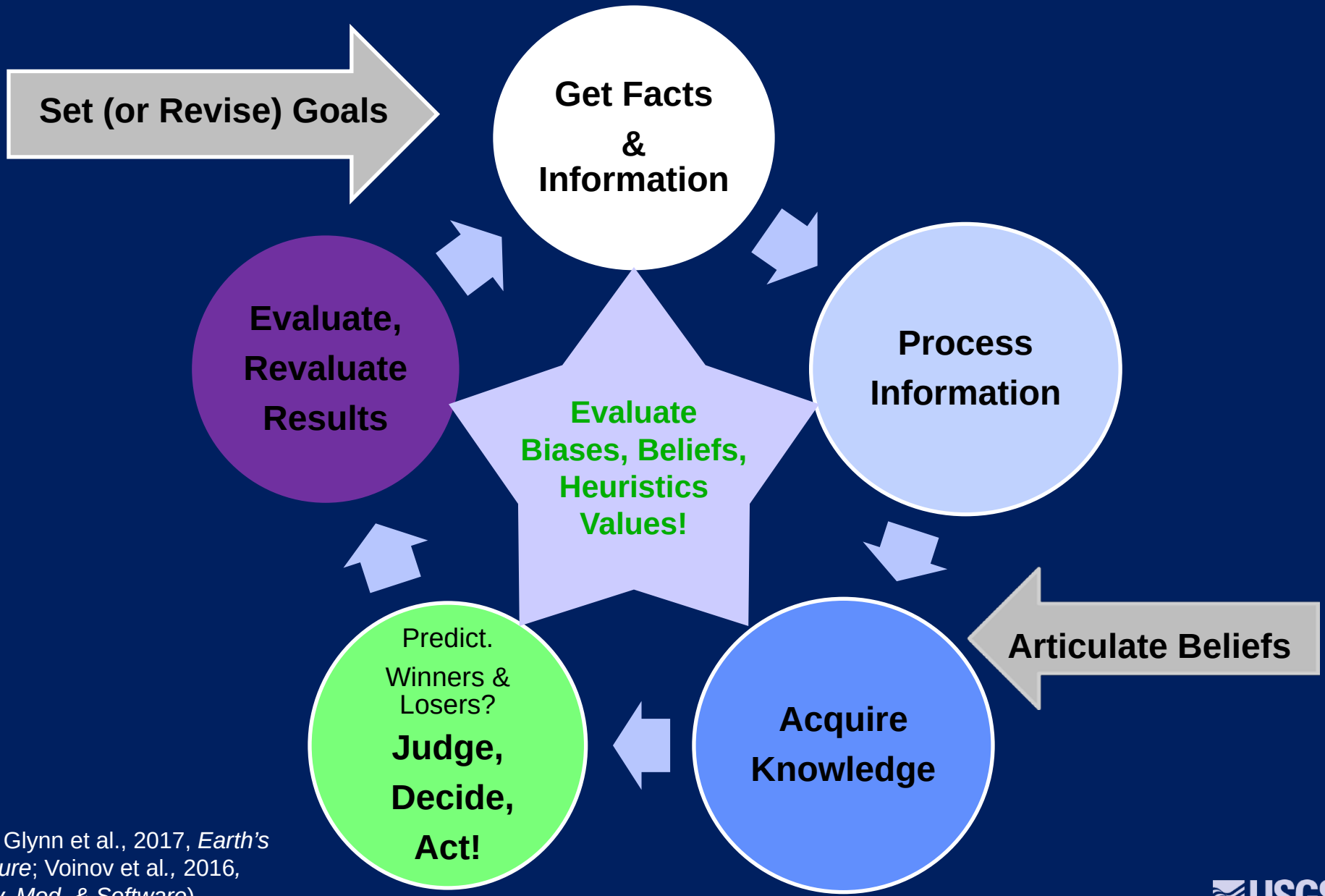
A Science-Infused Adaptive Policy *Process*



(cf. Glynn et al., 2017, *Earth's Future*; Voinov et al., 2016, *Env. Mod. & Software*)

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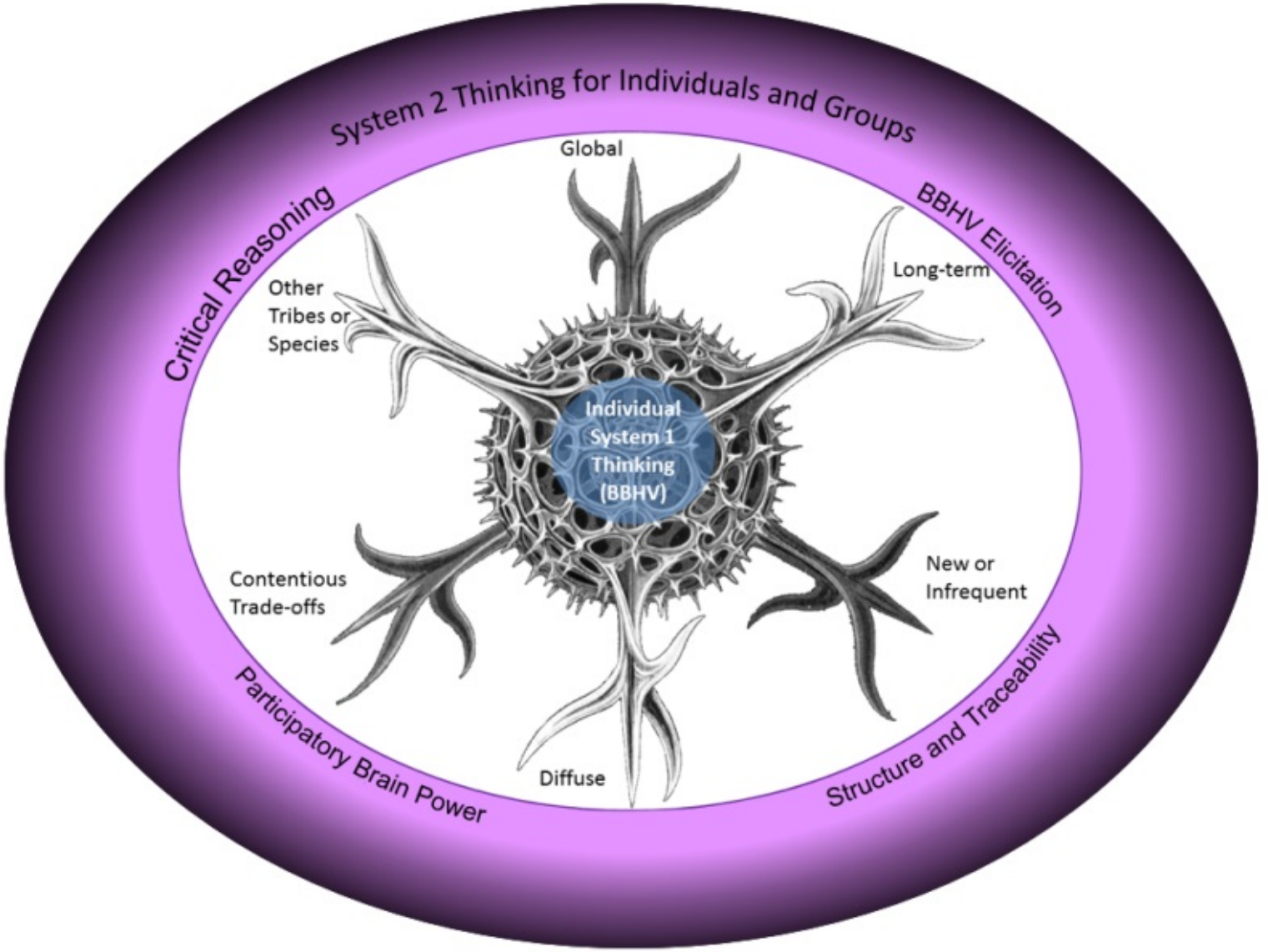
Characterization of Issues for Optimization of System 1 or System 2 Thinking

Glynn et al., 2017, *Earth's Future:*

From data to decisions: Processing information, biases, and beliefs for improved management of natural resources and environments.



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Is Open Systematic Science Enough?

- No. An *ecosystem* of laws, policies, traditions, rituals, norms, belief networks, and trust systems **constrains** any application of science-infused information.
- **We also need systematic policy and decision-making!** This means openness, traceability, accountability.
- Should managers, politicians, lawyers, shamans, business leaders, or priests be the only experts for this ecosystem of rules?
- Is there any reason to hide the rules from the rest of society?
- Sunlight disinfects: articulate rules, creeds, or beliefs. Discuss and be transparent about their limits, and about limits on “transparent discussions”.

Communication and Understanding Beyond Babel Fish

- Science/policy governance is not just about information. It's about understanding beliefs, creeds, and systems of trust, i.e. rules.
- We need Babel Fish (Douglas Adams; Hitchhiker's Guide to the Galaxy): "instant language translators".
- Babel Fish are not enough. We need communication of science and of laws, rules, norms or other constraints (and of how they vary between different people or groups).
- BBHV and constraints are present because of past evolution and adaptation. We need to understand the past conditions that gave rise to the constraints (and to the BBHV). **Are the conditions still present or likely to continue into the future?**

Don't Just Manage the Past, but rather the *Present* and the *Future*

- Beliefs help create the future. Homo Sapiens has a unique ability to create systems of rules, trusts, and beliefs in future imagined states (cf. Yuval Noah Harari), that then have a chance of realization (but only if the constraints can be maintained.)
- Operations Research (OR) and expert systems technology can document, analyze, and navigate these systems of behavioral constraints, including human behavior and interactions in Science/Policy interactions (incl. adaptive management).
- The conditions of the past and our BBHV need to be assessed. Artificial Intelligence (AI) may provide more emotionally-detached assessments of BBHV effects on decisions in Science/Policy interactions. AI can also assess similarities & differences between past issues and present issues, and between past and present behaviors. (Anthropologists needed).

Summary

- Coupled human/natural systems are complex, dynamic and information about them is always incomplete and never perfect.
- Biases, beliefs, heuristics and values (BBHV) are societal and evolutionary adaptations created by past frequently and acutely experienced conditions. They don't necessarily apply well to present or future system conditions.
- Knowledge is power. While knowledge sharing (transparency) is generally highly worthwhile, laws, rules, and norms have been devised to constrain the sharing.
- Open Science must be complemented by Open Traceable Accountable Policy in adaptive governance processes. At a minimum, limits on transparency must be discussed, and the limits must be made transparent.
- AI and OR have the potential to help document, analyze, navigate or complement human science/policy governance.

Courteous & Courtly Governance

Opening of the First Parliament of the Commonwealth of Australia by The Duke of Cornwall and York (later H.M. King George V), May 9, 1901. 1903 painting by Tom Roberts (wikimedia commons).

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