

# Coupled epistemic-ethical issues in analyzing climate risk management strategies

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**Workshop on Informing Risk Management  
Decisions in the Face of Deeply Uncertain Sea-  
Level Rise Projections**

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# Dr. Evil and the Role of Philosophy

“Can Dr. Evil Save The World?”

Last summer, an elite group of scientists, economists and government officials gathered at Snowmass ski resort near Aspen, Colorado, to contemplate the end of the world.”

“Weyant, surprised by the “emotional and religious” debate over Wood’s proposal, cut off discussion before it turned in a match”



Citations:

- 1) Talk Wood, @ snowmass
- 2) JEFF GOODELL, April 16, 2013, <http://rezn8d.net/2013/04/16/can-dr-evil-save-the-world/>

# Overview

- Values
  - Epistemic values
  - Ethical values
- Sustainability
- Coupled Ethical-Epistemic Analysis
  - Examples
    - Geophysical
    - Human uncertainties
- Robust Decision Making and Coupled Ethical-Epistemic Analysis

# Key Values in Science

- System understanding
- Improved approximation to truth
- Improving lives
- Empowerment through education



- Responsible science
- Values transparency
- Contributing to justice
- Environmental sustainability



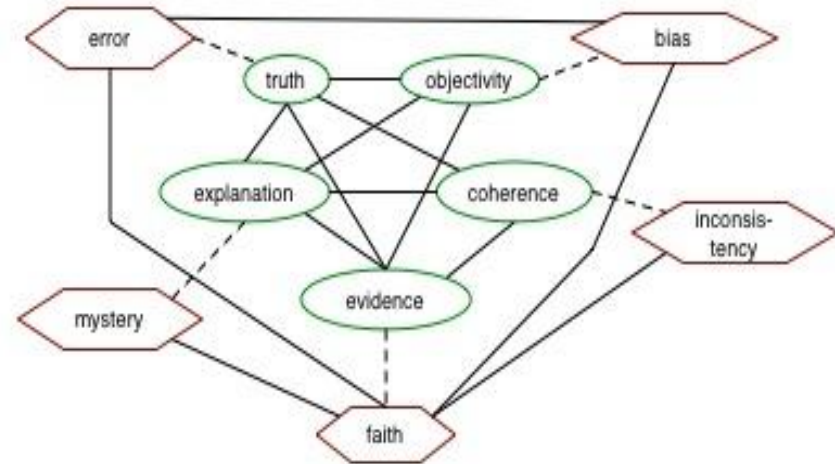
The Network for  
Sustainable  
Climate  
Risk  
Management

SCRiM

# Values

- **Epistemic values:**

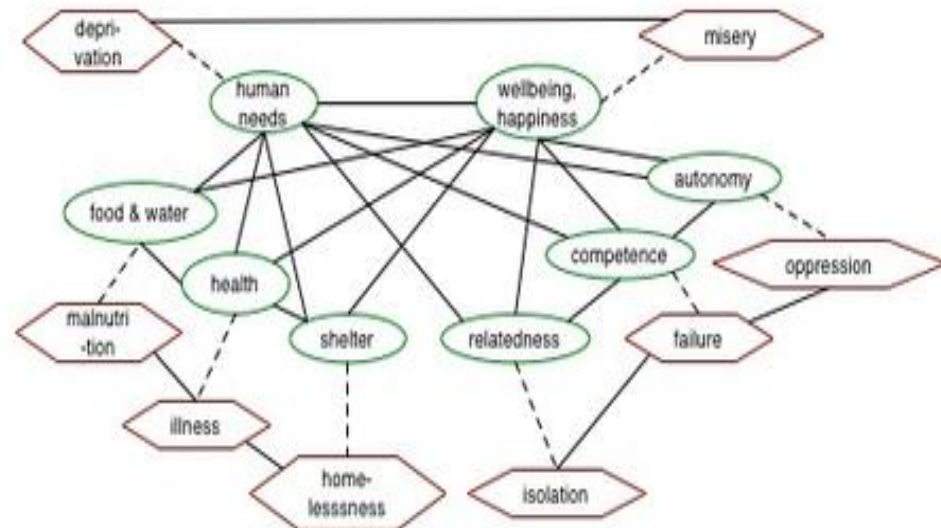
- Robustness of evidence
- Predictive power
- Convergence of evidence
- Completeness



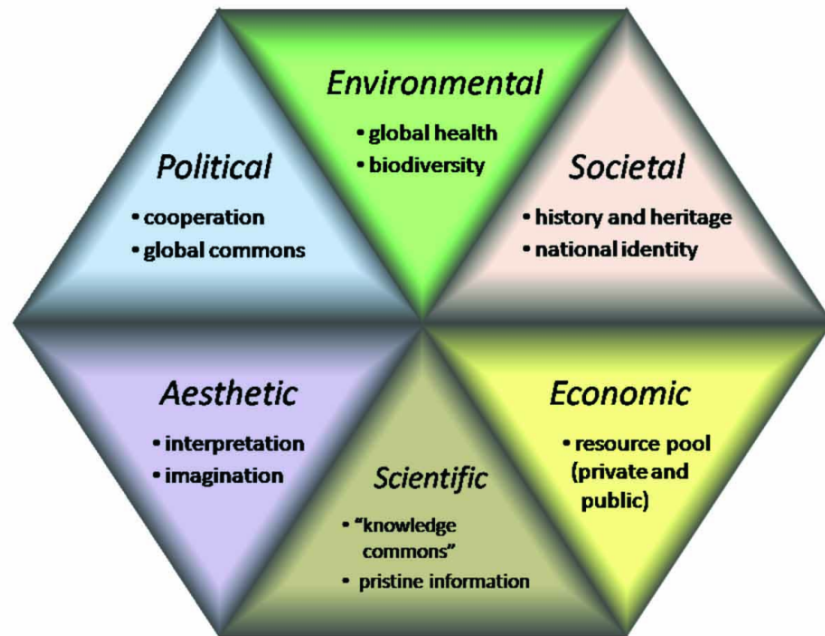
Paul Thagard 2012

- **Ethical values**

- Fairness/Justice (Rawls)
- Trustworthiness
- Care



- “values inescapably and legitimately play a role in scientific deliberations, and the key to improving science is to make application of these values rationally appropriate”
  - (Thagard, 2012)



- **Values clarification**
  - What are our values?
  - Are there value disagreement?
- **Values deliberation**
  - What do we need to know to judge which values are relevant and how to rank values?
- **How can values bias scientific deliberations?**
- **How can values legitimately contribute to scientific inferences?**

Scientific Committee on Antarctic Research 2010  
 Overview of the types of values associated with Antarctica

# Scientific/Epistemic Values



# Ethical Values



# Sustainability

- Sustaining what?
  - “Sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.”
    - Brundtland Commission  
1987
- What do we value that we aim to sustain?
  - Human life
    - Well being
    - Ways of living
    - Economic prosperity
  - Other life forms
  - Ecosystems
  - Environmental integrity



# Sustainability for whom?



- Who has moral standing?
  - Humans only
  - Animals
  - All life forms
  - Ecosystems
- How do we weigh different priorities?

# The Question of Justice

- Intergenerational Justice
  - The question of time



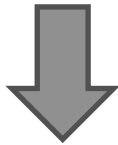
- Inter-species Justice
  - The question of moral standing



# Ethical Analysis

## How should we act?

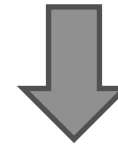
- Social impacts of scientific research
- Research Integrity to ensure trustworthy science
- Responsible selection/funding of research topics



# Epistemic Analysis

## What can we know?

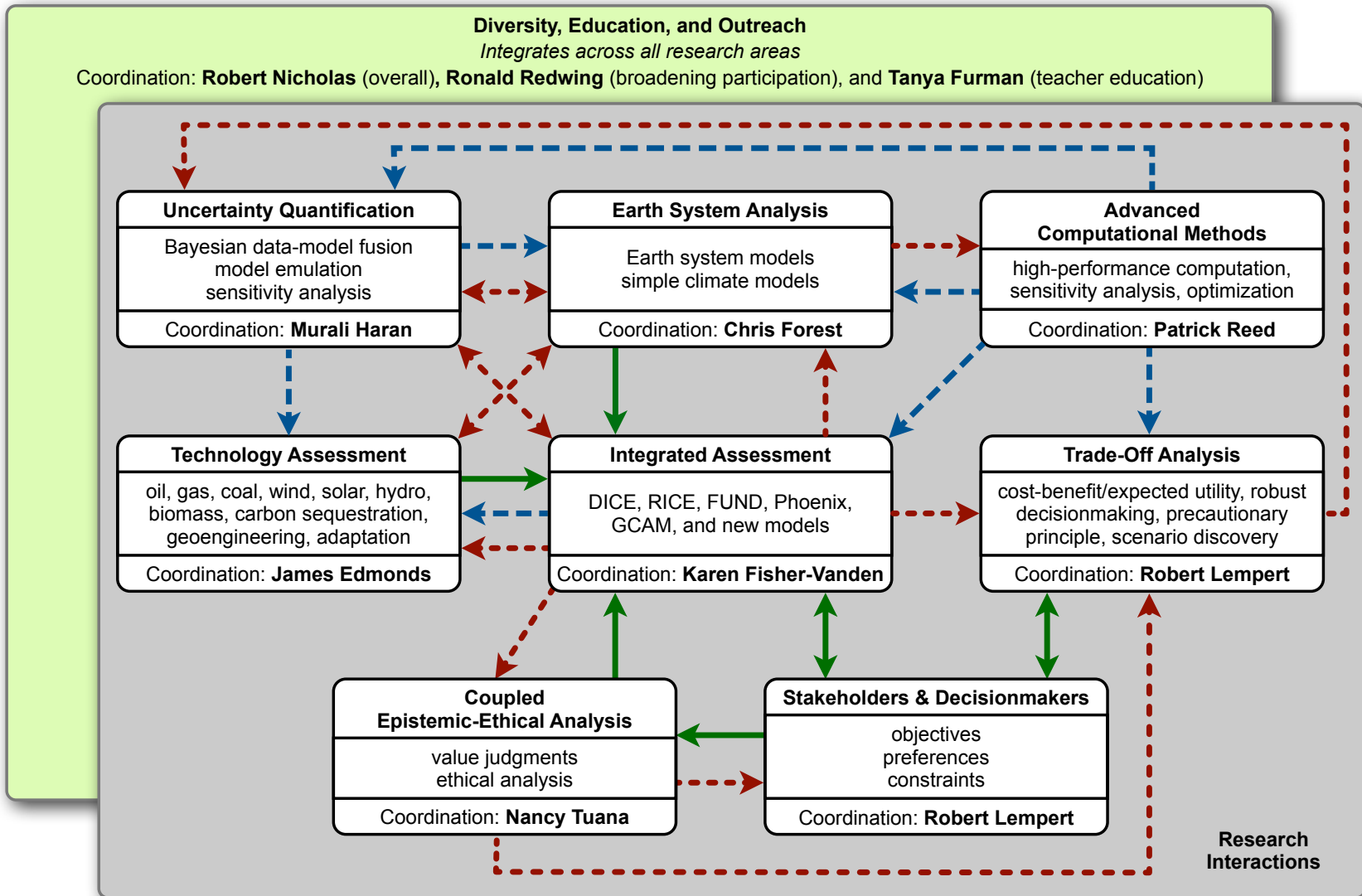
- Types of uncertainty
  - Deep uncertainty
- Model selection
- Data inclusion and management decisions



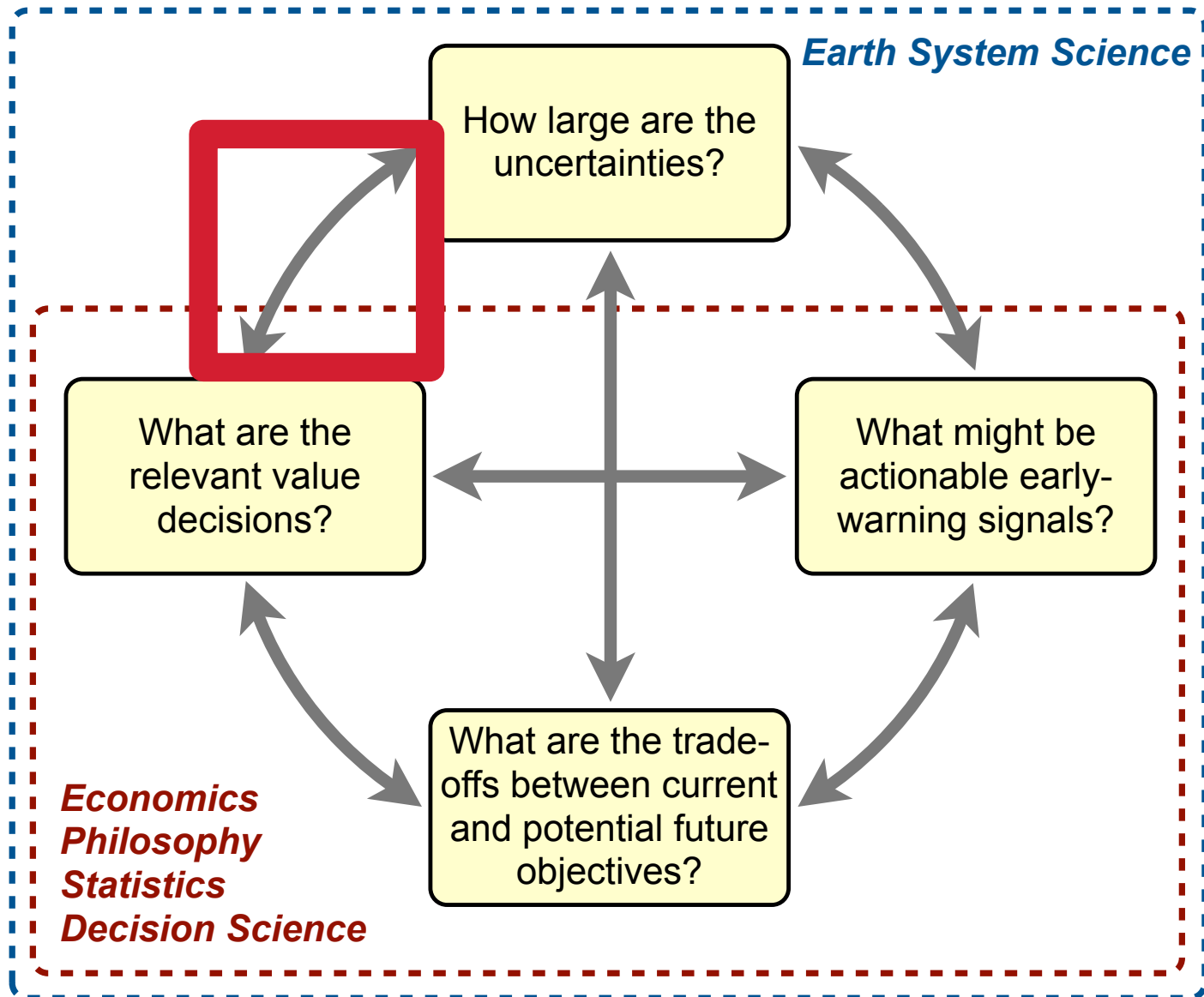
# Coupled Ethical-Epistemic Analysis

- Values that inform epistemic decisions (robustness, reliability)
- Epistemic decisions that have ethical import
- Decisionmaking under conditions of uncertainty

# The Role of Coupled Epistemic-Ethical Analysis



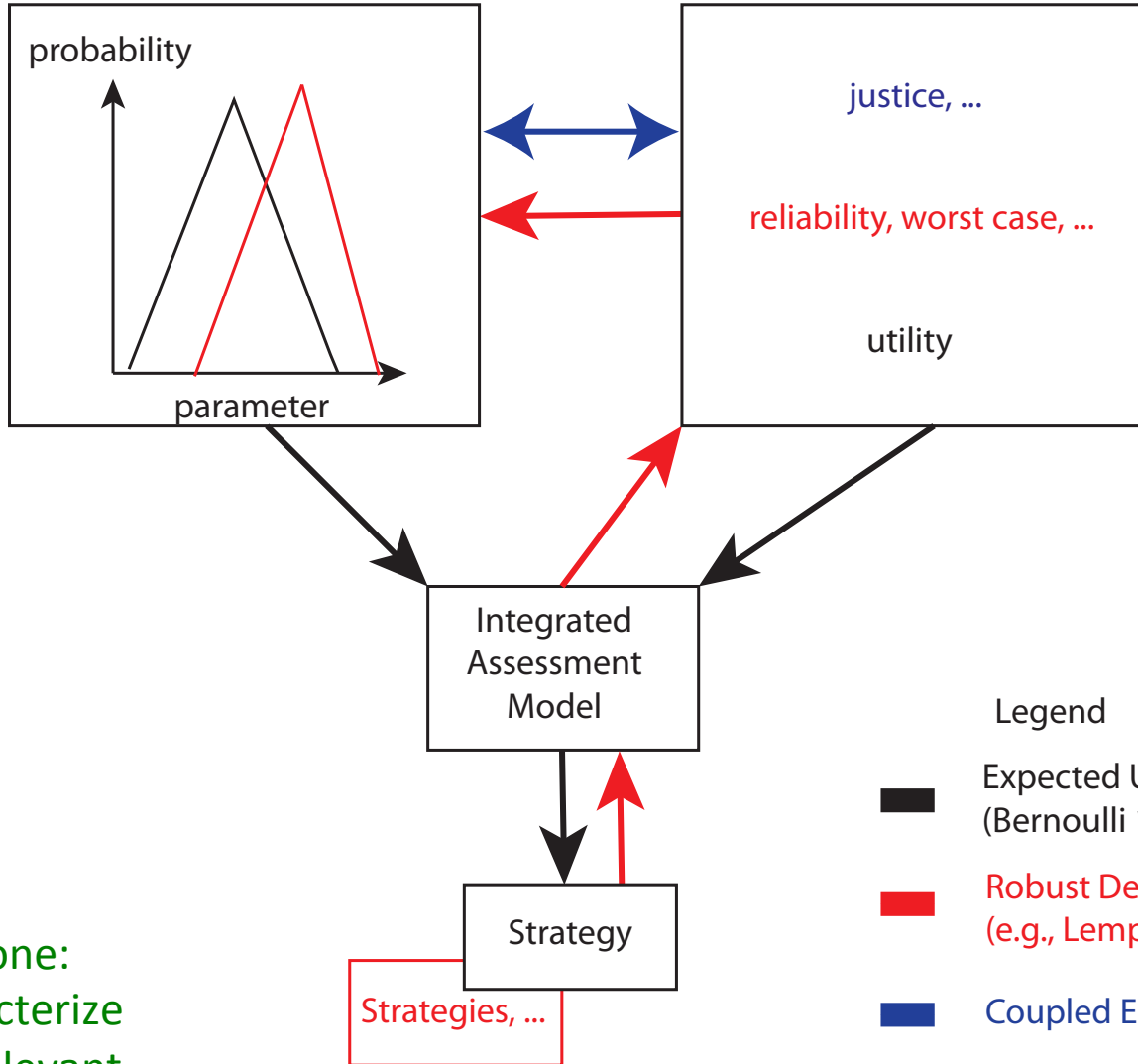
# Closing the feedback loop



# Key Coupled epistemic-ethical questions in decision-analysis

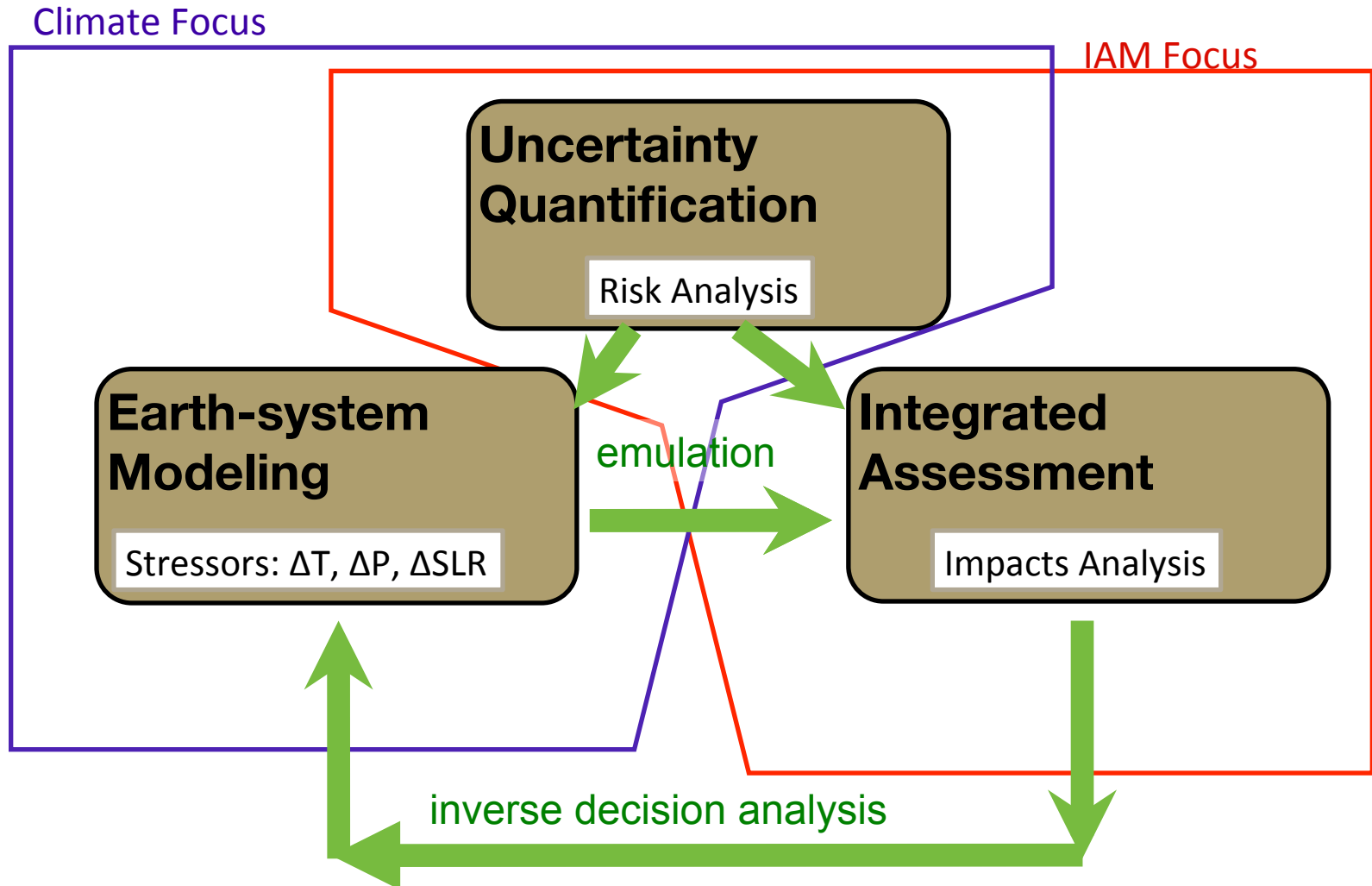
Epistemology (What can we learn?)

Ethics (How should we act?)



Step one:  
characterize  
the relevant  
interactions...

# Inverse decision analysis: What are decision-relevant uncertainties?



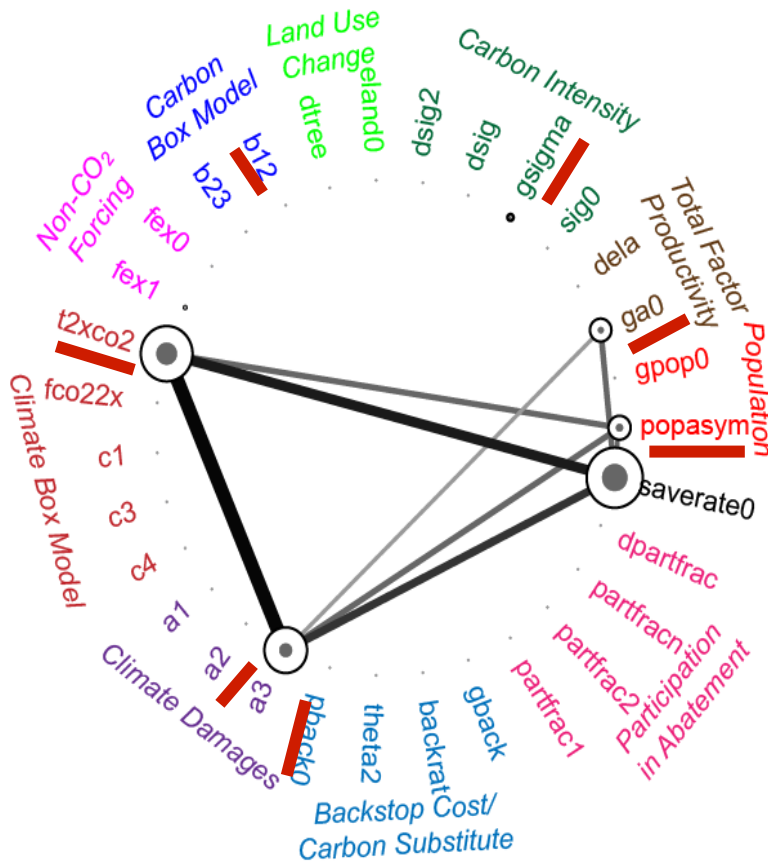
How does this work in a real-world example?



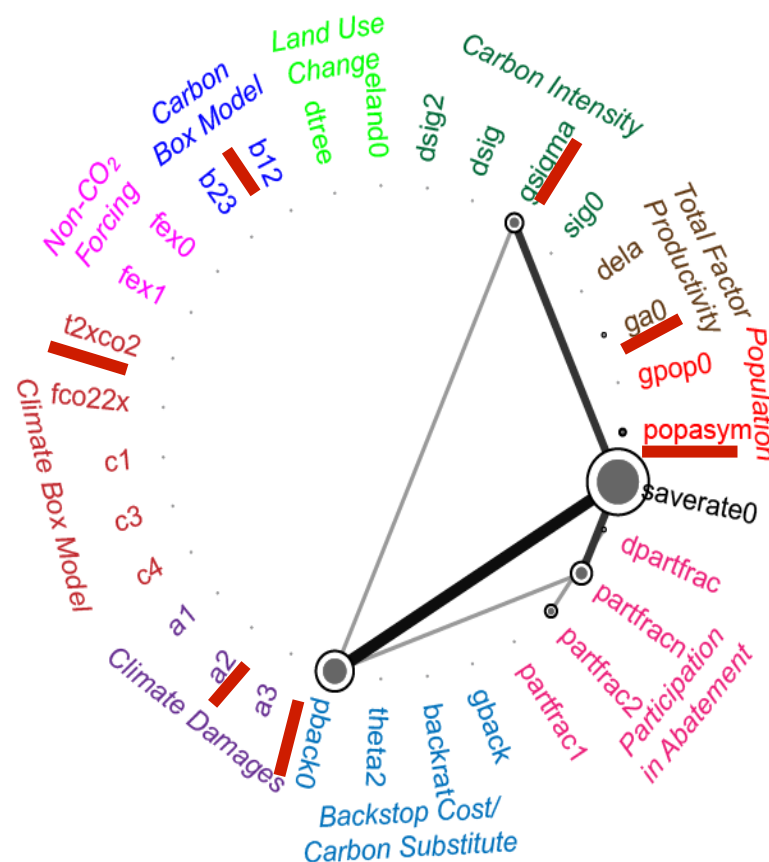
# One (maybe simplistic and obvious) example: The choice of the three most important parameters in DICE depends on the objective

Butler, Reed, Fisher-Vanden, Keller, and Wagener (2013)

## NPV Climate Damages



## NPV Abatement Costs



Exogenous parameters named as 'important' in Nordhaus (2008)



# Uncertainty about Ethical Frameworks

Utilitarian

- Balancing harms and benefits

Deontological

- Rights and duties

Virtue

- Values and character

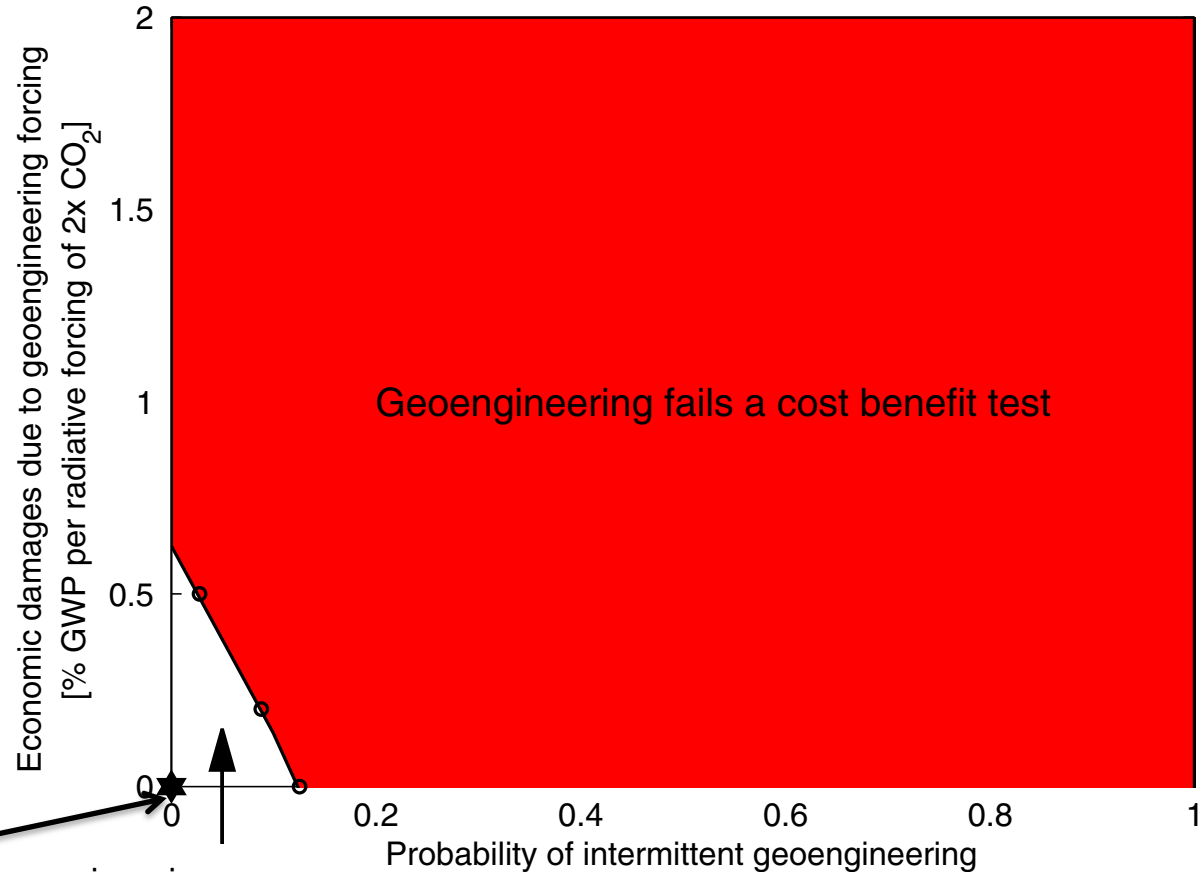
Care

- Relationships and response-ability

# RECAP: Does substituting aerosol geoengineering for abating CO<sub>2</sub> emissions pass a cost-benefit test?

- Analysis limited to a utilitarian approach
- Is that adequate?
- What would the conclusion be using different ethical frameworks?
- Deep uncertainty concerning future ethical framework preference.

Goes, Tuana, and Keller (2011)



Assumption of Wiggley (2006)

Geoengineering passes a cost-benefit test

# An example process as applied to geoengineering analysis

What could happen?  
What is efficient? Trade offs?

Goes et al 2011



What are the relevant ethical frameworks?  
Svoboda et al 2011

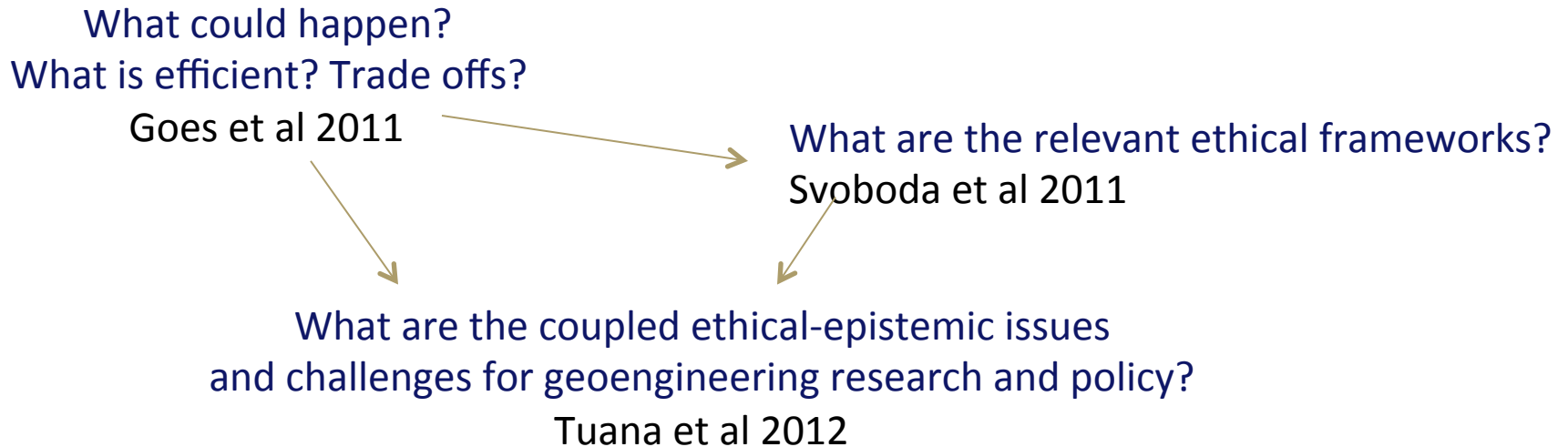
# Geoengineering via Sulfate Aerosol Deployment (SAD)

- Ethical convergence
  - All versions of Distributive Justice (DJ) concur:
    - Based on our current scientific understanding of the impacts of SAD that the harms to some from this form of climate control violate principles of DJ
    - SAD should not be deployed unless it can be shown that impacts would not violate basic principles of DJ or solid reasons given why it should be implemented despite its ethical shortcomings

# Geoengineering via Sulfate Aerosol Deployment (SAD)

- Ethical convergence
  - All versions of Intergenerational Justice (IJ) concur:
    - The risks and potential harms resulting from discontinuous SAD implementation violate basic principles of IJ
    - A short term application of SAD combined with robust abatement may be able to satisfy the demands of IJ, but still risk violation of basic principles of DJ
  - SAD must also satisfy the requirements of Procedural Justice

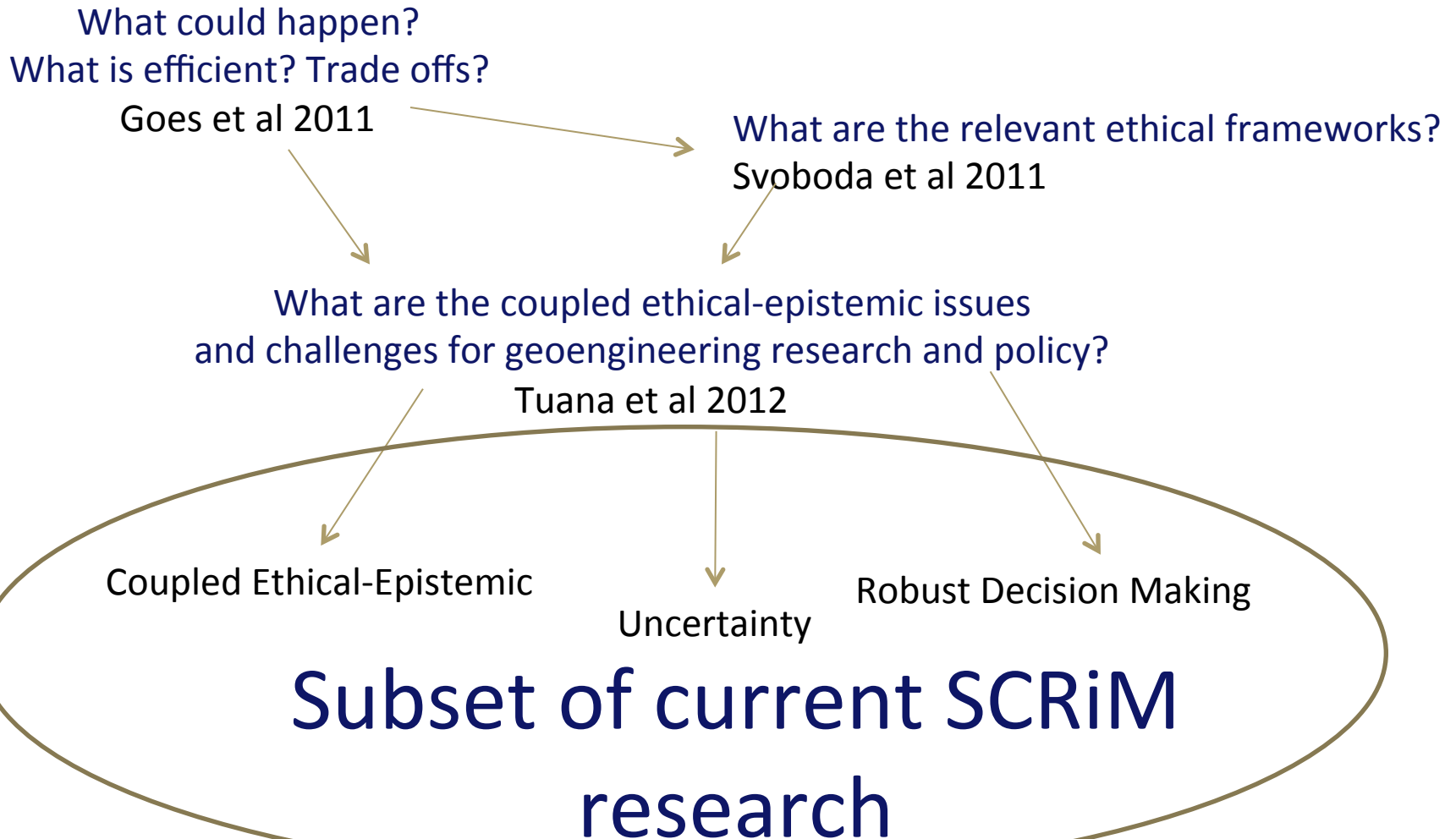
# An example process as applied to geoengineering analysis



# Geoengineering raises questions at the interface of science and ethics

- We identify nine key fields of coupled research including:
- whether SRM can be tested,
- how quickly learning could occur,
- normative decisions embedded in how different climate trajectories are valued,
- justice issues regarding distribution of the harms and benefits of geoengineering.

# An example process as applied to geoengineering analysis





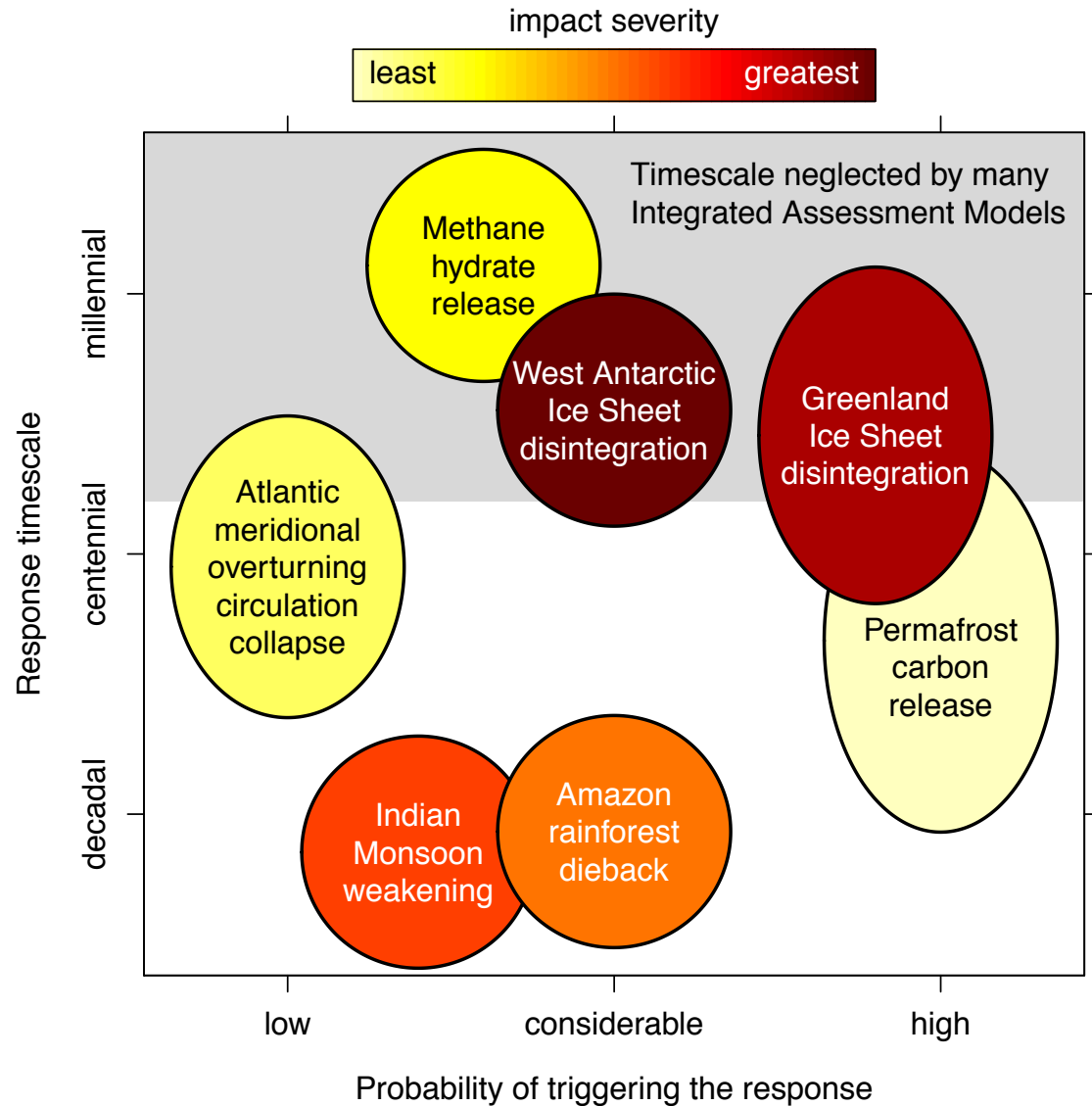
# A working definition of Robust Decision Making (RDM)

1. RDM is a method to support decision making.
2. Rather than using a single model to describe a best-estimate future, RDM provides decision-makers with resources for evaluating alternative strategies under conditions of deep uncertainty.
3. RDM engages stakeholders and decision-makers to identify factors and values relevant to the decision process, acknowledging that there may be strong disagreements
4. Runs a large range of models that assess a wide range of choices and options.
5. Helps decision-makers identify, evaluate, and choose robust strategies, i.e., that perform well over a wide range of possible futures and can manage surprise.

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RECAP:  
The question  
of moral  
standing.  
Relevant  
time scale  
and inter-  
generational  
justice



Nicholas and Keller (2012), synthesis of published assessments

# Rawls Principles of Justice

- Principles of justice are those principles that would be chosen by rational persons in an original position behind a “veil of ignorance”.

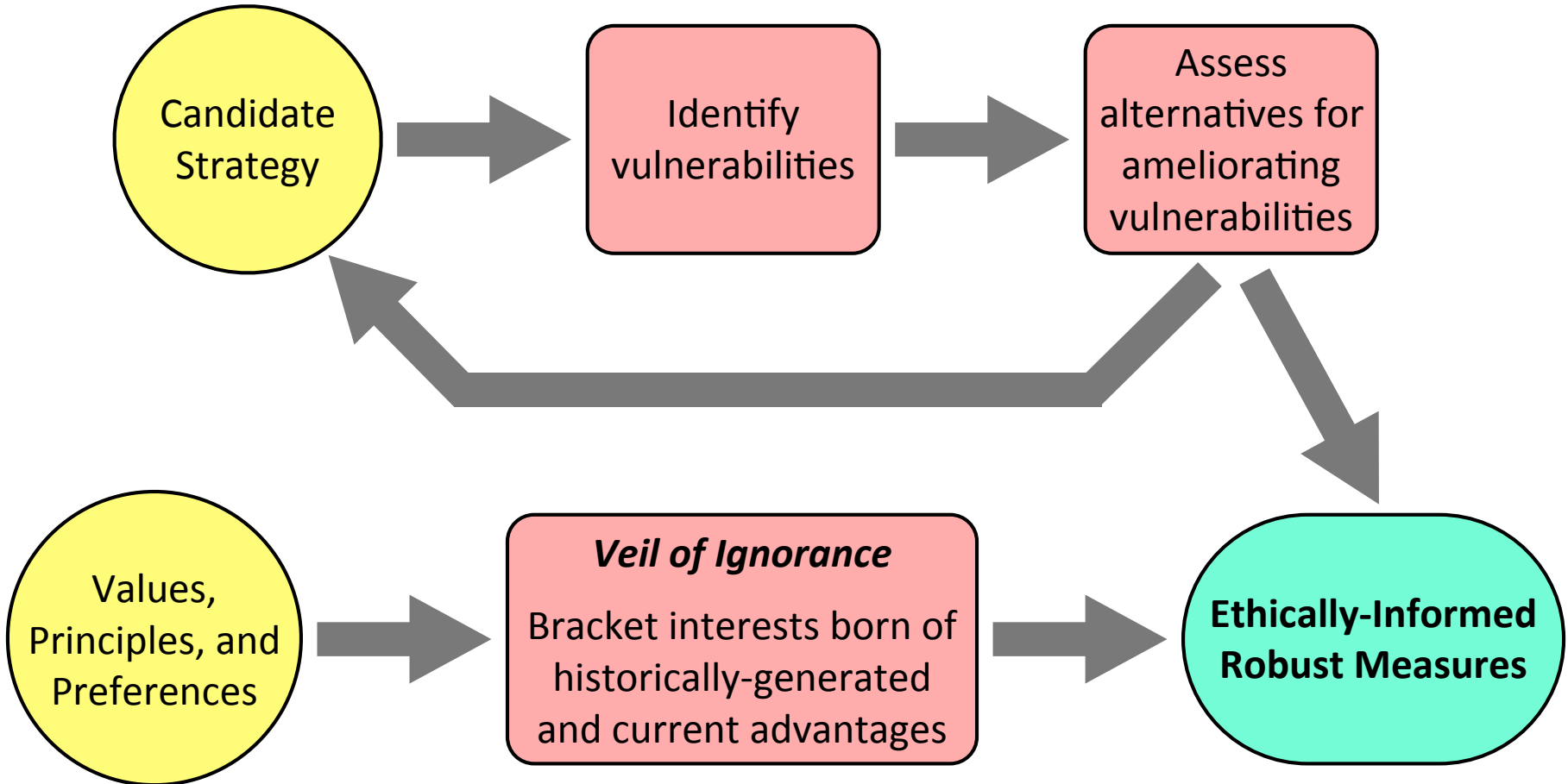
## RDM

- Whose principles, values, and interests are being represented?

- The Veil of Ignorance:  
*“...no one knows his place in society, his class position or social status, nor does anyone know his fortune in the distribution of natural assets and abilities, his intelligence, strength, and the like.”*

*- Rawls (1999), p. 11*

# The *Veil of Ignorance* can be a useful concept in decision analysis



# Avenues to improve the social acceptability and justice of the analysis



- Veil of Ignorance
  - Analysis from all stakeholder perspectives to insure impartiality
- Values clarification
- Principles identification
- Justice dimensions
  - Spatial/distributive
  - Temporal/intergenerational
- Multiple stakeholder inclusion

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All errors and opinions are (unless cited) ours

