

# Leading under deep uncertainty: the need for *inclusive leadership*

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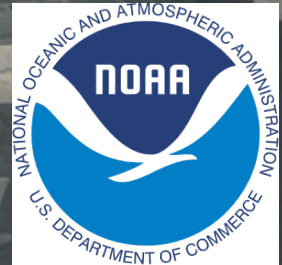
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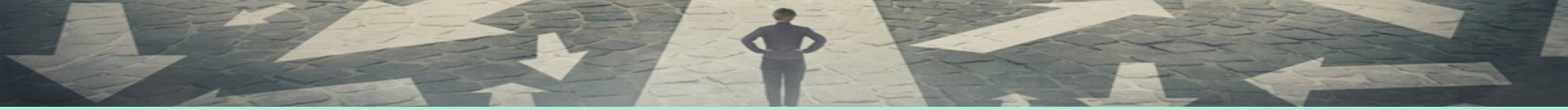
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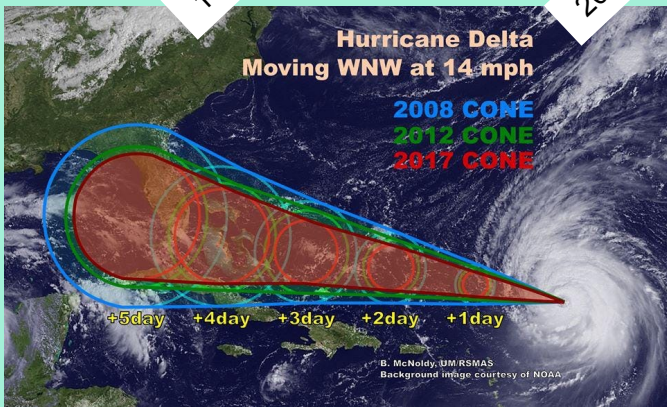
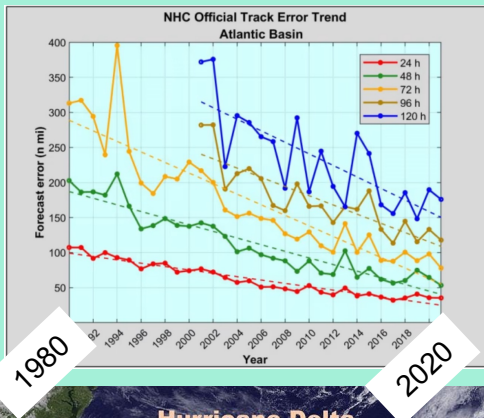
# Outline

- Brief intro to what is *deep uncertainty*
- Examples on DMDU (Decision Making under Deep Uncertainty)
- Three questions to consider and discuss
- Summary take-homes



# Storm tracks and Chess

- Better data
- Better models

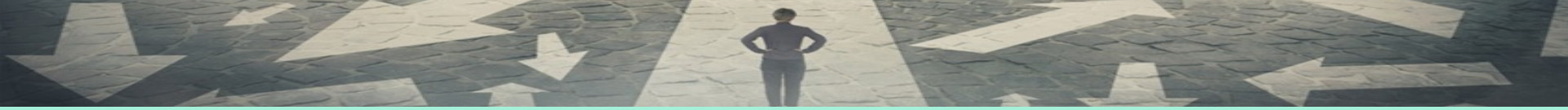


BEST CHESS  
OPENING  
MOVES

COMPLETE  
GUIDE



- There are over **1,300 named openings and variants**, e.g., the *Italian Game*, the *Sicilian Defense*, the *French Defense*, the *Ruy-Lopez*, etc.
- There are over **300 million ways** of starting **the first four moves** in a game of chess.
- One way to **reduce mistakes** in later stages of the game is **through increased diversity**.



# What is deep uncertainty?

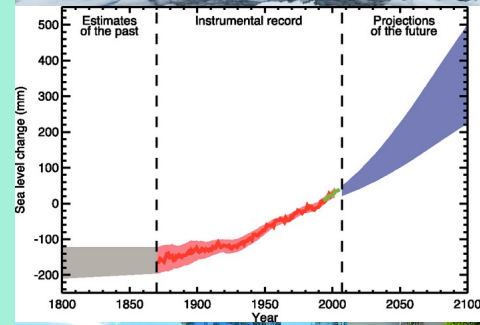
- The likelihood of future events & outcomes cannot be well-characterized with existing data and models
- Uncertainty cannot be reduced by gathering additional information
- Stakeholders disagree on consequences of actions





# Example #1 – sea level rise/coastal planning

- Coastal project design decisions are complex
  - project performance is vulnerable to changing conditions (adaptation may be required),
  - costs increase rapidly with increasing risk (e.g., the Big Dig), and
  - underperforming projects may lead to worse outcomes than if the project had not been built.
- Policy and project outcomes are also contingent upon conditions that are deeply uncertain:
  - including future trajectories of sea-level rise,
  - frequency and intensity of coastal storms, and
  - the amount of development in the coastal zone.
- Coastal adaptation is an area in which stakeholders may disagree over probabilities and the benefits of different outcomes.





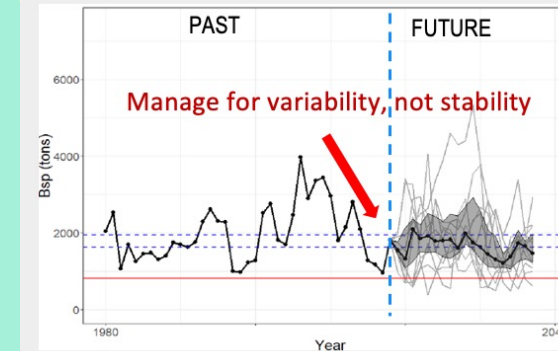
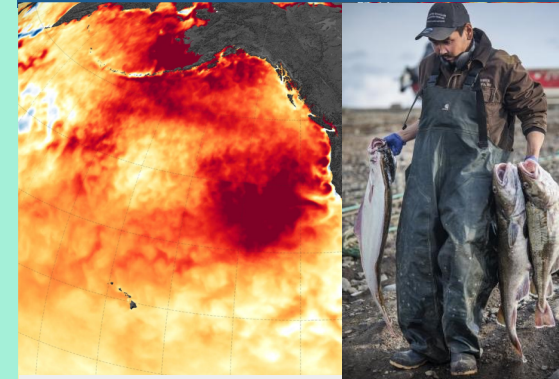
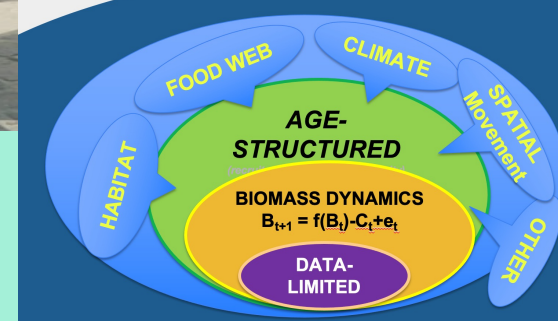
## Example #2 – fisheries management

- Deep uncertainty complicates management actions, such as
  - setting quotas, and
  - area and season closings

while also achieving other environmental and ecosystem goals.

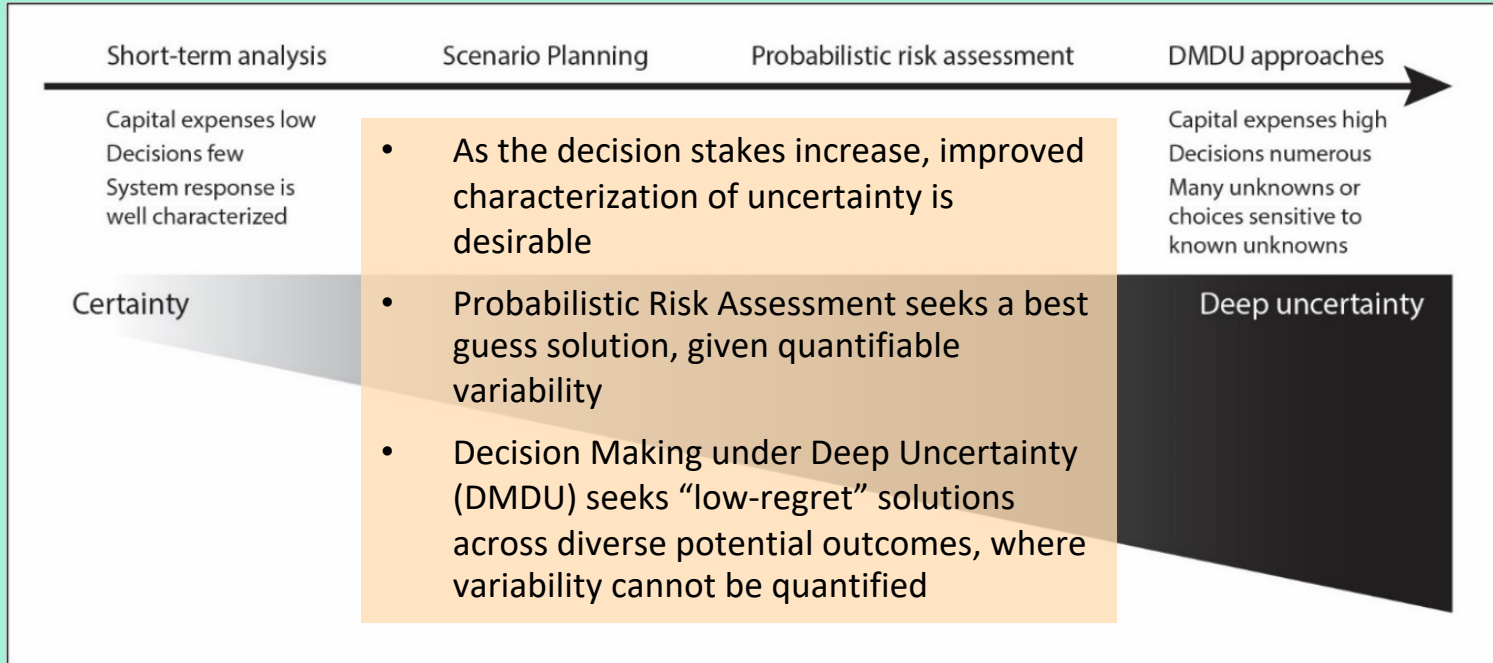
- These decisions are made based on estimates of current and future conditions that are subject to uncertainty and potential stakeholder disagreement:
  - fish stock assessments and dynamics,
  - climate change impacts,
  - fish stock recovery paths.

Data availability to support these decisions varies across fisheries and situations, and many fisheries are data-poor.





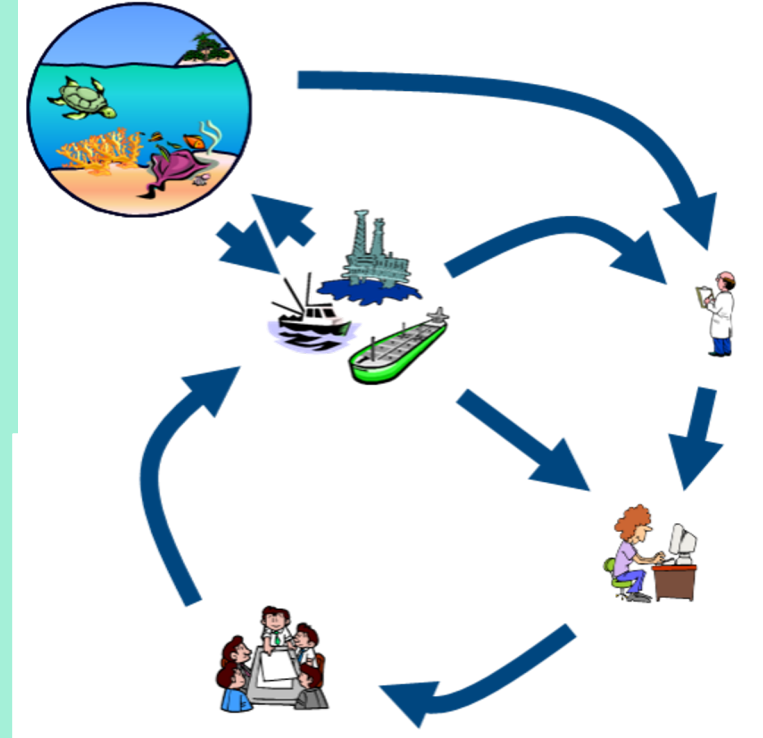
# When to use DMDU



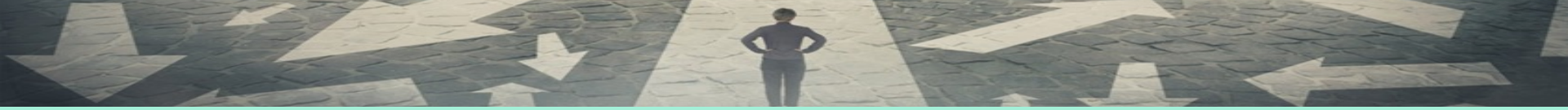
# Management Strategy Evaluations (MSEs)

## Ecological forecasting and scenario planning

- Multiple scenario development, engagement strategies and modeling techniques to consider implications of choices under likely (and unlikely) future conditions.
- Techniques couple systematic analysis with deliberation, in coordination with stakeholders.





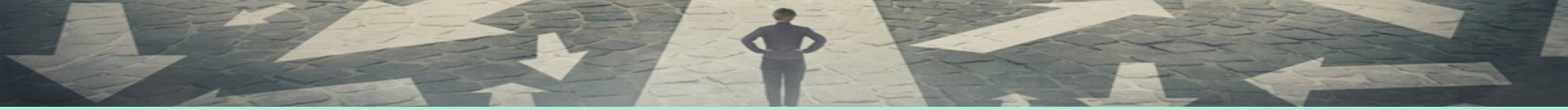


# Decision-making and leadership

- Leadership requires us to make decisions that impact the workplace.
- In turn, decision-making is a leadership skill used to assess a situation and determine how the organization may proceed.

”Normally” ...

- Identifying the challenge
- Devising solutions
- Weighing options
- Making a choice
- Informing others of the decision



# What is deep uncertainty?

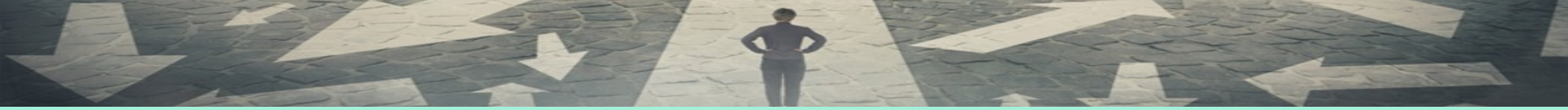
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## Question 1

- **Consider aspects of your work where you see elements of deep uncertainty. What makes them “deeply uncertain”?**

These need not be technical, scientific, or engineering.

For example, consider aspects of the future workplace, the way we relate to each other, how we communicate, etc.



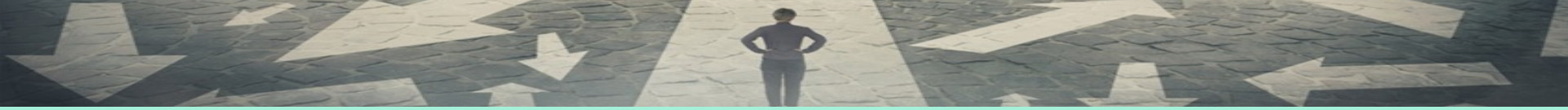
## DMDU Techniques

1. **Stakeholder engagement** from beginning to end
2. Structured **scenario development**
3. Modeling of pre-selected options
4. **Stress-testing** recommended actions to **characterize regret**
5. Dynamic **adaptive planning**

## Question 2

- **What approaches would you consider in attempting to address components of your work that are “deeply uncertain”?**

Some aspects may be **objective** (“quantifiable”) while others **subjective** (where you have to go with your instinct).



## DMDU: Leadership benefits

- DMDU can lead to **stability** in the workplace
- When no one fully understands the problem, or its solution, it is **useful to negotiate**.
- It builds **trust** and generates **buy-in**
- DMDU **strengthens the democratic process** and adds a value to leadership that “technocratic” processes might not.

## Question 3

- **What leadership strategies have you use when approaching DMDU?**
- **How would you change/adapt your leadership approaches to be more inclusive?**



Science Advisory Board

# DECISION MAKING UNDER DEEP UNCERTAINTY

WHAT IS IT AND HOW MIGHT NOAA USE IT?

PRESENTED TO THE NOAA SCIENCE ADVISORY BOARD  
BY THE SAB ECOSYSTEM SCIENCES AND MANAGEMENT WORKING GROUP

JANUARY 22, 2021

[https://sab.noaa.gov/wp-content/uploads/2021/08/ESMWG\\_DMDU-Report\\_Jan2021\\_Final.pdf](https://sab.noaa.gov/wp-content/uploads/2021/08/ESMWG_DMDU-Report_Jan2021_Final.pdf)

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Steven W. Popper *Editors*

# Decision Making under Deep Uncertainty

From Theory to Practice



OPEN



<https://link.springer.com/book/10.1007/978-3-030-05252-2>

# Thank you!

