1) Developing collaborative scenarios with the use of Bayesian networks to assess oil spill risks in the Bering Strait, Alaska

2) Governance analysis of Norwegian policy in Barents Sea (mainly oil production)

Potentially:

3) ? Analysis of marine insurances?

4) ? Relevancy analysis of SEADNA outcomes?

“Recommended practise of scenario based risk management for Polar waters”

Helsinki University

The need for collaborative scenarios in risk management and governance

- New participative ways are needed to govern risks in the Arctic. E.g. local communities need to be involved in decision-making processes concerning **vessel traffic routes and areas to be avoided.** The Arctic Waterways Safety Committee is an example of existing collaborative oil spill risk management including a wide range of stakeholders.
- Collaboration among actors and organisations at different levels can build adaptive capacity, foster shared understanding, increase dialoque and interaction and promote individual and group learning (Armitage et al. 2011)
- How can scenario methods be used for assessing and reducing risks related oil spills?

The aim of study is to develop collaborative scenarios based on Bayesian networks to assess and identify safe vessel traffic routes and areas to be avoided in the Bering Strait, Alaska

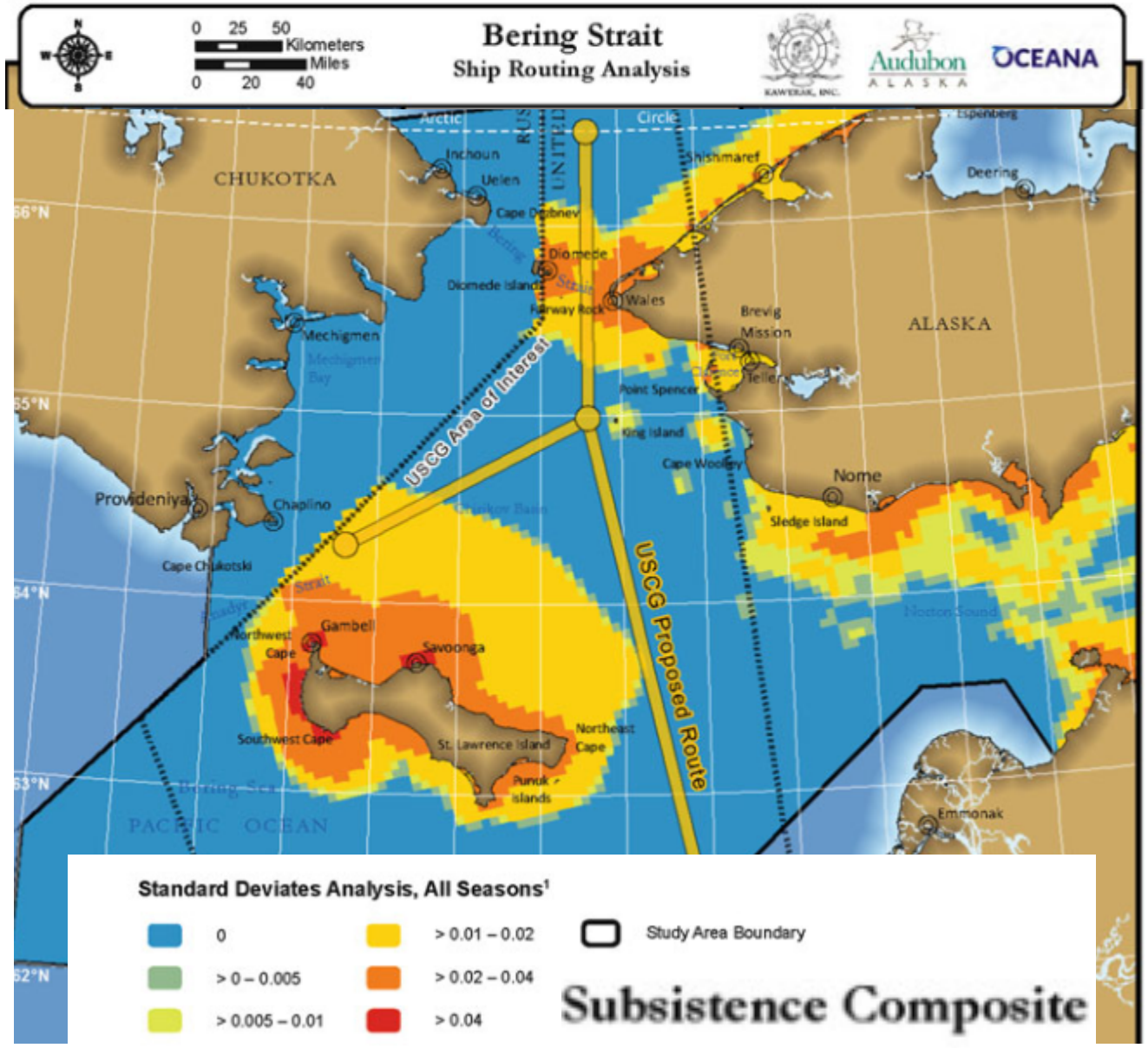
Bering Sea region Case Study:

- Bering Sea region is one of the most productive marine ecosystems on the planet
- Increased risk due to lack of response infrastructure and the threat to local livelihoods (subsistence hunters)
- Examples of collaborative risk management in the Bering Strait region exist
- Use of Bayesian risk models could further help in assessing and identifying risks

Previous studies and recommendations

- USCG “Port Access Route Study” for **the Bering Strait and Bering Sea**: completed in 2017
- Based on the study, IMO accepted the proposition of designated vessel traffic routes and protected areas in the Bering Sea and Bering Strait region (measures took effect December, 2018)
- “Recommendations on the port access route study: In the Chukchi Sea, Bering Strait and Bering Sea” by environmental organisations highlight that the vessel traffic routes overlap important areas used by subsistence hunters
- USCG has launched a new “Port Access Route Study” for **Chukchi and Beaufort seas** in 2019

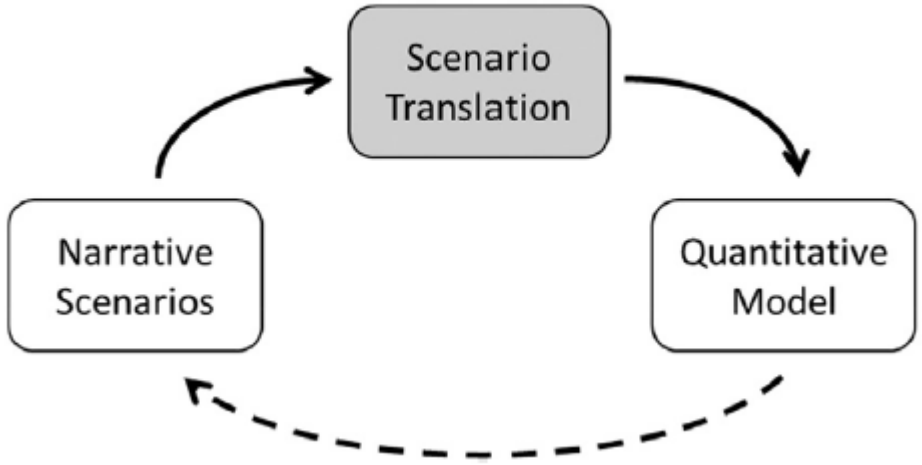
Map 8


0 25 50
Kilometers
Miles
0 20 40
Bering Strait
Ship Routing Analysis
Audubon ALASKA
OCEANA
CHUKOTKA
ALASKA
Arctic Circle
Inchoun
Uelen
Cape Dezhnev
Shishmaref
Deering
Diomede
Diomede Islands
Fairway Rock
Wales
Brevig Mission
Teller
Point Spencer
King Island
Cape Woolley
Nome
Sledge Island
Mechigmen
Mechigmen Bay
Provideniya
Chaplino
Cape Chukotski
Gambell
Northwest Cape
Savoonga
Southwest Cape
St. Lawrence Island
Northeast Cape
Punuk Islands
Emmonak
USCG Area of Interest
USCG Proposed Route
PACIFIC OCEAN
66°N
65°N
64°N
63°N
62°N
Standard Deviates Analysis, All Seasons[1]
0
> 0 – 0.005
> 0.005 – 0.01
> 0.01 – 0.02
> 0.02 – 0.04
> 0.04
Study Area Boundary
Subsistence Composite

Methods: Developing collaborative scenarios

Participative modelling, potentially with the use of Bayesian networks

- Treat uncertainty explicitly i.e in the form of probability distributions
- Can be easily updated as new data becomes accessible
- Combines different sources of knowledges (expert as well as stakeholder beliefs)

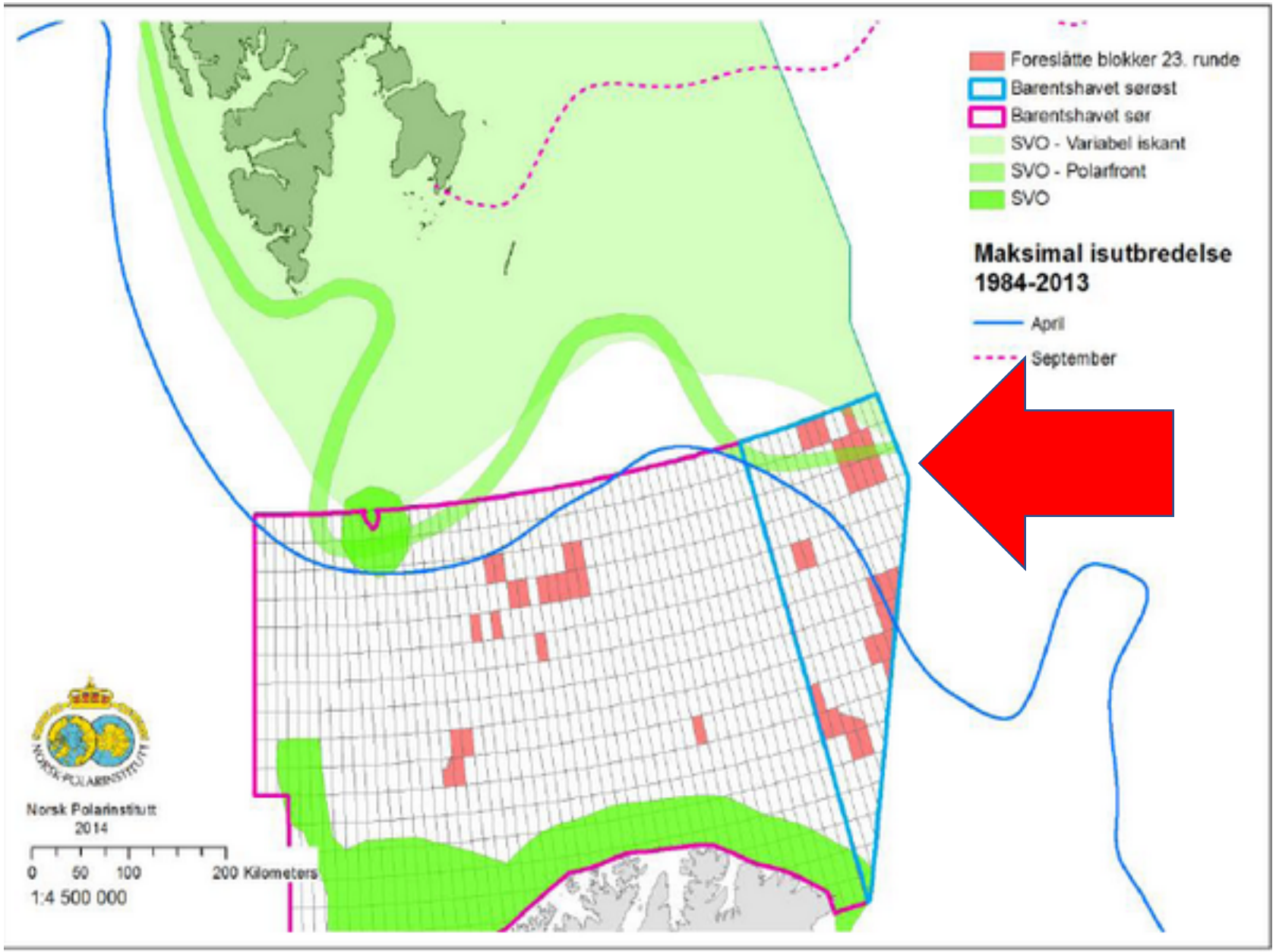


Scenario development process. Dashed arrow indicates that scenario development can be an iterative process (Source: Mallampalli et al. 2016)

Contribution to the project

- This is ”The best arctic example”?
- Human aspect –test of risk models and probability distributions: relevancy, understandability, acceptability
- What type of knowledge was needed in the case of “Port Access Route Study”, to make IMO to accept new traffic routes, how much we can cover of these, can we focus the practise guide to be more relevant?
- Evaluating the importance of local knowledge and interests
- Evaluation of the challenges of a well established Arctic shipping route system: example for new potential cases

Risk frames and multiple ways of knowing: how to cope with ambiguity in oil spill risk governance in the Norwegian Barents Sea? *Manuscript submitted in January, 2019*


Foreslåtte blokker 23. runde
Barentshavet sørøst
Barentshavet sør
SVO - Variabel iskant
SVO - Polarfront
SVO
Maksimal isutbredelse
1984-2013
April
September
Norsk Polarinstitutt
2014
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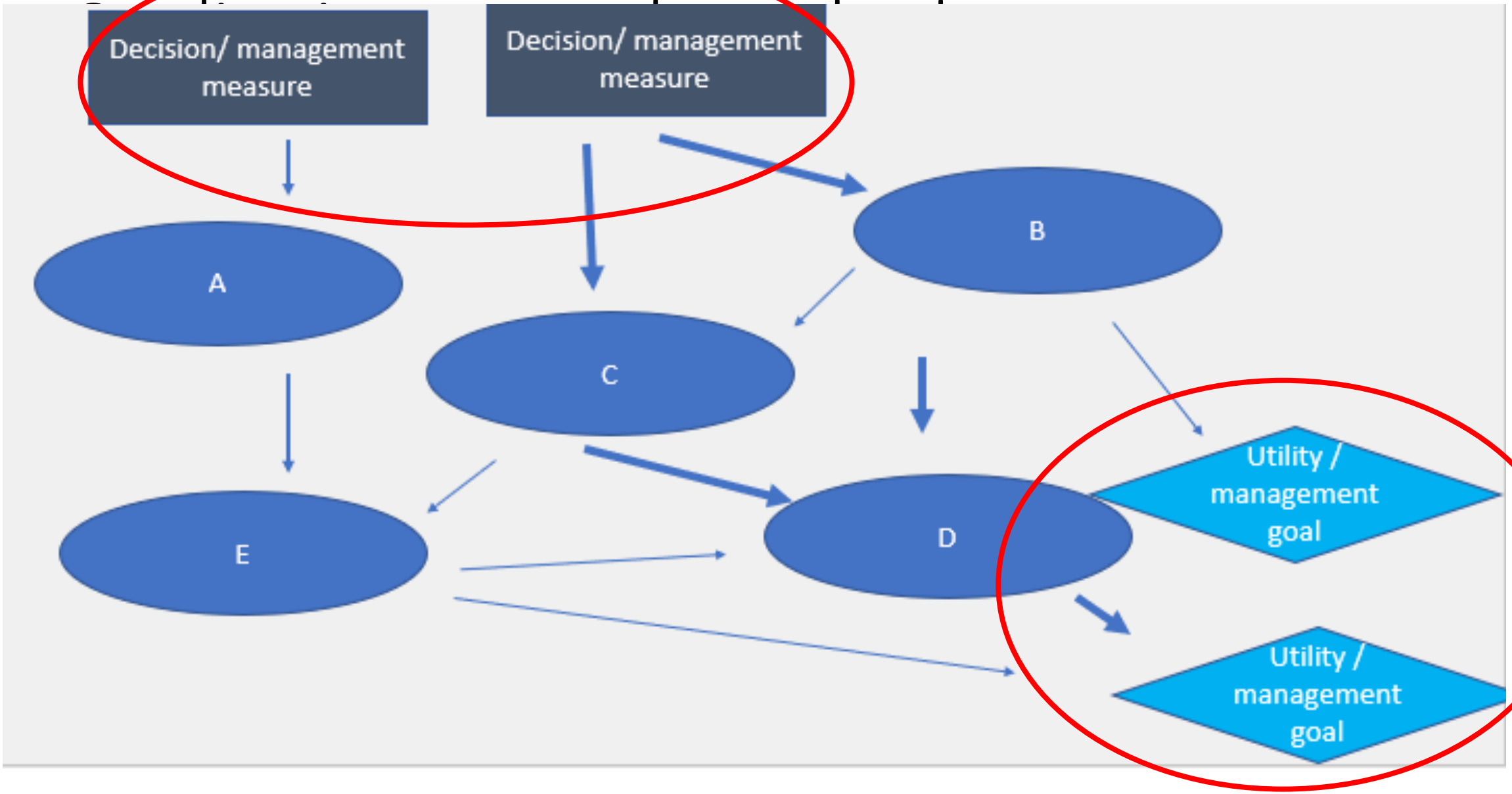
Decision/ management measure
Decision/ management measure
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Utility / management goal
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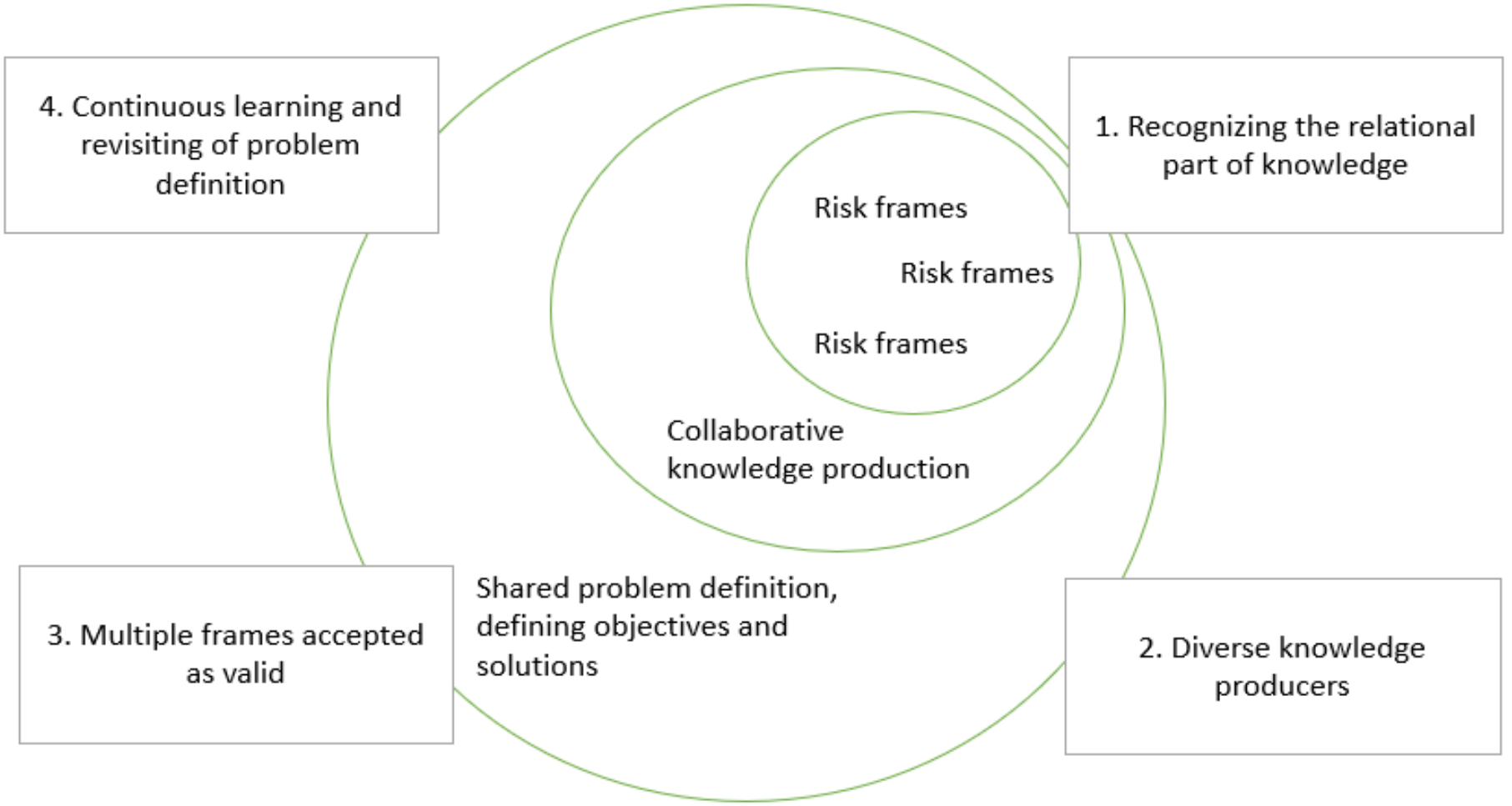

Figure X. Towards collaborative knowledge production and learning where ambiguity resolved by creating a connected frame that represents a shared view on the problem.

Contribution to the project

- Provides views about the complexity of required scientific understanding (variable aims, variable ways to manage = variable knowledge needs)

- General view about governance aspects in oil spill related management: potentially useful in the Practise Guide

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