Net Environmental Benefit Analysis: An Overview

Dr Tom Coolbaugh, ExxonMobil

Geeva Varghese, Oil Spill Response Limited

Overview

- NEBA
- NEBA in 4 Stages
- Response Strategy Development using NEBA

Net Environmental Bene

"Structured approach used b
stakeholders during oil spill p
response, to compare the er
potential response tools, and
that will reduce the impact of
environment"

Helps decision-makers use th
most beneficia

IPIECA

IOGP International Association of Oil & Gas Producers

Response strategy development using net environmental benefit analysis (NEBA)

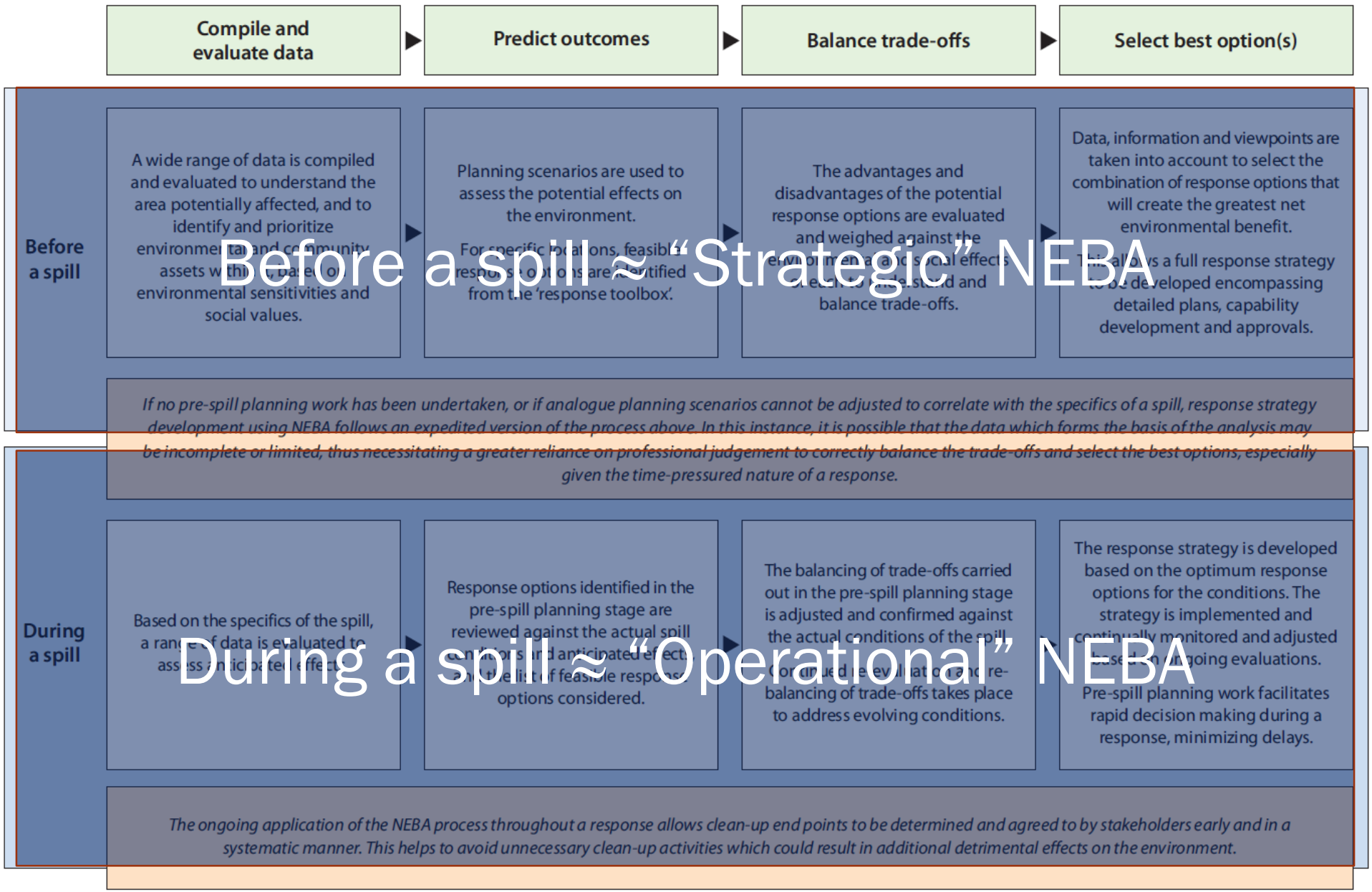
Good practice guidelines for incident management and emergency response personnel

New IPIECA-IOGP
Good Practice Guidance

NEBA in 4 stages

1. **Compile and evaluate data** to identify exposure scenario and potential response options, and to understand the potential impacts of that scenario
2. **Predict outcomes** for the given scenario to determine which techniques are effective and feasible
3. **Balance trade-offs** by weighing a range of benefits and drawbacks resulting from each feasible response option
4. **Select the best options** for a given scenario, based on which combination of tools and techniques will minimize impacts

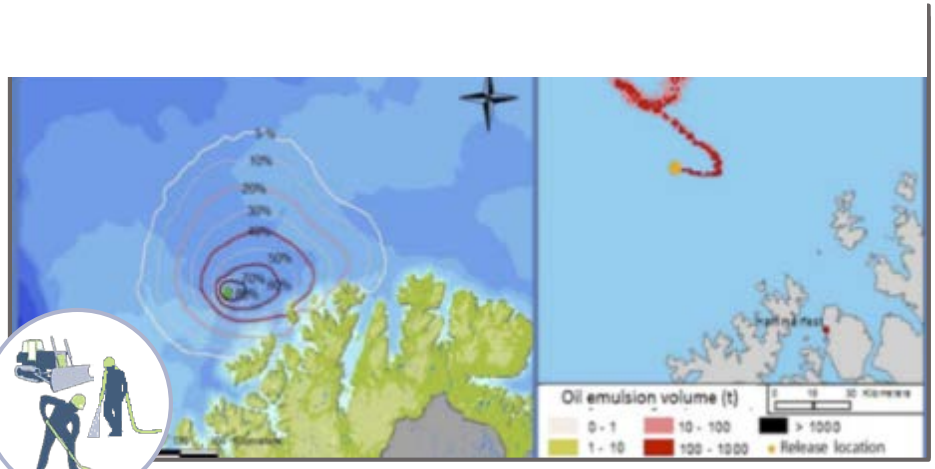
Response strategy development using NEBA



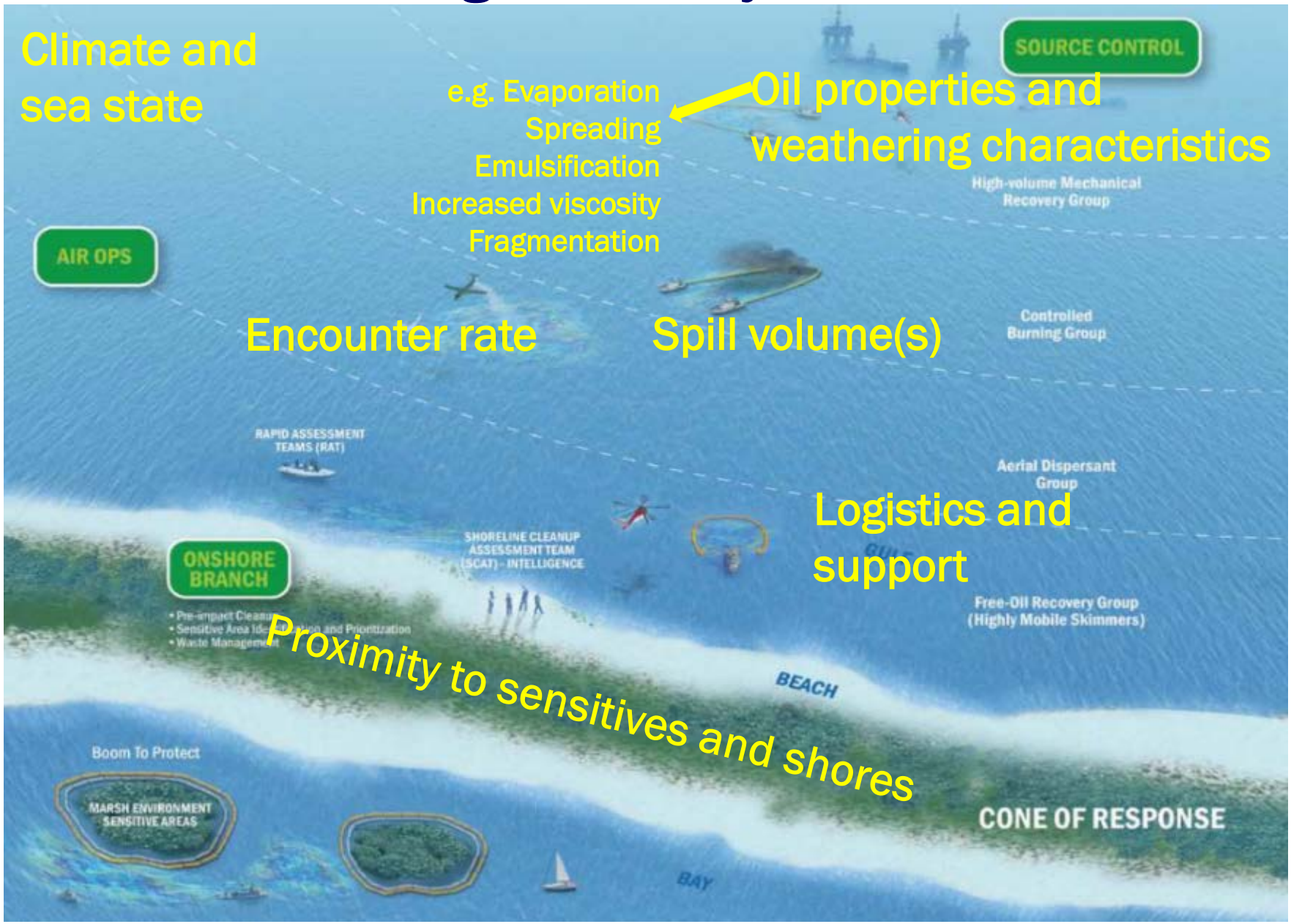
Response strategy development using NEBA

Compile and evaluate data ▸ Predict outcome ▸ Select best

- Know your oil
- Model fate and trajectory
- Consider sensitivity data
- Identify potential response options:
  - effectiveness
  - feasibility
  - regulation



Factors Influencing Feasibility



Response strategy development using NEBA

Compile and evaluate data ▸ **Predict outcomes** ▸ Balance trade-offs ▸ Select best option(s)

- For chosen scenarios, review consequences of “no response” activities
- Consider how different combinations of response options may change these impacts in order to characterize trade-offs

Example Scenarios		Possible Response Tools				
		Dispersants	Mechanical Recovery	In-Situ Burning	Physical Removal	Natural Processes
Offshore Release tanker spill						
Offshore Release subsea spill						
Offshore Release spill flowing towards populated area						
Near Shore Release spawning season						

Response strategy development using NEBA

Compile and evaluate data ▸ **Predict outcomes** ▸ Balance trade-offs ▸ Select best option(s)

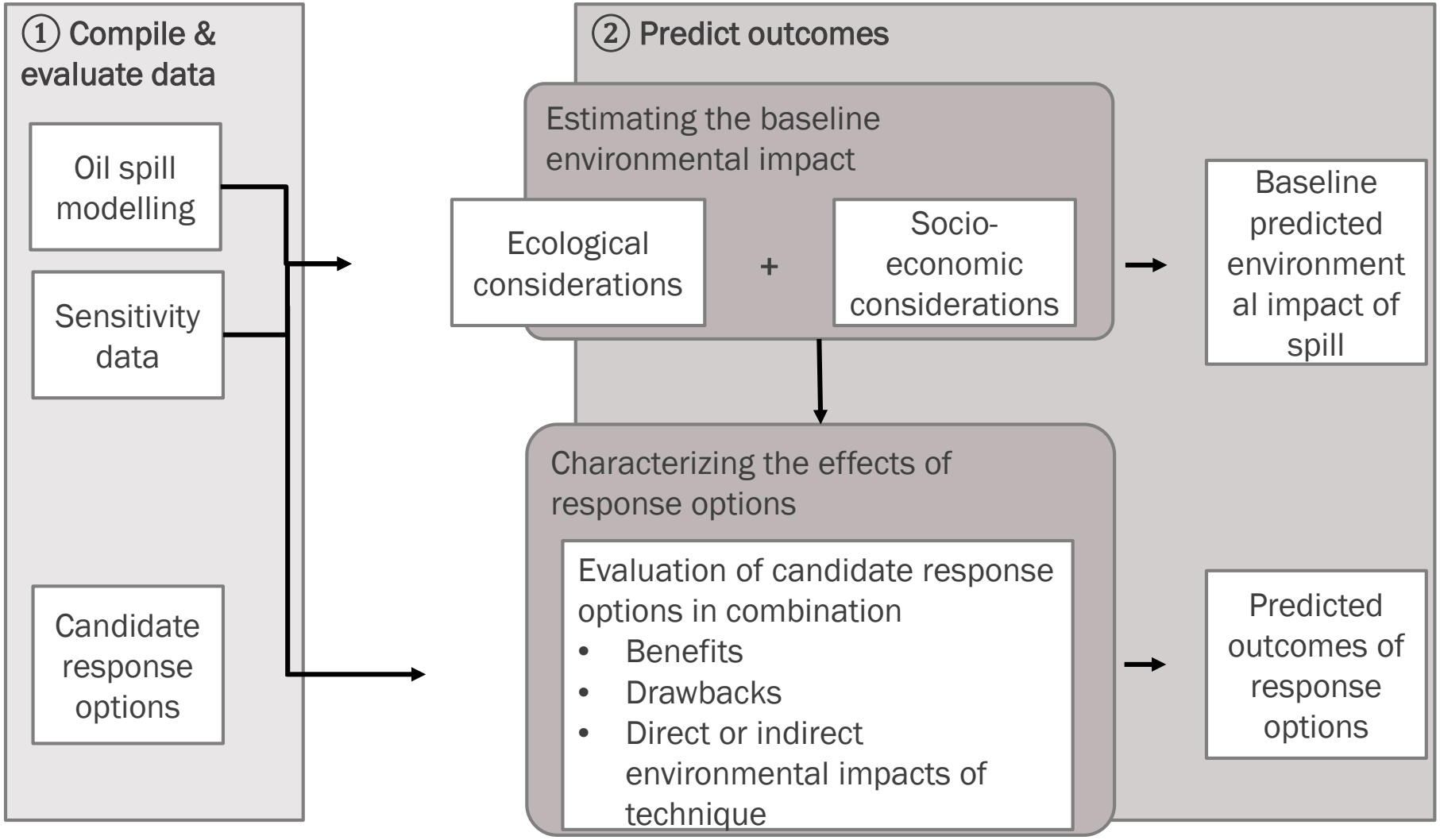
How to predict outcomes?

- 'No response' scenario covers the timescale needed for the oil to weather and naturally attenuate
- Quantifies potential environmental effects at a general level
- With the number of variables involved, it is impractical to quantify potential damage to any environmental resource in the NEBA process
- Subject matter expert input, drawing on extensive knowledge of oil impacts

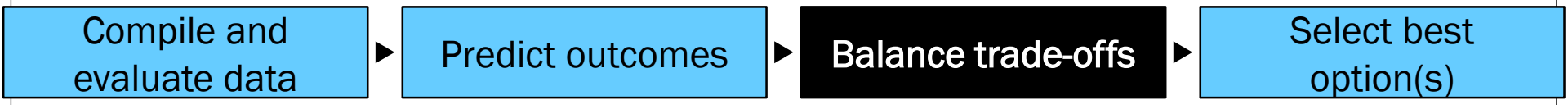
Overall, the NEBA process provides an estimate of potential environmental effects which is sufficient to allow the parties to compare and select preferred combinations of response options

Response strategy development using NEBA

Compile and evaluate data ▸ **Predict outcomes** ▸ Balance trade-offs ▸ Select best option(s)



Response strategy development using NEBA



- May be differing priorities relating to perceptions of the importance of sensitive resources
- No universally accepted way to assign value or importance to different environmental and socioeconomic sensitivities
- Essentially a qualitative process
  - Seeks consensus
  - A risk-based decision making approach may allow comparison of disparate resources in order to facilitate consensus on relative values of resources
  - A more quantitative approach is being developed

Response strategy development using NEBA

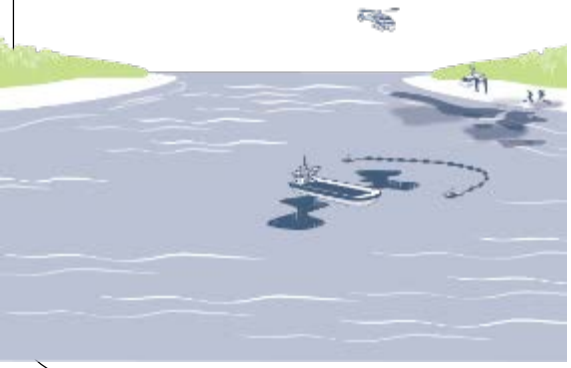
Compile and evaluate data ▸ Predict outcomes ▸ [illegible] offs ▸ Select best option(s)

Response Toolbox	Benefits	Drawbacks
Dispersants  Dispersants allow small oil droplets to form which speed up natural breakdown in the water column.	• High aerial coverage rate possible at the water surface • High treatment efficiency possible subsea • Large volumes of oil can be treated • Potentially high oil elimination rate • Reduced vapors at the water surface; improves safety • No recovered oil storage requirements • Lower manpower requirements • Potentially the quickest response option • Prevents oil from spreading to shoreline • Useful in higher wind and sea conditions • Effective over wide range of oil types and conditions	• Special approvals required • Less known about long term effects of subsea use • Perceived to be unsuitable for calm seas • Short-term, localized reduction in water quality • Potential impact on water column ecology • Specialized equipment and expertise required • Usage near shore in shallow water could result in greater water column impacts • Will not work on high viscosity fuel oils in calm, cold seas • Has a limited "window of opportunity" for use
Mechanical Recovery  Mechanical recovery uses booms and skimmers to contain and remove oil from the water surface.	• Well-accepted, no special approvals needed • Effective for recovery over wide range of spilled products • Large "window of opportunity" • Minimal side effects • Greatest availability of equipment and expertise • Recovered product may be reprocessed	• Inefficient and impractical on thin slicks • Ineffective in inclement weather or high seas • Requires storage capability • Typically recovers no more than 10-20 percent of the oil spilled • Labor- and equipment-intensive
In-Situ Burning  In-situ burning involves igniting contained oil slicks.	• High oil elimination rate possible • No recovered oil storage requirements (except possibly for burn residue) • Effective over wide range of oil types and conditions • Specialized equipment (boom) is air transportable • Minimal environmental impact	• Special approvals required • Ineffective in inclement weather or high seas • Black smoke perceived as significant impact on people and the atmosphere • Localized reduction of air quality • Specialized equipment and expertise required • Potential for secondary fires during inland use • Burn residue can be difficult to recover
Physical Removal  Physical removal consists of the physical removal of surface oil by crews with tools and machinery.	• Non-aggressive methods can have minimal impact on shore structure and shore organisms • Useful for detailed cleaning of near shore environment in specific or sensitive areas	• Aggressive removal methods may impact shoreline and shore organisms (e.g., sand removal and cleaning) • Potential for heavy equipment and high foot traffic (trampling) can cause additional environmental damage • Removal occurs after oil has already impacted shore • Labor-intensive
Natural Processes  Natural removal allows for more effective recovery in environments where intervention would be detrimental.	• No intrusive removal or cleanup techniques that further damage the environment • Complements other response techniques • May be best option if there is little to no threat to human or environmental well-being • When selected for certain areas and conditions, the environment can recover from the spill more effectively than it might when using other response tools	• Winds and currents can change, sending the oil spill toward sensitive areas • Residual oil can impact shoreline ecology, wildlife, and economically relevant resources • Public perception that responders are doing nothing

Response strategy development using NEBA

Compile and evaluate data ▸ Predict outcomes ▸ Balance trade-offs ▸ **Select best option(s)**

- Target an optimum response strategy for planning scenarios and incident specific conditions
  - Before a spill, response strategies are defined for each of the planning scenarios, and response capabilities are designed and developed accordingly
  - During a spill, NEBA supports
    - the deployment and adjustment of response resources as conditions change
    - decisions about when response end-points have been reached



Summary

A systematic NEBA process can:

- establish an understanding of the potential effects of a spill on environmental and other resources
- help to evaluate various response options
- address potential trade-offs that may result for different response strategies

NEBA also has a role when a response is under way:

- safety at the forefront
- NEBA should regularly be considered as a scenario evolves
- response strategies are optimized for a balance of response techniques
- government and industry working together cooperatively
- effective, timely and transparent communication

Currently looking to standardize the focus beyond environmental

- Spill Impact Mitigation Assessment (SIMA)