

# Gaming Adaptation

*Using role-play simulation exercises to help stakeholders enhance their resilience*



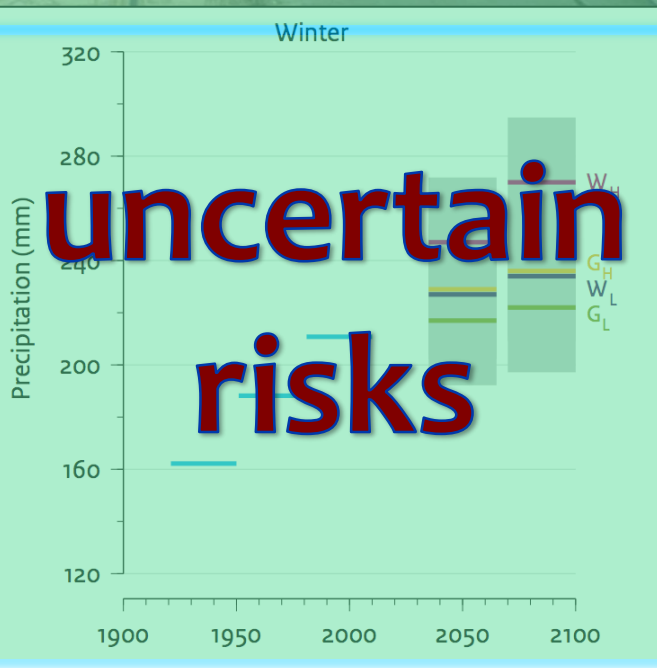
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**TRB's International Conference on Transportation System  
Resilience to Climate Change and Extreme Weather Events**

**multiple options**

**different interests**



**uncertain risks**

**divided responsibilities**

# Role-play simulation exercises for deliberation and learning



## ***Wet and Quiet***

- Precipitation and/or riverine flooding leads to higher water levels in the near future
- Vehicular traffic volume remains constant or declines in the coming years

## ***Wet and Busy***

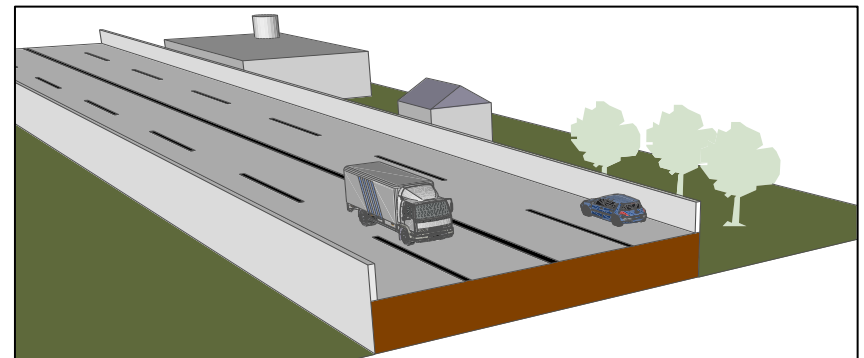
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# Institutionalizing Uncertainty Project

## Independent variable 1 – Wider governance regime

Neo-corporatist

Technocratic/authoritarian

Neo-pluralist

*Rotterdam*

*Singapore*

*Boston*

## Independent variable 2 – Stakeholder engagement

Multi-stakeholder deliberation

Multi-stakeholder deliberation

Multi-stakeholder deliberation

*vs. status quo*

*vs. status quo*

*vs. status quo*

## Independent variable 3 – Tool for framing uncertainty

Scenarios

Risk  
assessment

Scenarios

Risk  
assessment

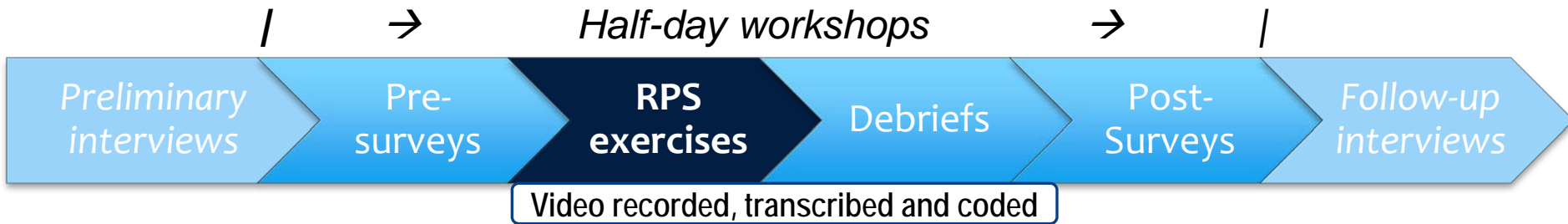
Scenarios

Risk  
assessment

Dependent variables: Decision-making process *and* outcomes  
(reflected both in the exercise, and debrief and follow-up interviews)

# Institutionalizing Uncertainty Project

Decision-makers and other stakeholders from **transportation** and other **agencies**, and **other stakeholder groups** in and outside of government at the local, regional and national levels.



~80 across  
cities

**14 Rotterdam • 30 Singapore • 32 Boston**

Half play **multiple scenarios** version of  
exercise and half **risk assessment** version

Most of the  
76 participants

# A New Connection in Westerberg

## *Role-play simulation exercise*



- \* A large port city with major congestion on existing (A3) highway
- \* New highway (A39) posed as a solution to the congestion problems
- \* However, a new Climate Impacts Assessment suggests that the A39 could be vulnerable
- \* Transportation Agency pulled together a multi-stakeholder group to evaluate the threats and possible responses

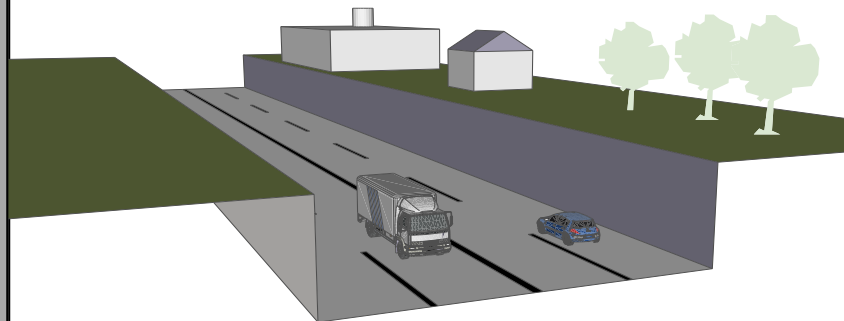
# A39-C Members

## *A New Connection in Westerberg*

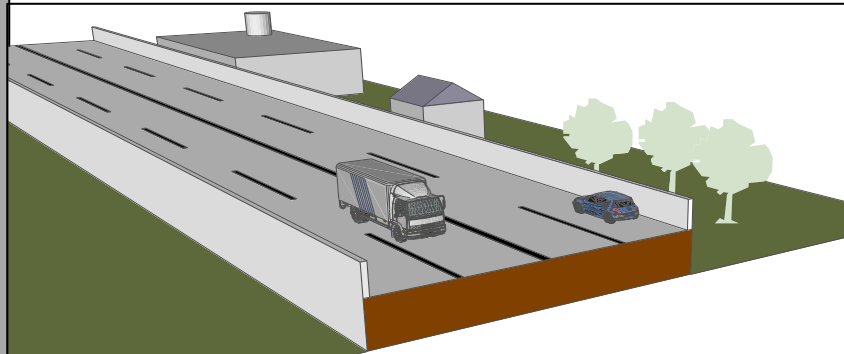
- \* **Seven roles from different stakeholder groups, including:**
  - \* A senior manager from the transportation agency
  - \* Technical experts from national agencies and a municipal department
  - \* Local politician (speaking for community)
  - \* Non-governmental interests – Port and environmental NGO rep
- \* **Each given shared general instructions and role-specific confidential instructions, reflecting different information and divergent interests**

# Options for the A39-C

\* Option A = Low road

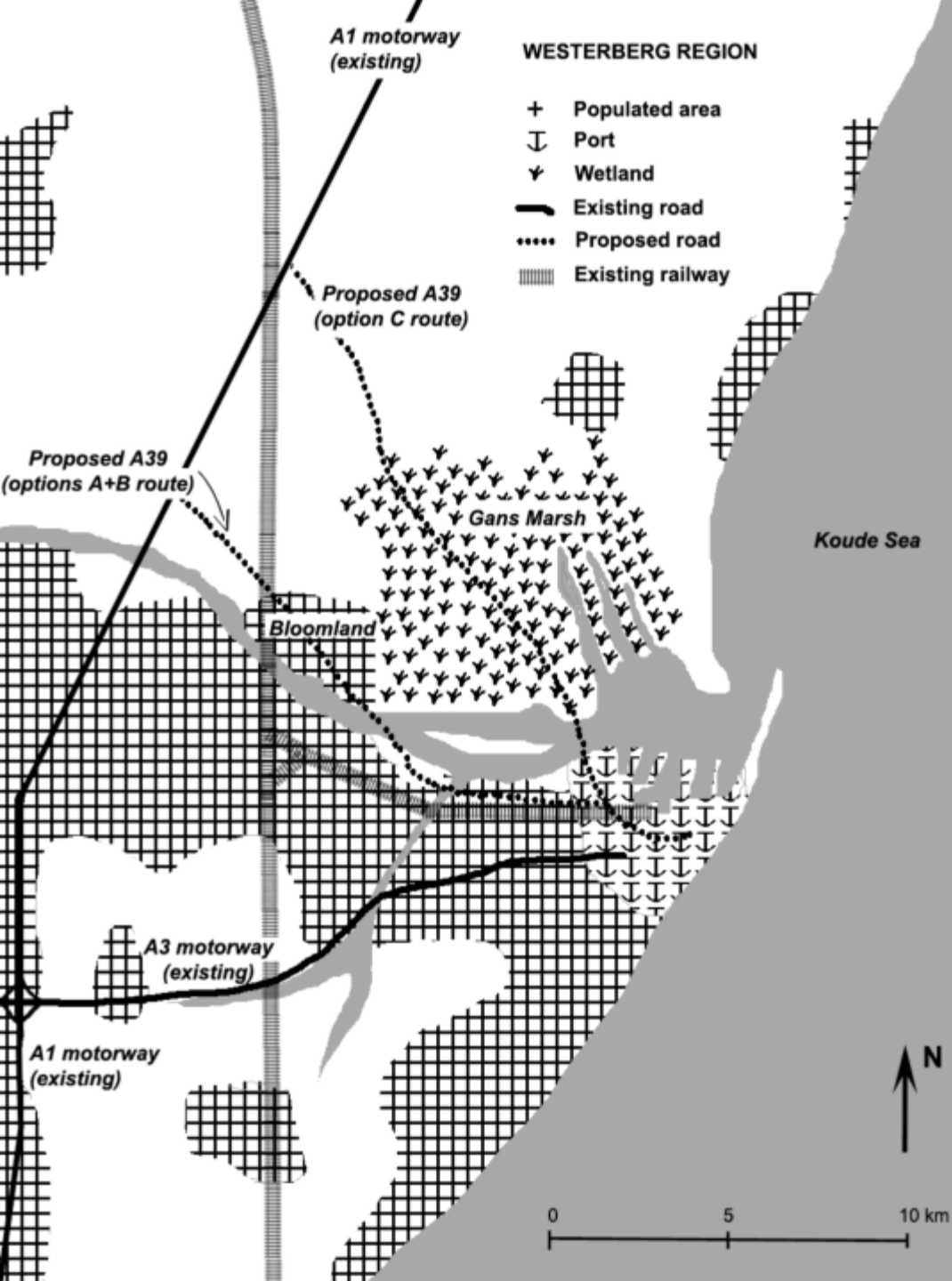


\* Option B = High road



\* Option C = Swamp road

\* Option D = Old road





# Scenarios (one version)

## A New Connection in Westerberg

### ***Wet and Quiet***

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Transportation  
demand

### ***Dry and Quiet***

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Climatic  
change

# Risk Assessment (other version)

## *A New Connection in Westerberg*

- \* **Precipitation** forecasted to increase by: 0 – 5% by 2030; 3 – 10% by 2050; and 6 – 15% by 2080
  - \* Anything over a ~7% increase in precipitation would cause major problems for low-lying infrastructure
- \* **Storm intensity and associated flooding** may increase the frequency of current 500-storms (i.e., 1:500 chance yearly) to: 1:400 by 2030; 1:250 by 2050; 1:150 by 2080
  - \* Currently, new roads should be built to 1:500 standard, and existing roads more vulnerable than 1:200 are flagged
- \* **Sea and water level rise** above current levels projected to be: 5 to 12 cm by 2030; 15 to 30 cm by 2050; and 30 to 60 cm 2080
  - \* More than 30 cm could cause significant problems for both existing A3 and potentially new A39

# FINDINGS

*From the exercise runs and associated research*

- Uncertainty + flexibility
- Process matters
- Cross-case comparison
- Scenarios vs. risk assessment
- Value of RPS exercises

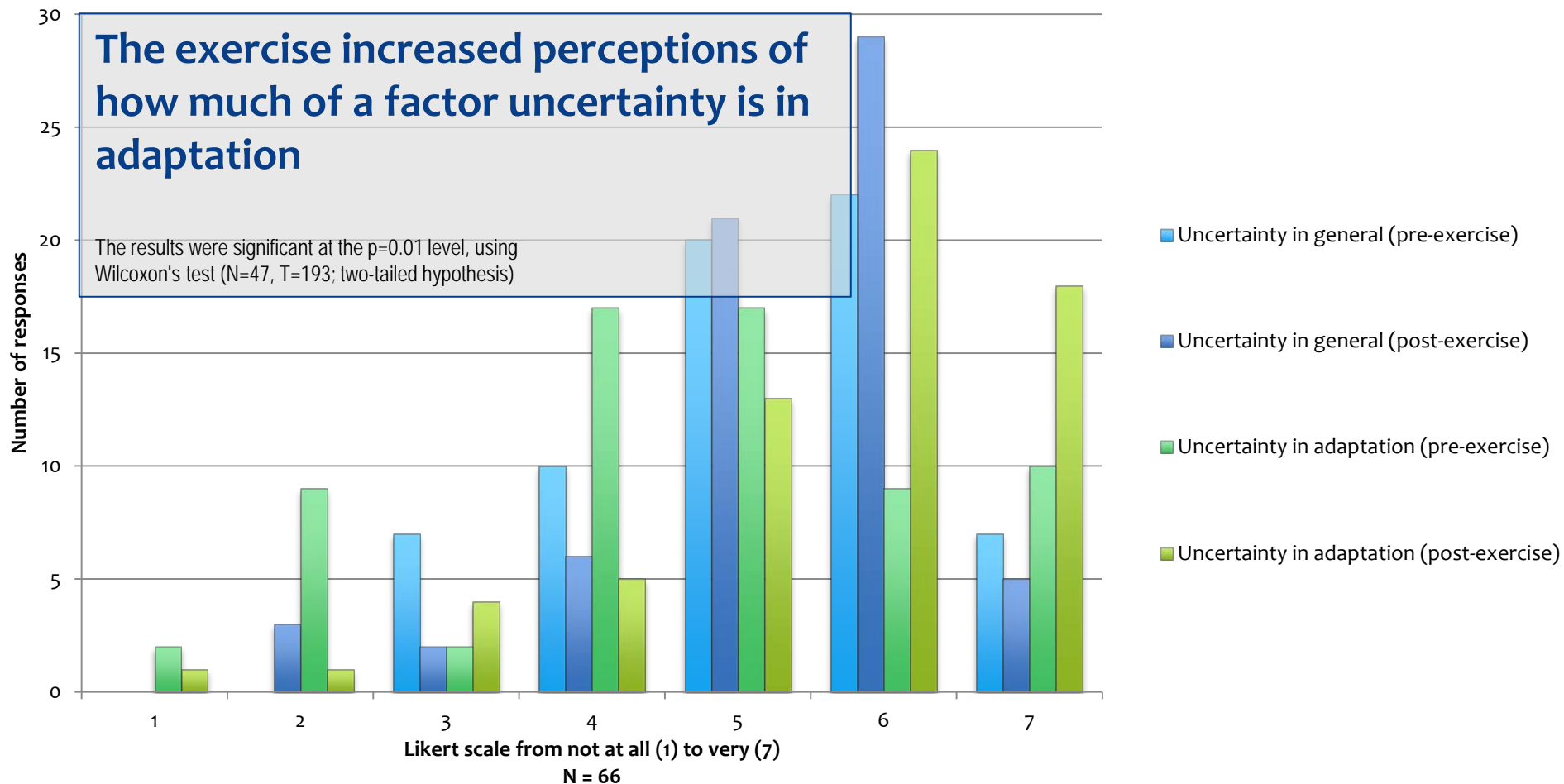


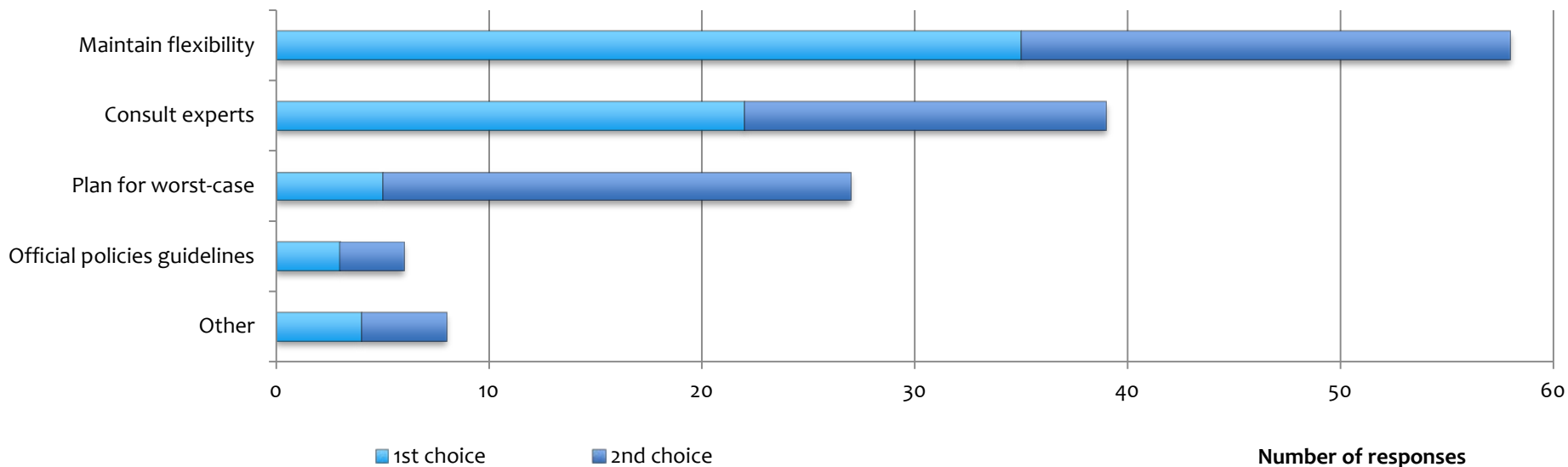
# Westerberg Exercise Process + Outcomes

Scenarios	Risk Assessment
<p><i>Rotterdam:</i> Call for more research, but recognition after that <i>NA</i> political. Information withheld. Opinionated experts, and active chair</p> <p><b>NA (research)</b></p>	<p><i>Rotterdam:</i> Impasse. Leaning towards below grade road (A+) but <i>NA</i> all consensus involved by chair. Strong expert opinions. Issue of 'fairness' (around \$)</p> <p><b>NA (almost A+)</b></p>
<p><i>Singapore 1:</i> Improve existing road and freight rail service (D+). \$ for port transition to rail. Active enviro. and port, appealing to <i>reason</i>. Info on table</p> <p><b>D+</b></p>	<p><i>Singapore 1:</i> Elevated road with pollution mitigation measures (B+). Community outreach process. Alderwoman convinced on "merit of the arguments"</p> <p><b>B+</b></p>
<p><i>Singapore 2:</i> Improve existing road and freight (D+). Further study of <i>land</i> as well. Fact-based process (vs. interests). Active chair, and prominent experts</p> <p><b>D+</b></p>	<p><i>Singapore 2:</i> Concerns around economic costs of no new road and <i>viability</i> of rail. Leaning towards phased approach. Loss information disclosure</p> <p><b>NA (\$ impacts)</b></p>
<p><i>Boston 1:</i> Call for more research, with D+ popular. Attention to <i>community</i> options, like alternative routes. Interests directly discussed</p> <p><b>NA (research)</b></p>	<p><i>Boston 1:</i> Improve existing road with new dedicated truck lanes, and <i>passenger</i> rail (D+). If \$ found, broader rail investments - \$ not on table immediately</p> <p><b>D+</b></p>
<p><i>Boston 2:</i> Tentative agreement on improving road and freight (D+). <i>Passenger</i> rail in future. Complaints of insufficient info. Assume wet and busy</p> <p><b>D+ (tentative)</b></p>	<p><i>Boston 2:</i> Improve existing road, freight AND passenger rail (D+). Extra \$ from city. Competing interests emerged. Focused on risk criteria (climate, economy, community). Port and city sidebar</p> <p><b>D+</b></p>

# Pervasive uncertainty...

- How much of a problem is uncertainty in general (not just from climate change) to you and your organization as you plan and make decisions?
- To what degree is uncertainty a factor in how your organization views and plans for climate change adaptation (1 being not at all and 7 being very)?





Participants see maintaining flexibility as the best way to move forward despite uncertainties

Framed as an approach to policy-making, planning, *and* design

*"[We need to] learn to live with uncertainties, and think adaptively [...] think in scenarios and make the solution that can be no-regrets, that can be adapted for each scenario"*

# However, there are substantial barriers to flexibility in practice...

- \* **Legal** and **regulatory** standards
- \* **Professional** norms, standards and capacity
- \* **Fragmentation** across agencies, levels of government and other stakeholder groups
- \* Unclear **allocation of responsibility**
- \* One-off and fragmented **funding** arrangements
- \* Competing **priorities** and **interests**
- \* Paradigm shift from **robustness to agility**

*"Detailed [standards] are fixed in law, [and] it takes a long time to change them"*

*"[We] just have the manuals, and the standards, and follow them blindly, you don't think, you don't have time to think!"*

*"We have to reeducate our engineers, because our engineers are educated in a linear world – things are true or not true. They learn to discuss risks, but they didn't learn to discuss uncertainty. So, that's a way of thinking that they didn't learn."*

# Process matters...

- \* **Multi-stakeholder engagement** important, although *who* varies
  - \* **Increase in perceived importance** from pre- to post-exercise<sup>1</sup>
  - \* Recognition of **interests**, fostering of **mutual understanding**, **optimization**, and **creativity**
- \* **Process design** has implications (e.g. agenda followed)
- \* Techniques employed by **chairs** mattered in exercises (e.g., active listening, straw polls) and issue of bias
- \* Performance of **other parties**, including:
  - \* Representing interests, seeking mutual gains
  - \* How **experts** presented data, including uncertainty

*97% of participants learned something from the exercise. Process-related lessons dominated when asked what they learned*

1. Question: How important is it that you engage with other decision-makers and stakeholders as you plan and make decisions (1 being not at all and 7 being very)? Conclusion: The results were significant at the  $p=0.005$  level, using Wilcoxon's test ( $N=43$ ,  $T=253.5$ ; one-tailed hypothesis).





# Case Comparison

## Westerberg Exercise Process + Outcomes

	Boston	Singapore	Rotterdam
Process	<p>Explicit <u>recognition of interests</u>, and attention to them</p> <p>Clear <u>negotiation tactics</u></p> <p><u>Financing emphasized</u> as a factor</p>	<p>Invocation of <u>national priorities</u> (economy in particular)</p> <p>Appeal to ‘<u>rationality</u>’, and persuasion based on strength of arguments</p>	<p><u>Little deference</u> to hierarchy; very opinionated experts</p> <p>Emphasis on <u>info</u>, but to <u>support positions</u>; also persuasion</p> <p><u>Poldering</u> tradition</p>
Outcomes	<p>D+ favorite in all groups, because <u>flexible and cost-effective</u> today</p> <p>Other options discounted because of strong <u>stakeholder opposition</u></p>	<p>Emphasis on <u>avoiding hardship</u> to port</p> <p><u>Community sacrifice</u> for larger concerns (e.g., B+ option)</p>	<p><u>No agreement</u> in either case, although reason differed</p>

# Scenarios vs. Risk Assessment

## Westerberg Exercise Process + Outcomes

	Scenarios	Risk Assessment
Process	<p>Largely <u>ignored</u>; most groups implicitly or explicitly defaulted to the worst-case scenario (i.e., ‘wet and busy’)</p> <p><i>However, <u>accentuated uncertainty</u>, making deliberations more difficult; questioned what they should design to</i></p>	<p>Parties either <u>accepted or rejected</u> forecast, based on their interests</p> <p>Some debate around why these forecasts should be questioned as more tenuous than others used in decision-making</p>
Outcomes	<p>Greater difficulty reaching agreement – 3/5 concluded with <u>calls for more research</u>, and another almost did</p> <p>Favored D+ option , which may be seen as the <u>most flexible</u></p>	<p><u>Mix of outcomes</u>: B+, two D+s, and two no agreements (one almost an A+)</p> <p>No agreements were <u>impasses in negotiations</u>, rather than calls for more research</p>

# Scenarios for Framing Uncertainty

- \* **Scenarios widely used** by various agencies in all three cities/countries (prior experience: 86% in Boston; 82% in Singapore; 93% in Rotterdam)
- \* **Positive opinions** on value of scenarios (6.2 in Boston; 5.6 in Singapore; and 5.8 in Rotterdam on 7-point Likert scale)
- \* However, **questionable value** in exercise runs (ignored, complicated matters)
- \* Appreciated that scenarios force them to **acknowledge uncertainties**
- \* Very **difficult to make decisions** without fixed design standards
- \* Value is in the **process of scenario planning**

*"I think scenario planning inevitably engages people in the discussion, and gives people a concrete understanding, whereas the risk assessment is kind of abstract numbers that you have to take at face value, or you dispute, but the scenarios really change how people think and get them talking to each other about it. So it's more time consuming, but there is a lot more benefit that comes out of it."*

# Role-play simulation exercise

## *Why take this approach?*

- \* Facilitating **social learning**
- \* Catalyzing **collective action**
- \* **Experimenting** with new tools and approaches
- \* Providing venues for the **brainstorming** of new ideas
- \* **Researching** how actors might react in certain circumstances



# What did participants learn?

## *Westerberg Exercise Outcomes*

**65 of 67** reported learning something

- \* **What?** *Largely process-related lessons...*
  - \* Role of interests in deliberations
  - \* Importance of tactics and strategies
  - \* Roles that chairs/facilitators can play
  - \* Barriers to and value in getting information ‘on the table’
  - \* Institutional (vs. scientific) barriers to climate adaptation

# Conclusions

- \* **Substantive:** Processes are deliberations between stakeholders within and outside government, and not simply technical efforts
  - \* Complicated by uncertainties
  - \* Differences across governance regimes
  - \* Better process design can help
  - \* Use of decision-support tools valuable, but can be challenging
- \* **Methodological:** RPS exercises can help groups to explore and experiment, while generating research insights
- \* **Next steps:** More targeted interactions with groups experimenting with tools/approaches (e.g., MPO members)

# Thank you!

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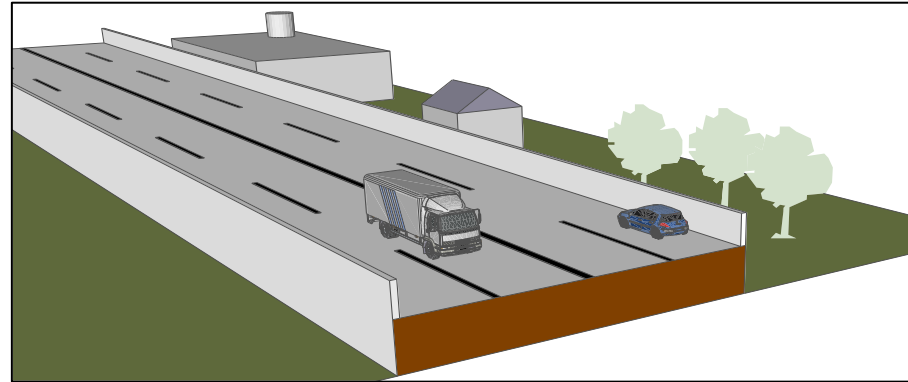
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