National Defence / Défense nationale

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DRDC RDDC

Defence Investment Portfolio Decisions: Insights from a National Practice Survey

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Canada

Outline

Background

- Operational Research & Decision Analysis
- Decision Quality (DQ)
- Defence Investment Prioritization:
  - DQ Challenges
- Survey Design

Survey Result Highlights

- Decision Frame
- Feasible Alternatives
- Values & Trade-offs
- Information
- Sound Reasoning
- Commitment to Act

Conclusions

- Conclusions

Questions?

Background

Operational Research (OR) & Decision Analysis (DA)

- OR: problem well-defined, well-modelled (Defence Investment Prioritization: complex!)
- OR: investment prioritization = portfolio optimization (not portfolio review, adjustment)

- DA: Managing decision complexity

What's the problem?

What can you do?

What do you want?

What do you know?

What does it mean for your problem?

How will you get results?

Decision Quality (DQ)

- Decision Quality: Six dimensions of “good enough”
- **Scalable**: Mental Checklist . . . . . Fully-documented decision
  (non-routine decisions) (everything in between) (complex, critical decisions)

1. Decision **Frame** (issues, boundaries). . . What’s the problem?
2. Creative, feasible **Alternatives** . . . . . What can you do?
3. **Values & Trade-offs** (preferences) . . . . . What do you want?
4. Relevant & Reliable **Information** . . . . . What do you know?
5. Sound **Reasoning** . . . . . What does it mean for your problem?
6. A **committed** decision . . . . . How will you get results?

Defence Investment Prioritization – DQ Challenges

1. **Frame:** What the nation needs from National Defence (ND) assets

2. **Alternatives:** Scalable, under-defined investments in combination

3. **Values:** Multiple, conflicting, contested

4. **Information:** Guessed needs; Estimated project benefit, costs, schedules; Risks

5. **Reasoning:** Hedge the worst outcomes, assume the least-bad risks

6. **Commitment:** The right people supporting, getting 1-5 right, instructing implementers

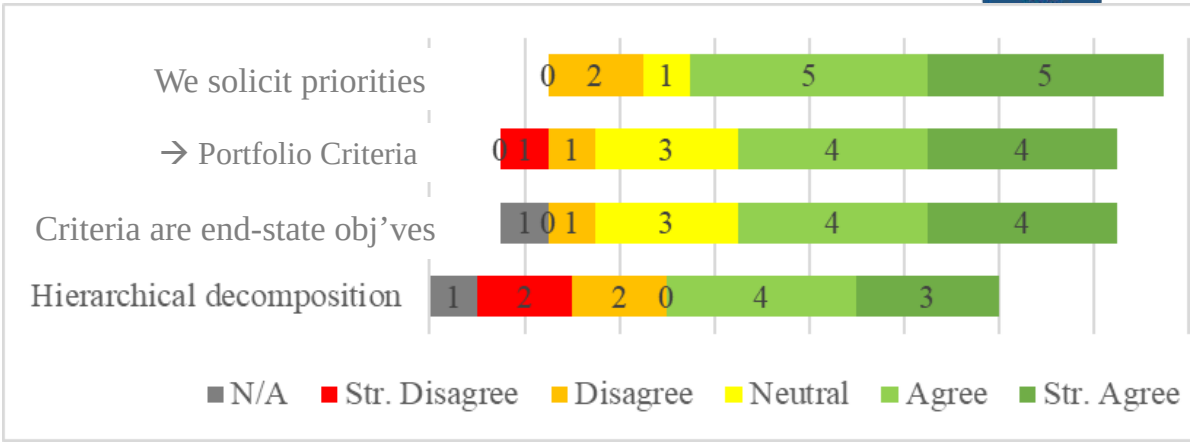
Survey Design

- Early inspiration, content: Tate & Thompson [1], [2]
- Topics:
  - Timings & process,
  - Objectives & preferences,
  - Value modelling & costs,
  - Constraints & risks
- Expert survey (1 survey per nation)
- 105 questions: Yes/No, Likert agree/disagree, levels of analysis
- Every question: “Comments: _____”

[1]Tate, and Thompson, (2016), “Portfolio Selection and Resource Allocation for Defence Applications,”, IDA Document NS D-5439, March 2016.
[2]Tate, and Thompson (2017), “Portfolio Selection Challenges in Defence Applications,” IDA Document NS D-8493, August 2017.

Survey Result Highlights

Frame



- 10 / 13 nations: Solicit <u>what is important for investment</u> – priorities, preferences
- 8 / 13 nations: <u>What is important</u> → <u>Portfolio Criteria</u>
- Large nations more likely to agree (almost 5% significance)

<u>Also prioritized</u> with equipment investments

- 10/13 nations: new facility construction
- 6/13 nations: regular & reserve force recruiting

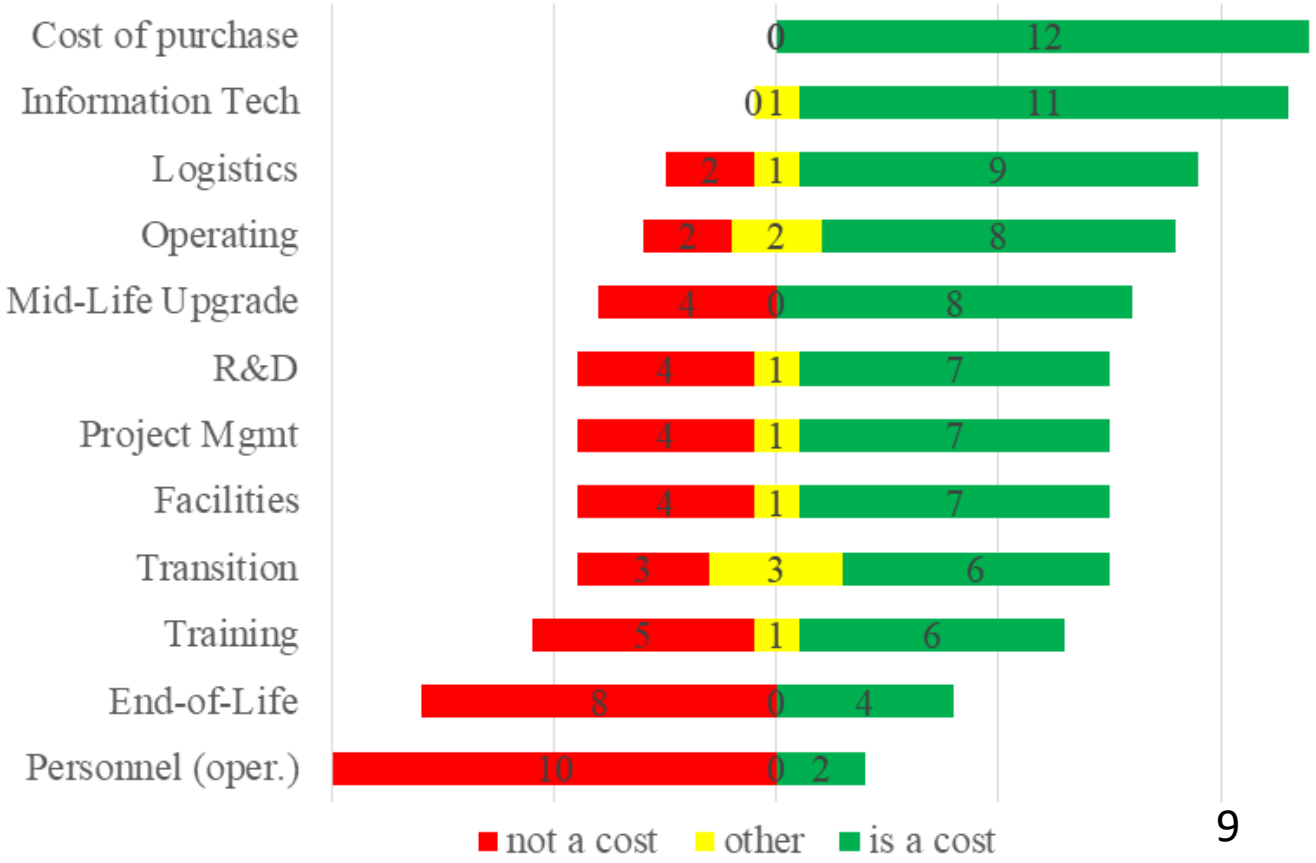
Frame

Frame includes resource assumptions.

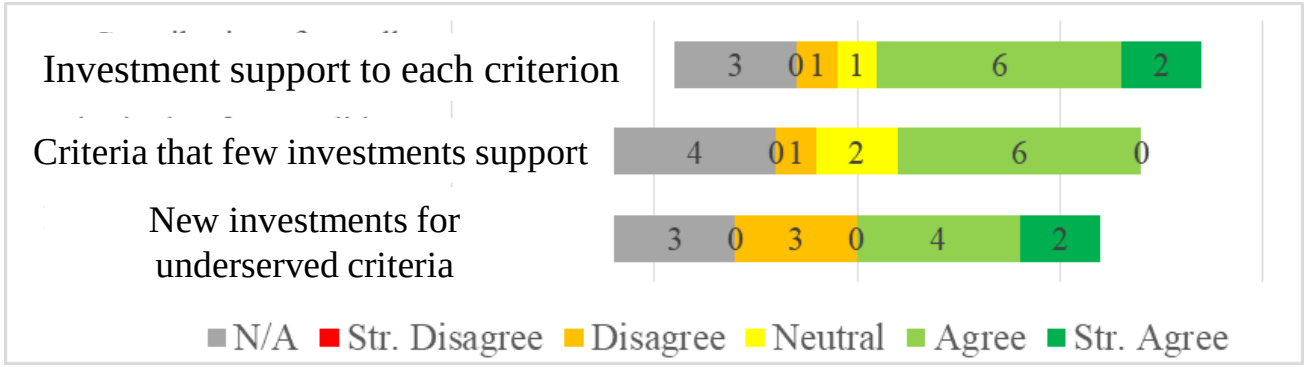
- Costs against investment budget
- Availability of other capability input resources

We asked:

“Which costs must the portfolio budget cover?”

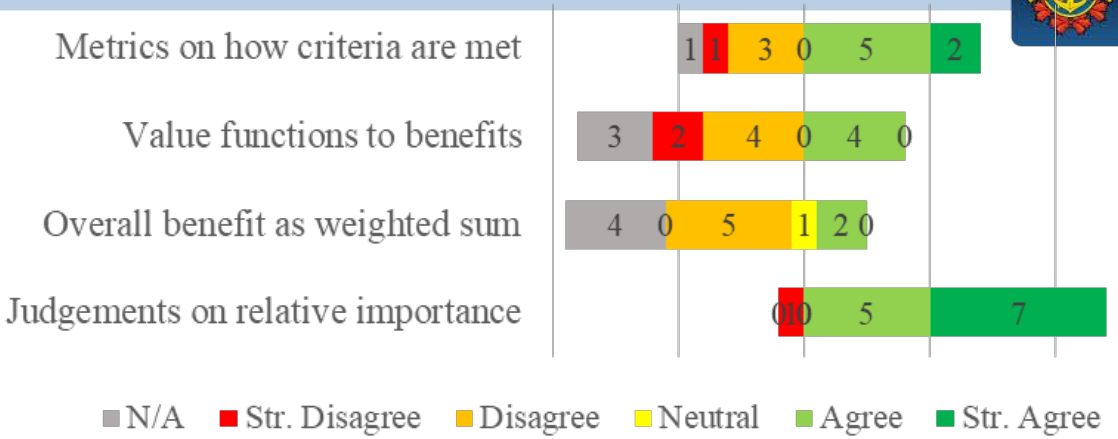


Feasible Alternatives



- 4 nations: No explicit Portfolio Benefit Criteria
- 6 nations: Seek new investments supporting under-served Benefit Criteria
- Several nation comments: Close capability gaps without explicit criteria

Values & Trade-offs

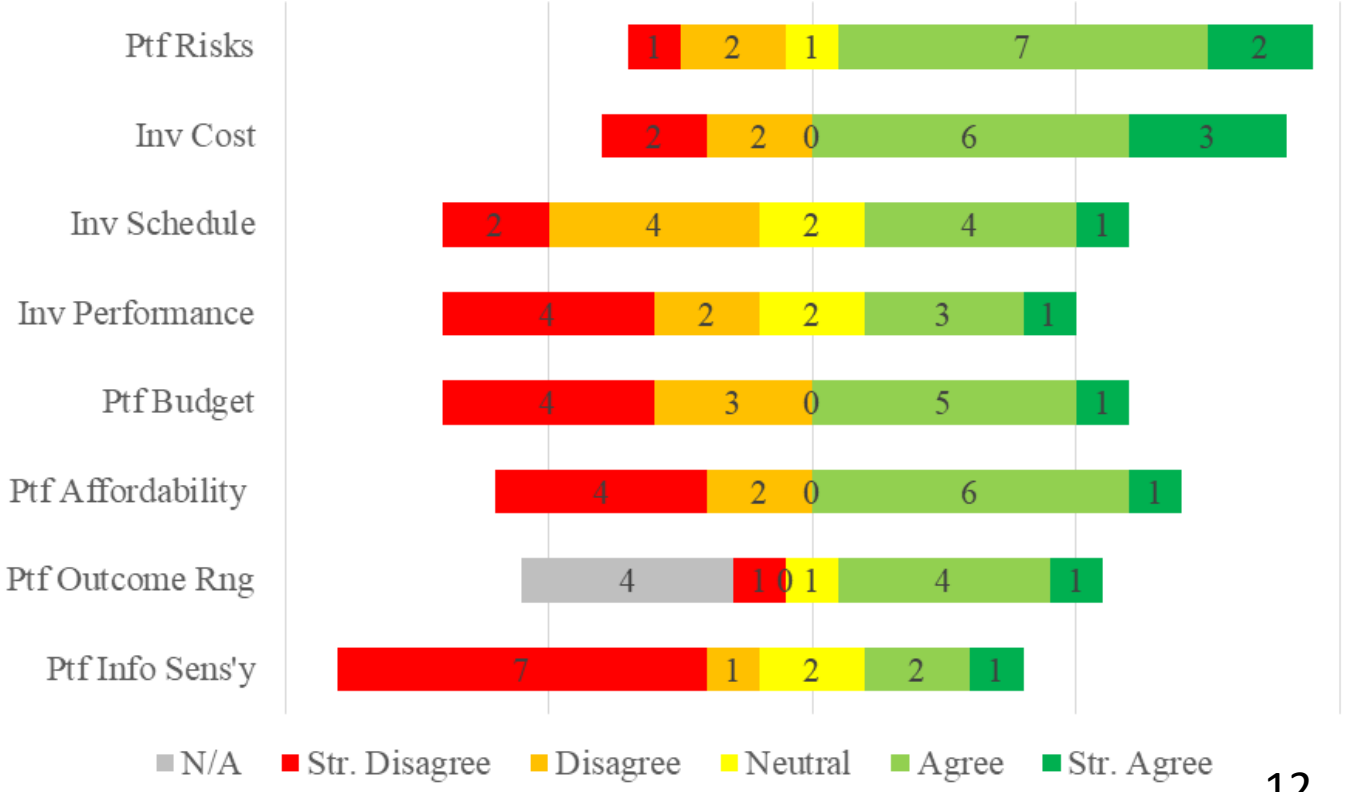


- Metrics for <u>portfolio criteria satisfaction</u>: 7 nations
  - 2 nations agreed, but only aspire to do this
  - 1 nation agreed: Total cost is the only portfolio metric used
- Portfolio benefits mostly judged <u>qualitatively</u>
- Large nations more likely to agree (4.8% significance)
- 8 / 12 nations use a listed value modelling method (or one directly related)

Information

“Do you model risks?

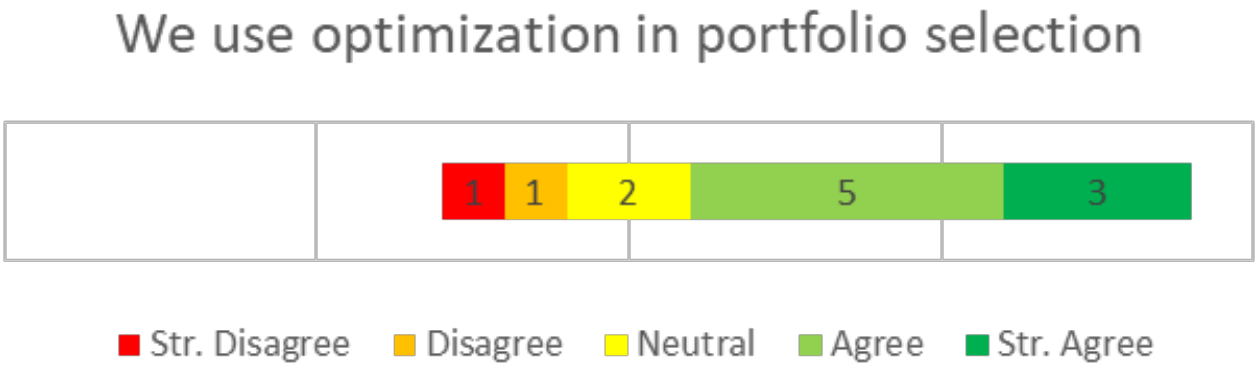
(… linking outcomes with probabilities?)



Sound Reasoning

"We use optimization to find the best combination of investments."

- 3 Strongly Agree, 5 tend to Agree



However, few nations model portfolio benefit

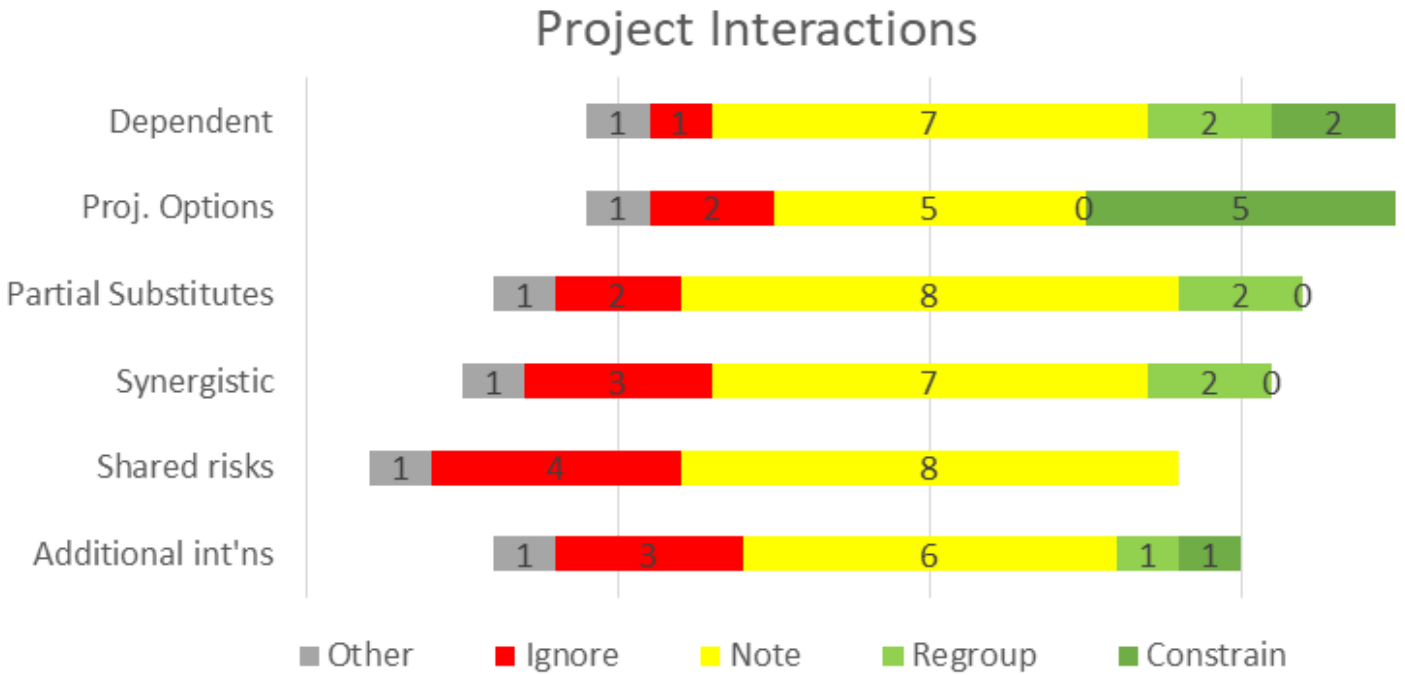
- Are objective functions disconnected from "portfolio" objectives?

Sound Reasoning

- Max. 1 **project option** per req't (5 nations)
- Some regrouping / constraint of **dependent investments** (4 nations)

Mostly "noted"

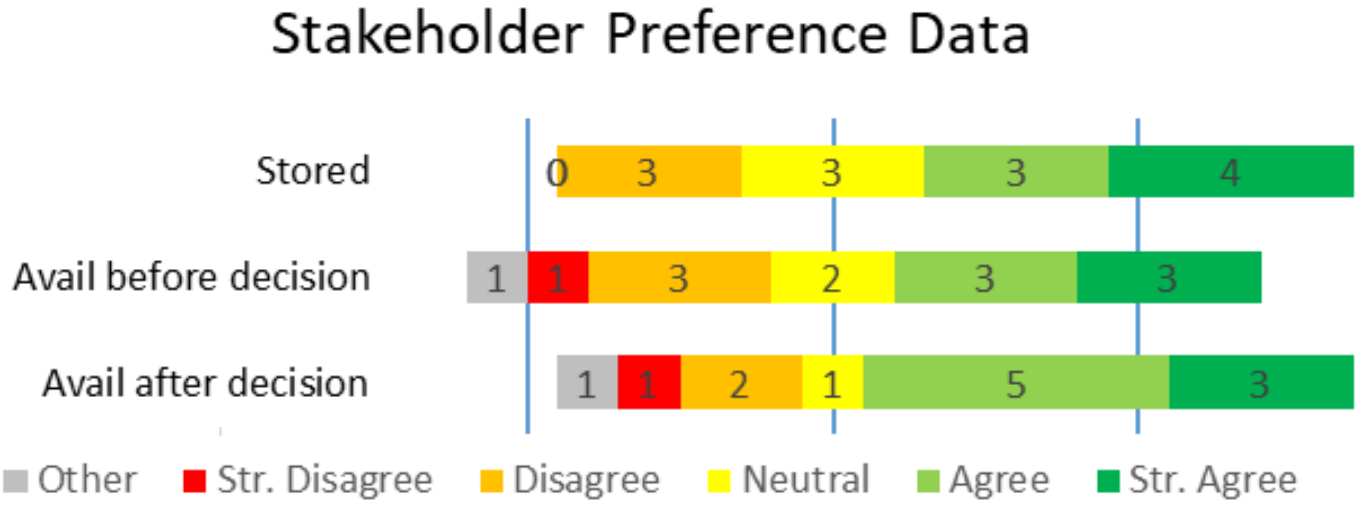
Several "ignore"



Commitment to Act

Techniques

- Consensus Modelling (3 nations)
- Decision Conferencing (4 nations)
- Dialogue Decision Process (10 nations)



Conclusions

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- Little explicit use of portfolio objective-based benefit modelling
- Deliberation preferred without modelling
- Value modelling: Early step statements get more agreement than later steps
- Great variety of practice across nations surveyed
    - Nations differ! (culture, history, philosophy of government)

        →Recommended procedures *will be ignored*. (arbitrary, no size fits all)

        →Overarching principles are *more valuable*

➔Decision Quality: 6 lenses on any nation's prioritization

(See our Final Report for details)

Questions?