



NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

NAVY FORCE STRUCTURE REVIEW STRATEGIC RISK

WORKSHOP AND TECHNICAL REVIEW

by

Jeffrey E. Kline

September 2022

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**NAVAL POSTGRADUATE SCHOOL
Monterey, California 93943-5000**

Ann E. Rondeau
President

Scott Gartner
Provost

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This report was prepared by:

Jeffrey E. Kline
Professor of Practice, Military Operations Research

Reviewed by:

Released by:

Dr. Matt Carlyle, Chairman
Operations Research

Kevin B. Smith
Vice Provost for Research

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ABSTRACT

The OPNAV Lead for the 2022-2023 Navy Force Structure Review requested an interdisciplinary NPS team conduct an independent strategic risk and technical risk of the current programmed force structure and three alternatives. Three week-long efforts by thirty NPS faculty and officer scholars from various disciplines produced classified assessments and delivered them to the Navy Force Structure Review study team in narrated briefing style. This report describes the process these two risk assessments used, without providing the classified alternative force designs or results.

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I. INTRODUCTION

A. REQUEST FOR INDEPENDENT ASSESSMENT

In January of 2022 the Navy's lead for the OPNAV wide Navy Force Review Study (NFRS) requested the Naval Postgraduate School conduct an independent strategic risk assessment and a technical risk assessment of the current programmed Navy force structure and three alternative force designs generated by the OPNAV NFRS team. The objective was to provide additional independent valuations of each fleet alternative to assist in down-selecting to one alternative for further study. A total of thirty NPS faculty and officer-scholars participated in either one or both assessments. Results were provided to the OPNAV NFRS team in two classified narrated briefings with written notes. Since these briefings are classified, pre-decisional, time-sensitive, and will be included in the OPNAV NFRS report, they are not reproduced in this report. Instead, the process used to conduct a force design strategic risk and technical assessment is recorded here for possible future applications.

B. EXECUTION

The OPNAV NFRS team provided NPS with alternative force design descriptions for the Strategic Risk Assessment effort. Faculty and students were recruited from diverse academic and operational backgrounds, provided the material provided by OPNAV, then came together for a one-day workshop on 11 March 2022 in NPS Center for Executive Education spaces to conduct the classified qualitative Strategic Risk Assessment. The process for this assessment is in Chapter 2. Results of the workshop were provided to OPNAV in a classified narrated briefing format and used by a Flag level panel to assist in down-selecting to one alternative force structure.

The OPNAV NFRS team then provided specific engineering and technology concepts included in the alternative force structure selected by the Flag level panel. Again, faculty and officer scholars were recruited from the NPS engineering and technical curricula to review this information, then came together on 22 July 2022 to exchange observations. After dialog, each participant provided their own technical risk

assessment. This process is described in Chapter III. Results were synthesized and provided to the NFRS in a classified narrative briefing for use in further force assessment efforts.

II. CONDUCTING A QUALITATIVE STRATEGIC RISK ASSESSMENT

A. THREE PART PROCESS

The NPS force design qualitative strategic risk assessment was conducted in three phases. In the first phase, participants independently reviewed the OPNAV provided alternative force design descriptions over several weeks. The second phase brought all participants together in a one-day scenario generation workshop on 11 March 2022 and in another on 18 March 2022 to exchange ideas and observations. The final phase involved each participant providing an individual strategic risk assessment of each fleet in each future scenario. The following section describes the workshop process.

B. STRATEGIC RISK ASSESSMENT WORKSHOP

The Strategic Risk Assessment workshop used variations on scenario planning [Schoemaker, 1995 and Wilkinson and Kupers, 2013.] The outcome is a qualitative assessment for each Navy force alternative using the force design metrics of:

- Robustness--the relevance or ability of the fleet to support the United States national strategy across various futures and various national strategies);
- Resilience -- a subset of robustness, the fleet's ability to sustain damage in a particular future yet continue to operate to achieve national objectives);
- Reactivity--the ability for a fleet to quickly capitalize on new technology advancements and react to surprise from a potential adversary);
- Recovery--the fleet's timeliness to be repaired, rebuilt, and reconstituted during and after a conflict period [Kline, 2017] .

Reasons for specific ratings in these metrics are generated by each participant and possible mitigation to the fleet design suggested.

The workshop contained two phases: (1) the generation of possible futures given geo-political, economic, technology and other drivers; and (2) the qualitative risk assessment using the metrics above for each fleet architecture alternative in each future.

1. Generation of possible futures

During the workshop, possible futures were generated using the methodology suggested by Dr. Paul Stames in the Center for Executive Education Strategic Thinking lecture series. Two ranges of possible future drivers or trends were drawn perpendicular to each other to create four different environments for alternative futures. Participants then described each quadrant in geo-political and economic terms, and the nature of likely conflicts generated for that future quadrant.

Figure 1 provides an illustrative example not generated in the classified workshop. The drivers are China as a world power (strong or imploding) and world political and trade characteristics (globalization or the rise of nationalism.). One quadrant, “Neighbors Trade” may occur if China for some reason stumbles and does not become the world’s premier power, and nations must look to themselves or their immediate neighbors to create protectionist trade and economic environments. This may result in the rise of regional economic and political spheres with the related regional conflicts.

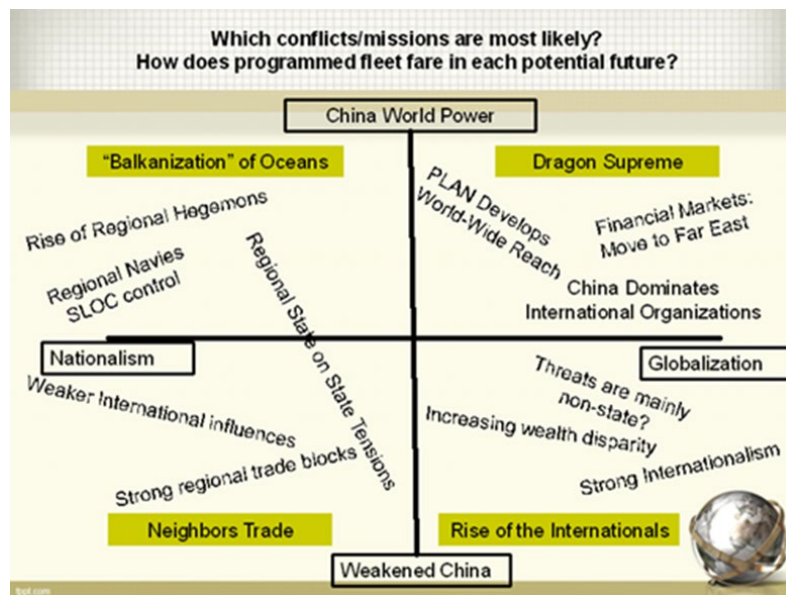


Figure 1. Example of generating alternative futures.

Examples of other drivers may be the United States’ national strategy (ranging from leader of free world and integrationists to “Fortress America” and protectionist); key technology drivers such as rate of implementation of quantum computing and

quantum sensing, hypersonic weapons, or energy systems; or climate factors like energy and water availability. Appendix A contains a form used for a future quadrant's description and possible conflicts

Since an infinite number of "futures" may be generated in this manner, the workshop created only eight potential futures in some detail --two charts with four quadrants each-- to accomplish the next step, the qualitative strategic risk assessment.

2. The qualitative strategic risk assessment

The qualitative strategic risk assessment was conducted with the same NPS faculty, scholars and Warfare Chairs workshop participants using the metrics and "score sheets" in Appendix A. This session began with a description of the method, the alternative force structures, the alternative futures, and the metrics with their score sheet. Groups were formed to discuss each future, force alternative, and metric assessments. However, each participant later filled out the score sheet independently. This process mirrored a Delphi method of bringing subject matter experts together after their initial individual rankings on particular topic to exchange ideas, then have them re-assess their original observations individually. Participants also provided brief explanations for low scores and possible mitigation measures to the fleet architecture. At workshop's end, the individual scores sheets were combined and summarized quantitatively, and comments recorded for the workshop's final briefing to OPNAV.

III. THE QUALITATIVE TECHNICAL RISK ASSESSMENT

A. THREE PART PROCESS

Like the qualitative strategic risk assessment, the technical risk assessment was conducted in three phases. Select engineering and technical faculty and students were recruited to review the technical information provided on an alternative fleet design selected by a flag level panel. Participants were encouraged to make their own classified notes, observations and assessments before a group dialog. The second phase brought the participants together to hear orientation briefings on the force design alternative and to review the technical and engineering dependencies which that force design depended. Dialog was inspired through group facilitation to exchange ideas on vulnerabilities and possible mitigation strategies. The final phase involved each participant providing a written technical assessment of the alternative force design. Individual notes, facilitation notes, and participant assessments were collected, synthesized, and provided to the OPNAV NFRS team in a classified narrated briefing.

B. THE QUALITATIVE TECHNICAL RISK ASSESSMENT WORKSHOP

After several weeks of enabling the select engineering and technical faculty and students to review the technical information provided by OPNAV, a workshop brought them together to discuss their findings. Where possible, current Technical Readiness Levels were used for participants to assess the likelihood of that technology to be operational by 2038. For example, if quantum sensing is a critical component in the fleet architecture employment, a participating engineer may provide a current TL6 for this technology, but identify it as a risk due to under investment in R&D for quantum sensing and lack of workforce education in this field. A technical risk chart found in Appendix B was used for facilitation and discussion. As several of these technologies and force design platforms were visionary, participants had to provide their best qualitative assessments in their individual written assessments.

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IV. SUMMARY

This report has outlined the process used by Naval Postgraduate School faculty and students to conduct an independent qualitative strategic risk assessment and technical assessment on alternative force designs for the OPNAV Navy Force Review Study team. Assessing a force structure against various potential futures and conflicts emerging from those futures is a unique application of scenario planning and provides insight into potential vulnerabilities in the national capital investment in a naval force.

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APPENDIX A

Two forms used during the qualitative strategic risk assessment included the future description form to assist generating alternative futures and their likely conflicts, and a strategic risk assessment form to assess each force design alternative against each possible future.

Future Description

NAME _____

Describe the Geo-political situation (World Power competition? Regional Hegemons? Bi-polar power world? Alliances—Political, Military, and Economic?)

Describe the World Economic, Trade, and Financial Situation (Globalization? Regional Trade Blocks? Divided “Have” and “Have not” nations)

Describe possible U.S. Strategies in this Future (Fortress America, Western Hemisphere Hegemon, or Leader of the Free World)

Describe predominate character of conflicts in this future (Adversaries, Allies/Partners, Types of conflict, State & Non-state actors, Social and Political status)

Score Sheet for Strategic Risk Assessment

Fleet Alternative Number _____

Evaluator _____

Metric Summary:

Robustness: the relevance or ability of the fleet to support the United States national strategy across various futures and various national strategies

Resilience: a subset of robustness, the fleet’s ability to sustain damage in a particular future yet continue to operate to achieve national objectives

Reactivity: the ability for a fleet to quickly capitalize on new technology advancements and react to surprise from a potential adversary

Recovery the fleet’s timeliness to be repaired or rebuilt during and after a conflict period

Future 1 Resilience

← 1-----5 →

1=Fleet can sustain loses up to 10%
40%=5

Fleet can sustain loses up to

Future 2 Resilience

← 1-----5 →

1=Fleet can sustain loses up to 10%
40%=5

Fleet can sustain loses up to

Future 3 Resilience

← 1-----5 →

1=Fleet can sustain loses up to 10%
40%=5

Fleet can sustain loses up to

Future 4 Resilience

← 1-----5 →

1=Fleet can sustain loses up to 10%
40%=5

Fleet can sustain loses up to

Future 5 Resilience

← 1-----5 →

1=Fleet can sustain loses up to 10%
40%=5

Fleet can sustain loses up to

Future 6 Resilience

← 1-----5 →

1=Fleet can sustain loses up to 10%
40%=5

Fleet can sustain loses up to

Future 7 Resilience

← 1-----5 →

1=Fleet can sustain loses up to 10%
40%=5

Fleet can sustain loses up to

Future 8 Resilience

←1-----5→
1=Fleet can sustain losses up to 10% Fleet can sustain losses up to
40%=5

Metrics Across Futures:

Robustness:

←1-----5→
1=Fleet is relevant in 20% of futures and strategies Fleet is relevant in 100% of futures
= 5

Reactivity:

←1-----5→
1=Fleet can react to technical or operational surprise in 2 years Can react in six months =
5

Recovery

←1-----5→
1=Fleet can be reconstituted in 5 or more years Fleet can be reconstituted in 1 year =
5

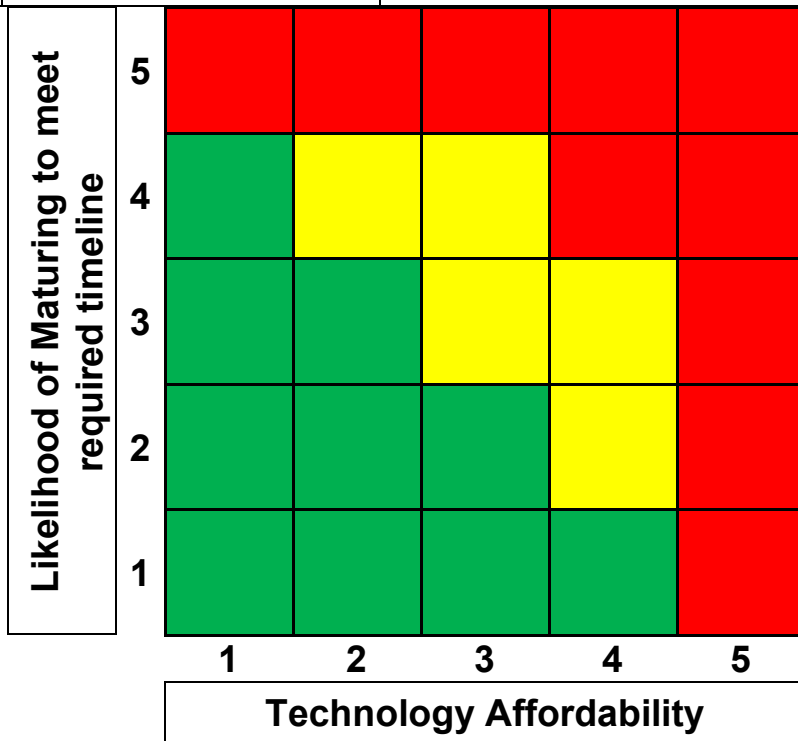
MOST IMPORTANT: Comment on any low score by identifying the future, metric, and score and rationale. Suggest possible ways to mitigate this risk.

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APPENDIX B

Risk matrix used to facilitate discussion during the technical risk assessment

Level	Likelihood	Cost Assessment
5	Not Likely	Unaffordable
4	Low Likelihood	Affordable – significant offset required
3	Likely	Affordable – some offset required
2	Highly Likely	Affordable – minimal offset required
1	Near Certainty	Affordable – no offset required



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LIST OF REFERENCES

Kline, 2007, “Impacts of the Robotics Age on Naval Force Design, Effectiveness, and Acquisition,” Naval War College Review, Vol 70, 2017, no 3. Found at <https://digital-commons.usnwc.edu/nwc-review/vol70/iss3/5/>

Shoemaker, 1995, “Scenario Planning: A Tool for Strategic Thinking”, MIT Sloan Management Review, Winter 1995 found at <https://sloanreview.mit.edu/article/scenario-planning-a-tool-for-strategic-thinking/>

Wilkinson and Kupers, 2013, “Living in the Futures”, Harvard Business Review, May, 2013 found at <https://hbr.org/2013/05/living-in-the-futures>

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