RESEARCH SUMMARY

Resilient Partnerships for U.S. Military Satellite Communication Missions

Designing a Method to Assess the Impact of Partnerships on Resilience

BONNIE L. TRIEZENBERG, KRISTA LANGELAND, GARY MCLEOD

To access the full report, visit www.rand.org/t/RRA584-1

ISSUE

The U.S. Space Force (USSF) is seeking to enhance the resilience and robustness of its space operations. Resilience assessments rely on a wide variety of inputs, from quantitative hard numbers, such as the number of satellites or the jam resistance of waveforms, to qualitative assessments regarding the impact of more-subjective factors, such as the incorporation of coalition and commercial partners into USSF missions and the subsequent impacts on organization, tactics, and training. Given the subjective nature of many of these inputs, there is an ongoing need to assess their continued relevance over time. This report documents our development of a methodology by which resilience criteria can be defined, assessed, applied to decisions, and evaluated *over time*, with a particular focus on the qualitative assessments of subject matter experts (SMEs).

APPROACH

An overview of our general methodology is provided in Figure S.1. Our research focus is on the qualitative data steps needed to generate inputs to a quantitative analysis. To demonstrate the methodology, we focused on a specific mission and approach to building resilience: integrating coalition and commercial partners into the military satellite communications (MILSATCOM) mission. We used semistructured interviews to elicit logic models regarding how and why integrating partners into MILSATCOM missions could impact resilience. Using insights from those interviews, we formulated explanatory paired logic statements about how partnerships impact resilience. We then used these paired logic statements in a community attitudes survey that was designed to ascertain whether the paired items are independent factors that should be modeled as separate inputs in later quantitative resilience modeling. By giving additional operational context to half of the survey respondents, we also sought to measure how these factors change based on operational context. We used the results of this factors analysis to perform an exemplar quantitative analysis, but because of the confounding factors highlighted by our factors analysis, we do not draw conclusions from the quantitative analysis.

FINDINGS REGARDING THE METHODOLOGY

- Factor analysis is useful in identifying independent factors—even for such highly ambiguous concepts as resilience and partnership—but factor analysis cannot provide insight into the confounding factors that create dependencies between factors.

continued

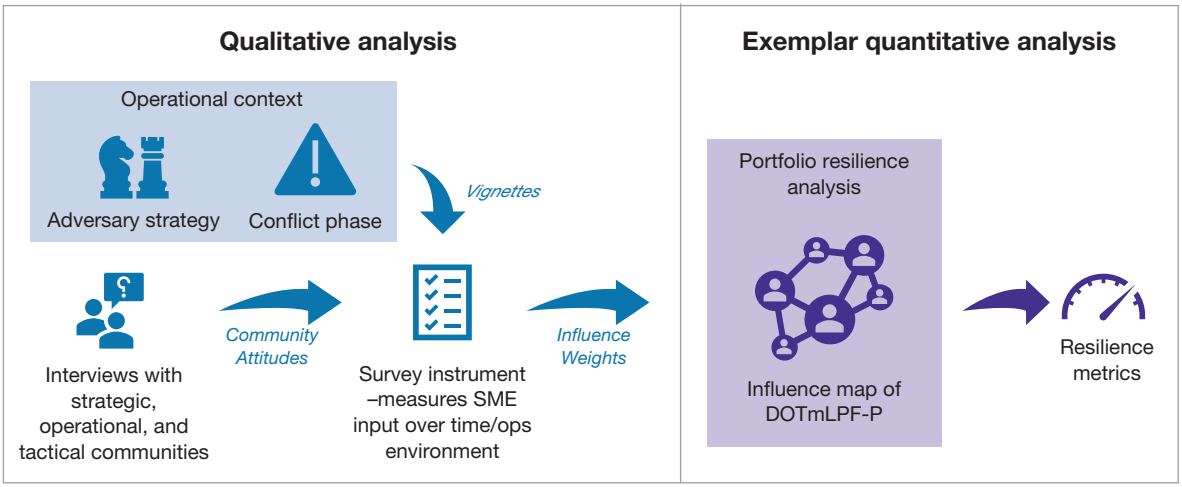
- Consensus on a topic as ambiguously defined as resilience is deeply affected—not, as we had hypothesized, by time or operational context, but by confounding factors.
- The specificity of vignettes appears to influence SME assessments of how operational context changes the factors of resilience. A more specific vignette appears to force experts beyond preconceptions and to confront *conventional wisdom*.

FINDINGS FROM SURVEY OF COMMUNITY ATTITUDES AND FACTORS ANALYSIS

- Personnel surveyed overwhelmingly believe that the USSF, in responding to adversary attacks,
  - has insufficient MILSATCOM resources to achieve resilience on its own (there is less consensus on whether the United States has sufficient diversity of resources)
  - lacks the tools and processes needed to integrate coalition and commercial partners in MILSATCOM operations
  - lacks the tools, training, and procedures necessary to rapidly reallocate MILSATCOM resources (whether alone or with partners) and recover in an operationally relevant time frame.
- More-detailed analyses regarding how best to integrate coalition or commercial resources may be biased by the lack of trust that those resources can or will be properly integrated.

Based on these findings, we recommend that **the USSF should prioritize the development of tools and processes capable of reallocating MILSATCOM resources in an operationally relevant time frame and train operations personnel in their use**.

FIGURE S.1. METHODOLOGY OVERVIEW



NOTE: DOTmLPF-P = doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy.

RAND PROJECT AIR FORCE

RAND Project AIR FORCE (PAF), a division of the RAND Corporation, is the Department of the Air Force's (DAF's) federally funded research and development center for studies and analyses, supporting both the United States Air Force and the United States Space Force. PAF provides DAF with independent analyses of policy alternatives affecting the development, employment, combat readiness, and support of current and future air, space, and cyber forces. For more information, visit PAF's website at www.rand.org/paf.