IDA | Research Summary

Formal Processes for Mitigating Risks of Strategic Materials Shortfalls

Mounting U.S. supply chain issues exposed by the recent pandemic point to the need to minimize the effects of shortages of various kinds in a national emergency. In one important area, IDA supports the efforts of the Defense Logistics Agency to assess and efficiently mitigate the risk of shortages of U.S. strategic materials stockpiles using a framework that has become the gold standard in the defense community for promoting materials resilience. This framework can be expanded to other items for critical U.S. supply chains.

Since 1988, IDA has been developing processes to help the Department of Defense (DOD) and Congress set inventory goals for the National Defense Stockpile of strategic and critical non-fuel materials, such as rare earths, energetics, carbon fibers, and high-purity materials with essential defense and civilian uses. The initial processes have been honed over time to become a comprehensive suite of mathematical procedures, policy judgments, computational models, and databases collectively known as the Risk Assessment and Mitigation Framework for Strategic Materials (RAMF-SM). RAMF-SM integrates the best available government and industry data and policy judgments to prepare structured assessments of supply chain vulnerabilities and estimate potential shortfalls of strategic and critical materials under emergency and other planning scenarios. It is also used to help set stockpile acquisition priorities, drawing upon formal optimization tools.

Accredited by DOD and the Defense Logistics Agency, RAMF-SM is recognized in the defense community as the gold standard when it comes to assessing essential demands and safe supplies of strategic and critical materials as well as risks in potential high- priority emergencies at both macro and micro levels. For example,

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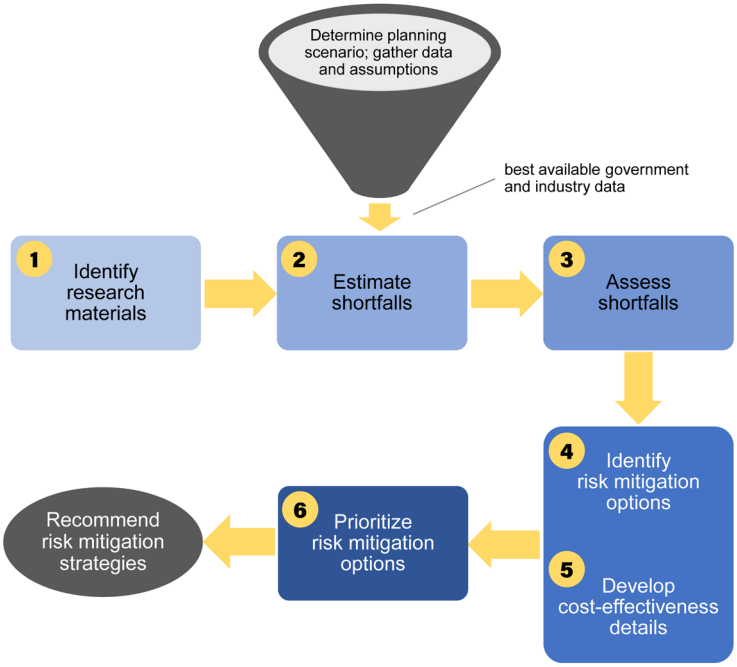
a macro assessment might determine which of more than 150 materials (with associated quantities) are in demand and locate safe supplies of them. Any likely shortfalls become strong stockpiling candidates. A micro assessment might uncover specific supply disruption risks, drawing in detailed firm-specific data regarding defense industrial base capacities and weapon system-specific demands.

Jim Thomason, Eleanor Schwartz and Julie Kelly are prominent members of the IDA team devoted to updating data and improving methods to support DOD and ensure future analysts are able to effectively use the RAMF-SM framework, interpret results, and convey results to sponsors, Congress and the White House.

A March 2022 report by Eleanor provides computational and mathematical details and a user's guide for the Material Demand Computation Model. The model encompassed streamlined methods and processes for computing material demand in the framework, integrating four different computer programs into a single faster and more efficient one.



Eleanor and Jim are the authors of another report that consolidates documentation on changes made since the late 1980s to the methods and file structures of the Stockpile Sizing Module. The report also updates users on RAMF-SM's less frequently used features and introduces new options and new output file types.

Jim and Julie prepared an overview last year of the RAMF-SM framework for the Defense Logistics Agency's Office of Strategic Materials to present to DOD counterparts in Canada, Australia and the United Kingdom. The presentation describes ongoing RAMF-SM improvements to reflect, for example, essential infrastructure, reliability of domestic and foreign sources of materials during national emergencies, effects of extreme weather damage, and more.

Finally, IDA's innovative work on developing linear programming methods to effectively and efficiently set stockpile acquisition priorities is documented in another IDA report. These methods were used in DOD's forthcoming biennial report to Congress on strategic materials.

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