

Adaptation, Complexity, and Long-Term Competition in UGS: Perspectives from Policymakers and Technologists

Chapter Five

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Adaptation, Complexity, and Long-Term Competition in UGS: Perspectives from Policymakers and Technologists

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This chapter offers insights into policymaker and technologist perspectives of adaptive planning in *undergoverned spaces* (UGS). UGS are complex in several ways—from their definition, to the lack of consensus on the threat they pose to U.S. strategic interests, to operational needs for engaging within them, to how technology can assist decisionmaking about them. We sought insights from experts with a wide variety of experience and perspectives on these topics to illuminate engagement and, more specifically, the complexities of decisionmaking in UGS and to show how the National Security Enterprise (NSE) can better leverage existing and emerging technologies for this purpose. We selected interviewees according to their expertise and experiences in formulating and supporting policy, consuming analysis, or developing technologies relevant to the information processing and decisionmaking portions of the Act-Sense-Decide-Adapt (ASDA) cycle.¹ We initially drew interviewees from the RAND Corporation’s in-house experts on policy and technology. After this preliminary round of interviews, we expanded the expert pool to include individuals outside RAND to ensure that our analysis included a broad set of perspectives.²

¹ Justin Kelly and Mike Brennan, “OODA Versus ASDA: Metaphors at War,” *Australian Army Journal*, Vol. 6, No. 3, Summer 2009; Head Modernisation and Strategic Planning—Army, *Army’s Future Land Operating Concept*, Canberra, Australia: Australian Army Headquarters, 2009.

² Interviewees consisted of experts that formerly served or currently serve in government positions, research laboratories, federally funded research and development centers, private industry, and academia. (A list of interviewees is provided at the end of this chapter.) All interviews were conducted under protocols that ensured that individual interviewee comments were presented as *not for attribution*. The specific comments of interviewees are anonymized in this chapter, though their individual contributions are acknowledged at its conclusion.

The discussion in this chapter is based on 33 semistructured interviews with 37 policymakers and technologists.³ During our discussions, interviewees were free to define UGS in ways that made sense to them, drawing from their own expertise and experience. Therefore, participants often had different conceptions and definitions of what constituted UGS. Table 5.1 provides a sampling of the different views on UGS reflected by the participants.

Moreover, given the diversity of interviewees' backgrounds, discussions yielded insights on a variety of focus areas, such as explorations of policymaking in specific cases, examinations of the process by which the U.S. government acquires technologies, and considerations of the value of particular tools and approaches for engagement in UGS. Table 5.2 provides a sense of this diversity by offering quotes to illustrate differences in interviewees' topics and tone. Our interview process yielded a rich set of data, in which there were substantial areas of overlap, agreement, and disagreement.

Interviewees' perspectives are presented in the next three sections. The first section provides interviewees' views on engagement in UGS. The second section discusses analytical challenges associated with analysis and adaptive decisionmaking in UGS. The third section discusses specific areas of investment that interviewees identified as having the potential to provide relevant, high-impact capabilities for improving engagement in UGS and increasing the adaptive capabilities of DoD and the broader NSE.

TABLE 5.1
Interviewees' Definitions of UGS

Category	Details
Characteristics	<ul style="list-style-type: none"> • UGS are unpredictable and multidimensional. • UGS have highly varied political, economic, and conflict dynamics. • UGS lack human capital. • Policy becomes irrelevant quickly, and its impact is uncertain.
Types and levels of governance	<ul style="list-style-type: none"> • UGS may fall on a spectrum of governance. • Governance structures and institutions are not shared, nor are they long term. • Standard-setting is difficult. • If laws, standards, and norms exist, they are poorly designed, which enables exploitation. • Shared protocols, norms, and technologies might perversely leave UGS vulnerable to exploitation by adversaries. • Adhering to rules and norms does not benefit actors. • Some rules exist, even if they are informal; some UGS have robust social standards that are necessary and help the society function. • In UGS, governance qualities change frequently; there are intermittent and fragmentary attempts to build communities and infrastructures.
Actors	<ul style="list-style-type: none"> • Not all adversaries are known. • The relevant actors are not always obvious; it is difficult to understand who is doing what. • The relative power of groups and actors is highly variable across time and space. • Actors within UGS might be highly susceptible to exploitation by external actors.

³ Two interviews were conducted with multiple experts participating.

TABLE 5.2
Exemplar Quotes from Different Interviewee Types

Type ^a	Exemplar Quote
Staff-level policymaker	“There is so much paper and so little time. Prescribed decision processes prevent issues that aren’t emergencies or crises from rising to the top.”
Senior policymaker	“The trend over time has been less patience with analysis. Leaders want insights and actionable analysis quickly, and the idea of analysis that takes 12 months is seen as unacceptable.”
Political risk expert	“A better representation and understanding of the world comes from getting on the ground and talking to the full spectrum of actors.”
Academic	“Undergoverned spaces are areas where you need to insist on getting as much outside information from smart people. Our government isn’t well structured for that.”
Technologist	“The probability that a problem is framed incorrectly is nearly 1. What is the fastest way to go through hypothesis generation and work through alternative formulations and diverse perspectives?”
Senior technologist	“I think the [U.S. Department of Defense] DoD could play a role in driving how companies think [about innovation]—how the private sector invests and spends money [on research and development]. [Long-term competition] has to be a whole-of-country effort. One hundred people in [Defense Advanced Research Projects Agency] DARPA are not going to create the whole idea. You have to energize national competitiveness through techniques and get the whole country to think about benefits to the bottom line, to be more successful. Don’t try to be a technology picker.”

^aThis table demonstrates the diversity of views posed by interviewees based on their professional backgrounds and experiences but provides minimal contextual details on their backgrounds and positions. For the remainder of this chapter, all participants will only be identified as “interviewee” or “interviewees” to maintain anonymity.

Engagement in UGS

Throughout the interview process, participants identified numerous challenges to policymakers’ engagement in UGS. Interviewees presented a wide variety of perspectives on the relative priority and preferred outcomes of U.S. policy in UGS in the policymaking process, the complex bureaucratic environment in which UGS sit, and the organizational capacities that DoD and the NSE should adopt for greater success in UGS. The following section explores these themes in greater detail.

Engaging in UGS Presents Uncertain Payoffs for U.S. National Security Objectives

Among several interviewees, there was a sense that UGS largely represent low-level DoD policy priorities relative to high-intensity conflict with great and regional powers and that UGS were better addressed by other agencies within the NSE.⁴ There was little agreement

⁴ RAND Interview E9A4, December 2020; RAND Interview D6B0, December 2020.

across the bureaucracy about whether and how much the United States should be engaged in UGS. At the core of this disagreement was a lack of consensus on the criteria that would justify whether to engage in UGS, support other governments or actors, monitor, or completely disengage. While interviewees accepted these spaces as arenas where extended great-power competition occurs, it was not clear what U.S. policy goals and risk estimates would need to be to unambiguously warrant engagement in specific cases.⁵ Policymakers need to sharpen strategic assessments and national objectives to better differentiate among necessary engagements, opportunities to consider engagement, and potentially costly blunders.

Several interviewees noted the limitations of planning and analysis for UGS to support the highest levels of strategic assessment. Resources and long-term planning processes are dominated by traditional warfare, thus leaving a gap in policymakers' understanding of UGS. As one interviewee noted, wargaming and planning are built around preparing for "World War Three."⁶ Similarly, another interviewee noted that the U.S. armed services, for example, are primarily concerned with how they spend money in governed spaces, leaving little time or resources for UGS: "Undergoverned spaces are sort of an afterthought. The services don't get excited about this."⁷

Finally, engaging in UGS could pose significant challenges at the political and operational levels. As one interviewee noted, it is one thing to engage in places where governance has collapsed and is openly contested (e.g., failed states). It is quite another to engage in shadowy corners of sovereign states, such as the Federally Administered Tribal Areas in Pakistan.⁸

The United States Might Not Be Able to Achieve Its Preferred Policy Outcomes in UGS, Leading to Disagreements About Achievable Goals

Interviewees disagreed on the extent to which the United States could reasonably expect to achieve its preferred outcomes in UGS. Skeptical interviewees argued that the ideal outcome is often simply unrealistic. Other interviewees noted that high-level goals in UGS were fairly uniform across policymakers; where disagreements arose was over feasible goals—given the constraints on U.S. power, what is realistic and possible?⁹ One interviewee argued that the United States is working against broad, systemic trends in many areas, and thus persistent, costly, long-term engagements in UGS would likely be unproductive in reversing these dynamics.¹⁰ Similarly, two other interviewees saw UGS as unlikely to receive the sustained

⁵ RAND Interview E9A4, December 2020.

⁶ RAND Interview B6D1, September 2020.

⁷ RAND Interview C3A0, October 2020.

⁸ RAND Interview C7C9, January 2021.

⁹ RAND Interview C7C9, January 2021.

¹⁰ RAND Interview E9A4, December 2020.

attention and resources that effective engagement would require. As a result, they predicted that engagements would be more costly and less productive than desired.¹¹

In one salient example, an interviewee noted that shifting claims and norms in the South China Sea—which could represent an undergoverned space in the U.S.-China relationship—are never going to be resolved in favor of the United States because of China’s structural advantages in geographical distance and regional knowledge.¹² The interviewee argued that DoD’s understanding of competition (e.g., the United States lost its historical balance of power in Asia to China and therefore must recover it) is insufficient, insensitive to these structural concerns, and anchored in returning to an unrealistic position of military and economic dominance in the region.¹³

Other interviewees spoke about the lack of understanding about acceptable risk and the expected consequences of U.S. policy choices in UGS. For example, one interviewee noted that the most helpful analysis they encountered on Afghanistan was an assessment of uncertainties and identification of risk and how to understand the second- and third-order effects of policy decisions rather than the optimal allocation of U.S. resources.¹⁴ Another interviewee argued that the high-level goals across the government on engaging in UGS are often shared by stakeholders, yet consensus cannot be reached once real-world constraints are imposed, and policymakers need to prioritize among multiple objectives; this creates confusion about what a “good enough” solution looks like.¹⁵

UGS Feature a Crowded, Complex Bureaucratic Environment That Challenges Coordination

Beyond the challenges posed by developing well-formed goals and strategies within DoD, there are many players across the NSE who have a stake in the policymaking process for UGS. Interviewees often highlighted differences between DoD and U.S. Department of State (DoS) perspectives. DoD typically has a specific, actionable end state that it is trying to achieve, whereas DoS views continued engagement as an important goal in and of itself.¹⁶ This difference creates tension between offices with different missions and capabilities. In general, DoD is not the lead agency for policy decisions in these spaces and must constantly work within a larger group of stakeholders with varied incentives and interests. Yet DoD’s resources dwarf those of underfunded civilian agencies, resulting in DoD being asked to take on more and different roles—despite the fact that its personnel often do not have the expertise and are

¹¹ RAND Interview D6B0, December 2020; RAND Interview C3A0, October 2020.

¹² RAND Interview E9A4, December 2020.

¹³ RAND Interview E9A4, December 2020.

¹⁴ RAND Interview D3A8, October 2020.

¹⁵ RAND Interview C7C9, January 2021.

¹⁶ RAND Interview D6B0, December 2020.

not well suited for key engagement tasks in UGS, such as postconflict reconstruction, law enforcement, humanitarian assistance, and cultural outreach.¹⁷

Understanding the ecosystem of the actors involved; reaching a shared perspective on risks, opportunities, and desired outcomes among these actors; and then mobilizing various agencies for collective action is extremely difficult. For example, one interviewee discussed the problem of coordinating counterterror activities in cyberspace, which involved a large list of U.S. government actors with distinct and competing equities. The result required creating policymaking processes that could simultaneously empower local action when agreed on and credibly elevate issues to principals when deconfliction was needed:

The role of the National Counter Terrorism Center was to bring together all of the different department and agency views and preferences—[National Security Agency] NSA, [U.S. Cyber Command] CYBERCOM, [Central Intelligence Agency] CIA, [Federal Bureau of Investigation] FBI—and come to a resolution. Each organization comes to the process with their equities and we had to be a trusted party to represent their views objectively.¹⁸

Similarly, another interviewee echoed the increasing difficulty of operating in, governing, and acquiring capabilities in space because of the dual needs to support (1) a broad set of stakeholders demanding the use of systems and services and (2) the emerging needs for survivability of these capabilities in response to weakening governance regimes associated with anti-satellite capabilities.¹⁹ This interdependence reveals the high complexity in UGS that creates coordination costs within and across domains.

Bureaucratic structures, barriers, and habits compound the inherent difficulty of reaching decisions with large numbers of actors. One interviewee emphasized that because of the political process, leadership is turned over in a fashion that is not conducive to long-term policymaking.²⁰ Moreover, the relative power of certain offices over others can cause confusion about goals and strategies on complex issues. For example, regional offices in the Office of the Secretary of Defense for Policy, which generally deal with issues through bilateral relationships with allies and partners, often compete with functional offices, which generally are charged with long-term strategy formulation. Many interviewees also observed that the desire to centralize policymaking creates bottlenecks in reaching decisions. One interviewee noted that far too many issues percolate up to senior levels because subordinates are unable or unwilling to settle issues at the working level.²¹ Another interviewee argued that the U.S. government has “split portfolios into ever finer detail” and that the smallest decisions need to be “coordinated at so many levels,” such that a decision is taken as a point of debate or an oppor-

¹⁷ RAND Interview D6B0, December 2020.

¹⁸ RAND Interview E0A1, January 2020.

¹⁹ RAND Interview A5A8, November 2020.

²⁰ RAND Interview B6D1, September 2020.

²¹ RAND Interview E1C7, December 2020.

tunity to elevate to the next level.²² The end result is that senior leaders are presented with either nondecisions or decisions that should have been made at a much lower level, which is a costly use of their limited time and attention.

Another coordination issue has to do with classification barriers. Several interviewees noted that information needed to coordinate action in UGS—such as space or cyber—is tightly controlled, thus limiting both the ability to develop a common understanding of the environment and the capabilities for acting within it.²³ One interviewee noted that policymakers do not have a good understanding of the tools and capabilities in the irregular warfare realm because of classification issues.²⁴ For example, the partner engagement activities of special operations forces (SOF) are opaque to many DoD and NSE stakeholders. Certain SOF authorities allow SOF to provide training and equipment to actors within countries where other programs are already operating, thus risking competing or contradictory efforts or duplication as a result of fragmented visibility and poor coordination.

Constructive Engagement in UGS Requires the Perspectives of Multiple Stakeholders—Many Outside the Government

A common theme in our interviews was the importance of multi-stakeholder engagement. One interviewee discussed the value of gathering a group of experts with diverse experiences and views in a series of meetings and iterative workshops. They remarked that there is “substantial value in talking to people with really different opinions and [e]ffecting a synthesis. Or getting people with different opinions to argue in front of me.”²⁵ The interviewee also noted that these types of engagements can help push leaders to change their minds if the right context is provided.²⁶ For this method to be successful, the engagement must be repeated to “sift and sort through information and eventually find a point of convergence.”²⁷ If an engagement is a single event, participants are more likely to stick to what they know, come to the discussion with their hobbyhorses, and not change their minds.²⁸

Another interviewee highlighted two issues that could be solved by multi-stakeholder engagement. The interviewee mentioned that in their area of expertise, policymakers are worried about both too much and too little security: Too much security leads to a military buildup and a security dilemma, but too little security leads to illegal activities and an inabil-

²² RAND Interview D8A8, October 2020.

²³ RAND Interview A5A8, November 2020.

²⁴ RAND Interview B6D1, September 2020.

²⁵ RAND Interview A5E7, December 2020.

²⁶ RAND Interview A5E7, December 2020.

²⁷ RAND Interview A5E7, December 2020.

²⁸ RAND Interview A5E7, December 2020.

ity to enforce international law.²⁹ Multi-stakeholder engagements are particularly helpful for solving the issue of too little or too much, because they bring leaders together to find the balance between encouraging stakeholders to commit resources to building and preserving governance capacity and overcommitting resources in pursuit of national interests that might trigger a security dilemma and undermine governance institutions.³⁰

This same interviewee also discussed how multi-stakeholder engagements at senior levels signify that leadership views UGS as important, both to other parts of the NSE and to those operating within the space. For example, the interviewee noted that active involvement by senior government officials in Arctic policy signaled the importance of international law and norms in the region. Furthermore, they noted that a successful sign of governance in UGS was visible in the Arctic, where the institutions at the foundation of regional governance rested on global laws and norms (e.g., the United Nations Convention on the Law of the Sea); this limited the extent to which actors were willing to risk actions in the Arctic that might undermine them in other domains.³¹

An Organization's Capacity for Learning and Adaptation Is Critical for Engagement in UGS

A recurring theme in our interviews was the need to maintain an organizational commitment to exploration and learning and the continuous search for alternative ways to deal with problems. Adaptation and innovation in long-term competition requires putting greater weight on experimentation and learning and less weight on binary success or failure criteria for technologies, operations, and organizations. How organizations manage risk and hedge is critical because it is the foundation of their ability to adapt.³² As one interviewee noted, getting DoD to think in terms of a “campaign of learning” is critical to DoD’s adaptive capability.³³ Organizations that are committed to exploring, adapting, and maintaining heterogeneity can better cope with complexity.³⁴

Interviewees noted that one way to measure an organization’s commitment to exploration and innovation is through learning metrics. Learning metrics, as opposed to outcome metrics, track and measure changes in how organizations frame, understand, and monitor problems. Learning depends on observing and maintaining an organizational commitment to preserving heterogeneity and diversity at three levels—alternative views on the state of the world (data), alternative views on how the world works (models), and alternative views on

²⁹ RAND Interview A3E1, November 2020.

³⁰ RAND Interview A3E1, November 2020.

³¹ RAND Interview A3E1, November 2020.

³² RAND Interview D0E6, October 2020.

³³ RAND Interview A0C2, January 2021.

³⁴ RAND Interview C2C2, December 2020.

what to do about the problem (goals and actions). As one interviewee noted, “how decision-makers invest their time and attention away from things that they are predisposed to believe is an indicator of the adaptive potential of an organization.”³⁵ Thus, instead of using direct outcome metrics, organizations could develop metrics focused on process and adaptation. One interviewee mentioned “triple loop learning”—how organizations “learn how to learn” by reflecting on how they learn in the first place—as a way to transform organizations and increase their capacity for learning.³⁶

Another dimension of adaptiveness highlighted by interviewees was the importance of *policy testing* so that policymakers can receive feedback on what is or is not working during implementation. Interviewees noted A/B testing, which provides a way to compare two versions of interventions into UGS to discover which one performs better. Multiple interviewees argued that breaking decisions up into smaller, modular pieces could allow the use of feedback from structured testing such that policymakers can make more-informed decisions by collecting feedback on the efficacy of small, localized actions before committing to larger resource decisions. For example, one interviewee advocated for an *ink drop* strategy, where policymakers look at the effects of one small decision to get early insights into possible outcomes and the effects of additional interventions: “Start with a small intervention, assess its results, and grow as you need.”³⁷ Policy engagement should be guided by the logic of experiments that involve hypothesis generation, testing, and data collection. One interviewee indicated that the U.S. government already does this kind of testing to a degree but that it has not been systematically tracked or used:

We sent out probes, for example, through bomber assurance missions. You would do this and see what reaction you got to your probe from Russia. Track 1.5 dialogues can also help test policy options as a sort of “trial balloon.”³⁸

Innovation in Government Business Practices Must Be Considered for Long-Term Competition

Several interviewees noted the importance of investing in research on organizational design and management practices that could help make the U.S. government and commercial sector more competitive. One interviewee noted that a variety of mechanisms exist to incentivize research, development, experimentation, and innovation—such mechanisms as changes in accounting practices, tax credits, and incentives that could mobilize the commercial sector to

³⁵ RAND Interview D0E6, November 2020; RAND Interview A5E7, December 2020.

³⁶ RAND Interview D4C1, December 2020.

³⁷ RAND Interview E2D8, November 2020.

³⁸ RAND Interview E1C7, November 2020.

take on challenges in UGS at scales that exceed what government-sponsored research could support.³⁹

Several interviewees noted that DoD's acquisition system produced tension between the desire to try out an approach and the bureaucratic pressure to commit to it for an extended period. One interviewee provided an example from the weapons acquisition community:

There was a desire to move toward life cycle costing—the total cost of a system over its full life, including the cost of planning, development, acquisition, operation, support, etc. There is a pressure to look out 30 years and determine how many billions it will cost to buy a system. There is little tolerance for experimentation, for trying things out and failing.⁴⁰

Another interviewee agreed and noted that the U.S. government's requirements process is rigid and tends to push systems toward early closure.⁴¹ As one interviewee noted, DoD should not try to be a "technology picker," given that it has not proven to be very good at picking winners.⁴²

Another area of investment for shifting business practices is evaluating program effectiveness by criteria other than the sophistication of the technologies that are developed. Additional criteria are community building and signaling the value of research approaches that sponsors value. One interviewee argued that creating sustained intellectual input and a sound body of ideas, practices, and techniques requires seeding new professions and disciplines, not just producing artifacts—particularly in the social sciences and the infrastructures affecting sociotechnical interfaces and practices.⁴³ The interviewee noted that research patrons did not create a new approach but rather tended to use their resources to signal interest in and legitimize particular approaches.⁴⁴ Programs that were successful were oriented around building a community of researchers rather than funding specific projects. Using programs to validate and secure promising research approaches and seed the research ecosystem represents one way in which government business practices could be changed to ensure adaptability and flexibility.

Analysis in UGS

Interviewees also discussed challenges associated with analysis and adaptive policymaking in UGS. These discussions covered such areas as how different policymakers consume

³⁹ RAND Interview D1E1, November 2020.

⁴⁰ RAND Interview E2D8, November 2020.

⁴¹ RAND Interview C3A0, October 2020.

⁴² RAND Interview D1E1, November 2020.

⁴³ RAND Interview C4B3, December 2020.

⁴⁴ RAND Interview C4B3, December 2020.

analysis, the challenges of sensing and data collection in UGS, information presentation, and the evaluation of the effectiveness of U.S. engagement in UGS.

How Policymakers Consume Information Bounds the Utility of Analysis

Interviewees presented varied perspectives on how policymakers consume information. First, several interviewees indicated that policymakers might not be receptive to new or contradictory information and do not always seek out diverse information that challenges their views, thus limiting their ability to adapt as circumstances change. For example, one interviewee noted the following:

Most of the leaders I worked with did not want to entertain complex intelligence that contradicted their own worldview. Many of them will create their own reality. It is difficult to explain to decisionmakers that they are wrong.⁴⁵

Another interviewee noted that in situations where policymakers have already decided to move out on a particular course of action, analysis can simply “make their lives miserable.”⁴⁶

A central issue is the relationship between analysts and policymakers. Policymakers might inherently resist the idea that analysts can reveal hidden assumptions and biases in their reasoning. As one interviewee noted, “Analysis that tries to change policymakers’ preferences is beyond what analysis is capable of. They already know what they think.”⁴⁷

However, this sentiment was not universal; other interviewees described a variety of consumer reactions to analysis. For example, one interviewee noted that some principals they worked with at the undersecretary level were willing to engage with analysis when it showed results that were unexpected: “I could tell them that their fundamental principles were wrong and they would say show me the data.”⁴⁸ Similarly, another interviewee noted that although analysis is unlikely to change policymakers’ intuitions or preferences, data or field research that is directly relevant to an immediate policy that they have to make, along with “information that is not an opinion,” can help policymakers find a stronger basis for their actions.⁴⁹

A second issue on information consumption is the amount of time policymakers can devote to consuming analysis. Policymakers’ attention is a scarce and valuable currency. Several interviewees noted that principals are often overwhelmed by paper and have little time to sit and read because their attention is drawn to emergencies and crises that require con-

⁴⁵ RAND Interview C7A1, December 2020.

⁴⁶ RAND Interview D1A1, October 2020.

⁴⁷ RAND Interview C7C9, January 2021.

⁴⁸ RAND Interview D1A1, October 2020.

⁴⁹ RAND Interview C7C9, January 2021.

sideration and decisions.⁵⁰ Moreover, there is often not enough time to consider long-term analysis. One interviewee noted that the trend over time has been that decisionmakers have less patience with analysis and want insights and actionable analysis quickly:

The idea of analysis [that] would take 12 months is seen as unacceptable. Decisionmakers are generally willing to accept analysis that is unsophisticated if it at least gives them something to go with. Too often analysis is seen as something that takes too long and comes back with fine-grain results that [are] not what the decisionmaker is looking for.⁵¹

The demands on policymakers' time limit the attention that they can commit to problems; they need information that can be quickly absorbed and integrated with their existing knowledge. This tends to drive senior policymakers to seek simplicity over nuance.

Several interviewees raised the issue of the tension between the need for greater specificity for understanding complex problems and the need for increased simplicity for presenting information. One interviewee noted that when analytical approaches lack the ability to keep pace with policymaking needs, policymakers default to relying on their instincts because they do not have access to topic-specific, high-quality analysis when it is needed, which means that analytical outputs are often misaligned with needed policymaking inputs.⁵²

A third and final issue involving policymakers' consumption of analysis is the extent to which policymakers trust the analysis they receive. Interviewees noted that policymakers typically act using their own knowledge or instincts or recommendations by advisers that they trust. Several interviewees identified the extent to which policymakers were comfortable with data and models as a critical issue. One interviewee noted that data literacy varies among policymakers, which might make it difficult for them to distinguish between high-quality and lesser-quality analysis. They noted that "[t]here is a risk that as people start to use the sophisticated tools that are available, it will look like they did sophisticated analysis. There is a greater need to provide checks on that process."⁵³

Another interviewee explicitly called out such computational methods as Agent-Based Modeling (ABM) and Bayesian logic models that were a "black box" to policymakers. Using these tools without an understanding of how they will be received by policymakers could increase the risk that the tools are simply ignored or dismissed if they produce analytical results that policymakers disagree with or do not understand.⁵⁴ One interviewee likened policymakers' apprehension about models to the distrust of automation in the U.S. military; the interviewee recounted an experience when the U.S. Air Force outfitted aircraft

⁵⁰ RAND Interview B6D, September 2020; RAND Interview C7A1, November 2020.

⁵¹ RAND Interview D8A8, October 2020.

⁵² RAND Interview D1A1, October 2020; RAND Interview E2D8, November 2020.

⁵³ RAND Interview A5E7, December 2020.

⁵⁴ RAND Interview D8A8, October 2020.

with heads-up displays but untrusting pilots simply turned the technology off and chose to fly the airplanes without that assistance. As that interviewee summed up the issue, “The problem is that people don’t trust models.”⁵⁵ Finally, interviewees emphasized the weight that principals put on their closest and most-trusted advisers versus what analysis and models might tell them.⁵⁶

Data Collection in UGS Demands a Sustained Commitment

It is extremely challenging for the NSE to obtain information that helps it understand dynamics on the ground. One interviewee emphasized that the NSE consistently struggles with sociocultural intelligence and the “softer, human side” of intelligence collection versus the harder military information that the Intelligence Community (IC) is primed to collect.⁵⁷ Questions of human motivation and behavior require context to interpret, which can be difficult to obtain without sustained commitment and presence. Such commitments to data collection have been difficult to sustain precisely because the United States has tended to withdraw those individuals best suited to gather necessary information when the security situation was deteriorating. Interviewees noted that a feedback loop has existed between security and intelligence—one where good security was needed to secure intelligence collectors and assets and good intelligence collection enabled effective security.⁵⁸ Declines in one can be seen as jeopardizing the other.

In an example of this dynamic, one interviewee expressed how difficult it was to vet armed nonstate groups in Syria to provide them with U.S. assistance, noting the inherent challenges of human intelligence collection in dangerous environments with few U.S. personnel:

We needed a better understanding of the network of who held power, who was best connected, who [were] the right people to leverage. How do you get information about local actors when you don’t even have Peace Corps volunteers there, if it is a hostile or ungoverned space?⁵⁹

In this case, the lack of consistent information about various political and military actors in Syria made it difficult for the United States to vet, understand, and trust irregular forces. Another policymaker noted the similar challenge posed by understanding criminal cartel

⁵⁵ RAND Interview B1A8, December 2020.

⁵⁶ RAND Interview E1C7, December 2020.

⁵⁷ RAND Interview C4D1, October 2020.

⁵⁸ RAND Interview C3C1, December 2020; RAND Interview D3A8, October 2020; RAND Interview A9D2, December 2020.

⁵⁹ RAND Interview A9D2, October 2020.

influence in Mexico, which required collecting data on previous formal and informal relationships, family ties, and historical commitments and rivalries.⁶⁰

In addition to collecting information, intelligence collectors must develop capabilities to vet information to ensure that it is truthful and accurate. Given that vetting largely rests on triangulation (comparing one data source with another), it requires multiple data sources to increase the quantity and quality of data.⁶¹ As a result, the time and cost of data collection are raised and made more difficult given the challenge of sustaining resource commitments in UGS.

Interviewees emphasized that there are few shortcuts when it comes to gathering and processing the type of data that is needed for analyzing UGS. One interviewee noted that gathering highly qualitative, human-centric information in UGS requires high levels of trust and repeated engagement. They noted that sustained relationships diminish incentives to lie because sources realize that future gains can be more valuable than a single payday and that high-quality information is valued by policymakers and motivates a continued demand for its collection.⁶² This type of collection requires resources to travel, to hire observers and listeners with the appropriate language and cultural skills, to pay collectors on the ground, and to use fixers to secure meetings and provide security.⁶³ As one interviewee noted, the data are challenging and time-consuming to collect and must be constantly and manually updated. This means that highly qualitative, human-centric data on UGS can be difficult to produce at scale.

Another interviewee noted the problem that knowledge in UGS is likely to be contested. Well-governed spaces might be able to produce authoritative, official data, such as a population census, tax and health records, or economic employment statistics. By contrast, the fragmented nature of UGS means that records of this type might be difficult to produce or unreliable and challenged if they are produced: “Producing numbers requires authority and legitimacy. In undergoverned spaces, which can lack both authority and legitimacy, numbers are going to be contested and you might not get relevant information.”⁶⁴

Understanding Human Dynamics in UGS Is Highly Valued by Policymakers but Difficult to Achieve

Understanding UGS involves synthesizing large amounts of qualitative, ethnographic, human-centric data to explain both how social systems work in these settings and the importance of specific actions in UGS. Interviewees noted the importance of nuanced,

⁶⁰ RAND Interview C7A1, December 2020.

⁶¹ RAND Interview C3C1, December 2020.

⁶² RAND Interview C3C1, December 2020.

⁶³ RAND Interview C3C1, December 2020.

⁶⁴ RAND Interview C4B3, December 2020.

highly localized and country- and issue-specific expertise that requires experience and specialization to address. Importantly, the demand for depth and expertise to develop nuanced and case-specific assessments and engagements is challenged by senior policymakers' limited ability to commit time and attention to analysis, thus creating an inherent dilemma about analysis and its communication. Despite policymakers' desire for sophisticated analysis, many interviewees remarked that the U.S. government often struggles to develop—and then use—expert-driven, methodologically rigorous analysis for the reasons noted earlier.

Policymakers often lack depth and expertise in UGS, thus limiting their baseline understanding of problems. One interviewee referenced the Rumsfeld square—“known knowns, known unknowns, unknown knowns, and unknown unknowns”—to illustrate the complexity of developing decision-relevant information and matching analyses to needs.⁶⁵ UGS have high levels of “unknown unknowns,” thus frustrating analysts' attempts to build accurate models of the world. Complex problems present many elements that might or might not be relevant, which makes it difficult to scope or abstract models that capture the most-salient features of the situation.⁶⁶ Policymakers enter into UGS unsure of the nature of the problems they confront and thus might not be able to ask the right questions to guide research and analysis or place what knowledge they have in a larger strategic context.

Interpreting nuanced and highly localized information requires deep expertise. Interviewees noted that policymakers often lacked confidence that they, their organizations, and the broader NSE had the necessary expertise for solving policy problems in UGS. There was a sense that the community's “bench” on highly specialized issues was not sufficiently deep and that the lack of depth meant that analysis and advice were potentially biased.⁶⁷ One interviewee noted that, too often, the right people and expertise were not involved in the policy-making processes. They also observed that the government could improve its ability to reach outside traditional sources of expertise to involve diverse perspectives.⁶⁸ There are several government programs working to solve this outreach problem. For example, one interviewee argued that more could be done to exploit open-source intelligence collection networks on an enduring basis to bring critical information on UGS to policymakers, which would make engagement more effective.⁶⁹ They discussed IC outreach efforts, which would better integrate open-source intelligence from sources outside the IC, such as academia, nongovernmental organizations (NGOs), and industry.⁷⁰

⁶⁵ RAND Interview E7B1, November 2020.

⁶⁶ RAND Interview E1D6, August 2020.

⁶⁷ RAND Interview D6B0, December 2020.

⁶⁸ RAND Interview A5E7, December 2020.

⁶⁹ RAND Interview C3C1, December 2020.

⁷⁰ RAND Interview C3C1, December 2020.

Additionally, interviewees noted how issues and terminology within UGS are contested, leading to confusion over what is relevant for the problem at hand. For example, one interviewee noted how difficult it was to achieve agreement on a shared lexicon among policymakers:

DoD uses the term *irregular warfare*, and most of the community thinks this just means counterterrorism, but it also includes counter-state. *Gray zone* is used in the academic literature. *Competition* is a catch-all term that has become meaningless.⁷¹

Another analyst noted that in technical domains, such as space, the complexity of operations has proliferated as competitors have adapted to one another's capabilities and operations, introducing issues of organizational behavior, psychology, and strategic culture that have traditionally been excluded or only marginally considered in highly specialized studies.⁷² Thus, even when the physics of the environment was known, the human and organizational dimensions of competition became the dominant sources of uncertainty and complexity.

Finally, because analytical findings about UGS tend to be contextual, contingent, and qualitative, they are rarely quick to consume. For example, several interviewees pointed to the issue of information overload. After a certain point, excess information becomes a source of noise for policymakers. The ability to sift through data to find the correct information and make it both useful and digestible for policymakers gets more difficult as the amount of data increases.⁷³ While the solution to this issue might be to limit collection to relevant data, the definition of relevance itself shifts with policy priorities that depend on time and stakeholders. One interviewee noted that it was often rare that they had definitive evidence to make long-term policy decisions.⁷⁴ In the context of long-term competition, analysts do not know what questions policymakers will have, what information will be needed to answer them, and how to efficiently communicate insights when needed. "Standing out from [the] noise" is a key challenge.⁷⁵

Analysis of the Effectiveness of Engagement in UGS Is Ambiguous, Because Outcome Metrics Are Difficult to Define

Several interviewees noted that it was difficult to support policymakers when policy objectives were uncertain and shifting and when there was limited or no explicit mapping between actions and outcomes. They noted the importance of developing metrics for evaluating policy outcomes and rationalizing actions within a causal logic that could indicate whether actions

⁷¹ RAND Interview B6D1, September 2020.

⁷² RAND Interview A5A8, November 2020.

⁷³ RAND Interview C4D1, October 2020.

⁷⁴ RAND Interview E2D8, November 2020.

⁷⁵ RAND Interview C7C9, January 2021.

were producing expected and desired outcomes.⁷⁶ Metrics, in theory, enable policymakers to understand how well they are doing and what they can be doing better.⁷⁷ One interviewee noted that the problem of ambiguous outcomes was acute on such issues as cyber deterrence, where the objective of preventing conflict led to the belief that deterrence was failing whenever breaches and hacks were discovered, while a broader, cross-domain view suggested that the limiting of conflict to the cyber domain was a sign of successful deterrence and the management of conflict at the geopolitical level.⁷⁸

While the importance of metrics was emphasized, the fact that they rely on developing causal models of the system in question was seen a challenge for UGS. Suitable metrics require a clear understanding of a causal pathway, the development of certain measures to determine adherence to the identified causal pathway, and the data to populate the measures—all of which are difficult to identify, derive, and collect in UGS. Many interviewees expressed doubt as to the utility of these metrics in UGS. As one interviewee noted, “[p]olicymakers have no ability to understand how their investments yield strategic results—spending a dollar on Estonia is simply assumed to be a dollar spent deterring Russia.”⁷⁹ Another interviewee noted how difficult it was to measure nebulous concepts in the international system. For example, despite years of experience in the space domain, it was still unclear what outcome metrics would demonstrate the policy choices that would lead to resilient space capabilities.⁸⁰

A related but distinct issue has to do with the difficulty of measuring a particular strategy’s effectiveness when the outcome of the decision cannot be observed. As one interviewee noted, “How do I develop a measure that shows that I reduced strategic surprise? Outcomes that are truly hard to measure present their own set of challenges.”⁸¹ These perspectives point to a similar conclusion about using outcome metrics in UGS: Policymakers have little way of knowing whether outcomes happen as a result of actions they have taken. More fundamentally, though, policymakers do not know whether the metrics measure outcomes that are in their long-term interests or what they believe their interests are in the moment.⁸²

The Complexity of UGS Often Requires Broad Exploration and Multistep Analysis

Interviewees we spoke with repeatedly emphasized the idea that “exploration” was critical to organizational and policy adaptation. A policymaking process needs to be designed so that it can maintain the search for new models, frames, and assessment criteria to improve

⁷⁶ RAND Interview D4A2, November 2020; RAND Interview D7A7, November 2020.

⁷⁷ RAND Interview D0E6, November 2020.

⁷⁸ RAND Interview C2C2, January 2021.

⁷⁹ RAND Interview B6D1, September 2020.

⁸⁰ RAND Interview A5A8, November 2020.

⁸¹ RAND Interview D4A2, November 2020.

⁸² RAND Interview D4C1, December 2020.

and adapt, while at the same time building in pathways for new information to enter future decisions. Interviewees noted that the biggest uncertainty for policymakers is often the definition of the problem itself. Policymakers' initial framing of the problem is almost guaranteed to be wrong, but organizational decisionmaking seeks solutions and action quickly. Thus, the challenge is to find the fastest way to get to better formulations and models. Tools and approaches that can help speed up the process through which policymakers explore and work through alternative formulations are valuable.⁸³ One interviewee summed up the need for exploration succinctly:

If we agree that the system is legitimately complex, the likelihood that we are framing the problem correctly is low. Anything that can be done to scale insights and the speed of those insights—from open-source development, to rapid multiple competing framings, to teaming—will be a critical area of investment.⁸⁴

Throughout our interviews, one potentially helpful method in this area that was repeatedly mentioned was gaming. Many of the interviewees argued that gaming provides a catalyst for analyzing difficult issues and understanding how various stakeholders will react to challenges in UGS.⁸⁵ Games can also highlight where and how it would be strategic to act in UGS.⁸⁶ Gaming at the senior leader level was identified as being particularly useful, because games can reveal how DoD leaders unconsciously frame problems. A challenge of gaming at senior levels is the resistance that some leaders have to letting games show them things they do not know. Many interviewees had suggestions for how to make gaming more tailored to UGS. For example, because UGS have constant changes in the political and military atmosphere, one interviewee suggested that games be used less for optimization and more for “robust alternative discovery.”⁸⁷

The importance of generating a diverse array of hypotheses throughout the policymaking process was another key theme. For example, when asked how they would characterize the role of technology in understanding long-term adaptation and competition, one interviewee replied: “Rapid access to a diversity of hypotheses.”⁸⁸ Another interviewee noted that generating hypotheses “in a way that is different but not random” was a key area of analytical and decision support for UGS because having a principled way to explore high-

⁸³ RAND Interview D4C1, December 2020.

⁸⁴ RAND Interview D4C1, December 2020.

⁸⁵ RAND Interview D3A4, November 2020; RAND Interview D1A1, October 2020; RAND Interview G9R7, September 2020; RAND Interview B6D1, September 2020.

⁸⁶ RAND Interview B6D1, September 2020.

⁸⁷ RAND Interview D1A1, October 2020.

⁸⁸ RAND Interview D4C1, December 2020.

dimensional spaces is needed to move in productive ways that are more likely to help policymakers improve and learn.⁸⁹

One important caveat that interviewees provided is that tools for exploration that might help organizations be more adaptive might compete with other organizational resources. As one interviewee noted, “There is no such thing as free lunch. Every dollar spent trying to implement a model is a dollar less for [the organization’s mission].”⁹⁰

Many interviewees noted that analysis is valued when it helps policymakers understand uncertainties and identify risks. Analytical paradigms and tools that emphasize robustness and discovery rather than optimization are most useful.⁹¹ Analysis, therefore, should be seen as evolutionary, or something that changes over time. For example, analysis should not invest too much in details early in the process when uncertainty is high and the features of the problem are unknown. Analytical models, data, and frames should change with time; errors result from pushing these tools beyond their capabilities.⁹²

The role of models in supporting analysis should be regarded as variable and dynamic. One interviewee noted that early in an engagement on a new problem, when little is known, analysis should be viewed as exploratory, broad, and unable to support detailed or long-term planning. The effort should be on getting a broad understanding of goals, information requirements, and options for actions. Together, these insights provide organizations with a capability for learning that enables models and interventions to become increasingly tailored, eventually allowing modeling and analysis to sit atop a stronger foundation of knowledge, expertise, and experience. One interviewee discussed this learning process in the context of the coronavirus disease 2019 (COVID-19) pandemic by noting that early in the pandemic, little was known about the virus’s spread and treatment. Making long-term policy was not possible, and efforts to apply models that were available at the time using the accessible data would not have provided a credible basis for long-term policy. Under those conditions, the best strategy was to start with broad policies updated frequently and then make increasingly differentiated policies based on local conditions as models and data matured.⁹³

Finally, as policymakers use models to develop and search for solutions to complex problems—design challenges—testing each model-derived and -generated solution becomes infeasible. Instead, interviewees noted that experimental resources should be employed to validate the models at multiple points around the design space so that policymakers have a better understanding of the reliability and valid use of model-generated solutions.⁹⁴

⁸⁹ RAND Interview E7B1, December 2020; RAND Interview D7A7, November 2020.

⁹⁰ RAND Interview D4A2, November 2020.

⁹¹ RAND Interview D3A8, October 2020.

⁹² RAND Interview E2D8, November 2020.

⁹³ RAND Interview E2D8, November 2020.

⁹⁴ RAND Interview B1A8, December 2020.

The Presentation of Information to Policymakers Is as Important as the Information Itself

Policymakers and technologists agreed on the importance of information presentation in moving policymakers toward collective action. Visualization and simplicity are keys to communication because they provide ways to reduce complex information so that it can be consumed and applied.⁹⁵ Interviewees emphasized that information should be made visual and should tell a story to be most effective. One interviewee noted,

Visual analytics are crucial for communication. How can you put together ideas in a cognitively appealing way that would make a principal want to take credit and put them in [the] deck?⁹⁶

This interviewee noted the importance of minimizing the use of numbers: “Do not present numbers—present stories. Presenting a number outside what it really means is focusing on the wrong thing for decisionmakers.”⁹⁷

Another interviewee similarly noted that visualization is a powerful tool to help policymakers gain insight into the complexity of a situation or space. This official described how the IC had made inroads into using data visualization during the campaign to counter the Islamic State of Iraq and Syria (ISIS):

We kept getting the same questions, so we tried to create a visualization tool that was available to policymakers in real time. . . . We visualized Syrian opposition groups, their location on the ideological spectrum, and their effectiveness. We also visualized in real time areas of ISIS control. This was a powerful tool to show policymakers not just what was happening, but why.⁹⁸

Priority Investments for Engaging in UGS

Throughout the interview process, participants identified areas of investment that could provide high-impact capabilities for supporting engagement in UGS and facilitating increases in the adaptive capabilities of DoD and the NSE. It is important to note that there are likely some UGS that will always lie outside policymakers’ control, regardless of investments in social science, models, technology, and better bureaucratic processes, because of structural factors, such as geography or lack of attention and resources. Nevertheless, these structural constraints might not be absolute. Thus, this final section highlights prescriptions for broad areas of investment in the domains of bureaucratic practice, data, and analysis.

⁹⁵ RAND Interview C7C9, January 2021.

⁹⁶ RAND Interview D4C1, December 2020.

⁹⁷ RAND Interview D4C1, December 2020.

⁹⁸ RAND Interview C4D1, October 2020.

Investments in U.S. Bureaucracy and Business Practices

Explore Organizational Incentives and Practices to Increase Investments and Rigor in Research and Development

DoD could be a model for both experimenting and promoting new research and development practices. As the federal government's largest spender, DoD is in a unique position to set practices for the rest of the government and incentivize different behaviors. Through adjustments in its own contracting and bureaucratic practices, DoD could play a role in driving how companies think, invest, and spend their money in ways that increase innovation and national competitiveness.⁹⁹

Invest in Making Policymaking More Experimental

Investments of this type can involve (1) collecting baseline conditions that reflect patterns of life in specific areas of interest where potential future interventions might seek to influence, (2) collecting base rates of events and features at site-specific and global levels to differentiate between normal and unusual observations and behaviors, and (3) building logic models or other causal representations that map actions and expectations that allow interventions into a system to be compared with indicators of stability and change.¹⁰⁰ Investments in such tools as gaming and such models and forums as Track II negotiations—unofficial, informal interactions between nongovernmental actors—that provide a sandbox to test implementation might also serve a useful role in promoting a more experimental approach.¹⁰¹

Invest in Multi-Stakeholder Engagements

Investments that bring together stakeholders working on UGS from inside and outside the U.S. government, including academia and NGOs, could help the government better understand and adapt its policies in UGS. These engagements can consist of such settings as Track II negotiations and more-analytical settings, such as games and workshops.

Invest in Tools to Remove Barriers to Inter-Agency Coordination

Tools for fusing information across security levels might help to increase collaborative decisionmaking by mitigating barriers caused by the level of secrecy and compartmentalization associated with some UGS areas, such as space, cyber, or special operations. Algorithms could look for common entities or data values in different agencies' systems at different levels and then alert analysts when a match is found. Automating data discovery and characterization in this way, when combined with appropriate inter-agency data governance capabilities, could help create a structure where machines can share information in ways that humans

⁹⁹ RAND Interview D1E1, November 2020.

¹⁰⁰ RAND Interview D4A2, November 2020; RAND Interview D7A7, November 2020; RAND Interview B4D0, July 2020.

¹⁰¹ RAND Interview E1C7, December 2020.

cannot, thus preserving organizational practices but enabling the sharing of information when inter-agency coordination is needed.

Investments in Analytical Tools and Techniques

Invest in Tools for Exploring Large Decision Spaces

Tools and approaches that can help to speed up the process through which policymakers explore and work through alternative formulations of policy problems are valuable. These tools should promote diversity of thinking and speed up the process of cycling through hypotheses. Tools that can scale insights and the speed of those insights—from open-source development to rapid, multiple, competing framings to teaming—are a critical area of investment.

Invest in Modeling to Understand the Long-Term Implications of Decisions

Models that can help leaders understand the long-term implications of their decisions are another area of investment.¹⁰² After the initial exploratory effort, empirical data collection and testing (including specialized data gathering and historical back testing) enable models and interventions to become increasingly tailored, eventually allowing modeling and analysis to sit atop a stronger foundation of knowledge, expertise, and experience; this foundation aids leaders as they consider long-term consequences.¹⁰³ To understand different potential implications and results of stakeholder choices, decision trees could be particularly useful.¹⁰⁴ Real options, which help policymakers keep options open to allow for future decisions by placing a quantitative value on the benefits of maintaining and keeping multiple designs, might also help.¹⁰⁵

Invest in Modeling Human Dynamics and Relationships

Models that accurately portray the volatility of the human dynamics of UGS are also a critical area of investment. When predicting certain groups or actors' reactions to U.S. policy decisions and actions, it is important to understand how the people that occupy UGS will engage or react. The nuanced views of human behavior, interactions, and relationships can affect how these groups of interest will react to policymaker decisions in UGS.¹⁰⁶ One way to develop this understanding is to leverage data from social media, which presents large sets of data that are rich for analysis.¹⁰⁷

¹⁰² RAND Interview D3A4, November 2020.

¹⁰³ RAND Interview B4D0, July 2020.

¹⁰⁴ RAND Interview D3A4, November 2020.

¹⁰⁵ RAND Interview D1E1, November 2020.

¹⁰⁶ RAND Interview E9A4, December 2020.

¹⁰⁷ RAND Interview E9A4, December 2020.

Invest in Modeling Real-World Limitations and Constraints

Aligning models with the tools and capabilities that policymakers have is important. While it is common practice to match models to the system being represented, a critical feature of achieving policy-relevant analysis is to also ensure that simulated interventions could be mapped to real-world constraints on policymakers.¹⁰⁸ These constraints might involve both limits on resources (such as time, information, budgets, and expertise) and organizational factors (such as authorities and coordination processes). Absent these considerations, models might identify theoretically interesting but impractical, immoral, and even illegal strategies.¹⁰⁹ While research investments have been made in model validation strategies for simulating complex systems (e.g., financial markets), investments in capabilities that can search across the space of viable interventions in ways that are both computationally efficient and organizationally and operationally plausible might be worth pursuing.

Invest in Models to Evaluate and Consider Risk in Policymaking

Interviewees identified the importance of tools that could aid policymaking in conditions with complicated levels of uncertainty and risk. Among the specific tools discussed were Robust Decision Making tools to identify strategies for regret minimization and real options for identifying the value of preserving flexibility and delaying choices that will lock out future flexibility.

Invest in Cognitive Architectures of Agent Policymaking

Interviewees noted that computational agents play a significant role in modeling the behavior of complex systems, most visibly in ABM. While the policymaking architectures of software agents have advanced, the overwhelming majority of those used in advanced modeling and simulation applications remain grounded in probabilistic logic and the Kolmogorov axioms of probability.¹¹⁰ While these models allow for internal mathematical validity, it is difficult to align them with real-world deviations from rationality that are both experimentally observed and important to many theories of social behavior. Investments in formal, computationally efficient policymaking architectures for individual and collective behavior might enable new approaches to modeling the social behaviors of actors within UGS and assist in the discovery and assessment of alternative engagement approaches that rely on more-realistic treatments of information consumption and social interaction.

¹⁰⁸ RAND Interview D3A4, November 2020.

¹⁰⁹ RAND Interview B4D0, July 2020.

¹¹⁰ RAND Interview D7A7, November 2020.

Concluding Thoughts

Discussions with interviewees summarized in this chapter reveal several important and challenging insights about decisionmaking and action within UGS. First, while there is no clear, emergent definition as to what an undergoverned space is and, therefore, no singular way to assert which national interests are put at risk by the presence of UGS, interviewees repeatedly identified approaches that they regarded as necessary for successful engagement. Clear examples of potentially beneficial investments to help guide engagement emerged from our interviews, but no singular method can be applied to all UGS.

Second, the United States needs to clearly understand its own interests and willingness to commit time, attention, and resources—both military and nonmilitary—to engage in UGS.

Third, policymakers should be realistic in their assessments about the structure of the situation and the opportunities to change or otherwise live with circumstances that might be less than ideal. Prior positions of power, status, and influence might evoke desires or reverse unwanted trends, but policymakers must be focused on future possibilities and not anchored on the past.

Fourth, analytical needs are varied and feature two opposing requirements. One requirement is deep expertise, nuance, and attention to the details of specific circumstances, often necessitating long time lines to develop. The other requirement is to produce information that nonexpert policymakers can consume with limited time and attention, often under crisis conditions. The result is a trade space with two poles: On one end is sophisticated analysis that incorporates a broad variety of qualitative and quantitative information and expertise to expose the dynamics of systems and their responses to interventions. On the other is breadth-first analysis that quickly identifies risks and opportunities, allowing policymakers to manage complex challenges by informing their choices at the speed of relevance.

Finally, within this mix, analysis of all types must consider the likelihood of the information being consumed by multiple stakeholders engaged in organizational and bureaucratic processes. Without attention to the circumstances within which policymakers reside, the most sophisticated information collection and analysis—the *Sense* stage of the ASDA cycle—cannot connect to the *Decide* stage, thus leaving the final and necessary *Adapt* stage beyond reach.

Appendix: Interviewees and Interview Protocols

Interviewees

We interviewed the following people:

- Phil Anton, RAND Corporation
- Sina Beaghley, RAND Corporation
- Irv Blickstein, RAND Corporation
- Marjory S. Blumenthal, RAND Corporation

- Eric Bonabeau, Telepathy Labs
- Leonard Braverman, Army Science Board
- Jason Campbell, RAND Corporation
- Joseph Eash III, U.S. Department of Defense (Retired)
- Bernard Finel, National War College
- Steven Flanagan, RAND Corporation
- Samantha Golden, National Intelligence University
- John Hanley, United States Naval War College
- Hunter Heyck, Oklahoma State University
- Quentin Hodgson, RAND Corporation
- Timothy Hoyt, United States Naval War College
- Kimberly Jackson, RAND Corporation
- Joshua Kerbel, National Intelligence University
- Yool Kim, RAND Corporation
- Matthew Koehler, MITRE Corporation
- Natasha Lander, RAND Corporation
- Eric Landree, RAND Corporation
- Jon R. Lindsay, University of Toronto
- Joseph N. Mait, Army Research Laboratory (Retired)
- Michael Mazarr, RAND Corporation
- H. Van Dyke Parunak, Parallax Advanced Research
- Christopher G. Pernin, RAND Corporation
- Thomas Pike, National Intelligence University
- Patrick M. Reed, Cornell University
- Eric Robinson, RAND Corporation
- Adam Russell, Applied Research Laboratory for Intelligence and Security, University of Maryland
- Thomas M. Sanderson, Tom Sanderson Consulting, LLC; Center for Strategic and International Studies Transnational Threats Project (Former)
- Richard Silbergliitt, RAND Corporation
- John Sullivan, Safe Communities Institute, University of Southern California
- Danielle Tarraf, RAND Corporation
- Abbie Tingstad, RAND Corporation
- Brian Tivnan, MITRE Corporation
- J. D. Williams, RAND Corporation

Interview Protocol for Policymakers

1. Can you tell us about your background? In what capacity have you supported policymakers? What kinds of problems were you working on? What kinds of decisions and choices were you involved in, and in what kinds of environments (individual decisionmaker, multi-stakeholder group in the interagency, etc.)?
2. In your view, how do problems of long-term competition and undergoverned spaces present decisionmakers and organizations with distinct challenges when compared with preparing for and executing kinetic military operations?
3. In your experience, in what contexts do decisionmakers primarily rely on their instincts and expertise versus more analytical processes? When do they, and when should they, seek to challenge their beliefs?
4. In your experience, how do policymakers' expectations about analysis differ under different circumstances? How do analytic products and processes assist, or hinder, the ability of organizations and stakeholders to reach a shared perspective or better understand sources of their disagreements regarding situational assessments, risks, actions, and outcomes?
5. What analytical approaches or tools might help policymakers develop adaptive policies for long-term competition? What could help policymakers be more flexible in their decisions?
6. Are there particular analytic tools and/or processes that were helpful to you in the past? What types of decisions did you use it for? Are there any that have been unhelpful? If so, how? What is the bar for being useful? What is it about the problems, or the technology, that lead you to think that?
7. What analysis and information would make it easier for decisionmakers to reconsider their choices and commitments? What increases their confidence that they are making wise decisions?
8. Oftentimes, analysis can be overlooked or difficult to sort through due to the volume of information available. What format or context would be most helpful in presenting/communicating information to policymakers so that it can be easier and simpler to understand?
9. What are the major pros and cons of policymakers using their instincts to make decisions versus making a "data driven decision"?
10. Is there anything we should have asked you that we didn't?

Interview Protocol for Technologists

11. How might technologies assist decisionmakers and organizations to understand long-term competition and be adaptive to changing and unforeseen circumstances?
12. Is there a difference in technologies that would assist in the discovery of preferences and goals, vs. those that help optimize the allocation of resources?

13. What would be the best way to organize, manage, and resource research and development programs when target technical applications are changing or unknown?
14. Are there particularly promising emerging approaches to understanding uncertainty in open systems? Are there measures of effectiveness associated with these approaches that could determine if their employment in real-world systems was producing desired results?
15. Conversely, are there popular approaches that decisionmakers should be skeptical about applying? Are there demonstrations of their limitations?
16. What recommendations would you offer decisionmakers to discern between understanding when technologies are good versus when they are less reliable?
17. As a technologist, have you had any experiences where communicating the usefulness of analytic tools is challenging? What was challenging in particular? Were you able to overcome that challenge? If so, how?
18. Is there anything we should have asked you that we didn't?

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Abbreviations

ABM	Agent-Based Modeling
ASDA	Act-Sense-Decide-Adapt
DoD	U.S. Department of Defense
DoS	U.S. Department of State
IC	Intelligence Community
ISIS	Islamic State of Iraq and Syria
NGO	nongovernmental organization
NSE	National Security Enterprise
SOF	special operations forces
UGS	undergoverned spaces

References

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