U.S. Marines and Georgian soldiers exit USMC MV-22 Osprey tiltrotor aircraft during operation in Helmand Province (DOD/Ashley E. Santy)

Improving DOD Adaptability and Capability to Survive Black Swan Events

By William R. Burns and Drew Miller

Professor of risk engineering at New York Polytechnic University Nassim Taleb wrote persuasively about the need to prepare for catastrophes in his seminal work on risk management, *The Black Swan: The Impact of the Highly Improbable*.[1] A black swan event is an outlier, something outside the realm of regular expectations, where nothing in the past can convincingly point to the real possibility that it will occur or persuade us we need to prepare for its potentially dire consequences. But it is not an unpredictable event. Most major black swan events (the 9/11 attacks, for example) are foreseen and warned about, but the warnings tend to be ignored because of strong personal and organizational resistance to changing opinions and outlook. Many experts describe future threats such as bioengineered viral

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pandemics as "inevitable," yet they cannot predict their likelihood, and gaining attention (let alone mitigation) for these coming disasters is therefore extremely difficult.

The black swan provides insights into our tendency to avoid thinking about and preparing for rare but potentially catastrophic events. Taleb makes the case that we are physically and psychologically programmed to make common misjudgments. His key point is critical for the Department of Defense (DOD): Do not try to *predict* the likelihood of a disaster, but *prepare* for the impact. The most important thing DOD can do to prepare for inherent unknowns and new technologies capable of producing catastrophic effects is to enhance individual and organizational adaptability and procure more flexible, diverse weapons systems operated by more adaptable personnel.

Tasked by DOD to identify changes to training that would produce a military better prepared to respond to asymmetric threats, Institute for Defense Analyses (IDA) researchers postulated that given the uncertainty of future threats, the key skill or attribute that individuals, units, and teams of commanders and leaders need to improve on is adaptability.[2] IDA defines *adaptability* as the capacity to bring about an effective response to an altered situation, a metaskill that requires the integration of both cognitive and relational skills. To be adaptive, leaders at all levels, and particularly senior leaders, need to apply well-developed skills of critical and creative thinking, intuition (pattern recognition), self-awareness and self-regulation, and a variety of social skills in varying combinations and across a wide range of situations.[3]

This article offers eight recommendations on how to make DOD more adaptable and capable of deterring, countering, or recovering from black swan events.

Stop Using the Traditional Risk Matrix

The idea that we cannot predict when and where the military will have to respond has broad acceptance. A 2012 National Research Council report stated that "the U.S. is not very good at predicting threats of any kind."[4] Former Secretary of Defense Robert Gates noted, "Our record of predicting where we will use military force since Vietnam is perfect—we have never once gotten it right. . . . We need to have in mind the greatest possible flexibility and versatility for the broadest range of conflict."[5]

Since black swans are "unpredictable," Taleb states, "we need to adjust to their existence (rather than naively try to predict them)."[6] We should operate on the assumption that they will eventually occur and position ourselves to survive them. This view calls for rejecting the traditional two-axes risk matrix with consequence of event on one axis and probability of occurrence on the other. Defining *critical risks* the organization should deal with as those with high consequences and high likelihood of occurrence means ignoring black swans and remaining unprepared to survive the consequences when they occur.

Nick Bostrom, director of the Future of Humanity Institute at Oxford University, also argues against the common practice of assigning low probabilities to or ignoring unpredictable, has-never-happened-before threats:

Although more rigorous methods are to be preferred whenever they are available and applicable, it would be misplaced scientism to confine attention to those risks that are amenable to hard approaches. Such a strategy would lead to many risks being ignored, including many of the largest risks confronting humanity. It would also create a false dichotomy between two types of risks—the "scientific" ones and the "speculative" ones—where, in reality, there is a continuum of analytic tractability.[7]

Dr. Bostrom argues that when we consider the many potential sources of existential, black swan risks, there is substantial likelihood of some great disaster:

The balance of evidence is such that it would appear unreasonable not to assign a substantial probability to the hypothesis that an existential disaster will do us in. My subjective opinion is that setting this probability lower than 25% would be misguided, and the best estimate may be considerably higher. . . . The reactive approach—see what happens, limit damages, and learn from experience—is unworkable. Rather, we must take a proactive approach. This requires foresight to anticipate new types of threats and a willingness to take decisive preventive action and to bear the costs (moral and economic) of such actions.[8]

U.S. conventional force technological superiority almost demands that a determined opponent use an asymmetric attack such as weapons of mass destruction (WMD) or terrorism either to defeat our forces or to inflict losses that lead to loss of popular support for the campaign. Intelligent, determined adversaries will make their decision based on their calculation of costs and benefits influenced by our relative vulnerability.[9]

We maintain robust nuclear forces not because we estimate enemy use of nuclear weapons is likely, but because the consequences of not being well prepared could be disastrous. We cannot predict the likelihood of WMD attacks and should not try. It would be wiser to assume that an intelligent and determined adversary, aware of our vulnerabilities, would act to exploit them. We need the capability to deter, defeat, and recover from the worst threats.

Given unpredictable aspects of WMD and new technology risks, DOD would be better off focusing on consequences rather than deluding itself into thinking it could reasonably estimate likelihood of occurrence. If an organization refuses to abandon the standard risk matrix, then change the definition of critical risk so low-probability threats qualify as critical risk. Taleb points out that, "There are so many things we can do if we focus on anti-knowledge, or what we do not know."[10] While generally contrary to DOD culture of preventing attack, for many threats we need to prepare for disaster recovery: "It is much easier to deal with the Black Swan problem if we focus on robustness to errors rather than improving predictions."[11]

Encourage Critical Thinking

While IDA was tasked to develop an adaptability training strategy, its researchers found that adaptability was a function of not only training, but also education and experience. Education and training are part of a continuous process of learning, the robustness of which is dependent on real-world experience. In the classroom, regardless of the subject, the most important thing the student learns is to think critically—an essential skill for adaptive performance. Critical thinking takes hard work to develop and constant practice to maintain. Derek Bok, former president of Harvard University, observed, "Many [graduates] cannot reason clearly or perform competently in analyzing complex, non-technical problems, even though faculties rank critical thinking as the primary goal of an education."[12] Lieutenant General Sir John Kiszely, former director of the Defence Academy of the United Kingdom, recognizes the long-term value of education in developing adaptive leaders:

It is important to recognize the purpose of this education. Its purpose is not the purist one of the pursuit of knowledge for its own sake, but of developing capacity for good judgment. Such education, therefore, has a training dimension in that it is preparing practitioners to exercise good judgment in their profession, but not just in their next job or deployment, but over the duration of their career.[13]

A superficial understanding of the security environment and a simplistic view of history and culture are an invitation to bad judgments. The alternative is continuous learning, an ever-broadening perspective, and the practice of critical thinking, which allows students to question their own thinking and that of others.

DOD leadership should ensure that the development and practice of critical thinking is a priority of the military academies, the Naval Postgraduate School, command and staff schools, and war colleges. Books such as *Thinking in Time* that teach critical thinking and challenging assumptions and false analogies, brainstorming, and adaptive planning techniques should be a key part of officer education.[14] Nuclear strategist Victor Utgoff suggests that DOD should brainstorm black swan threats and then assign them as critical and creative thinking exercises to National Defense University classes, charging students and faculty to figure out how we could deal with them.[15]

Encourage and Promote Innovation and Adaptation

Probably the best adaptive capability we have in the U.S. military is the ability of Soldiers and young officers to adapt in battle. Special Forces on horseback in Afghanistan and Servicemembers in Iraq performing duties they had never been trained for—improvising to deal with bad situations—are case studies in bold, successful adaptation. As a particularly decisive example, when al Qaeda in Iraq took actions that led many Sunni insurgent allies to break with them, Army and Marine officers quickly adapted, moving to assist and work with insurgents they had just been fighting. Cooperatively, they promoted the Anbar Awakening and its expansion across Iraq. It is likely that future studies of the Iraq campaign will conclude that this movement was at least as important as the surge in U.S. forces.[16]

Many have suggested that adaptability in the lower ranks was not matched by similar adaptability in the strategic thinking and campaign planning of senior leaders.[17] The challenge, therefore, is to continue promoting adaptability on the battlefield while moving both the more adaptable individuals and the more adaptive thinking from the tactical level into the realm of operational and strategic planning, including efforts to deal with black swan events.

U.S. troops in the field are so good at adaptation because they are freed from many of the bureaucratic constraints that are constant in a headquarters. That bureaucracy is also what drives many bright young officers from the military. A 2011 Harvard study, which surveyed nearly 250 former junior officers who left the military between 2001 and 2010, revealed that the second most frequently reported reason was frustration with military bureaucracy.[18]

In 2004, Leonard Wong of the U.S. Army War College warned that the "Army must now acknowledge and encourage this newly developed adaptability in our junior officers or risk stifling the innovation critically needed in the Army's future leaders."[19] Six years later, William Deresiewicz, a Yale professor in a widely publicized lecture at West Point, urged cadets to fight bureaucratic conformity by thinking both critically and independently, challenging routines, and taking risks.[20] David Chu, former head of the top DOD personnel management office, suggested that talented and adaptive young officers could be retained and groomed for more senior leadership positions by not tying them to routine staff jobs that are a complete letdown from their combat tours. He pointed out that with the drawdown in Afghanistan, more officers would become available for nontraditional assignments that will allow them to advance their educations and expand their perspectives. He contends that those officers are much more apt to grow as leaders and be retained by the military if they are given the opportunity to influence their career paths and are not penalized for time away from traditional jobs.[21]

In 2007 the Army moved in a unique way to overcome its inability to promote talented but unconventional thinkers. Secretary Gates had directly challenged Army promotion practices when he called for "reexamining assignments and promotion policies that in many cases are unchanged since the Cold War."[22] Secretary of the Army Pete Geren called General David Petraeus, recognized as an unconventional thinker, "back from Iraq to Washington to lead a promotion board [fiscal year 2008 board] to pick the Army's new class of brigadier generals—an unprecedented assignment for a theater commander in the midst of a war."[23] Ultimately, the board selected several unconventional thinking colonels, officers who had previously been passed

USS *New Jersey* fires salvo from 16-inch guns during early 1984 deployment off coast of Lebanon (U.S. Navy/Ron Garrison)

over, for brigadier general. Many were watching for Colonel H.R. McMaster, USA, whose book *Dereliction of Duty* was an indictment of military leadership during the Vietnam War. McMaster was a brilliant officer who did not follow the "normal" career path to general, and he had been passed over before. McMaster was promoted and now serves as commanding general of the U.S. Army Maneuver Center of Excellence.

Civilian leaders need to ensure that those chosen to sit on selection boards and the precepts given to these boards contribute to promoting military leaders who are most capable of adapting to a rapidly changing environment and dealing with low probability but highly consequential events.

Continue to Improve Planning

General Dwight Eisenhower wrote, "Plans are worthless; planning is everything."[24] When black swan disasters hit, if we have anticipated them and conducted diverse "what if?" planning, we will be better prepared to act. DOD switched to adaptive planning in the 1990s. Paul Davis, an architect of those changes, judges that the shift has been largely successful.[25] By looking at a wide range of scenarios and a lot of "what if?" analyses of different enemy actions and capability options the United States could deploy, analysts, operators, and decisionmakers can devise a more flexible and capable force. Davis believes that most black swan events can be anticipated "but not which ones will actually occur."[26]

The Office of the Secretary of Defense (OSD) planning scenario process and shift to improving broad capabilities versus a force structure focused on one specific threat scenario (such as the Soviet invasion of Western Europe) has improved readiness to adapt. The Defense Department does consider some low probability events, but the scenario set should continue to broaden to include more black swan disasters such as electromagnetic pulse (EMP) attacks, bioengineered viral pandemics, and overwhelming homeland defense and recovery scenarios. OSD scenarios are limited by not only what is considered plausible, but also what can be funded. A larger and more challenging set of OSD scenarios is needed in a process that promotes adaptability despite budget constraints. IDA developed the Integrated Risk Assessment and Management Methodology to encourage evaluators to bring up all kinds of scenarios.[27] This structured approach to interviewing, discussing, and evaluating senior subject matter expert assessments permits the experts to assess risks as high as they want, unbounded by the

simple multiplication of probability and consequences.

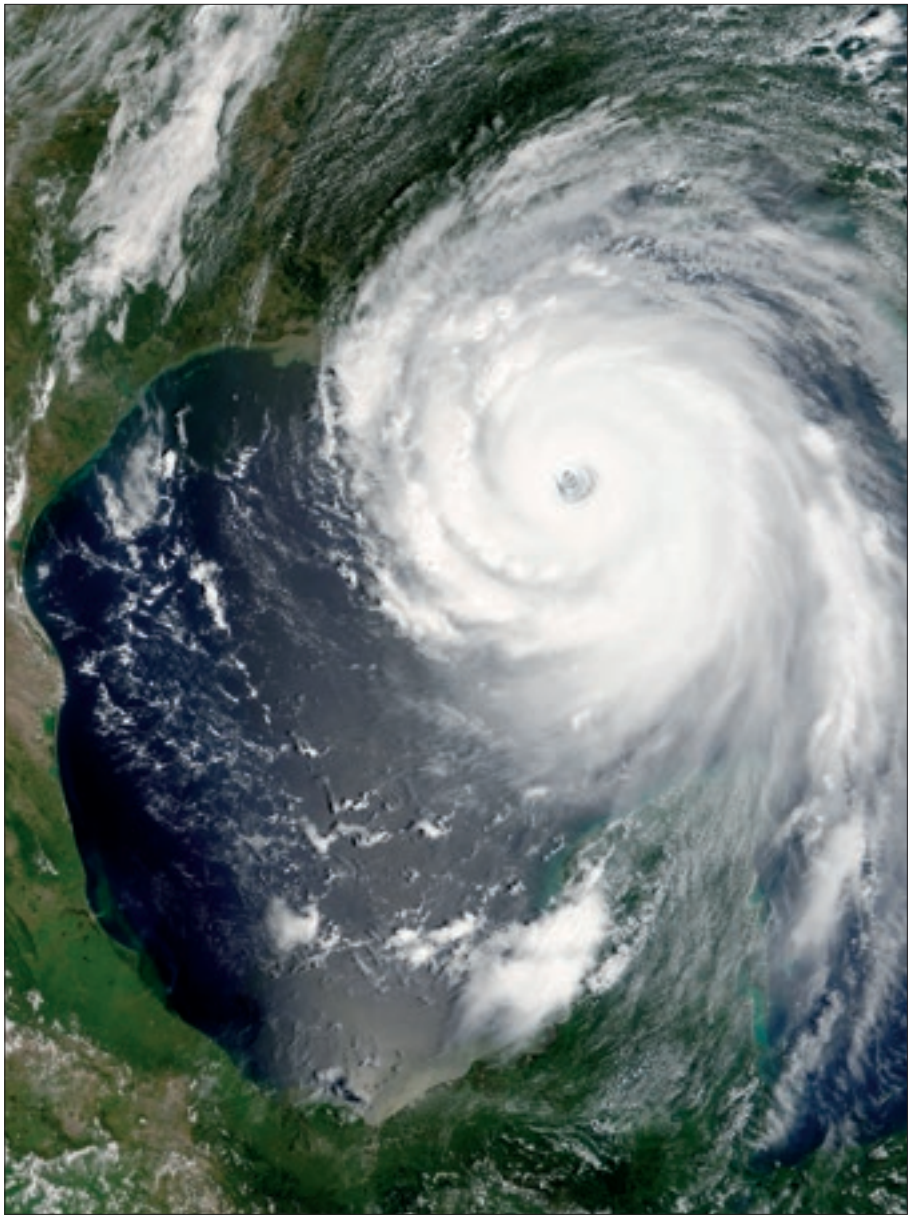
Army Colonels Kevin Benson and Steven Rotkoff call for more red teaming to improve planning: "the Red Team envisions the worst-case future. They describe the nightmare scenario in detail . . . then examine the plan to see how well it heads off the events that would lead to failure. Invariably, this leads the staff to see things it otherwise would not."[28]

Davis cautions that while the adaptive planning process has improved and young military officers are good at it, "they can get those traits beaten out of them by working in a bureaucratic headquarters."[29] This is another reason for the recommendation offered later to adapt DOD culture to promote questioning and challenging.

Promote "FARness"

Davis's key recommendation for improving DOD resource management is to emphasize "FARness"—that is, flexibility, adaptiveness, and robustness.[30] This is not the norm for acquisition programs. We have historically focused on specific threats or capability needs and chosen the single most capable (and usually most expensive) system to address the threat. Taleb's recommendations for improving adaptability and the capability to recover from black swan disasters are applicable: "Avoid optimization; learn to love redundancy. . . . Overspecialization also is not a great idea. . . . Above all, learn to avoid 'tunneling'—the last thing you need to do when you deal with uncertainty is to 'focus,' this focus makes you a sucker. . . . Compensate complexity with simplicity."[31]

Perhaps DOD should not pick the one item that appears the most capable but instead pick the top three or a combination with a broader range of capabilities, yielding a more flexible, robust force. A balanced, resilient force needs large numbers of simple, diverse systems to handle all contingencies. Low-cost systems procured in large numbers may not be optimal for meeting specific known requirements, but they may be lifesaving to preempt or recover from black swan disasters. Recall, too, that "known requirements" often assume the ability to predict the future accurately, a skill rarely demonstrated.



Hurricane Katrina at peak strength on August 28, 2005 (NASA/Jeff Schmaltz)

Many have warned that a high-altitude EMP attack could severely damage our high-tech conventional military capability. Cyber attacks, viral pandemics, and other disasters that shut down our just-in-time delivery-dependent economy might cause cascading effects that dwarf initial damage and casualties. Black swan risks and adaptability argue for having some basic systems in the inventory that would enable us to operate without the Internet, overnight deliveries, or staff who refuse to come to work to avoid a virus.

Demand Accountability

Adaptability requires responding to change, but in an effective manner. Leaders should be rewarded for adaptive performance and held accountable when they prove unable to adapt.[32] In *The Generals*, Thomas Ricks argued that "accountability is the engine that drives adaptability"[33] and took the Army to task for failing to hold its leaders accountable since World War II. He demonstrated how a system that

has not held leaders accountable has produced leaders who in many cases failed to adapt to the changing environment in which they operated, resulting in costly failures. Not holding leaders accountable has removed a major incentive for leaders to adapt. Promotions keep on coming even as a lack of understanding of the operational environment and adherence to outdated strategies lead to unnecessary expenditures and tragic loss of lives.

The military can improve its adaptive performance and better prepare for a black swan event if it takes the idea of accountability seriously. Senior leaders should be evaluated on their success or failure at meeting the goals and milestones they have established.[34] Their retention or relief should be dependent on hard-nosed evaluations. Holding senior leaders accountable in this manner would also influence talented younger officers to continue their service. Aggressive and forward-thinking young officers want to be part of an effective organization. The frustration of working under ineffective leaders who are unable to adapt was borne out in Paul Yingling's widely read article from 2007: "America's generals have failed to prepare our armed forces for war and advise civilian authorities on the application of force to achieve the aims of policy. . . . America's generals failed to adapt to the demands of counterinsurgency."[35] The symbiotic effect between seniors held accountable and imaginative junior leaders would, over time, produce a more adaptable military that is better prepared to deal with the constant challenge of a changing security environment and black swan threats.

Adopt a Policy of "Radical Openness"

Army colonels Benson and Rotkoff note that "Commanders require critical thinkers who can challenge assumptions and offer alternative perspectives,"[36] but if traditional reluctance to question commanders leads to self- or staff censorship, this vital critical thinking challenge and debate will not occur. Outworn ideas will persist. Nobel economist Kenneth Galbraith observed that, "faced with the choice between changing one's mind and proving that there is no need to do so, almost everyone gets busy on the proof." Chu reported that even when he asked people for their opinions, he often had to "pull" their thoughts out.[37] With the risks of disagreeing with bosses, few are likely to challenge them or to question accepted conventional wisdom. Yingling subsequently received a mediocre performance evaluation from his commanding general, who publically took exception to what the lieutenant colonel wrote.[38]

We examined how successful and adaptable businesses encourage people to speak out. Hedge funds stand out as businesses that must be especially adaptable to survive. Bridgewater is the largest and arguably most successful hedge fund. Founder and chief executive officer Ray Dalio has an aggressive culture he promotes called "radical openness," which basically means that one is not only allowed but also required to question anything and anyone, with total disregard to personal feelings or hierarchy, to probe for weaknesses and get at the truth. According to the Bridgewater Web site:

Above all else, we want to find out what is true and figure out how best to deal with it. We value independent thinking and innovation, recognizing that independent thinking generates disagreement and innovation requires making mistakes. To foster this thinking and innovation, we maintain an environment of radical openness, even though that honesty can be difficult and uncomfortable. . . . Everyone is encouraged to be both assertive and open-minded in order to build their understanding and discover their best path. The types of disagreements and mistakes that are typically discouraged elsewhere are expected at Bridgewater because they are the fuel for the learning that helps us maximize the utilization of our potential.[39]

This policy is aggressively implemented at Bridgewater.[40] There is no worse offense than failing to speak out or analyze. One must be "hyper realistic and hyper truthful" with cold, hard-hitting analysis. Would we not want this same commitment in the Intelligence Community and DOD?

The same ruthlessness at getting to the truth and "speaking truth to power" regardless of hurt feelings or positional authority was a feature of General Electric (GE) under Jack Welch. Of 30 companies originally in the Dow Jones industrial average, only GE has survived—a testimony to adaptability and evidence of the consequences of failing to adapt. An infamous management rule of Welch was to fire the lowest performing 10 percent of managers annually. He argued that firing the low performers was not only good for the company (and 90+ percent of the company personnel remaining) but also, in the long run, the individuals fired.[41] They were not in the right position and could move on to find a better fit. Bridgewater's Dalio makes the same argument: people often struggle with personal problems because they are not honest with themselves in focusing on harsh realities. Being told and having to accept that one really did make mistakes, or that one has poorly thought-through ideas or annoying personal habits that make them less effective, will never be enjoyable. But finding out about issues so one can change is better than remaining in ignorance.

DOD may not want to use the term "radical openness" and might prefer instead to call it "moral or intellectual courage," but it must seek a way to describe the duty to speak out strongly and honestly about improving everything from combat and major acquisition plans to office operations. Forcefully disagreeing does not require one to be rude or disrespectful. Honesty and moral courage should hardly be perceived as a threat to teamwork, camaraderie, or good order and discipline. Particularly for officers and personnel in decisionmaking positions, consistent with other principles of effective leadership, DOD should create a culture of radical openness that invites critical and creative thinking and demands speaking truth to power. Such openness would have particular relevance in thinking about potential black swan events where traditional standard operating procedures may be less likely to work and truly adaptive, perhaps radical, change may be needed.

USS *Cole* (DDG-67) conducts berth shift during port visit to Crete (U.S. Navy/Paul Farley)

Accept Disasters and Improve Capabilities

Taleb believes the effects of black swan events have been growing and accelerating as the world gets more complicated: "The future will be increasingly less predictable, while both human nature and social 'science' seem to conspire to hide the idea from us."[42] Many other policy analysts and business leaders have a similar view. The late Aaron Wildavsky, a president of the American Political Science Association and author of many books on public policy analysis, argued for adaptiveness and resilience over excessive regulations and restrictions on new technologies. He believed that enhancing the capacity to cope with and adapt to surprises rather than trying to prevent all catastrophes in advance was the best course of action.[43] Moreover, Warren Buffet insists that "the CEO should regard his position #1 as the Chief Risk Officer. Now you have a lot of other functions too, but you should wake up every morning and think about 'is this place built to take everything'?"[44]

Military culture understandably does not fit with the idea of admitting that we cannot know, cannot be prepared, and must accept a campaign phase of recovery from setbacks and defeats. Indeed, there is no such phase in formal DOD campaign planning. The military prides itself on being a "can do" organization where "failure is not an option." Yet even within the department, there are prophets accepting the inevitability of black swan events. In their 2012 strategic vision report, the Defense Threat Reduction Agency's Joint Science and Technology Office for Chemical and Biological Defense wrote, "Surprise from biological and chemical threats is inevitable."[45] As former Defense Secretary Donald Rumsfeld put it, "The only thing that should be surprising is that we continue to be surprised."[46] While we must do what we can to forestall or preempt an attack, we must also prepare to be surprised by ramping up both our ability to adapt

as the attack is happening and our capacity to recover from damage inflicted.

There are many low-cost preparations DOD could make to improve its ability to recover from a black swan disaster such as a viral pandemic. There are innovative and adaptive ways to cut costs if DOD becomes more adaptable and innovative.[47] (Many years ago, the Air Force Logistics Command developed a system to reward individuals for not fully spending their budgets, something considered impossible.[48]) With more innovative cost savings programs and more emphasis on simpler, flexible systems and adaptable people, DOD can improve its capability to deal with black swan risks.

Taleb warned that "the history of epidemics, narrowly studied, does not suggest the risks of the great plague to come that will dominate the planet."[49] We, and Taleb, would argue against "focus" on any specific threat, but we do urge the development of more adaptable leaders and more flexible capabilities to be prepared to respond to the broadest range of threats. While the Department of Defense is the most adaptive and innovative Federal agency in many ways, major improvements are still needed. **JFQ**

Notes

[1] Nassim Nicholas Taleb, *The Black Swan: The Impact of the Highly Improbable*, 2nd ed. (New York: Random House, 2010).

[2] John Tillson et al., *Learning to Adapt to Asymmetric Threats*, Institute for Defense Analyses (IDA) Document D-3114 (Alexandria, VA: IDA, August 2005).

[3] Waldo Freeman and William R. Burns, Jr., *Developing an Adaptability Training Strategy and Policy for the Department of Defense (DOD)*, IDA Paper P-4591 (Alexandria, VA: IDA, August 2010).

[4] Committee on Determining Core Capabilities in Chemical and Biological Defense Research and Development, Board on Chemical Sciences and Technology, Division on Earth and Life Studies, National Research Council, "Determining Core Capabilities in Chemical and Biological Defense Science and Technology," prepublication—uncorrected proofs, 2012.

[5] Robert M. Gates, remarks to the American Enterprise Institute, May 24, 2011.

[6] Taleb, xxiv.

[7] Nick Bostrom, director, Future of Humanity Institute, Oxford University, available at <www.nickbostrom.com>.

[8] Ibid.

[9] Phillip V. Fellman, Greg S. Parnell, and Kathleen M. Carley, "Biowar and Bioterrorism Risk Assessment," paper presented at the Eighth International Conference on Complex Systems, Boston, June 2011, available at <http://necsi.edu/events/iccs2011/papers/95.pdf>.

[10] Taleb, xxiv.

[11] Ibid.

[12] Derek Bok, *Our Underachieving Colleges* (Princeton: Princeton University Press, 2006), 8.

[13] John Kiszely, *Post-Modern Challenges for Modern Warriors*, The Shrivenham Papers Number 5 (Shrivenham, Oxfordshire, UK: Defence Academy of the United Kingdom, December 2007), 15, available at <www.comw.org/rma/fulltext/0712kiszely.pdf>.

[14] Richard E. Neustadt and Ernest R. May, *Thinking in Time* (New York: The Free Press, 1986).

[15] Victor Utgoff, interview by authors, March 2013.

[16] Richard Polin, interview by authors, March 2013.

[17] This point was dramatically made in a broadly publicized article by an Army officer in 2007. See Paul Yingling, "A Failure of Leadership," *Armed Forces Journal*, May 2007. A more recent example is Thomas E. Ricks, *The Generals: American Military Command from World War II to Today* (New York: Penguin, 2012). See chapters on Tommy Franks, Ricardo Sanchez, George Casey, and David Petraeus.

[18] Sayce Falk and Sasha Rogers, *Junior Military Officer Retention: Challenges and Opportunities* (Boston: John F. Kennedy School of Government, March 2011). In another survey of West Point graduates by Tim Kane, when asked why they left military service, 82 percent of the veterans responded "frustration with military bureaucracy." See Tim Kane, "Why Our Best Officers Are Leaving," *The Atlantic*, January/February 2011, 80–85, available at <www.theatlantic.com/magazine/archive/2011/01/why-our-best-officers-are-leaving/308346/>.

[19] Leonard Wong, *Developing Adaptive Leaders: The Crucible Experience of Operation in Iraqi Freedom* (Carlisle Barracks, PA: Strategic Studies Institute, July 2004), v, 20.

[20] William Deresiewicz; "Solitude and Leadership," *The American Scholar*, Spring 2010.

[21] David Chu, interview by authors, March 26, 2013.

[22] Ann Scott Tyson, "Petraeus Helping Pick New Generals," *The Washington Post*, November 17, 2007.

[23] Ricks, 438.

[24] President Dwight Eisenhower, Remarks at the National Defense Executive Reserve Conference, November 14, 1957.

[25] Paul K. Davis, email interview by authors, March 2013.

[26] Ibid.

[27] James S. Thomason, *IDA's Integrated Risk Assessment and Management Model*, IDA P-4470 (Alexandria, VA: IDA, 2009).

[28] Kevin Benson and Steven Rotkoff, "Goodbye OODA Loop: A Complex World Demands a Different Kind of Decision-Making," *Armed Forces Journal*, October 2011, 28.

[29] Davis, interview.

[30] Paul K. Davis, "Methods and Tools for Portfolio Analysis," Military Operations Research Society Quadrennial Defense Review Conference, January 13, 2009.

[31] Taleb, 133, 371, 375.

[32] As an example of great critical thinking and adaptability, consider the World War II decision to "island hop" in defeating Japan. The idea was to leave Japanese-held islands isolated rather than take each one in succession: "The Central Pacific drive was unique in the history of warfare. Nothing in the past gave any sure clue as to how armed forces could advance in great leaps across an ocean studded with hostile island bases." See E.B. Potter and Chester W. Nimitz, eds., *Sea Power—A Naval History* (New York: Prentice Hall, 1960), 737.

[33] Ricks, 451.

[34] See David Barno et. al., *Building Better Generals* (Washington, DC: Center for a New American Security, October 2013), 27–29.

[35] Yingling.

[36] Benson and Rotkoff, 41.

[37] Chu interview.

[38] Ricks, 443.

[39] Full text available at <www.bwater.com/home/culture—principles.aspx>.

[40] Bess Levin, "Bridgewater Associates: Be the Hyena. Attack the Wildebeest," *Dealbreaker.com*, May 10, 2010, available at <http://dealbreaker.com/2010/05/bridgewater-associates-be-the-hyena-attack-the-wildebeest/>.

[41] Jack Welch, *Jack: Straight from the Gut* (New York: Warner Books, 2003).

[42] Ibid.

[43] Aaron Wildavsky, *Searching for Safety* (New Brunswick, NJ: Transaction Books, 1988).

[44] Warren Buffett, interview by *FoxBusiness.com*, January 2010.

[45] Defense Threat Reduction Agency (DTRA), *2012 DTRA RD Enterprise CB Directorate Strategic Vision*, 16, available at <www.dtra.mil/docs/system-documents/2012_StrategicVision-Web2.pdf?sfvrsn=0>.

[46] Donald Rumsfeld, *Rumsfeld's Rules: Leadership Lessons in Business, Politics, War, and Life* (New York: Broadside Books, 2013).

[47] The Air Force tanker lease debacle will come to mind for some, but there are ways to leverage civil air patrols and official state militias, to use Reserve and retired personnel more effectively, and to ready large, simple forces with little strain on the DOD budget.

[48] Michael Barzelay and Fred Thompson, *Efficiency Counts: Developing the Capacity to Manage Costs at Air Force Materiel Command* (Washington, DC: IBM Center for the Business of Government, 2003).

[49] Taleb, 354.