

NATO at Seventy: Filling NATO's Critical Defense-Capability Gaps

Wayne A. Schroeder

With a Foreword by Air Marshal Sir Chris Harper KBE



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Cover: New NATO Headquarters Handover Ceremony in Brussels, May 25, 2017. Credit: NATO.

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FOREWORD

As a young, single-seat fighter pilot based in Germany in the Royal Air Force of the early 1980s, I enjoyed a degree of certainty about my role in life. The world was, to all intents and purposes, a bi-polar place. We knew exactly from where our threat emanated and, indeed, had comprehensive standing plans for dealing with it. In the event of an attack by the Warsaw Pact on NATO's eastern flank, we had pre-designated areas in which we would interdict any enemy military force heading westwards. We had pre-planned missions for systematically taking down all elements of Soviet air power — be it through suppression of enemy air defense sensors and surface-to-air systems or denial of his airfields' operating surfaces. In the event that the conflict escalated too rapidly, or went too far, we even had plans to resort to the ultimate sanction of the pre-planned and graduated employment of tactical nuclear weapons. Our plans, and our skills, were tested on a frequent and regular basis. It was no rare experience to be woken by a siren in the middle of the night to be called to duty. Our response time was measured, as was the ability to demonstrate our preparedness to brief our wartime missions, arm our aircraft, and prove our abilities to be airborne within the allocated time period. The results of these exercises—known as NATO Tactical Evaluations (TacEvals)—were equally rigorous in the Land and Maritime domains. Their results were widely shared within Alliance circles. Achieving a “one” for a TacEval result was every commanding officer's goal.

At the end of the Cold War and over subsequent years, many of these operational plans and the TacEval exercises that ensured their validity fell fallow. Many nations, if not all, took their ‘peace dividends’ by dramatic, draconian, and repeated cuts to their defense budgets and military capabilities. Conflicts in the Gulf, the Balkans, Afghanistan, and Libya demanded a rather different approach to the application of the military instrument; the likelihood of all-out state-on-state conflict was considered very slight indeed. Efforts were made to reach out with a hand of friendship—or at least of cooperation—to Russia. This sentiment changed little even in the face of Russian military activities in Georgia in August 2008. As Wayne Schroeder correctly comments in this paper, the NATO 2010 Strategic Concept document (the *de facto* articulation of NATO's overarching strategy) claimed that, “the Euro-Atlantic area is at peace, and the threat of a conventional attack against NATO is low.”

In recent years all this has changed. As the former Secretary General of NATO, Anders Fogh Rasmussen, commented recently, “Europe faces the greatest set of external risks to its security since the end of the Cold War.” The instability to our south and south-east bring the challenges of terrorism and migration ever closer to home. To the east, as evidenced by its illegal annexation of Crimea, its aggression in Eastern Ukraine, its introduction of chemical weapons to the streets of the United Kingdom cathedral city of Salisbury and, more recently, its aggressive maritime actions on the Sea of Azov, Russia is behaving as an ever-more belligerent revisionist power. Notably, while NATO allies were cutting both their defense budgets and military forces, the Russian Federation invested heavily in military research, development and capability. The slow but systematic build-up of the multi-domain Russian so-called Anti-Access, Area-Denial (A2AD) network that stretches the whole length of NATO's eastern flank, from the Baltic Sea into Syria, is but one example of the practical manifestation of that strategy.

NATO has already reacted to these changes of geopolitical circumstance. It has enhanced its defensive forward presence and air policing posture in the east, and has re-cast its Maritime Strategy. The most recent Alliance Summit of Heads of State and Government (Brussels, July 2018), saw an agreement to adopt a significantly enhanced readiness posture (the “30-30-30-30” plan will, by 2020, see the generation of 30 land battalions, 30 naval ships, and 30 fighter squadrons all at 30 days’ notice to deploy), and a renewed commitment to increased defense spending. In October 2018, NATO mounted Exercise Trident Juncture, involving some 50,000 personnel, in Norway. While all these steps are welcome, most defense and security experts recognize them to be ‘rather too little, rather too late’. In the event of a determined attack, NATO would still not be adequately well-prepared, let-alone properly equipped, trained or postured, to operate effectively across the 6 domains of modern conflict (Air, Land, Maritime, Space, Cyberspace and Information), or to deal effectively and sufficiently rapidly with its full Article 5 responsibilities.

NATO is now at its seventieth anniversary as, without question, the most successful political-military defensive alliance ever known. This is cause for some celebration, but much remains to be done to fill extant capability shortfalls if it is to retain its rightfully earned respect, credibility, and strategic relevance. Wayne Schroeder’s excellent analysis of both the problem and the potential solutions is thus timely and apposite. It deserves careful attention and should serve as a powerful call for action. I have been delighted to contribute in a small way to the development of this important piece of work and commend it to you unreservedly.

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OVERVIEW

The international rules-based world order, as established at the end of the Second World War, is currently undergoing a series of unprecedented challenges that are impacting NATO and its twenty-nine constituent members. NATO defense-resource goals and commitments, as outlined at the 2014 NATO Summit in Wales, are unavoidably interconnected with the broader emerging international security environment. These emerging security challenges have already begun to impact NATO defense planning, and promise to decisively impact the Alliance's future approach to defense-resource management and its ability to fill critical defense-capability gaps as expeditiously as possible.

Only two years ago, discussion of “adversaries” at political levels within NATO headquarters (HQ) was considered unacceptable. There was little appetite for adjusting the language of the NATO 2010 Strategic Concept (“... the Euro-Atlantic area is at peace, and the threat of a conventional attack against NATO is low”). Discussion of the Alliance's nuclear deterrent was resisted. This situation is now changing.

Within NATO HQ, the consideration of adversarial intent and Alliance nuclear capability has become far more commonplace than before the 2014 Wales and 2016 Warsaw summits. However, it is critically important to note that NATO's Allies still lack a common view on the expression of strategic risk.

In general terms, NATO's newer members, who predominantly occupy NATO's eastern flank, are primarily concerned about the threat posed by a resurgent Russia. Those allies with a Mediterranean border consider jihadism, migration, and human trafficking to be their preeminent risks. NATO's “older hands”—including the United States, United Kingdom, Canada, France, and Germany—take a rather more global view. While recognizing the issues posed in the east and the south, they are also rightly concerned by the threat of war on the Korean Peninsula and the risks attending the renewal of great-power competition between Russia, China, and the West.

NATO and Europe need to develop a consolidated view on threats so that the Alliance can come to agreement quickly on a coherent, well-integrated plan for how and where to invest defense resources. These three threat areas are assessed below. Together, they form the basis for the recommendations in this Atlantic Council report on how best to fill the Alliance's critical defense-capability gaps as NATO reaches its seventieth anniversary.

Finally, within the broader NATO defense-planning context, political differences need to be set aside as security issues come to the fore. It will be especially important to reassert the key role played by the United Kingdom on the development of NATO's future defense posture. The United Kingdom is leaving the European Union, but remains a pillar within European security; it is not leaving Europe or NATO, and its key role within the Alliance must be underscored. Brexit must not be allowed to endanger the transatlantic security bond, from either Washington or Brussels.

Russia

NATO is seeing the rise of a resurgent Russia engaged in an across-the-board military build-up, which is impacting the balance of power in the Baltics, the Black Sea, and the North Atlantic. Behaving as a classic revisionist power, Russia has shown a willingness to take increased risks while disregarding its obligations concerning sovereignty, territorial integrity, and the rule of law—all basic principles set forth in the Helsinki Final Act, to establish a secure and lasting peace throughout Europe.¹ Prime examples include Russia's 2008 conflict with Georgia, 2014 annexation of Crimea, ongoing aggression in Eastern Ukraine, and recent operations in support of the Bashar al-Assad regime in Syria. More recent examples include the March 2018 Novichok nerve-agent attack in the United Kingdom, and the November 25, 2018 incident in which Russian Federal Security Service (FSB) coast-guard boats fired upon and captured three Ukrainian naval vessels that had attempted to pass from the Black Sea into the

¹ The key principles of the Helsinki Final Act include: sovereign equality, and respect for the rights inherent in sovereignty; refraining from the threat or use of force; inviolability of frontiers; territorial integrity of states; peaceful settlement of disputes; non-intervention in internal affairs; respect for human rights and fundamental freedoms, including the freedom of thought, conscience, religion, or belief; equal rights and self-determination of peoples; cooperation among states; and fulfillment in good faith of obligations under international law. See: Organization for Security and Co-operation in Europe, *Conference on Security and Co-operation in Europe Final Act*, Helsinki 1975, p. 3, <https://www.osce.org/helsinki-final-act?download=true>.

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Sea of Azov through the Kerch Strait.² These incidents demonstrate Russia's determination to upset the post-Cold War order in Europe.

Russia is also engaging in a recurring, and expanding, number of military exercises in areas adjacent to NATO's newest members. The September 2017 Zapad (West) 17 joint strategic exercise—the largest since the end of the Cold War—simulated the military mobilization of up to seventy thousand troops into the Russian Western Military District, Belarus, and Kaliningrad. The first major Russian exercise since the annexation of Crimea and the unrest in Ukraine, Zapad 17 demonstrated a Russian ability to use power, force generation, electronic warfare, and cyber operations in ways not previously displayed. Additionally, unannounced, short-notice military exercises and deployments have occurred, without regard to the transparency required by the Vienna Documents.³ Russia limited NATO access to Zapad 17 to two NATO observers, causing NATO Secretary General Jens Stoltenberg to call for additional transparency, in accordance with the Vienna Documents.⁴ How long Russian forces remain in Belarus is a legitimate NATO concern.

All along NATO's eastern flank, including the Black Sea region, Russia's deployment of integrated, advanced air-defense systems and anti-ship missiles has created a significant anti-access/area-denial (A2/AD) dilemma for NATO. Much more will need to be done, across all five military domains—air, land, sea, cyber, space, and information—in defense of the eastern flank and the Black Sea region, including an enhanced naval presence and operations, and improved cyber defense.

In the North Atlantic, Russia has enhanced its naval presence and power projection. Russian submarine forces have recommenced transiting the North Atlantic, and Russia has established a new Arctic Command;

therefore, naval affairs must return to the forefront of NATO defense planning.

In both theory and reality, Russia has employed and operationalized techniques associated with “hybrid warfare” (the use of disinformation, deception, cyber-attack, and economic subversion). It has done so in ways that seek to avoid attribution, while remaining below the threshold of conflict.

Russia's actions have given Moscow vehicles through which to leverage and operationalize newfound defense-technological capabilities. Russia is expanding its military capabilities across all five major domains. These developments have ushered in a defense-planning dynamic for NATO, one decidedly different than that of the Fulda Gap scenario used for defense planning and investment decision-making during the Cold War.⁵

Thus, NATO is seeing the creation of a new front line, one that has moved eastward toward regions adjacent to Poland and the Baltic states, and southeast toward the Black Sea. Moreover, this dynamic is taking on a new sense of urgency. As General Curtis M. Scaparrotti underscored in his March 8, 2018 statement to the US Senate Committee on Armed Services, “... the Command's focus has shifted from engagement and assurance to deterrence and defense.”⁶

General Scaparrotti's March 28, 2017 testimony to the US House Armed Services Committee clearly elucidates the reason for this shift in focus: “... today we face the most dynamic European security environment in history ... In the east a resurgent Russia has turned from partner to antagonist. Countries along Russia's periphery, especially Ukraine and Georgia, are under threat from Moscow's malign influence and military aggression. In the southeast, strategic drivers of instability converge on key allies, especially Turkey, which has

2 NATO has yet to offer a consolidated view on the outcome of the Skripal case in the United Kingdom, involving the use of the chemical agent Novichok against a former Soviet agent, Sergei Skripal, and his daughter in the city of Salisbury. Prime Minister Theresa May announced the expulsion of twenty-three Russian diplomats in March. Jenny Gross, “U.K. Expels Russians Over Spy's Poisoning,” *Wall Street Journal*, March 14, 2018, <https://www.wsj.com/articles/russia-snubs-deadline-amid-spy-spat-setting-stage-for-u-k-response-1521026389>.

3 US Department of State, “Overview of Vienna Document 2011,” <https://www.state.gov/t/avc/cca/c43837.htm>. The Vienna Document 2011 involves confidence- and security-building measures (CSBMs) to increase the openness and transparency of military activities within the countries comprising the Organization of Security and Co-operation in Europe (OSCE). These CSBMs include: information exchanges; onsite inspections, evaluations, and observation visits; and military-to-military contacts. At the Atlantic Council's July 11, 2017 program, “Zapad 17: Implications for NATO and the United States,” former Deputy Assistant Secretary of Defense for Russia/Ukraine/Eurasia Evelyn N. Farkas reported that Russian “no notice,” snap exercises increased from four in 2013, to eight in 2014, to twenty in 2015, then fell to eleven in 2016.

4 Drew Hinshaw and Julian E. Barnes, “NATO Slams Russia for Limiting Access to Military Drills,” *Wall Street Journal*, August 25, 2017, <https://www.wsj.com/articles/nato-slams-russia-for-limiting-access-to-military-drills-1503682210>.

5 The Fulda Gap scenario refers to the Cold War-era allied defense-planning scenario anticipating a major Warsaw Pact thrust through the Fulda region of East Germany into West Germany and across the Rhine River.

6 Curtis Scaparrotti, “Statement of General Curtis M. Scaparrotti, United State Army, Commander, United States European Command to the United States Senate Committee on Armed Services,” March 8, 2018, p. 1, <https://www.armed-services.senate.gov/hearings/18-03-08-united-states-european-command>.

to simultaneously manage Russia, terrorists and refugee flows ... In the High North, Russia is reasserting its military prowess and positioning itself in the Arctic. Moscow intends to reemerge as a global power, and views international norms such as the rule of law, democracy and human rights as a component of a system designed to suppress Russia. Therefore, Russia seeks to undermine this system and discredit those in the West who have created it ...”⁷

At the 2016 Warsaw Summit, in response to this new security environment, NATO proposed a multinational framework for enhanced Forward Presence (eFP) in the Baltic states and Poland, increased defense of the southern approaches to NATO, and a revitalized maritime strategy. It is widely recognized in NATO HQ that any future conflict with Russia would likely involve horizontal escalation that could quickly encompass the North Atlantic, the Baltics, the Black Sea, and now—due to Moscow’s footprint in Syria (which includes air bases and warm-water ports)—the Mediterranean. These Russian initiatives are impacting both US interests and regional balances of power.⁸ If NATO’s warning and response times were significantly reduced, new sets of military capabilities would be needed to align with this much broader set of future defense needs, and to respond to potential crises with speed and dispatch. Addressing this military challenge with a new approach to deterrence and defense is critical, as it is crucial to the strengthening of both the transatlantic community’s military self-confidence and its political unity.

Great-Power Competition

Both Russia and China are dissatisfied powers that are determined to change the terms of a Western-devised, US-policed international order, which, they believe, does not serve their legitimate interests.⁹ Despite being in continued long-term economic decline, Russia has invested heavily in modernizing its armed forces and restoring the nation’s instruments of hard power. It also seeks to “... fracture NATO ... undermine US leadership to protect its regime, re-assert dominance over its neighbors, and achieve greater dominance around

the globe.”¹⁰ China, during a period of sustained economic growth, has transformed its military to give it a genuinely global strategic reach, and an expeditionary capacity it previously lacked. Both have demonstrated the capacity to impose their will on their neighbors by use of force.

Some argue that the United States’ rising technological advantage reduces the potential effectiveness of Chinese and Russian nuclear arsenals, thus increasing the risk of great-power conflict. In contrast, advocates of US defense-technological superiority see it as having a salutary effect as one of the key defense elements essential to winning potential conflicts and keeping the peace. Others suggest that war between the United States and China is not just possible, but much more likely than currently recognized.¹¹ Regardless of one’s strategy and policy preferences, it is apparent throughout the transatlantic community that a prolonged period of defense-technological competition between the United States and these great powers is more likely than not in the years ahead. Thus, investment in defense research and development must also be a critical element of NATO’s focus as it reaches its seventieth anniversary.

Alongside those broader dynamics, North Korea has demonstrated a capacity to strike the mainland United States with intercontinental ballistic missiles (ICBMs). While the danger of war on the Korean peninsula may have slightly receded in recent months, the United States may continue to consider contingency plans for a disabling, preemptive strike against North Korean nuclear sites, in addition to stiffer economic sanctions and enhanced deterrence-and-defense measures. Many in NATO HQ conveniently forget that the Alliance has a Pacific coastline, to which Article 5 clearly applies.

The Mediterranean and Southern Flank

Outside of Europe, long-term Russian power-projection goals and actions are impacting future NATO defense planning. Russia extended its Syrian military presence by negotiating long-term naval and air base-access agreements with Damascus in January

7 Curtis Scaparrotti, “Statement of General Curtis M. Scaparrotti, Commander, United States European Command, to the House Armed Services Committee,” March 28, 2017, pp. 1-3, <https://docs.house.gov/meetings/AS/AS00/20170328/105780/HHRG-115-AS00-Wstate-ScaparrottiC-20170328.pdf>.

8 In his 2018 SAC testimony, General Scaparrotti noted that Russia’s new posture in the Middle East is “... changing regional dynamics, adversely affecting Israel’s security, stability in Lebanon, and other U.S. interests in the region.” *Ibid.*, p. 4.

9 “The Growing Danger of Great-Power Conflict,” *Economist*, January 25, 2018, <https://www.economist.com/leaders/2018/01/25/the-growing-danger-of-great-power-conflict>.

10 Scaparrotti, “Statement to the United States Senate Committee on Armed Services,” p. 2.

11 *Ibid.*

2017.¹² Moscow supported the Assad regime militarily during the Syrian Civil War, via deployment of the Russian carrier *Admiral Kuznetsov* from Murmansk to support joint-strike operations, and also executed cruise-missile strikes from the Mediterranean against Islamic State of Iraq and al-Sham (ISIS) forces near Palmyra, and similar strikes against rebel forces from ships in the Caspian Sea. Russia's military intervention in the Syrian Civil War served to keep the Assad regime in power, but is now taking on a broader geopolitical and military importance in the Mediterranean and Black Sea regions.

An unwelcome byproduct of the conflicts in Iraq, Afghanistan, and Libya—along with the Syrian Civil War and the phenomenon of the so-called “Arab Spring”—has been a refugee crisis that poses a persistent and immediate security challenge for Europe's southern flank. More than one million refugees have entered Europe since 2015. The significant strain on Europe's national economic, social, and medical systems cannot be underestimated. Hundreds of thousands of refugees have already fled into and routed through Turkey. Greece and Italy have been similarly affected.

In addition, the infiltration of ISIS terrorists into European nations and a rising number of jihadist terrorist atrocities have strained the capacity of European (and US) intelligence services and police forces, while also raising questions about NATO's capacity in a counterterrorism role.

Summary

In addressing this increasingly complex security environment, it will be critical that NATO focus on more than just its “2/20” defense-spending goals. NATO should also to develop a “New Deal” for the Alliance, one that seeks to transform NATO's twenty-nine nations militarily and truly restore a fighting mindset congruent with the evolving threat. The progression from what was once a low-threat environment to what is now a medium-to-high-threat one, combined with shorter decision cycles and response timelines, puts a premium on the development of new sets of military technologies, capabilities, and operational concepts that will strengthen Alliance deterrence, defense, and joint war-fighting capabilities.

12 The Syria-Russian lease agreements for the naval base at Tartus and the Khmeimin Air Base reportedly last for forty-nine years. Rod Nordland, “Russia Signs Deal for Syria Bases; Turkey Appears to Accept Assad,” *New York Times*, January 20, 2017, <https://www.nytimes.com/2017/01/20/world/middleeast/russia-turkey-syria-deal.html>; Sam LaGrone, “Ship-launched Russian Cruise Missile Strike Part of New Aleppo Offensive,” *USNI News*, November 15, 2016, <https://news.usni.org/2016/11/15/ship-launched-russian-cruise-missiles-part-new-aleppo-offensive>.

PART ONE: NATO AT SEVENTY: ADAPTING THE ALLIANCE FOR THE NEXT CENTURY

NATO's priority must now be to restructure its resource-investment strategy so that member nations can increase spending in a targeted manner that meets NATO's highest defense and security priorities. The countries within NATO now need to look within themselves to rekindle their military self-confidence, by strengthening NATO's military posture vis-à-vis Russia, through the development of more effective defense capabilities supporting more-responsive defense planning for the Baltic, Black Sea, and North Atlantic regions.

To do so, NATO's twenty-nine nations should leverage the NATO Defense Planning Process and Framework Nation Concept to develop a comprehensive and collaborative roadmap, to assist member nations in employing their sovereign resources more effectively and efficiently. As NATO underscored in its Warsaw Communiqué of 2016, "Our overall security and defense depend both on how much we spend *and how we spend it*."¹³ [Emphasis added.]

Under the leadership of former NATO Secretary General Anders Fogh Rasmussen, NATO members agreed to a Defense Investment Pledge at the 2014 Summit in Wales, seeking the twin goals of 2 percent of gross domestic product (GDP) on defense and 20 percent of defense spending on major defense equipment by 2024. The goal would be based not just on a numerical target, but also, according to Rasmussen, "with a view to meeting NATO capability priorities."¹⁴

However, a decade-long decline in defense spending opened significant gaps in NATO defense capabilities. Admittedly, the downturn US and European economies experienced after the 2008–09 Great Recession played a significant role in this regard. The downturn reached its zenith seven years ago during NATO's no-fly-zone operation in Libya, where shortages in munitions,

target acquisition, and aerial-refueling capabilities impacted operational performance.¹⁵ Key defense decision-makers across the Alliance alerted NATO to the full scope of the problem.

"Part of this predicament stems from a lack of will, much of it from a lack of resources in an era of austerity. For all but a handful of allies, defense budgets—in absolute terms, as a share of economic output—have been chronically starved for adequate funding for a long time, with the shortfalls compounding on themselves each year ... total European defense spending declined, by one estimate, by nearly 15 percent in the decade following 9/11."

—Former US Secretary of Defense Robert Gates

At a June 2011 speech in Brussels, former US Secretary of Defense Robert M. Gates highlighted the growing urgency for NATO defense investment, remarking: "Part of this predicament stems from a lack of will, much of it from a lack of resources in an era of austerity. For all but a handful of allies, defense budgets—in absolute terms, as a share of economic output—have been chronically starved for adequate funding for a long time, with the shortfalls compounding on themselves each year ... total European defense spending declined, by one estimate, by nearly 15 percent in the

¹³ NATO, press release, "Warsaw Summit Communiqué: Issued by the Heads of State and Government Participating in the Meeting of the North Atlantic Council in Warsaw, 8-9 July 2016," July 9, 2016, paragraph 33, https://www.nato.int/cps/su/natohq/official_texts_133169.htm.

¹⁴ NATO, "Allied Leaders Pledge to Reverse Defence Cuts, Reaffirm Transatlantic Bond," September 5, 2014, http://www.nato.int/cps/en/natohq/news_112461.htm.

¹⁵ United Nations, "UN Security Council Resolution 1973," March 17, 2011, [http://www.un.org/en/ga/search/view_doc.asp?symbol=S/RES/1973\(2011\)](http://www.un.org/en/ga/search/view_doc.asp?symbol=S/RES/1973(2011)).

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decade following 9/11. Furthermore, rising personnel costs combined with the demands of training and equipping for Afghan deployments has consumed an ever-growing share of already meager defense budgets. The result is that investment accounts for future modernization and other capabilities not directly related to Afghanistan are being squeezed out—as we are seeing today over Libya.”¹⁶

Secretary Gates aptly underscored the negative impact that reductions in defense spending have on defense investment. As a general rule, when topline defense spending contracts, defense investment also contracts, in terms of research, development, test, and evaluation (RDT&E) and procurement. The only question is by how much.

A review of data on NATO's defense-equipment spending from 2010–2015 underscores this point. Defense spending for NATO Europe (the Alliance, excepting the United States and Canada), as a whole, declined during the entire five-year period; the percentage distribution of defense expenditure going to equipment likewise contracted for eighteen of NATO's then-twenty-eight nations.¹⁷ Defense-spending cuts adversely impacted defense investment and, in turn, Alliance defense modernization.

NATO's “2/20” goal was reaffirmed at Warsaw, where the Alliance reported that five of its members met the 2-percent defense-spending guideline, while ten met the 20-percent equipment-spending guideline.¹⁸ NATO Secretary General Jens Stoltenberg reported further progress in his 2016 annual report, as twenty-three member nations increased defense spending in real terms in 2016.¹⁹

NATO's March 2019 report on defense expenditure depicts additional progress since Wales, with a consistent pattern of increased spending across the Alliance, from 2014 to 2018.²⁰ Seven nations now meet the 2-percent goal, with twenty-two having increased their defense spending as a percent of GDP over that four-year period.²¹ Defense spending by NATO Europe and Canada has increased by \$41 billion over this four-year period, and now equates to 1.48 percent of GDP.²² Whereas NATO Europe and Canadian defense spending was 30.8 percent of the entire Alliance in 2014, it can now be estimated to have risen to 34.1 percent, as of 2018.²³ (For a review of 2018 member defense spending against NATO's 2/20 metric, see Table 1.)

There has also been substantial progress toward meeting the 20-percent equipment-spending goal. Turning around this spending metric will be particularly difficult, due to the legacy of the end of the Cold War and weak economic growth in much of the Euro area. Still, much progress can also be reported here. NATO forecasts that up to fourteen members will meet their 20-percent expenditure goal for 2018; significantly, over the period of 2014–2018, a total of twenty-four members increased the percentage of their defense spending going to equipment.²⁴ Several countries—Bulgaria, the Czech Republic, Hungary, Italy, Latvia, Lithuania, Romania, the Slovak Republic, and Slovenia—reported four-year growth rates above the 100-percent level (see Table 2). In just over three years, the Alliance-wide erosion in defense-equipment spending has been halted.

After a period of real decline, NATO defense spending is increasing once again.²⁵ The key question for NATO and national defense planners is *where additional defense resources should be directed*.

16 Robert Gates, “Remarks by Secretary Gates at the Security and Defense Agenda, Brussels, Belgium,” June 10, 2011, <http://archive.defense.gov/Transcripts/Transcript.aspx?TranscriptID=4839>.

17 NATO, press release, “Defence Expenditure of NATO Countries 2010-2017,” June 29, 2017, pp. 7, 11, https://www.nato.int/cps/en/natohq/news_145409.htm.

18 NATO, “Warsaw Summit Communiqué,” paragraph 34.

19 NATO, *The Secretary General's Annual Report 2016*, p. 29, https://www.nato.int/cps/en/natohq/opinions_142149.htm. As of 2017, four nations have met the 2-percent goal: the United States, UK, Estonia, and Greece (Poland, at 1.99 percent, fell below the mark due to accelerated GDP growth).

20 NATO, *The Secretary General's Annual Report 2018*, Graph 1, p. 121.

21 Ibid., table 3, p. 125.

22 Ibid., graph 1, p. 121.

23 Ibid., table 2, p.124. (For 2018: \$313 billion of NATO's \$919 billion, author's calculation.)

24 NATO, *The Secretary General's Annual Report 2018*, table 7a, p. 129.

25 NATO, “Defence Expenditure of NATO Countries, 2010-2017,” tables 2-3, pp. 6-7. NATO Europe-wide defense spending declined from \$274.6 billion and 1.63 percent of GDP in 2010 to \$235.1 billion and 1.42 percent of GDP in 2015. NATO Europe increased to \$237.9 billion and 1.44 percent of GDP in 2016, and is estimated to increase to \$249.7 billion in 2017 and 1.46 percent of GDP in 2017. In constant 2010 prices, NATO Europe defense spending was an estimated \$275.4 billion in 2017.

Table 1: 2018 NATO Estimate of Member Defense as Percentage of GDP and Equipment
Expenditure as a Share of Defense Expenditure (Based on 2010 prices and exchange rates)

NATO Member	Defense Spending as a Percentage of GDP	Equipment Expenditure as a Share of Defense
<i>NATO Europe</i>	1.51	
Albania	1.16	10.72
Belgium	0.93	9.80
Bulgaria	1.43	20.30
Croatia	1.71	9.45
Czech Republic	1.11	12.39
Denmark	1.21	13.43
Estonia	2.07	18.15
France	1.82	23.66
Germany	1.23	14.13
Greece	2.22	12.40
Hungary	1.15	20.35
Italy	1.15	21.12
Latvia	2.03	35.37
Lithuania	2.00	30.59
Luxembourg	0.54	41.77
Montenegro	1.55	9.66
Netherlands	1.35	24.93
Norway	1.62	26.69
Poland	2.05	26.54
Portugal	1.35	12.97
Romania	1.92	34.36
Slovak Republic	1.21	22.27
Slovenia	1.02	8.22
Spain	0.93	23.04
Turkey	1.64	31.55
United Kingdom	2.15	24.14
<i>North America</i>	3.18	
Canada	1.23	13.05
United States	3.39	25.27

Source: NATO, *The Secretary General's Annual Report 2018*, tables 3 and 7a, pp. 125 and 129.

Bold: Indicates member nations will meet the 2-percent or 20-percent goals.

Red: Indicates member nations will meet both 2-percent and 20-percent goals.

Table 2: Selected NATO Member Four-Year Equipment-Expenditure Growth Rates
Equipment Expenditures as a Percentage of Defense Expenditure
 (Minimum 100-Percent Growth, 2014–2018)

NATO Member	2014	2018	Percent Growth (2014–2018)
Bulgaria	1.02	20.30	2,379.20
Czech Republic	6.53	12.39	172.10
Hungary	7.76	20.35	294.40
Italy	10.92	21.12	100.70
Latvia	7.55	35.37	1,036.80
Lithuania	14.06	30.59	445.70
Netherlands	10.68	24.93	189.60
Romania	15.77	34.36	244.20
Slovak Republic	11.12	22.27	164.30
Slovenia	0.66	8.22	1,330.00

Source: NATO, *The Secretary General’s Annual Report 2018*, Graph 7a, p. 129.

Addressing Capability Shortfalls

Where should additional NATO resources be directed to address key capability shortfalls in the future? Former NATO Secretary General Anders Fogh Rasmussen spoke clearly to NATO’s immediate future course in this regard:

“... After decades of détente in Europe, a resurgent and aggressive Russia has created a fundamentally new security environment on the European continent. This will require a new security posture ... But more must be done. If Europe wants to be a useful and preferred partner of the United States, European allies must also make their military forces more deployable, and acquire military assets that make them able to assist in international operations beyond Europe.”²⁶

To begin with, NATO should address its three core tasks as outlined in its Strategic Concept: *collective defense, crisis management, and cooperative security*. Within this broader context, NATO should seek to spend additional investment resources smartly, addressing key

infrastructure, readiness, and training needs as its first order of business, in concert with the NATO Defense Planning Process (NDPP). NATO’s clear investment goal, articulated in the Secretary General’s 2018 annual report, is for “interoperable, cutting-edge and cost-effective equipment.”²⁷

NATO Defense Planning Process (NDPP)

NATO’s Defense Planning Process (the NDPP) currently highlights seventeen critical capability shortfalls (sometimes called defense planning priorities). Formulated by NATO defense ministers in June 2017, these form the Alliance’s prioritized “shopping list” for future NATO defense capabilities.

The following areas are arguably of key interest to NATO defense planners: Deployable Networks; Airborne Electronic Attack; Joint Intelligence, Surveillance, and Reconnaissance (JISR); Cyber Defense (designated at the 2016 Warsaw Summit as a new NATO operational domain); Suppression of Enemy Air Defenses (SEAD); Anti-Submarine Warfare (ASW); NATO Command Structure Command and Control (C2); Air and Special Operations Forces; Ground-Based Air Defense/Counter

²⁶ Anders Fogh Rasmussen, *The Will to Lead: America’s Indispensable Role in the Global Fight for Freedom* (New York: Broadside Books, 2016), pp. 159–160.

²⁷ NATO, *The Secretary General’s Annual Report 2017*, p. 39.

Rocket, Artillery, and Mortar (GBAD/CRAM, including Command, Control, and Communications (C3) systems); and Land Intelligence, Surveillance, Target Acquisition, and Reconnaissance (Land ISTAR).

“NATO initiated three new key projects in 2017: the start-up of the Special Operations Component Command, the Land Decisive Munitions Initiative, and the Maritime Multi-Mission Aircraft.”

NATO initiated three new key projects in 2017: the start-up of the Special Operations Component Command, the Land Decisive Munitions Initiative, and the Maritime Multi-Mission Aircraft. Other ongoing projects, such as Air-to-Ground Precision Munitions and the Multi-Role Tanker Transport Fleet initiative will need to be sustained.

It should be noted that NATO is not, and will not be, the “customer” for any of these capabilities. NATO will encourage and, if requested, facilitate member nations, or frameworks of nations, (see below) to fill these capability gaps.

Framework Nation Concept

Warsaw also saw a reaffirmation of the NATO Framework Nations Concept. Largely because of dissatisfaction with the progress of “Smart Defense” programs, NATO has now agreed on mechanisms for capability development and burden sharing, through regional or functional cooperative “frameworks” of both larger and smaller allies. This has arguably been a game changer in NATO thinking, as it significantly eases the challenge of achieving consensus, while inevitably strengthening the Alliance. Crucially, it allows regional groupings to address their key strategic concerns without impacting those groupings that share different priorities.

For example, one of the emerging framework groupings covers Baltic air defense. Heralding the potential for previously unthinkable cooperation between the three Baltic states (Estonia, Latvia, and Lithuania) and surrounding NATO Allies (Poland, Germany, and, possibly, the Netherlands) and partners (Sweden and Finland), the project is likely to prioritize C3 systems, common training and simulation, and, possibly,

collaborative investments in an interoperable, medium-range, surface-to-air-missile (MRSAM) capability.

Permanent Structured Cooperation (PESCO)

In 2017, to deepen defense cooperation in the European Union (EU), twenty-five member states signed the Permanent Structured Cooperation (PESCO) agreement. PESCO seeks to jointly develop defense capabilities and make them available for EU military operations, while maximizing the effectiveness of defense spending.

To date, thirty-five collaborative PESCO projects have been agreed upon. In the areas of capability development and military-operational concepts, these include the establishment of a European Medical Command, an EU Training Mission Competence Centre, Cyber Rapid Response Teams, Mutual Assistance in Cyber Security, Military Disaster Relief, and an upgrade of Maritime Surveillance.

While not in opposition to NATO's Framework Nation Concept, PESCO prioritizes spending for EU nations and their industries. Though not precluded, non-EU nations bidding in these areas will almost inevitably need to form partnerships within the European defense industrial base in order to be successful. Notably, however, there has been no formal agreement between NATO and the EU on the standards that should be implemented when delivering future military capabilities. While the EU is clearly aware of the NATO standardization process, it has not determined to adopt it.

US National Defense Strategy and the US European Deterrence Initiative (EDI)

The most recent US National Defense Strategy (NDS) forms the policy basis for the US response to this challenge, and calls for a militarily credible US force posture in Europe:

“Fortify the Trans-Atlantic NATO Alliance. A strong and free Europe, bound by shared principles of democracy, national sovereignty, and commitment to Article 5 of the North Atlantic Treaty is vital to our security. The alliance will deter Russian adventurism, defeat terrorists who seek to murder innocents, and address the arc of instability building on NATO's periphery. At the same time, NATO must adapt to remain relevant and fit for our time—in purpose, capability, and responsive decision-making. We expect European allies to fulfill their com-

mitments to increase defense and modernization spending to bolster the alliance in the face of our shared security concerns.”²⁸

To achieve this policy goal, the United States and its NATO allies will need to work collaboratively to address force-structure imbalances and capability shortfalls. The US European Deterrence Initiative (EDI) sets the foundation for achieving this policy goal. But first, planners should remember the changes to US force posture necessitated by the defense budget reductions of the US Budget Control Act (BCA).

In his written statement to the House Armed Services Committee (HASC) in March 2017, General Scaparrotti noted that the combination of the rebalance to the Asia-Pacific and budget reductions forced by the Budget Control Act of 2011 “contributed to substantial posture reductions” across the United States European Command (EUCOM) land and air domains between 2010–2013, contributing to capability shortfalls. The United States inactivated two heavy brigade combat teams (BCTs), a two-star division headquarters, and a three-star corps headquarters, as well as two tactical air-fighter squadrons and an associated two-star US Air Force (USAF) headquarters.²⁹ The US land assets currently remaining in the EUCOM theater are a Stryker BCT, a single airborne brigade, and regimental eFP support.

Capability shortfalls have been identified in five key areas: General Strategic Lift; Intelligence, Surveillance, and Reconnaissance (ISR); Deployable Command and Control (including deployable C2 networks); Air-to-Air Refueling (AAR); and Air and Missile Defense (AMD).³⁰ Significantly, EUCOM is currently developing mobility strategies to work with existing assets to develop response capabilities that emphasize reacting “to crises at speed.”³¹

There has been considerable debate on both sides of the Atlantic as to the merits of retaining NATO's current rotational force posture, versus returning to a more permanent stationed presence.³² A debate over permanently stationed forces may be needed sometime in the future. Future force-posture adjustments should be addressed intelligently and realistically, providing flexibility for future needs.

Both NATO and EUCOM understand that NATO's ground forces are inadequate to deter a potential Russian attack in the east, and must be augmented. In Warsaw in 2016, NATO committed to an augmented heavy-force presence, one capable of “delivering heavier and more high-end forces and capabilities, as well as more forces at higher readiness.”³³ EUCOM sees the need for “fully resourced heel-to-toe rotational forces” to support the emerging mission in the east.³⁴

If the permanent stationing of heavy forces in the eFP region of Europe is not a viable option at this time, solutions must be directed elsewhere. Additional infrastructure investment that emphasizes resilience and redundancy, readiness enhancements, augmented training exercises, and improved cybersecurity operations would begin to address the problem. The EDI has already begun to improve the force posture and readiness situation, in both the land and air domains.³⁵ Resources should be earmarked for an increased F-15 presence, additional high-end training and exercises, and enhanced US Army and Air Force prepositioning of stocks and equipment.³⁶

To support this approach, the EDI should be made permanent. It currently enables the rotational armored BCT, as well as US Army-prepositioned equipment and stocks throughout Europe. The EDI, currently funded at \$6.5 billion for fiscal year (FY) 2019 (see Table 3), should be gradually increased throughout the FY19–23

28 US Department of Defense, *Summary of the 2018 National Defense Strategy of the United States* (Washington, DC: Department of Defense, 2018), p. 9, <https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>.

29 Scaparrotti, “Statement to the House Armed Services Committee,” pp. 17–18.

30 Ibid., p. 14.

31 Scaparrotti, “Statement to the United States Senate Committee on Armed Services,” p. 9.

32 This debate had largely been driven by defense analysis and war games that project that, without changes in its planning assumptions and posture, NATO could lose the Baltic states in a dedicated Russian attack from its western TVD (Russian theater of military operations) in a period of 60–72 hours. David A. Shlapak and Michael W. Johnson, *Reinforcing Deterrence on NATO's Eastern Flank: Wargaming the Defense of the Baltics* (Santa Monica, CA: RAND, 2016), 2016, https://www.rand.org/pubs/research_reports/RR1253.html.

33 NATO, “Warsaw Summit Communiqué,” paragraph 45.

34 Scaparrotti, “Statement to the House Armed Services Committee,” p. 18.

35 Scaparrotti, “Statement to the United States Senate Committee on Armed Services,” p. 15. Emphasis here is on the ABCT presence, CAB rotations, deployment of theater-security packages of bombers and fourth- and fifth-generation tactical aircraft, and additional military-to-military engagements and exercises.

36 For a discussion of future EDI requirements, see Scaparrotti, “Statement to the House Armed Services Committee,” p. 18.

Table 3: European Deterrence Initiative Categories (*\$ in Millions*)

Categories	FY 2018 Enacted	FY 2019 Enacted	FY 2020 President's Budget Request
Increased Presence	1,732.5	1,874.7	2,051.20
Exercises and Training	217.7	290.8	608.70
Improved Infrastructure	337.8	828.2	523.80
Enhanced Prepositioning	2,221.8	3,235.4	2,352.60
Building Partner Capacity	267.3	302.3	374.30
Total	4,777.1	6,531.4	5,910.60

Source: Office of the Under Secretary of Defense (Comptroller)/CFO, European Deterrence Initiative Department of Defense Budget Fiscal Year (FY) 2020 p. 1.

US Future Years Defense Program (FYDP), to a level approaching \$8-10 billion.³⁷

The EDI should then be transitioned out of the US Overseas Contingency Operations budget and moved permanently into the Defense Department base budget, so that it can be made a permanent part of the department's FYDP.³⁸ Working with the Army as its executive agent, EUCOM should work to systematically identify areas where additional resources could be programmed or reprogrammed through its Integrated Priority List (IPL) process.

The EDI has the political support of the US Congress; that support should be leveraged to enable a more permanent expansion of EDI that reflects the reality of a new frontline for NATO.

Maritime, Hybrid, and CT Capabilities

For the first time since the end of the Cold War, NATO is seeing the reintroduction of Russian naval vessels and strike capabilities into the North Atlantic, the Baltic Sea, and the Mediterranean—along with the reinvention of Russian “bastion defense” concepts.³⁹ NATO's

post-Cold War elimination of naval presence and power projection in the North Atlantic must be revisited, along with the standup of a formal naval strategic-command structure fully integrated into the defense planning of NATO's maritime nations, led by the United States and the United Kingdom. It will be critical to operationalize a new NATO maritime strategy, with a new set of key technologies and capabilities.⁴⁰ Critical capability areas that need to be addressed in the maritime domain include ASW, maritime engagement, and maritime mine countermeasures (MCM).

Hybrid warfare will also take on increased urgency for Alliance nations; NATO should also absorb the “lessons learned” related to hybrid warfare now evident on battlefields across the globe. Countering hybrid warfare must be elevated as a part of NATO collective defense. The Alliance is on record as stating that “it could invoke Article 5 of the Washington Treaty” to assist any Ally subject to a hybrid warfare attack; that policy should be backed up by dedicated national investment programs to counter hybrid-warfare attacks by incorporating four key strategy elements: countering the low-level use of force, cyberattacks, economic and political coercion and subversion, and information warfare.⁴¹

37 Office of the Under Secretary of Defense (Comptroller)/CFO, *U.S. Department of Defense Fiscal Year 2019 Budget Request* (Washington, DC: Department of Defense, 2018), pp. 4-8, https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2019/FY2019_Budget_Request.pdf.

38 The Department of Defense funds EDI at \$6.5 billion in fiscal year 2019, a good start in this direction. However, EDI is still located in the Overseas Contingency Operations (OCO) budget. *Ibid.*, p. 4.

39 For an excellent discussion of Russian naval developments affecting the North Atlantic, see John Andreas Olsen, ed., *NATO and the North Atlantic: Revitalizing Collective Defence* (Abingdon, UK: Royal United Service Institute for Defence and Security Studies, 2017).

40 NATO, “Warsaw Summit Communiqué,” paragraph 48.

41 Franklin D. Kramer and Lauren M. Speranza, *Meeting the Russian Hybrid Challenge: A Comprehensive Strategic Framework* (Washington, D.C.: Atlantic Council, 2017), <http://www.atlanticcouncil.org/blogs/natosource/meeting-the-russian-hybrid-challenge-a-comprehensive-strategic-framework-2>.

NATO nations should also look to counterterrorism (CT) improvements, particularly for those in the southern region. NATO's "arc of instability" includes the non-state terrorist threat from the south, which poses "a direct threat to the security of the citizens of NATO countries, and to international stability and prosperity."⁴² Working out of Naples, its regional hub in the south, NATO should promote a broad range of new technology initiatives for its member nations to help improve their understanding of the threat, fight the influx of foreign terrorists into Europe, stymie illicit financial networks, and develop new capabilities to defeat terrorism and improve consequence management. Investment resources could be effectively utilized in the Defense Against Terrorism Program of Work (DAT POW), the counter-CBRN (chemical, biological, radiological, and nuclear) effort, and the NATO Strategic Direction South Hub sponsorship of additional exercises, trials, and prototypes.⁴³

A Winning Defense Posture

A defense-planning mentality that tacitly acknowledges Russian aggression, and merely seeks to control any conflict in place, is not what is needed. NATO nations should not seek simply to defend their territory *in situ*, but be proactive and prepare to take the fight to the opponent's territory, disrupting the advance of follow-on forces, controlling escalation, limiting damage, and, finally, enabling NATO to prevail and end any conflict on terms favorable to the Alliance. Thus, NATO nations must place a premium on *deployed military technology* that promptly gets into the field, not on technology that is "promissory in nature," offering solutions 15–20 years into the future.⁴⁴ NATO planning should start from this basic premise—that the Alliance must have *in hand* the defense systems critical to fighting and winning military conflict at every level. Planning for anything less could run the risk of stalemate or defeat.

42 NATO, "Countering Terrorism," July 17, 2018, http://www.nato.int/cps/en/natohq/topics_77646.htm.

43 Ibid. Key R&D capabilities include counter-IED, counter-rocket attacks against aircraft and helicopters, and counter-CBRN.

44 Technology kept in basic research, exploratory development, or prototyped, as opposed to technology transitioned through engineering development and production, and eventually deployed and fielded.

PART TWO: RECOMMENDED PROGRAM IMPROVEMENTS

The objective of these improvement programs will be to mitigate and reverse current operational shortfalls, by targeting investments into procurement, research and development, infrastructure, and readiness. Key long-term planning goals should include:

- offsetting emerging capability gaps;
- seeking new force multipliers for the joint warfight; and
- obtaining new *deployed* defense capabilities with growth potential to counter evolving Russian threats.

Building on the capability areas and planning goals outlined above, NATO should develop a menu of program improvements across the full spectrum of defense domains: land, maritime, air, space, cyber, and information. An investment strategy for each of the major defense domains, as well as other critical areas, follows below.

The Land Domain: Infrastructure, Army, and Air Bases

The establishment of the 4,500-troop enhanced Forward Presence (eFP) was central to NATO's ability to respond to potential Russian aggression. The current four battalion-sized eFP battle groups must be enhanced with additional capabilities, to ensure greater flexibility and responsiveness. Central to NATO planning is the use of the five-thousand-troop Very High Readiness Joint Task Force (VJTF), which would reinforce the eFP as part of the NATO Response Force (NRF). A critical development has been the expansion of the NRF itself from thirteen thousand to forty thousand troops.⁴⁵

The broader issue facing NATO is to develop a defense strategy that deals with the effective reinforcement of

the Alliance's key defense frontiers in the event of conflict. NATO agreed at the 2018 Brussels Summit to a request by then-US Secretary of Defense James Mattis to increase Alliance readiness levels and ensure that "at least 30,000 troops, plus additional aircraft and naval ships, can reach a trouble spot within 30 days of NATO commanders putting forces on alert."⁴⁶ The NATO Readiness Initiative, known as the "Four Thirties," provides for "... an additional 30 major naval combatants, 30 heavy or medium manoeuvre battalions, and 30 kinetic air squadrons, with enabling forces, at 30 days' readiness or less."⁴⁷ Meeting this challenge will require significant infrastructure, readiness, and programmatic investments. A key consideration for NATO defense planners will be ensuring that the Alliance is able to respond to these planning metrics as expeditiously as possible, within the thirty-day timeframe. NATO should seek to meet these metrics closer to the front end, as opposed to the back end, of the thirty-day planning timeline.

To this end, NATO seeks to remove obstacles to military movement into and across Europe as part of a process being referred to as "enabling SACEUR's area of responsibility." NATO Command Structure adaption, announced at the 2018 Brussels Summit, included the establishment of Joint Force Command Norfolk to focus on the protection of transatlantic lines of communication, and a Joint Support and Enabling Command in Germany to ensure freedom of operation and sustainment in support of the rapid movement of troops into and across Europe. These two new commands will contribute to ensuring the timely reinforcement of eastern allies.

Member-nation infrastructure investments would enhance common networks throughout NATO, especially for the newest members in the northeast, and should be considered independently of timelines for reintroducing permanently stationed heavy forces. Infrastructure improvements should begin with the development and upgrade of port, airfield, and ground-transportation

⁴⁵ NATO, *The Secretary General's Annual Report 2017*, p. 12.

⁴⁶ Julian E. Barnes, "NATO Fears Its Forces Not Ready to Confront Russian Threat," *Wall Street Journal*, March 29, 2018, <https://www.wsj.com/articles/nato-moves-toward-readying-more-troops-to-confront-russian-threat-1522290156>. This report also noted that the US proposal "would have the alliance commit to 30 battalions, 30 fighter squadrons and 30 naval ships ready to deploy. That would translate to roughly 30,000 troops and more than 360 fighter planes."

⁴⁷ NATO, Brussels Summit Communique, paragraph 14.

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hubs into the Baltics and Black Sea/southeast regions to support the reception of heavy reinforcements. Additional investments are needed in indications and warning (I&W), logistics, telecommunications, transportation, host-nation support (HSN), and brigade reinforcements, to better enable prompt response planning and enhanced resilience.

In the Baltics, NATO member nations should support the expansion of road and rail networks, particularly through Germany and Poland up into the northeast—where the threat is potentially greatest. Infrastructure investment would be supplemented by building greater partner capacity and joint multinational training capabilities for the affected states (Poland, Latvia, Lithuania, and Estonia). Such an infrastructure effort should also focus on the development of the logistics footprint needed to conduct large-scale exercises supporting NATO's eFP and reinforcement in the east, as well as developing contingencies for the southeast.⁴⁸ Many of these initiatives could be resourced under the proposed expansion of the EDI.

Updated airfield site planning should be undertaken to support enhanced strategic lift capacity from the continental United States (CONUS) into both existing and newly constructed regional airfields in Europe, including the Nordic countries. Such an infrastructure expansion would include expanded airbase and runway construction in eastern Germany, Poland, and the Baltic states, to support C-5 and C-17 outsize and oversize cargo delivery directly into theater.⁴⁹ From a planning perspective, airbase development should be linked with the broader national highway, rail, and port infrastructure development, to encompass a comprehensive NATO member roadmap for future infrastructure and logistics improvements.

Follow-on contingency options could be built into this roadmap, to include options for the transportation of permanently stationed heavy forces, if required. Importantly, there will be a need to defend these new

airfields, so air-base defense plans and programs should also be integrated into NATO members' national defense plans, especially those of the Central European and Baltic countries.

Capabilities improvements are also in order for NATO's Readiness Action Plan (RAP). NATO member nations need to develop "just in time" stationing capabilities that would be moved into new infrastructure upon indication and warning (I&W) of imminent hostilities. For the RAP, this would involve increasing the overall readiness and sustainability of the forty-thousand-troop NRF and the five-thousand-troop VJTF, toward the goal of giving both elements joint operational capabilities in the air, land, special-operations, and maritime domains. At the 2018 Brussels Summit, NATO reiterated the importance of pursuing a coherent approach and synergies with the EU in the area of military mobility, in which NATO and EU countries would establish military mobility related procedures to allow the free movement of military forces and equipment throughout Europe in the event of a defense contingency.

National infrastructure improvements would augment the NRF land component considerably, by assisting in the transition from a five-thousand-troop, brigade-sized unit to a ten-thousand-troop, division-sized unit, as announced at the Warsaw Summit in 2016.⁵⁰ The objective would not only be to prepare for a conflict in the Baltics, but also for a broader, Europe-wide contingency. This would require the development of rapid-reinforcement strategies for additional battalions in all regions, as well as the accelerated deployment of additional armored BCTs (supported by the infrastructure improvements discussed above).

Increasing the eFP toward a force presence of 7–8 BCTs and thirty thousand troops is not politically practicable at this time, although it may very well be necessary in the future.⁵¹ NATO member nations should initially proceed with a technology- and infrastructure-based solution, followed by permanent stationing—if, and when,

48 With respect to the enhanced Forward Presence, NATO's increased presence in the east involves four multinational battle groups deployed on a rotational basis in Latvia, Lithuania, Estonia, and Poland, led by Canada, Germany, the UK, and the United States, respectively. These 1,000–1,200-troop infantry and mechanized infantry battalions form the heart of NATO's commitment to the defense of the Baltic states and Poland.

49 "Outsize cargo" refers to cargo transportable only on a C-5 or C-17 (e.g., an M-1 tank). "Oversize cargo" refers to cargo requiring a C-130 or larger (typically larger than one 463L pallet). Air University, "NWV Mobility Body," <http://www.au.af.mil/au/awc/awcgate/vistas/mobch2.pdf>.

50 At Warsaw, NATO agreed to enhance the NRF, "increasing its readiness and substantially enlarging its size, making it a more capable and flexible joint force comprised of a division-size land element with air, maritime, and special operations forces components." NATO, "Warsaw Summit Communiqué," paragraph 37.

51 Stationing troops permanently in Poland and the Baltics is an option worthy of full and serious consideration, and advanced by former high-level political and military officials. Ambassador (Ret.) R. Nicholas Burns and General James L. Jones, Jr., USMC (Ret.), *Restoring the Power and Purpose of the NATO Alliance: Deter our Adversaries, Stabilize our Partners, and Strengthen the North Atlantic Area through US Leadership in NATO* (Washington, DC: Atlantic Council, 2016), pp. 1, 14, <https://www.belfercenter.org/sites/default/files/legacy/files/Restoring%20the%20Power%20and%20Purpose%20of%20the%20NATO%20Alliance%20vF.pdf>.

the political consensus emerges to support such an option. Expanded infrastructure and logistics support will enable taking the fight to the Russians across all military domains throughout Europe.

Additionally, NATO member nations should consider expanding both the scope and composition of eFP deployments. The deployment of at least one additional rotational battalion into either Poland or the Baltic states would further expand eFP's response capacity and enhance Alliance resilience. Further, to underscore the seriousness of purpose of NATO's efforts in defense of its Baltic allies, the United States should deploy forces up to the company level into all of NATO's Baltic members.

A new air-mobility posture is also needed to implement an enhanced infrastructure and land-domain strategy. The Department of Defense, in concert with NATO defense planners, should immediately reassess NATO air-mobility requirements for the FY20–24 FYDP period and beyond. This reassessment should include a thorough review of the Department of Defense Mobility Requirements Study (MRS) and logistics support analyses, and also the Time-Phased Force Deployment Data (TPFDD) timelines associated with the EUCOM AOR, to ensure they are updated for the most stringent Baltic and Black Sea contingencies. Additionally, air-resupply and air-refueling plans should be updated to identify new locations for the deployment of both oversize and outsize cargo directly into the western parts of Poland, the Baltics states, and eastern Germany.

NATO defense planners should also reevaluate airfield and airbase access assumptions for the defense of the Baltic region. One potential initiative that should be seriously considered is the integration of Sweden into NATO's military-response options. In all likelihood, NATO will need access to Swedish airspace and sea space in the event of a NATO-Russian contingency in the Baltics. NATO should promptly engage in serious defense discussions with Sweden concerning the development of access plans to Swedish bases and airfields in the event of such a defense contingency.

Swedish-EUCOM defense contacts should be promptly elevated to the general-officer level. Sweden should consider participating in I&W activities, as well as NATO maritime, ISR, strike, and mobility exercises, with respect to the Baltic region. Finally, in concert with NATO defense planners, Sweden should evaluate

the feasibility of expanded air defense of its airfields and bases. Such an approach would facilitate greater NATO-EU defense cooperation, and provide the EU with a policy rationale for working on logistics, transportation, and resilience issues with NATO.

Technologies based on the US Third Offset Strategy are becoming available, and should be integrated into long-range NATO national defense plans in ways that will leverage them to defeat and disrupt advanced Russian threats. These technologies include the use of dedicated surface-to-surface missiles, joint precision strike, hypersonics, electromagnetic, directed energy, land-decisive munitions, and cyber assets against any frontal assault. These would be followed by the use of air and naval power to strike deep against follow-on forces—including strikes into Russian territory—to defeat the timing of and disrupt any Russian attack.

The US Army should focus on the Long Range Precision Fires (LRPF), focusing on Deep Strike, the LRPF missile (as an ATACMs follow-on), and Extended Range Cannon Artillery (ERCA) to provide the Alliance with capabilities to attack, neutralize, suppress, and destroy targets using missile-delivered indirect-precision fires. Field artillery units should be provided with long-range, deep-strike capability while supporting brigade, division, corps, Army, theater, joint, and coalition forces across the full range of NATO support operations.⁵²

NATO is structuring a more aggressive training-and-exercise program. This is a positive development, and provides a credible foundation to build upon. In 2017, NATO reported that it “conducted 108 exercises varying in scope, duration and form,” and that NATO was “associated with 181 national exercises.”⁵³ More recently, the Trident Juncture 18 exercise in central and eastern Norway and the maritime areas of the North Atlantic and the Baltic Sea was conducted from October 25–November 7, 2018. This air-land-sea exercise, led by Admiral James G. Foggo, commander of NATO's Joint Force Command Naples (JFC Naples), involved fifty thousand participating forces, “around 250 aircraft, 65 vessels and up to 10,000 vehicles.”⁵⁴

This is a solid record of close to three hundred total annual exercises, but it can—and should—be expanded to include additional exercises, especially ones associated with multinational battalion training in the Baltic states and Poland. Specific recommendations include:

52 The Army's *Weapons Systems Handbook* provides a full review of these capabilities. US Army, *Weapons System Handbook 2018* (Washington, DC: Office of the Assistant Secretary of the Army, 2018), <https://asc.army.mil/docs/wsh2/2018-wsh.pdf>.

53 NATO, *The Secretary General's Annual Report 2017*, p. 50.

54 NATO, “Trident Juncture 18,” October 25, 2018, https://www.nato.int/cps/en/natohq/news_158620.htm.



A US Air Force B-1B Lancer, assigned to the 28th Bomb Wing, flies over the Exercise Trident Juncture 18 joint-capability demonstration near Byneset, Norway, Oct. 30, 2018. *Credit:* U.S. Navy/Mass Communication Specialist 2nd Class Jonathan Nelson.

- **Additional military exercises.** NATO and its allies now conduct close to three hundred exercises. As infrastructure support expands, this should gradually increase by 10–20 percent (330–360) annually. Exercises similar to Trident Juncture should be continued regularly. Also, a return to highly focused, Reforger-like annual exercises would serve an integrating function for US airlift, tanking, and sealift assets, both into and out of newly expanded infrastructure.⁵⁵

- **Integrated urban warfare, hybrid, and cyber-defense exercises.** NATO has taken steps in each of these areas, particularly with its Cyber Defense Pledge, the NATO Cyber Range, and an agreed Countering Hybrid Warfare strategy.⁵⁶ Exercise planning should incorporate urban-warfare, hybrid-warfare, and cyber-defense scenarios into Alliance planning.

- **Integration of the Reserve Component (RC).** The development of national RC-augmentation plans into exercise defense strategies for the Baltics and

Poland should be considered, including the use of mobilization augmentations specifically for infrastructure-support missions.

The Maritime Domain

NATO member nations will also need to modernize in the maritime domain. Three central strategic considerations need to be considered: Russia's increased operational presence in the North Atlantic, its expanded fleet in the Black Sea, and the increasing likelihood that Syria could become a new Russian naval enclave in the Mediterranean for an extended period of time. All of these Russian naval developments will impact NATO's long-term naval strategy, policy, planning, and operations, and influence modernization and investment plans for years to come.

NATO's overarching goal should be free and open NATO access to the waterways of the North Atlantic, the GIUK gap, the Baltic Sea, the Norwegian Sea, the Black Sea, and the Mediterranean Sea.⁵⁷ Russia, learning from Chinese anti-access/area-denial (A2/AD)

⁵⁵ Reforger was a series of annual NATO exercises conducted during the Cold War to simulate the ability of primarily US forces to rapidly deploy to Germany upon outbreak of hostilities between NATO and Warsaw Pact forces.

⁵⁶ NATO, "Warsaw Summit Communiqué," paragraphs 71–72.

⁵⁷ The acronym Greenland-Iceland-United Kingdom (GIUK) gap has been used for decades to describe the ocean gap between the Norwegian Sea and the North Atlantic Ocean.

strategies, is seeking technologies and systems designed to make NATO maritime assets easier to target. Russia is also aggressively promoting a “bastion defense” concept, seeking to cut off naval access for power projection from North America to the continent of Europe. It is time for NATO to refocus on the centrality of the North Atlantic and develop a coherent, integrated naval strategy.

The 2017 RUSI Whitehall Paper stands as the most definitive strategic NATO maritime policy roadmap—its recommendations should largely be supported within NATO councils.⁵⁸ What NATO needs is a companion naval-investment roadmap, to support maturing naval policy and strategy development. NATO naval investment should seek to offset Russian A2/AD strategies with high-end technological counters in such areas as autonomy, robotics, cyber, electronic protection, sixth-generation air platforms, and new naval-strike weapons. This will require directing resources for technology development into such areas as

- advanced anti-submarine warfare (including resumption of intelligence monitoring out of Iceland, maritime mining, mine clearance/destruction, and advanced undersea submarine-detection technologies);
- advanced anti-surface warfare (including low observables);
- expanded electronic-warfare programs;
- high-end, long-range-strike hypersonic weaponry, electromagnetic rail guns, and naval-directed energy weapons;
- maritime-domain situational-awareness and hybrid-warfare capabilities;
- counter-tactical ballistic-missile defenses (naval TBM defense against S-400, Iksander land-attack, KH-101 land-attack, and Kalibr anti-ship threats);
- research and development (R&D) on autonomous maritime and unmanned underwater vehicles;
- advanced underwater communications;
- promotion of greater NATO maritime interoperability; and
- improved maritime-mine countermeasures.

In anticipation of naval action in an open-ocean environment, NATO maritime countries, led by the United Kingdom, should consider technology applications for unmanned carrier-based aerial refueling systems (UBARS), and unmanned combat aerial systems (UCAS) for ISR, airborne communications, and strike missions in the North Atlantic, Baltic Sea, and Norwegian Sea. Additional strike capabilities could be realized through the dedication of

a US attack submarine (SSN), with the Virginia Payload Module, on regular deployments in the North Atlantic.

Baltic Sea

NATO's maritime capabilities must also be upgraded in the Baltic Sea. A Baltic Maritime Component Command has been set up, and will augment NATO's overall maritime force structure. The operating assumption is that, in order to deter regional aggression based on advanced Russian A2/AD capabilities, NATO upgrades must focus on joint air-land-sea counters, rather than standalone naval capabilities. Consequently, capability upgrades cut across all major military domains, including cyber.

Germany will play a key role in efforts to build up surface and subsurface fleet capabilities. The Germans are already looking at two new naval construction efforts—a new F125 frigate to replace decommissioned frigates, and a joint common-submarine program with Norway to enhance anti-submarine and strike capabilities in the Baltic Sea. The common-submarine program, to be built in Germany, should be reevaluated for the feasibility of an increased buy beyond the current program of record, enabling a longer period of industrial production. Finally, additional maritime cooperation between Germany and the Netherlands should continue in the area of mine countermeasures.

Unlike the Black Sea, the Baltic Sea is an open maritime environment. NATO maritime strategy should focus on revitalizing “high-end” maritime capabilities, including counter-ASW, counter-UAS, counter-drone, and counter-hybrid. Baltic maritime capability upgrades in these areas should be logically interwoven with broader transatlantic naval considerations, so that NATO develops a coherent, fully integrated approach to capability upgrades in all maritime regions and domains.

Finally, NATO should seriously consider stationing a US littoral combat ship (LCS) in the Baltic on a rotational basis. The LCS deployment to Singapore should be used as a model. Such a deployment would serve to strengthen NATO's maritime forward presence and resolve, and would be seen as an essential element of a broader NATO maritime strategy to contest increased Russian naval activities and A2/AD capabilities. This would serve as an important linkage in renewed transatlantic maritime affairs.

The Black Sea

NATO nations risk placing themselves at a significant disadvantage to the Russian A2/AD threat in the Black

⁵⁸ John Andreas Olsen, ed., *NATO and the North Atlantic: Revitalizing Collective Defence*.



The amphibious dock landing ship *USS Carter Hall* (LSD 50) transits the Bosphorus Strait en route to the Black Sea to participate in exercise Spring Storm 2017. Credit: U.S. Navy/Lt. Sherrie Flippin.

Sea region, unless they undertake major new investments. A critical component of an integrated allied response to Russia's expansion of A2/AD capabilities in the Black Sea would be to augment air and maritime capabilities on NATO's southeastern flank. A formal NATO maritime mission in the Black Sea region, with Romania, Bulgaria, and Turkey, would be the logical first step, followed by partnering opportunities with Georgia and Ukraine.⁵⁹

Expansion of Romanian and Bulgarian land-based training facilities, as well as increased bilateral and multilateral naval exercises—taken in conjunction with further development of a land-based tailored forward presence, and Romania's effort to create a multinational-framework

training brigade under Headquarters Multinational Division Southeast—would serve to expand combined-operations capabilities for the entire region. Key technology thrusts should include ISR, special-operations forces (SOF), hybrid and cyber warfare, and standoff attack of inland hard and soft targets.

In 2017, the US Navy conducted an expanded set of deployments into the Black Sea with southeastern allies in support of both maritime-security operations and naval exercises. This occurred with US guided-missile, destroyer-sized warships on a rotational basis, in accordance with the legal limitations of the Montreux Convention.^{60,61} NATO should maintain a semi-permanent, rotational naval presence in the Black Sea region,

59 Burns and Jones, *Restoring the Power and Purpose of the NATO Alliance*, p. 14. The report notes that, "NATO should undertake to create a NATO maritime mission in the Black Sea region—led by Romania, Bulgaria, and Turkey and including partner countries Georgia and Ukraine—as a response to Russia's illegal annexation and subsequent militarization of the Crimean peninsula."

60 The US Navy conducted multiple maritime security operations with Romania and Bulgaria within the Black Sea region in 2017, including: the USS Porter (DDG-78), February 2017; the USS Carter Hall (LSD-50), March 2017; the US Oscar Austin (DDG-79), May 2017; the USS Carney (DDG-64), July 2017; and Exercise Sea Breeze with the USS Hue City (CG 66) and the Ukrainian auxiliary ship Balata (U811) in July 2017. See US Navy, "U.S. Naval Forces Europe-Africa/U.S. 6th Fleet," <http://www.c6f.navy.mil/tags/black-sea>.

61 The 1936 Montreux Convention limits the total number of foreign capital ships passing through the Turkish Straits to nine, with a maximum tonnage of less than 15,000 tons per vessel. The maximum tonnage that foreign navies may have in the Black Sea is 45,000 tons, with the maximum for any one limited to 30,000 tons. Foreign naval vessels cannot stay in the Black Sea for more than twenty-one days, with proper notification given to Turkish naval authorities.

through the use of Montreaux-compliant warships. Such a posture, led by the United States, would regularize rotational deployments of NATO warships in the region, and would contribute to both naval presence and confidence building for NATO's Black Sea maritime nations.

In support of such a posture over the long term, NATO should consider the development of an affordable, common-hulled NATO strike frigate, based initially on a US FF (X) or LCS hull, and then collaborate on design and construction of an entirely new hull for Alliance-wide development and potential co-production.

The long-term goal would be to establish a NATO-wide maritime force in the Black Sea region, capable of regular, near-seamless deployments into and out of the Mediterranean and Black Seas, as a means to enhance naval forward deployments and maritime presence, while increasing situational awareness and naval power projection.

Such a treaty-compliant program would display a full NATO commitment to the security of its allies and friends in these regions. A NATO-wide naval-construction program would induce cost sharing and spread naval capabilities across a broader spectrum of alliance partners. Additionally, the United States should consider regularizing carrier-based or amphibious-based deployments in the Mediterranean.

The Air Domain

Air superiority is absolutely essential for NATO as it reaches its seventieth anniversary. While the air domain is historically a strong one for the Alliance, Russia continues to invest in high-performance, fourth generation-interceptors, and is moving toward advanced fifth-generation capabilities in an effort to complement its land-based buildup throughout the region.

Current Russian tactical air-production programs include interceptors, multi-role fighters, and fighter-bombers such as the

- twin-engine SU-27 Flanker fighter;
- multirole MIG-29M Fulcrum-E;

- multirole, all-weather SU-30 Flanker;
- medium-range SU-34 Fullback fighter-bomber; and
- twin-engine multirole SU-35 Flanker-E.

Russia is also reportedly investing in advanced MIG-35 and MIG-41 developmental aircraft, which—once developed and fielded—could contest allied air superiority. A recent Russian press report highlighted movement toward initial fifth-generation fighter capabilities with the SU-57.⁶²

NATO should never cede the air domain to Russia; rather, its overmatch here should be widened in such a way as to negate and offset Russia's attempt to gain a land-based military advantage. This should include consideration of faster deployments of stealth fighters by NATO members taking part in the international F-35 program. National efforts should focus on air superiority, air-to-ground capability, and joint precision strike.

The US Air Force is laying the groundwork for air superiority in Europe with the deployment of the F-35A. Some eight F-35As from the 34th Fighter Squadron trained in England, alongside F-15s from the 48th Fighter Wing flying out of RAF Lakenheath in 2017. During that 2017 spring exercise, the F-35 flew a total of seventy-six sorties and accumulated 154 flying hours.⁶³ The exercise deployment involved missions to Estonia, and required the deployment of a "tanker bridge" from CONUS. C-5 and C-17 transport aircraft were used to provide essential airlift support, maintenance equipment, and personnel for the exercise. The United States is planning a permanent deployment of the F-35A to England by 2021.

The UK role in NATO's retention of air superiority is also critical, and the UK's 2015 *Strategic Defense and Security Review* strongly emphasized improvements throughout the air domain.⁶⁴ The United Kingdom, a key F-35 partner country, declared F-35B initial operating capability in January 2019, following completion of US stateside evaluation and training in 2018.⁶⁵ The UK has committed to buying 138 F-35s, with two F-35 Lightning squadrons to be fielded by 2025.⁶⁶ The United Kingdom could do more to leverage the

62 "Russia's Defense Ministry to Sign Contract for 12 SU-57 Fighter Jets," TASS, February, 8, 2018, http://www.defense-aerospace.com/articles-view/release/3/195409/russia-to-sign-contract-for-su_57-fighters-by-end-of-summer.html.

63 See Malcolm Mayfield, US Air Force press release, "F-35 Complete First European Training Deployment," May 8, 2017, <http://www.af.mil/News/Article-Display/Article/1176231/f-35-complete-first-european-training-deployment/>.

64 HM Government, *National Security Strategic and Strategic Defense and Security Review: A Secure and Prosperous United Kingdom* (London: Her Majesty's Government, 2015), pp. 28-29, 31-32.

65 Tony Osborne, "Braced for Change: RAF Commanders Want to Send the F-35 into Theater Once it is Operationally Ready," *Aviation Week and Space Technology*, March 28-April 10, 2016, pp. 38-39.

66 HM Government, *National Security Strategic and Strategic Defense and Security Review*, pp. 28, 31.

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capabilities of F-35B, including linking its communications network to other platforms.⁶⁷

Given a security environment in which Russian double-digit SAMs pose an increasing threat to fourth-generation fighters, US and UK F-35 deployments should be accelerated, as should those of the other five F-35 partner countries (Denmark, Netherlands, Italy, Norway, and Turkey), if practical. With Belgium's decision to acquire the F-35, other NATO members should likewise consider this option. As US F-35 production begins to ramp up in the FY2019–23 timeframe, NATO partner nations will begin to see more beneficial pricing, through both production learning-curve savings and the possibility of more economical buys.

An F-15 presence should be retained in Europe for as long as necessary. Given the F-22's importance in the Asia-Pacific, an F-15 European presence is all the more critical. As part of EDI infrastructure and exercise augmentation, NATO should increase its scheduled F-35 and F-15 training operations and deployments into both Poland and the Baltic states. In the longer term, NATO countries should partner with the United States in future technology development to integrate both unmanned air vehicles (UAVs) and sixth-generation fighter capabilities into NATO's theater-wide defense plans.

NATO nations should also look to improve their long-range conventional-strike capabilities in the European theater. EDI-funded exercises involving the B-52 should continue, and gradually shift to the younger, high-payload B-1. The United States should consider six to twelve B-1s in a conventional-strike role for Europe, be they forward deployed or in rapid redeployment, for the purpose of conducting long-range, standoff, high-volume precision attacks against both mobile and fixed ground targets.

Another goal in the air domain should be to enhance "smart defense" capabilities throughout the Alliance, via precision-guided munitions (PGMs).⁶⁸ A December

2016 agreement by the NATO Support and Procurement Agency offers tremendous promise, allowing the United States to acquire PGMs for up to nine allied nations.⁶⁹ The expansion of medium-to-high-volume PGM capabilities among non-US NATO members is critical if they are to close the gap with the United States in this area.⁷⁰

NATO's encouragement of "smart defense" rebalancing is also a critical enabler for multinational Alliance efforts in intelligence, surveillance, and reconnaissance (ISR).⁷¹ At the Chicago Summit in 2012, NATO began the process of collaborating on joint ISR (JISR). A significant feasibility study in this regard was completed in 2015.⁷² A JISR attained initial operating capability in 2016, and a NATO Alliance Ground Surveillance (AGS) capability in 2017.⁷³

JISR is an air-domain capability worthy of substantial additional investment. Additional resources could also be effectively utilized in such areas as intelligence sharing and support to NRF rotations. Allied collaboration here would seek a more robust and systematic application of technologies for wide-area ISR, ground moving-target indicators (GMTI), broad-area maritime surveillance, and airborne communications relay.⁷⁴ Additionally, the time is ripe to consider maritime and battlefield applications of UAVs for ISR and reconnaissance, surveillance, and target-acquisition (RSTA) applications, and deployment of additional airborne intelligence-collection platforms.

The NATO AWACS program is proceeding as planned, with the full fleet having been modernized at the end of 2018. Modernization plans for NATO AWACS call for extended service through 2035. NATO AWACS is used in both airborne early-warning/battle-management and base-defense/counter-air missions.

NATO should accelerate the Alliance Future Surveillance and Control System (AFSACS)—the follow-on NATO AWACS capability replacement—and conduct the program with far more urgency. It will be important

67 Daniel Gouré, "How the F-35B will Lead the British Navy into the 21st Century," RealClear Defense, August 10, 2017, http://www.realcleardefense.com/articles/2017/08/10/how_the_f-35b_will_lead_the_british_navy_into_the_21st_century_112018.html.

68 The overwhelming US advantage in PGMs, in combination with low-observable aircraft, has been cited as a prime reason for the quick US victory over Iraq in the 1991 Gulf War. Andrew Krepinevich and Barry Watts, *The Last Warrior: Andrew Marshall and the Shaping of Modern American Defense Strategy* (New York: Basic Books, 2015), p. 198. For an excellent air history of Operation Desert Storm, see James P. Coyne, *Airpower in the Gulf* (Arlington, VA: Air Force Association, 1992), chapter 9, "Technology Meets the Test," pp. 116–118.

69 The eight nations comprising the multinational cooperation framework include Belgium, the Czech Republic, Denmark, Greece, Netherlands, Norway, Portugal, and Spain. A follow-on agreement to include Poland was also reached. NATO, "Group of Allies Sign Off On Multinational Precision Guided Munitions Order," December 15, 2016, http://www.nato.int/cps/en/natohq/news_139432.htm?selectedLocale=en.

70 See NATO, "Smart Defence," February 20, 2017, http://www.nato.int/cps/en/natohq/topics_84268.htm?selectedLocale=en.

71 NATO, "Warsaw Summit Communiqué," paragraph 78.

72 *NATO Multinational Joint Intelligence Surveillance and Reconnaissance Unit: A Feasibility Study* (Kalkar, Germany: Joint Air Power Competence Center, 2015), https://www.japcc.org/wp-content/uploads/JAPCC_MJISRU_web.pdf.

73 NATO, "Warsaw Summit Communiqué," paragraphs 75–76.

74 Candidate platforms include the US Global Hawk, Romanian Hirus, and Belgian B-Hunter.



NATO’s first Alliance Ground Surveillance aircraft arrived at Edwards Air Force Base, Calif., Dec. 19, 2015, completing its first flight. Credit: US Air Force/Chris Okula.

to expand the program beyond the sixteen NATO AWACS aircraft and to adopt a “systems approach” to early warning and airborne command and control.

NATO should also reevaluate expanding its \$3 billion AGS program—consisting of five Global Hawks and the associated ground command-and-control systems to be based in Sigonella, Italy—across all of Europe. Such a program would consider the dual addition of more satellite-communications (SATCOM) bandwidth and more NATO Global Hawk deployments over the entire continent, including the eastern and southeastern approaches. NATO should be forward looking, anticipating an Alliance-wide increase in the demand for NATO Global Hawk AGS, and a broader expansion of SATCOM capabilities. An expanded Global Hawk AGS Core program would go beyond the current five Global Hawks, to ensure year-round, dedicated systems for the Black Sea region (including Romania, Bulgaria, Greece, and Turkey).

The future of air warfare over land continues to evolve in ways unforeseen even one decade ago. The possibility of “drone wars” in the skies above the land battle

in Europe is something for which NATO should begin to plan. This is already occurring in Syria and Iraq, with the use of small, unmanned, aerial systems (UAS) on the battlefield.⁷⁵ NATO should undertake a comprehensive “lessons learned” study on the battlefield use of drones in the counter-ISIS conflict, toward the goal of identifying the most-likely future technology threats and potential Alliance-wide defense applications, in anticipation of aggressive Russian UAS investment.⁷⁶

Given Europe’s population density, NATO nations should evaluate non-kinetic means of defeating and disabling drone attacks. Defensively, NATO should evaluate the efficacy of non-lethal counter-UAS (C-UAS) technologies that fully exploit the electromagnetic spectrum (e.g., jamming, interference, and drone capture). Offensively, NATO should begin a drone-technology application program to prototype and test small explosive/IED drone UAVs for battlefield “swarm” defense applications. The development of swarm operational planning and tactics would be a major element of this effort.⁷⁷

NATO should bolster its Predator and Reaper deployment plans by enabling expanded day-night full-motion-video

⁷⁵ Dan Gettinger, *Drones Operating in Syria and Iraq* (Annandale-on-Hudson, NY: Center for the Study of the Drone at Bard College, 2016), <http://dronecenter.bard.edu/files/2016/12/Drones-in-Iraq-and-Syria-CSD.pdf>. There are five categories of US Department of Defense unmanned aerial system (UAS) group definitions. A program in the small UAS area would primarily involve UAS systems Group 1 (0-20 pounds, less than 1,200 feet) and Group 2 (20-50 pounds, less than 3,500 feet).

⁷⁶ Ibid. Russian small UAS systems reportedly used in the Syrian conflict include the Eleron 3SV, Oral 10, Pchla-1T, and Ptero-GO.

⁷⁷ A NATO technology-applications program in this area should logically be led by the United States.

(FMV), signals-intelligence (SIGINT), and synthetic-aperture-radar (SAR) applications. This effort should include the Predator B/Brimstone, Predator B/Paveway, and MQ-9 Reaper deployments, and—as the technology matures into the next several decades—deployments of sixth-generation, air-to-air, and air-to-ground tactical aircraft.

Additional research should be started in advanced weapons technology. As outlined in the maritime section, NATO should develop technologies related to high-end, long-range strike—including hypersonic weaponry (Mach +5), electromagnetic rail gun, and, potentially, directed-energy weapons. Considerable US R&D is already ongoing in these areas, especially in hypersonic technology (tactical boost-glide and hypersonic air-breathing weapons concepts). US research into advanced weapons technology should be leveraged throughout the Alliance for potential applications by key member and partner countries.

The Space Domain

There will be a recurring need for NATO to improve the survivability and durability of its space and SATCOM capabilities. As laid out in the 2014 US *Quadrennial Defense Review*, “global communications and military operations depend on freedom of access in space,” making security in the space domain “vital to our ability to project power and win decisively in conflict.”⁷⁸ NATO nations should begin the space-defense planning process from the proposition that SATCOM and bandwidth issues will only become more acute and complex, due to probable increases in Alliance-wide requirements.

Requirements in key space areas have increased substantially in recent years, due to increases in operational tempo (OPTEMPO). NATO AGS itself will place a large demand on SATCOM and bandwidth capacity.⁷⁹ The space-communications effort should work in parallel with NATO's broader ISR communications initiatives to provide extended SATCOM coverage and bandwidth across a much wider NATO geographical footprint—one that will range from the Baltics to the Black Sea.

NATO's SATCOM Post-2000 program (NSP2K) offers NATO militaries improved satellite communications at

both ultra-high frequencies (UHF) and super-high frequencies (SHF), as well as expanded capabilities in voice and data, out to the year 2019. This set of improvements has become especially important for NATO in the consideration of potential tactical and overseas missions.⁸⁰

NATO should immediately begin to plan for a follow-on NSP2K communications program, to extend and enhance these capabilities well into the 2020–40 timeframe. NATO's Communications and Information Systems Agency (NCSA) would take the lead on reallocating bandwidth and user traffic within prospective satellite capacity.

NATO must also be prepared to protect and defend its space-based assets from space-based or land-based attacks. Space situational awareness is a critical concern. It includes not only space-based threats to NATO satellites, but also potential land-based threats to mobile and fixed ground stations. NATO space architectures should take space system and subsystem survivability into account from the beginning, rather than as mid-life system modifications.

“Cyber defense has become a core task of NATO's collective defense, with cyber now a warfare domain, just like land, sea, air, space, and information.”

The Cyber Domain

Cyber defense has become a core task of NATO's collective defense, with cyber now a warfare domain, just like land, sea, air, space, and information. Russia has shown a willingness and proclivity to use cyber intrusions in military contexts—and, now, in electoral contexts, as evidenced by its intrusions into the 2016 US presidential election. Cyber threats emanating from Russia can only be expected to increase in coming years.

Potential cyberattacks fall into three primary categories—denial-of-service, physical destruction of critical infrastructure, and malware. Past Russian attacks on

78 US Department of Defense, *Quadrennial Defense Review 2014* (Washington, DC: Department of Defense, 2014), p. 20, http://archive.defense.gov/pubs/2014_quadrennial_defense_review.pdf.

79 Julian Barnes, “NATO Invests in More Bandwidth for New Data-Hungry Drones,” *Wall Street Journal*, March 28, 2017, <https://www.wsj.com/articles/nato-invests-in-more-bandwidth-for-new-data-hungry-drones-1490601588>.

80 The program, which provides NATO militaries with access to national satellite-communications systems, is run under a NATO consortium led by the United Kingdom, (SKYNET 4&5), France (SYRACUSE 3), and Italy (SICRAL 1 and 1Bs). NATO, “SATCOM Post-2000: Improved Satellite Communications for NATO,” December 15, 2011, http://www.nato.int/cps/en/natohq/topics_50092.htm.

Georgia, Estonia, and Ukraine have generally fallen within these categories.⁸¹

Through its Cyber Defense Pledge, NATO has agreed to augment cyber defense “as a matter of priority.”⁸² The development of a NATO-wide cyber strategy, focused on operational capabilities, is essential to developing successful defense plans in this area.⁸³ The establishment of a Cyber Operations Center in Belgium at the 2018 Summit will provide improved situational awareness and coordination of NATO operational activity in the cyber domain.

This dynamic is opening up an entirely new battlefield ripe for additional NATO defense cooperation and investment.⁸⁴ What is needed, in addition to sound strategy, is a concerted, well-reasoned resource plan in which all members apply fiscal resources to the areas of highest collective need—the vulnerability of NATO member civilian and military networks—in a timely manner. Moreover, cyber and space defense need to be integrated in a more coherent fashion.

Additional resources should be directed toward:

- alliance-wide network compatibility;
- alliance-wide cyber education, training, and exercises;
- information sharing on cyberattack prevention, mitigation, and recovery;
- NATO-EU cyber-defense cooperation on information exchange, training, research, and exercises;
- additional cooperation with industry, via the NATO Industry Cyber Partnership;
- integration into national operational defense planning; and
- expansion of the NATO Cyber Range.

All NATO members' defense programs should identify cyber defense as a high national defense priority. Each

member should develop its internal cyber-defense-resource plan, share that plan with NATO, and clearly identify its national cyber-resource needs and priorities.⁸⁵ This would facilitate greater transparency and coordination between national cyber R&D efforts.

Cyber defense should become a new element of the NATO Defense Investment Division, reporting directly to the Conference of National Armaments Directors (CNAD). Finally, every effort should be made to meet US and UK cyber-defense standards, so that Alliance-wide cyber-defense programs have the highest degree of commonality.

Air and Missile Defense

Missile defense has been a high NATO priority ever since the Lisbon Summit in 2010. As highlighted in the 2016 Warsaw Summit Communiqué, “[t]he threat to NATO populations, territory, and forces posed by the proliferation of ballistic missiles continues to increase, and missile defense forms part of a broader response to counter it.”⁸⁶ NATO ballistic-missile defense (BMD) is clearly an area deserving of additional investment.

An interim BMD capability was declared at the Chicago Summit in 2012, following the initiation of the Enhanced Phased Adaptive Approach (EPPA) by the Barack Obama administration. EPPA was designed to address the evolving regional ballistic-missile threat, primarily from outside the Euro-Atlantic area (emanating from the southeast, not the east).⁸⁷ An initial operating capability (IOC) for NATO BMD was declared at the Warsaw Summit in 2016.⁸⁸

To date, NATO ballistic-missile defense has progressed in three phases, in accordance with supportive US policy:⁸⁹

- **Phase I:** Deployment of BMD-capable Aegis ships with the SM-3 interceptor for mobile capability to ad-

81 In the case of the 2008 Georgia war, cyberattacks were instigated prior to the initiation of kinetic warfare. A similar pattern has been witnessed in Ukraine.

82 NATO, “Warsaw Summit Communiqué,” paragraph 71. NATO agreed “that cyber defense is a part of NATO’s core task of collective defense” at the 2014 Wales Summit.

83 See Kramer and Speranza, *Meeting the Russian Hybrid Challenge*, pp. 1–2, 8–9, 12–13.

84 NATO, “Warsaw Summit Communiqué,” paragraphs 70–71.

85 The authors assume the high likelihood that this report would need to be classified.

86 NATO, “Warsaw Summit Communiqué,” paragraph 55.

87 NATO has repeatedly made this fact known to Russia, which continues to assert that NATO BMD poses a threat to its territory. NATO, “NATO-Russia Relations, the Facts,” September 7, 2018, http://www.nato.int/cps/en/natohq/topics_111767.htm?#cl202.

88 NATO, “Summit Meetings,” July 19, 2018, http://www.nato.int/cps/cn/natohq/topics_50115.htm#.

89 White House Office of the Press Secretary, “Fact Sheet on U.S. Missile Defense Policy: A Phased, Adaptive Approach for Missile Defense in Europe,” September 17, 2009, <https://obamawhitehouse.archives.gov/the-press-office/fact-sheet-us-missile-defense-policy-a-phased-adaptive-approach-missile-defense-eur>. The United States also considered a Phase 4 effort in the 2020 timeframe involving deployment of the SM-3 Block IIB to “help better cope with medium- and intermediate-range missiles and the potential future ICBM threat to the United States.”

dress regional missile threats. This included forward deployment of Aegis-BMD ships to Rota, Spain;

- **Phase II:** The introduction of the Aegis Ashore site in Deveselu, Romania, in 2016, providing protection for much of the southeastern part of NATO; and
- **Phase III:** Deployment of the Polish Aegis Ashore site, now delayed to 2020 (with the SM-3 Block 2A missile), providing BMD coverage for all NATO territory.⁹⁰

NATO must now move aggressively, with full continental BMD coverage for all of Europe.⁹¹ The combination of Aegis-capable BMD ships in Rota and the Aegis Ashore site in Romania form the foundation for this capability. However, the Romanian site will ably protect the southeast, but not the major cities of Paris, Berlin, and London. Planned NATO expansions of early-warning capabilities in Turkey, a new Aegis Ashore site in Poland, and the completion of a NATO BMD command-and-control (C2) system offer the basis for the mature evolution to continent-wide protection.⁹²

To obtain full continental coverage, NATO must complete the Polish site (Aegis Ashore 5.1 site at the Redzikowo military base, with the SM-3 Block 2A missile), advance the deployment of early-warning radars in Kuricek, Turkey, and complete BMD C2 functionality efforts. The IOC goal for the Polish site, with NATO to assume control, has been delayed until 2020. Additional voluntary national contributions should be directed toward BMD sensors and interceptors, with common funding going to support C2/battle-management capabilities (C2/BMC), to fully mature NATO's BMD C2 system.

As NATO-wide BMD architecture matures, NATO should evaluate the utility of deploying other types of air and missile-defense systems, including those currently deployed in theaters outside of Europe, such as Asia and

the Arabian Peninsula. Finally, NATO leaders should hold firm on their present policy course, and disregard near-sighted appeals—emanating from the disarmament lobbies within both the United States and Europe—to cancel the Polish site.

Russian arms-control objections to continent-wide BMD deployments should be dealt with resolutely. NATO should continue to justify its BMD efforts within the context of the ballistic-missile threat emanating from the southeast. Russia's own track record of arms-control noncompliance displays a lack of seriousness concerning cardinal principles of cooperative arms control—mutual compliance, reciprocity, and transparency.⁹³

NATO should also develop an integrated air- and missile-defense (IAMD) system architecture to counter growing next-generation threats from advanced Russian aircraft, cruise missiles, UAVs, and short-range and tactical ballistic missiles. Key modernization considerations should include full-sector/360-degree coverage, improved interoperability, and growth potential against future threats. Poland is taking the lead for NATO in this regard, and should be looked to as a model by other members of the Alliance.⁹⁴

The United States and Poland recently signed a seminal agreement that enables Poland to acquire the Phase I, \$4.6 billion Patriot missile defense.⁹⁵ NATO fully supports Polish air-defense efforts that focus on obtaining increased mobility and longer-range firepower for its IAMD systems. The US Defense Security Cooperation Agency (DSCA) reported that the Polish program includes: four radar sets; engagement-control stations and radar interface units (RIUs); sixteen launching stations; 208 Patriot PAC-3 Missile Segment Enhancement (MSE) missiles; and six Integrated Air and Missile Defense Battle Command System (IBCS) engagement

90 Marcin Gocłowski and Lidia Kelly, "Poland says US missile shield site delayed until 2020," Reuters, March 22, 2018, <https://www.reuters.com/article/us-poland-defence-usa/poland-says-u-s-missile-shield-site-delayed-until-2020-idUSKBN1GY2RE>.

91 More than twenty-five countries possess various ballistic-missile systems of short, medium, and intercontinental ranges. North Korea's ICBM program is within what appears to be 12–18 months of deployment, and Iran's ballistic-missile program was left unrestricted by the Joint Comprehensive Plan of Action (JCPOA). JCPOA restricts Iranian nuclear programs over the next 10–15 years, but not its missile programs.

92 NATO, "Warsaw Summit Communiqué," paragraphs 55–57.

93 The US State Department continues to document Russian violations of the INF Treaty, and Russia has walked away from the CFE Treaty. US Department of State, *2018 Report on Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments* (Washington, DC: State Department, 2014), p. 8, <https://www.state.gov/t/avc/rls/rpt/2018/280532.htm>. The 2014 State Department report found that "the Russian Federation is in violation of its obligations under the INF Treaty not to possess, produce, or flight-test a ground-launched cruise missile (GLCM) with a range capability of 500 km to 5,500 km, or to possess or produce launchers of such missiles."

94 The NATO "air defense front line," as defined here, includes all Alliance members with a contiguous border with Russia, Belarus, Armenia, Syria, and the Black Sea region. This includes Poland, Latvia, Lithuania, and Estonia in the east, and Romania, Bulgaria, and Turkey in the southeastern Black Sea region.

95 US Department of State, press release, "Poland: United States and Poland Sign the Patriot Deal," March 28, 2018, <https://www.state.gov/r/pa/prs/ps/2018/03/279632.htm>. The State Department reports that the agreement includes "a brand new state-of-the-art command and control system for Poland's air and missile defense," and highlights the deal as an example of Poland's commitment to its 20-percent NATO equipment pledge.



Aegis Ashore Missile Defense Complex in Devesulu, Romania. *Credit:* US Missile Defense Agency.

operations centers.⁹⁶ Poland plans to acquire its first Patriot fire units with a 120-degree sectional radar, but is also evaluating 360-degree radar capabilities. Such a missile-defense solution would provide Poland and NATO allies on the air-defense “front line” the capability needed to catch up to the expanding Russian threat.⁹⁷ The total value of the US-Poland Patriot deal could reach \$10.5 billion. Additional options worthy of consideration include connecting Poland’s planned air-defense systems (e.g., Patriot) with those of its Baltic neighbors and, in the south, encouraging Romania to complete its purchase of up to seven Patriot fire units.

Other NATO members should seriously consider emulating the Polish and Romanian air- and missile-defense initiatives. NATO members in southeastern Europe—including the Black Sea countries of Bulgaria and Turkey—should consider developing air-defense capabilities. Each country should consider an integrated deployment plan, involving medium- and extended-range systems,

and also integrating low-tier air-defense options for point defense and force protection. If cost is an issue, countries should evaluate the feasibility of available lower-cost interceptors to be used, in addition to existing radar and command-and-control components.

The countries in NATO’s southeast region have a different threat problem—one that includes traditional aircraft, cruise missiles, and tactical ballistic missiles (TBMs), but also a next-generation target set of subsonic, low-flying UAS, UAVs, and homemade drones. As evidenced by the ongoing Syrian Civil War, both terrorists and nonstate actors can deploy next-generation UAS and drones. NATO members should begin counter-UAS R&D efforts now. These should focus on the threats that UAS and drones pose to ports, airfields, and infrastructure. A non-lethal C-UAS program, as opposed to a kinetic one, will be essential in this regard, to protect urban, suburban, and collocated infrastructure from excessive collateral damage.

⁹⁶ For details, see Defense Security Cooperation, “Poland—Integrated Air and Missile Defense (IAMD) Battle Command System (IBCS)-enabled Patriot Configuration-3+ with Modernized Sensors and Components,” November 17, 2017, <http://www.dsca.mil/major-arms-sales/poland-integrated-air-and-missile-defense-iamd-battle-command-system-ibcs-enabled>.

⁹⁷ While both a modernized Patriot system with 360-degree coverage and the MEADS system would potentially meet the requirement, there are advantages and disadvantages with both system options. The Patriot solution would be available earlier, offering a more time-sensitive solution. MEADS offers a more comprehensive solution, with the advantage of a 360-degree radar, and superior agility, transportability, and mobility.



A NATO E-3A Sentry Airborne Warning and Control System (AWACS) aircraft sits on the tarmac in Konya, Turkey. *Credit: NATO*

Counterterrorism (CT)

Terrorism poses an ever-present threat to NATO countries and their citizens. NATO, part of the Global Coalition to Counter ISIS, recognizes terrorism as a “persistent global threat that knows no border, nationality or religion and is a challenge that the international community must tackle together.”⁹⁸ While NATO effectively began its fight against terrorism with its support to US combat operations in Afghanistan, it must now look within its own borders at a threat that is immediate, and increasingly deadly.

The southern border of NATO forms what is now considered an “arc of insecurity and instability” for the Alliance, with transnational threats emerging from both the Middle East and North Africa.⁹⁹ ISIS-inspired attacks hit the cities of Paris, Berlin, Brussels, and Istanbul, as well as Nice, in 2016. Such attacks continued into 2017, and included London, Manchester, Barcelona, and Istanbul.

These attacks further evidenced the reality and seriousness of the problem. ISIS-linked arrests escalated

during the past two years, as hundreds of its foreign fighters are now believed to be residing in NATO and EU countries.

NATO has established its own regional hub for the south at NATO's JFC Naples, and is cooperating with moderate Arab states by opening a regional CT center in Kuwait.¹⁰⁰ US EUCOM activities are also becoming increasingly important in CT realms of relevance to NATO, including halting the flow of jihadists into NATO Europe, disrupting indigenous networks, thwarting illicit financial transactions, and stopping the trafficking of small arms, light weapons, and potential weapons of mass destruction (WMD). Operational progress to date is impressive. NATO should continue to support Operation Sophia, which is critical to southern ISR and logistical support to Libyan capacity building.

NATO's Defense Against Terrorism Program of Work (DAT POW), which began in 2004, addresses technological counters to these threats, as well as issues such as consequence management and infrastructure protection. Modern terrorist technology threats include: conventional and unconventional weapons;

98 NATO, “Countering Terrorism,” July 17, 2018, http://www.nato.int/cps/en/natohq/topics_77646.htm.

99 NATO, “Warsaw Summit Communiqué,” paragraph 5.

100 Jens Stoltenberg, “NATO's Vital Role in the War on Terror,” *Wall Street Journal*, May 24, 2017, <https://www.wsj.com/articles/natos-vital-role-in-the-war-on-terror-1495665078>.

improvised explosive devices (IEDs); chemical, biological, radiological, and nuclear (CBRN); and cyberattacks. DAT POW's 2017 work program is extensive, and places significant emphasis on countering IEDs/EOD, aircraft survivability, CBRN, and special-operations-force (SOF) technology.¹⁰¹

Additional progress is needed in the development of CT technology. Key technology areas that DAT POW should examine for additional national investment include:

■ *Incident Management*

- airspace security: infrared countermeasures (IRCM);
- air and missile defense: missile and rocket defense (e.g., Iron Dome-like systems), and nonlethal counter-UAS;
- maritime/port security: protection of harbors and port points of entry (POEs) with advanced sensors and imaging technologies, unmanned underwater vehicles (UUV), and underwater magnetic barriers complementing sonar and counter-IED solutions; and
- development and integration of systems-incident-management architectures.

■ *Force Protection and Survivability*

- base protection: counter-MANPADs (e.g., IRCM, flares), CBRN detection, counter-IED, counter-UAS, explosive-ordnance disposal (EOD), and nonlethal technologies;
- Alliance-wide military base, facility, and expeditionary force survivability assessments;
- integration of special-operations-force (SOF) technologies;
- information sharing on foreign fighters (e.g., expand Battlefield Information and Collection and Exploitation System (BICES)); and
- cyber network defense.

■ *Critical Infrastructure Protection*

- physical vulnerability assessments of key defense-support infrastructure (e.g., energy, transportation, water, emergency services);
- updated supervisory control and data acquisition

(SCADA) system architectures to mitigate the effects of cyberattacks;

- relocation plans or redundancy for servers, switching centers, and electric power systems;
- building glazing-protection and facade-detailing standards;
- back-up relocation sites for key defense continuity of government/continuity of operations missions;
- hardening or use of underground facilities in high-threat-level environments;¹⁰²
- best practices and uniform standards in defense critical-infrastructure protection; and
- development of both national and Alliance-wide critical infrastructure-protection investment roadmaps.

Two vehicles exist to more aggressively leverage CT technological development and potential applications. First, NATO should look to expand capability and capacity with US Combatant Commands—especially EUCOM, AFRICOM, and SOCOM—working through JFC Naples. Second, CT technological development should be added as a component of cooperative-security partnerships. Many countries outside of NATO are also focused on the CT threat, and have relevant experience in these technology areas. Vehicles could include selected partners in the Partnership for Peace (PfP), Mediterranean Dialogue, and Istanbul Cooperation Council programs. As a start, NATO could focus on partnerships in such areas as CT crisis management, capacity building, and training.

Nuclear Deterrence

The history of NATO's nuclear-weapons posture has been marked by transatlantic solidarity and steadfastness. Whether it is the flexible-response policy in the 1960s or the decision to modernize its theater nuclear-weapon posture in the 1980s in response to Soviet SS-20 deployments, NATO has witnessed positive results when it has been fully united on matters of nuclear programs and policy.¹⁰³

The nuclear landscape changed dramatically over the past twenty-five years, as US ground-based nuclear weapons were withdrawn from Europe, courtesy of

101 NATO, *The Secretary General's Annual Report 2017*, p. 57.

102 Norway has taken a leadership role in the use of underground facilities to protect infrastructure; its national program dates back to the Cold War era. NATO, as a whole, could benefit from Norway's national knowledge base in this area. Richard G. Little, Paul B. Pattak, and Wayne A. Schroeder, eds., *Use of Underground Facilities to Protect Critical Infrastructures* (Washington, D.C.: National Academy Press, 1998), pp. 35–37. This book includes a discussion of the subject by Arnfinn Jensen of the Norwegian Defence Construction Service.

103 David S. Yost, *The US and Nuclear Deterrence in Europe* (London: IISS/Oxford University Press, 1999). See also NATO, "Final Decision on MC 14/3: A Report by the Military Committee to the Defence Planning Committee on the Overall Strategic Concept for the Defense of the North Atlantic Treaty Organization Area," <https://www.nato.int/docu/stratdoc/eng/a680116a.pdf>. The 1980s nuclear-force modernization involved deployment of one hundred and eight Pershing II intermediate-range ballistic missiles and four hundred and sixty-four ground-launched cruise missiles.

the 1987 INF Treaty and the 1991 Presidential Nuclear Initiatives (PNIs).¹⁰⁴ Additionally, in the NATO Founding Act, the Alliance committed not to deploy nuclear weapons of any kind on the territory of its new members—a promise it has kept. What remains are several hundred tactical nuclear weapons for delivery from NATO dual-capable aircraft (Tornados and F-16s).

Today, the Alliance must once again develop a revitalized and credible extended-deterrence nuclear posture. Russia's nuclear-modernization effort—including its increasing willingness to threaten the “first use” of nuclear threats in declaratory policy statements, and its continued violations of the range limits in the INF treaty—suggests that NATO should adopt programs that help to ensure that Russia does not exploit its nuclear capabilities to gain geopolitical leverage, or extract political or economic concessions from the Alliance or its members.^{105,106} NATO's policy statement at the 2016 Warsaw Summit provides reason for optimism, as the Alliance clearly committed to extended deterrence: “As long as nuclear weapons exist, NATO will remain a nuclear alliance.”¹⁰⁷

To strengthen extended nuclear deterrence in NATO, the Alliance must retain air-launched nuclear gravity bombs and dual-capable aircraft (DCA) in theater.¹⁰⁸ The two most supportive programmatic actions it can take are to proceed with US B61-12 production and accelerate F-35 nuclear capability. The twin combination of advanced, accurate nuclear weapons and a fifth-generation stealth-delivery platform residing in NATO territory for decades would both strengthen

deterrence and contribute to Alliance solidarity against the Russian threat.¹⁰⁹ The United States and its NATO allies will need to, in the words of the 2018 US *Nuclear Posture Review*, “consult and work cooperatively to enhance the readiness and survivability of the NATO DCA,” and “promote the broadest possible participation of the Allies in their agreed burden sharing arrangements regarding the DCA mission.”¹¹⁰ Should the United States follow through on the alternative of redeploying nuclear-armed Tomahawk cruise missiles on its attack submarines, NATO should conduct a full evaluation of the feasibility of integrating them into Alliance nuclear-deterrence planning.¹¹¹

Finally, NATO should also consider distributed non-nuclear strike options to complicate Russian planning, such as submarine-launched conventional Tomahawk land-attack cruise missiles. The US Third Offset Strategy technologies, discussed in Section IV, would also serve to impose additional costs on Russian defense planners.¹¹²

The INF Treaty: The Need for a New NATO Planning Posture

On October 20, 2018, President Donald Trump announced his decision to give official notice of the US intention to withdraw from the 1987 Intermediate-Range Nuclear Forces (INF) Treaty. On February 2, 2019, Secretary of State Michael R. Pompeo formally announced the US intent “to suspend its obligations under the treaty,” arguing that Russia was in material breach of its obligations under INF, and giving the required six-month US notification of withdrawal unless Russia comes back into

104 For the text of the 1987 Intermediate Nuclear Weapons Treaty, see US State Department, “Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Elimination of Their Immediate-Range and Shorter-Range Missiles (INF Treaty),” December 8, 1987, <https://www.state.gov/t/avc/trty/102360.htm#text>. For a discussion of the 1991-1992 PNIs, which “eliminated approximately 3,000 U.S. nuclear weapons and resulted in an approximately 90 percent reduction in all U.S. tactical nuclear weapons,” see US Department of State, *Report of the United States of America Pursuant to Actions 5, 20, and 21 of the NPT Review Conference Final Document*, April 27, 2015, p. 6, <https://www.state.gov/documents/organization/241363.pdf>.

105 Alexander Velez-Green, *The Unsettling View from Moscow: Russia's Strategic Debate on a Doctrine of Pre-emption* (Washington, DC: Center for a New American Security, April 2017), <https://www.cnas.org/publications/reports/the-unsettling-view-from-moscow>.

106 US Department of State, *2018 Report on Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments*, p. 8. The 2014 report found that “the Russian Federation is in violation of its obligations under the INF Treaty not to possess, produce, or flight-test a ground-launched cruise missile (GLCM) with a range capability of 500 km to 5,500 km, or to possess or produce launchers of such missiles.”

107 NATO, “Warsaw Summit Communiqué,” paragraphs 53-54.

108 For an excellent discussion on the future of NATO nuclear policy, see Dr. Keith B. Payne and Dr. John B. Foster, Jr., *A New Nuclear Review for a New Nuclear Age* (Fairfax, VA: National Institute for Public Policy, 2017), pp. 157-174, <http://www.nipp.org/wp-content/uploads/2017/06/A-New-Nuclear-Review-final.pdf>.

109 The deployment of additional F-35s, discussed earlier in *Air Initiatives*, would provide the option for additional quantitative capabilities if a portion are made dual-capable.

110 US Department of Defense, *Nuclear Posture Review 2018* (Washington, DC: Department of Defense, 2018), p. 36, <https://dod.defense.gov/News/SpecialReports/2018NuclearPostureReview.aspx>.

111 One key recommendation in the *Nuclear Posture Review* is to consider the alternative of redeploying nuclear-armed Tomahawk sea-launched cruise missiles on US attack submarines. *Ibid.*, pp. 54-55.

112 Velez-Green, *The Unsettling View from Moscow: Russia's Strategic Debate on a Doctrine of Pre-emption*, p. 21.

treaty compliance.¹¹³ Less than forty-eight hours later, President Vladimir Putin announced that Russia would join the United States in “the suspension of participation in the treaty.”¹¹⁴ This dramatic turn of events promises to complicate NATO defense policy, military and nuclear planning, and public diplomacy at a critical time in the history of the Alliance. This issue needs the prompt, collaborative, and ongoing attention of Alliance security officials from both sides of the Atlantic.

The Administration's decision was based on longstanding concerns over Russian noncompliance with its “obligations under the INF Treaty not to possess, produce, or flight test a GLCM [Ground Launched Cruise Missile] with a range capability of 500 kilometers to 5,500 kilometers, or to possess or produce launchers of such missiles.”¹¹⁵ Russian noncompliance with the INF Treaty has been a serious US arms control concern dating back to the Obama Administration. In seeking to justify its position, the Trump Administration reported in November 2018 that the United States has had “... more than 30 engagements with various departments and levels, including the highest, of the Russian government” to address US concerns.¹¹⁶ Additionally, new US information on Moscow's 9M729 cruise missile deployments “indicated Russia now had four battalions, including near southern and eastern Russia,” up from the three battalions reported in the fall of 2018.¹¹⁷

While fully supporting the US withdrawal decision, NATO's North Atlantic Council expressed regret over the situation, encouraged Moscow to come back into full compliance with the treaty, and announced that it will “closely review the security implications of Russian intermediate-range missiles and will continue to take steps necessary to ensure the credibility and effectiveness of the Alliance's overall deterrence and defense posture.”¹¹⁸ An Alliance consensus exists on facts surrounding Russia's violation of the INF Treaty—Secretary General Stoltenberg himself has supported the US position.¹¹⁹ What does not exist is a unified Alliance prescription on how to move forward and deal with its

conventional defense posture in the absence of INF.

The US action to unilaterally withdraw from the INF Treaty was at variance with previous Alliance declarations made at the July 2018 NATO summit in Brussels. The July 2018 NATO Summit press communiqué issued by the Heads of State and Government, while acknowledging the “serious concerns” raised by the 9M729 missile, lack of Russian transparency, and a “plausible assessment” that Russia is in violation of the treaty, nevertheless did not promote or endorse a US withdrawal. Neither was research and development, procurement or deployment of conventionally-armed intermediate-range ballistic or cruise missiles supported at Brussels. Instead, the communiqué urged “... Russia to address these concerns in a substantial and transparent way, and actively engage in a technical dialogue with the United States. *Allies will continue their efforts to engage Russia on this issue in bilateral and multilateral formats.*”¹²⁰ [emphasis added]. Thus, US policy is inconsistent with official NATO policy as enunciated as recently as the summer of last year.

At the time of the US suspension announcement in February, the North Atlantic Council had made no commitment to supporting US intermediate-range cruise or ballistic missile deployments on NATO soil. Rather, NATO reiterated its support for arms control, disarmament, and a return to “full and verifiable compliance to preserve the INF Treaty.”¹²¹ The US decision, taken less than five months after Brussels, has understandably impacted the ability of NATO defense policy-makers and planners to develop a more detailed response.

Given this politico-military backdrop, the United States should work collaboratively with its NATO allies to address emerging policy and technical issues associated with the pace of US missile development programs. This should be done in a manner that preserves, rather than forecloses, options for further negotiation with Russia on the INF violations issue. At the policy level, US national security and defense officials should regularly consult

113 US Department of State, *U.S. Intent to Withdraw from the INF Treaty* February 2, 2019, <https://www.state.gov/secretary/remarks/2019/02/288722.htm>

114 Ann M. Simmons and James Marson, “Russia's Exit Unravels Arms Agreement,” *Wall Street Journal*, February 4, 2019, p. A6.

115 US Department of State, *Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments*, April 2018, p. 10.

116 US Department of State, *INF Diplomacy Highlights Timeline*, <https://www.state.gov/t/avc/inf/287411.htm>

117 Michael G. Gordon, “U.S. Finds More Suspect Russian Missiles as Treaty Exit Looms,” *Wall Street Journal*, February 1, 2019, p. A1, A9.

118 NATO, “Statement on Russia's failure to comply with the Intermediate-Range Nuclear Forces (INF) Treaty,” issued by the North Atlantic Council, Brussels, 1 February 2019, https://www.nato.int/cps/en/natohq/news_162996.htm

119 NATO, “Press conference by NATO Secretary General Jens Stoltenberg ahead of exercise Trident Juncture 2018”, October 24, 2018, https://www.nato.int/cps/en/natohq/opinions_159666.htm.

120 Brussels Summit Declaration, issued by the Heads of State and Government participating in the meeting of the North Atlantic Council in Brussels, 11-12 July 2018, Paragraph 46. https://www.nato.int/cps/en/natohq/official_texts_156624.htm.

121 *ibid.*

and collaborate with their NATO counterparts on the pace, scope and nature of US conventional intermediate-range cruise and/or ballistic missile research and development programs.¹²² The primary policy concern should be on the proposed pace and schedule of US conventional intermediate-range missile programs. For US and NATO planners to effectively scope and bound the future policy issues facing the Alliance, they need to fully understand the program and scheduling options the US Department of Defense is currently considering.

At the programmatic and technical level, there is simply no need for an accelerated US missile development or deployment program – research and development should be limited to the pre-prototype phase for the immediate future (applied research, advanced technology development) without transition to the prototyping or flight testing. This should be the primary defense planning construct between now and the period through the official US withdrawal in August. US defense planners and programmers should structure future US missile research and development programs related to NATO Europe accordingly. Any other signal would likely foreclose the possibility of advancing diplomatic options over the next six months.

The North Atlantic Council's primary concern henceforth should be to fully understand the military implications of the US INF withdrawal for NATO defense planning. A reasonable Alliance position would include regular consultations and dialogue over the potential impact that ending the INF Treaty will have on the future conventional and nuclear force balance in Europe – in essence, a net assessment of the impact that a world without INF would have on the future military balance in Europe.¹²³ These transatlantic consultations should include discussions of limiting all US missile programs to conventional warhead technologies only, and proceeding at a deliberate, as opposed to an accelerated, pace of development.

A second defense concern for the North Atlantic Council should be the operational and planning issues associated with the possibility that a US-Russian intermediate-range arms competition could spill over into the nuclear area. While the Trump Administration has argued that new ground-based missiles would be conventional and not nuclear, NATO should also review the military implications

of the INF withdrawal decision on its nuclear posture. This net assessment should include the likely relative balance in theater conventional and nuclear-weapon technologies, the effects of additional US and Russian nuclear deployments on NATO forces and systems survivability, the broader impact of a US-Russian INF withdrawal on NATO warfighting capabilities, and finally, the possible impact of the reemergence of the nuclear issue on NATO capabilities and resource planning.

Secretary General Stoltenberg has made clear that European allies do not want a new arms race in the nuclear arena.¹²⁴ Additionally, prominent European foreign ministers have also expressed skepticism about the US decision, clearly preferring avoiding an arms build-up in this area. Militarily, the United States and its allies likely have far fewer nuclear-response options at their disposal today to counter a potential expanded Russian theater nuclear build-up than they did during the 1980s. A decision to withdraw from the INF treaty without militarily significant response options could be decidedly counterproductive.

The United States and its allies should also develop a coherent, well-thought-out dual-track policy that has clear programmatic and arms control benchmarks that all NATO parties can agree upon, while still upholding the goal of bringing Russia back into INF Treaty compliance. The United States and NATO should not proceed with a sense of resignation and finality over the US and Russian withdrawal decisions. Instead, over the next six months the United States and NATO should seek avenues to advance dialogue with Moscow on returning to the boundaries of the INF Treaty. Such a “dual-track” approach should continue throughout the next six months – every effort should be made to preserve the treaty and restore its integrity up until the very end of the withdrawal period. Of necessity, this will require a resolution of the Russia violations issue.

If such an outcome is unsuccessful, future US and NATO arms control planning should focus on the feasibility and scope of numerical limitations for conventional intermediate-range missile forces in Europe, to the exclusion of nuclear deployments.

If INF Treaty withdrawal does not benefit the Alliance militarily—and if it would, instead, undermine and complicate current NATO defense-planning goals and

122 Other reported options include a ballistic missile variant of the Army ATACMs or “a new U.S. ground-based cruise missile,” adapted from the existing Joint Air-to-Surface Standoff Missile (JASSM) or from the Tomahawk cruise missile. See Michael G. Gordon, “U.S. Finds More Suspect Russian Missiles as Treaty Exit Looms,” *Wall Street Journal*, February 1, 2019, p. A9.

123 James Marson and Laurence Norman, “Breakdown of Arms Accord Unnerves America's Allies,” *Wall Street Journal*, February 2-3, 2019, p. A7.

124 Robin Emmott, “NATO Urges Trump Officials not to Quit Nuclear Treaty: Diplomats,” Reuters, October 25, 2018, <https://www.reuters.com/article/us-usa-nuclear-nato/nato-urges-trump-officials-not-to-quit-nuclear-treaty-diplomats-idUSKCNIMZ2KZ>.

objectives—then NATO Europe has every reason to work with the United States to seek out alternative defense and arms control frameworks that will enhance the security of the Alliance.

Hybrid Warfare

Hybrid warfare is an escalating problem for NATO defense planners and member militaries—one that involves the use of nontraditional threats that cross the borders of sovereign nation states. Technology development in this area has been expanding rapidly over the past fifteen years, led by Hezbollah's effort against Israel in the Second Lebanon War, Russia's military operations in Georgia in 2008, and Russian operations in Ukraine since 2014. The use of embedded irregulars, improvised explosive devices (IEDs), rockets and missiles, and militarized unmanned aerial systems ensures that any future strategy to counter hybrid warfare must include a strong technology component.

The 2018 NATO Summit Declaration declared that in cases of hybrid attack, the Alliance could decide to invoke its collective defense mechanism, Article 5 of the Washington Treaty. The Alliance also announced the establishment of Counter Hybrid Support Teams, which will provide tailored assistance to allies in responding to hybrid activities. NATO clearly outlined its preliminary approach at the Warsaw Summit in 2016, where it announced adoption of “a strategy and actionable implementation plans on NATO's role in countering hybrid warfare,” and that it is prepared to “assist an Ally at any stage of a hybrid campaign.”¹²⁵ Because NATO must deal with “multi-layered threats to undermine the functioning of the State or polarize society,” NATO's efforts to counter hybrid warfare should have a strong focus on critical-infrastructure protection.¹²⁶ Connecting hybrid-warfare programs with the concept of resilience should also be a policy priority.

At its highest level, a NATO R&D program to counter hybrid warfare should largely parallel a strategic approach that follows the five key thrusts articulated in an earlier Atlantic Council report, authored by Franklin Kramer and Lauren Speranza: low-level use of force; cyberattacks; economic and political coercion and subversion; information war; and transatlantic strategy coordination.¹²⁷

Building on this broad strategic approach, NATO should develop a robust counter-hybrid-warfare technology

program that focuses on aggressive R&D investment in the following areas:

- urban warfare and civil preparedness;
- incidence response, investigation, and field support;
- continuity of operations/continuity of government (COOP/COG);
- data analysis and information sharing;
- physical protection of essential services;
 - health- and medical-systems infrastructures (hospitals, clinics, deployed medical/health workers in the field);
 - first responders (police, fire, rescue);
 - water and food supply; and
 - integration of essential network architectures.
- critical-infrastructure protection;
 - information technology;
 - energy;
 - electric power (protection of above-ground, high-voltage transmission lines); and
 - nuclear power (protection of nuclear-power installations).
- protection of supervisory control and data acquisition (SCADA) systems;
 - cyber defense and cyber retaliatory measures;
 - site defense: hardening and fire protection, system redundancy and relocation, site proliferation, and underground protection; and
 - CBRN protection.
- counter-IED technologies;
- rocket and missile defense; and
- C-UAS technologies.

NATO should foster the development of broad and effective counter-hybrid resource strategies in each area mentioned above. Member countries will need to prioritize investments based on national threat assessments and resource availability. However, much of the technology development for the hybrid mission would be similar to that found in the counterterrorism area, so an effort should be made to exploit useful synergies.

NATO should take advantage of the use of expanded trust funds and capacity building more broadly throughout the Alliance, as well as the European Infrastructure Consolidation activity. NATO should also leverage its Partnership Interoperability Initiative with countries such as Australia, Finland, Georgia, Jordan, Israel, and Sweden, to seek out “best in class” technology solutions in the hybrid-warfare area.

¹²⁵ NATO, “Warsaw Summit Communiqué,” paragraph 72.

¹²⁶ NATO, “Critical Infrastructure Protection Against Hybrid Warfare Security Related Challenges,” March 7, 2017, http://www.nato.int/cps/en/natohq/topics_142011.htm?selectedLocale=en.

¹²⁷ Kramer and Speranza, *Meeting the Russian Hybrid Challenge: A Comprehensive Strategic Framework*, pp. 14-29.

PART THREE: DEVELOPING A ROBUST NATO TECHNOLOGY AND R&D STRATEGY

An essential part of NATO's approach at its seventieth anniversary will be to close critical defense-capability gaps by leveraging technology to the Alliance's long-term advantage. No adaptation will be fully successful without effective R&D resource management geared toward achieving new defense applications that reach the field expeditiously and alter the military balance to the Alliance's advantage.

This is an issue that NATO has seen before—in the debate over rationalization, standardization, and interoperability (RSI) in the late 1970s, the NATO cooperative R&D program of the 1980s, or more recent concerns about a widening gap in capabilities between the United States and NATO Europe. There is a realization that a large disparity in operational capabilities between allied militaries could adversely impact Alliance defense effectiveness.¹²⁸ Narrowing technology gaps should be a paramount goal, so that differences close rather than widen, allowing the resource and warfighting burden to spread more equitably across all members of the Alliance.

Innovation is now at the heart of NATO's technology agenda. Secretary General Stoltenberg's 2017 annual report identifies ten areas of emphasis for NATO's 2017 Science and Technology agenda, as seen in Table 4.¹²⁹

NATO is beginning to take the actions necessary to revamp and reenergize its Science and Technology (S&T) program. This effort is indeed laudable, as it takes NATO S&T in a direction that encourages member ministries of defense (MODs) to more closely parallel

the innovative technology path laid out by the United States to counter that of Russia and China. Additionally, NATO's Science & Technology Organization (STO) now has a Collaborative Program of Work that encompasses more than two hundred and fifty projects.¹³⁰ NATO has laid a strong foundation for cross-national collaboration and future success in science and technology.

A further step would involve vectoring future NATO-nation R&D efforts along the lines of the technology path of the US "Third Offset Strategy," championed by former Deputy Secretary of Defense Robert Work. This strategy seeks to counter the rise of new operational-defense challenges and the proliferation of A2/AD capabilities—capabilities Russia is now operationalizing.¹³¹ While the third-offset nomenclature is no longer used by the Trump administration, the centrality of the concept of innovative defense programs has been retained in such areas as hypersonics, autonomy (including unmanned air, land, and undersea platforms, as well as counter-UAS technology), cyber, space, directed energy, electronic warfare, and artificial intelligence.¹³²

With its 2017 initiatives, NATO has made an excellent start, but more progress can be made, particularly in the area of weapons research. NATO countries should promote increased R&D investment in key weapons-technology areas such as hypersonics, directed energy, and electromagnetic rail gun, and also look to robotics, electronic protection, counter-UAS, and sixth-generation aerial platforms.¹³³ Many of the critical-infrastructure R&D activities recommended in this report should be evaluated for additional investment.

128 For a well-thought-out explanation of critical issues impacting US-NATO Europe divergence in defense-technology development, see Donald C. Daniel, "NATO Technology: From Gap to Divergence?" in Hans Binnendijk and Gina Cordero, eds., *Transforming NATO: An NDU Anthology* (Washington, DC: Center for Technology and National Security Policy, National Defense University, 2008).

129 This effort is being conducted under the auspices of NATO's Science and Technology Board.

130 NATO, *The Secretary General's Annual Report 2017*, p. 40. Key 2017 initiatives highlighted in the annual report include autonomy, artificial intelligence, big data, quantum technologies, modeling and simulation, and electronic countermeasures.

131 STO was formed in 2012. Its current mission is to "help position both national and NATO science and technology investments as a strategic enabler of the knowledge and technology advantage for the defence and security posture of NATO Allies and partners." NATO, "NATO Science and Technology Organization," May 22, 2018, http://www.nato.int/cps/en/natohq/topics_88745.htm?selectedLocale=en.

132 Office of the Under Secretary of Defense (Comptroller)/CFO, *U.S. Department of Defense Fiscal Year 2019 Budget Request*, p. 11.

133 For an excellent synopsis of the operational challenges the United States will see in the future, see Robert Martinage, *Toward a New Offset Strategy: Exploiting U.S. Long-Term Advantages to Restore U.S. Global Power Projection Capability* (Washington, DC: Center for Strategic and Budgetary Assessments, 2014), <https://csbaonline.org/uploads/documents/Offset-Strategy-Web.pdf>.

**Table 4: 2018 NATO Science and Technology Activity
Key Areas of Interest**

1. Advanced Systems Concepts (15 percent)	6. Platforms and Material (9 percent)
2. Data Collection and Processing (11 percent)	7. Cultural, Social, and Organizational Behaviors (9 percent)
3. Precision Engagement (12 percent)	8. Communications and Networks (5 percent)
4. Information Analysis and Decision Support (16 percent)	9. Autonomy (6 percent)
5. Advanced Human Performance and Health (14 percent)	10. Power and Energy (3 percent)

Source: *The Secretary-General’s Annual Report 2018*, p. 40

The United States and Europe should adopt a truly transatlantic approach to defense cooperation, one involving more integrated US-NATO Europe defense R&D and production. NATO should refocus its attention on higher-order, defense-wide technology requirements, as well as the sufficiency, size, and scope of European national defense-technology investments. Policy direction coming from the 2016 Warsaw Summit is encouraging. The Alliance noted in Warsaw that:¹³⁴

“A stronger defence industry across the Alliance, which includes small-and medium-sized enterprises, greater defence industrial and technological cooperation across the Atlantic and within Europe, and a robust industrial base in the whole of Europe and North America, remain essential for acquiring needed Alliance capabilities. For the Alliance to keep its technological innovation, it is of particular importance to support innovation with the aim to identify advanced and emerging technologies, evaluate their applicability in the military domain, and implement them through innovate solutions. *In this regard NATO welcomes initiatives from both sides of the Atlantic* to maintain and advance the military and technological advantage of Allied capabilities through innovation and encourages nations to ensure such initiatives will lead to increased cooperation within the Alliance and among Allies.” [Emphasis added.]

A business-as-usual, level-of-effort approach to R&D is not what is needed; looking at R&D as an always-available commodity is not helpful to sound technology leadership. Rather, a dedicated effort should be made to move aggressively on all key R&D fronts, including the S&T base, in order to address the most demanding defense-technology challenges NATO members will face. R&D and S&T must be viewed as perishable resources that need to be nurtured and grown over the long term.

Bureaucratically, this should be accomplished through the expansion of scientific and technical bodies already existing within NATO and its member nations. For NATO, this would include the Collaboration Support Office (CSO) and the Centre for Maritime Research and Experimentation (CMRE). Further, the development of a strong partnership between STO and the new US Department of Defense Office of Research and Engineering is essential to promoting essential cross-Alliance collaboration.¹³⁵ More broadly, Alliance member nations should consider embedding science advisors throughout their military organizations (as the United States does within its Combatant Commands), in order to accelerate the integration of emerging defense requirements into the S&T and R&D resource-planning processes.

To facilitate innovation more broadly, NATO countries should promote the concept of Alliance-wide commercial-technology innovation, similar to what the United States is doing with the Defense Department’s Defense

¹³⁴ NATO, “Warsaw Summit Communiqué,” paragraph 136.

¹³⁵ The (O)USDR&E will be one of two new offices created in February 2018 from a division of the existing Office of the Under Secretary of Defense for Acquisition, Logistics and Technology.

Innovation Unit Experimental (DIUx). Greater openness and transparency would foster a willingness to actively encourage new defense ideas from industry.¹³⁶ In this way, European industry would help NATO member MODs to better understand and prioritize new and unconventional defense applications for advanced technologies, laying the groundwork for sustained Alliance military technological superiority well into the future.

“NATO should also encourage collaborative, cross-national R&D—at both the governmental and the industry levels—to foster improved defense industrial S&T and R&D capabilities.”

NATO member MODs should also develop their own “architectural framework” for S&T, similar to the US Department of Defense’s S&T Communities of Interest (COIs).¹³⁷ NATO members should evaluate technology activities across these seventeen COIs to assist them in developing their own national S&T and R&D investment roadmaps.¹³⁸ Within each COI, there are four to five subareas that further elaborate technology opportunities that address real-world defense problems. NATO has already identified areas of potential collaboration with the EU, including counter-hybrid, cyber defense, harbor protection, border security, military exercises, counter-IED, and C3.¹³⁹

NATO should also encourage collaborative, cross-national R&D—at both the governmental and the industry levels—to foster improved defense industrial S&T and R&D capabilities. NATO member MODs should conduct an Alliance-wide survey of the health and vitality of nongovernment-funded (independent) R&D within the Alliance. Finally, the Conference of National Armaments Directors (CNAD) should take the lead in supporting

and promoting the transition of NATO’s new S&T and R&D policy thrusts into NATO member MoDs.

Alliance-wide, MODs should be encouraged to increase their S&T and R&D budgets by a reasonable benchmark—5-10 percent within the next five years—an achievable rate that would assist Alliance members in meeting their 2-percent defense-spending commitments. In this regard, a NATO-wide, annual public report on the state of NATO S&T and R&D would assist greatly by highlighting the annual progress of the twenty-nine member nations.

Conclusion

The strategic risks facing NATO and Europe are sharper, and more obviously present, than at any time since the end of the Cold War. The rules-based international order, carefully developed over the past seventy years, is being challenged by a resurgent Russia. Additional threats are also emerging, stretching from North Africa across the Mediterranean and the Levant, and into Iran. The language of adversaries and nuclear deterrence has become more commonplace in NATO HQ, and there is consideration of recrafting NATO’s Strategic Concept accordingly.

That being said, there is still no common view, let alone a consensus, on the prioritization of these risks. Newer nations in the east are principally concerned by Russia, the allies with a Mediterranean coastline are focused on migration and the rise of jihadist terrorism, and the “older hands” are preoccupied with the potential for great-power conflict. Considering these phenomena, NATO and the EU have developed and articulated several responses.

NATO recognizes these challenges from a policy and strategy perspective, and is seeking to meet them by encouraging members to invest more heavily in defense. There is a drive to increase defense expenditure, and concepts such as that of “Framework Nations” in NATO and PESCO in the EU—which stress the need for a collaborative approach—will assist in filling current capability shortfalls. The logical next step for NATO is

136 Opportunities could include greater use of unsolicited proposals, broad area announcements and long-range R&D program concepts (such as requested in the Department of Defense’s Long-Range R&D program to the US defense industry in 2015).

137 See Defense Innovation Marketplace, <http://www.defenseinnovationmarketplace.mil/coi.html>. The Department of Defense’s seventeen COIs currently include: advanced electronics, air platforms, autonomy, biomedical ASBREM, C4I, counter-IED, counter-WMD, cyber, electronic warfare, energy and power technologies, engineered resilient systems, ground and sea platforms, human systems, materials and manufacturing processes, sensors, space, and weapons technologies. ERS is identified as an alumni COI.

138 NCMBC, “Communities of Interest (COI) Tier-1 Taxonomy and Descriptions,” March 7, 2016, http://www.defenseinnovationmarketplace.mil/resources/COI_Tier1_Taxonomy_7March2016.pdf. For example, the subcategories for advanced electronics include electronics integration, electronic materials, microelectronics and nanoelectronics, and RF components for sensing, transmission, and communications.

139 NATO, “Warsaw Summit Communiqué,” paragraph 122.

to develop a coherent defense-investment plan, addressing where defense resources can be targeted most effectively. These structures and processes offer the hope of continued progress on the defense front across the entire Alliance.

Without a sense of urgency, the momentum gained to date will be lost. A broad range of defense-planning initiatives—similar to those described in this report—are essential for these changes to become a reality.

Planning must be ongoing and iterative.¹⁴⁰ Reengagement in, not disengagement from, defense planning, modernization, and technology issues must be the hallmark of any future NATO approach as it nears its seventieth anniversary. In this process, Alliance-wide collaboration and partnership building will be critical.

The obstacles and inhibitors to transatlantic defense cooperation must be eliminated—on both sides of the Atlantic. Now is not the time for Alliance members to raise barriers to cooperation or criticize each other

for longstanding economic and commercial policies. Partnership building should not be compartmentalized, but truly opened, by tearing down the technology and industrial barriers to transatlantic defense cooperation.

The US Leadership Role

Finally, the success of this approach for NATO depends on the United States having the will to lead the Alliance. If, as former NATO Secretary General Rasmussen has stressed, the world is “at a tipping point,” and the United States has “the material greatness to stop the slide,” then there can be no question of abdication of US leadership.¹⁴¹ Therefore, the Trump administration and its entire national security team need to focus on this activity with full force and power.

The United States must, once again, show the world its willingness to captain the Alliance. That leadership will provide the foundation and vision needed for a lasting peace.

¹⁴⁰ Dwight Eisenhower, “Remarks at the National Defense Executive Reserve Conference, November 14, 1957,” <http://www.presidency.ucsb.edu/ws/?pid=10951>.

¹⁴¹ Rasmussen, *The Will to Lead*, pp. 1–21.

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