

Marines fire tube-launched, optically tracked, wire command-link guided-missile system from M-41 Saber weapon system during sustainment training at Udairi Range, Kuwait, July 10, 2012 (U.S. Marine Corps/Michael Petersheim)



Violent Nonstate Actors with Missile Technologies

Threats Beyond the Battlefield

By Mark E. Vinson and John Caldwell

During the summer of 2014, three overlapping crises involving violent nonstate actors (VNSAs) with missile technologies captured the world's attention.¹ First, for 50 days in July and August, Israel engaged in a

major conflict with Hamas, Palestinian Islamic Jihad, and other VNSAs that fired more than 4,500 rockets and mortars from the Gaza Strip at Israel.²

The second crisis occurred on July 17, 2014, when Malaysian Airlines flight MH-17, a civilian airliner carrying 298 people, was shot down at cruising altitude by an advanced surface-to-air missile (SAM) while transiting territory controlled by Ukrainian separatist rebels.³

U.S. intelligence officials believe the airliner was shot down by pro-Russian rebels using an advanced Russian SA-11 missile system.⁴

The third crisis seemed to erupt in the spring and summer of 2014, when the self-proclaimed Islamic State of Iraq and the Levant (ISIL) seized territory and captured advanced weapons as it attacked across large stretches of Iraq and Syria. Among the weapons ISIL

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reportedly captured and used were shoulder-launched SAMs, also known as man-portable air defense systems (MANPADS).⁵ ISIL claims to have used MANPADS to shoot down an Iraqi military helicopter.⁶ ISIL's possession of MANPADS threatens low-flying coalition aircraft as well as aircraft at Baghdad International Airport.⁷

As indicated by these crises, the availability of advanced missile technologies—particularly precision-guided missiles—to VNSAs can be a game changer in their warfighting capabilities against nation-states if they use the weapons to offset their air superiority disadvantages with stand-off attack capabilities. This may be attributed in part to a general absence of enforceable control of the proliferation of missile technologies to nonstate actors. Counterproliferation is a term most commonly associated with the international conventions for the control of weapons of mass destruction, specifically nuclear, chemical, and biological weapons. However, without the control of international laws or the legitimacy and accountability constraints of state governments, VNSAs have gained access to an array of missile technologies that grant state-like capabilities to threaten significant death and destruction.

Ominous View from Israel

Israel may be unique in terms of the magnitude of the rocket and missile threats from its VNSA adversaries, but these threats could be a leading indicator of emerging threats not only to the United States but to any nation-state. Despite substantial differences in their security requirements, the United States and Israel share many interests and military challenges. Both are threatened as a result of the proliferation of missile technologies to VNSAs, and both are in persistent conflicts with VNSAs. As such, the U.S. military should carefully consider Israel's threats and responses to these threats for implications to the future development of joint force capabilities to counter irregular threats.

Israel's 2014 Gaza conflict is the latest in a series of conflicts featuring

VNSAs firing large numbers of rockets, mortars, and missiles into its territory. For decades, the country has been attacked by a hostile array of VNSAs using a growing assortment of such weapons.⁸ According to the Israel Defense Forces (IDF) blog, prior to the start of the latest conflict, Gaza-based militants had fired more than 15,200 rockets at Israel since 2001.⁹ Although Gaza VNSAs may be a more active threat, Hizballah, a VNSA operating from Lebanon, is a substantially greater one. In July 2006, Hizballah escalated its campaign against Israel with a cross-border ambush of an IDF patrol. With Israel's strong military response, the situation quickly intensified. Before a ceasefire was secured 33 days later, Hizballah had fired nearly 4,000 rockets and missiles into Israel.¹⁰ Since 2006, there have been little more than threats exchanged, but Israeli intelligence estimates that Hizballah has used the lull in fighting to amass an estimated 100,000 rockets (although some estimates are as high as 150,000).¹¹ The quantity of missiles and rockets that Hizballah possesses prompted the IDF's chief of operations to declare that Hizballah's arsenal is "similar to any national army's."¹²

In response to these missile threats, Israel has worked closely with the United States to develop and evolve air and missile defense capabilities to help protect its homeland and strategic assets.¹³ During the Gulf War in 1991, the United States supported Israel with Patriot missile defense batteries to help protect it from Iraqi Scud missiles.¹⁴ Since then, Israel has partnered with the United States to develop a multitiered missile defense system that contains active defense systems, including the Iron Dome mobile air defense system, as well as early warning/passive defense and counterstrike capabilities.¹⁵ While the U.S. homeland has not been attacked by VNSAs employing rockets or missiles, the United States anticipates that an enemy will use such capabilities to contest deployment of military forces to operational areas and their freedom to operate within those areas.¹⁶ Furthermore, with the proliferation of portable and advanced missile technologies, the United States must anticipate

and adapt its joint forces to be able to address the range of regional and global threats, including those to its homeland, strategic assets, and allies, as well as to its military bases, ports, lines of communication, choke points, and operational areas.

Although Israel may be unique in the magnitude of the threat of VNSAs with missile technologies, it also may provide the United States and its partners with a valuable glimpse into the future. This article first explores the threats and associated operational issues likely to emerge as missile technologies are proliferated to VNSAs. Second, it identifies the joint force capabilities that the U.S. military may require to address these threats.

An Expanding Threat

The U.S. National Intelligence Council's Global Trends 2030 noted that the proliferation of "standoff missiles will increase the capacity of nonstate actors" and that the availability of "precision-guided weapons would allow critical infrastructures to be put at risk by many more potential adversaries."¹⁷ As evidenced by the military capabilities of Hizballah, Hamas, ISIL, Ukrainian separatist militias, and the many other VNSAs around the world, the increasing availability of advanced missile technologies, coupled with improvements in their capabilities, is significantly expanding the threat to Israel, the United States, and other partner states, both regionally and globally.

The global arms trade is big business. According to a 2012 Congressional Research Service report, more than \$71.5 billion in arms transfer agreements were made in 2011 to developing countries alone.¹⁸ Besides the direct transfer of missiles, proliferation can enable VNSAs to manufacture or modify missile capabilities by providing precursor, dual-use materials and the "know-how" to fabricate rockets. VNSAs can obtain the materials and the knowledge to make their own rockets or can forge alliances with state sponsors and transnational criminal elements to obtain and smuggle weapons. In March 2014, IDF special forces intercepted a ship in the Red Sea carrying an Iranian arms shipment headed for the Gaza



Soldier with 2nd Battalion, 263rd Air Defense Artillery, demonstrates FIM-92 Stinger man-portable air defense system at Bolling Air Force Base, April 14, 2010 (U.S. Army)

Strip and recovered several dozen Syrian M-302 medium-range rockets (surface-to-surface, 100-kilometer range) hidden in shipping containers.¹⁹

Inadequate Arms Control

The United Nations Arms Trade Treaty (ATT) entered into force on December 24, 2014, with the intention of reducing the illicit arms trade by promoting “accountability and transparency by state parties concerning transfers of conventional arms.”²⁰ Although the ATT is a step toward preventing the proliferation of arms to bad actors, arms control regimes are currently inadequate to address the proliferation of missile technologies to VNSAs.²¹ So far, 130 states have signed the treaty, and 61 have ratified it.²² However, the power of the ATT relies on the compliance of signatories. More specific to missile technologies, the Missile Technology Control Regime

(MTCR), established in 1987, now includes 34 countries. As with the ATT, the MTCR relies on signatory countries adhering to export control guidelines to preclude the proliferation of unmanned delivery systems capable of delivering weapons of mass destruction. The ATT and MTCR may help cooperative states control the legal arms trade, but they are unlikely to dissuade the illegal sale or transfer of arms to VNSAs.

When VNSAs Obtain Improved Missile Technologies

The availability of improved missile technologies allows VNSAs to develop missiles and rockets with greater range, lethality, and precision, and in increased quantities. Perhaps the most significant improvement so far is in range. Increased range extends the risks, and fear, to a greater proportion of the population. With each major conflict

since 2008, Hamas has obtained longer-range rockets, extending the risk to Tel Aviv and Jerusalem in 2012 and to most of Israel in 2014.²³ Improved precision will be a game changer, enabling VNSAs to target specific high-value civilian or military facilities, and increasing requirements (and competition) for active defense systems such as Iron Dome for their dedicated protection. Greater VNSA missile capabilities will also increase the need for additional passive defense capabilities, such as shelters and early warning, and more effective integrated air and missile defense (IAMD) attack operations.

In conflict regions, VNSA missile capabilities could deny deploying forces access to ports and challenge their freedom of action in the area of operations. Perhaps most significantly, adversary VNSAs could use MANPADS, advanced SAMs, and cruise missiles to

contest U.S. and Israeli air and maritime superiority. Hizballah in Lebanon already possesses such capabilities. According to Major General Ya'acov Amidror, former national security advisor to the prime minister of Israel, in addition to an arsenal of "some 150,000 missiles and rockets, several thousand of which have a range that cover the entire State of Israel . . . Hizballah also has long-range anti-ship missiles, anti-aircraft missiles, unmanned aerial vehicles, and modern anti-tank missiles."²⁴ Degraded air support would seriously affect joint force operations that rely on air superiority for close air support, attack helicopter operations, air-mobility operations, IAMD attack operations, and surveillance by low-flying unmanned aircraft systems and other reconnaissance platforms.

Cruise missiles also significantly threaten maritime operations because their low trajectory challenges timely detection and effective defense. During the 2006 Second Lebanon War, Hizballah fired a Chinese-made, Iranian-supplied C-802 surface-to-sea antiship cruise missile at the INS *Hanit*, an Israeli Sa'ar 5-class corvette patrolling the Lebanese coast 16 kilometers from the shore.²⁵ The missile struck the corvette, killing four sailors and severely damaging the ship.²⁶ In the future, VNSAs might use cruise missiles in the global commons to contest U.S. power projection capabilities and joint force maritime access to forward areas of operations, affecting deployment and sustainment efforts. VNSAs such as Hizballah, Hamas, and ISIL are already using advanced antitank guided missiles (ATGMs) to challenge friendly force freedom of maneuver.²⁷ The convergence of cyber and electronic warfare capabilities in conjunction with VNSA missile attacks could further exacerbate challenges to joint force air and maritime superiority.

VNSAs can also obtain large numbers of rockets and missiles, creating a stand-off capability to attack friendly forces or other high-value targets as well as the capacity to sustain a high volume of attacks. During the 31 days of fighting between Hizballah and Israel in 2006, Hizballah fired an average of approximately 130 rockets per day.²⁸ Even without high accuracy, large



U.S. Soldiers with 3rd Battalion, 2nd Air Defense Artillery Regiment, talk after routine inspection of Patriot missile battery at Turkish military base in Gaziantep, Turkey, February 26, 2013 (DOD/Sean M. Worrell)

quantities of low-cost rockets can challenge missile defense battle management capabilities, particularly when fired in barrages. Limited active defense capabilities could be stretched to protect military capabilities, critical infrastructure, and population centers, increasing one's reliance on passive defense, attack operations, and IAMD battle management capabilities. While Hizballah and Hamas rockets have increased in quantity and range, they have generally lacked a high degree of accuracy.²⁹ As a result, the IDF has not had to fire as many of its limited numbers of missile defense interceptors. When VNSAs improve on their accuracy or obtain guided missiles, the IAMD protection challenge will increase tremendously.

Israel is a small country surrounded by well-armed VNSAs that have repeatedly attacked it. With the notable exception of the September 11 attacks, the United States homeland historically has been protected from such threats by both oceans and friendly neighbors. However, with VNSAs having increased access to relatively small, portable missile systems (notably MANPADS and ATGMs), the risk that these organizations could develop expeditionary capabilities to expand the battlefield beyond the primary conflict region is growing. Individuals or small teams of terrorists with MANPADS and ATGMs could target airports and

seaports in the homeland and at intermediate staging/transit facilities around the world, expanding and complicating IAMD resource allocation and protection considerations. The impact of these actions would not only affect friendly force power projection capabilities, but it could also have a major global economic effect if commercial shipping and air transport are affected.

Ultimately, the proliferation of missiles and related technologies expands the capability of VNSAs to attack vital U.S. interests and to contest U.S. freedom of action globally, thereby increasing the risk of missile attacks both on the battlefield and on the homeland.

Challenges and Capabilities

Although VNSAs have directly threatened Israel's homeland with rocket and missile attacks for decades, the United States, as a global power, faces a different set of challenges for countering these threats. Perhaps the greatest challenge for the United States is to adequately understand the nonstate actors around the world that might threaten U.S. vital interests. Traditional intelligence capabilities are challenged to understand the complex relationships of VNSAs and their networks. First, it is difficult to gain the necessary cultural understanding to appreciate



Iron Dome battery in Ashkelon, Israel, intercepted approximately 8 rockets and BM-21 “Grad” rockets launched from Gaza, April 10, 2011 (Courtesy Israel Defense Forces)

the dynamic connections between the many global, regional, and local VNSAs, proxy actors, state sponsors, and transnational criminal organizations. In Gaza, even when Hamas was the acknowledged governmental authority, other militant organizations opposed to Israel, such as the Palestinian Islamic Jihad (PIJ), the Popular Resistance Committees, the Army of Islam, Tawhid wal’ Jihad, and Jund Ansar Allah, all pursued their own goals and in many cases acted independently of Hamas.³⁰ Second, many of these groups are organized around political, social, and military wings and operate in small cells dispersed among the population. Without a detailed mapping of the target population, it is difficult to gain intelligence on these organizations or to separate their true intent and capabilities from rhetoric.³¹ VNSAs are not constrained by the laws or norms of states

and will frequently use social media to obfuscate the facts. Ideology-based VNSAs may not have easily identifiable or targetable centers of gravity. Adding to the complexity of intelligence operations are the temporary alliances VNSAs form with other organizations and states to achieve complementary short-term objectives. When multiple extremist groups are operating in a confined battlespace, motives and attribution of VNSA missile attacks could be difficult to determine.

Rebalance Offensive and Defensive Capabilities

As the proliferation of missile technologies to VNSAs increases, the balance of offensive and defensive capabilities required to enable preventive and protective IAMD operations may need to shift. The availability of missile technologies to VNSAs and the develop-

ment of American and Israeli IAMD capabilities might produce new operational and campaign-level requirements for both offensive and defensive IAMD capabilities. This challenge was revealed in November 2012 by the IDF’s successful employment of the Iron Dome missile defense system during Operation *Pillar of Defense*. Although Hamas, PIJ, and other VNSAs fired more than 1,500 rockets and mortars at Israel from Gaza and the Sinai, Israeli officials reported that Iron Dome shot down almost 90 percent of the rockets it engaged.³² Additionally, Israel’s civil defense system of early warning and shelters passively protected its civilian population.³³ As a result, only three Israeli civilians were killed during the conflict.³⁴ Concurrently, the Israeli air force attacked more than 1,500 targets in Gaza.³⁵ Ultimately, the success of Israel’s IAMD efforts

removed the need and justification for an IDF ground attack into Gaza.³⁶

Successful missile defense operations buy valuable time both operationally and strategically. Operationally, they protect key assets while offensive military capabilities are mobilized, deployed, and employed. Strategically, they reduce public pressure on senior political and military decisionmakers. A successful missile defense effort may also reduce the need and justification for ground attacks. If IAMD capabilities prevent friendly casualties, then the option of conducting a ground attack, which carries with it both the greater likelihood of heavy damage to infrastructure and the potential for increased civilian and friendly military casualties, may not be justifiable domestically or internationally. Finally, effective IAMD may help deter missile attacks by changing the VNSA leader's cost-benefit decision calculus.³⁷

Countering VNSAs in Urban Areas

VNSAs are also adapting defensively to U.S. and Israeli asymmetric advantages of air superiority, precision engagement, and surveillance/reconnaissance. They are concealing and protecting their missile and command and control capabilities underground among the civilian population in urban areas. VNSAs have used expendable launchers to reduce firing crew exposure and to complicate the friendly force's attack operations decision calculus. By embedding their missile capabilities in urban areas, they try to deter friendly attack operations.

A related issue is the use by VNSAs of civilians as human shields, which can have both a tactical defensive effect and a strategic offensive effect. Defensively, VNSAs can store missiles in schools, religious sites, and other sensitive facilities to prevent friendly attack. However, an offensive strategic effect is achieved if the VNSA can "bait" an attack on missile capabilities at sensitive locations and cause collateral civilian destruction and casualties. News and social media accounts of civilian casualties, whether accurate or not, could strategically influence domestic and international support and legitimacy.

Measuring Progress and Success

Finally, it is difficult to measure progress and success in missile warfare with VNSAs. At the operational and strategic levels, Israel has found that missile warfare with VNSAs lacks a decisive endstate. VNSAs must only show resistance (for example, by periodically firing rockets) and survive attacks to claim victory. Israel has largely measured its strategic success by the length of calm (that is, the period of deterrence) between major conflicts with VNSAs.

Although there are a number of useful tactical and technical metrics of performance for missile defense (for example, the number of rocket attacks per day or the number of civilian casualties), these metrics do not add up to indicate operational or strategic success. A higher level of success might be indicated by a change in the way VNSAs conduct their attacks. For example, Israel's enemies have evolved their primary concept of operations over the years from maneuver warfare (through 1973) to suicide attacks (Second Intifada) and then to missile attacks. If IAMD is successful, then VNSAs will need to adapt, either by seeking a different approach or perhaps by reinterpreting their strategic intent sufficiently to enable a peace agreement. Ultimately, strategic success may not be measured in terms of quantitative offensive or defensive metrics, but rather by the gain or loss of international influence and legitimacy achieved as a result of the holistic efforts of each combatant.

Strategic and Operational Implications for the United States

Broaden IAMD Strategy with "Left of Launch" Focus. The proliferation of missiles and related technologies to VNSAs has significantly extended the threat of attack on U.S. interests well beyond distant battlefields. In light of such ubiquitous VNSA-based threats, the U.S. military should broaden its IAMD strategy and expand its global IAMD coverage requirements to include its homeland bases and deployment infrastructure, worldwide deployment,

and logistics lines of communication (including choke points, ports, and staging/logistic bases). Because missile proliferation cannot be prevented, the United States should pursue multinational IAMD cooperatives to share the costs of a regional capability and the value of collective security from a common threat. Such cooperatives should coordinate international and regionally tailored collective IAMD strategies with a main effort focused on preventing VNSAs from obtaining and using missile technologies. Such efforts, collectively known as "left of launch" efforts, should include strengthened counterproliferation, expanded international and regional IAMD security cooperation, more balanced and integrated air and missile defense capabilities, a wider scope of vulnerability assessments, and adaptation to VNSAs' use of human shields.

Strengthen Arms Control Regimes.

As the global leader in the value of arms transfer agreements (77.7 percent of all such agreements in 2011), the United States should lead international efforts to strengthen arms control regimes to reduce or limit the proliferation of missiles and related technologies to VNSAs.³⁸ Such efforts will require greater international cooperation and enforcement mechanisms to reduce smuggling and dissuade violator nations.

Expand Security Cooperation

Partnerships. Even with improved arms control, VNSAs will continue to obtain and use missile technologies to terrorize populations and to offset their conventional military disadvantages against states. Therefore, the United States should expand its efforts to develop international and regional security cooperation partnerships for IAMD against common VNSA threats. The Joint IAMD Vision 2020 identifies pursuing policies to leverage partner capabilities as one of its six IAMD imperatives.³⁹ Specifically, it seeks to build partnerships and establish multilateral agreements to develop "an integrated defensive network of interoperable IAMD systems" that can "leverage cost-sharing and help spread the burden among willing participants."⁴⁰ Such an approach should pursue the cooperation



Rockets fired from Gaza toward Israel during Operation *Protective Edge*, July 16, 2014 (Courtesy Israel Defense Forces)

of international stakeholders and regional states with common security interests to dissuade, deter, and, if necessary, preempt or respond to VNSA air and missile threats. Perhaps the most valuable cooperation among international stakeholders and regional partners would be sharing relevant intelligence. In regions where VNSAs have obtained ballistic and cruise missiles, cooperative states should ensure the interoperability and integration of their IAMD battle management systems (for example, command, control, communications, intelligence) and conduct multinational exercises to develop the tactics, techniques, and procedures for their integrated employment. Each nation's IAMD personnel should be trained and ready to plan and employ their capabilities in support of joint and multinational operations. Finally, the U.S. military should address the development and management of personnel capable of manning joint and multinational IAMD positions at all levels.

Increase Integration and Cooperation Among Government Organizations. Within the U.S. Government, there are overlapping authorities and responsibilities among military, law enforcement, and intelligence organizations that also require closer cooperation and better integration. For example, VNSAs use transnational criminal organizations to smuggle missile technologies. Detecting and preventing such smuggling operations at home and abroad could cross organizational boundaries and authorities of all three types of organizations. Therefore, these organizations should jointly examine this cross-functional issue to develop policies and authorities that close vulnerable seams and improve coordination. Further, the counterproliferation capabilities of these organizations should be interoperable and integrated.

Enable Balanced Capabilities to Counter VNSAs with Missile Technologies. Effective missile defense

capabilities must be balanced and integrated with offensive capabilities to suppress or destroy VNSA attack capabilities, seize the initiative, and mitigate the operational risks of adaptive adversaries. Achieving the right balance may require trade-off analyses of joint force capabilities using the context of planning scenarios that include the extended VNSA missile threats. Beyond integrating specific IAMD capabilities, intelligence, surveillance, and reconnaissance (ISR), information operations, cyberspace, and electronic warfare capabilities should be integrated with IAMD planning and employment.

Conduct Wide-Ranging Vulnerability Assessments. Increased missile capabilities by violent groups that profess the intent and capability to attack the United States and its global interests will pose a more widespread threat. Such a threat will necessitate wide-ranging vulnerability assessments to ensure key infrastructure and deployment lines of communication are protected. Overseas

base security agreements should be reviewed and revised based on the global and unpredictable nature of some VNSA threats. Force protection postures should be reviewed for the continental United States, intermediate and forward staging areas, and vulnerable transit/choke points in between. War plans should not assume unopposed movement of forces to the conflict area of operations. IAMD protection must start at the homeland and extend to protect bases, ports, strategic choke points, and lines of communication to the area of operations.

Adapt Operations to Counter VNSAs Embedded in Urban Populations.

Finally, the U.S. military must adapt its IAMD attack operations to address the VNSAs' evolving concept for protecting their missile technologies from preemptive attacks. With a global trend toward urbanization—50 percent of the world's population lived in cities as of 2008, with this number expected to rise to 75 percent by 2050—it seems more likely that urban warfare will increase.⁴¹ Urban infrastructure, underground facilities, and dense populations could quickly overwhelm a U.S. joint force's capacity. To address the unique challenges in this environment, the joint force must increasingly emphasize the development of ISR, maneuver, and precision engagement capabilities. Increased human intelligence will also be essential. There may be a role for nonlethal weapons, as well as the development of smaller precision-guided munitions capable of being tailored to achieve the desired effects with minimal collateral damage. Finally, international law should be examined concerning VNSA accountability for using human shields.

The proliferation of missiles technologies to VNSAs has expanded the threat of their use well beyond military conflict zones. As a result, the U.S. military should mitigate the risks by broadening its IAMD strategy and extending its global IAMD coverage to protect the military's capability to deploy and sustain its forces in response to global crises. The focus of the IAMD strategy should be on "left of launch" efforts designed to prevent VNSAs' missile attacks and to better protect vital U.S. interests. JFQ

Notes

¹ For this article, missile technologies include short-, medium-, and long-range ballistic missiles; antiship and land-attack cruise missiles; rockets; antitank guided missiles; surface-to-air missiles (including man-portable air defense systems); unmanned aerial systems; and the precursor materials, software, and intellectual property for their manufacture.

² Alon Ben-David, "No Fatalities in Israel's Iron Dome Zone," *Aviation Week and Space Technology*, September 1, 2014.

³ "MH17 Malaysia plane crash in Ukraine: What we know," *BBC*, September 9, 2014.

⁴ *Ibid.*

⁵ "ISIS fighters seen with advanced anti-aircraft missiles," *Al-Arabiya News*, October 28, 2014.

⁶ Kirk Semple and Eric Schmitt, "Missiles of ISIS May Pose Peril for Aircrews in Iraq," *New York Times*, October 26, 2014.

⁷ *Ibid.*

⁸ According to the IDF Blog, since 2001, Gaza-based VNSAs have fired more than 15,200 rockets and mortars at Israel. See "Rocket Attacks on Israel from Gaza: Israel under Fire," available at <www.idfblog.com/facts-figures/rocket-attacks-toward-israel/>. In the north, Palestine Liberation Organization rocket attacks from Lebanon began before the IDF's Operation Peace for Galilee in 1982. During the 2006 Lebanon war, Hizbullah hit Israel with approximately 4,000 rockets. For details, see Uzi Rubin, *The Rocket Campaign against Israel during the 2006 Lebanon War*, Begin-Sadat Center for Strategic Studies, June 2007, 2, 10. Hizbullah's rocket and missile quantities are based on Israeli intelligence estimates, as cited by Adam Entous, Charles Levinson, and Julian E. Barnes, "Hizbullah Upgrades Missile Threat to Israel: Components Said to Have Already Been Moved to Lebanon from Syria," *Wall Street Journal*, January 2, 2014.

⁹ "Rocket Attacks on Israel from Gaza."

¹⁰ Russell W. Glenn, *All Glory Is Fleeting: Insights from the Second Lebanon War* (Santa Monica, CA: RAND, 2012), 6.

¹¹ Entous, Levinson, and Barnes; Ya'acov Amidror, "The Terrorist Defense Force," Begin-Sadat Center for Strategic Studies Perspectives Paper no. 281, January 13, 2015.

¹² "Hizbullah's Arsenal Similar to Any National Army's," *Arutz Sheva*, May 20, 2014.

¹³ Jewish Virtual Library, "Fact Sheets: Israel's Missile Defense System," September 2014, available at <www.jewishvirtuallibrary.org/jsource/talking/88_missiledefense.html>.

¹⁴ *Ibid.*

¹⁵ *Ibid.*

¹⁶ Joint Chiefs of Staff, Joint Operational Access Concept (JOAC), Version 1.0, (Washington, DC: Joint Chiefs of Staff, January 17, 2012), 8–14.

¹⁷ National Intelligence Council, *Global*

Trends 2030: Alternative Worlds, December 2012, 60, 64.

¹⁸ Richard F. Grimmett and Paul K. Kerr, "Conventional Arms Transfers to Developing Nations, 2004–2011," Congressional Research Service, August 24, 2012, 6.

¹⁹ Itamar Sharon, "IDF intercepts major Iranian missile shipment to Gaza," *The Times of Israel*, March 5, 2014.

²⁰ Daryl G. Kimball, "The Arms Trade Treaty at a Glance," *Arms Control Association*, July 2013.

²¹ United Nations Office for Disarmament Affairs, "The Arms Trade Treaty," available at <www.un.org/disarmament/ATT/>.

²² *Ibid.*

²³ Jim Michaels, " Hamas boosts rocket range, reaching deeper into Israel," *USA Today*, July 10, 2014.

²⁴ Amidror.

²⁵ David Eshel, "INS Hanit Suffers Iranian Missile Attack," *Defense Update*, July 17, 2006.

²⁶ *Ibid.*

²⁷ Yasmin Tadjdeh, "Islamic State Militants in Syria Now Have Drone Capabilities," *National Defense Magazine*, August 28, 2014.

²⁸ Uzi Rubin, "The Rocket Campaign against Israel during the 2006 Lebanon War," *Mideast Security and Policy Studies*, no. 71 (June 2007), 10.

²⁹ David A. Fulghum, "Iron Dome Repels Hamas Rockets," *Aviation Week and Space Technology*, November 21, 2012.

³⁰ "Worse Than Hamas? Gaza's Other Terror Groups," *The Times of Israel*, August 15, 2014.

³¹ Ben Caspit, "Israeli experts: If Europe won't wiretap, they won't know," *Al-Monitor*, January 13, 2015.

³² International Crisis Group, *Israel and Hamas: Fire and Ceasefire in a New Middle East*, Middle East Report no. 133, November 22, 2012, 2.

³³ Eitan Shamir, "Operation Pillar of Defense: An Initial Strategic and Military Assessment," Begin-Sadat Center for Strategic Studies Perspectives Paper no. 189, December 4, 2012, 2.

³⁴ *Ibid.*

³⁵ *Israel and Hamas: Fire and Ceasefire in a New Middle East*, 2.

³⁶ *Ibid.*, 9.

³⁷ Mark E. Vinson, "An Israeli Approach to Deterring Terrorism: Managing Persistent Conflict through a Violent Dialogue of Military Operations" (Alexandria, VA: Institute for Defense Analyses, November 2014).

³⁸ Grimmett and Kerr, 3.

³⁹ Joint Chiefs of Staff, "Joint Integrated Air and Missile Defense: Vision 2020" (Washington DC: Joint Chiefs of Staff, December 5, 2013), 5.

⁴⁰ *Ibid.*

⁴¹ Peter Storey, "Why Urban Warfare Studies Still Matter," *Cicero Magazine*, June 24, 2014.