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Asset Test 2021: How the U.S. Can Keep Benefiting from Its Alliance with Israel

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With the Biden administration now in office, the U.S. “special relationship” with Israel is entering a new phase.* But its diverse roots remain firmly in place: common values, democratic politics, and strategic interests, as well as close intelligence, military, economic, scientific-technological, cultural, and people-to-people ties. At the same time, recent years have witnessed some dramatic ups and downs in the relationship, along with significant changes in the broader strategic context. Given such parameters, this memo assesses the current status of the U.S.-Israel relationship and offers recommendations for realizing its full potential.

*This paper is an update of the authors’ 2012 study, *Asset Test: How the United States Benefits from Its Alliance with Israel*.



The New Strategic Context for the U.S.-Israel Partnership

Over the next decade, the U.S.-Israel alliance will be shaped by concurrent global, regional, and domestic transformations. Taking them all into account will be key to sustaining the benefits of this longstanding partnership. While Israel is not at the center of U.S. security and international economic policies, it will make an important contribution as the new order emerges.

At the global level, the sharpening U.S.-China—and, to a lesser extent, U.S.-Russia—competition looms larger today than in the past, while Middle East oil and gas have lost their centrality to the American economy. Nevertheless, the Middle East is an important arena in this new Great Power competition due not just to growing Asian demand for its energy resources but also to its geographic location, political and religious significance, and continuing potential to export instability worldwide. To the extent that Great Power competition is increasingly economic and technological as well as military and political, Israel is one Middle East state well-placed to deliver outsized contributions.

Exemplifying Israel's seriousness as a player in this new "great game" are its military activities since 2017 to counter Iranian efforts to transform Syria into a forward military base in the Levant. Even beyond the Middle East, Israel's burgeoning arms exports, intelligence ties, and high-tech civilian partnerships with India, Japan, South Korea, and other American allies advance the goals of the U.S. "rebalance" to the Indo-Pacific region. Moreover, President Joe Biden's declared intent to hold a "Summit for Democracy" suggests a firm place for Israel in a Trumanesque struggle between democracy and authoritarianism reminiscent of the dawn of the Cold War.¹

Israel is also a world-class innovator in technologies that will be critical to meeting future challenges, including artificial intelligence (AI), information technology (IT), and cybersecurity; sustainable water, food, and energy solutions; and high-tech medicine. All these areas are supportive of America's foreign policy priorities: pursuing peaceful Great Power competition; restoring global economic competitiveness; and building climate resilience, while addressing development, public health, sustainability, and similar concerns. And in all these areas, the United States is the preferred partner of Israeli firms seeking to expand operations and access to the global market. Furthermore, while Israel maintains ties with China, the latter's investment in the Israeli high-tech sector, for example, is holding at just around 10 percent, while the remaining 90 percent is overwhelmingly with Western, and especially American, partners.

In the Middle East regional arena, a major recent shift offers new horizons for U.S.-Israel cooperation: the tide of Arab "normalization" with Israel, which has occurred with active American support. This current is embodied by the August 2020 Abraham Accords with the United Arab Emirates and Bahrain, later joined by Sudan, along with a separate but parallel Israeli deal with Morocco. Saudi Arabia, Oman, and others could follow. This trend overturns the conventional wisdom that the unresolved Palestinian conflict is an insurmountable obstacle to decent relations between Israel and Arab states. Beyond that, it paves the way for U.S.-Arab-Israel collaboration in a host of areas. The recent decision by the U.S. Department of Defense to move Israel from the European Command (EUCOM) to the Middle East-focused Central Command (CENTCOM) was greeted without objections by America's Arab allies and partners, and is another important indicator of this new reality.

Partnerships between the United States, Israel, and Arab states that foster high-tech cooperation will be essential to meeting the defining challenges of the future. Already, these actors have taken steps

toward such cooperation in the energy, cyber, and medical spheres, in addition to the recently announced “Abraham Fund,” a \$3 billion trilateral endowment meant to spur development and economic cooperation in the Middle East and North Africa.² One can also expect the Biden administration to encourage tighter security cooperation between its Arab allies and Israel to facilitate a lighter U.S. military footprint in the region.

Regarding Iran, Washington and Jerusalem were at odds during President Barack Obama’s second term, then in agreement in the era of President Donald Trump, as he withdrew from the Joint Comprehensive Plan of Action (JCPOA), as the nuclear deal is known, and reimposed stiff sanctions against Tehran. Renewed disagreement can be expected as the Biden administration seeks to rejoin the nuclear accord in some form. As demonstrated by the recent controversy surrounding Israel Defense Forces chief of staff Lt. Gen. Aviv Kochavi’s public criticism of this U.S. plan, it is best to air these differences privately.³ Future consultations on this matter, moreover, will likely include a number of Israel’s new Gulf Arab partners.

Yet despite the serious Obama-era quarrel, both sides have long understood the value of cooperation against threats from Iran. This has included intelligence sharing, missile defense, joint cyber activities, and covert counterterrorism operations—including the 2008 killing of Hezbollah’s chief of external operations, Imad Mughniyah, in Damascus, and of al-Qaeda’s number two, Abu Muhammad al-Masri, in Tehran in 2020. The perceived threat of Israeli action against Iran’s nuclear program has at times helped the United States marshal international support for sanctions or negotiated limits instead. And developments over the past five years have clarified to U.S. policymakers that Iran’s growing conventional military capabilities—including highly accurate drones and missiles, military bases far from Iran’s

borders, and proxy and partner militias in Lebanon, Syria, Iraq, the Gaza Strip, and Yemen—pose an urgent threat not just to Israel and its Arab neighbors but to U.S. interests as well. Seen in this light, the public jousting over the JCPOA is truly the exception that proves the rule.

Similarly, regarding the Palestinians, Arab-Israeli normalization could provide a path forward, or at least a respite from bilateral tension. Today, normalization itself signals the reduced salience among many Arabs of the Palestinian cause, thereby reducing it as a priority for Washington as well. Still, one can readily foresee renewed diplomatic disputes over West Bank settlements, peace process terms of reference, and the fate of the two-state solution. Managing, if not resolving, such disputes will pose a complicated challenge for both Washington and Jerusalem. To be sure, resolving the Israeli-Palestinian conflict would be best for all parties, but this issue is no longer central to U.S.-Israel bilateral ties or the region’s politics.

Looking ahead, however, a number of countervailing factors present major challenges. Center-right and right-wing governing coalitions will likely dominate in Israel into the future, due to demographic and political trends, including the perceived absence of a peace partner on the Palestinian side, and settlements and other facts on the ground. This is likely to remain a long-term issue in any U.S.-Israel dialogue about the Palestinians—and indeed about Israel’s destiny as both a Jewish and a democratic state. In the United States, there is rising partisan polarization regarding Israel. Whereas a half-century ago polling showed Democrats to be more pro-Israel, today the trend is reversed, owing to increased Democratic sympathy for the Palestinians and growing evangelical Christian influence in the Republican Party.⁴ This trend, too, could affect the tone if not the substance of future bilateral ties.

Nevertheless, at least two mitigating factors should be borne in mind. First, the aforementioned polls also demonstrate that, while Republicans and



independents are more solidly supportive of Israel, the majority of Democrats (who today are about a third of the American public) still consider Israel an ally or friend of the United States. More important, American domestic politics is no longer the primary driver of the informal U.S.-Israel alliance. Rather, new regional and global realities, along with the tangible benefits to the United States of security and economic partnerships with Israel, now drive the “special relationship” to a greater extent.

Internally, Israel’s prospects are on balance quite encouraging. While the coronavirus emergency has exacerbated social tensions between the authorities and the ultra-Orthodox community (10% of the population), it has eased tensions with Israel’s Arab minority (20%), who participate in (as caregivers) and benefit from (as patients) Israel’s inclusive and relatively effective national healthcare system. The macroeconomic indicators during this difficult period are naturally mixed. Unemployment and poverty have spiked with each lockdown, but upward trends include start-ups, foreign direct investment, and overall economic growth. Societal resilience has so far withstood quarantine, corruption, and election fatigue.

In the past decade, the Arab uprisings have highlighted the brittle foundations of some of Washington’s regional allies. By contrast, Israel is a vibrant and stable, if fractious, democracy— notwithstanding multiple parliamentary elections over the past two years. Moreover, Israel shares Washington’s interests in regional stability, in countering violent Islamist extremism, and in preventing additional nuclear proliferation in the Middle East. And Israel’s high rates of political participation, including by its Arab citizens; its stubbornly independent press, NGOs, and legal system; and its very vocal but largely peaceful protests all clearly demonstrate the strength of its democracy—however imperfect it may be.

The Enduring Strategic Logic of the Alliance

The U.S.-Israel special relationship has traditionally been defined in terms of a moral obligation, shared values, and common interests. During the Cold War, Israel also came to be seen as a strategic asset that served as a bulwark against Soviet influence and a counter to radical Arab nationalism. U.S. military assistance to Israel contributed to peace treaties with Egypt and Jordan, and has deterred the outbreak of major interstate Arab-Israel conflicts since 1982. The U.S.-Israel relationship likewise has helped spur closer U.S.-Arab ties ever since the 1973 war, because most Arab leaders have believed that only the United States could deliver the Israeli concessions they required. Yet because media and policymakers tend to view Israel largely through the prism of the Palestinian conflict, many of the “hard” and “soft” security and other benefits of the U.S.-Israel alliance have often gone unrecognized.

In the Middle East today, the United States faces a changed, more complex security environment defined first by hard security challenges: terrorism; hybrid and nonconventional military threats; the proliferation of failed states; the rise of regional powers such as Iran and Turkey; the greater assertiveness and independence of traditional partners such as Saudi Arabia, the UAE, and Qatar; and the presence of Great Power competitors such as Russia—and increasingly China. But it is also defined by new and emerging soft security challenges related to: economic development; public health; water and food security in an era of accelerating climate change and environmental degradation; the quest for sustainable energy alternatives; and the IT, cyber, and AI revolutions. All these challenges will test U.S. resilience and require broad international cooperation if they are to be effectively managed. Israel is one of the few countries positioned to help the United States deal

with both these traditional and emerging security challenges.

Many of the considerations that justified the U.S.-Israel security relationship during the Cold War and in the immediate post-9/11 era remain valid today. Israel is an ally of Egypt in its fight against an Islamic State insurgency in the Sinai Peninsula (providing intelligence and air support), a quiet but effective ally of Jordan, and a bulwark against radical Islamism in the Levant (as embodied by Hezbollah in Lebanon and Hamas and Palestinian Islamic Jihad in Gaza). Since 2017, Israel’s “gray zone” campaign against Iran and its proxies in Syria has hindered efforts by these actors to transform that country into a springboard for attacking Israel and projecting power regionally.

Israel is the only de facto nuclear weapons state in the region. While previously this may have contributed to initial, unsuccessful attempts at nuclear proliferation by Egypt, Libya, and Syria, Israel’s policy of “opacity” also made it easier for some of these countries to subsequently forgo nuclear weapons. Its policy of prevention has, moreover, precluded further nuclear proliferation in Iraq (1981) and Syria (2007)—and delayed an Iranian bomb, at least thus far.

Washington has demonstrated a commitment to preserving Israel’s “qualitative military edge,” bolstering Israeli deterrence against hostile state and nonstate actors. The United States has also granted Israel “major non-NATO ally” status, signed a free trade agreement with it, and provided it with substantial military and economic aid—topping \$146 billion since 1949.⁵ Moreover, military equipment prepositioned in Israel, valued at around \$1.2 billion, is available to support U.S. contingencies in the eastern Mediterranean and Persian Gulf.⁶ This assistance has helped Israel build an extremely capable military that can independently ensure the survival of the state, without U.S. military intervention. Washington, moreover, is still seen as an address for Arabs seeking to influence Israeli

policies, while Israel is still seen as an address for Arabs seeking to influence Washington. Indeed, the recent Abraham Accords were at least partly born of these kinds of calculations. And Israel is seen by a number of Arab states as a critical ally in the struggle to contain Iran’s influence, as the United States draws down its military presence in the region.

Countering Traditional and Emerging Military Threats

To address common traditional hard security threats, the United States and Israel collaborate in numerous areas: intelligence sharing, rocket and missile defense, military and defense-industrial cooperation, and, since 9/11, homeland security.

INTELLIGENCE COOPERATION. U.S.-Israel intelligence cooperation dates to the early 1950s and has long been a pillar of the security relationship.⁷ During the Cold War, Israeli intelligence provided invaluable information regarding Soviet intentions, weapons systems, and intelligence activities, as well as the activities of Palestinian and other Arab terrorist groups, such as Hezbollah, that targeted both U.S. and Israeli interests.⁸ Israeli intelligence played a key role in exposing Iraqi efforts to rebuild its nuclear program in the decade following the Osiraq raid of 1981,⁹ helping UN weapons inspectors dismantle Iraq’s WMD programs after the 1991 Gulf War,¹⁰ uncovering Russian support for Iran’s missile program in the mid-1990s,¹¹ and exposing Syria’s nuclear program before Israel’s air force destroyed it in 2007.¹²

Today, Israeli intelligence remains a major source of information regarding the activities of IS and al-Qaeda and their affiliates,¹³ Hezbollah’s global

activities,¹⁴ as well as Iran’s nuclear program—as exemplified by its successful heist of Iran’s pre-2003 nuclear archive.¹⁵ Israeli sabotage operations, moreover, have helped delay Iran’s nuclear program.¹⁶ Israel’s comparative advantages include a sustained focus on key hard targets, the development of unique sources and innovative methods, and a willingness to incur risk. And as U.S. intelligence increasingly turns its attention to China, Russia, and North Korea and U.S. intelligence spending likely remains flat or decreases,¹⁷ America will rely more on allies such as Israel to fill capabilities and knowledge gaps, manage risk, and maintain situational awareness in the Middle East.

MISSILE DEFENSE. Israel—America’s most sophisticated partner in this arena—is the only country worldwide with an operational national missile defense system protecting major population centers. U.S. aid for this program since the early 1990s totals more than \$7 billion.¹⁸ In return, the United States has obtained a deeper understanding of the rocket and missile threat in the Middle East, and lessons drawn from Israel’s extensive operational experience since 1991. Israel’s Iron Dome counter-rocket and mortar system—the most active component of the country’s rocket and missile defenses—is credited with more than 2,400 intercepts and an 85 percent success rate, enabling Israel to act with relative restraint in the face of frequent rocket attacks from Gaza.¹⁹

In light of this success, the United States has purchased two Iron Dome batteries—renamed “SkyHunter” by the U.S. Army—to fill an interim cruise missile defense gap, and elements of the system are being considered as a long-term answer to the growing rocket, unmanned aircraft system (UAS), and cruise missile threat. The first Iron Dome batteries have reportedly been approved for deployment to protect U.S. forces in the Gulf region.²⁰ However, interoperability and cyber vulnerability challenges may preclude their integration into U.S. missile defenses.²¹ Looking toward the future, Israel and the United States are

discussing joint R&D for laser weapons and hypersonic missile defenses.²²

MILITARY COOPERATION. The U.S. and Israeli armed forces have benefited from decades of extensive collaboration in the fields of counterterrorism, military lessons learned, and UAS employment.

- **Counterterrorism.** The Israeli military conducted the first successful rescue of hostages from a hijacked airplane in 1972 and pioneered many of the tactics eventually adopted by U.S. and allied counterterrorism units. Since then, U.S. and Israeli special forces have forged professional relationships and regularly train together.²³ Israeli intelligence support has been instrumental to the U.S. apprehension of wanted terrorists, and Israel partnered with the United States in February 2008 to kill Hezbollah operational mastermind Imad Mughniyah.²⁴ Israel also reportedly provided intelligence that contributed to the 2011 killing of Osama bin Laden.²⁵ More recently, in August 2020, an Israeli hit team is reported to have killed al-Qaeda’s number two, Abu Muhammad al-Masri, in Tehran at the behest of the United States.²⁶ The United States and Israel also conduct cooperative R&D on promising technologies relevant to counterterrorism and irregular warfare, with a recent emphasis on subterranean warfare, as part of the U.S. Combating Terrorism Technical Support Office, which also counts Australia, Canada, Singapore, and Britain as members.²⁷
- **Military lessons learned and concepts development.** Lessons learned from the 1973 October War influenced the design of several key weapons systems and helped create the U.S. military that prevailed in Operation Desert Storm in 1991.²⁸ Lessons from Israel’s 1982 war in Lebanon regarding the use of decoys and UASs and the conduct of an integrated air-defense suppression campaign were applied in subsequent U.S. operations over Libya, Iraq,

and the former Yugoslavia.²⁹ And lessons from the 2000–2005 second intifada and subsequent Israeli operations in Gaza pertaining to counter-terrorism operations, tunnel and urban operations, and irregular warfare have been applied by U.S. forces in Iraq, Afghanistan, and Syria.³⁰

Israel's experience integrating collection means and weapons platforms (attack helicopters, strike aircraft, and UASs) profoundly influenced the U.S. approach to targeting violent extremist networks in Iraq, Afghanistan, Pakistan, and Yemen.³¹ More recently, Israel has used AI to identify "lone wolf" attackers during the Palestinian "knife intifada" (2015–16) and to detect cross-border attack tunnels from Gaza and Lebanon.³² It is also involved in a dialogue with the United States on AI issues.³³ Israel's experience in waging a gray zone campaign against Iran and Iranian forces in Syria since 2017 (its so-called campaign between wars)³⁴ has provided valuable insights for U.S. planners waging their own gray zone campaign against Iran in Iraq and the Gulf.³⁵ And ongoing exercises involving Israel's Refaim (Ghost) unit,³⁶ which seeks to integrate air and ground elements, physical and cyber activities, and men and machines, will help the United States develop its own joint warfighting concept of the future³⁷—just as Israel will benefit from similar U.S. efforts.³⁸

- **UAS, counter-UAS, and robotics.** Israeli innovations in the use of UASs for intelligence, surveillance, reconnaissance, and combat unveiled during the 1982 Lebanon war and afterward helped jump-start the U.S. effort.³⁹ Since purchasing its first Israeli UASs in the mid-1980s, the United States has emerged as the world leader in the production and employment of unmanned systems. While the U.S. military is no longer a major operator of Israeli drones, the United States has purchased Israeli Skystar-180 aerostats (unmanned aerial surveillance balloons) for military surveillance missions,⁴⁰ and is considering purchasing the

Israeli Hero-120 antiarmor loitering drone for use by Special Forces.⁴¹ Israeli quadcopter drones are used by civilian utilities in the United States as a consequence management tool to survey the aftermath of floods and fires.⁴² The United States is also evaluating a handful of Israeli counter-UAS systems to deal with the drone threat both overseas and at home, and several have already been field-tested.⁴³

Israel is producing robotic systems for use on the land and in the sea, and its military is pushing to rapidly integrate robotic systems into its force structure.⁴⁴ The U.S. military is evaluating a number of Israeli robotic systems, including the unmanned Micro Tactical Ground Robot and the manned EZRaider HD4 off-road vehicle.⁴⁵ Given its head start in this arena, Israel will likely play a leading role in the fielding of ground and naval unmanned systems, constituting significant potential for future collaboration with U.S. industry.

- **Defense-industrial cooperation.** In the past two decades, Israel has emerged as a major supplier of defense articles to the U.S. military, with sales growing from \$300 million annually in the 1990s to nearly \$1.5 billion annually in 2019—about 20 percent of Israel's \$7.2 billion in arms exports in that year.⁴⁶ Israeli firms partner with American counterparts or create U.S. subsidiaries to enhance the prospects of sales to the U.S. military and to third countries, thus preserving or creating American jobs. Israel-origin defense articles used by the U.S. military include unmanned aircraft and ground vehicles and counter-UAS systems, ISR systems, integral and add-on vehicle armor, active defenses for armored fighting vehicles, helmet-mounted sights used by Army, Navy, Air Force, and Marine aviators, combat aircraft navigation and targeting pods and passive airborne warning systems, long-range precision air-to-ground munitions, naval point-defense weapons systems, and lightweight armor for warships. A



number of Israeli firms are also trusted suppliers of major components for U.S. weapons systems.⁴⁷ Israel's defense industries—working with U.S. partners—will likely remain important niche suppliers of innovative high-tech items and systems.⁴⁸

- **Homeland security.** Following the 9/11 attacks, homeland security became a major American priority, and U.S.-Israel cooperation in this area has expanded dramatically in the past two decades.⁴⁹ The U.S. Department of Homeland Security's Science and Technology Directorate and the Israel Ministry of Public Security, since 2015, have jointly funded R&D in promising technologies that address homeland security needs. Current priorities for joint R&D include advanced first-responder technologies as well as technologies for combating cybercrime, securing critical infrastructure and public facilities, ensuring safe and secure cities, protecting borders, and countering UASs.⁵⁰ Moreover, since 9/11, thousands of U.S. law enforcement, homeland security, and emergency services personnel have received training on emergency response, consequence management, and counterterrorism tactics used in Israel.⁵¹ Many U.S. agencies and local security authorities have studied Israel's homeland security experience,⁵² and have acquired Israeli technologies to secure border crossings, critical infrastructure, and air- and seaports.⁵³

In sum, Israel is a leader in developing technologies and concepts that will bolster U.S. deterrence and better equip it during an era of gray zone and Great Power competition. Some of the more critical examples include advanced analytics and AI, cyberwarfare, military robotics, drone/rocket/missile defenses, directed energy weapons, battlefield ISR, nanosatellites, long-range precision strike systems, and passive and active defenses for weapons platforms.⁵⁴ Moreover, the United States has benefited from indirectly helping foster one of the world's most innovative defense industries.

Specifically, by partnering with Israeli firms, U.S. defense contractors have created new jobs and expanded their market share, while benefiting from Israeli experience and gaining access to technologies that enhance their qualitative edge and save lives on the battlefield.

Economic, Technological, and Sustainability Partnerships

Global transformations in recent decades have redefined notions of U.S. national security,⁵⁵ with a variety of soft security challenges assuming greater salience. These include: revitalizing the American economy; addressing the consequences of climate change and environmental degradation; improving public health and fighting pandemics; securing and exploiting the cyber domain; pursuing diverse, renewable energy sources; and enhancing societal resilience. Israel can make significant contributions in nearly all these areas. Moreover, growing Arab receptivity to cooperation with Israel⁵⁶ in both the soft and hard security domains creates opportunities for trilateral ventures involving governmental entities, as well as private sector researchers, investors, and entrepreneurs.⁵⁷

ECONOMIC RENEWAL. Both major U.S. political parties recognize that revitalizing the American economy by rebuilding the manufacturing sector, restoring the middle class, and ensuring a living wage for workers is crucial to preserving U.S. global leadership and a viable national future.⁵⁸ Technological innovation is key to achieving this goal, and close U.S.-Israel ties have facilitated remarkable economic synergies.

On several innovation indices, Israel scores impressively (6th, 2020 Bloomberg Innovation

Index⁵⁹; 10th, 2019 UN Global Innovation Index⁶⁰; 15th, 2019 World Economic Forum index⁶¹). It leads the world in both the number of engineers and R&D investment per capita.⁶² And Israel now hosts more “unicorns” per capita—privately owned companies valued at over \$1 billion—than any other country, marking its transition from “start-up” nation to “scale-up” nation.⁶³ Israel also leads in women’s entrepreneurship, topping the 2020 Mastercard Index of Women Entrepreneurs.⁶⁴

Israel is among the top twenty-five sources of foreign direct investment in the United States,⁶⁵ and two-way U.S.-Israel trade is greater than that with some much larger countries, such as Saudi Arabia and Poland.⁶⁶ Even U.S. cities far from the traditional coastal tech hubs—e.g., Tulsa, Oklahoma—are actively seeking to attract Israeli investment and start-ups, touting the digital infrastructures they have built to cope with the pandemic and the associated online economy.⁶⁷

Because of Israel’s outsize role in high-tech fields ranging from AI to clean technology, more than three hundred U.S. companies, including tech standouts (e.g., Microsoft, Apple, Cisco, Abbott Laboratories, IBM, Google, General Electric, and General Motors), have set up R&D centers in Israel.⁶⁸ Several highly successful U.S.-Israel binational foundations, in addition, have been created to spur joint R&D and start-ups in emerging technologies, generating billions of dollars in additional revenues in recent decades. And because of the longstanding U.S.-Israel relationship, U.S. companies are frequently the partners of choice for Israeli firms seeking to market their products in the United States and the world, leading to the creation of tens of thousands of jobs in the United States.⁶⁹

ARTIFICIAL INTELLIGENCE. The AI revolution promises to transform every aspect of human activity,⁷⁰ and Israel is poised to help lead it—ranking first globally in the number of AI companies per capita, and third globally in the number of AI start-ups.⁷¹ Israel’s AI activities tend to focus on

traditional high-tech areas where the country has already established a niche advantage: medical diagnostics, treatment, and recordkeeping; autonomous vehicles; computer-assisted design and manufacturing (CAD/CAM), especially in nanotechnology and 3D printing; telecom and social media optimization and analytics; facial and voice recognition; and engineering systems for ultraefficient irrigation, human nutrition, and energy conservation. In 2018, Israel hosted about a thousand different AI start-ups, accounting for nearly 40 percent of all high-tech investment in the country that year.⁷²

In all these areas, Israeli developers and start-ups are teaming up with American partners, from giant corporations to small- and medium-size entrepreneurs. To cite two recent examples, in 2019 Walmart purchased Israeli AI platform Aspectiva to produce better customer-satisfaction analysis.⁷³ And in January 2021, Elon Musk, among the top American pioneers in applied AI, cited a small Israeli start-up for its advanced work on autonomous vehicles as his Tesla company opened a significant presence inside Israel.⁷⁴ U.S. growth and global leadership in this critical area, in the face of serious near-peer competition from China and perhaps others, will depend to some extent on intensified cooperation with Israel and emerging AI powers like it. At the same time, Israel needs to address the potential use of its AI products by customers to perpetrate human rights violations, wage disinformation, or conduct fraud or similar abuses.⁷⁵ This makes U.S.-Israel and multilateral cooperation to define AI ethics and norms all the more imperative, in order to enhance AI’s potential while minimizing its risks.

IT AND CYBERSECURITY. Israel has emerged as an information technology pioneer—becoming the world’s second largest exporter of cyber technology behind the United States in 2018.⁷⁶ Moreover, U.S.-Israel cybersecurity cooperation in the private sector is substantial. Intel is one U.S. firm with strong ties to Israel.⁷⁷ The Israel-made



Sandy Bridge processor accounted for 40 percent of Intel's global sales in 2011, and the Israeli research facility responsible for the chip has been integral in designing two successive generations of Intel's microprocessors.⁷⁸

Recently, Intel announced its planned acquisition of Israeli chip maker Habana Labs for \$2 billion⁷⁹ and smart-transit start-up Moovit for \$900 million,⁸⁰ along with the machine-learning platform cnvrg.io.⁸¹ Another industry giant, Apple, has recently announced its plans to lease a 92,000-square-foot office space in Haifa.⁸² Israeli researchers have also been central in developing other computer-related and telecommunications inventions and applications, including instant messaging, Voice over Internet Protocol (VoIP), online money transfers, network security, workforce management software, and data mining programs.⁸³

WATER/FOOD SECURITY AND CLIMATE

RESILIENCE. In the coming years, large parts of the Middle East and the western United States will likely experience severe water and food shortages due to rapid population growth, climate change, and economic development—potentially creating tens of millions of climate refugees.⁸⁴ Israel has been navigating such issues since its establishment, becoming a world leader in water management and high-tech agriculture. Israel recycled nearly 90 percent of its wastewater in 2016, the highest level in the world,⁸⁵ and continues to cooperate with the Environmental Protection Agency on planning better water management strategies for the United States.⁸⁶ As of late 2020, the water distribution and conservation company Mekorot became the most valuable Israeli company of the hundreds listed on U.S. stock exchanges, with a market capitalization of over \$16 billion—surpassing the “traditional” Israeli market leaders in cyber, pharmaceuticals, and other high-tech sectors.⁸⁷ This is especially notable because a significant part of the company's global business involves sustainable technology transfer to underdeveloped countries suffering from water shortages aggravated by climate change.

Israel is also a pioneer of drip irrigation for arid regions. In 1965, the agricultural firm Netafim introduced the world's first drip irrigation system,⁸⁸ and today it has U.S. owners and major offices, and is the second-largest drip irrigation producer globally by revenue.⁸⁹ Israel is also emerging as a player in desalination, with the world's third largest currently operating desalination plant,⁹⁰ and the largest existing facility that utilizes reverse osmosis—a process that requires less energy than other means.⁹¹ Israel is the only country worldwide to appoint a water attaché in one of its embassies (in India), reflecting its commitment to sharing this know-how.⁹²

In seeking to enhance food security, Israel has established itself as a leader in precision agriculture and “agtech,” with ten Israeli firms included in a Top 50 Agtech and Foodtech rankings for 2020 published by *Forbes*.⁹³ An Israeli agriculture start-up is producing a system for vertical farming that can be used in dense urban areas.⁹⁴ Israel is also at the forefront of synthetic meat products, and Meat-Tech 3D, which produces a meat substitute with 3D printing, recently filed for a public offering in the United States.⁹⁵ Israeli-designed GrainPro technology, a storage container that preserves grains before they reach market, has achieved use in more than a hundred countries.⁹⁶ Such innovations support long-term U.S. national security objectives, including sustainable development, water and food security, climate resilience, economic development, and political stability.

RENEWABLE AND CLEAN ENERGY. In 2019, the Israel Innovation Authority launched its sixth technological innovation laboratory, which will focus on environmental research and sustainability.⁹⁷ Innovations like Israeli company SolarEdge's HD-Wave solar inverter (winner of the 2018 Edison Award)⁹⁸ and Raycatch's AI-integrated DeepSolar technology (winner of the 2019 Intersolar Award)⁹⁹ are redefining the solar energy industry. And Israeli cleantech often appears in the U.S. market. For instance, in late 2020 the Israeli

renewables firm OPC announced plans to acquire U.S. counterpart CPV and intends to target the American renewables market as a growing industry partner.¹⁰⁰ One leading U.S. solar company, BrightSource, has Israeli origins.¹⁰¹ In 2019, the Israel-U.S. Binational Industrial Research and Development (BIRD) Energy program invested in \$15.4 million worth of joint clean energy ventures between Israeli and U.S. firms.¹⁰² Finally, as of early 2021, an Israeli start-up producer of advanced modular electric car platforms, REE, is ready to launch its IPO estimated at over \$3 billion, a market leader in this avant-garde niche.¹⁰³

MEDICAL RESEARCH. In light of the Covid-19 pandemic, potential partnerships are emerging with Israel’s medical and public health sector. After initially stumbling in its response, Israel’s performance in acquiring and administering vaccinations is now among the world’s best—although not all Israeli lessons learned may be applicable to the United States, given vast differences in scale, social norms, and health systems. Still, rapid-response Israeli medical technologies are ripe for American use, development, and distribution. Examples include coronavirus testing techniques;¹⁰⁴ air filtration systems;¹⁰⁵ and Israeli “big data” applications for epidemiology.¹⁰⁶ U.S. vaccine manufacture Pfizer has been granted access to Israel’s national medical database so that it can refine its product to help both countries and their worldwide partners confront the coronavirus.¹⁰⁷

More broadly, the 2020 Bloomberg Healthiest Country Index ranked Israel 10th (and the United States 35th).¹⁰⁸ Israel is a world leader in basic research and clinical applications in the medical field. In 2017, Israel received the most U.S. Patent and Trademark Office medical patents per capita of any country,¹⁰⁹ and Israeli company Teva is the world’s largest generic drug manufacturer, with major U.S. operations.¹¹⁰ Israel is also a world leader in computerized patient records, and an Israeli start-up has developed an algorithm for better managing patient data in a way that can forecast diagnoses

of dangerous conditions.¹¹¹ Israel’s VRHealth, with offices in Tel Aviv and Boston, has used virtual reality to assist with pain management and physical and cognitive therapy.¹¹² Other notable recent accomplishments include Israeli start-up Montfort’s use of smartphone and AI technology to test for Covid-19 with brain monitoring,¹¹³ as well as Israeli company G Medical Innovations’ continued development of a wireless vital signs monitoring system.¹¹⁴

Israel’s medical accomplishments contribute to the health of the American public and economy by helping reduce healthcare costs, increasing the productivity of the American workforce, and adding to the commercial success of U.S. biomedical manufacturers. Furthermore, with six hundred companies in the field, Israel is a leader in digital health,¹¹⁵ a sector considered vital for pandemic response—a public health problem that is likely to be exacerbated by climate change.¹¹⁶

U.S.-Israel medical cooperation is extensive. In 2020, Israeli and U.S. researchers at Cornell University made a neurological breakthrough that could redefine the way the brain is mapped.¹¹⁷ Mayo Clinic and Israel’s Vocalis Health have announced a joint study using AI to identify vocal markers of pulmonary hypertension,¹¹⁸ and Houston Methodist Hospital has announced plans to coordinate on innovation in telehealth and data sharing with Israel’s Sheba Medical Center.¹¹⁹ Johnson & Johnson’s strategic venture capital arm, JJDC, currently has nine portfolio companies in the medical devices sector in Israel.¹²⁰ Beyond the civilian sphere, the U.S. military and numerous emergency services have long relied on the so-called Israeli bandage, which enables more rapid treatment of the injured, and the U.S. Department of Veterans Affairs recently expanded access to an Israeli exoskeleton that allows wounded veterans to walk again.¹²¹ Israel is also on the cutting edge in medical imaging, nuclear medicine, and healthcare IT, with GE’s Israeli subsidiaries contributing to the company’s role as a world leader in these areas.¹²²



SOCIETAL RESILIENCE. Having endured numerous wars and acts of terrorism over its seven-plus decades, Israel can offer insights into individual and societal resilience. Practitioners and administrators from both countries collaborate on preventive education and information strategies, advances in emergency response, and mass casualty treatment.¹²³ And Israeli programs have served as models for U.S. Department of Veterans Affairs programs helping U.S. veterans deal with post-traumatic stress.¹²⁴ Despite the pandemic, Israel experienced record capital investment in domestic companies in 2020—an indicator of economic resilience.¹²⁵ And in January 2021, Israeli start-ups raised an all-time one-month record \$1.2 billion.¹²⁶

Many Israeli firms have been developing solutions designed for a post-Covid world that will likely see greater Internet activity and virtual learning. They include SentinelOne’s cybersecurity technology designed for periods of increased virtual traffic, Intuition Robotics’ social robot designed for elder care, AgriTask’s program for remote management of farms, and Class.Me’s virtual education platform.¹²⁷ And these companies are active in the U.S. market—in November 2020, Deloitte Technology Fast 500 named SentinelOne one of the fastest growing companies in North America.¹²⁸ Israel is poised to be a valuable U.S. partner in navigating the post-pandemic economy.

Future Challenges

While Israeli contributions to U.S. economic, national security, and foreign policy objectives are substantial, achieving the full potential of the partnership will require both sides to address several challenges:

LINGERING MISTRUST. Despite enjoying intimate ties, an undercurrent of mistrust continues to affect

U.S.-Israel relations. This is the result of a number of events, including the 1980s-era Jonathan Pollard espionage affair, secret U.S. nuclear talks with Iran followed by Israel’s open lobbying against the 2015 nuclear deal, and Israel’s commercial ties to China. Even the 2020 killing of Iran’s chief nuclear weapons scientist, Mohsen Fakhrizadeh, was seen by some as an attempt by Israeli prime minister Binyamin Netanyahu to scuttle U.S. efforts to rejoin the JCPOA.¹²⁹ Mistrust also arises from inevitable tensions caused by divergent approaches toward the Palestinians, as well as an Israeli interpersonal and political style—and a tendency to overreach—that some American officials find off-putting. While differences between even the closest of allies are inevitable, the United States and Israel can do more to avoid or defuse such tensions.

SELF-RELIANCE. The U.S.-Israel relationship has thrived, in part, because Israel has never asked Americans to risk their lives on its behalf. However, policies that create the impression that Israel is trying to maneuver the United States into launching a military strike on Iran’s nuclear program, or indefinite requests for U.S. military aid—especially if the post-Covid U.S. economy remains in the doldrums—could introduce additional tensions.

ECONOMIC CHALLENGES. Israel transformed an economy with high unemployment and hyperinflation in the 1980s into one enjoying solid growth ever since. This is a remarkable achievement. Yet, economic danger signs abound. Israel also has one of the highest poverty rates of any country within the Organisation for Economic Co-operation and Development,¹³⁰ with dramatic disparities in the distribution of wealth; a lackluster public education system; and growing unemployment in the ultra-Orthodox Jewish and the Arab communities—which by 2060, according to one projection, may together make up as much as half of Israel’s population.¹³¹ And Israel’s innovative edge may dull without proper tending.¹³² It remains to be seen whether steps being taken to address these problems will prove sufficient.

DELEGITIMIZATION. Israel’s critics and enemies are turning to boycott, divestment, and sanctions (BDS) as a means of diplomatically isolating the Jewish state, limiting its military and economic options, and pressuring it to unilaterally withdraw from the West Bank—which, for many BDS proponents, is a first step toward dismantling Israel itself. Such efforts have not garnered widespread support in the United States and have had a limited impact thus far—the BDS movement has established only a toehold in the far-left wing of the Democratic Party. Nevertheless, they could, if successful, harm investment in Israel and hinder collaborative R&D and production efforts that are central to the Israeli economy, to high-tech sectors of the U.S. economy, and to the broader U.S.-Israel relationship.

PEACE WITH THE PALESTINIANS. The perception that Israel bears significant responsibility for the impasse with the Palestinian Authority has gained traction in various U.S. circles, and could eventually endanger the U.S.-Israel relationship. This is partly a self-inflicted wound by Israel; halting land expropriations and showing greater restraint regarding settlement construction or the destruction of illegal Palestinian dwellings, given the difficulties in obtaining building permits, would help avoid unnecessary U.S.-Israel tensions. Such restraint will be increasingly necessary amid emphasis on this issue by progressives within the Democratic Party.

COVID-19 AND GOVERNANCE FAILURES. The Israeli government’s uneven management of the pandemic has heightened domestic social tensions, especially between secular Jews and the ultra-Orthodox, and highlighted shortcomings of Israel’s political system. The Israeli government is concurrently facing a period of gridlock, with the country’s fourth election in less than two years looming. Israel’s future effectiveness as a partner may suffer if social divisions fester and political polarization deepens.

Policy Recommendations

The foregoing analysis has highlighted the potential for broadening and deepening U.S.-Israel cooperation to address both hard and soft security challenges. Indeed, cooperation between the United States and allies such as Israel will be imperative given that Washington cannot manage, or resolve, these challenges alone. And while Iran and the Palestinian issue may be the most obvious candidates, U.S.-Israel cooperation on much broader global issues is just as important to American interests. Moreover, the normalization process begun by the Abraham Accords creates the potential for multilateral cooperation to address many of these challenges. The following is an illustrative, though hardly exhaustive, menu of options for expanded cooperation.

Regional Cooperation: A “New Normal”

The past decade has shown the most promising areas for U.S.-Israel engagement to be in the wider regional and global arenas, rather than the narrow Israeli-Palestinian framework. This contrarian approach is based not only on growing, mutually beneficial U.S.-Israel economic partnerships, and on the Arab normalization wave, but also on the closer cooperation between Washington and Jerusalem on other important regional issues—including Syria, Iran, and the eastern Mediterranean.

Accordingly, the United States should work with Israeli and Arab diplomatic partners to create synergies between the normalization process and Palestinian needs. If Palestinians resist joint projects with Israel aimed at enhancing their quality of life, addressing water and food security challenges, and building climate resilience, then



perhaps Arab partners can help. Israel's inclusion in any forthcoming "Summit for Democracy" or resulting global coalition, along with Arab and other Muslim-majority states, might likewise help create regional and global connections that could advance this goal.

This growing momentum on the regional front, moreover, could prompt Egypt and Jordan to warm up their "cold" peace accords with Israel. While they cooperate closely with Israel on border and other security issues, and periodically on shared energy or water issues, conspicuously lacking have been the deeper economic, environmental, public health, and other ties that would clearly benefit all three countries. The United States should therefore renew efforts to bring these two important Arab states into joint projects and business ventures with Israel and its new peace partners in North Africa and the Gulf. Saudi Arabia should likewise be enlisted in this common endeavor. Beyond overflight rights or under-the-table cybersecurity deals, the Saudis might be coaxed to support inclusive regional economic development schemes, interfaith dialogues, and international legal or maritime freedom of navigation measures—because doing so is in their interest. And Saudi participation would provide major impetus to this normalization process.

Soft Security Partnerships: Public Health, Sustainable Development, Cybersecurity

The soft security dimension of the U.S.-Israel partnership is ready for another major expansion through enhanced bilateral as well as multilateral efforts involving select Arab partners—to include Palestinians.

- **Public health.** Given the speed with which Israel procured, distributed, administered, and tracked Covid vaccines,¹³³ Washington should consider

enlisting Israeli experts to create international rapid-response teams to address this challenge in the Middle East and elsewhere. The Biden administration can, in turn, advance its commitment to international engagement and cooperation by sharing associated best practices with the World Health Organization and other international organizations.

- **Sustainable development and climate resilience.** The Abraham Fund—which seeks to promote regional economic development and cooperation—will reportedly focus on increasing agricultural productivity, improving access to clean water, and providing more reliable access to electricity, among other issues.¹³⁴ The Biden administration should work to find donors to ensure the fund is fully capitalized at \$3 billion, and should energetically pursue its potential. Climate change has probably contributed to regional conflicts in Syria, Yemen, and elsewhere,¹³⁵ and the United States should strongly encourage the Abraham Fund to support Israel-Arab partnerships that specifically enhance sustainable development while building climate resilience. The fund might also prioritize projects that advance water management efforts in Jordan, Sudan, and Egypt, with potentially beneficial spillover effects for managing the conflict over Nile River waters between Sudan and Egypt on the one hand, and Ethiopia on the other.

Washington might also consider increased funding for USAID's Middle East Regional Cooperation (MERC) Program—which sponsors joint Arab-Israel work on public health, water, agriculture, and the environment,¹³⁶ and the U.S.-Israel Energy Center—which promotes energy security and economic development, with a focus on natural gas, more efficient batteries, cybersecurity for energy infrastructure, and the energy-water nexus.¹³⁷ Likewise, at least some funds authorized under the Nita M. Lowey Partnership for Peace Act—which

was passed by Congress in 2020 to encourage Israeli-Palestinian cooperation and to build the Palestinian economy as a foundation for peaceful coexistence—should go to projects that advance sustainable development and climate resilience goals.¹³⁸ And USAID and its Israeli counterpart, MASHAV, should look for opportunities to join with Arab counterpart development agencies on projects in the region and beyond. Finally, Israel already participates in several significant UN regional programs, with representatives at the Middle East Desalination Research Center in Oman (since 1996) and the International Renewable Energy Agency headquarters in the UAE (since 2015). This is the ideal time for the United States to become more engaged in these endeavors, which would serve multiple American and global objectives.

- **Cybersecurity and AI.** For both the United States and Israel, IT plays a key role in high-tech innovation, the economy, and critical infrastructure. Protecting intellectual property from theft and industrial espionage, and protecting economic activity and infrastructure from cyberattack, will therefore be critical to the economic future of the two countries. In particular, protecting the fruits of joint U.S.-Israel investments and R&D in cutting-edge proprietary technologies, formulas, and processes—both civilian and military—will be key to preserving U.S. and Israeli global competitiveness. Washington and Jerusalem should therefore tighten and broaden cybersecurity cooperation and seek collaborative cybersecurity ventures with other high-tech democracies. And they should consider creating a joint AI R&D institute and a binational research foundation to facilitate AI collaboration and jump-start the pursuit of promising technologies and approaches—emulating successful entities in other areas, such as the U.S.-Israel Energy Center and the BIRD Foundation.

Hard Security Partnerships: Drone and Missile Defense, Cooperative Military R&D, Growing Military Innovation

Despite longstanding U.S.-Israel cooperation on hard security issues, room exists for broader and deeper engagement on several fronts.

- **A drone and missile defense “Manhattan Project.”** Increasingly, the United States faces adversaries such as Iran, China, North Korea, and Russia that rely on drones and surface-to-surface missile systems as core components of their antiaccess/area-denial (A2AD) and warfighting capabilities.¹³⁹ Everywhere, expensive U.S. and allied missile defenses risk being overwhelmed by much cheaper and more numerous adversary drones and missiles or defeated by countermeasures. As these systems become more accurate, they will ensure that future conflicts are more costly, and they may in fact determine the outcome of future wars.¹⁴⁰ The heavy reliance of America’s adversaries on drones and missiles could, however, be transformed into a vulnerability if these capabilities can be neutralized. Given flat or declining U.S. spending on missile defense, the United States and Israel—longtime collaborators in this area—should engage in a crash effort with high-tech allies (e.g., France, Germany, Britain, Japan, and South Korea) as well as deep-pocketed partners (e.g., the UAE and Saudi Arabia) to dramatically expand R&D and investigate promising cyber, directed energy (laser), and kinetic solutions.¹⁴¹
- **Cooperative military R&D.** In 2019, Congress directed the Defense Department and armed services to evaluate the feasibility of enhanced cooperative R&D with Israel, resulting in a July 2020 report.¹⁴² Congress should require the Defense Department to regularly update this report and expand this effort to include other



close allies, identify potential areas of multilateral cooperation, and thereby grow the National Technology and Industrial Base (NTIB—see below). A similar top-down approach by the Department of Homeland Security may yield further areas for mutually beneficial U.S.-Israel cooperative R&D in the national security arena.

- Growing the National Technology and Industrial Base.** Given the diffusion of radical leveling technologies and the growing role of foreign private-sector firms as engines of innovation, the United States must strengthen technological/industrial cooperation with other states. The ability to do so is one of America’s key asymmetric advantages vis-à-vis strategically lonely adversaries such as China, Russia, North Korea, and Iran. To this end, the United States should consider expanding the NTIB—a defense technology alliance that currently includes the United States, Canada, Britain, and Australia—to include Israel and other high-tech partners that share U.S. interests and values. This will allow the national security innovation bases of all these countries to achieve greater synergies than is currently possible.¹⁴³ Doing so, however, may require the United States to provide clear redlines to Israel (and other potential members) regarding ties to China, to ensure the protection of innovation and technological advancements enabled by membership. President Biden should also consider following up on his proposed “Summit for Democracy” by creating an informal grouping of high-tech democracies to set norms, define a common agenda on emerging issues, forge a common position on emerging challenges, and counter the growing power of authoritarian states like China.¹⁴⁴ Israel should be included as a founding member-state of such a grouping, which would offer new ways to advance the U.S.-Israel relationship in a multilateral framework. This could likewise require hard decisions by Israel regarding its ties to China. All these collaborative efforts

would be facilitated if Washington eased vestigial bureaucratic obstacles to business and scientific partnerships with Israelis, including those involving visas, the Food and Drug Administration, the Office of Foreign Assets Control, and the Committee on Foreign Investment in the United States.

Conclusions

Israel is a small country, but it contributes significantly in several areas important to the security of the United States. Its value extends beyond any single issue, including traditional concerns about the Palestinians and Iran. Indeed, a narrow focus on such diplomatic and security conundrums only obscures the many other areas of productive U.S.-Israel cooperation, which include business, academic, medical and scientific, cultural, and religious communities, as well as local government, NGOs, and cultural and religious institutions.

Indeed, in today’s global context, Israel is one of America’s most valuable strategic partners—one that not only shares myriad interests and values with the United States, but also makes unique contributions to addressing common challenges in the military, economic, sustainability, and other domains. The Biden administration, even as it attends to other urgent concerns, should build on the achievements of its predecessors to broaden and deepen this partnership toward achieving its full potential—for the benefit of the peoples of both countries and of the global community.

Israeli innovations in a number of critical areas can help the United States meet many of the soft security and global economic competitiveness challenges of the future. At the same time, Israel is a valued partner for the U.S. intelligence and counterterrorism communities and the U.S. military

in dealing with various hard security challenges.

For the relationship's potential to be fully realized, U.S. commercial, technical, scientific, medical, and aid agencies should take even greater advantage of Israeli expertise—and more actively involve Israel alongside other international partners.¹⁴⁵ And the U.S. private sector, which is already deeply invested in practical partnerships with its Israeli counterparts, should be further incentivized to bring home the benefits of these unusually productive connections. This paper's policy recommendations provide a few examples of how this can be done.

To be sure, even the closest allies occasionally disagree; and some U.S.-Israel disagreements are almost inevitable, regarding both Iran and the

Palestinians. Yet as this paper has shown, those issues are no longer the centerpiece of bilateral relations. Instead, a whole web of mutual interests and joint projects—whether security-related, economic/scientific, or some combination thereof—links the two countries, in ways that benefit both. And with the current wave of Arab-Israel normalization, those benefits promise wider sharing across the region as a whole.

Sustaining and enhancing the special U.S.-Israel relationship will require attention by both sides. But the future looks promising, even as past challenges linger. Increasingly—in an ever-wider range of fields—the U.S.-Israel relationship has the potential to benefit not only both countries but also their common regional and global partners. ❖

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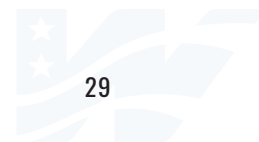
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Appendix A: Select Israel-Origin Systems Used by the U.S. Military

Item	Number	Manufacturer	User
AEROSPACE SYSTEMS			
Mastiff UAS	n/a	IAI	U.S. Navy/U.S. Marine Corps
Pioneer UAS	72	AAI/IAI	U.S. Army, Navy, U.S. Marine Corps
Hunter UAS	70–100	TRW/Northrop Grumman/IAI	U.S. Army and DHS
Skystar-180 tactical aerostat system	n/a	RT LTA Systems	U.S. Army
SMASH 2000 c-UAS rifle smart scope	n/a	Smart Shooter	Under evaluation by U.S. Army in Syria
Drone Guard c-UAS jamming system	n/a	IAI/ELTA	Under evaluation by U.S. Air Force
EnforceAir radio frequency c-UAS system	n/a	D-Fend Solutions/ELTA	More than 20 DoD, DHS, and DoJ units and agencies
Skylord hit-to-kill c-UAS system	n/a	Xtend	Under evaluation by DoD
On-the-Move V4 c-UAS system	n/a	ELTA	Under evaluation by DoD and DHS
Wing sets for F-35 stealth fighter	800 by 2034	IAI	U.S. Air Force and possibly foreign F-35s
Litening targeting pod	1,000+ (U.S./allies)	Northrop Grumman/Rafael	Used on most first-line U.S. and many allied strike aircraft
Pylon-based infrared missile warning system	n/a	Elbit	U.S. Air National Guard and Air Force Reserve F-16 fighter aircraft
F-35 Joint Helmet Mounting Cueing System	1,000+	Collins/Elbit	Used in all F-35 Lightning II stealth fighter aircraft
Joint Helmet Mounted Cueing System	6,000+ (U.S./allies)	Collins/Elbit	Used in nearly all first-line U.S. and many allied fighter aircraft
Aviator’s Night Vision Imaging System/Head-Up Display (ANVIS HUD)	n/a	Elbit	Used in all U.S. Army UH-60, CH-47, and AH-64 helicopters
Helmet Display Tracker System (HDTs) helmet mounted display	n/a	EFW/Elbit	U.S. Marine Corps AH-1W helicopters
AGM-142 Have Nap air-ground missile	200+	Lockheed Martin/Rafael	Carried by U.S. Air Force B-52H bombers
ADM-141 TALD/ITALD air-launched decoy	2,000+	IMI	U.S. Navy
Spike NLOS (Non-Line-of-Sight) air-to-ground missile	n/a	Rafael	Interim long-range fire-and-forget munition for U.S. Army AH-64 Apache attack helicopters
Hero-120 loitering antistructure/antiarmor munition	n/a	UVision	Under evaluation by DoD
Iron Dome countermortar, rocket, and missile defense system	2 batteries	Rafael	Two batteries purchased by U.S. Army to provide interim counter-cruise missile defense capability



Item	Number	Manufacturer	User
LAND SYSTEMS			
MRAP/M-ATV armor	12,500+	Plasan	For U.S. Army/Marine Corps MRAPs/M-ATVs
M2 Bradley ERA armor upgrade kit	1,450+	General Dynamics/Rafael	For U.S. Army Bradley IFVs
M1A2 Abrams TUSK survivability upgrade kit	565+	General Dynamics/Rafael	For U.S. Army M1 tanks
M1126 Stryker armor upgrade kit	n/a	General Dynamics/Rafael	For U.S. Army Stryker armored fighting vehicles
AAV-7A1 armor upgrade kit	1,137+	Rafael	For U.S. Marine Corps AAV-7A1 amphibious assault vehicles
MTVR truck armor kit	7,500	Plasan	For U.S. Marine Corps MTVR trucks
M915 tractor trailer cab armor kit	1,915	Plasan	For U.S. Army M915 trucks
D7 bulldozer armor kit	n/a	IMI	For U.S. Army D7 bulldozers
D9 bulldozer armor kit	12	IMI	For U.S. Army D9 bulldozers
Golan armored vehicles	60	PVI/Rafael	U.S. Marine Corps
Trophy active protection system	400+ units	Rafael	For Army M1 Abrams tanks
Iron Fist active protection system	124 units	IMI/General Dynamics	For Army M2 Bradley infantry fighting vehicles. Deployment delayed due to technical, integration challenges.
EZRaider HD4 manned all-terrain vehicle	n/a	DSRaider	Under evaluation by U.S. Army Special Forces
Micro Tactical Ground Robot (MTGR)	n/a	ROBOTEAM	For EOD, CBRN, and HAZMAT missions. Used by U.S. Army, under evaluation by U.S. Air Force
M120/M121 120mm mortar	n/a	Soltam	U.S. Army
Cardom 120mm mortar system	320+	Elbit	U.S. Army's primary heavy mortar
Mk 153 SMAW (Shoulder-Launched Multipurpose Assault Weapon)	n/a	IMI/McDonnell Douglas	U.S. Marine Corps
FGM-172 SRAW (Short-Range Assault Weapon)	960	IMI/Lockheed Martin	U.S. Marine Corps
Mine-clearing equipment (plows, rollers, dozer blades)	150+	Urdan, IMI	U.S. Army and Marine Corps
SINGARS tactical radios	Thousands	General Dynamics/Tadiran	U.S. Army

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Item	Number	Manufacturer	User
Spider long-range automatic border surveillance system	n/a	CONTROP Precision Technologies Ltd.	U.S. Army, U.S. Air Force, and U.S. government agencies
EyeBall R1 hand-tossed audio-visual sensor	n/a	Remington/ODF	DoD and law enforcement
Xaver through-wall imaging system	n/a	Camero-Tech	DoD and law enforcement
Simon/M100 GREM door-breaching rifle grenade	n/a	GD/Rafael	U.S. Army
Integrated Clip-On Advanced Targeting Sight for small arms		n/a	Kollsman/Elbit
Common Laser Range Finder–Integrated Capacity (CLRF-IC) handheld targeting system	n/a	Elbit	U.S. Marine Corps
Laser Target Designator	n/a	Elbit	U.S. Marine Corps
RPDA-57 Rugged PDAs	n/a	Elbit	U.S. Army, U.S. Marine Corps

NAVAL SYSTEMS

Mk. 38 Mod 2/3 25mm Machine Gun System	n/a	BAE/Rafael	Used on 14 different classes of U.S. Navy warships and Coast Guard cutters to counter small-boat/swarm attacks
Lightweight armor for Zumwalt DDG-1000 class stealth destroyers	3	Plasan	Armor shipsets for first three ships in class delivered to builder (Bath Iron Works)

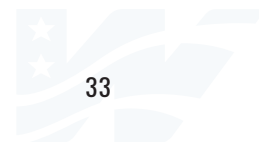
Note: Some of these systems are no longer in the active inventory—though most were in use recently or are in current use.

Appendix B: Select U.S. Corporations with R&D Centers in Israel

Name	Sector	Employees	Comments
Abbott Laboratories	IT	50	Software for laboratory information management systems
Accenture	IT	50+	R&D center focusing on cybersecurity acquired in 2016
Amazon	IT	1,300	Three centers focusing on services such as Prime Air and Alexa Shopping
AOL	Media	50+	Video and neuro-linguistic programming
Apple	IT	1,500	Two current offices working with artificial reality and computational imaging, along with a contract to lease a 92,000-square-foot space in Haifa in 2022
Applied Materials	IT	1,600	Technology incubator serving as AM's largest R&D center outside the U.S.
AT&T	IT	600	AT&T's first development center outside the U.S., focusing on entertainment, television, and advertising
Autodesk	IT	50+	Software tools for the construction industry
Avaya	Communications	40	Business communications systems and software
BMC Software	IT	250	Headquarters in Tel Aviv and an R&D center in Galilee
Broadcom	Communications	500+	Semiconductors, broadband technology, cloud infrastructure, mobile, wireless, and home networking
CISCO	Communications	1,800	Networking solutions; R&D center in Israel produces silicon chips for company's 2019 router series
Citigroup	Financial services	300	Fintech development center under Citibank
Dell	IT	1,200	Four centers focusing on flash storage, information security, cloud computing, big data, and data science
eBay	IT	350	Electronic commerce applications
Facebook	IT	250	AI and blockchain technologies
Ford	Industrial tech	200	Vehicle lab with focus on AI
GE	IT Medical devices Cleantech	600	Rehovot center exports nuclear medicine systems and some of GE's most advanced healthcare systems. Other centers focus on clean energy and water tech.
GM	Industrial tech	400	Alternative driving systems, vehicle electronics, communications systems, robotics, advanced materials, imaging systems, safety

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Name	Sector	Employees	Comments
Google	IT	800	Two centers focusing on search, data analytics, applications (Gmail), and special projects
HP	IT	2,600	HP Indigo subsidiary focused on digital printing
IBM	IT	2,000	Haifa lab is IBM Research's largest center outside the U.S., focusing on AI, cloud data services, healthcare informatics, and image and video analytics
Intel	Semiconductors	13,750	Four R&D centers and two manufacturing facilities engaged in microprocessor and software design; was Intel's first R&D center outside of the U.S.
Intercontinental Exchange	IT	200+	Risk management analytics
Intuit	IT	180	Plans to grow to up to 500 R&D employees
Johnson & Johnson	Medical devices Therapeutics	500+	Two subsidiaries and a tech incubator, focusing on software and hardware for cardiac mapping, navigation devices, bio-surgery, and passive immunotherapy products
Marvell Technology	Semiconductors	500	Cellular, controllers and systems-on-a-chip, and switches
Medtronic	Life sciences	800+	Cardiovascular, diabetes, restorative and minimally invasive technologies
Microsoft	IT	2,300	R&D focusing on cybersecurity, AI, big data, and healthcare
Motorola	Communications	1,000	Communications products, two-way radio systems, information systems, mobile data systems, paging systems, automobile electronics, and data terminals for the courier industry
Oracle	IT	320+	Cloud-computing solutions
PayPal	IT	250	Online payment fraud detection and protection
Perrigo	Life sciences	900	Active pharmaceutical ingredients
Red Hat	IT	100	Open source software products
SanDisk	Semiconductors	650	Memory and data storage technologies
Seagate	IT	10	First innovation hub outside the U.S.



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