THE IRAN PROJECT | EUROPEAN LEADERSHIP NETWORK

Ballistic Missiles and Middle East Security: An Alternative Approach

GLOBAL SECURITY POLICY REPORT

January 2022

The Iran Project (IP)

The Iran Project seeks to support a balanced, objective, and bipartisan approach to diplomacy with Iran – one that enhances U.S. national security and that of our friends and allies in the region. The Iran Project was started in 2002 by the United Nations Association of the USA and Rockefeller Brothers Fund, and became an independent project under the auspices of the non-profit organization Foundation for a Civil Society in 2009. For nearly a decade, The Iran Project's methodology has aimed to reduce misunderstandings between Iran and the U.S. by establishing ongoing informal dialogues with Iranian counterparts, and informing senior U.S. Government officials and members of Congress on the content of their talks.

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Foreword

Regional security in the Middle East is at a critical juncture, and this is especially true when it comes to the Persian Gulf. Negotiations between the United States and Iran to mutually restore full implementation of the Joint Comprehensive Plan of Action (JCPOA) – the deal that limits Iran's nuclear program – continue and the outcome remains uncertain. This means that one of the most significant steps within nuclear nonproliferation in recent time continues to be on the line. Meanwhile, regional states are displaying newfound interest in easing tensions, as highlighted by talks towards that end that Saudi Arabia and the United Arab Emirates (UAE) have been holding with Iran. External political developments, specifically the recent change of administration in the United States, provide the context to these promising developments. But this progress in improving regional security is fragile and could easily be derailed, especially by any mishandling of a restored nuclear deal.

Ballistic and other types of missiles loom large over this situation. In turn, the intent of this paper is to move the discussion forward by addressing the full scope of issues related to missiles in the Middle East. By placing Iran's missiles in the context of regional security dynamics and the balance of military power, collective solutions to missile control can be developed that advance regional security while being fully in accord with American and European interests.

Iran would never agree to restrictions placed solely on its own missile capabilities if similar restrictions were not place on other regional states. Additionally, the mosaic of other conflicts and rivalries in the Middle East, even those which do not directly involve Iran, bring additional complexity and pressures. As a result, only a multilateral approach which effectively addresses capabilities and concerns across the region would be able to lead to meaningful controls on missiles and a reduction of associated security risks.

In addition to the ability of missiles to overcome conventional defenses and inflict destruction at a distance, developments within the Middle East have heightened concerns among regional actors about the use of these weapons. The September 2019 missile and drone attack on Saudi oil processing facilities, for instance, demonstrated strong capabilities and remarkably high accuracy, which could be employed with even greater effect against other targets. The attack probably helped to motivate Saudi Arabia to enter tension-reducing talks with Iran, while heightening concerns in Israel and elsewhere in the region. The Iranians – clearly remembering the missiles that Iraq rained down on Iranian cities in the 1980s – have their own concerns about the missile capabilities of regional rivals.

Missiles will surely figure prominently in discussions after the restoration of compliance with the JCPOA, if it occurs. Missiles have often been proposed as a subject for a follow-on agreement with Tehran. But it is important to remember why that subject was not included in the negotiations that led to the JCPOA in the first place. Achieving the nuclear limitations in the JCPOA was significant and challenging enough in its own right without complicating the negotiations by introducing other difficult topics. Moreover, although the nuclear restrictions and verification and monitoring requirements in the JCPOA complement and extend Iran's existing obligations with the International Atomic Energy Agency and under its Comprehensive Safeguards Agreement and the Nuclear Non-Proliferation Treaty, no comparable international regime exists for the control of missiles.

Quite unlike nuclear weapons – which Iran has not produced or possessed – Iran relies heavily on missiles for deterrence. This is especially true because Iran's ability to project power through manned aircraft is significantly weaker than that of some of its rivals, partly because years of sanctions have debilitated the Iranian air force. Added to this are Tehran's concerns about the damage that other states' missiles and most sophisticated modern combat aircraft could inflict on Iran.

Despite these many challenges, the opportunities for progress toward regional control of missiles are promising. In addition to heightened interest among key regional states in détente and increased willingness to talk to rivals, backing from outside powers can help: Russian diplomats have voiced support for a multilateral approach to arms control in the Middle East, and the Biden administration in the United States may be open to a similar framework alongside its European allies.

However, the risks of current opportunities being mishandled are substantial. The biggest mistake would be to address control of missiles as a follow-up to the JCPOA that would impose restrictions only on Iran. Such a formula would be just as much of a nonstarter for Tehran as it was when negotiations on the JCPOA began. Insistence on such a narrowly focused approach would preclude useful controls on missiles and encourage the worsening of a regional missile arms race, involving not only the growth of national capabilities but also the transfer of capabilities to groups such as the Lebanese Hezbollah and the Yemeni Houthis. Such insistence also would jeopardize progress in other efforts to reduce tensions and enhance regional security, such as the current Saudi-Iranian talks.

The outcome of the current negotiations on returning to compliance with the JCPOA will obviously affect both the opportunities and the risks concerning missiles but will not negate the principles outlined here. A successful conclusion will immediately thrust to the front the question of what sort of negotiations should come next, and what topics they should cover. A breakdown of the JCPOA would

Project Objectives:

1. Make information on the changing nature and unique capabilities of each of the systems that we discuss - from rockets and ballistic missiles to combat aircraft and drones - more accessible and comprehensive.

2. Examine the changing role of these weapons systems in the region, as well as global context.

3. Separate the problem of Iran's missiles program from the top priority of limiting and verifying the peaceful nature of the Iranian nuclear program by restoring the JCPOA;

4. Examine ballistic missiles, and related weapons, as a multilateral challenge to regional security, while recognizing that Saudi Arabia and the UAE are most concerned about Iran's short to mid-range missile capability using conventional warheads and Europe and the US are most concerned about potential Iranian ICBMs.

5. Contribute to information about incentives that would lead to confidence-building measures and agreements on limiting the testing, development, deployment and use of ballistic missiles and related weapons systems. We will do this through direct dialogue, particularly with groups and individuals in the Middle East.

mean the continuation of serious concerns about missiles, amid a regional environment which is more tense than ever.

The Iran Project (IP) and the European Leadership Network (ELN) have been studying missiles in the Middle East since 2017. Developments during this time, including changes in the diplomatic and security environment, have confirmed our judgment that a genuinely multilateral approach is needed for progress in restricting or controlling this class of weapons. What is most needed now is a broadened dialogue conducted in full awareness of not only the threats to stability that missiles may pose but also the roles they play in deterrence strategies and security programs of regional states. We have prepared this paper to help inform and stimulate such a dialogue. The paper addresses ballistic missiles as well as cruise missiles and other air-deliverable weapons.

We do not prescribe specific formulas for limiting missiles or specific mechanisms for achieving agreement. Multiple options need to be explored on multiple questions, such as a possible role for the United Nations, the feasibility of range limitations or other types of restrictions on missiles and how they would be verified, and the geographic scope of any future bilateral or multilateral agreements. The development of options should emerge from an expanded dialogue, which will also test what principles and provisions may achieve consensus.

In the months ahead, the joint IP-ELN team will identify individuals, non-governmental organizations, and government officials to engage in discussions on these weapons systems, as well as explore possible risk reduction, confidence building, and regional arms control initiatives. Our goal is to elicit reactions and further proposals from organizations and governments in the United States, Greater Europe, and especially the Middle East, where there is the most to learn about missiles and the political and technical feasibility of limiting them.

Executive Summary

American and European concerns over Iran's missiles have recast the debate around the JCPOA. One of the Trump administration's rationales for pulling out of the deal was that Iranian missile containment was not included. Many in the US Congress, on both sides of the aisle, have since stated that without a negotiated reduction in Iran's missiles, they cannot support the Biden administration's efforts to return to the agreement. Similarly, various political forces in Europe have made statements also to that effect.

However, the JCPOA was tailored specifically to Iran, which is the only state in the Middle East to have an advanced nuclear program. The deal has built upon previously established international law, norms and practices, including the Nuclear Non-Proliferation Treaty (NPT) and the work of the International Atomic Energy Agency on safeguards and related verification and monitoring measures. Limitations on missile systems, however, would not have a similar international framework upon which to build, although the Missile Technology Control Regime (MTCR) and the Hague Code of Conduct offer examples.

Iran's stated position is that its missiles (and drones) are not negotiable because they are the main source of its deterrence and should play no part in restoring compliance with the JCPOA. Despite this posture, Iran may agree to limitations on its missiles, though only in concert with reciprocal limitations on the missiles and related delivery systems of other regional states. Such a multilateral approach would be consistent with Iran's own long-standing proposals for enhancing regional security. It is important to note that other states in the region have publicly noted that they want to be part of such future talks.

After all, Iran is not the only state in the Middle East with advanced long-range missiles and drones. Missile proliferation is widespread and becoming increasingly serious. Any lasting reduction requires a region-wide solution. Direct dialogue between external powers and their partners that builds on regional bilateral efforts can begin to move this process forward. The growing challenges to deterrence structures, the increasing capacity of cruise missiles and drones, and the risk of a war escalating into a widespread regional conflict have caught the attention of all. As external powers remain deeply involved in the region, with the US in particular carrying weight with its security guarantees to Gulf partners, multilateral efforts to strengthen strategic stability retain an important role and could begin to shape limitations on the testing, development, deployment, transfer, or sale of missiles.

In focusing on the changing role of deterrence in the region, including the role of outside powers, this paper draws attention to the following points:

Missiles and the JCPOA

- Fully restoring the implementation of the JCPOA is the most effective route, and vital first step, to addressing regional arms control issues.
- The JCPOA does not include missile reduction as it is a nuclear-only accord that fits within the context of existing bilateral agreements between the IAEA and Iran, as well as the international Nuclear Non-Proliferation Treaty (NPT).
- No international missile control and reduction regime equivalent to the NPT exists yet to provide a basis for missile limitations negotiation. The NPT only places controls on the production of nuclear weapons, making it ineffective as a framework for a collective regional agreement on missile control.
- The JCPOA negotiations enjoy the approval of Iran's Supreme Leader and other security entities that sit on Iran's National Security Council. They also fall within the portfolio of Iran's president and the Foreign Ministry.
- Other security issues, including missile limitations, do not sit within the Iranian presidential portfolio, and will therefore likely encompass military and Revolutionary Guard Corps (IRGC) representatives who are not directly involved in the JCPOA.
- The US and certain European powers have condemned Iran for abrogating the "spirit" of the JCPOA by expanding its ballistic missile program, but the JCPOA itself, beyond possibly offering an umbrella for additional negotiations on the nuclear file, does not provide the structure for either a unilateral or regional limitation agreement.

Regional Missiles Systems

- Middle Eastern countries have integrated asymmetric capabilities, such as ballistic and other types of missiles, into their military strategies for decades; Iran, however, is the first country in the region to embrace asymmetric deterrence as its main defensive strategy.
- Six regional states – Turkey, the UAE, Iran, Israel, Egypt, and Saudi Arabia – maintain cruise missiles, as do Yemen's Houthis. More states will likely join this list soon. Israel, Iran, and Turkey produce their own missiles; the other states depend on foreign suppliers.

- Israel's missile and rocket defenses are the Middle East's most advanced. Israel also has the most sophisticated stockpile of ballistic missiles and both its advanced systems and its submarine-launched cruise missiles have nuclear-armed capability.

- Israel, Saudi Arabia, and Iran all field missiles with ranges of 1500-3000kms. Israel's Jericho 3 is thought to reach over 4000km.

- Regional nuclear-based deterrence structures have frequently failed to deter conventional and chemical weapons attacks in the past. For many states in the region, missiles now form an essential part of their deterrence architecture.

- Deterrence systems in the Middle East are being challenged and destabilized by the increasing accuracy of cruise missiles and the growing capabilities of drones, with implications for long-term regional stability.

Iran's Missile Capabilities

- Iran indicates it will not agree to reduce its dependence on missiles and drones – its main source of deterrence – without reciprocal limitations on missiles and related delivery systems by other regional states.

- Unable to afford conventional force upgrades – especially the acquisition of advanced strike aircraft – as a result of sanctions, Iran has compensated by building up asymmetrical forces – missiles, cyber, information warfare and non-state militia alliances. Iran's missiles, some of which have exhibited high levels of precision, allow it to project power within the region and deter attack.

- Iran has the region's largest and most diverse arsenal of close-, short-, and medium-range missiles. Missiles are a pillar of Iran's *defa-e mozaik* (mosaic defense), an asymmetrical strategy that includes foreign militia alliances and the use of drones.

- Iran's naval defense relies on domestically produced, Chinese-designed anti-ship missiles.

- The increased accuracy of Iran's cruise missile/drone capability enables them to avoid most antiballistic missile defense systems.

- Iran empowers allied militia proxies for strategic utility and deterrence. Hezbollah's reported arsenal of 100,000 rockets includes weaponry with ranges up to 250km, though most are close-range systems lacking precision guidance. Yemen's Houthis have Iranian-produced long- and short-range precision-guided missiles, and SA-2 anti-aircraft missiles converted to serve as surface-to-sur-

face systems. The cruise-missile and drone attacks on Aramco in September 2019, claimed by the Houthis, demonstrated a potential for a larger role for future combined drone, cruise, and ballistic missile attacks.

The Regional Context for Missile Limitation

- Missile proliferation in the Gulf and wider Middle East requires a region-wide solution to head off military escalation. Without it, the region would face immediate threats of instability, uncertainty, and an arms race.

- A major challenge to deterrence through reliance on both nationally produced and foreign forces is the lack of an agreed institutionalized regional framework for collective security.

- Iran's new President, Ebrahim Raisi, says missiles are not negotiable, but in the context of Iran's own longstanding regional security proposals, such as the recent Hormuz Peace Endeavor (HOPE) Initiative, Iran has put community deliberations on arms control, risk reduction, and confidence building on the table.

- Israel is the only regional state possessing nuclear weapons and hence a nuclear deterrence capability.

- Poor quality airforce, or a lack of access to modern aircraft weapons systems, as seen in Iran and Syria, raises missile dependency, complicating discussion of limitations.

- Syria and Iraq have both deployed longer-range ballistic missiles with chemical warheads in the past, aiming them at enemy populations, often civilian. They also used chemical weapons to serve as tactical battlefield weapons.

- States in the Middle East may be close to realizing that preventing the outbreak of a large war demands steps be taken soon. The mending of fences within the Gulf Cooperation Council (GCC) and the 2020 decision by the UAE to pull out of the war in Yemen could both be harbingers of that realization.

- Saudi Arabia and the UAE's decision to open a dialogue with Iran may have been driven by their sense of vulnerability to Iran's weapon systems in the wake of its unexpectedly accurate attack on an Aramco facility in 2019. When the US largely failed to respond, the Saudis and Emiratis began direct diplomatic efforts to reduce tensions in the region.

Four Immediate Reasons to Head Off Further Proliferation

1. Saudi Arabia is reportedly building domestic infrastructure to manufacture ballistic missiles.

2. Turkey is ramping up domestic capacity to build and export short-range ballistic missiles.

3. Syria's Assad government is expanding domestic capacity with Iran's and Hezbollah's assistance to build more accurate rockets and ballistic missiles as the civil war winds down.

4. Iran, having now overcome the technical hurdles of precision guidance, is poised to undergo a significant and rapid expansion of its missile arsenal.

The Choice for External Powers

- Both Europe and the US have expressed concern over the increased accuracy of Iran's missiles, and its willingness to utilize them for deterrence and effect, such as its use of precision-guided ballistic missiles to strike US forces at Iraq's Ayn al-Assad airbase in retaliation for General Suleimani's assassination in 2020.

- External powers' (US, UK, France, Russia) readiness to enter conflicts with attack aircraft and drones on behalf of regional allies, and to supply modern weaponry to partner states, creates security imbalances. Acquisition of rockets and missiles by some states, particularly Iran, is partly driven by these imbalances in strike capabilities.

- Interested external powers could encourage key states to move toward solutions and processes to reduce the chances of a local dispute or force miscalculation escalating into a region-wide conflagration.

- Direct dialogue between external powers and Middle East partners can begin to shape limitations agreements by complementing regional bilateral efforts.

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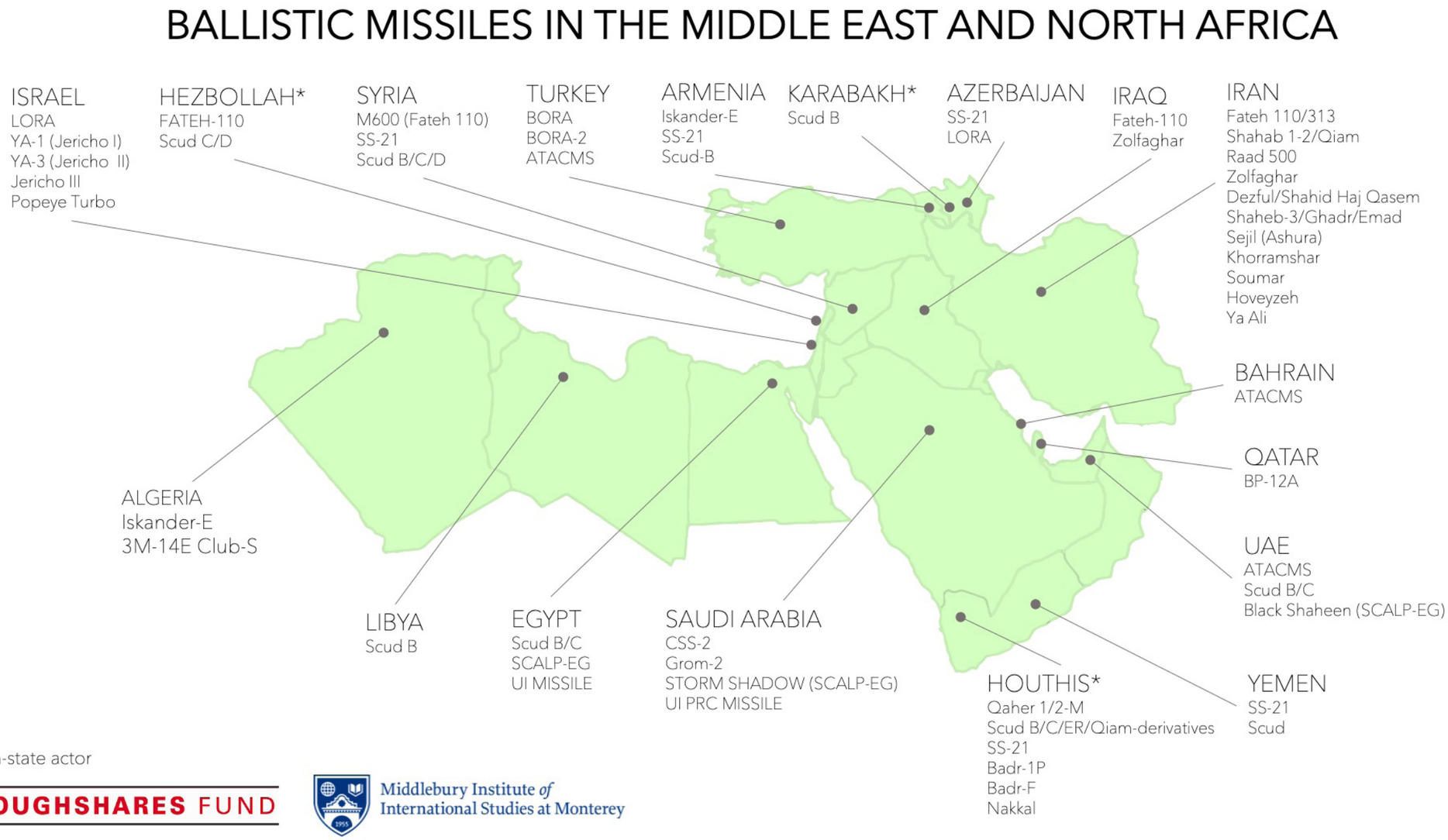
Chapter I: Challenges Related to Ballistic Missiles in the Middle East



Ballistic missiles preoccupy security experts and government officials in the Middle East and beyond. This chapter seeks to address why ballistic missiles feature so prominently in the region's security discourse, providing a framework for analyzing the capabilities and limitations of weapons-delivery options – including artillery rockets, ballistic missiles, cruise missiles, strike aircraft and armed drones – particularly as they pertain to a variety of potential conflicts in the region. This chapter also summarizes how ballistic missiles have been used in past regional conflicts and identifies major challenges that must be addressed when considering possible agreements to limit the use of these weapons. The ballistic missile and other related military capabilities of nine states in the region will be addressed: Egypt, Iran, Iraq, Israel, Saudi Arabia, the United Arab Emirates, Syria, Turkey, and Yemen.

Historic Role of Ballistic Missiles and Other Weapon-Delivery Platforms

1. **Ballistic missiles have been a part of the Middle East's security landscape for five decades.** Israel and Egypt initiated indigenous programs after the 1956 Second Arab–Israeli war, with extensive help from France and what was then West Germany. Today, eight countries in the region possess ballistic missiles, including Egypt, Syria, Israel, Iran, Saudi Arabia, the UAE, Turkey, and Qatar. Ballistic missiles are also operated by non-state actors in Yemen, Lebanon, and potentially Iraq and Syria. Iran has the largest, most diverse arsenal of close-, short-, and medium-range missiles, while Israel maintains the most sophisticated stockpile of ballistic missiles, covering similar ranges, as well as the capacity to arm them with nuclear warheads.

2. **Every state in the Middle East fields military aircraft, though the quantity and quality vary greatly across the region.** For example, Yemen's air force is not presently operational. Neither Hezbollah nor the Houthis are known to possess manned military aircraft.

3. **Each state possesses heavy-artillery rockets that can reach targets up to about 200 km.** Artillery rockets are used by state-operated land forces throughout the region to achieve tactical and operational objectives on the battlefield. Hezbollah is reported to maintain an arsenal of 100,000 or more rockets of various ranges up to at least 250km. An overwhelming majority of those rockets under Hezbollah control are unguided or not precisely guided, close-range systems that fly fewer than 100 km.

4. **Six states in the region field cruise missiles: the UAE, Israel, Iran, Egypt, Turkey and Saudi Arabia.** The number of possessor states is likely to grow. At least one non-state actor, Yemen's Houthi rebels are known to operate cruise missiles. Iranian cruise missiles are reported to have been used in a major attack against Saudi Aramco in 2019. Only Israel operates submarine-launched, potentially nuclear-armed cruise missiles as part of its nuclear deterrent.

5. **Major military forces in the region field anti-ship cruise missiles.** Iran's naval deterrence strategy relies heavily on large numbers of domestically-produced anti-ship missiles. The country has also developed ballistic missiles capable of being used against naval targets. Conventional anti-ship missiles have been provided to both the Houthis and Hezbollah. Iran's large arsenal of anti-ship missiles is a major element of its deterrence force in the Gulf.

6. **Every military conflict in the Middle East since WWII has included use of military aircraft and artillery rockets.** Only nine regional conflicts featured ballistic missile attacks. Egypt was the first state to use ballistic missiles in combat.

7. **Ballistic missiles are an attractive weapon for many countries and, increasingly, non-state actors.** They provide status and prestige and are valued because they face few countermeasures; are difficult to intercept in flight; can be used to attack targets at significant distance without risking the loss of expensive aircraft and their highly-trained crews; do not require fighter escorts or electronic countermeasures to suppress and penetrate an adversary's defenses; and, finally, the speed of ballistic missiles offers an element of surprise in an attack. Iran's Shahab-1/Scud-B can fly 300 km in about five minutes, while its Ghadr can cover 1,500 km in less than 11 minutes.

   If sufficiently accurate, missiles are effective tactical weapons against point targets. Ballistic missiles are employed against large-area targets, with varying degrees of effectiveness. But even when they are not accurate, rockets have a powerful psychological impact on citizens on the ground.

Countries Operating MTCR Category I Ballistic Missiles

The Missile Technology Control Regime (MTCR) is an informal political understanding among states that seek to limit the proliferation of missiles and missile technology.

Category I items include complete rocket and unmanned aerial vehicle systems (including ballistic missiles, space launch vehicles, sounding rockets, cruise missiles, target drones, and reconnaissance drones) capable of delivering a payload of at least 500 kg to a range of at least 300 km, their major complete subsystems (such as rocket stages, engines, guidance sets, and re-entry vehicles), related software and technology, as well as specially designed production facilities for these items. **Category II** items include other less-sensitive and dual-use missile related components, as well as other complete missile systems capable of a range of at least 300 km, regardless of payload.

Countries Operating MTCR Category II Ballistic Missiles

Delivery Systems and Characteristics

1. **Artillery rockets and guns** are typically unguided battlefield weapons designed to strike tactical targets. They are fired in large numbers from road-mobile platforms and carry multiple rounds for near-simultaneous launch.

2. **Ballistic missiles** are unmanned-delivery systems that rely on one or more booster rockets (either solid or liquid fuel) to propel warheads to their targets. Seven states in the Middle East have ballistic missiles with a range of 300km or more when carrying a 500kg payload. Israel has the most diverse and sophisticated missiles, some of which are presumed to be armed with nuclear warheads, that can target to about 2,000 km.

3. **Satellite Launch Vehicles (SLVs) and Intercontinental Ballistic Missiles (ICBMs)** use similar, if not identical, hardware, subsystems, and components. No country in the Middle East is recognized as developing an ICBM, although Israel and Iran have SLV programs for launching satellites into space.

4. **Cruise missiles** are pilotless, air-breathing systems that fly within the atmosphere. Low flying and accurate cruise missiles are particularly effective since they are difficult to intercept when heading toward their assigned targets. Israel, Iran and Turkey produce their own cruise missiles. Saudi Arabia and the UAE depend on other nations to provide cruise missiles.

5. **Armed drones or Unmanned Combat Aerial Vehicles (UCAVs)**, though not classified as cruise missiles, are pilotless, air-breathing delivery systems which can fly at low altitudes and on circuitous courses making them harder to detect and intercept. Israel, Iran, the UAE, Iraq, Egypt, Saudi Arabia, as well as some nonstate actors presently possess UCAVs and more countries are expected to acquire them soon.

Military aircraft are the weapons systems that complicates the discussion on limiting ballistic missiles. It is virtually impossible to address ways to limit ballistic missiles in the Middle East without taking into taking into account the role of military aircraft. Combat aircraft are far more effective and threatening than ballistic missiles and are the preferred weapons system for strategic defense in the region. Every state in the region possesses military aircraft, yet no state can develop and produce them. Israel does have the capacity to build an outdated Lavi fighter from scratch, but that is probably not cost effective. Overall, access to outside providers of military aircraft and the weapons systems, spare parts, as well as the training of pilots and crews is difficult for those states that do not have access to builders of modern aircraft weapons systems. Politically this is a large factor in the region's dependence on external security providers.

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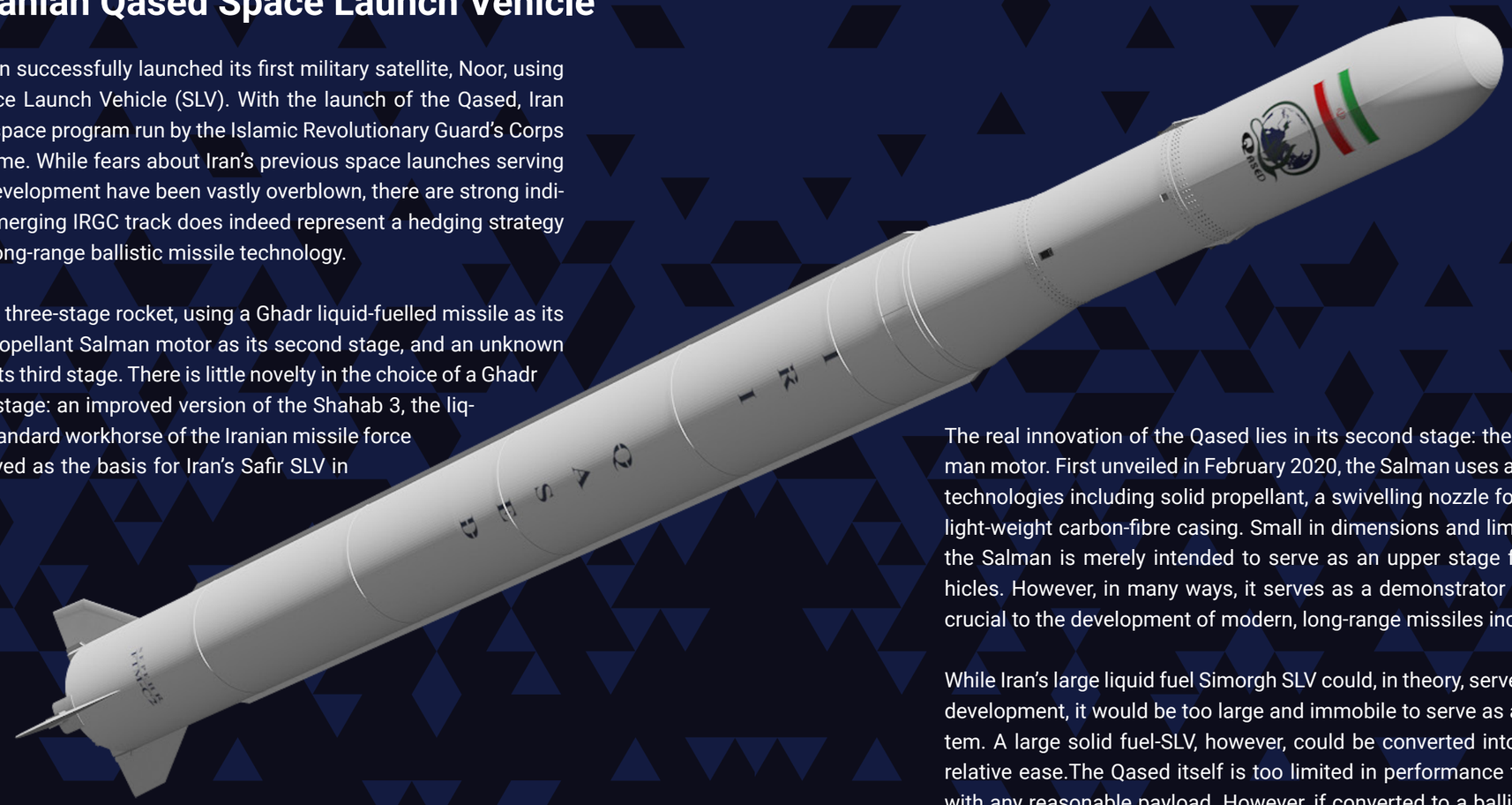
Figure A: Iranian Qased Space Launch Vehicle

On 22 April 2020, Iran successfully launched its first military satellite, Noor, using the new Qased Space Launch Vehicle (SLV). With the launch of the Qased, Iran unveiled its parallel space program run by the Islamic Revolutionary Guard's Corps (IRGC) for the first time. While fears about Iran's previous space launches serving as cover for ICBM development have been vastly overblown, there are strong indications that Iran's emerging IRGC track does indeed represent a hedging strategy aimed at acquiring long-range ballistic missile technology.

Iran's Qased SLV is a three-stage rocket, using a Ghadr liquid-fuelled missile as its first stage, a solid propellant Salman motor as its second stage, and an unknown small kick motor as its third stage. There is little novelty in the choice of a Ghadr as the Qased's first stage: an improved version of the Shahab 3, the liquid-fuel Ghadr is a standard workhorse of the Iranian missile force and has already served as the basis for Iran's Safir SLV in the past.



The real innovation of the Qased lies in its second stage: the solid-propellant Salman motor. First unveiled in February 2020, the Salman uses a set of sophisticated technologies including solid propellant, a swivelling nozzle for flight control and a light-weight carbon-fibre casing. Small in dimensions and limited in performance, the Salman is merely intended to serve as an upper stage for space launch vehicles. However, in many ways, it serves as a demonstrator for the technologies crucial to the development of modern, long-range missiles including ICBMs.

While Iran's large liquid fuel Simorgh SLV could, in theory, serve as a basis for ICBM development, it would be too large and immobile to serve as a viable weapon system. A large solid fuel-SLV, however, could be converted into a viable ICBM with relative ease.The Qased itself is too limited in performance to serve as an ICBM with any reasonable payload. However, if converted to a ballistic missile, it would exceed Iran's self-imposed 2000km range limit and represent the first step on the technological path towards an Iranian ICBM capability. How quickly Iran can proceed from this starting point depends on both the progress it has already made in large-diameter motor development, as well as the political willingness of Iran's leaders.

Source: "Have Iran's space ambitions taken a worrisome new turn?" by Fabian Hinz (European Leadership Network)

How Regional States Think About Ballistic Missiles

While military and security requirements are the primary driver of states acquiring rockets and ballistic missiles, states are also motivated by stature and prestige. This chapter describes how states conceptualize their own defense doctrines.

1. **Strategic deterrence drives ballistic missile acquisition by Iran, Syria, Egypt, and Israel.**

    a. **Iran sees ballistic missiles as a core pillar of its defense and deterrence strategy**. This commitment to short- and medium-range missiles underlines their centrality in Iran's military strategy of *defa e mazaik*, or mosaic defense, which became part of Iranian military doctrine in 2007. Recognizing the comparative weakness of Iran's armed forces, the strategy created a layered asymmetrical defense based on three elements:

        i. Foreign-based allied militias represent an initial capacity for retaliation, should Iran be attacked;

        ii. Iranian naval forces to employ 'swarming' tactics involving many small, high-speed boats to hinder potential seaborne assaults; and

        iii. The threat of ballistic missiles aimed at Israel and the Gulf Arab States to increase the costs of offensive military action, particularly an invasion

    Russia is also providing Iran with an outdated air defense system. The strategy is designed to deter air attacks and avoid a direct conventional conflict with an adversary who would almost certainly be much stronger. In line with this approach, Iranian decision-makers see their stockpile of ballistic missiles as a way to project power across the region and deter and punish any would-be aggressor.

    b. **Syria has traditionally viewed its ballistic missiles, whether armed with conventional or chemical warheads, as an offset to Israel's superior air force** and as a means to maintain some capacity to deter Israel by threatening to strike its cities and other large-area, strategic targets. Syria depends heavily on chemical weapons warheads and started to build a nuclear reactor which destroyed by Israel in 2007.

    c. **Egypt's motives are less clear, but likely derive from legacy missile development programs initiated by Gamal Abdel Nasser in the late-**

1950s to deter or punish Israel for attacks on Egypt or its vital interests. The peace accord between Israel and Egypt has likely reduced Egypt's perceived need to deter Israel.

d. **Israel's *Jericho-2* ballistic missiles (approximate range of over 2000km) are presumably capable of being armed with nuclear warheads and represent one leg of its strategic-nuclear triad.** Aircraft and submarine-launched cruise missiles, namely the *Popeye Turbo*, form the other two legs.

2. **States possessing effective strike aircraft may desire missiles to maintain some diversity in delivery capability, or to hedge against an emerging vulnerability or possible loss of strategic aircraft**. This likely explains Israel's rationale for fielding its *Jericho* ballistic missiles, even while its air force and *Popeye Turbo* submarine launched cruise missiles are capable of delivering conventional – or nuclear – munitions to any regional target.

3. **States that have a limited number of attack aircraft and trained pilots are unable to afford or sustain aircraft infrastructure and operations** without substantial foreign assistance. They may also face an enemy with superior missile capability and decide to reduce dependence on strike aircraft for tactical or strategic missions. The decisions by Iran, Saudi Arabia, Syria, the UAE, and Yemen to acquire ballistic missiles were all largely explained by the poor quality of their respective air forces or as a hedge against losses or dependence on suppliers of aircraft.

4. **States often consider ballistic missiles as symbols of military might and national prestige which act as a prerequisite for major power status irrespective of their immediate military utility.** Having the capability to indigenously manufacture ballistic missiles calls attention to a state's technical prowess and military self-sufficiency and suggests a degree of independence from foreign military suppliers and their political influence. This rationale certainly applied to Egypt's initial efforts to produce its own missiles, with West German help, as well as the Saudi and UAE decision to respectively procure Chinese *DF-3* intermediate-range missiles and North Korean *Scud-B* missiles in the late-1980s.

5. **States often acquire ballistic missiles or other high-tech weaponry from a foreign supplier to cement a political or security relationship by coupling a major power's strategic interests to those of the recipient**. The supplier may take on some commitment to the recipient's security thereby enhancing the latter's prestige. For example: Soviet missile sales to Syria, Iraq, and North and South Yemen in the 1970s and 1980s provided an important signal of Moscow's commitment to the security of those countries.

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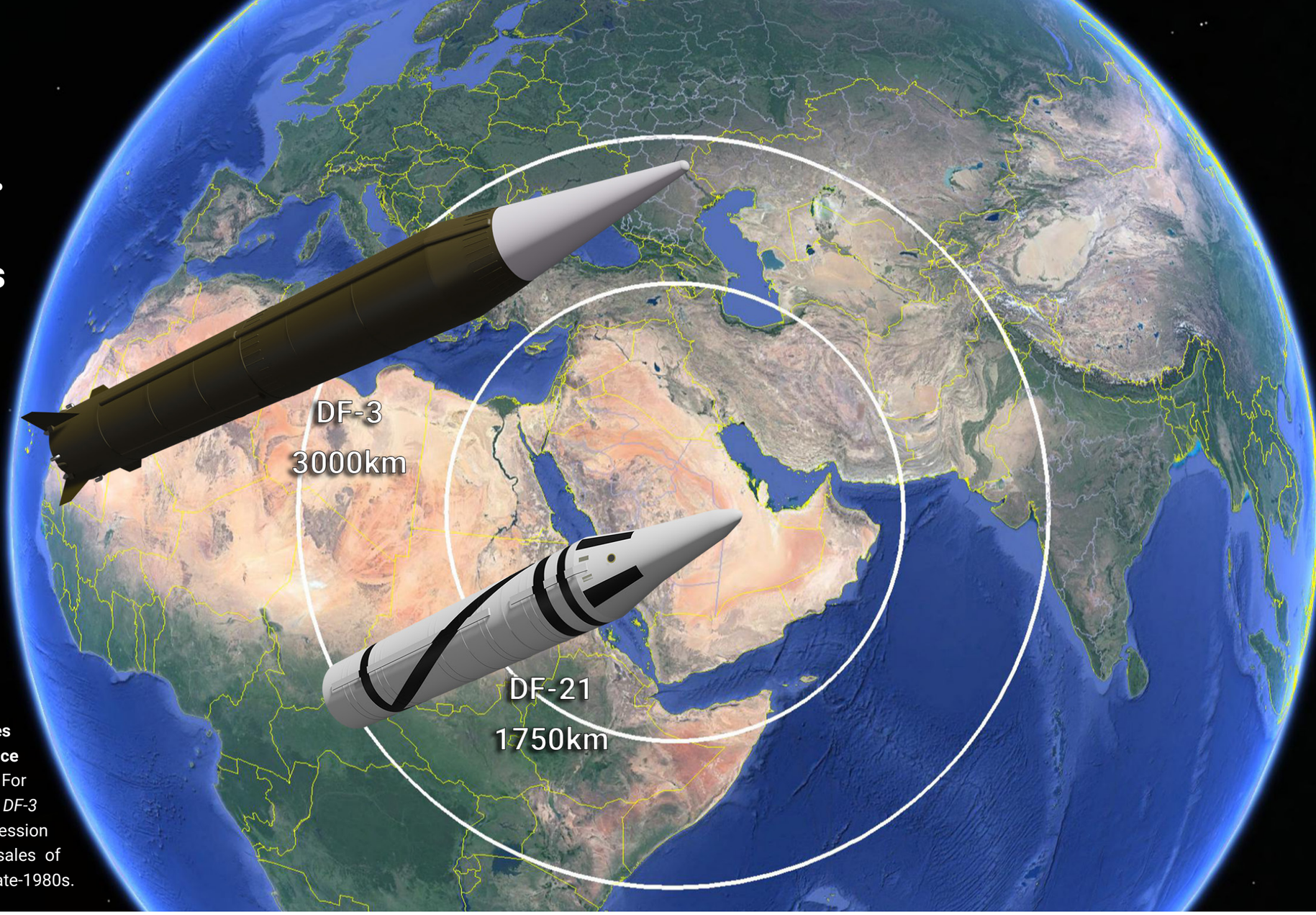
Figure B: Saudi Ranges from Al-Wata Missile Base



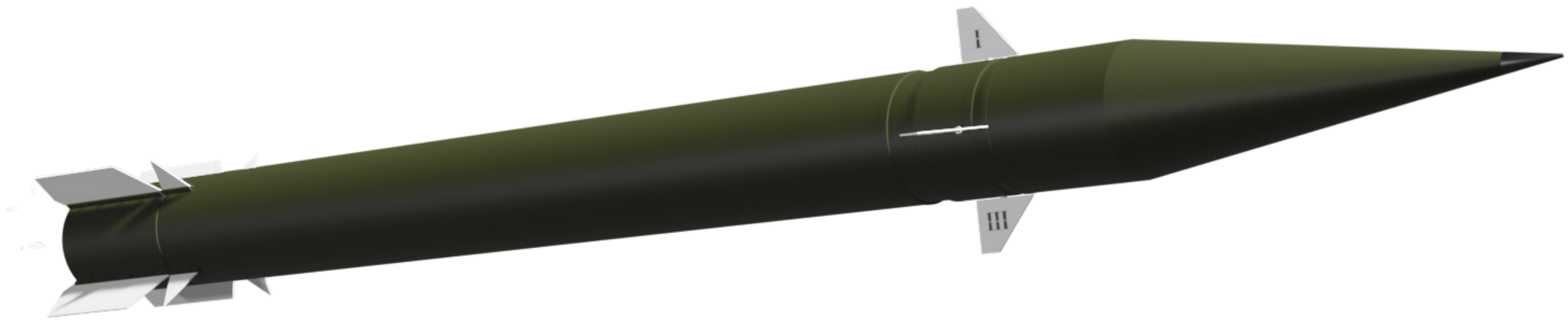
6. **Conversely, states sometimes acquire missiles from one major power to show independence from another or as an act of defiance**. For example: the Saudi acquisition of the *DF-3* missiles from China was, in part, an expression of dissatisfaction about US restrictions on sales of certain weapons to Saudi Arabia in the late-1980s.

7. **States may feel compelled to acquire missiles to keep up with another state's acquisition in order to maintain appropriate prestige regardless of immediate military utility.** The inability or unwillingness of a state to 'maintain missile parity' may convey a perception of inferiority or a lack of will to defend itself, thereby stimulating regional arms races. For example, the UAE was driven to procure a small arsenal of *Scud-B* missiles from North Korea in the late-1980s, after witnessing the strategic use of missiles by Iraq and Iran earlier that decade.

Similarly, Saudi Arabia's acquisition of *DF-3* intermediate-range missiles in the late-1980s was largely driven by the need to mirror or exceed the operational capabilities of its rivals. Riyadh's purchase of solid-fuel, medium-range missiles in the mid-2000s, and its acquisition of a solid rocket motor production facility in the late-2010s were likely motivated by the perceived need to match Iran's missile capabilities. Turkey's interest in producing advanced-capability artillery rockets indigenously is also likely driven by similar perceptions.

8. **States that transfer rockets and missiles to another state or non-state actors are largely motivated by strategic utility, the need to reinforce existing relationships, and to bolster their own defense and deterrence capabilities by empowering proxies.** Iran's transfer of *Fateh-110* missiles and possible production infrastructure to Syria serves multiple purposes. In addition to arming Damascus with weapons for use in its civil war, Tehran also provides Syria with the means to produce weapons that can more easily be shipped to Hezbollah in Lebanon, with some measure of deniability.

Figure C: Hezbollah Zelzal rocket equipped with a precision-guidance kit



All but one of the rockets Hezbollah fired at Israel in 2006 were supplied by Syria, who very likely also produced them. The Syrian-supplied rockets do not match any known Iranian design or manufacture and carry small warheads of less than 100kg. However, public reporting suggests that Iran has provided infrastructure, equipment and training to Syria for production of much larger, Iranian-designed rockets, such as the *Zelzal* and the *Fateh-110* missile. The manufacturing facilities were originally operated by Syrian personnel, but since the start of the civil war in 2011, reporting suggests that Hezbollah agents may now run the production lines in Syria for *Zelzal, Fateh-110*-type rockets and missiles. The status of large-rocket production in Syria is not presently known, as Israel has attacked and destroyed several targets, including a plant suspected of missile production in Masyaf, Syria.

According to Israeli reports, workshops for the conversion of unguided rockets into precision-guided missiles and a factory for the production of missiles have been set up in Hezbollah-controlled parts of Lebanon.

9. **Non-state actors, such as Hezbollah and the Houthis in Yemen, see rockets and missiles as the principal (if not only) weapon of retaliation and deterrence against Israel and Saudi Arabia, respectively.** Neither Hezbollah nor the Houthis have manned combat aircraft, nor are they capable of posing an existential military threat to their respective neighbors. Both seem to have adopted Iran's defense and deterrence strategy, which relies on the threat of use, or actual use of rockets and missiles.

a. **The Houthis began using missiles early on in their war with the Saudi-led coalition, yet they quickly exhausted their pre-conflict supply inherited from the Yemeni government's arsenal.** Iran, seeing an opportunity to inflict some damage in retaliation against Saudi Arabia and the UAE, began resupplying the Houthis with heavy artillery rockets and ballistic missiles. The Houthis have used the *Burkan-H2* missile, an Iranian-supplied copy of the *Qiam*, to strike targets as far as the Saudi capital, Riyadh, about 1,000 km from Yemeni territory. The cost of supplying the Houthis with these missiles is low, but for Tehran the benefits of complicating the Saudi mission in Yemen are substantial. At least seven, and possibly as many as 13 or 15, *Burkan-2H* missiles have been fired at Saudi targets.

b. **Hezbollah's massive arsenal of rockets and missiles in southern Lebanon (reportedly over 100,000) offers the suppliers of these weapons an additional, unique option for deterring Israel.**

Since the Hezbollah rocket and ballistic missile arsenal is so key to the major concerns of several states in the region, a more extensive discussion of Hezbollah capacity is required.

An overwhelming majority of Hezbollah's rockets are short-range systems that have low accuracy and were supplied by Syria. Iran has a limited deterrence capacity when relying solely on the 100 or so *Shahab-3*, *Ghadr* and *Emad* medium-range missiles capable of reaching Israeli territory when launched from locations inside Iran. Israel's *Arrow and Patriot* missile-defense systems could block a significant fraction of the missiles launched from Iran, which would inevitably degrade Tehran's confidence in its ability to deter Tel Aviv through punishing missile attacks. Providing Hezbollah with many hundreds, if not thousands, of artillery rockets and close-range missiles for use against Israel bolsters Iran's deterrence capacity. Similarly, Syria (Hezbollah's primary supplier of light-artillery rockets) enhances the credibility of its deterrence posture aimed at Israel by arming an allied force in neighboring Lebanon.

The potential value of doing so was vividly demonstrated by the sustained attacks that Hezbollah launched against Israel in 2006. Hezbollah's one-month campaign, which included the firing of 4,400 rockets and essentially shut-down commerce in northern Israel, causing significant economic losses. Today, Israel's missile defenses may provide a psychological boost to its citizenry, but it will not be able to blunt a significant portion of Hezbollah's large arsenal, especially if launched simultaneously in salvos to overwhelm the Iron Dome and Patriot defenses.

It is important to recognize that an overwhelming majority of Hezbollah's arsenal consists of *Katyusha*, *Uragan*, and *Khaibar* rockets produced and supplied by Syria, with some level of assistance from Iran. The Syrian-supplied rockets have ranges below 100km and relatively small warheads.

The larger, more potent *Zelzal* rockets, as well as the *Fateh-110* missiles, are of Iranian-design though Tehran has provided Damascus with the industrial capability and knowledge to produce them in Syria for potential transfer to - and use by - Hezbollah. With Syrian personnel diverted to the military to fight President Assad's domestic opponents,

reports indicate the Hezbollah now operates the facilities in Syria and runs the transportation networks that smuggle the rockets into Lebanon. Regardless of origin, the overall size of Hezbollah's stock of *Zelzal* and *Fateh-110* rockets and missiles is likely measured in the hundreds, not the thousands. Recent comments by Israeli leaders and security experts claim that Hezbollah has succeeded in acquiring fewer than ten precision-guided versions of the *Fateh-110*. The validity of these assertions is almost impossible to confirm using only public information.

Ballistic Missile Use in the Middle East

1. **Ballistic missiles have been used in nine regional conflicts since 1973.** Syria and Yemen have fired missiles during their respective civil wars. Iran has attacked extra-territorial, non-state entities with missiles, notably Mojahedin-e Khalq Organization (MEK) camps in Iraq, Kurdish opposition groups in Northern Iraq and the Islamic State (IS) in Syria. Iran and Iraq attacked each other with ballistic missiles during their bloody war in the 1980s. Iraq fired dozens of missiles at Israel, Saudi Arabia, and Bahrain in 1991 and against Kuwait in 2003. Beginning in 2015, Houthi rebels in Yemen employed ballistic missiles taken from Yemeni army depots to attack Saudi and Emirati targets until the stocks ran dry. The Houthis have received additional missiles from Iran to use against Saudi Arabia. The non-state actors Hezbollah and Hamas have fired mortars, improvised rockets, and artillery rockets at Israel, but have not yet launched ballistic missiles. More recently, Shia militia have used ballistic missiles against US bases in Iraq and Iran allegedly fired at Saudi oil facilities in Abqaiq from southern Iraq. Iran has retaliated with ballistic missiles launched at Ayn al Assad airbase in Iraq against US forces in response to the US drone assassination of Quds Force commander Qassem Suleimani.

2. **The Iran-Iraq War (1980-1988) is the first conflict to feature ballistic missile attacks between combatants. Some 400 *Scud*-type missiles were exchanged, most of which were launched by Iraq at Iranian cities.**

    a. In 1982, mounting battlefield losses led Iraq to intensify its strategic bombardments of Iranian cities and petroleum facilities, using both aircraft and *Scud-B* ballistic missiles. The air and missile strikes were designed to degrade Iranian resolve, as Iraq sought to create the leverage needed to negotiate a cease fire. Tehran refused Baghdad's approaches.

    b. Iran did not retaliate against Iraq with its own missile strikes until 1984, when it finally acquired *Scud-B* missiles, initially from Libya, and North

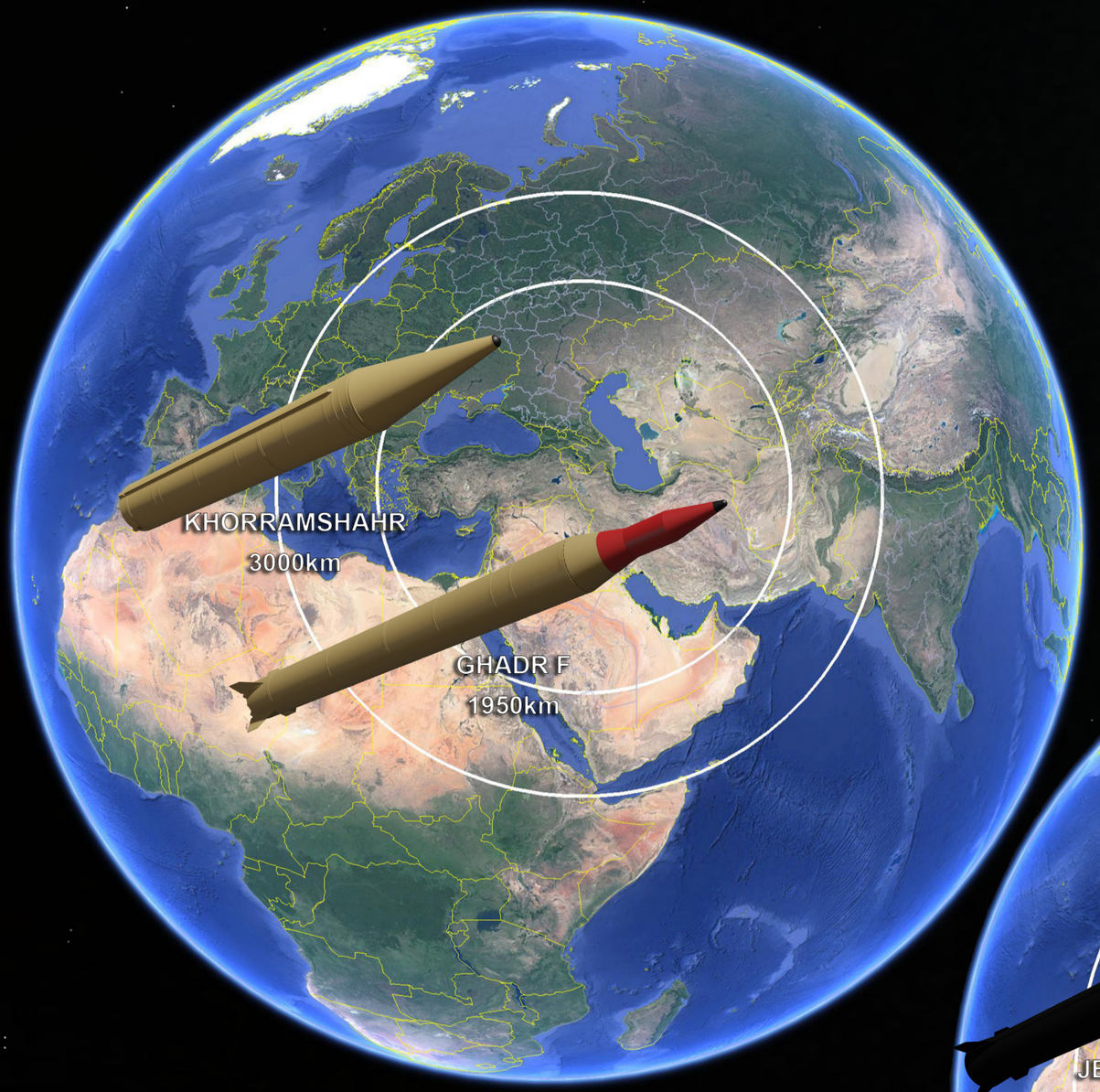


Figure D: Iranian Ranges from Tabriz Missile Base

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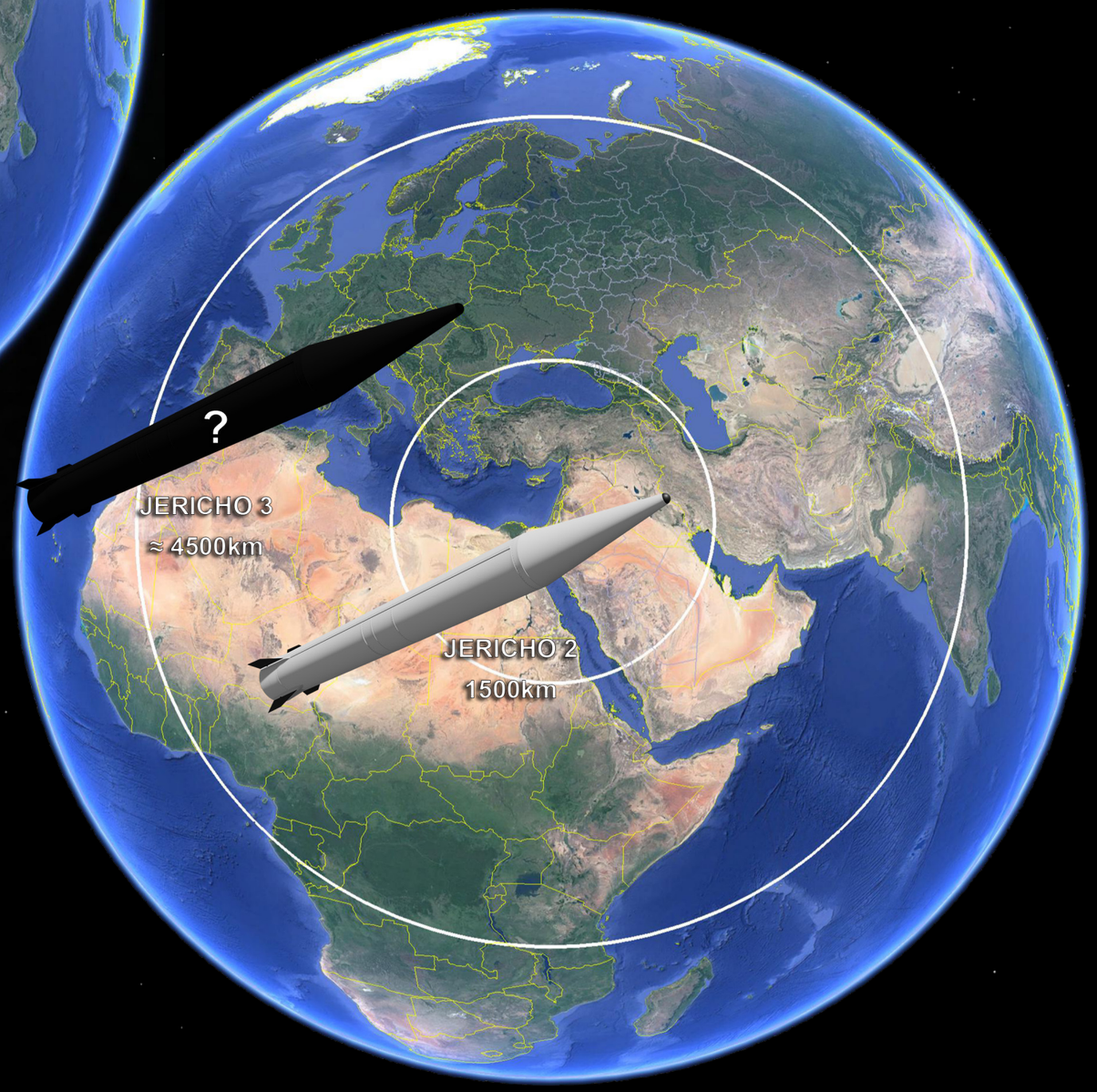
Figure E: Israeli Ranges from Sedot Mikha Missile Base



Korea. Iran's ability to respond using missiles led to a pause in missile exchanges.

c. Near the end of the war, Iraq extended the reach of its *Scud* missiles, which put Tehran within reach of the new *al Hussein* missile. Over the final three months of the war, Iraq launched 189 *al Hussein* missiles, 135 of which were directed against Tehran, killing more than 500 civilians.

3. **Iraq launched more than 80 modified *Scud-B* missiles at Israel, Saudi Arabia, and Bahrain in response to the US-led campaign to liberate Kuwait in 1991.** The military utility of these missile strikes was limited by poor accuracy. Ballistic missile defenses were employed for the first time, though successful intercepts of Iraqi missiles were spotty.

    a. Iraq attempted to fracture the US-led coalition by attacking Israel. Tel Aviv refused to respond militarily, thereby preserving the Arab component of the coalition. The Iraqi missiles, 39 in all, caused limited damage and resulted indirectly in one, possibly two deaths.

        i. Roughly 46 missiles were aimed at military bases in Saudi Arabia and the US Naval base in Bahrain. One Iraqi *Scud* missile struck a US military barrack in Dhahran, Saudi Arabia, killing 28 US soldiers and injuring 100 others.

    b. During the 1991 Gulf War, the threat of Iraq launching missiles against Israel with nerve gas warheads was disruptive psychologically and physically for the Israeli population and government.

4. **Iran launched *Scud-B/Shahab-1* missiles and numerous rockets at Camp Ashraf in northeast Iraq, near Baghdad. This camp was home to the Mojahedin-e Khalq Organization** (MEK or MKO), a radical group (once designated as a terrorist organization by the US) advocating the overthrow of the Islamic regime in Tehran. The missile strikes occurred in 1994, 1999, and again in 2001.

5. **During the 1994 civil war, North and South Yemen launched a limited number of *Scud-B* and SS-21 Tochka missiles at each other's capital cities**, Sana'a and Aden, respectively.

6. **Iraq launched five *al Samoud* and 14 *al Fath* short-range missiles at US-coalition targets during the opening days of Operation Iraqi Freedom in 2003**. The missiles were either intercepted by *Patriot* defenses or landed harmlessly in the desert. There were no reports of casualties.

    a. Concerns about Iraq's potential use of ballistic missiles compelled US defense planners to deploy dozens of *Patriot* missile defense batteries to Israel and the Gulf states in advance of the 2003 US-led invasion.

7. **Syrian forces loyal to Bashar al Assad launched missile strikes against anti-regime forces during the civil war that began in 2011**. The strikes signaled Assad's willingness to escalate the conflict, though the regime's subsequent use of barrel bombs and chemical weapons against civilian targets resulted in far more casualties.

8. **Houthi rebels in northern Yemen have launched dozens of ballistic missiles and heavy-artillery rockets against Saudi Arabia and the UAE since the start of the Saudi-led campaign in 2015**. The Houthis also reportedly fired missiles at US warships.

    a. At the beginning of the conflict, the Houthis relied on *Scud-B* and *-C*, as well as SS-21 *Tochka* missiles originally supplied to North and South Yemen several decades ago by the Soviet Union, and later by North Korea in 2002. When the original Yemeni government stockpile of missiles ran out, the Houthis turned to Iran for resupply, which included the transfer of 950km range *Qiam/Burkan-2H* missiles.

    b. During the early months of the conflict, the Houthis fired a combination of *Scud* and *SS-21* missiles at Saudi Arabia and at Emirati forces operating in Yemen and along the Saudi border with Yemen. On September 4, 2015, a *Tochka* struck a Saudi base in the Yemeni city of Marib, killing 73 soldiers, the majority from the UAE, and dozens of Yemenis.

    c. In 2017, Houthi forces began launching long-range *Burkan-2H* missiles toward Riyadh, with at least one striking along the periphery of the capital city's international airport. At least seven *Burkan-2H* missiles, supplied by Iran to the Houthis, were directed at Riyadh and one was launched in the direction of Jeddah. The Houthis also fired at least one stretched *Qiam*, the *Burkan 3*, at a military facility in Dammam.

    d. Patriot missile defense batteries operated by Saudi and Emirati troops have intercepted some, but not all, of the Houthi-launched missiles.

    e. While long-range strikes gain the most attention, the majority of Houthi missile strikes are conducted using short-range precision-guided missiles such as the Badr-1P and SA-2 anti-aircraft missiles converted to serve as surface-to-surface missiles.

9. Iran fired Zolfaghar missiles against IS targets in Eastern Syria in June 2017, Fateh 1110 missiles against a Kurdish opposition group in Northern Iraq in September 2018 and Zolfaghar and Qiam missiles against IS targets in Eastern Syria in October 2018.

10. In September 2019, a combined drone and cruise missile strike targeted Saudi Aramco facilities in Abqaiq and Khurais. While the Yemeni Houthi rebels have

claimed responsibility for the strike, Western countries have accused Iran of conducting the attack. The success of the strike (in terms of accuracy and timing) and Saudi Arabia's inability to counter it might hint at a larger future role for combined operations of drones, cruise missiles, and ballistic missiles capable of avoiding local missile defenses in the future. In the past, Yemen's Houthi rebels have already used suicide drones and ballistic missiles in combination.

11. In January 2020, Iran's Revolutionary Guards used *Qiam* and *Fateh 313* missiles to strikes US forces based at Erbil and Ayn al-Assad airbases. While the strike against Erbil failed, the missile attack on Ayn al-Assad caused a substantial amount of damage, wounded dozens of US troops and demonstrated the high level of precision of Iran's short-range ballistic missiles. The apparent ability of a regional power like Iran to organize the precision cruise missile and drone attack on the important Abqaiq facility in Saudi Arabia and shortly afterward to mount a successful attack against US forces using ballistic missiles is almost certain to have a dramatic impact on missile proliferation incentives and deterrence structures in the region and beyond.

Countries with Domestic Ballistic Missile Production Infrastructure

Challenges to Constraining Ballistic Missiles Through Agreements

Reaching arms control agreements or arrangements that constrain the acquisition, development, deployment, use or transfer of ballistic missiles in the region requires actors to overcome at least seven significant challenges (in no particular order):

1. **Distinguishing between satellite-launch vehicles (SLV) and intercontinental ballistic missiles (ICBM) capable of delivering destructive payloads across long distances.** SLVs and ICBMs both rely on powerful booster rockets, multiple stages, and guidance and control systems. Because ICBMs operated by major powers are almost always armed with nuclear warheads, there is inevitably a concern that states in the region developing SLVs or ICBMs are seeking a long-range, nuclear-delivery platform. No nation in the Middle East possesses an ICBM, although two states, Israel and Iran, operate SLVs. Turkey is currently pursuing a domestic SLV capability, while Egypt has expressed intent to launch satellites from its own soil. Only one state in the region has nuclear weapons: Israel.

2. **Most nations in the region prefer combat aircraft as the delivery system for tactical weapons against tactical targets** since they are generally more accurate and reliable, offer greater operational flexibility, can deliver larger payloads, and are reusable. Many nations in the region have modern aircraft (Israel, Turkey, Saudi Arabia, and UAE); however, Iran's air force consists of much older aircraft (many of which are American from the time of the Shah). Highly-accurate ballistic missiles armed with conventional warheads are considered support weapons for some countries in the region.

3. **Israel's sophisticated stockpile of ballistic missiles can be coupled with nuclear warheads,** making them strategic weapons of concern for many countries in the region. Israel's sophisticated, highly-accurate; close-, short-, and intermediate range ballistic missiles are effective tactical weapons for use on the battlefield, even when armed with conventional warheads.

4. **For Iran, conventionally-armed ballistic missiles are fundamental to the country's defense and deterrence strategy. Iran does not have nuclear warheads.** Iran's concentration on ballistic missiles stems from its experience during the Iran-Iraq War, when it acquired ballistic missiles in response to Iraq's aircraft-delivered bombardments and missile strikes. Iran's inability to acquire advanced-strike aircraft amplifies Tehran's view of the importance of ballistic missiles. Today, Iran possesses the largest, most diverse missile arsenal in the region.

5. **Iran's transfer of ballistic missiles and rockets to non-state actors such as Hezbollah, the Houthi rebels in Yemen, Palestinian factions, and Shia militias in Iraq and Syria is a source of concern to the US and its regional allies and partners.** An important uncertainty is the number, range, and accuracy of the rockets and ballistic missiles that these groups control. However, there is no doubt that Lebanese Hezbollah is both quantitatively and qualitatively the best equipped Iranian-supported non-state actor in the region. Arming Hezbollah is an extension of Iran's larger defense and deterrence (and coercion) strategy, which seeks to threaten punishment against Israel for attacks on Iran's strategic interests. However, the degree to which Tehran has direct operational control of Hezbollah's arsenal is unclear and continues to be debated. Hezbollah is prepared to launch rockets to protect its own security regardless of Iran's preferences. With regard to Yemen, Iran supplies missiles to the Houthi rebels to retaliate against Saudi Arabian air attacks. There have also been reports of ballistic missiles being transferred to pro-Iranian formations in Iraq and Syria.

6. **As seen in multiple Gulf Wars, the readiness of outside powers (such as the US, UK, France, Russia, and others), to enter conflict directly to aid partner states in the region - particularly by offering support through attack aircraft and drones or modern weaponry - exacerbates security imbalances.** The acquisition of rockets and missiles by some states, particularly Iran, is partly driven by these imbalances in strike capabilities. The U.S. and other states have exercised some restraint in supplying advanced missiles and missile technology to the Arab States and Israel.

7. **Ballistic missile defenses deployed by some states in the region offer only a finite level of protection against missile strikes. They cannot, for example, neutralize large ballistic missile salvos or attacks sustained over a long period.** It is unclear whether the introduction of ballistic missile defenses will deter missile acquisition, or induce states to field larger, more diverse missile arsenals to offset or overwhelm the defenses of adversaries.

The Limited Protection of Ballistic Missile Defense

1. **Israel currently operates three dedicated ballistic missile defense systems: Iron Dome, David's Sling and Arrow. Saudi Arabia has signed a contract for US-made Terminal High Altitude Area Defense (THAAD). While the UAE is already operating the system, the US itself has deployed THAAD to Israel and Saudi Arabia.**

2. **Several countries in the region use advanced surface-to-air missile systems with an anti-ballistic missile capability**. Various versions of the MIM-104 Patriot are operated by Israel, Kuwait, Qatar, the UAE, Saudi Arabia and Jordan. Egypt, Syria and Iran operate Russian-made S-300 systems while Turkey - against strong objections from the US - recently purchased the more advanced S-400, which it has not yet deployed. The US has also deployed versions of the Patriot to some of its bases in the region.

3. **Due to range constraints, missile defense systems offer only limited coverage of key sites**. This is particularly the case with countries covering large area such as Saudi Arabia.

4. **Missile defense favors the attacker**. Ballistic missile interceptors tend to be more expensive than ballistic missiles, especially at shorter ranges. This opens up the strategy of overwhelming enemy defenses with large numbers.

5. **Combined attacks can limit the utility of missile defense**. The Houthis have already demonstrated combined attacks of drones and ballistic missiles, with drones attacking radars in preparation for a missile strikes. Cruise missiles might fulfill the same role in future attacks.

6. **The track record of ballistic missile defense in the region is mixed.** Older Patriot versions fared poorly against Iraqi missiles in the 1991 Gulf War. More recently, Saudi Arabia has managed to intercept many Houthi missiles but has been unable to protect some key sites from them.

7. **The increasing sophistication of surface-to-air missiles with an anti-ballistic missile capability might have a mixed impact on the ballistic missile threat.** On the one hand, they will result in a more widespread proliferation of missile defense capabilities. On the other hand, their increased effectiveness when also used against combat aircraft might encourage states to invest in less vulnerable ballistic missiles and cruise missiles.

The Future of Ballistic Missile Development and Use in the Region

In this overview of the role that ballistic missiles and related weapons systems are playing today, we give a static picture of a rapidly changing arms situation in the Middle East that is likely to become more complicated due to several reasons.

1. **Other nations will theoretically be free to sell advanced aircraft to Iran now that the UN arms embargo has expired.** However, the role of Iranian ballistic missiles as a core pillar of Iranian deterrence is unlikely to change. Iran does not seem capable of investing the sums needed for reequipping its air force with state-of-the-art equipment on a larger scale. Unlike ballistic missiles, even a reasonably well-equipped air force would not be capable of inflicting larger damage on US forces in a potential military confrontation, thus limiting its deterrence value. Almost all of Iran's combat aircraft are operated by the regular military, while ballistic missiles are operated by the IRGC. With the IRGC's domestic power steadily rising, it seems unlikely that scarce funds would be devoted to a major overhaul of country's regular air force. Last but not least, Iranian missile development represents a large financial and human investment and a rare success story in the country's quest for military self-sufficiency. The progress made in this regard is unlikely to be given up for combat aircraft, whose provision and spare parts supply would mean continued reliance on foreign powers.

2. **Iran is likely to continue its policy of providing ballistic missiles and artillery rockets as well as production equipment to Hezbollah, the Houthis, and to Shia non-state actors in the region. It is unclear whether Iran is now prepared to transfer its more sophisticated cruise missiles and drones to these proxies.**

3. **The proliferation of shorter-range MTCR category II missiles (systems not exceeding a 300km/500kg range/payload threshold) is likely to continue among regional militaries. This trend is aided by an increasing supply of such systems on the international market.**

4. **Saudi Arabia is reportedly building the domestic infrastructure to manufacture ballistic missiles.** Other nations could follow suit. Turkey is ramping up its domestic capacity to build and even export weapons including close-range ballistic missiles.

5. **The Assad government has virtually restored its authority over most of Syria and is likely to expand its domestic capacity to build rockets and ballistic missiles.**

It is therefore important to begin now to determine what constraints might be introduced to prevent further proliferation of ballistic missiles and related weapons systems in the Middle East.

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Chapter 2: Mapping the Regional Military Balance

The relative strength of conventional forces for each regional power is an important back drop for the evaluation of the role of ballistic missiles in the region. Relative strength is particularly difficult to quantify because of the significant qualitative differences in equipment, training, and experience.

Overview of the trends in conventional forces

1. **Israel and Turkey remain the dominant military powers in the region.** There is little indication Israel's military primacy in the region will be challenged anytime soon. Turkey, as a long-time member of NATO, has been required to maintain a more ready military force and has benefited from access to up-to-date military equipment. The country has also demonstrated its ability to project military power abroad and its willingness to use its conventional forces in 'hot pursuit' of (Kurdish) armed non-state actors. However, Turkey's domestic political issues may begin to affect the country's long-term military outlook.

2. **Egypt aims to become a regional military power again.** Despite being the largest Arab country, Egypt has been a sideshow in the regional security architecture for a long time. Egypt's new leaders seem determined to change this and are willing to spend large sums to acquire the equipment they believe necessary to become a regional power. Egypt's military modernization must also be seen in the framework of its security alliance with the UAE and Saudi Arabia.

3. **The military power of Gulf Cooperation Council (GCC) states is on the rise.** The stalemate in Yemen should not distract from the fact that the UAE, and to a lesser degree Saudi Arabia, have made large gains in turning their armed forces into serious actors capable of unilateral operations. Moreover, their ambition goes far beyond securing their borders. Both countries aim to fill the perceived vacuum left by US disengagement from the region and they continue to maintain the highest military budgets in the region.

4. **In conventional terms, Iran is falling behind its neighbors.** Despite its numerical advantage and combat experience, Iran is increasingly unable to compete with its neighbors' aerial power. This disadvantage would be even more dramatic were the US to intervene against Iran in any potential conflict. Because of the arms embargo, Iran has not been able to modernize either its air force or much of its military equipment, a disadvantage Iran's leaders are well aware of. Instead of competing in an arms race in which they have no

possibility of winning, the Iranians focus most of their resources on developing an arsenal of ballistic missiles and in pursuing asymmetric capabilities beyond Iran's borders, through Hezbollah and Shia militia. While the expiration of the UN arms embargo in 2020 might now lead to some acquisitions of advanced foreign equipment, Iran is unlikely to change its asymmetric military outlook.

5. **The conventional military forces of Syria, Iraq, and Yemen have ceased to be a factor in regional power dynamics.** While Syria and Iraq's armies may be reconstituted slowly but steadily, there is little chance a powerful conventional Yemeni military will emerge even in the long term.

6. **All the major players invest heavily into building up a local arms industry.** These efforts are not only aimed at helping countries become more self-reliant, they are also designed to keep a larger share of the region's vast defense budgets in-country.

Egypt

1. **Aerial Capabilities.** While Egypt operates a large number of advanced combat aircraft and continues to acquire new types, there are doubts about the country's ability to integrate all of its purchases into an effective and sustainable fighting force. Traditionally the owners of the largest Arab air force, the Egyptians currently operate more than 200 F-16s of various versions, as well as advanced airborne early warning and control capabilities.

    a. **The government of Abdel Fattah al-Sisi has set out on an ambitious modernization and expansion program for the Egyptian Air Force (EAF)** that includes the acquisition of dozens of advanced Mig-35s and Rafale multirole combat aircraft, as well as an order for Su-35 fighters.

    b. **While both the numbers and the type of equipment sound impressive, several factors impede the strength of the EAF. Training is not up to Western standards, and the enormous financial costs of current purchases puts a severe strain on maintenance budgets.** Furthermore, the operation of four different types of advanced French, American and Russian-made combat aircraft, where most countries operate only one or two, will substantially complicate integration and maintenance.

2. **Land Forces.** While Egyptian land forces are numerically significant, they operate a mix of advanced and outdated equipment and their effectiveness is hampered by institutional shortcomings. With more than 1,300 M1A1 Abrams tanks in its arsenal and Russian T-90s on order, Egypt continues to operate one of the largest tank forces in the region. The number of other armored vehicles and artillery systems, mostly of U.S. but also of Soviet origin, is equally high.

a. **Nevertheless, inflexible structures and doctrines, low maintenance budgets, and low interoperability have had a severe impact on the Egyptian army's fighting capabilities. Egypt's land forces also suffer from a major lack of training; this is particularly true for conscripts.** Nowhere has this been as visible as during the country's ongoing counterinsurgency effort on the Sinai Peninsula.

b. **While the modernization efforts undertaken by the al-Sisi government have had some positive effect so far, it remains to be seen how successful these will be in the face of deep-rooted institutional shortcomings.**

c. **Egypt's domestic arms industry is in many ways a mirror image of the country's armed forces. While extremely large, it is somewhat inefficient and has reached nowhere near the sophistication of its Israeli and Turkish counterparts.**

1. **Naval Capabilities.** The second largest navy in the region, Egypt has recently embarked on a major naval modernization effort. Yet the country's capability to combine these new systems into an effective fighting force is anything but clear.

    a. **No other branch of service has seen such a major expansion under the al-Sisi government as the Egyptian navy.** In recent years, Egypt has not only acquired French and South Korean frigates, as well as German submarines, but also two French Mistral class amphibious assault ships, which provide the country with a unique expeditionary capability.

    b. **As with the Egyptian Air Force, doubts remain that Egypt's navy will be able to integrate the rapid influx of diverse and advanced capabilities into existing structures.**

2. **Ballistic missiles.** While it is known that the country operates and produces ballistic missiles, assessing Egypt's ballistic missile force is severely complicated by the country's high levels of secrecy.

    a. **Egypt is known to have established a factory producing Scud missiles with North Korean assistance in the 1980s.** A freighter carrying North Korean shipments of components to Cairo was being intercepted as late as 2013.

    b. **An ambitious German-Argentinian-Iraqi-Egyptian program to develop the solid-fuel Condor II was cancelled in the early 1990s.** However, the solid-fuel motor factory built for the project still appears active on satellite pictures.

c. **Whether Egypt developed or acquired missiles with ranges beyond the Scud remains unknown.** In the late 1990s, the country reportedly became interested in acquiring the North Korean *Nodong*, but it is unclear whether any purchases took place. In the 2000s, Egypt's rocket engine test stands underwent substantial upgrades. Yet, it remains unknown what program the development was related to.

Iran

1. **Aerial Capabilities.** Iran's Air Force is suffering from aged equipment, government neglect, and a lack of serious modernization programs. As a result, it is lagging far behind its neighbors. The Islamic Republic of Iran's Air Force (IRIAF) operates an eclectic mix of outdated combat aircraft types falling into three categories: American-made fighter jets from the Shah era, former Iraqi combat aircraft evacuated to Iran in the Gulf War, and Russian-built aircraft acquired during the early 1990s. Not having introduced any new type of combat aircraft for over 25 years and currently being prevented from doing so by sanctions, Iran's ability to compete with its neighbors is severely limited.

    a. **Current modernization programs focus on minor updates for existing platforms, the development of indigenous trainer aircraft, and concept studies for more advanced projects.** With Iran's leadership focused on extending its asymmetric warfare capabilities mostly associated with the IRGC, even these modest projects suffer from a lack of funding and managerial attention.

    b. **Even if a political decision was made to shift attention towards the air force, a thorough modernization of the IRIAF would take years if not a decade to implement and would require an unreasonable amount of funding.**

    c. **The IRGC's Aerospace Force, mostly known as the operator of Iran's ballistic missiles, operates only a handful of combat aircraft and helicopters. Its drone capabilities, however, are substantial and have repeatedly seen combat use.**

2. **Land Forces.** Iran operates large and a reasonably well-trained army, yet they suffer from a severe lack of modern equipment. This trend is well exemplified by Iran's armored force. The total number of Main Battle Tanks (MBT) in Iranian service might be large, but unlike most of its neighbors the country does not operate any state-of-the-art tank model. Instead, Iran's army continues to rely on outdated American and British types imported before the revolution and older MBTs of Soviet origin. Previous attempts at developing indigenous MBTs have resulted in little more than prototypes.

a. **The recently unveiled advanced Karrar tank might change this situation but has yet to enter mass-production.** With the exception of rocket artillery, which has been a focus of Iranian development efforts, Iranian artillery capabilities present a similar picture.

b. **A factor that should not be underestimated is the continued legacy of the Iran-Iraq War. For the most part, all high-ranking members of Iran's military leadership actively participated in the eight-year long war and thus have ample combat experience in inter-state warfare.**

c. **Iran also possesses substantial asymmetric war-fighting capabilities and mass-produces equipment useful for this kind of warfare, such as anti-tank guided missiles and sniper rifles, in both substantial numbers and reasonable quality.** Recent interventions in Iraq and Syria have demonstrated the IRGC's ability to successfully conduct expeditionary warfare through the use of small IRGC contingents and multinational Shia militias and networks loyal to Iran's Supreme Leader.

3. **Naval capabilities.** Iran's regular navy and its IRGC naval forces offer limited conventional fighting capabilities but are a force to be reckoned with in asymmetrical naval warfare. Operating mostly Western-made surface vessels acquired before the revolution, Iran has in recent years set out on a modest naval modernization program with mixed results in recent years. While three domestically built frigates were introduced within the last decade, doubts about their quality remain following the sinking of one of the frigates in an accident in 2019. The survivability of Iran's surface fleet in any regional conflict would be low.

    a. **Iran operates a more potent submarine force consisting of three Russian-made Kilos submarines and a large fleet of domestically made midget submarines based on North Korean designs.** A locally designed semi-heavy submarine was commissioned in 2019.

    b. **The IRGC's navy employs a high number of speed boats intended to be used in swarming attacks in the Persian Gulf, as well as a large force of land-based anti-ship missiles and naval mines.**

4. **Ballistic missiles.** Iran is currently operating the Middle East's largest and most diverse missile force.

    a. **Ballistic missiles have become a central pillar of Iran's strategy of asymmetric defense.**

    b. **Iran's current arsenal includes large numbers of domestically developed solid-fuel missiles with ranges of up to 1000km and liquid fueled missiles based on *Scud* and *Nodong* technology with ranges up**

to 2000km.

c. **Even though currently configured for a 2000km range, the Khorramshahr missile has the technical potential to achieve a range beyond this.**

d. **To increase survivability, Iran has constructed a large number of underground 'missile cities' buried deeply into mountains all over the country.**

e. **More, recently Iran has made great progress in the area of precision guidance and is in the process of making the entirety of its ballistic missile force precision-guided.** In addition to this program, Iran has also developed unique missile capabilities, such as specialized ballistic missile for use against naval and radar targets.

f. **Iran has transferred ballistic missiles, artillery rockets and rocket production equipment to clients in Gaza, Lebanon, Syria, Iraq and Yemen.** These arsenals perform a dual function. On one hand they are used in local conflicts in which Iran has an interest. On the other hand, they also constitute an essential part of Iran's deterrence capabilities.

g. **Iran is the Middle Eastern country with most combat experience in the use of ballistic missiles.** The country has twice used ballistic missiles against the IS armed group and conducted ballistic missile strikes against Kurdish opposition groups as well as the US military. Iran is also likely to have deepened its combat experience by advising the Houthis in their missile campaign against Saudi Arabia and Yemeni forces opposed to them.

h. **Iran's missile strike against US forces in Iraq has proven the value of ballistic missiles as a battlefield weapon against vastly superior military forces.** The barrage of the *Qiam* and *Fateh 313* short-range precision guided missiles that Iran fired against Ayn al-Assad base managed to score precise hits against targets within the base.

i. **Iran has an active cruise missile development program.** Although details are scarce, Iran is known to have developed a reverse-engineered version of the Soviet KH-55 and two domestically developed shorter-range systems. Iranian cruise missiles have been used by the Houthis on a very limited scale and potentially by Iran itself in the September 2019 strike against Aramco.

a. **Iran's space program has seen a dramatic uptick in acitivity after the US withdrawal from the JCPOA.** Iran's liquid-fuelled Safir and Simorgh SLVs have so far shown a rather poor success rate with Iran's last four launch attempts all failing. Furthermore, both SLVs are of extremely

limited military utility. The country's announced goal of solid-fuel SLVs does open up the possibility that a part of Iran's space program might serve as a cover for long-range missile development.

Iraq

1. **Aerial Capabilities.** Despite substantial expansion over recent years, the Iraqi Air Force remains a small service unable to compete with its neighbors. Having been rebuilt from scratch at a low pace after the 2003 invasion, Iraq only acquired fixed-wing jet-powered combat aircraft in the mid-2010s.

    a. **While the quality of the material is high, including advanced F-16 versions and FA-50s, their full integration is still a work in progress.** A case in point was the fight against the Islamic State, in which most fixed-wing airstrikes were actually conducted by converted transport planes and Su-25 ground attack planes hastily delivered from Iran and Russia.

    b. **Nevertheless, Iraq is expected to substantially increase its aerial combat capabilities over the coming years.**

2. **Land Forces.** Though substantial in numbers, the Iraqi army's fighting capabilities are stymied by major structural problems and continuing instability in the country. The Iraqi army's near meltdown in the face of the IS's capture of Mosul in 2014 put a spotlight on the many interconnected shortcomings that had caused the service's failure, including excessive politicization, sectarianism, extensive corruption, as well as a lack of training and cohesion. The magnitude of these problems dwarfed any potential advantage gained from the relatively modern equipment the country has been operating.

    a. **While the post-Maliki leadership has made considerable progress in many fields, most of these issues still plague the Iraqi army today, albeit to a lesser degree than in 2014.**

    b. **With most of the investments into the army focusing on COIN capabilities and political instability as low-level insurgency is still gripping parts of the country, the ability of Iraq's army to face any state adversary is very much in doubt.**

3. **Naval Capabilities.** The Iraqi navy continues to be a very minor player in the Persian Gulf. Due to Iraq's extremely small shoreline, Iraqi naval capabilities have historically lagged behind the country's aerial and land forces. Even at the heyday of Iraqi military power in the 1980s, the country never fielded large naval forces.

a. **Today, the Iraqi navy is a modest service operating mostly patrol boats and two older Italian-built corvettes originally ordered by the Saddam regime.**

4. **Ballistic Missiles**

   a. **Iraq's armed forces are currently not operating any ballistic missile systems and Iraqi domestic development efforts are so far limited to simple artillery rockets.**

   b. **Various news reports have alleged that Iran has transferred ballistic missiles to Shia militias in Iraq.** At least one report also alleged there was an Iranian effort to establish missile production facilities inside the country.

Israel

1. **Aerial Capabilities.** Israel continues to operate the most sophisticated air force in the region, currently in possession of the most advanced fighter jet in all of the Middle East and maintaining a decisive qualitative edge over all its neighbors. The Israeli Air Force (IAF) operates large numbers of advanced F-15 and F-16s, along with the F-35s.

   a. **This qualitative edge is matched by its extremely high training standards and ample combat experience.** The country's sophisticated electronic warfare capabilities serve to further amplify the IAF's combat capabilities. Combat action in Syria over the past years is a testament to the IAF's primacy. While conducting hundreds of airstrikes against targets in the country, the Israeli Air Force lost only a single plane.

   b. **Another notable feature of Israel's military might is the advanced state of its aviation industry, whose capabilities go far beyond its regional counterparts.** Israel's aviation industry is capable of customizing combat aircraft, produces highly-advanced precision-guided munitions, as well as cruise missiles and has developed a domestic airborne early warning and control system.

   c. **The Israeli arms industry has also become a world leader in the development of UAVs and UCAVs.**

   d. **There is little prospect for any of Israel's neighbors to catch up with the IAF in the near to medium term.**

2. **Land Forces.** While not as large as some of its neighbors, Israel's army makes up for its medium size with highly advanced equipment, cutting edge training, and its high capacity for innovation. The Israeli army's numerical disadvantage is further mitigated by its large and well-trained force of reservists as well as the country's large fleet of highly advanced main battle tanks (MBTs).

    a. **Possessing the most extensive and sophisticated arms industry in the region by far, Israel develops and manufactures a huge variety of advanced military equipment for its armed forces, ranging from assault rifles and anti-tank missiles to the series of *Merkava* MBTs.** Its arms industry has proven adept at quickly translating Israel's frequent combat experience into custom-tailored products for its armed forces, making the country a world leader in military innovation in the progress.

    b. **Unlike many of its neighbors whose militaries are led by rigid and politicized hierarchies, Israel's military has consistently maintained its professionalism, its flexibility, and its ability to learn and adapt after failures such as the Yom Kippur War or the 2006 war against Hezbollah.** It is exactly this combination of advanced technology and institutional factors that will leave the Israeli army the strongest force in the region for the foreseeable future.

3. **Naval Capabilities.** Israel's surface fleet is sophisticated but currently too small to play a major regional role. Its more substantial submarine fleet constitutes a core element of the country's nuclear deterrence force. While the Israeli Navy has extensively participated in previous military campaigns, including in Lebanon and Gaza, its core fleet comprised of three corvettes and eight missile boats is not significant enough to alter the naval balance of power in the region.

    a. **The Israeli navy is currently set for a major expansion with the acquisition of five more corvettes, which are intended to provide Israel with the means to protect its offshore gas fields in the Mediterranean.**

    b. **With a total of five advanced Dolphin I & II in service and one more to be delivered shortly, Israel possesses a comparatively large submarine fleet.** While details are elusive, it seems almost certain that these submarines are equipped with nuclear-armed cruise missiles and their primary purpose lays in guaranteeing an Israeli second-strike capability.

4. **Ballistic Missiles.** Israel operates a sophisticated arsenal of ballistic and cruise missiles serving as the prime delivery vehicle for the country's nuclear deterrent. The country also produces conventionally armed ballistic missiles and cruise missiles.

    a. **In the nuclear delivery role, Israel operates the Jericho II and Jericho**

III ballistic missiles. Some Israeli media reports allege ballistic missile development is continuing with the Jericho IV. The Jericho II served as the basis for Israel's Shavit Space Launch Vehicle (SLV).

b. **Israel nuclear second strike capability relies on submarine-launched Popeye cruise missiles.** The country also operates a number of conventionally armed shorter-range air-launched cruise missiles.

c. **Israel has developed a conventionally armed shorter-range ballistic missile system called Lora primarily for export.**

d. **The country also works on establishing a force of precision-guided tactical ballistic missiles and artillery rockets.** It will include the 150km-range EXTRA rocket as well as the 300km-range Predator Hawk.

Saudi Arabia

1. **Aerial Capabilities. Saudi Arabia operates a large number of extremely advanced Western-made combat aircraft. The service is rapidly gaining strength and becoming more effective.**

    a. **Operating large numbers of F-15s and Eurofighter Typhoons as well as advanced airborne early warning and control capabilities, the Saudi Air Force qualifies as the second-best equipped air force in the region.**

    b. **In the past, the service, much like the rest of the Saudi Armed Forces, has often been considered a paper tiger.** The acquisition of equipment for prestige and political purposes instead of military utility, combined with a reliance on foreign personnel to maintain its fighter jets, a lack of realistic training, and the prioritization of royal connections over qualifications, have been among the many problems the service has been facing.

    c. **Yet recent years have seen a steady and substantial professionalization of the Royal Saudi Air Force.** In Yemen, civilian casualties have been extraordinarily high and aerial attacks have proven insufficient to decisively turn the tide of the war, yet the intervention has demonstrated Saudi Arabia's ability to conduct an intense and protracted air campaign, effectively operate drones, use precision-guided ammunition on a vast scale, and coordinate with ground forces. The seven years of war have also led to a great accumulation of experience by Saudi airmen.

    d. **Saudi Arabia has succeeded in decreasing the number of foreign contractors, resulting in an ambitious effort to develop a local aviation industry.** This effort not only includes the establishment of local

assembly lines but also domestic license production of precision-munitions and UCAVs.

2. **Land Forces.** Saudi Land Forces are reasonably large and well equipped with state-of-the-art equipment. Their actual current effectiveness is open to question, however. The country's army operates a plethora of advanced systems including a large arsenal of armor with more than 400 M1A1 Abrams MBTs.

    a. **The effectiveness of Saudi land forces has traditionally suffered from several issues ranging from the prioritization of royal and tribal ties over competence, infighting, 'coup-proofing', corruption and the rivalry and lack of interoperability between the Saudi Army and the completely separate National Guard.**

    b. **As with the Air Force, there have been increased attempts to overcome these problems in recent years, but it is hard to estimate how effective these measures have been.** The fact that Saudi Arabia, while fully unleashing its air power, has so far refrained from major troop deployments to Yemen might be for strictly political reasons but might also be a sign that Saudi decision-makers still do not trust their army's capability to execute a larger campaign; in a brief 2009 border war with the Houthis, Saudi forces suffered significant losses.

    c. **The war in Yemen has seen continued Houthi attacks against Saudi Army units stationed at the border. Even though details often remain elusive, Saudi Arabia seems to have lost hundreds of men and dozens of MBTs in these clashes, with Saudi soldiers reporting neglect and a lack of supplies.** All of these signs seem to indicate that the Saudi Land Force's fighting prowess is still falling short of its nominal power.

    d. **Crown Prince Mohammad Bin Salman has made the establishment of a domestic arms industry a key part of his Saudi Vision 2030 and has stated that from now on every new weapons contract must include at least some local manufacturing.** While these efforts are top-priority for the Saudi leadership and receive vast funding, they are still in their infancy.

3. **Naval Capabilities. Saudi Arabia's Navy is currently undergoing a rapid expansion. Operating seven frigates and four corvettes, the Saudi navy is a comparatively large service that gained its first major combat experience during the war in Yemen.**

    a. **With U.S. security guarantees in the Gulf looking increasingly uncertain to Saudi leaders, the Kingdom has embarked on 20 billion dollar naval**

expansion program. The effort will see Saudi's somewhat aged surface fleet being augmented by advanced Spanish frigates, American littoral combat ships, and a large number of patrol boats aimed at countering Iran's presence in the Gulf.

b. **Both the expansion program and plans for a Saudi base in Djibouti demonstrate the Saudi ambition to turn its navy from mere coastal protection into a more potent force able to operate on a regional level.**

c. **Saudi Arabia, however, still lacks important capabilities, such as submarines, landing craft, or helicopter carriers required to turn it into a major regional force.**

4. **Ballistic Missiles. Saudi Arabia operates the Middle East's second largest ballistic missile fleet and has invested heavily in upgrading its missile program in recent years.**

   a. **Saudi Arabia's initially purchased Chinese DF-3 missile with a range of about 3000km as a reaction to ballistic missile use in the Iran-Iraq war.** While outdated, the missiles remain in service.

   b. **Verified information about the subsequent development of the Saudi Missile Force remains scarce. Several reports allege a Saudi purchase of Chinese DF-21 solid fuel missiles.** According to members of the US Congress briefed on the subject, Saudi Arabia has significantly ramped up its missile program with Chinese assistance in recent years.

   c. **Saudi Arabia operates at least four underground missile bases which have seen major upgrades in recent years.**

   d. **Satellite imagery strongly indicates that the country has recently acquired a domestic production capability for solid-propellant rocket motors.**

   e. **Saudi Arabia is financing the development of the Ukrainian *Grom* short-range ballistic missile and is expected to introduce the system in the future.**

Syria

1. **Aerial Capabilities.** Outdated and heavily worn out by ten years of war, the Syrian Arab Air Force (SAAF) currently plays no role in the regional balance of power.

    a. **The SAAF was in no position to compete with its neighbors even before the civil war. Not having introduced any new type of combat aircraft in thirty years, the SAAF currently operates a mixture of outdated and vintage equipment of exclusively Soviet origin.** The same applies to Syria's air defenses, which despite the addition of some more advanced Russian-made systems, have proved unable to resist hundreds of Israeli air attacks conducted against targets inside Syria.

    b. **Considering both the current state of the SAAF and the financial situation of the country, there is little chance of the SAAF becoming a credible force anytime soon.**

2. **Land Forces.** The Syrian Arab Army is a centralized military formation in name only and has become more of an arena for local and regional power brokers than an independent actor. Once a large army organized along Soviet lines, the Syrian Arab Army has thoroughly fractured during the course of the civil war.

    a. **Today, Syria's military force is a mixture of formal army units still in existence, local paramilitaries, pro-Iranian militias and formations associated with high-profile regime figures.**

    b. **Despite the combat experience accumulated by some special units, the overall training standards are still low.**

    c. **Russian efforts to restructure the Syrian army face considerable obstacles.** For instance, even though some modern Russian-made systems are being introduced, the bulk of the equipment used is outdated.

3. **Non-State Actors.** An Iranian long-term effort to establish a Syrian deterrent force against Israel is still in its infancy.

    a. **While Iranian-controlled militias proved effective in the civil war, Iran's attempts to build a credible military force against Israel are currently restrained by local demographics, fierce Israeli counter-action, and the presence of another powerful player in the form of Russia.**

4. **Naval Capabilities.** The Syrian Arab Navy has become defunct.

    a. **Historically a small service relying on outdated Soviet equipment and**

some Iranian-made missile boats, the Syrian Arab Navy experienced shifting priorities in the course of the civil war which has led to a steep decline in Syrian naval operations.

b. **The sole exception to this overall picture is a small contingent of advanced Russian-made Bastion anti-ship-missile systems.**

5. **Ballistic Missiles.** Syria continues to operate a large fleet of ballistic missiles. However, Syria's civil war has taken a toll on the arsenal.

   a. **Using ballistic missiles to offset Israeli air superiority has been a key component of Syrian military strategy for over four decades.**

   b. **The country used to operate a large number of Scud B, C and D missiles mostly stored in underground bases.** With North Korean assistance a domestic manufacturing capability for these missiles was established within the country

   c. **Syria's Scud missile fleet is augmented by shirt range SS-21s imported from the Soviet Union and domestically manufactured Iranian Fateh 110s.** Solid propellant ballistic missile production infrastructure is currently being expanded with Iranian assistance, even though the effort is being severely hampered by Israeli airstrikes.

   d. **Israeli sources allege that large parts of Syria's missile arsenal have been depleted through combat use in the country's civil war.**

   e. **Syrian ballistic missiles are also known to serve as delivery vehicles for chemical weapons, offering Damascus a limited counterweight to Israel's nuclear arsenal.**

   f. **Several Iranian-allied militias and networks in the country have been equipped with artillery rockets and, allegedly, shorter range ballistic missiles.** Details however, are scarce and Israeli airstrikes seem to have proven effective in blocking major transfers.

Turkey

1. **Aerial Capabilities.** Turkey operates one of the largest and most capable air forces of the Middle East. With over 240 advanced F-16 versions and advanced airborne early warning and control capabilities in service, the Turkish Air Force's modern equipment is matched by its high training standards and experience.

   a. **Turkey's growing domestic arms industry is increasingly active in the aviation sector and already produces precision-guided munitions and a domestically designed air-launched cruise missile.**

b. **The country has led a remarkably successful effort to build up a large drone force relying on domestically designed and produced UAVs and UCAVs.** These systems have been used with decisive effect in the Libyan civil war as well as the Karabakh war. These deployments not only demonstrated the combat value of Turkish UAVs but also Turkey's ability to project military power abroad.

c. **Despite the continued strength of Turkey's aerial capabilities, the country's domestic political issues have started to catch up with the Turkish Air Force's short-term readiness and long-term development.** A large purge of officers in the wake of the 2016 coup attempt has hit the Air Force particularly hard, leading to a shortage of pilots and a decrease in operational readiness. Turkey's deteriorating relationship with the U.S. and its warming to Russia is threatening to cut off Turkey from latest Western technology such as the F-35 whose eventual delivery to Turkey looks increasingly uncertain.

2. **Land Forces.** NATO's second largest standing army, Turkey's land forces combine large numbers of soldiers with reasonably modern equipment and comparatively high training standards. Even though Turkey's recent interventions in Syria have demonstrated some deficiencies in training and materiel, the Turkish army remains the region's strongest with the exception of Israel.

   a. **The modernization of Turkey's army is increasingly relying on the country's advanced domestic military industry which engages in upgrades, license production of equipment, and the domestic development of equipment.** A case in point is Turkey's tank force which though numerically large still relies on a number of older German and U.S. designs. The domestically-built Altay tank, developed with South Korean and German technology transfer, is intended to enter mass-production and replace older systems soon.

3. **Naval capabilities.** The Turkish Navy is currently the largest and most capable navy of all countries surveyed in this chapter. Turkey operates not only a sizable and modern surface fleet but also a large number of submarines.

   a. **In line with the country's ambitious foreign policy, that has seen the establishment of Turkish overseas bases in Somalia and Qatar, Turkey has set out on a naval modernization program that will significantly increase Turkish blue water capabilities.** The most ambitious piece of this program is the TCG Anadolu, an amphibious assault ship/light aircraft carrier currently under construction, that when finished will provide Turkey with a unique capability in the region.

4. **Ballistic Missiles.** Turkey currently produces short range ballistic missiles based on Chinese designs

    a. **Turkey's Bora, a 280km range ballistic missile has been used in combat against Kurdish insurgents in Northern Iraq.**

    b. **So far Turkey seems to consider its ballistic missiles as tactical weapons systems.** However, there has been some speculation regarding potential interest in longer range systems.

    c. **SOM, a 250km range air-launched cruise missile is another domestically developed system in use with the country's armed forces.**

    d. **The Gezgin project aims at developing a domestic cruise missile with a range of over 1000km to be fitted on Turkish warships and submarines.** Once succesfully introduced, this system would give Turkey a strategic missile strike capability.

UAE

1. **Aerial Capabilities.** While not as large as its Saudi neighbor, the UAE's air force is well-equipped and currently probably the most experienced and best-trained GCC air force at the moment.

    a. **The United Arab Emirates Air Force (UAEAF) operates about 80 of one of the most advanced F-16 version ever built and around 70 Mirage 2000 fighter-bombers.** This fleet is augmented by a huge array of advanced munitions including hundreds of Black Shaheen/Storm Shadow air-launched cruise missiles. The US is reviewing possible sale of F-35s, currently only provided to Israel, as the UAE's normalization of ties with Israel has opened up potential opportunities to acquire more advanced equipment.

    b. **The UAEAF's technological prowess is matched by its high training standards and broad combat experience.** UAEAF fighter-bombers have participated in NATO's campaign against Libya, the Libyan civil war that followed it, the anti-IS airstrikes in Syria, and the coalition's air campaign in Yemen, to which UAE made a crucial contribution.

2. **Land Forces.** Modest in numbers, the UAE's army combines top-notch equipment with high training standards and significant combat experience. The UAE's army sports a diverse set of advanced equipment including about 400 state of the art French-made Leclerc MBTs, as well as advanced armored vehicles and artillery systems from the US, France, Ukraine and South Africa.

a. **What makes the UAE's army stand out in the region is its high training standards as well as its broad combat experience.** The UAE not only deployed a contingency of troops to Afghanistan but has also operated special forces inside Libya, as well as offered helicopter support there and in the Balkans where they also participated. In the course of the war in Yemen, the UAE has been more active when it comes to deploying troops to Yemen itself, operating both armor and artillery units. UAE forces have also taken part in operations against Yemen's Al Qaeda in the Arabian Peninsula (AQAP).

b. **The war in Yemen has also seen the UAE acquire experience with non-conventional operations.** UAE forces have been training local forces and liaising with various armed groups both for the sake of counterinsurgency against AQAP and IS, as well the fight against the Houthis. These operations provided the UAE with a rare set of skills in a region whose armies are still primarily focused on traditional inter-state warfare.

c. **The country also has a built up a sprawling arms industry, which is manufacturing a range of armored vehicles, infantry weapons and UAVs.**

3. **Naval Capabilities.** The UAE operates an advanced and surprisingly large navy for a country of its size. Already operating ten corvettes and a large number of speed-boats and landing crafts the Emirati navy is currently set for further expansion.

   a. **UAE naval forces have played a key role in the intervention in Yemen, enforcing the blockade of the country, as well as transporting supplies to UAE troops and local allies in the country.**

   b. **Like Saudi Arabia, the UAE envisages a regional role for its navy, including in the Red Sea, and has already taken key steps towards realizing this ambition.** It has taken part in multinational antipiracy operations in the Gulf of Aden and Bab al-Mandab. The UAE's naval base in Assab, Eritrea, played a central role as a staging area for the intervention in Yemen until it withdrew from there.

   c. **In its efforts to turn its navy into a major force, the UAE is aided by its sophisticated shipbuilding industry.** Local shipyards have built several of the country's advanced French-designed frigates and have also started marketing their own military speed boat designs.

4. **Missiles.** The UAE continues to operate a small arsenal of short-range ballistic missiles.

    a. **In the late 1980s, the UAE acquired a small number of Scud B missiles in reaction Iranian and Iraqi ballistic missile use.** The country acquired both Scud B and C missile from North Korea, with a 2005 US diplomatic cable giving the total number of missiles as 38.

    b. **It remains unknown whether the Scuds are still in use.**

    c. **More recently, the country acquired US-made ATACMS short range missiles.**

Yemen

1. **Aerial Capabilities.** For all practical purposes, Yemen's air force is currently non-existent. Already a small and feeble service before the civil war, Yemen's air force was utterly destroyed in the Saudi-led intervention. Today the only combat aircraft operated by Yemen are a handful of counter insurgency aircraft used by the Abdrabbuh Mansur Hadi government (Hadi government). With Iranian assistance, however, the Houthis have assembled a significant drone force that has been used for attacks within Yemen and Saudi Arabia.

    a. **Taking both the economic and political conditions of the country into account, there is little prospect for a powerful Yemeni air force to emerge anytime soon.**

2. **Land Capabilities (Hadi Government).** The internationally-recognized Hadi government currently does not possess an organized army under central command.

    a. **Instead, the government's fighting power relies on a hodgepodge of former Yemeni Army units, local armed formations, various political militias, mercenaries, and special units trained and equipped by the coalition.** Most of these formations possess aged Soviet-made material from former Yemeni army stocks and, to a lesser degree, more modern Western-made material provided by the coalition.

    b. **Despite the backing of coalition airstrikes, artillery and special forces, the military advances by forces loyal to Hadi have been sluggish at best.**

3. **Land Capabilities (Houthis). While also decentralized, the Houthis have managed to establish a more coherent military structure than the Hadi government.**

a. **An amalgam of both former rebel units and former Yemeni Army units, the Houthi's fighting force has been in control of the majority of arms and equipment of the former Yemeni army.**

b. **Despite the major air campaign by Saudi Arabia and its allies, the Houthis so far have managed to hold onto large swathes of Yemeni territory and staged limited incursions into Saudi territory.** Nevertheless, the Houthi land forces have been slowly but steadily losing ground over the past years and currently pose no major conventional threat to its neighbors, other than from missiles.

4. **Naval Capabilities (Houthi).** With Yemen's tiny navy obliterated in the current civil war, the Houthis have established a small asymmetric naval force closely mimicking Iranian tactics. This includes the use of naval mines, anti-ship missiles, and remote-controlled bombs filled with explosives.

   a. **There is evidence to suggest Iran has been aiding this effort both with expertise and material.**

   b. **Attacking oil tankers and coalition naval vessels in the Red Sea, this effort has achieved a certain level of success despite its limited nature.**

5. **Missiles (Houthi).** Yemen's Houthi rebels have managed to conduct an extensive missile campaign against coalition forces within the country as well as targets inside Saudi Arabia.

   a. **Initially, the Houthis used older systems taken over from Yemeni army stocks.** These included as SS-21s, Scud Bs and SA-2 SAMs modified for the air to ground role.

   b. **Currently the group operates missiles based on the Iranian-made Qiam missiles ranges (Burkan 2H and Burkan 3) as well as a limited number of Iranian-made cruise missiles.**

   c. **The Houthis also employ shorter range solid-fuel missiles which are a combination of Iranian-supplied components and domestic manufacturing.**

   d. **Recent statements by Houthi leaders alluded to missiles capable of reaching Israel.**

   e. **While effective in the war against the Saudi-led coalition, the group's missile arsenal is currently too limited to serve as a major regional deterrent.**

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Chapter 3: Complex Deterrence Structures in Context

Deterrence in the Middle East is not practiced in a stable context

Instead, it takes place in an area characterized by fluid, contested spaces and gray areas that lend themselves to constant probing and renegotiations of the red lines required for deterrence. In this chapter, we consider the multilayered components of deterrence that are specific to the Middle East and help illuminate possible ways to avoid further and worse conflict.

1. **Conventional Deterrence** still remains the prime mode of deterrence for countries like Israel, Turkey, Saudi Arabia and the UAE, but it has faced several challenges. This includes the historic failure of Arab armies to deter Israel, their heavy reliance on foreign suppliers, the difficulty of correctly assessing conventional military power in the region, and the general limitations of the model for smaller states. For example, the war in Yemen exposed the limits of Saudi Arabia's conventional deterrence, despite being intended to do exactly the opposite.

2. **Chemical, Nuclear and Biological Deterrence** retains a limited role in the region. While Israel's nuclear deterrent is a well-known secret, Syrian and Egyptian chemical arsenals also played – and continue to play – an important role in these countries' deterrence strategies. Turkey could draw on US nuclear weapons as part of its NATO membership. Even though WMD-based deterrence has proved to be relatively stable, it has also provided Israel with the option to take more aggressive action in view of its nuclear capability. The subsequent quest by other regional states to acquire nuclear arms has had major destabilizing consequences.

3. **Deterrence through Foreign Forces** has been a key element of the local security architecture, especially for the Gulf States. The US, and to lesser degrees Russia, France, and the UK, remain the major players in this area. However, a lack of formalization and decreased trust in American security assurances are having negative effects on the viability of the model.

4. **Asymmetric Deterrence** is well known to be the foundation of Iran's defense strategy. Other countries, such as Egypt, Syria and Saudi Arabia have also adopted elements of asymmetric deterrence to various degrees. While attractive to compensate for a lack of conventional military power, asymmetric deterrence poses several challenges. Relying on novel and unproven ways of warfighting complicates accurate assessments of military power in the region. The use of proxies as part of asymmetric deterrence has proven to be highly destabilizing.

5. **Complex multilevel deterrence can be managed as demonstrated by lessons from Hezbollah's standoff with Israel.** These include the importance of clear and credible public communication by all sides and the usefulness of a viable mediator offering a direct line of communication.

Conventional Deterrence

Conventional Deterrence describes the attempt to dissuade foes from taking military action through the maintenance of conventional military forces that are either strong enough to defeat enemy forces or at least capable of inflicting an amount of damage deemed unacceptable by adversaries.

1. **Conventional deterrence was the prime mode of operation in the Middle East in the 1950s, 1960s, 1970s and with limitations in the 1980s.** Countries like Egypt, Israel, Iraq, Syria, Libya, Iran and Saudi Arabia all aimed at building large, well equipped and in a few cases (Israel) highly capable conventional armies often modelled after their Western or Soviet counterparts and prominent alliance relationships.

    a. **Several factors have diminished this model's attractiveness over past decades, often leading local states to complement it with asymmetric elements or, in the case of Iran, shift towards asymmetric deterrence altogether.** Conventional deterrence utterly failed in the 1967 Six Day War, when the vast Arab armies were not only unable to deter an Israeli attack but were largely ineffective and badly defeated in the process. The military defeat of Arab armies that had attacked Israel in the 1973 Yom Kippur war demonstrated that Israel's superior military force did not deter Arab states from launching the war. The abysmal performance of the Syrian Air Force in Lebanon in 1982 further demonstrated that even large and well-equipped conventional armies might not have the desired deterrent effect. In 1990, Iraq's army, one of the world's largest, failed to deter an American-led intervention and suffered a defeat even more devastating than that of Arab armies in 1967.

    b. **Nevertheless, conventional deterrence remains one of the core**

elements of regional security architecture. While not deemed sufficient to guarantee all of the country's national security needs, Israel's more positive experience with conventional deterrence and its vast superiority in this field means that it continues to employ conventional forces as its prime deterrent. Israel's possession of deliverable nuclear weapons is another important factor beyond conventional deterrence of importance when it comes to existential or perceived existential threats.

c. **Turkey's large and capable armed forces mean that conventional deterrence is still a viable model to follow for the country.** Egypt also still operates a vast conscript army, large, armored formations and a substantial air force, even though its ability to deter Israel must very much be doubted.

d. **While Syria had begun to shift towards more asymmetric modes of deterrence, it still maintained a large conventional standing army before the civil war.**

e. **Even though Iran's mode of deterrence is primarily asymmetrical, it also still maintains a conventional military capability.**

f. **In the Gulf region, conventional deterrence is again gaining significance as regional actors, especially Saudi Arabia and the UAE, try to counter increased perceived security threats with conventional military buildups.** However, as Saudi Arabia's expanding ballistic missile force and potential future nuclear program further demonstrate, conventional deterrence is not the only deterrence mode anymore. It is important to note that the Saudi-led military offensive in Yemen was an attempt to establish deterrence and overturn long-held assumptions about how Gulf countries would and could use force, but evidently not with the intended results. It is important to note that the Saudi-led military offensive in Yemen was an attempt to establish deterrence and overturn long-held assumptions about how Gulf countries would and could use force, but evidently not with the intended results.

Challenges to Conventional Deterrence

Compared to the mode of conventional deterrence that existed between Warsaw Pact and NATO members alongside nuclear deterrence, conventional deterrence in the Middle East is subject to unique challenges.

1. **Assessing the strength of conventional forces in the Middle East can lead to miscalculation.** While there were differences in both numbers and equipment between the two sides during the Cold War both blocks enjoyed high-quality

training as well as well-functioning command and control structures. This enabled decision makers to acquire quite an accurate understanding of their own and their adversary's strength thus decreasing the risk of miscalculation. In the Middle East arriving at an accurate assessment of conventional military forces is a much more challenging task. Many local state armies are plagued by a lack of cohesiveness and training, nepotism, outdated operating structures, and politicization. As a result of these factors, the actual strength of these states can be vastly different from their strength on paper. Nowhere was this made clearer than during the six-day war in 1967. The Arab armies which numerically were vastly superior and technologically comparable in equipment to Israel's armed forces were obliterated or – in some cases – failed even to reach the battlefield in useful strength on a timely basis, which was a key factor in US military assistance for Israel. Similarly, conventional deterrence failed in 1980 when Saddam Hussein overestimated the damage done to Iran's armed forces as a result of the Revolution and overestimated his own military capabilities, launching a disastrous war against Iran.

2. **Unlike the US-Soviet case, conventional deterrence in the Middle East is highly susceptible to foreign influence.** The reliance on foreign actors in the realm of conventional military forces in turn decreases trust in its deterrent effects. Despite the mushrooming of local military industries, Middle Eastern nations are still heavily dependent on foreign suppliers for their advanced weapons systems and almost exclusively so in the crucial field of high technology and air power. A highly capable conventional deterrent force might be heavily degraded by a foreign power's decision to withhold technology, new equipment, spares and ammunition. Israel had to face an arms embargo by France, the main supplier of its weaponry, after its attack on Arab neighbors in 1967. Similarly, Egypt's Soviet-equipped armed forces had to cope with massive challenges when the country reoriented itself to the West in the 1970s. Currently, US arms sales to Saudi Arabia are undergoing increased scrutiny, as the US bipartisan consensus for the Saudi-US partnership shows signs of weakening. Many European countries have suspended arms sales to Saudi Arabia and the UAE. The fact that Saudi Arabia and the UAE engaged in an offensive international military operation in Yemen changed the basis on which arms sales were being assessed; several countries suspended sales of arms specifically for use in the Yemen war rather than rejecting or cutting their entire relationship with Saudi.

3. **The game changing case of Iran's Air Force.** The most extreme example of this dynamic is probably the Iranian Air Force. When the Shah ruled Iran, its air force was numerically and qualitatively by 1979 was the most impressive air force of the region after Israel. Iran's air power was massively degraded when the US decided to cut off support after the Islamic Revolution. This development severely limited Iran's ability to either defend against Iraqi air attacks on its

urban centers or retaliate in kind. As a result, Iran established a small ballistic missile force which it aimed at Iraqi population centers in order to re-establish deterrence. Iraq responded by extending the range of its Scuds to be able to reach Tehran and other major Iranian cities. In the so-called War of the Cities, both countries ended up using conventionally armed ballistic missiles against each other's population centers - a development that sparked the foundation of both Saudi Arabia's and the UAE's missile forces. Thus, the Iranian embrace of asymmetric deterrence through ballistic missiles, as well as the regional spread of asymmetric deterrence to Gulf States can be directly traced back to the failure of modes of conventional deterrence over-reliant on foreign suppliers.

4. **Vast differences in the size, wealth, and population of countries impacts the effectiveness of conventional deterrence, as in other regions of the world.** Many countries simply lack the financial, technological and human resources to build up conventional armies capable of deterring their neighbors or global powers. A case in point is Kuwait, whose small size simply made it utterly incapable of building up forces that could deter its larger neighbor, Iraq. The six Gulf Arab states combined have a far smaller population than Iran and cannot match its military scale, so aim for aerial and technological advantages instead. Israel's lack of strategic depth leaves the country's leaders with a deep sense of vulnerability. Despite possessing the best conventional army in the region, Israel's leaders concluded that conventional deterrence alone was not enough to guarantee their national security. They decided to develop a nuclear capacity and a triad of delivery systems – air, ballistic missiles, and submarines. They also developed more effective asymmetrical deterrence early on – including cyber, small, specialized unit operations, and carefully targeted air strikes. What holds true for the regional level applies even more on a global level. A large and comparatively wealthy country like Iran without access to foreign military equipment has found itself incapable of building up conventional forces capable of deterring potential US military action against the country. Its recourse can only be asymmetrical action or the threat of such action.

Non-Conventional Deterrence: Nuclear, Chemical and Biological Weapons

Israel is the only state in the Middle East that has nuclear weapons today. Yet chemical weapons form an essential part of the region's deterrence architecture. Biological Weapons remain the most elusive of the non-conventional weapons systems in the region.

5. **Nuclear. Israel is now the only country in the region possessing an independent and operational nuclear deterrent.** While details are well-guarded, it is widely believed that Israel possesses several hundred nuclear warheads, a long-range ballistic missile force capable of delivering them as well as second-strike capability in the form of submarines equipped with nuclear-tipped cruise missiles. Israel's nuclear weapons can serve a variety of purposes that include deterring a potential, even if currently not realistic, conventional onslaught overwhelming the county, deterring non-nuclear WMD strikes against the country and serving as tool to force global powers to support the country at a time of crisis. While the so-called Begin Doctrine prescribes Israel's clear intent not to allow any adversarial nation to acquire nuclear arms, it seems obvious that Israel's nuclear weapons would also serve as a deterrent in case these efforts fail.

    a. **Turkey. As part of its NATO commitments, Turkey still participates in nuclear sharing with the capacity to call for the US to deliver number of US nuclear gravity bombs stored at Incirlik Airbase.** As Turkey does not currently face any Middle Eastern threat worthy of needing a nuclear response and with the nuclear weapons at Incirlik being under US control, Turkey's role in nuclear sharing does not currently play a major role in the Middle Eastern security architecture.

    b. **Others in the past, including Iran, Iraq, Libya, and Syria all had active nuclear weapons programs at various stages of advancement, none of which resulted in any significant production of fissionable material, much less a deliverable nuclear weapon.** Iran developed the most advanced nuclear program among these states but discontinued a weapons dimension in 2003. The motivations to launch these programs ranged from prestige to deterring US-led regime change operations, to achieving nuclear parity with Israel. It is also worth mentioning the Saudi and UAE nuclear energy programs, given questions over the Saudi program in particular and its connections with Pakistan.

6. **Chemical. While chemical weapons in the Middle East have gained notoriety for their use against civilians, it is often overlooked that they also form part of the region's deterrence architecture.** Egypt's, Iraq's and Syria's decision to launch chemical weapons programs were all strongly influenced by a desire to acquire at least a partial counterweight to Israel's nuclear deterrent. Even though the destructive power of chemical weapons is much more limited than that of nuclear weapons, their comparative ease of production and the substantially reduced political costs associated with them made them an attractive choice for several countries. Iraq and Syria's well-studied chemical weapons program illustrate the dual nature of chemical weapons programs in the Middle East.

On one side, chemical arsenals were designed to act as a strategic deterrent with their deployment mirroring nuclear forces. Both Syria and Iraq deployed longer-range ballistic missiles with chemical warheads aimed at enemy urban centers. On the other hand, Syria and Iraq also weaponized CW agents to serve as tactical battlefield weapons. In the latter function, Iraq's army used them on a massive scale against Iranian forces during the Iran-Iraq war, as did Syria against the government's opposition forces with devastating impacts against civilians.

a. **Iraq's chemical weapons program was dismantled after Desert Storm, but Syria and Egypt still possess arsenals of chemical weapons, including highly potent nerve agents and strategic delivery vehicles in the form of ballistic missiles.** Israel is known to have had an offensive chemical warfare program in the past but it remains unknown whether the program remains operational or whether the country is merely retaining a breakout capacity. Iran has been accused by the United States of having breached the Chemical Weapons Convention but these claims cannot be independently verified.

7. **Biological. Biological weapons remain the most elusive of non-conventional weapons in the region.** With the exception of Iraq, whose previous biological weapons program was disclosed and destroyed in the early 1990's in part under UN supervision and then verified by the US, there is no hard publicly available evidence of any offensive biological weapons program existing in the Middle East. Allegations about potential biological weapons programs in several countries, however, continue. This ambiguity is further amplified by the small minor technological difference between offensive and defensive biological weapons research and the vast overlap between biological weapons programs and civilian biotechnology. Due to the inherent ambiguity of the issue and its relatively low profile in political discourse, biological weapons currently do not play any major role in regional deterrence. However, in case serious accusations of biological weapons production emerge, or any country of the region decides to publicly acknowledge a biological weapons capability, this dynamic could quickly change. Judgments about the impact and effectiveness of such programs remain uncertain stretching from the horrendous to the only lightly effective (depending on many currently unknown factors), and this clearly affects conclusions about their effectiveness as a deterrent.

Challenges to Chemical, Nuclear and Biological Deterrence

1. **WMD-based deterrence structures in the Middle East seem to have failed to deter conventional military attacks.** Egypt's chemical weapons did nothing to dissuade Israel from attack in 1967, Israel's nuclear weapons did not change Egypt's decision to attack in 1973, the US liberated Kuwait despite Iraq's vast stockpile of chemical and biological arms, and Syria's chemical arsenal did not prevent Israel's policy to conduct hundreds of airstrikes against targets in the country. Whether this logic would still hold up in more extreme settings, in which military action is not limited to border wars or occasional airstrikes but the overthrow of a regime and the occupation of a country is very much a subject of debate.

    a. **WMD arsenals seem to have been successful in the narrow sense of deterring other states from conducting WMD attacks.** With the exception of Iran, which was incapable of retaliating in kind against Iraqi attacks in the 1980s; no state actor in the Middle East has ever been targeted by nuclear, chemical, or biological weapons. While strong international norms against the use of such weapons might have contributed to this fortunate absence, chemical attacks on civilians by Egypt, Syria and Iraq show that these norms cannot be the only explanation. Thus, it seems that rather than deterring military action in general, WMD arsenals where they are known to exist in deliverable and balancing quantities deter and thus 'neutralize' each other more than anything else.

    b. **While nuclear weapons doubtlessly serve as a powerful deterrent, their development programs tend to have the opposite effect.** Iraq's nuclear program resulted in an Israeli attack in 1982 against the Osirak reactor project and was later used as one of many explanations for the US-led 2003 invasion of the country. Israel's leaders considered Syria's clandestine nuclear weapons program such an existential threat that they decided to attack a reactor in eastern Syria in 2007, apparently provided by North Korea, despite very real fears of Syrian retaliation. To this day, controversies continue surrounding the previously UN-investigated Possible Military Dimensions (PMD) of Iran's nuclear program.

    c. **Advanced civilian nuclear programs seem to have a mixed deterrence balance.** Iran's civilian nuclear program has reached a technological level at which the country could build a nuclear weapon in a relatively

short period of time if it chose to do so. The restrictions that the JCPOA placed on the program extended that time to roughly a year, although in response to US reneging on its obligations under the JCPOA Iran decided to acquire larger amounts of low enriched uranium (LEU) and enriched it to a higher status often described as 'nuclear latency'. On the one hand, the ongoing tension surrounding the currently limited expansion of its program seems to imply that the program does not currently serve as a deterrent. On the other hand, Iran's technical capability to abandon its Non-Proliferation Treaty (NPT) commitments and rush towards a bomb (seeking 'breakout') has served as a powerful argument against attacking the country.

Deterrence by Foreign Intervention

Deterrence which relies on the credible threat that a capable foreign power will intervene on a country's behalf is another prevalent mode of deterrence in the Middle East.

1. **The US is the major extra-regional power most likely to intervene.** The threat of potential US intervention and growing Russian capability in the region today has the broadest implications for Middle Eastern security, while French and British forces have a number of regional bases and may still play a role. Through its alliances the US is deeply enmeshed into the regional security architecture, while its substantial military assets in the region, positions it well to deter action by adversarial nations. America's role is especially pronounced in the Gulf region, which headquarters the US Fifth Fleet in Bahrain as well as major air bases in Qatar and the UAE. Since the withdrawal of British Forces in 1971, the oil price shock in 1973 and the Iranian Islamic Revolution in 1979, the US has considered itself the protector of its Gulf partners and of freedom of navigation in the Persian Gulf. In 1991, it reaffirmed that role by militarily reestablishing Kuwaiti sovereignty after Iraq's invasion.

2. **Russia's increased military presence in Syria and Libya provide it with some local deterrence capability.** However, Moscow's assets in the region remain limited while the country takes a more neutral stance towards the core regional conflicts and pursues looser alliances when compared to the US, except in Syria. Inside Syria, Russia has deterred basically any other state from attacking the Assad regime directly but has signaled that it can live with Israeli airstrikes targeting Hezbollah supply line. In both Libya and Syria, Russia's intervention proved decisive, yet in both cases it was conducted within internationalized domestic conflicts. Russia's presence and its position as a major world nuclear power add key elements of uncertainty, especially in the direction of conflict by accident or miscalculation, which need to be taken into account as a possible

factor of deterrence by all actors in the region.

3. **On a regional level, there are noteworthy security arrangements, albeit with very limited deterrent effect.** Saudi Arabia managed to hold together a coalition of nations for three years for its intervention in Yemen, yet UAE withdrew from the coalition in 2019. That coalition proved far from being a formal alliance and even if it had been, the relatively modest military strength of many of its members would achieve only a very limited deterrent effect. Egypt continues to maintain a close military relationship with the UAE and Saudi Arabia. Several recent, large Egyptian purchases of military equipment were reportedly financed by Gulf States. Turkey not only intervened in Libya to dramatic effect but has also stationed troops in Qatar in order to deter potential Saudi and UAE action against the country.

4. **Challenges to deterrence through foreign forces. A major challenge to deterrence through foreign forces is the lack of collective security.** While both sides in the Cold War possessed capable collective security organizations in the form of NATO and the Warsaw Pact, no comparable organization exists in the Middle East today. US attempts to form the Baghdad Pact and CENTO as a regional NATO equivalent in the 1950 failed.

    a. **Because of a lack of institutionalization, factors such as predictability, trust and credibility become all the more crucial to deterrence by foreign forces.** Unsurprisingly, this has resulted in failures and instability. A prime example is Iraq's failure to foresee the US response to its invasion of Kuwait.

5. **The Gulf states' increasing doubts about the US commitment to their security are having destabilizing effects.** Decision makers in Saudi Arabia and UAE in particular perceived quick American abandonment of Hosni Mubarak in the wake of the Arab spring, its military restraint following suspected Syrian chemical weapons use which it had previously declared a 'red line', and acceptance of even a limited portion of Iran's nuclear program as part of the JCPOA as major signs that the US had given up its traditional role as the reliable guardian of the Gulf States' security. This view has been given further credence by the changes in the world oil market, with the US less directly dependent on Middle East oil, and statements by both Obama and Trump indicating a desire to reduce the US's military footprint in the region. As a result, both Saudi Arabia and the UAE decided to bolster their conventional and asymmetric deterrence capabilities and have engaged in a more pro-active ramified and extensive foreign and military policy. With traditional partnerships like the one with Saudi Arabia, being increasingly questioned and subject to Congressional and partisan politics in the US, this trend could continue. Alternatively, the perception of decreased US commitment to local security could also lead states to soften their Iran policy

and seek accommodation with Iran in order to guarantee their security. After the US proved incapable or unwilling to prevent attacks against oil tankers in 2019, the UAE initiated consultations on maritime security with Tehran. The discourse of de-escalation also gained ground in Riyadh after the combined drone and cruise missile strike against Saudi Aramco facilities in Abqayq and Khurais in September 2019.

Asymmetric Deterrence

Asymmetric deterrence may describe the ability to deter by inflicting military, economic and/or political costs on an adversary through tactics and equipment that fall outside traditional military thinking or that are qualitatively different from the type of attack they are intended to deter. While some Middle Eastern countries have integrated certain asymmetric capabilities into their military strategies for decades, Iran is the first country in the region to embrace asymmetric deterrence as its main defensive strategy.

1. **Ballistic Missiles**

    a. **Iran uses conventionally armed ballistic missiles as the central pillar of its asymmetric deterrence.** Difficult to intercept and with ranges of up to 2000km, they are capable of serving as a counterweight to local air supremacy of the US and its allies. Once considered too inaccurate to inflict any militarily significant damage, Iran has compensated for these shortcomings through numbers, their strategic deployment against urban centers and, more recently precision guidance technology. Even though Iran has used ballistic missiles as battlefield weapons against IS and Kurdish militant groups in Iraq and Syria, Iranian commanders leave little doubt that they consider their missile force a tool of deterrence more than a conventional warfighting capability. Iran's missile arsenal has a substantial deterrent effect in any discussion of potential military action against Iran's nuclear program. The country's ballistic missile strike against US forces in Iraq in January 2020, amply demonstrated the high military value of ballistic missiles even when used against a vastly superior foe. Iran's September 2019 attacks against Saudi Aramco facilities also showed the precision and fire power of the country's cruise missile and drone fleet.

    b. **Syria's ballistic missile force performed a similar role before the outbreak of the civil war.** Published accounts show that though much smaller and less sophisticated than Iran's arsenal, Syrian ballistic missiles were an important factor in the Israeli decision-making process before the country's strike on the al-Kibar reactor. Due to the extremely

limited openly available information on Egypt's missile program, it is difficult to judge whether it remains a mere legacy capability or a serious attempt to establish an asymmetric deterrent.

c. **Iraq and Iran used ballistic missiles during the so-called War of the Cities in the 1980s.** That experience sparked the purchase of ballistic missiles by Saudi Arabia and the UAE respectively from China and North Korea, not their traditional suppliers in Europe and the United States. Even though Iran merely employed its limited number of missiles to deter enemy air attacks instead of enemy aggression as a whole, the exchange was deemed significant enough by Saudi Arabia and the UAE to justify purchases of comparable systems. While the UAE's missile arsenal has remained limited, Saudi Arabia has invested heavily into building up a more modern and substantial missile deterrent aimed at Iran, supported by China.

2. **The Proxy Strategy**

a. **The use of proxies has become a primary means of Iran's deterrence from direct attack. Iran has a substantial network of mainly non-governmental allies that enjoy Iranian financial, political and material support in Gaza, Lebanon, Syria, Iraq and Yemen.** Iranian clients are not a homogenous block though, while some like Hezbollah and Kataib Hezbollah who are Shia coreligionists display a high degree of loyalty to Iran others, such as Sunni Hamas, maintain a looser alliance with Tehran. The Houthis in Yemen appear to have internal divisions over the extent to which they should remain allied with Iran or reach an accommodation with Saudi Arabia. The purpose of supporting clients is two-fold. These proxies help Iran to promote foreign policy goals such as strengthening the Syrian regime or weakening its geopolitical foe Saudi Arabia at relatively low costs. They have also been used in Iran's campaign to exert deniable military pressure on the West and its allies in response to the Trump Administration's maximum pressure campaign. Many states of the region support and, in some cases, fight for Tehran. Perhaps most importantly their potential action in the case of war with Iran serves as a deterrent to thwart any major military attack against the Islamic Republic.

b. **Ballistic missiles, artillery rockets, and rocket production equipment delivered to Iranian clients or proxies, enable these groups to build a local deterrent, complementing Iran's own missile deterrent.** Hezbollah's rockets and missiles in Southern Lebanon are used to deter an Israeli attack on Lebanon. The rockets of Palestinian factions are aimed without significant success to deter a major Israeli assault on

Gaza. The Houthi use their long-range missiles trying to deter Saudi air attacks on Yemen's capital Sanaa and on Houthi establishments. At the same time, these arsenals also function as an extension of Iran's own deterrent. It is likely that an attack on Iranian nuclear facilities or on Iran more broadly would result in missile and rocket strikes from Lebanon, Syria, Iraq and potentially Yemen.

c. **No other state in the Middle East currently maintains proxy relationships comparable to Iran's in terms of loyalty, quantity and capability.** While the UAE is increasingly trying to cultivate relationships with local actors in places like Yemen and Libya, their ability to inflict damage on Iranian interests is limited and their interest in combat in Yemen apparently declining. It is also worth noting that the UAE's focus in Yemen is on supporting its clients in southern Yemen against Islamist and other rivals. It has largely left the fight against the Houthis to Saudi Arabia. The UAE has claimed it has left Yemen, though some Yemeni officials contest that. Turkey's use of Syrian militia in both the Libyan civil war as well as the Karabakh war hints at further proliferation of the proxy strategy. In addition, Gulf support for militias in Syria and historically in Afghanistan is also important to keep in mind.

3. **Asymmetrical Naval Tactics**

a. **Iran has taken several steps to devise asymmetric naval tactics custom-tailored to the Gulf and the perceived threat by US naval assets.** As the dividing line between Iran and the Gulf States, the home of the US Fifth Fleet and one of the region's main commercial arteries, the Persian Gulf takes a prime spot in the region's security architecture. Iran has therefore has sought to devise an asymmetrical strategy to compensate for its vastly inferior naval capability.

b. **The IRGC operates a large number of smaller speedboats that are supposed to swarm and overwhelm larger US vessels in case of war.** They are currently being used to sequester and attack tankers to deter increased sanctions and other pressures by the US. Iran's fleet of midget submarines, optimized for the shallow waters of the Persian Gulf, is augmented by a large number of anti-ship missiles and anti-ship ballistic missiles. With little precedent in terms of asymmetric naval warfare, it remains unknown how effective these tactics would actually be. Nevertheless, Iranian commanders often mention their claimed ability to sink a US aircraft carrier as a deterrent. Iran partially demonstrated its asymmetric naval capabilities in limpet mine attacks against tankers widely attributed to the country in summer 2019.

4. **Cyber as an asymmetric weapon**

    a. **As was the case with many other military innovations in recent decades, the Middle East has been at the forefront of emerging cyberwarfare.**

    b. **Israel and Iran have both built up major cyberwarfare capabilities. Saudi Arabia and the UAE are also increasing their efforts in this area.** In cooperation with the US, Israel launched the Olympic Games attack, more commonly known as Stuxnet, which sabotaged Iranian nuclear facilities and is considered the first major cyberattack to physically damage high-value infrastructure. Iran apparently has the capacity to receive and overcome attacks of this nature.

    c. **Lower level cyberattacks as well as disinformation campaigns have become a regular feature of the hybrid conflict raging in the region, but the prospect of even more potent future cyberattacks does act as a deterrent.** Particularly noteworthy in this regard are revelations about the US cyberattack plan Nitro Zeus which was intended to disable Iranian military communications infrastructure.

Challenges to Asymmetric Deterrence

Uncertainty is probably one the most challenging aspects of asymmetric deterrence. While conventional military forces and nuclear arsenals might differ substantially, it is still possible to arrive at rough comparative estimate of countries' capabilities. Arriving at a similar assessment in the field of asymmetric capacity is extremely challenging.

1. **Effectiveness of asymmetric deterrence.** Many parts of asymmetric deterrence are highly novel concepts with little precedent in recent military history. Their actual performance in combat conditions, their ability to inflict actual damage and their economic and political impacts are hard to guess. How effective will the missiles and 100,000 rockets in Southern Lebanon be as a deterrent against an Israeli attack on Iran? How successful are the widespread Iranian proxy and Shia militia forces in the region in inhibiting US, Israeli, or Saudi strikes against Iran? How well would Iranian swarming tactics work? How capable would Israeli and Iranian cyber capabilities be even after the experience with Stuxnet? How effective would all of these pieces be in combination? The resulting uncertainty surrounding an adversary's military or asymmetric capabilities adds a further layer of uncertainty to the regional security dilemma.

2. **Deterrence through proxies offers unique challenges.** Iran's proxies and the Shia militia pose a formidable deterrent. Hardly any discussion on a potential military strike against Iran fails to mention the vulnerability of US troops

stationed in Iraq or the potential of Hezbollah rocket and missile strikes against Israel. However, this deterrent value comes at the price of highly destabilizing side effects. While Iran might consider its proxies an effective deterrent, Iran's adversaries very much see them as blatant Iranian expansionism, a perception that again accelerates the regional security dilemma. Ambiguity and uncertainty about the command and control that Iran exerts over its proxies or allied groups is another destabilizing factor. A strike that might have been ordered by local elements could be directly attributed to the Iranian leadership and result in direct action against the Islamic Republic starting a process of escalation which would be hard to halt. This issue is further aggravated by the wide gap in perception of Iranian proxies and their agency between countries but also between domestic political factions inside the US.

3. Even though the cover of deniability of actions taken by some Shia militia might embolden Iranian decision makers to urge more escalatory measures, Iranian leaders certainly realize that any action taken by Hezbollah would be directly attributable to Iran instructions.

Where does deterrence start?

Potentially the biggest challenge to deterrence in the Middle East is the question of just where exactly deterrence begins. Deterrence can be both active and passive, and both have varying impacts. Additionally, many states' deterrence policies do not merely rely on a single element of deterrence, but combined them in complex ways.

1. **Instead of large-scale military action, the Middle East's current conflict environment is dominated by sequences of smaller steps and escalatory ladders.** In the Cold War Europe, two relatively consolidated and homogenous blocks of economically and politically strong countries faced each other. As a result, any military action that would have substantially altered the status quo would almost by definition have to be so major as to almost certainly trigger a military response. While a potential conventional attack against Iranian nuclear facilities would be a comparable clear-cut case of military action certain to trigger retaliatory action, most military moves in the region do not fall into this category at all. Instead, military action tends to be taken in the gray areas of fragmented states on the periphery of regional powers and in the form of careful escalatory ladders and rounds of retribution.

2. **The fluidity of the Middle East's political and military dynamics requires a constant renegotiation of red lines for effective deterrence. Such re-negotiations are often accompanied by probing.** This volatile process carries with it the danger of miscalculation. For example, the entry of Russia on the side

of the Assad government and alongside Iran substantially changed the military calculus. Likewise, the sudden embargo imposed on Qatar in 2017 by the Arab 'quartet' (the UAE, Saudi, Bahrain, Egypt) and the UAE's decision to break with Saudi Arabia in Yemen added fluidity to the political and military calculus in the Gulf. Accidental escalation is another threat that could materialize through loose command and control structures, potential misattribution of deniable operations or the intrinsically incalculable effect of many military actions.

3. **Hezbollah's ongoing confrontation with Israel might offer some lessons for how such a complex dynamic can be managed.** Since the 2006 war, itself a result of miscalculation on both sides, the two parties have succeeded in avoiding major escalation. Two relatively strong and stable actors, Israel and Hezbollah in Lebanon, have a border with Syria, a fractured state with a fluid political-military environment which has seen intervention from both sides. Through continued negotiations and renegotiations an elaborate pattern of deterrence has emerged. An Israeli airstrike on Hezbollah targets in Lebanon would certainly trigger a major response using Hezbollah's rocket and missile arsenal in the country. Israeli airstrikes against Hezbollah positions and weapons depots in Syria will probably continue to be tolerated. However, in case of strikes against major IRGC infrastructure, Iranian-allied militias might fire artillery rockets at the Israeli-occupied Golan from Syrian territory. In case a high-ranking Hezbollah commander is killed by an Israeli airstrike in Syria, Hezbollah could well stage a limited attack on an Israeli patrol at contested parts of the Israeli-Lebanese border. Both sides seem to appreciate the dangers of a repetition of the War of 2006, which acts as a deterrent factor for as long as it prevails on both sides' thinking, or unless wider regional developments destabilize it (e.g. an attack on Iran).

Deterrence can be stabilizing

1. **One of the main reasons the complex multilevel deterrence relationship between Israel and Hezbollah has so far been able to head off another conflict between the two so far is the role of the United Nations Interim Force in Lebanon (UNIFIL).** While the mission is not in a position to prevent the outbreak of major hostilities by force, it serves as an effective intermediary on the ground providing a direct communication channel between both parties, facilitating the negotiation of red lines and a cessation of excessive action (even if only temporary) therefore decreasing the risk of miscalculation and accidental escalation. The fact that both sides, at least in the realm of red lines, enjoy a high degree of credibility and have largely abstained from empty threats has further contributed to the success of deterrence.

2. **Replicating the unique role of UNIFIL will be difficult.** The tempered Israeli-Hezbollah confrontation does not have a counterpart elsewhere in the region and therefore the uncertainties are real and dangerous. The degree to which confrontation is spreading raises the ante even more. Yet states in the Middle East may be closer to the realization that the outbreak of a larger war demands that steps need to be taken soon to limit the chances of a conflict that could be catastrophic for the entire region. The 2020 decision by the UAE to pull out of the war in Yemen may be a straw in the wind. It may well be that some of the interested external powers could in this moment encourage some states to move toward solutions that will reduce the changes of a larger and destructive conflict.

Deterrence can fail

1. **The US assassination of Qassem Soleimani and the subsequent Iranian missile strike against US forces in Iraq demonstrated how unstable regional deterrence can be.** Following a rocket strike by Iraqi Shia militia that (apparently unintentionally) killed a US military contractor, as well as violent demonstrations in front of the US embassy, former US President Donald Trump ordered the assassination of Soleimani on January 3, 2020. What the US President saw as an action aimed at re-establishing deterrence after a US fatality, was perceived as a major escalation by leaders in Tehran. Five days later, IRGC forces responded by firing a barrage of ballistic missiles against US forces at Ayn al-Assad and Erbil airbase.

2. **Deterrence failed at every step of the escalation ladder.** Washington's red line regarding US casualties failed to deter risky strikes by Iranian proxies, Iranian asymmetric power failed to deter US action against Soleimani and US threats against Iran proper failed to deter Iran's missile strike. Furthermore, both Shia militias' seemingly unintentional killing of a US contractor as well as Iran's accidental shootdown of a civilian airliner after the missile strike demonstrated the limits to the notions of rational decision-making and operational control lying at the heart of the concept of deterrence.

3. **Communication is crucial even in unstable deterrence relationships.** The brief but violent exchange between US and Iranian forces ended after the strike on Ayn al-Assad caused no US fatalities. Considering the nature of the attack and the weapons used, this was partially the result of chance. However, the risk of fatalities was decreased by advance warnings relayed to the US side through Iraqi and Swiss channels.

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