



# **Iran-Russia Defense Cooperation: Current Realities and Future Horizons**

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International Studies at Monterey**

*James Martin Center for Nonproliferation Studies*



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## Iran-Russia Defense Cooperation: Current Realities and Future Horizons

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## Executive Summary

### Key Takeaways

**(1) Big leap forward.** Against the backdrop of Russia's war against Ukraine, the Iran-Russia defense relationship has moved past the previous client-patron dynamic, with Iran emerging as an important provider of defense technology to Russia. Bilateral cooperation has expanded both in *degree* and in *kind*. In pre-existing areas of cooperation—such as electronic warfare, space, cyberspace, and military-to-military contacts—engagement has accelerated or deepened. Since 2022, Iran and Russia have also cooperated in entirely new areas. Those have included Iran's provision of uncrewed aerial vehicles (UAVs), UAV production technology, and UAV training to Russia, alongside Iran's multifaceted support for Russia's ground war and assistance with expertise on evading sanctions.

**(2) The gloves are off.** Since February 2022, what were historically key drivers of defense cooperation—a shared animosity toward the United States and the international order it promotes (including in the Middle East), and each side's interest in military technology that the other side can offer—have *increased* in importance. Key constraints—Russia's susceptibility to U.S. or Western pressure, causing it to limit cooperation with Iran; Russian concerns with adhering to nonproliferation norms and export control regimes; Russian reputational concerns over collaborating with Iran; Iran's inability to pay for Russian technology; or historical mistrust—have become less relevant with Moscow's growing dependence on Iran and its increased enmity toward the United States and Europe.

**(3) Growing institutionalization.** Amid a general increase in numbers of mutual visits and high-level engagements among military and defense officials, Iran and Russia have taken steps to further institutionalize their defense relationship. Those have included work on a new strategic cooperation agreement to replace the one from 2001, forays into joint production of some weapon systems, and joint efforts to develop the International North-South Transport Corridor and other infrastructure that should provide a further boost to defense cooperation.

**(4) Thinking about the future in three steps.** We propose a three-step methodology to think through the contours of bilateral defense cooperation over the next three to five years. It involves a) extrapolating from current trend lines, drivers, and constraints; b) drawing up inventories of future military needs for each country and identifying the areas in which the other country could help meet those needs; and c) accounting for potential high-impact scenarios and developments that may trigger dramatic shifts in cooperation. The latter include various scenarios of war in the Middle East, the end of Russia's military campaign against Ukraine, and regime change in either Russia or Iran.

**(5) Neither a transactional relationship nor a military alliance.** Present trend lines and drivers suggest that the relationship is no longer purely transactional and will probably not lapse back into the patron-client dynamic that characterized it prior to 2022, even once the war in Ukraine ends. Iran and Russia each have specific military-technical needs that the other might help meet. That said, beyond Russia's campaign against Ukraine, Iranian needs from Russia will be greater than Russian needs for advanced technology from Iran. Other constraints—chiefly both countries' challenges in procuring advanced components because of sanctions, Russia's aversion to antagonizing the Gulf Arab states, and Russia's enduring technological superiority in key areas—will also likely continue to act as brakes on the defense relationship, precluding it from developing into a full-fledged military alliance.



## Introduction

Since Russia's full-scale invasion of Ukraine in February 2022, the country's defense relationship with Iran has deepened and widened considerably. Since the summer of 2022, Tehran's support has been critical for Moscow's military campaign. As of May 2024, the Russian armed forces had launched at least 4,000 Iranian-designed Shahed drones against Ukraine<sup>1</sup> while also benefiting from Iranian ammunition and support for Russia's domestic drone production. Russia's military campaign may benefit from Iranian ballistic missiles, though there is no clear evidence of transfers or their use against Ukraine yet. Finally, Iran has promised to share with Russia insights gained during its own experience in trying to circumvent and overcome the effects of Western sanctions.

In return, Russia has stepped up its provision of sensitive military technology and assistance to Iran: In August 2022, Russia launched the Khayyam (Kanopus-V) imaging satellite for Iran,<sup>2</sup> and it has generally stepped up its cooperation on space. In September 2023, it delivered two Yak-130 trainer aircraft to the Iranian Regular Air Force. According to the CIA, Russian technicians have been detected working on Iran's space launch vehicle (SLV) program and other aspects of Iran's missile programs.<sup>3</sup> Commenting on this type of support, U.S. officials have raised the alarm over what they believe is an evolution to "a full-fledged defense partnership."<sup>4</sup> Yet, highly coveted items on Iran's wish list—such as advanced fighter aircraft (Sukhoi Su-35) or advanced air defense systems (S-400)—have not yet been delivered by Russia. Potential reasons for the withholding of such assistance include a Russian caution not to antagonize its Gulf Arab partners, an inability of the Russian defense industry to produce sufficient quantities of high-end technologies for export because of the effects of sanctions, and a desire to retain some leverage amid its growing dependence on Iran.

The deepening defense cooperation has unfolded against the backdrop of a growing alignment between Iran and Russia more generally. Though its origins precede the 2022 invasion of Ukraine, that alignment has greatly accelerated since, driven by Russia's confrontation with Western states over Ukraine. Over the past two years, Russia has emerged as a *de facto* protector of Iran's near-nuclear status.<sup>5</sup> Enjoying Russian support, Iran became a full member of the Shanghai Cooperation Organization (SCO) in July 2023 and joined the expanded BRICS in January 2024.<sup>6</sup> Russia and Iran have also deepened their collaboration in Syria after February 2022; this collaboration includes pushing back against the U.S. presence in the country.<sup>7</sup> Russia's growing tilt toward anti-Western forces in the Middle East—Iran and its partners and proxies in the "Axis of Resistance"—has gained further momentum since Hamas's attack against Israel on October 7, 2023, and amid the ensuing war in Gaza.<sup>8</sup>

This study investigates the nature and anticipated future trajectory of the bilateral Iran-Russia defense relationship, addressing a number of questions: How is that relationship best characterized today (transactional vs. strategic), and based on what indicators? Which Iranian and Russian actors are primarily involved in military-technical cooperation, and through what channels is such cooperation being negotiated and executed? In which areas has cooperation evolved since February 2022, and what does that suggest about the future? In which areas do the two partners provide each other with intangible assistance, practicing knowledge diffusion? What are the drivers and constraints shaping the future defense relationship? What types of defense support may Iran and Russia need from each other over the coming three to five years? And which scenarios or "black swan" events may trigger sudden shifts in cooperation?

This study proceeds as follows: Part 2 will provide relevant definitions and elaborate on the methodology employed and on the sources used by the authors in order to assess the current realities and future horizons of the Iran-Russia defense relationship. Part 3 will provide a brief historical overview of that relationship leading up to February 2022, characterizing it as largely transactional, one-way, and subject to clear constraints. Part 4 will detail the evolution of bilateral defense cooperation since Russia's invasion of Ukraine in 2022. It will also provide an overview of the key Iranian and Russian actors involved, the channels available to both partners for cooperation (at the level of policy making and implementation), and the key drivers and constraints shaping cooperation. Part 5 will offer a methodology for assessing the future contours of Iran-Russia defense cooperation, taking into account a) an extrapolation of current observable trends, including drivers and constraints; b) an evaluation of future Iranian and Russian military needs and capabilities; and c) future scenarios and critical developments that may result in dramatic changes in cooperation. Part 6 will summarize the findings in a Conclusion.

The study argues that Iran-Russia defense cooperation is evolving, having expanded in both kind and degree since February 2022 and slowly becoming more institutionalized. Present trend lines, drivers, and constraints suggest that the relationship is no longer transactional and will probably not lapse back into the patron-client dynamic that characterized it prior to 2022, even once Russia's military campaign in Ukraine ends. That said, Iranian needs from Russia will continue to be greater than Russian needs for advanced technology from Iran. The study develops a three-step methodology to think through the contours of bilateral defense cooperation over the next three to five years. It involves a) extrapolating from current trend lines, drivers, and constraints; b) drawing up inventories of future military needs for each country and identifying the areas in which the other country could help meet those needs; and c) accounting for unforeseen scenarios and developments that may trigger nonlinear shifts in cooperation.

## Methodology and Definitions

The following section provides relevant definitions and elaborates on the methodology employed and on the sources used by the authors in order to assess current and future Iran-Russia defense cooperation.

### Definitions

**Defense cooperation:** In this report, we broadly define defense cooperation to include any collaboration that involves the transfer of weapons or military technologies, joint military training and exercises, and strategy and operations. We also consider collaboration in areas such as evading or overcoming trade sanctions and export controls, since such collaboration contributes to enhancing the defense capabilities of one or both sides. Although Iran and Russia have also cooperated in broader security areas—such as intelligence, counterterrorism, and internal security—these are not the main focus of this report.

**Types of diffusion:** The study considers both mutual material assistance and the transfer of expertise or knowledge between Iran and Russia. Material assistance can include the transfer of hardware such as weapon systems, components, materials, equipment, and facilities. The transfer of expertise or knowledge can include the transfer of explicit<sup>9</sup> and/or tacit<sup>10</sup>

knowledge, such as in the provision of training, technical expertise, and operational experience. Some types of diffusion, such as the transfer of production technology for weapon systems and important subsystems, involve both material assistance and knowledge transfers.

**Channels and actors:** Channels refer to the mechanisms or pathways by which Iranian and Russian actors conduct military-technical cooperation; they can include one or more of the three main types listed below. This report makes this distinction with the view that the specific type of channel(s) being used for military-technical cooperation might have implications for detecting and analyzing the cooperation and for crafting effective policy options to address it.

- Channel 1: Official, top-down: Cooperation in this channel is conducted under the framework of joint commissions and high-level meetings and is implemented according to government-to-government agreements. Importantly, this cooperation is driven by national-level requirements and then “tasked” to the appropriate organizations to implement. This channel includes cooperation on major weapon systems, technology transfer agreements, exercises, and training and education programs.
- Channel 2: Officially sanctioned, low-level: Cooperation in this channel is conducted by low-level individual organizations and companies of one country that negotiate contracts or purchase orders with entities of the other country to acquire specific components, materials, or expertise. This cooperation is thus driven by the requirements of these individual entities and the programs they are implementing, whether driven by the Channel 1 cooperation or unrelated to it. The transfers under these low-level deals are approved by the exporter country’s export control authorities.
- Channel 3: Not sanctioned, illicit: Cooperation in this channel includes cases in which assistance provided by organizations, companies, and individuals skirts the supplier country’s export controls without the government’s knowledge, as well as those in which the government is aware of the unauthorized export but turns a blind eye.

The actors are the Iranian and Russian organizations and key individuals that negotiate, oversee, and implement military-technical cooperation. One can distinguish between two main levels of actors:

- Political/command level: Relevant mainly to Channel 1, this level includes the higher-level Iranian and Russian political, military, and economic actors that are involved in the overall crafting of national policies and strategies and in negotiating and overseeing bilateral defense cooperation.
- Implementation level: Relevant to Channels 1-3, this level includes the specific military, defense-industrial, and other organizations that conduct the actual cooperation. Cooperation at this level can include meetings of individual organizations, as well as joint working groups and specialized committees that operate under the framework of the Iran-Russia high-level joint commissions and agreements.



## **Methodology for assessing future trajectories**

The main purpose of this report is to help analysts and policymakers think through the nature and future horizons of Iran-Russia defense cooperation over the next three to five years. To achieve this, it suggests three main components:

- An extrapolation of current trends, drivers, and constraints: We assume that areas of potential future cooperation can be identified based on current (reported or suspected) Iran-Russia defense cooperation, as well as the key drivers and constraints affecting such cooperation today.
- An evaluation of future Iranian and Russian needs and capabilities: We assume that future Iranian and Russian military-technical needs represent one key driver of future cooperation. The report presents “inventories” of important Iranian and Russian needs, as well as the capabilities (strengths) of the two countries in key areas. These inventories can help analysts and policy makers think about what kind of assistance Russia may seek from Iran (that is, where Russian needs and Iranian capabilities “match”), what Iran may seek from Russia (that is, where Iranian needs and Russian capabilities “match”), or what areas they may pursue jointly, either to benefit from advantages they both enjoy, or to jointly address shared needs.
- An analysis of future scenarios and triggers for “step changes”: Lastly, we take into account that certain developments—such as war in the Middle East or regime change in either Iran or Russia—may trigger abrupt but significant (that is, nonlinear) step changes in cooperation.

## **Sources**

The research for this project was predominantly grounded in Russian- and Persian-language primary and secondary sources (for example, official statements, press reporting, expert analysis, and relevant social media). These were augmented by Western media reports and analyses that capture important details from government and military sources or investigative journalists, that Iran and Russia have not publicly disclosed. In April 2024, the authors also convened a virtual workshop with 15 subject-matter experts on Russia’s and Iran’s defense sectors and militaries in order to vet initial findings and discuss the analysis and methodology. Insights generated during the discussion informed this report on a not-for-attribution basis.

## **Caveats**

The analysis in this report comes with a few caveats: First, Iran-Russia defense cooperation is evolving in the context of a bilateral economic and political relationship that has blossomed since February 2022. Important economic developments have included the intensified pursuit of trade routes and infrastructure (such as the North-South Transport Corridor and the Rasht-Astara railway line) and efforts to connect both countries’ payment systems, among other measures. This report, however, will narrowly focus upon defense—especially military-technical—cooperation and will mention broader economic measures only insofar as they are relevant for context.

Second, while much of Iran-Russia defense cooperation is bilateral in nature, the two countries are also cooperating on defense matters in various multilateral fora. The SCO, of which both are members, occasionally liaises on defense issues, and Iran and Russia have also conducted trilateral maritime drills with China. This report, however, will focus on bilateral defense cooperation.

## Historical Context: Iran-Russia Defense Cooperation before 2022

Russian assistance since the 1990s has played an important role in improving Iran's current military capabilities, through both officially sanctioned support and, to a lesser extent, unofficial help from individual Russian companies and experts. Over the past decades, Iran-Russia military-technical cooperation experienced ups and downs or "turbulence" (*por-faraz va nashib*)<sup>11</sup> and was mostly one-way—that is, Russian diffusion to Iran. It was constrained at times by at least three key factors: Russian political decisions to limit or halt cooperation (often as the result of U.S./Western pressure, sanctions, and incentives); technical problems, such as issues with Russian provision of maintenance and spare parts; and financial problems, such as Iran's inability to pay.<sup>12</sup> Despite claims by Iranian officials over the years that the bilateral relationship was "strategic" in nature,<sup>13</sup> it remained in fact largely "transactional,"<sup>14</sup> with some calling it a "marriage of convenience."<sup>15</sup> (For the purpose of this report, a transactional Iran-Russia relationship is one that is based on discrete, narrowly scoped, and shorter-term cooperation that can be disrupted relatively easily by disputes between the two countries, domestic politics, or by pressure from outside actors such as the United States. In contrast, a strategic Iran-Russia relationship includes longer-term cooperation across a broad range of defense and other security areas that can weather the ups and downs in the countries' bilateral relationship or domestic politics, and can resist pressure from outside actors.)

### 1990s-2000s

After its establishment in 1979 and during the Iran-Iraq War of the 1980s, the Islamic Republic of Iran received very little military assistance from the Soviet Union, which supported Iraq at the time. After the end of the war, Tehran and Moscow improved relations and increased military cooperation, concluding a series of major arms deals between 1989 and 1991.<sup>16</sup> With the fall of the Soviet Union, Iranian defense officials perceived a "golden opportunity" (*forsat-e talai*)<sup>17</sup> in the 1990s for Iran to acquire advanced Russian technologies. During the 1990s and 2000s, Iran purchased an extensive array of conventional weapons from Russia across the ground, naval, and aerospace domains. These transfers included tanks and related production technology; anti-tank missiles; armored vehicles; submarines; torpedoes; combat aircraft; air-to-air, air-to-surface, and surface-to-air missiles; helicopters; and radars.<sup>18</sup> Iran also reportedly tried to purchase the Tu-22M "Backfire" bomber but was unsuccessful.<sup>19</sup>

Limitations on Russian cooperation with Iran emerged during the mid- to late 1990s with U.S. and Western pressure and incentives. In 1995, U.S. Vice President Al Gore signed a secret agreement with Russian Prime Minister Viktor S. Chernomyrdin, calling for an end to all Russian sales of conventional weapons to Iran by the end of 1999. Russia also joined the Missile Technology Control Regime (MTCR) and the Wassenaar Arrangement (WA) that same year. However, with the election of Vladimir Putin as president in 2000, the Gore-Chernomyrdin agreement was canceled, and military cooperation increased.<sup>20</sup> In 2001, Iran and Russia signed a military cooperation agreement<sup>21</sup> and a 20-year agreement on mutual

relations and principles of cooperation.<sup>22</sup> During the 2000s the two sides held regular meetings at the defense minister level<sup>23</sup> and of the Iran-Russia Joint Defense Commission.<sup>24</sup>

Iran also sought Russian assistance in missile technology. In the 1990s, according to former Iranian president Ali Akbar Hashemi Rafsanjani, the Russian government stated its willingness to provide long-range missile technology, including assistance in increasing the accuracy of Iran's ballistic missiles<sup>25</sup> and in transferring intercontinental ballistic missile (ICBM) technology and rocket engines for missiles with a range of 4,000 kilometers (km).<sup>26</sup> By the end of the 1990s, Iran had received assistance from numerous Russian companies and individuals, including technical expertise in developing the engine for the Shahab-3 medium-range ballistic missile (MRBM), components related to the Soviet SS-4 ballistic missile and its RD-214 engine, missile guidance technology, missile-related materials, and missile-related training and education.<sup>27</sup> In the 2000s, Iran sought the 9K720 Iskander-E and 9K79 Tochka-U short-range ballistic missiles (SRBMs), as well as the P-800 Yakhont and P-700 Granit anti-ship cruise missiles (ASCMs),<sup>28</sup> but these systems probably were not transferred.

In the area of chemical and biological weapons (CBW) technology, Iran reportedly sought production technology, expertise, chemical weapons precursors, and dual-use biotechnology from Russian entities during the 1990s.<sup>29</sup>

In addition to military transfers, Iran sought various nuclear technologies from Russia and in 1992 concluded agreements on peaceful nuclear cooperation.<sup>30</sup> During the 1990s, Iran negotiated with Russia for assistance in building nuclear power plants and a heavy-water nuclear research reactor, and also for technology related to nuclear fuel cycle facilities such as those for uranium mining and milling, uranium conversion, and uranium enrichment.<sup>31</sup> In addition, Iran received technical training in Russia for its nuclear experts<sup>32</sup> and reportedly obtained assistance from an individual Russian expert in nuclear weapons design.<sup>33</sup>

Iran also pursued space cooperation with Russia during the 1990s and 2000s, including on satellite development and Russian space launches.<sup>34</sup> However, due to Russian halts to cooperation and other problems, Iranian officials viewed cooperation with Russia and its other foreign partners as a “bitter experience” (*tajrobeh-ye talkh*).<sup>35</sup> Owing to international pressure, Russia cut back its space cooperation with Iran in the late 2000s.<sup>36</sup>

## 2010s-February 2022

The year 2010 marked a low point in Iran-Russia defense cooperation, given Russia's support for UN Security Council-mandated sanctions against Iran over its nuclear program, as well as Russian President Dmitri Medvedev's decision to suspend the delivery of S-300 surface-to-air missiles (SAMs) to Iran.<sup>37</sup> The two sides entered a new phase of cooperation with Vladimir Putin's return as president in 2012. Cooperation was further boosted with Russia's entry into the Syrian civil war in September 2015.<sup>38</sup> In 2015, Tehran and Moscow signed a new military and defense cooperation agreement, under which they would accelerate cooperation in military-technical fields.<sup>39</sup> That same year, they also created a High Commission on Technology Cooperation that included committees on space and aviation.<sup>40</sup> The two sides also held high-level meetings and conducted cooperation within the framework of their Joint Military Cooperation Commission.

During the 2010s, especially the latter part of the decade, Iran and Russia negotiated and implemented cooperation in several areas, including the naval, ground, and air defense sectors as well as in strategic and operational areas.<sup>41</sup> Tehran's ambitious wish list for Russian support reportedly included combat aircraft, helicopters, the Yakhont supersonic ASCM, frigate-class surface ships, and submarines.<sup>42</sup> Actual transfers included S-300 SAM systems (which were finally provided in 2016), radars, and jamming systems.<sup>43</sup>

The two sides also continued to cooperate in the nuclear domain,<sup>44</sup> with Rosatom providing assistance to Iran's Bushehr nuclear power plant project.<sup>45</sup> They reinvigorated space cooperation, including through an agreement that foresaw Russian assistance in developing and launching imaging and communications satellites, Iranian access to Russian satellite images,<sup>46</sup> and Iran's use of Russian GLONASS satellite navigation data for missile targeting during Iran's ballistic missile strike in 2020 against U.S. military bases in Iraq.<sup>47</sup>

While Iran-Russia defense cooperation had been largely one-way through the 1990s and 2000s, Russia started showing interest in acquiring limited military-technical support from Iran in the mid-2010s. Following a Russian visit to Iran and negotiations with Iranian military officials in 2013,<sup>48</sup> the two sides agreed to cooperate on development of uncrewed aerial vehicles (UAVs),<sup>49</sup> and Russia reportedly sought technology transfer from Iran to produce long-range UAVs.<sup>50</sup> In addition, in 2016, Iran allowed Russia to briefly use one of its air force bases to conduct air strikes in Syria<sup>51</sup> and to use Iranian airspace to conduct cruise missile strikes against targets in Syria.<sup>52</sup> Notwithstanding these sporadic Russian turns to Iran for support, the bilateral military-defense relationship largely remained characterized by a patron-client dynamic prior to February 2022. (For a summary, see also Table A1 in the Appendix.)

## **Iran-Russia Defense Cooperation: Current Realities**

### **Iranian support for Russia since February 2022**

Russia's military campaign against Ukraine, which started in February 2022, marked a watershed for Iran-Russia military-technical cooperation. In the months immediately preceding the invasion, Iran and Russia had already vowed to deepen and expand their defense relationship. In January 2022, Iranian President Ebrahim Raisi visited Moscow, where he discussed plans for a 20-year strategic document for long-term (including defense) cooperation with President Putin.<sup>53</sup> During the visit, President Raisi stated that Iran's armed forces had made their choice in favor of Russian weapons and military equipment.<sup>54</sup> Russia and Iran also held a meeting of their Joint Military Cooperation Commission in late 2021 to boost defense cooperation.<sup>55</sup>

After February 2022, Iran emerged as a critical supporter of Russia's Ukraine campaign, both in the aerospace and ground domains, thereby ending the patron-client dynamic that had characterized the relationship for the better part of three decades. Most consequentially for its military campaign, Iranian combat UAVs improved Russia's ability to suppress Ukrainian air defenses and to conduct long-range strikes on military and nonmilitary targets, forcing Ukraine to spend critical resources on air defenses. Since August 2022, Iran has transferred complete UAVs belonging to at least five different families to Russia: Mohajer-6 armed UAVs<sup>56</sup> (at least three crashed or were shot down from 2022 to May 2024),<sup>57</sup> Shahed-129 armed UAVs,<sup>58</sup> Shahed-191 armed UAVs,<sup>59</sup> Shahed-131 (Geran-1) and Shahed-136 (Geran-2)

suicide UAVs,<sup>60</sup> Shahed-238 jet-powered suicide UAVs,<sup>61</sup> and Shahed-107 suicide UAVs<sup>62</sup> (which belong to the Shahed-101 family). There have also been reports about potential deliveries of Shahed-101 suicide UAVs<sup>63</sup> and about Russian interest in the longer-range Arash-2 suicide UAV.<sup>64</sup> In late 2023, according to reports, Russia agreed to purchase anti-drone defensive systems from Iran. These reports may have been referring to the “hunter-killer” UAVs designed to destroy enemy drones that were shown to Russian engineers on a visit to Iran in April 2023.<sup>65</sup> Since Russian operators were reportedly trained on Iranian Ababil-3 reconnaissance drones, it is also conceivable that Iran has provided those systems to Russia.<sup>66</sup>

Besides transferring complete UAV systems to Russia, Iran has also assisted its partner in indigenizing the production of UAVs on Russian and, possibly, Belarusian soil.<sup>67</sup> Satellite imagery of the Alabuga drone factory in Russia’s Tatarstan region, taken in November 2023 and analyzed by the Institute for Science and International Security, revealed significant activity at the factories where Shahed-136s had been assembled since midsummer 2023.<sup>68</sup> Russian documents obtained by the *Washington Post* in August 2023 described plans for Russia to manufacture 6,000 Shahed-136s by the summer of 2025.<sup>69</sup> Files released by an Iranian hacking group in February 2024 further indicated that Russia was seeking to license-produce several other types of Iranian drones, including two variants of a “236” drone—one powered by a turbojet engine, and one with a “seeker” powered by a piston engine—and the Shahed-107.<sup>70</sup> Moreover, the documents suggested that Russia would try to produce up to 10,000 Shahed-136s per year. Several of the documents also described an April 2023 visit by a delegation of Russian engineers to Iran to watch a demonstration of a new jet-powered UAV (variants included the MS-237, Shahed-238, and Shahed-236), of which Russia agreed to purchase more than 600, with most of the systems to be produced in Russia with Iranian components and help.<sup>71</sup> (As of May 2024, Russia was reportedly using Shaheds built entirely in Russia rather than systems transferred from Iran.<sup>72</sup>)

Iran-Russia co-production arrangements have also entailed joint work on new kinds of UAVs,<sup>73</sup> including on a new engine for the Shahed-136 variant to increase its speed and range.<sup>74</sup> Finally, Russian operators have received UAV training and assistance with use from Iranian instructors in Russia,<sup>75</sup> Crimea,<sup>76</sup> Belarus,<sup>77</sup> Ukraine,<sup>78</sup> and Syria.<sup>79</sup>

While the impact of Iranian UAVs has already been painfully felt by Ukraine, the prospect of Iranian deliveries of ballistic missiles to Russia has remained unconfirmed thus far—but it has alarmed both Ukraine and its Western partners. Reports of negotiations between Moscow and Tehran over the procurement of Fateh-110 (300-km range) and Zolfaghar (700-km range) solid-propellant SRBMs date back to at least the fall of 2022.<sup>80</sup> Subsequent reporting suggested that Iran planned to wait until October 2023 and the expiration of missile-related provisions under UN Security Council Resolution 2231 before transferring missiles to Russia,<sup>81</sup> or that Tehran would send missiles in modified versions that would be compliant with Resolution 2231.<sup>82</sup> Rumors over prospective missile deals intensified again in fall 2023 and on the back of Russian Defense Minister Sergey Shoigu’s visit to Tehran, where his delegation toured an Islamic Revolutionary Guard Corps (IRGC) defense exhibition and was shown Iranian ballistic missiles, such as the Ababil, and cruise missiles, such as the Paveh land-attack cruise missile (LACM).<sup>83</sup>

Following the expiration of missile-related provisions under UN Security Council Resolution 2231, U.S. officials voiced concern on several occasions that Iran was finally preparing to provide Russia with Ababil close-range ballistic missiles (CRBMs) and Fateh-110 SRBMs.<sup>84</sup>



Addressing the issue in January 2024, U.S. National Security Council spokesperson John Kirby stated that Iran-Russia negotiations over CRBMs—possibly referring to the Ababil—were “actively advancing,” though the United States had not yet detected any Iranian deliveries.<sup>85</sup> Subsequent media reports claimed that Iran had transferred 400 Fateh-110-family ballistic missiles to Russia in four shipments via the Caspian Sea and using aircraft.<sup>86</sup> Though the U.K. defense secretary confirmed the shipment in March,<sup>87</sup> there has been no concrete evidence of the transfer of the missiles or their use against Ukraine to date.<sup>88</sup>

While Iranian UAV and (possible) missile deliveries to Russia have caused considerable international furor, Iran’s support for Russia’s ground war in Ukraine has received less attention. That support has, however, been significant. During the first year of the war, Iran sent more than 300,000 artillery shells and one million rounds of ammunition to Russia.<sup>89</sup> Iran’s deliveries have included various types of artillery shells (for example, 122 mm artillery shells,<sup>90</sup> 115 mm and 125 mm armor penetration shells,<sup>91</sup> and various types of high explosive rounds<sup>92</sup>). Russia also received various types of small-arms ammunition from Iran<sup>93</sup> for use in weapons such as pistols, assault rifles, and machine guns.<sup>94</sup> Iranian assistance for Russia’s ground war has included 40 mm grenades for grenade launchers, 107 mm anti-tank rockets, mortar bombs,<sup>95</sup> artillery rockets (for example, Iranian Arash 122 mm high-explosive fragmentation rockets,<sup>96</sup> and 130 mm and 152 mm rockets<sup>97</sup>), helmets and body armor.<sup>98</sup> Iran has also provided Russia with glide bombs,<sup>99</sup> a type of weapon that has proven instrumental to Russia’s more recent advances against Ukraine. Iran has developed several families of glide bombs for delivery by aircraft,<sup>100</sup> so it is unclear which types Iran has transferred to Russia; however, most recently, reports have emerged of Iranian supplies of Qaem-5 UAV-delivered guided bombs to Russia.<sup>101</sup>

Finally, Iran has assisted Russia’s war effort in more indirect ways—sharing expertise and experience on how to circumvent or overcome the effects of sanctions and export controls—though the details are difficult to assess relying on open-source data. Having professed their intent to cooperate in this domain on multiple occasions, Iran and Russia signed a joint declaration “on ways and means to counter, mitigate and redress the adverse impacts of unilateral coercive measures” in December 2023.<sup>102</sup> As of May 2024, the two countries were developing cooperation to counter Western sanctions and adopt joint strategies to neutralize the effects of Western sanctions.<sup>103</sup> When considering Iranian assistance to Russia in this area, it is useful to distinguish between support that enhances Russia’s ability to *evade* sanctions and export controls (for instance, through illicit procurement strategies) on the one hand, and support aimed at helping Russia *overcome* the effects of sanctions through “strategic adaptation”—that is, learning and adaptation that affects national and military policy making, such as how states use their resources<sup>104</sup>—on the other. This can include, for instance, the reverse engineering of foreign systems and critical technologies.

Starting with techniques for *evading* sanctions, Iranian Foreign Minister Javad Zarif stated in December 2018 that “if there is an art we have perfected in Iran, it is the art of evading sanctions, and we can teach it to others for a price.”<sup>105</sup> Since the 1980s, Iran has refined its strategies to evade trade sanctions and export controls, such as operating illicit procurement networks—including the use of foreign intermediaries and brokers, intelligence officials, and embassy officials based overseas—and employing deceptive techniques such as layered transactions, false end users, front and cover companies, and transshipment through third countries.<sup>106</sup> Russia’s continuously high reliance on foreign inputs for its defense production suggests that it may benefit from such Iranian expertise on illicit procurement. A recent article in the Russian daily newspaper *Kommersant*, for instance, addressed U.S. sanctions on

Russian airline Pobeda and quoted Russian experts suggesting that the company should follow tactics used by Iran's Mahan Air.<sup>107</sup> There are also reports that Russia may be benefiting from the use of Iran's illicit procurement networks, including an Iranian front company—Generation Trading FZE, based in the United Arab Emirates (UAE)—to procure UAV components.<sup>108</sup> Some analysts, however, have noted that Russia is already highly capable when it comes to skirting trade sanctions and export controls, having honed its craft over decades.<sup>109</sup> These analysts doubt that there is much that Russia can learn from Iran.

With regard to strategies for *overcoming* the effects of sanctions, it is conceivable that Russia may benefit from Iranian advice on “strategic adaptation” in select areas. Indeed, Iran has decades of experience in increasing the self-sufficiency of its defense production and reducing reliance on foreign suppliers—for instance, through “domestication” (*bumi-sazi*) of weapon systems and their critical technologies through technology transfer, reverse engineering, “parts manufacture” (*ghateh-sazi*), and other methods.<sup>110</sup> Russian analysts have certainly taken note of successes and problems with import substitution in the Iranian defense industry.<sup>111</sup>

## Russian support for Iran since February 2022

Russia has reciprocated in various ways for the unprecedented military support it has received from Iran. Since February 2022, Russian officials have professed their desire to develop military-technical cooperation and strengthen the combat potential of the Iranian armed forces on numerous occasions.<sup>112</sup> In doing so, they have consistently asserted that any such efforts would fully comply with Russia's obligations under international law.<sup>113</sup> Over the past year, Moscow and Tehran have also repeatedly stated that their conclusion of a new strategic partnership treaty is imminent.<sup>114</sup> In spring 2024, Iranian officials and media described the country's military cooperation with Russia to include areas such as counterterrorism; tactical cooperation and operations such as moving toward the formation of a bilateral defense coalition; military training; joint exercises in the Caspian Sea, northern Indian Ocean, and Sea of Oman; participation in defense exhibitions; scientific, research, cultural, and sports cooperation; port visits; and the exchange of delegations at the level of defense ministers, chiefs of general staff of the armed forces, and force commanders.<sup>115</sup>

Besides intensifying such military-to-military engagement, Russia has lent assistance to Iran's traditional (air, air defense, ground, naval) and asymmetric capabilities:

It is in the area of advanced conventional weaponry that Iran has perhaps made the most progress in terms of checking off items on its long-standing “wish list” from Russia. Viewing foreign purchases as a “shortcut” (*rah-e miyanbar*) to complement Iran's domestic research and development (R&D) and production efforts,<sup>116</sup> Iranian defense officials have long sought billions of dollars' worth of military equipment from Russia, including combat aircraft, attack helicopters, and radars. In November 2023, Iran's deputy defense minister announced that Tehran had finalized a deal with Moscow for Su-35 fighter jets, Yak-130 training aircraft, and Mi-28 attack helicopters.<sup>117</sup> To date, only the Yak-130 have been delivered.<sup>118</sup> While there have been no known deliveries of Russian air defense systems to Iran since 2022, an Iranian delegation toured the NPP Start factory in Yekaterinburg, which produces mobile launchers and other components for anti-aircraft batteries (including the S-400), in March 2023.<sup>119</sup>

Israeli defense planners, in particular, have also been alarmed by Russian electronic warfare assistance to Iran. Russia has provided Iran with GPS denial and jamming capabilities,

sharing lessons from its own use of electronic warfare in Syria.<sup>120</sup> Iran is presently producing and deploying Cobra V8 jamming vehicles,<sup>121</sup> which some analysts assess to be Iran's version of the Russian 1RL257 Krasukha-4 (seen in commercial satellite imagery at Bandar Abbas in January 2024).<sup>122</sup> The Krasukha-4 is considered to be one of Russia's most sophisticated electronic warfare systems, designed to jam airborne or satellite-based fire control radars (such as JSTARS and AWACS)<sup>123</sup> and possibly capable of GPS spoofing or jamming.<sup>124</sup> Iran unveiled the Cobra V8, developed by the Defense Ministry's Iran Electronics Industries (IEI), in September 2023, claiming that the system can intercept, analyze, and jam enemy radar signals to protect against air and missile attacks.<sup>125</sup> While there is no hard evidence, it is not inconceivable that Iran received and reverse engineered the Krasukha-4 over the past decade.

Russian assistance with production technology may well have extended to other areas of conventional weaponry. In recent years, Iran has produced the AK-133 assault rifle, apparently a licensed copy of the Russian AK-103. The start of its production was announced in 2017, shortly after Iran had officially announced the purchase of the first batches of AK-103.<sup>126</sup> In 2022, Israeli defense sources also claimed that Iran was hoping Russia would not only sell it several warships, but also help it design more bespoke naval capabilities commensurate with Iran's operational requirements.<sup>127</sup> Iran has denied any interest in the joint production of warships with Russia but has not ruled out the pursuit of joint research.<sup>128</sup>

In the aviation domain, Iran and Russia have announced their intent to cooperate on overhauling and manufacturing airplanes and helicopters.<sup>129</sup> In early 2023, Russia was training Iranian pilots on Russian fighter aircraft.<sup>130</sup> In March 2024, Iran selected 40 MiG-29 pilots to start training on the Russian Sukhoi Su-35; some, according to reports, would undergo training in Russia, while others would do so in Iran using the Yak-130 trainer aircraft.<sup>131</sup>

There are also indications of Russian assistance to Iran's ballistic missile program. In 2023, CIA director William J. Burns stated on at least two occasions that Russian technicians were working on Iran's missile and SLV programs.<sup>132</sup> *Politico*, citing unnamed diplomats, reported in April 2023 that Iran was conducting secret talks with Russia's state-owned chemical producer FKP Anozit (and China) to purchase ammonium perchlorate (AP) for solid-propellant ballistic missiles.<sup>133</sup> Several reports have also suggested an Iranian interest in Russian technology for hypersonic missiles,<sup>134</sup> yet without providing concrete evidence that such assistance has indeed materialized.

U.S. intelligence has indicated that Iran may be seeking Russian help for its nuclear program, specifically nuclear materials and assistance in nuclear fuel fabrication.<sup>135</sup> Representatives of Rosatom and the Atomic Energy Organization of Iran (AEOI) have interacted frequently, and Iran has started participating in projects at St. Petersburg's Konstantinov Institute of Nuclear Physics, which is part of the Kurchatov Institute research center.<sup>136</sup> That said, there is no evidence of Russia directly assisting Iran in areas relevant to producing a nuclear weapon. Rather, as indicated earlier, Russian support for Iran's high nuclear latency has materialized mostly in the form of diplomatic backing.

Another area in which Russian assistance to Iran has intensified since February 2022 is space. In August 2022, Russia launched the Khayyam (Kanopus-V) imaging satellite for Iran.<sup>137</sup> Three months later, Iran stated it planned to manufacture the Khayyam-2, -3, and -4 satellites with Russian help.<sup>138</sup> In December 2022, the two countries concluded an agreement on space cooperation relating to the manufacture of remote sensing and communications satellites, the

creation of a laboratory infrastructure, assembly, launch base, and satellite testing, as well as the dispatch of an Iranian astronaut to the Russian space station.<sup>139</sup> According to further Iranian news reports, Russia committed to launching additional Iranian satellites,<sup>140</sup> jointly developing a scientific research satellite with Iran,<sup>141</sup> and providing technical assistance in developing imaging satellites.<sup>142</sup> In February 2024, Russia launched an Iranian-developed imaging satellite into orbit.<sup>143</sup>

Against the backdrop of this intensification in Russian defense assistance to Iran, the latter has extracted military-technical benefits from Russia's war against Ukraine in two additional ways: First, Russia has provided Iran with Western-origin military technology captured on the battlefield in Ukraine. Such technology has, at a minimum, included a British NLAW anti-tank missile, a U.S. Javelin anti-tank missile, and a U.S. Stinger anti-aircraft missile.<sup>144</sup> It must be assumed that Tehran will study such technology to develop countermeasures or to reverse engineer the technology.<sup>145</sup>

Second, Iran is learning technical and operational lessons from Russia's use of missiles and UAVs (including Iranian ones) in Ukraine, including insights about Western air defenses.<sup>146</sup> The evolution of Russia's use of drones and missiles over the course of its military campaign<sup>147</sup> should have further enriched such Iranian learning. In Ukraine, Iranian UAVs have been tested against a broad range of defensive assets, including Western and Russian SAM systems and electronic warfare capabilities.<sup>148</sup> Iranian drones have complemented more expensive long-range cruise and ballistic missiles in complex heterogeneous attacks,<sup>149</sup> generating additional lessons for Iranian defense planners. Specific Iranian insights may relate to how Russia "shadows" drones in Ukraine—that is, mirrors an adversary UAV's flight path with its own UAVs to evade defenses.<sup>150</sup> According to some reports, Russia shares assessments of weapons used against Ukraine's NATO-equipped forces with Iran in real time.<sup>151</sup>

In light of this knowledge diffusion, some analysts were quick to suggest that Iran's large drone and missile salvo against Israel on April 13, 2024, resembled Russian strike packages used against Ukraine.<sup>152</sup> However, while Iran may have gleaned operational and technical insights from Russia's campaign, it had already developed and emphasized (in statements, exercises, and operations) well before 2022 the operational principles that characterized the April 13 attack. In September 2019, for instance, the IRGC Aerospace Force (IRGC-ASF) conducted strikes against Saudi Arabian oil facilities with a mix of approximately eighteen Shahed suicide UAVs and seven "351" LACMs.<sup>153</sup> In January 2021, IRGC-ASF Commander Amir Ali Hajizadeh stated that after years of experience, a new capability was created in the IRGC-ASF by combining missiles and drones in hybrid operations (*amaliyat-e tarkibi*).<sup>154</sup>

A final area in which Russia assistance to Iran has intensified against the backdrop of the war in Ukraine relates to ties with Tehran's partners and proxies in the Axis of Resistance. Prior to February 2022, any Russian political contacts with or security assistance to such groups were sporadic (perhaps with the exception of Iran-backed groups in Syria, with which Russia collaborated more intensively from 2015).<sup>155</sup> After February 2022, Moscow relinquished several key positions in central and eastern Syria to Iran-backed militias and to Hezbollah, while also ramping up intelligence sharing with Iran-backed militias and supplying Hezbollah with anti-ship missiles via Syria. In addition, Russia gave a green light for Iran to upgrade Syria's air defenses. Such support provided a major boost to these groups' operational capabilities, enabling them to target U.S. interests in eastern Syria with increased frequency and precision.<sup>156</sup>

After October 7, amid its general anti-Israel tilt, Russia stepped up electronic jamming from its Hmeymim base in western Syria, disrupting Israel’s commercial air traffic. According to Iranian news outlets, Hezbollah struck Israel’s Meron air control base with Russian-made anti-tank guided missiles in January 2024, suggesting that Moscow may have been funneling arms to the militant group. U.S. officials warned that the Wagner Group may provide air defense systems to Hezbollah.<sup>157</sup> There were also reports in October 2023 that Tehran and Moscow had agreed on assisting the IRGC Quds Force in bypassing Israeli countermeasures against the smuggling of Iranian weapons to Lebanese Hezbollah. As the Gaza war continued amid an intensification of Israeli strikes against Iran-linked targets in Syria, Russia’s Hmeymim base reportedly emerged as a Russian-protected hub for Iranian weapons and technology transfers to Syria and Lebanon.<sup>158</sup>

Although not a focus of this report, Iran and Russia have also cooperated on intelligence and counterterrorism matters. This has included a 2023 security-intelligence cooperation agreement<sup>159</sup>—including the areas of counterintelligence, intelligence sharing, and countering cyberattacks—as well as cooperation on counterespionage, digital surveillance, monitoring and disrupting cell-phone communications, counterterrorist combat operations, and plans to adopt joint strategies to deal with piracy and to address “emerging threats.”<sup>160</sup> Since 2022, Russia has upped its cyber assistance to Iran, providing its partner with digital surveillance capabilities.<sup>161</sup> Cyberattacks against targets in Israel have increased significantly since October 7, 2023, and Israeli sources assume that such attacks, emanating from Iran or actors associated with it, have benefited from advanced Russian cyber capabilities.<sup>162</sup>

## Key drivers and constraints

Iran-Russia defense cooperation, as detailed above, has been shaped by a number of key drivers and constraints that have evolved since February 2022. An analysis of these drivers and constraints is useful in anticipating future horizons of the defense relationship. We define drivers and constraints as that set of factors that shape—by motivating/enabling or inhibiting/disincentivizing—Iran-Russia military-technical cooperation. Such drivers and constraints can be political, military, legal, economic, financial, technical, reputational, or organizational in nature. Some may predate 2022, whereas others are new; some of them may be shaped by actions of the United States or its allies, while others are immune to outside pressure.

Tables 1 and 2 summarize the key drivers and constraints shaping the Iran-Russia defense relationship, information on since when they have been present, how important they are today, and why.

**Table 1. Drivers of Iran-Russia defense cooperation**

| Driver                                       | Type of driver | Present since | Assessed importance | Additional information                                                |
|----------------------------------------------|----------------|---------------|---------------------|-----------------------------------------------------------------------|
| <b>Russia-Ukraine war as new opportunity</b> | Multiple       | February 2022 | High                | Similar to the “golden opportunity” that Iran perceived in the 1990s. |

|                                                                                                                                                                   |                             |                                                                                      |                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Shared animosity vis-à-vis the United States and U.S./Western-led international order; shared interest in decreasing U.S. military presence in Middle East</b> | Political, Military         | Russia: At least since 2012; Iran: Long-standing                                     | High (increasing importance since February 2022) | --Divsallar: "Common threat perceptions" are one of the two main "pillars of security convergence" for Russia and Iran.<br>--Smagin: Russia and Iran are "drawing ever closer, united in their opposition to the United States."                                                                                                                                                                                                 |
| <b>Iranian interest in Russian technology, expertise</b>                                                                                                          | Military, Technical         | Long-standing                                                                        | High                                             | Driven by Iran's asymmetric military strategy as well as by its longer-term efforts to modernize its "traditional" military capabilities.                                                                                                                                                                                                                                                                                        |
| <b>Russian interest in Iranian technology, expertise</b>                                                                                                          | Military, Technical         | 2010s, but mostly since February 2022                                                | High                                             | Driven mostly by Russia's needs for its military campaign against Ukraine and less by its military strategic needs and view of future warfare.                                                                                                                                                                                                                                                                                   |
| <b>Rise of Iranian hardliners</b>                                                                                                                                 | Political                   | 2000s, especially since 2018                                                         | High                                             | --Geranmayeh/Grajewski: "A significant factor pushing Iran to support Russia's war in Ukraine is the rise of hardliners and the deep state in monopolising decision-making."                                                                                                                                                                                                                                                     |
| <b>End of restrictions per UNSCR 2231 (2015)</b>                                                                                                                  | Legal, Political, Technical | October 2020 (arms imports and exports); October 2023 (ballistic missile technology) | Medium                                           | --Iranian Defense Minister Hatami, October 2020: "Many countries have approached Iran since last year, and we conducted a series of negotiations... Without a doubt, we will sell far more than we buy."<br>--Regarding reports of Iranian transfers of ballistic missiles to Russia, unnamed Iranian official, February 2024: "There is no reason to hide it. We are allowed to export weapons to any country that we wish to." |
| <b>Vladimir Putin as president</b>                                                                                                                                | Political                   | 2012                                                                                 | Medium                                           | --Kozhanov: "The beginning of a new period in Russian-Iranian relations was marked by the return to the Kremlin of President Vladimir Putin in 2012."                                                                                                                                                                                                                                                                            |
| <b>Geographic proximity</b>                                                                                                                                       | Additional                  | Long-standing                                                                        | Medium                                           | Enables shipping of relevant items via the Caspian Sea; new trade routes being developed.                                                                                                                                                                                                                                                                                                                                        |
| <b>Problems with the quality and quantity of North Korean transfers to Russia</b>                                                                                 | Additional                  | Recent                                                                               | Unclear                                          | Reports of quality problems with North Korean artillery shells and missiles shipped to Russia; might push Russia to seek even more Iranian munitions and missiles.                                                                                                                                                                                                                                                               |

Sources: Abdolrasool Divsallar, "The Pillars of Iranian-Russian Security Convergence," *International Spectator*, Vol. 54, No. 3 (2019), p. 108; Smagin, "United Against America: Russia-Iran Military Cooperation Is a Looming Threat"; Ellie Geranmayeh and Nicole Grajewski, "Alone together: How the war in Ukraine shapes the Russian-Iranian relationship," ECFR, September 6, 2023, <https://ecfr.eu/publication/alone-together-how-the>



war-in-ukraine-shapes-the-russian-iranian-relationship/; “rasaneh-ha-ye Rusieh: 27 Mehr, piruzi-e Iran bar yekjanebeh-gerai-e Amrika bud” [Russian media: 27 Mehr was Iran’s victory over American unilateralism], *IRNA*, October 20, 2020, <https://www.irna.ir/news/84081712/>; Parisa Hafezi et. al., “Exclusive: Iran sends Russia hundreds of ballistic missiles,” *Reuters*, February 21, 2024, <https://www.reuters.com/world/iran-sends-russia-hundreds-ballistic-missiles-sources-say-2024-02-21/>; Nikolay Kozhanov, “Understanding the Revitalization of Russian-Iranian Relations,” Carnegie Moscow Center, May 2015, [https://carnegieendowment.org/files/CP\\_Kozhanov\\_web\\_Eng.pdf](https://carnegieendowment.org/files/CP_Kozhanov_web_Eng.pdf).

**Table 2. Constraints inhibiting Iran-Russia defense cooperation**

| Constraint                                                                                                 | Type of constraint          | Present since | Assessed importance                   | Additional information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------|-----------------------------|---------------|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>International and national export controls, trade controls</b>                                          | Technical, Legal, Political | Long-standing | High                                  | Complicating Russia’s and Iran’s ability to procure sensitive technologies from third parties; exacerbating Iranian and Russian S&T, industrial, and supply chain weaknesses and vulnerabilities.                                                                                                                                                                                                                                                                                                             |
| <b>Iran’s emphasis on self-sufficiency</b>                                                                 | Contextual                  | Long-standing | Medium                                | Iran wants to minimize its reliance on Russia (or any other foreign supplier), which may limit some types of cooperation. Iran will still seek advanced weapons and technologies in select areas, especially for capabilities it cannot produce itself and especially if it can obtain production technology and training. In 2020, Iranian Foreign Minister Zarif said that “although Iran’s armed forces seek to achieve self-sufficiency, Tehran can still benefit from military cooperation with Moscow.” |
| <b>Limits in Iran’s capability to assimilate or integrate advanced, state-of-the-art weapons/equipment</b> | Military, Technical         | Long-standing | Medium (for advanced Russian systems) | This might delay or disrupt Iran’s assimilation of advanced Russian weapons such as combat aircraft and SAM systems and require long-term Russian support.                                                                                                                                                                                                                                                                                                                                                    |
| <b>Iran’s inability to pay</b>                                                                             | Economic, Financial         | Long-standing | Medium (declining importance)         | March 2024 DNI threat assessment: “Budgetary constraints will slow the pace and scale of [Iran’s conventional weapons] acquisitions.” However, while Iran’s inability to pay was an important constraint on occasion in the past, it may be less important now that it can barter or conduct arms trade with Russia via credit.                                                                                                                                                                               |

|                                                                                               |                     |               |                                                                                |                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------|---------------------|---------------|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Russia's membership in multilateral export control regimes / nonproliferation treaties</b> | Legal, Political    | Long-standing | Medium (less important since February 2022)                                    | This might limit what technologies Russia might transfer to Iran. However, this constraint will be less important if Moscow relaxes its export controls on transfers to Iran.                                                                                                                                                                  |
| <b>Russia's relations with GCC, Israel</b>                                                    | Political           | Long-standing | Medium (still important, at least for GCC)                                     | Russia has previously been reluctant to supply Iran with high-end systems, given concerns over antagonizing Israel or the GCC states. In the CNS expert workshop in April, several participants argued that Russia's ties with Saudi Arabia/UAE will likely cause Russia to continue to exercise some caution.                                 |
| <b>Historical mistrust</b>                                                                    | Contextual          | Long-standing | Medium (anecdotal evidence that of decreasing importance)                      | Commenting on the visit of an Iranian delegation to the Alabuga Special Economic Zone in February 2023, Russian defense analyst Yuri Lyamin noted that the head of the IRGC Aerospace Force's Research and Self-Sufficiency Jihad Organization participated, which "speaks of a very high level of trust between the parties."                 |
| <b>Russia's relationship with the United States; U.S./West use/threat of sanctions</b>        | Political           | 1990s         | Low (since February 2022)                                                      | --Geranmayeh/Grajewski: "Previously, the West managed to negotiate with Moscow to isolate Tehran, but this is clearly not possible now given Russia's aggression against Ukraine."<br>--Past examples: 1995 Gore-Chernomyrdin agreement; Moscow's halt to the transfer of the S-300 SAM in 2010.                                               |
| <b>Russian concerns with international backlash</b>                                           | Reputational        | Constant      | Low (since February 2022)                                                      | Today, Moscow is likely less concerned with international criticism for providing assistance to Iran.                                                                                                                                                                                                                                          |
| <b>Russian bureaucratic politics</b>                                                          | Bureaucratic, Legal | Constant      | Low (less important with greater institutionalization of defense relationship) | Ali Abdollahi, deputy chief of Iran's Armed Forces General Staff: "I see very good prospects and directions for the development of bilateral cooperation. Of course, some of Russia's internal rules are very demanding, but I think that it is possible and necessary to find the necessary solutions in order to speed up this cooperation." |

|                                                                                 |                     |               |                              |                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------|---------------------|---------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Russian concerns with giving Iran access to advanced military technology</b> | Multiple            | Long-standing | Unclear                      | Iran might reverse engineer Russian weapons, systems, components, equipment (for its own use and for transfers and exports).                                                                                                                                  |
| <b>Russian sense of enduring military-technological superiority</b>             | Military, Technical | Long-standing | Unclear (anecdotal evidence) | In the CNS expert workshop in April, several participants argued that Russia's defense establishment continued to look down upon Iran as a defense partner, suggesting that this attitude will continue to limit the depth and breadth of future cooperation. |

Sources: “ezharat-e Zarif darbarezha-ye hamkari-ha-ye Iran va Rusieh dar hozeh-ye Nezami” [Zarif’s statements about cooperation between Iran and Russia in the military field], *Hamshahri Online*, September 24, 2020, <https://www.hamshahrionline.ir/news/551949/>; U.S. Office of the Director of National Intelligence, “Annual Threat Assessment of the U.S. Intelligence Community,” February 5, 2024, <https://www.dni.gov/files/ODNI/documents/assessments/ATA-2024-Unclassified-Report.pdf>, p. 19; Yuri Lyamin, “6000 dronov” [6000 drones], Blog Post, February 6, 2023, <https://imp-navigator.livejournal.com/1105343.html>; Geranmayeh and Grajewski, “Alone together: How the war in Ukraine shapes the Russian-Iranian relationship”; “Interview with Deputy Chief of the General Staff of the Armed Forces of the Islamic Republic of Iran, Brigadier General Ali Abdollahi” (in Russian), *Natsionalnaya Oborona*, No. 2, February 2023.

## Channels and actors

### Channels

During the 1990s and 2000s, Iran-Russia defense cooperation was guided in large part by high-level agreements and joint military cooperation commissions (Channel 1). However, lower-level Iranian entities also reportedly sought and received assistance and expertise from individual Russian entities and individuals—for example, missile and CBW technology—either approved by Moscow (Channel 2) or that skirted Russian export controls (Channel 3).<sup>163</sup> Reported missile technology transfers from Russian entities and individuals to Iran in the 1990s that either avoided Russian export controls or that Russian authorities ignored are an example of cooperation conducted through Channel 3.<sup>164</sup> Unrelated to Russia, two other prominent examples involved Iran’s illicit acquisition of Kh-55 cruise missiles from Ukraine in 2001<sup>165</sup> and Iran’s unsuccessful attempt to illicitly obtain Kh-31 cruise missile components, similarly from Ukraine, in 2018.<sup>166</sup>

Since the 2010s and especially after February 2022, most—if not all—bilateral military-technical cooperation appears to have been discussed, negotiated, and implemented via Channel 1 through the Iran-Russia Joint Military Cooperation Commissions<sup>167</sup> and in high-level bilateral meetings at the levels of presidents, national security council heads, defense ministers, chiefs of general staff, and other high-level military and defense-industrial officials.<sup>168</sup> This channel includes what Iranian officials refer to as “defense diplomacy” (*diplomasi-e defai*)<sup>169</sup> and “technology diplomacy” (*diplomasi-e fanavari*).<sup>170</sup> Channel 1 also includes Iranian and Russian participation in defense exhibitions and conferences in their countries.<sup>171</sup> Channel 2 (low-level, approved cooperation) appears to be less important, but probably would be more difficult to detect, especially in open sources; as will be shown later, it may increase in the future, should the defense relationship undergo further

institutionalization. With Russia's declining commitment to export control and nonproliferation regimes, illicit cooperation (Channel 3) should become less salient because exporters would not need to find ways to skirt controls that the government is not enforcing.

The agreements that have guided Channel 1 cooperation since 2022 have included the 2015 military and defense cooperation agreement mentioned above, a 2023 security-intelligence cooperation agreement,<sup>172</sup> a 2023 agreement on improving cooperation between the two sides' ground forces,<sup>173</sup> and a 2024 memorandum of understanding (MOU) to increase cooperation in unspecified "strategic" areas.<sup>174</sup> During 2021-2024, the two sides have worked to finalize a strategic long-term (20-year) cooperation agreement—to include military and military-technical cooperation—that will replace the 20-year cooperation agreement from 2001. As of mid-June 2024, this process was on hold due to unspecified issues faced by Tehran, but both sides appeared confident that it would soon resume.<sup>175</sup> Iranian delegations have also held bilateral meetings with Russian counterparts when attending the annual Moscow Security Conference and "Army" Forum.<sup>176</sup>

The Iran-Russia Joint Military Cooperation Commission reportedly meets every year in Tehran or Moscow and determines the annual programs of bilateral defense cooperation.<sup>177</sup> Assuming it operates similarly to the two countries' Joint Economic Cooperation Commission and High Commission on Technology Cooperation, the Joint Military Cooperation Commission probably addresses issues such as negotiating road maps for long-term cooperation, including specific projects to implement; creating specialized committees and working groups (co-led by Iranian and Russian officials) that negotiate agreements and MOUs on specific topics of cooperation; concluding contracts to implement the projects; and reviewing the status of agreed areas of cooperation and addressing any problems.<sup>178</sup>

### Iranian actors

The Iranian actors are the organizations (and key individuals linked to them) that are involved in negotiating, overseeing, and implementing military-technical cooperation with Russia, either at the higher political/command level or the implementation level. (See also Figure A1 in the Appendix.)

**Iranian political/command-level actors:** This level includes the higher-level Iranian political and military actors involved in the overall crafting of national policies and strategies, and in negotiating and overseeing military-technical cooperation with Russia via Channel 1. Cooperation at this level can include meetings of political and military leaders as well as Iran-Russia joint commissions. Key Iranian political/command-level actors that are likely involved in Iran-Russia defense cooperation—either captured in reporting or suspected based on their organizational functions—include the following:

- Office of the Supreme Leader: As the ultimate decision maker in Iran and the commander-in-chief of the armed forces, Supreme Leader Ali Khamenei would make the top-level decisions regarding Iran-Russia defense cooperation, with inputs from key defense and foreign policy advisors.<sup>179</sup> In 2019, Iranian Armed Forces General Staff (AFGS) Chief Mohammad Bagheri stated that Khamenei attached special importance to the development of relations with Russia.<sup>180</sup>
- Supreme Council for National Security (SCNS): The SCNS, which has a Defense Committee, determines and coordinates Iran's defense-security policies—approved by

the supreme leader—and would likely approve and coordinate high-level policy and strategy related to Iran-Russia defense cooperation.<sup>181</sup> The SCNS secretary—previously Ali Shamkhani and currently Ali Akbar Ahmadian—has held discussions with his Russian counterpart in recent years to expand security cooperation,<sup>182</sup> and SCNS officials have been involved in negotiations with Russia on weapons transfers.<sup>183</sup>

- Office of the President: The death of President Ebrahim Raisi (and Foreign Minister Hossein Amir-Abdollahian) in May 2024 and the subsequent surprise election of reformist candidate Masoud Pezeshkian to the presidency on July 6 likely will not significantly impact Iran-Russia defense cooperation, since the supreme leader, SCNS, and high-level military officials are the most important strategic decision makers on these matters.<sup>184</sup> While President Pezeshkian may enjoy leeway to pursue modest economic reforms and social liberalization, and while it cannot be excluded that Iran under him may seek to revive diplomacy on the nuclear dossier and sanctions relief with the West after the November 2024 U.S. presidential elections, Iran's regional policy and its alignment with China and Russia are unlikely to fundamentally change.
- Defense Ministry: Although the defense minister is technically part of the president's cabinet, the Defense Ministry is for all intents and purposes a military organization and official member of Iran's armed forces, according to Iranian laws.<sup>185</sup> The ministry, which is responsible for supporting Iran's armed forces, oversees the various organizations that conduct R&D and production of weapons and equipment and that would be involved in implementing cooperation with Russia.
- Armed Forces General Staff (AFGS) and Khatemolaniah Central Headquarters (KCHQ): The AFGS and its direct counterpart, the KCHQ, are the highest-level military organizations in Iran, reporting to the supreme leader. The AFGS is responsible for policymaking, administration, and coordination for all of Iran's armed forces,<sup>186</sup> including on military strategies and plans as well as defense science and technology (S&T), research, and production activities. In this role, the AFGS would likely oversee and coordinate operational and technical aspects of Iran-Russia military cooperation. The KCHQ is the country's highest operational command of the armed forces, including command of crisis and wartime operations, other military operations, and military exercises.<sup>187</sup> In this role, the KCHQ would likely be involved in operational aspects of Iran-Russia military cooperation.
- IRGC and Artesh: As Iran's two parallel military combat organizations, the IRGC and Artesh have been involved in various aspects of military cooperation with Russia. The IRGC and Artesh oversee their parallel combat forces—air, air defense, naval, and ground—and the IRGC also controls its paramilitary Quds Force. The two organizations also oversee their own Research and Self-Sufficiency Jihad Organizations (RSSJOs) that are involved in weapons R&D and production, separate from the Defense Ministry.

For a detailed overview of these political/command-level actors, see also Table A2 in the Appendix.

**Iranian implementation-level actors:** This level includes the lower-level military, defense-industrial, and other organizations that have been reported or assessed to conduct defense cooperation with Russia. Cooperation at this level can include meetings of individual organizations as well as joint working groups and specialized committees under the framework of the high-level Iran-Russia joint commissions and agreements. Key actors that might be involved in Iran-Russia cooperation—either captured in reporting or suspected based on their organizational functions—include:

- Office of the President: Entities under the Office of the President have conducted cooperation with Russia, including the Department (Vice President) for S&T and Knowledge-Based Economy, the AEOL, and the ISA.
- Defense Ministry: Several Defense Ministry departments and organizations have been involved in military-technical cooperation with Russia and several more could work with Russia, depending on the future scope of cooperation. These entities include departments related to research, industries, and international affairs, as well as the Defense Ministry's defense-industrial organizations that would collaborate on UAVs, ballistic missiles, and other weapons and technologies.
- IRGC and Artesh: The IRGC Aerospace Force and its RSSJO have reportedly collaborated with Russia—including on Iranian UAV transfers and training as well as negotiations on ballistic missiles—and other IRGC and Artesh organizations could work with Russia on operational and technical issues, depending on the future scope of cooperation.
- Private companies: Iranian knowledge-based (*danesh-bonyan*) companies have worked with Russia on space technology—for example, to have Russia launch privately developed Iranian satellites<sup>188</sup>—and others could work with Russia in key technologies such as UAV or cruise missile engines as cooperation develops.

For a detailed overview of these implementation-level actors, see also Table A3 in the Appendix.

These Iranian implementation organizations execute work under contracts finalized as part of cooperation established under Channel 1. However, they can also conclude contracts and orders with Russian companies to purchase technologies that support Iranian R&D and production programs (unrelated to the higher-level cooperation) under Channel 2, separate from the Channel 1 cooperation. With increasing defense ties and a possible loosening of Russian export controls on sensitive technologies to Iran, we could see an expansion of such Iranian purchases from Russian companies to support Tehran's own weapons programs.

## Russian actors

The Russian actors are the organizations (and key individuals linked to them) that are involved in negotiating, overseeing, and implementing military-technical cooperation with Iran, either at the higher political/command level or the implementation level. (See also Figure A2 in the Appendix.)



**Russian political/command-level actors:** This level includes the higher-level Russian political and military actors involved in the overall crafting of national policies and strategies, and in negotiating and overseeing military-technical cooperation with Iran via Channel 1. Key Russian political/command-level actors that are likely involved in Iran-Russia cooperation—either captured in reporting or suspected based on their organizational functions—include the following:

- Presidential Administration: The president of the Russian Federation is the ultimate decision maker in Russia and the commander-in-chief of the armed forces, and would make the top-level decisions regarding Iran-Russia military cooperation, with inputs from his key military, defense, and foreign policy advisors.
- Ministry of Defense: The Ministry of Defense plays a key role in negotiating and overseeing defense cooperation with Iran. In September 2023, Defense Minister Sergey Shoigu led a Russian delegation to an IRGC defense exhibition in Tehran, underscoring the ministry's role in weapons procurement from Iran.
- Ministry of Foreign Affairs; other ministries: The Russian Foreign Ministry is involved in negotiating, deciding, and overseeing aspects of military-defense cooperation with Iran. For instance, it is involved in talks on the planned long-term strategic cooperation agreement. Similarly, it signed the “Declaration on means of counteracting and compensating for the negative consequences of sanctions” with its Iranian counterpart in December 2023. Overall, however, the Foreign Ministry's role in shaping defense cooperation has probably decreased since February 2022, given the reduced focus on ensuring compliance with international export controls and nonproliferation norms. Russian ministries involved in the Joint Economic Commission with Iran may also be involved in cooperation that has military dimensions and implications for defense cooperation. The Joint Economic Commission has 20 working groups, on topics such as transport, information technologies, trade and investment, and science and education. Cooperation in specific areas can also involve other ministries. Russia's Ministry of Digital Development, Communications and Mass Media, for instance, liaises with Iran on cooperation in the field of AI.<sup>189</sup>

**Russian implementation-level actors:** This level includes the lower-level military, defense-industrial, and other organizations that have been reported or assessed to conduct military cooperation with Iran. Key implementation actors that might be involved in Iran-Russia cooperation—either captured in reporting or suspected based on their organizational functions—include the following:

- Ministry of Defense: The Ministry of Defense is key to cooperation with Iran not only at the level of political decision making but also implementation. Deputy Defense Minister Alexander Fomin is responsible for bilateral defense cooperation with Iran (among other countries) and has led Russian delegations to discuss military-technical cooperation with Iranian counterparts.<sup>190</sup>
- General Staff of the Armed Forces: Russia's chief of the General Staff is involved in overseeing operational aspects of military cooperation with Iran. Valery Gerasimov gained considerable experience in coordinating with Iran during Russia's military campaign in Syria from September 2015. Gerasimov and Iran's AFGS chief (or their

deputies) have met on various occasions to discuss military cooperation between the armed forces of the two countries.<sup>191</sup>

- Federal Service for Military-Technical Cooperation (FSMTC): The FSMTC is the federal executive body responsible for control and oversight in the field of military-technical cooperation between Iran and Russia. Led by Dmitry Shugaev, the FSMTC is managed by the president and subordinate to the Defense Ministry, which coordinates and controls its activities.<sup>192</sup>
- Rosoboronexport: Rosoboronexport is Russia's official state intermediary for the export and import of military and dual-use products, technologies and services. It is part of Rostec State Corporation, a Russian state-owned defense conglomerate. A Rostec representative office operates in Iran. Its stated mandate is to "ensure the interests of Rosoboronexport" in Iran.<sup>193</sup>
- State and private companies: Various subsidiaries of Rostec are likely involved in military-technical cooperation with Iran. Those include, among others, Kamaz,<sup>194</sup> Uralvagonzavod,<sup>195</sup> and United Aircraft Corporation.<sup>196</sup> Other companies include Almaz Antey,<sup>197</sup> Tactical Missiles Corp., and United Shipbuilding Corp.<sup>198</sup>

### Growing institutionalization

We observe a trend of growing institutionalization<sup>199</sup> in contacts between these various Iranian and Russian actors. Indicators of this trend include a general increase in numbers of mutual visits and high-level engagements; work on a new strategic cooperation agreement to replace the one from 2001; forays into joint production of weapon systems; and joint efforts to develop the International North-South Transport Corridor, which will provide an infrastructural boost to defense cooperation.

Importantly, should Iran and Russia further institutionalize their defense relationship—especially with expanding military-technical cooperation—this may lead to an expansion of activity, both under Channel 1 and Channel 2. With the increasing scope and depth of defense cooperation, there may be more contracts between Iranian and Russian companies that are driven by Channel 1 top-down cooperation, including areas agreed upon under the high-level joint commissions and agreements. We may also see an expansion of contracts and purchase orders by Iranian companies to procure Russian technologies to support Iranian R&D and production programs that are not part of the Channel 1 cooperation. This might be enabled by Russian export control authorities allowing expanded exports of controlled technologies—such as those listed under the MTCR and WA—to Iran as part of the enhanced defense relationship. (Activity under Channel 1 and Channel 2 can be viewed as roughly analogous to the U.S. Department of Defense's Foreign Military Sales (FMS) channel versus Direct Commercial Sales (DCS) channel for exporting defense goods. FMS cooperation—similar to Channel 1—is conducted as part of an official government-to-government agreement, while DCS, like Channel 2, is done at the commercial level and approved by U.S. export control authorities.) Lastly, expansion of Channel 2 activities might also include joint Iran-Russia efforts to procure commercial and dual-use technologies from third countries such as China.

Here is a notional example to illustrate this possible expansion: In a future meeting of the Iran-Russia Joint Military Commission, the two sides agree to include cruise missile cooperation as a topic on the agenda and then create a cruise missile working group under the

auspices of the commission. They then agree to establish a program (and negotiate a contract) to transfer the production technology of a Russian supersonic cruise missile to Iran. The lower-level Iranian cruise missile producer tasked with implementing this program might then purchase various items (components, materials, equipment) from Russian companies necessary to support this effort. In addition—and unrelated to the commission’s work—an Iranian cruise missile producer, encouraged by the enhanced Iran-Russia relationship, might seek to purchase various items from Russian companies—such as missile engine or guidance components—to support Iran’s indigenous R&D and production programs (unrelated to Russia), with those purchases getting approved by Russian export control authorities. In that way, increased institutionalization might lead to an expansion of Iranian procurement activity under Channel 2, both that driven by Channel 1 cooperation and that driven by the needs of Iran’s internal programs.

## Future Horizons

### Extrapolation of current trends, drivers, and constraints

The review of military-technical support that Iran and Russia have provided to each other since February 2022—when augmented with the assessment of drivers and constraints—suggests certain trend lines going forward. In other words, one way of thinking about the future contours of Iran-Russia defense cooperation is to extrapolate from current trends, assuming that those will continue unless major developments interfere.

Iran-Russia defense cooperation since February 2022 has been characterized by a number of key trends:

- **Expansion of cooperation into new areas (changes in *kind*):** Since 2022, Iran and Russia have cooperated in entirely new areas. Those have included: Iran’s provision of UAVs, UAV production technology, and UAV training to Russia; negotiations to transfer Iranian ballistic missiles; Iran’s provision of expertise to Russia on evading and overcoming sanctions; and Iran’s provision of ammunition, artillery shells, rockets, and glide bombs to Russia.
- **Acceleration of cooperation in existing areas (changes in *degree*):** In some areas in which Iran and Russia already used to engage prior to 2022, cooperation has accelerated or deepened (compared to the 2000s and 2010s). Those have included: electronic warfare, space, cyber, military-to-military engagement, and possibly Russian support for Iran’s missile programs.
- **End of patron-client dynamic:** The Iran-Russia military-technical relationship is no longer marked by a patron-client dynamic, since Iran has emerged as an important source of material support and expertise to Russia.
- **Growing institutionalization:** Iran and Russia have taken steps to institutionalize their defense relationship, as detailed in the previous section. Some steps driving growing institutionalization were initiated after February 2022, while other efforts have been underway since the mid-2010s.

Moreover, as became evident in the overview of historical drivers and constraints shaping the bilateral defense relationship, **key drivers have increased in importance** since February 2022. Those have included a shared animosity vis-à-vis the United States and the international order it promotes (including in the Middle East), and mutual interest in military technology that the other side has to offer, among others. Meanwhile, some of the **key constraints** previously affecting the defense relationship have arguably **decreased in importance** since February 2022. Those have included: Russian susceptibility to U.S. or Western pressure, causing it to limit cooperation with Iran; Russia's concerns with adhering to nonproliferation norms and export control regimes; Iran's inability to pay for Russian technology; and historical mistrust. That said, certain constraints—chiefly both countries' supply chain vulnerabilities due to export controls and sanctions; Russia's aversion to antagonizing the GCC, and possibly Russia's enduring technological superiority in key areas—may continue to act as brakes on the defense relationship.

### **Neither a transactional relationship nor a military alliance**

We suggest that, barring significant developments or “black swan” events—such as regime change in either Iran or Russia, or the outbreak of a Middle Eastern war engulfing Iran—these trend lines, drivers, and constraints should continue to characterize the bilateral defense relationship over the coming three to five years. Enduring constraints should preclude the formation of a full-fledged military-strategic partnership and especially a military alliance. That said, present trend lines suggest that the relationship is no longer purely transactional and will probably not lapse back into the patron-client dynamic that characterized it prior to 2022. An additional indicator that suggests that the defense relationship has exceeded transactionalism is the occurrence of non-quid-pro-quo engagements. Tehran has already accrued considerable non-military benefits from its provision of drones to Russia—such as support for its accession to the BRICS and SCO and Russia's diplomatic shielding of Iran's high nuclear latency—that make the relationship more than just transactional from Iran's perspective.

### **Inventories of future needs and capabilities**

In addition to extrapolating from current trend lines, it is possible to conceive of the future defense relationship as being shaped by Iranian and Russian *anticipated* military needs (including needs that may not shape weapons procurement, defense production, or military planning and force posture today, but may do so in the future, given Iranian or Russian assessments of the future of warfare). This section presents “inventories” of important Iranian and Russian needs, as well as their capabilities (strengths) in key areas. These inventories can help analysts and policy makers think about what type of assistance Russia may seek from Iran in the future (that is, where Russian needs and Iranian capabilities “match”), what type of assistance Iran may seek from Russia (that is, where Iranian needs and Russian capabilities “match”), or what areas they may pursue jointly, either to benefit from advantages they both enjoy or to jointly address shared needs.

#### **Iran's inventory of needs**

In drawing up an Iranian inventory of military-technical needs for the coming three to five years, we focus on those areas that would be of greatest concern to the United States and its allies:

- Weapons and technologies that would enhance Iran’s asymmetric strategy and capabilities, especially those important to deterring or fighting the more likely conflicts with the United States and Israel in the aerospace and naval domains. These include capabilities important for Iranian retaliatory missile/drone strikes against U.S. or Israeli military bases or other targets, air defense against U.S. or Israeli air strikes targeting Iran’s nuclear or other sensitive facilities, a missile/drone-based conflict with Israel, and a naval conflict with the United States in the Persian Gulf or Gulf of Oman.
- Weapons and technologies that Iran might transfer to its Axis of Resistance partners—especially Lebanese Hezbollah, the Yemeni Houthis, and Iraqi militias—that could threaten U.S. and allied security interests.

Over the past decades, Iran has worked to refine its asymmetric strategy and associated capabilities<sup>200</sup> to enhance its deterrence and warfighting capabilities vis-à-vis the United States and Israel. Especially since the 2010s, these efforts have included an increased role for offensive capabilities—especially IRGC missiles and UAVs.<sup>201</sup> In 2016, Supreme Leader Khamenei called for an increase in offensive capability (*tavan-e tahajomi*) on the grounds that it was Iran’s “inalienable right” to ensure its security by increasing both offensive and defensive power.<sup>202</sup>

With this focus, most of the assessed technical and operational needs going forward would be for Iran’s Defense Ministry—for R&D and production—and the IRGC, for operational use, as well as for its own R&D and production. However, some needs may also apply to the Artesh, especially in niche areas related to its emerging long-range strike capabilities and key elements of its air, air defense, and naval forces that support Iran’s asymmetric strategy. To minimize its reliance on Russia, Iran in most cases will probably prefer receiving Russian transfers of technology and expertise that enhance Iranian domestic R&D and production programs, rather than complete systems. However, Iran will likely seek complete systems from Russia in limited cases—including advanced aircraft and missiles—especially when Iranian officials assess that Iran would not be able to develop such systems domestically. Also, Iran can attempt to acquire production technology for the systems or reverse engineer the purchased systems and their key subsystems.

While not a focus of this report, in addition to bolstering its asymmetric capabilities, Iran for decades has also worked to modernize its “traditional” military forces across the board (for example, Artesh ground, naval, and air forces) and almost certainly will continue to do so—albeit as a lower priority—including with Russian help.

We group Iranian military-technical needs into three main areas:

**1. Long-range strike (against land and naval targets):** Iran might seek assistance from Russia to improve key technical and operational elements of Iran’s targeting cycle (“kill chain”) for long-range strikes with ballistic missiles, cruise missiles, uncrewed aerial and naval systems, and even glide bombs. This might include seeking enhancements to its identification and analysis of potential targets; real-time targeting (detection, identification, tracking) of mobile targets; enhancing the survivability of its launch operations; evading or penetrating adversary air and missile defenses; overcoming enemy electronic warfare/jamming; more accurately striking targets; and post-strike damage assessment. Iran may also seek advanced technologies—such as seekers, guidance and control components, and engines—to improve the capabilities of its missiles and UAVs. Also, over the years,

Iranian officials have identified important technical and operational parameters for long-range strike weapons, which provide hints about the type of support Iran may seek from Russia. (See “Key Technical and Operational Parameters Driving Iranian Needs for Long-Range Strike” in the Appendix.)

Iran will probably seek to apply lessons from the Russia-Ukraine war, either observed from afar or obtained through direct interactions with Russian officials. These may include technical and operational insights from Russia’s successes and failures in long-range strikes against Ukraine and the performance of Iranian and Russian systems against Western-made air and missile defenses. These lessons might also include Russian insights from its employment of waves of missiles/UAVs from multiple platforms and locations; standoff air launches of cruise missiles, air-launched ballistic missiles (ALBMs), and glide bombs; and combining types, routes, and trajectories of different strike systems.

**2. Air defense:** Iran might seek assistance from Russia to improve key technical and operational elements of its “air defense cycle” (*cherkheh-ye padafand-e havai*) to protect its nuclear facilities as well as military, defense-industry, and other sensitive sites from a U.S. or Israeli air attack. This might include seeking Russian advanced SAMs, radars, or their associated technologies, to improve key areas of Iranian air defense capabilities to detect, identify, track, and engage air-based targets such as U.S. and Israeli stealth aircraft, cruise missiles, and UAVs. Iran might also seek to apply Russian tactics and acquire Russian technologies related to electronic warfare to protect itself from U.S. or Israeli air attack.

**3. Naval denial:** Iran might seek Russian assistance to improve key elements of the surface and subsurface attack and defense capabilities that underpin its asymmetric naval strategy. This might include assistance to Iran’s development of improved anti-ship ballistic missiles, cruise missiles, UAVs, and uncrewed surface and subsurface naval systems, and possibly the purchase of more advanced Russian systems and/or their key technologies, such as propulsion. Iran might also seek advanced submarines, torpedoes, and mines and/or their key technologies. Importantly, Iran may seek improvements to its over-the-horizon (OTH) situational awareness and ability to target enemy naval vessels located in the Persian Gulf, in the Gulf of Oman, and even further out into the Indian Ocean.

Russia could conceivably help Iran meet its technical and operational needs in the three areas above, given Moscow’s capabilities in long-range strike, air defenses, and naval systems, by either transferring complete systems, providing technology transfers, or sharing technical and operational expertise. For further detail on these needs, see Table A4 in the Appendix.

In addition, Iran might seek Russian assistance in applying artificial intelligence (AI) to enhance the capabilities of its ballistic missiles, cruise missiles, UAVs, uncrewed naval systems, and electronic warfare systems. Iran’s stated interests have included using AI to enable swarming attacks with UAVs, formations of uncrewed naval systems, long-range anti-ship attacks with UAVs, hybrid (*tarkibi*) attacks using multiple types of systems, alteration of missile and UAV trajectories during flight, avoidance of radars and air defense sites, improving target detection and recognition, and sharing of data among strike systems.<sup>203</sup>

A few other areas are important to consider for potential high-impact Russian military-technical cooperation with Iran, including Russian assistance that would enhance Iran’s suspected hedging strategies and capabilities for deterrence and compellence. Also, there are

low-probability/high-impact areas related to Russia assisting a potential future Iranian effort to develop nuclear weapons, as discussed further below.

**Enhancing Iran's hedging strategies and capabilities:** Iran might seek Russian technology or expertise that would support Tehran's suspected hedging strategies in key weapons technologies of concern, in order to enhance Iranian asymmetric deterrence and compellence. This would help Iran enhance its latent capabilities—without crossing the threshold to actual weaponization—in areas such as the following:

- Nuclear hedging:<sup>204</sup> Technology/expertise related to overt hedging (for example, enriching uranium or converting uranium into metal), or—less likely—related to covert hedging through nuclear weapon-relevant technology/expertise (for example, related to developing a highly reliable weapon design).
- Intermediate-range ballistic missile (IRBM)/ICBM hedging: Technology/expertise related to suspected Iranian overt hedging via its SLV development, including that related to large storable liquid rocket engines and cryogenic liquid rocket engines. Although it is less likely, Iran could also seek support for covert hedging through acquiring IRBM/ICBM-specific technology/expertise from Russia such as that related to developing long-range missile re-entry vehicles.
- Possible anti-satellite (ASAT) hedging: Technology/expertise important to developing direct-ascent ASAT missile systems, such as tracking satellites, upper-stage maneuverable propulsion systems, space-based seekers, and even the air launch of ASAT missile systems.<sup>205</sup> Also, Iran could seek Russian technology/expertise to enable it to develop satellites able to modify their trajectories to collide with other satellites in orbit (that is, “co-orbital” ASAT systems).
- Possible CBW hedging: Technology/expertise related to Iran's suspected CBW hedging, including enhancing Tehran's alleged “on demand” capability to produce CBW if Iranian leaders decided to do so.<sup>206</sup>

Russia could conceivably help Iran enhance its hedging strategies and capabilities in one or more of the areas above, given Moscow's more advanced capabilities in the nuclear, missile, ASAT, and CBW-related sectors, whether through supplying key technologies or sharing technical expertise.

**Nuclear weaponization:** Iran might conceivably seek Russian technology/expertise to develop and produce nuclear weapons, if Tehran decided to do so. This might include help with validating or improving Iran's weapon design, producing highly enriched uranium components, and miniaturizing missile warheads.

## **Iran's inventory of strengths and capabilities**

While Iran continues to lag behind Russia in terms of military-technical capabilities, it has over the past decades developed its own strengths in niche areas, some of which might be of interest to address Russia's needs. Examples include the following:



- The development and production of relatively inexpensive ballistic missiles, cruise missiles, and UAVs;
- Expertise on reverse engineering weapon systems and their key technologies;
- The transfer of production technology of missiles and UAVs to state or non-state actors;
- Technical and operational insights gained from the use of missiles and drones by Iran's military as well as its Axis of Resistance partners; and
- Illicit procurement of controlled and commercial technologies.

For a detailed overview of Iran's inventory of strengths and capabilities, see also Table A5 in the Appendix.

### Russia's inventory of needs

In drawing up a Russian inventory of military-technical needs for the coming three to five years, we focus on two categories: first, capabilities Russia will need as it pursues a protracted military campaign against Ukraine (assuming that the war continues); and second, capabilities Russia will need based on Russian defense planners' assessments of the future of warfare.

### Short-/medium-term needs for Russia's military campaign against Ukraine

While cognizant of the difficulties in analyzing Russia's military capabilities (and gaps that would result in needs) with any precision,<sup>207</sup> we assess Russia's most acute needs for its Ukraine campaign to broadly relate, over the upcoming period, to the following domains:

- Ammunition;<sup>208</sup>
- Ground warfare equipment (main battle tanks, armored personnel carriers, infantry fighting vehicles);
- Western-sourced industrial equipment and components (microchips; computers, electronic and optical devices; fabricated metal products, etc.);
- UAVs and missiles; and
- Knowledge of reverse engineering of Western systems.

Russia could realistically turn to Iran to meet its needs in all of these areas except, perhaps, ground warfare equipment.<sup>209</sup> As Russia ramps up its production of Iranian-designed drones at Alabuga, there is the question of whether Moscow will still need Tehran's support on UAVs—full systems, key components, production technology, training—going forward. Indeed, Russia already enhanced the original Shahed drones it received from Iran. Moreover, Russia's own UAV industry has undergone significant innovation over the past two years.<sup>210</sup> Still, Iran's own growing drone and missile capabilities will likely remain a source of some Russian interest—for reasons of quantity if not quality—especially with a view to obtaining joint production capabilities.<sup>211</sup> While Iranian (and North Korean) SRBMs lack the precision performance that Russian SRBMs have achieved, and notwithstanding Russian improvements in dynamic targeting over the course of the Ukraine campaign, it is also conceivable that Russia may turn to Iranian missiles for replenishing inventories, depending on the future course of its Ukraine campaign. Given ongoing difficulties with reverse engineering Western systems,<sup>212</sup> Russia may also benefit from Iranian assistance in this domain.

## **Medium-/long-term needs (beyond Russia’s military campaign against Ukraine)**

Looking beyond the military campaign against Ukraine, we turned to Russian assessments on the future of warfare to determine Russian medium-/long-term military-technical needs. Those needs relate to the following areas:

- Nuclear modernization;<sup>213</sup>
- Precision weapons that are faster, stealthier, longer range, and carry a higher payload (improvements sought include the use of advanced seekers, improved surface material on missiles, laser guidance, anti-jamming capabilities, sensors, and robust algorithms for precision strike);<sup>214</sup>
- Swarming tactics for uncrewed aircraft systems (UASs); integration of AI with UASs; counter-UAS capabilities;<sup>215</sup>
- AI;<sup>216</sup>
- Hypersonic technology; biotechnology, telecommunications, nanotechnology, quantum computing, stealth technology, laser weapons, and directed energy weapons;
- Command and control;<sup>217</sup>
- Space.<sup>218</sup>

During the expert workshop conducted for the purpose of this study, there was broad agreement among participants that Russian needs from Iran will arise mostly from pressures to replenish inventories and will extend to only a few niche areas of advanced Iranian technology. Overall, Iran will likely remain inferior to Russia in the production value of weapons and advanced technology of the types listed above. There is little to nothing that Iran has to offer Russia in areas such as AI or space, for instance.<sup>219</sup> That said, Russia may well turn to Iran in select areas where Iran boasts advantages—for instance, regarding technical and operational insights related to precision strike.

## **Russia’s inventory of strengths and capabilities**

Russia continues to surpass Iran in terms of military-technical strengths and capabilities in many areas, some of which it might be willing to leverage to address Iran’s needs. Examples of such areas may include, in theory, support for Iran’s nuclear, ICBM, and CBW capabilities. Russia also has the capability to assist Iran with enhancing its electronic warfare capabilities. By 2024, Russia reportedly had become effective at using jamming and spoofing to counter U.S.-supplied satellite-guided missiles, rockets, bombs, and artillery shells in Ukraine.<sup>220</sup> The extent to which Russia can support Iran’s ambitions in military applications of space over the medium term is an open question. While Russia tested an ASAT weapon (Nudol) in 2021 and is working on various (including laser-based) ASAT weapons,<sup>221</sup> its military space program is encountering considerable challenges.<sup>222</sup> Similarly, though the Russian military establishment is investing in AI research, development, testing and evaluation, international sanctions are constraining those efforts,<sup>223</sup> raising questions about the extent to which Russia would be able to meet Iran’s needs in the area of military applications of AI in the future.

## **Scenarios and triggers of “step changes”**

As argued above, the broad contours of the future Iran-Russia bilateral defense relationship can be forecast, if imperfectly, by extrapolating from current trend lines, drivers, and

constraints, while also taking into account specific future Iranian and Russian military needs that the other party might be willing and able to help meet.

In addition, it is worth listing future developments that may cause major disruptions in these trend lines—either by causing a breakdown in defense cooperation or, conversely, by resulting in qualitative or quantitative “step changes” in such cooperation. While studying the precise impact of each conceivable development on Iran-Russia cooperation goes beyond the scope of this study, the list below provides an overview of the types of developments that could have a significant impact and that analysts and policymakers should keep in mind:

- **Scenarios that could have an abrupt detrimental impact on cooperation:**  
A considerable cooling or break in relations could result from **regime change** in either Iran or Russia (which appears highly unlikely today).
- **Scenarios that could have an abrupt beneficial impact on cooperation:**
  - **Escalation in the Middle East**—for instance, a war between Israel and Lebanese Hezbollah, in which Russia might provide Iran with military materiel for Hezbollah, especially assuming that the United States comes to Israel’s aid. If Israel or the United States were to take military action against Iranian territory, Russia may also increase its defense support to Iran in the aftermath (though Russia will probably not enter a Middle Eastern war directly). The scope of any increased Russian support will, however, be contingent on the ongoing demands of its military campaign against Ukraine.
  - **Growing Chinese cooperation** with both Russia and Iran (and North Korea), which could result in synergies and could fill or compensate for Russian and Iranian gaps or weaknesses, and hence produce step changes in Iran-Russia cooperation down the line.<sup>224</sup>
- **Scenarios whose impact on Iran-Russia defense cooperation is highly contingent:**  
The impact of an end to the Russia-Ukraine war on defense cooperation is difficult to predict, since it would depend on several factors, including the terms on which the war would end, and the status of Russia’s forces and weapons inventories at that time.

## Conclusion

Since February 2022, the Iran-Russia defense relationship has undergone significant changes, moving past the previous client-patron dynamic and with cooperation changing both in *degree* and *kind*. In pre-existing areas of cooperation—such as electronic warfare, space, cyberspace, military-to-military contacts, and possibly Russian support for Iran’s missile programs—engagement has accelerated or deepened since 2022. Iran and Russia have also cooperated in entirely new areas. Those have included Iran’s provision of UAVs, UAV production technology, and UAV training to Russia, along with negotiations to transfer Iranian ballistic missiles and Iran’s provision of expertise to Russia on evading and overcoming the effects of sanctions. Iran’s delivery of ammunition, artillery shells, rockets, and glide bombs to Russia is also a new phenomenon.

Iran and Russia have taken steps to further institutionalize their defense relationship. Amid a general increase in numbers of mutual visits and high-level engagements among military and defense officials, the two countries are negotiating a new 20-year strategic agreement and

have made forays into joint production of certain weapon systems. Also, joint Iran-Russia efforts to develop the International North-South Transport Corridor and other economic projects require considerable investment, including in infrastructure, that will pay off in the medium to long term and should further boost defense cooperation.

What were historically key drivers of defense cooperation—a shared animosity toward the United States, or each side’s interest in military technology that the other side can offer—have *increased* in importance since Russia invaded Ukraine in February 2022. Key constraints—Russian susceptibility to U.S. or Western pressure, causing it to limit cooperation with Iran; Russia’s concerns with adhering to nonproliferation norms and export control regimes; Russian reputational concerns over collaborating with Iran; Iran’s inability to pay for Russian technology; and historical mistrust—have all become less relevant against the backdrop of growing Russian dependence on Iran and a shared Iranian-Russian animosity toward the West.

The present trend lines and drivers suggest that the relationship is no longer purely transactional and will probably not lapse back into the patron-client dynamic that characterized it prior to 2022, even if Russia’s military campaign in Ukraine were to end. Iran and Russia each have specific military-technical needs that the other might help meet. That said, beyond Russia’s campaign against Ukraine, Iranian needs from Russia will be greater than Russian needs for advanced technology from Iran. Moreover, some enduring constraints—chiefly both countries’ supply chain vulnerabilities due to sanctions, Russia’s aversion to antagonizing its Gulf Arab partners, and Russia’s enduring technological superiority in key areas—should preclude the formation of a full-fledged military-strategic partnership and especially a military alliance.

The study proposed a three-step methodology to think through the contours of bilateral defense cooperation over the next three to five years, by a) extrapolating from current trend lines, drivers, and constraints; b) drawing up inventories of future military needs for each country and identifying the areas in which the other country could help meet those needs; and c) accounting for events that may trigger non-linear changes in cooperation.

Regarding future Iranian and Russia military needs, we argued that Iran would most likely turn to Russia to elicit support on weapons and technologies that would enhance its asymmetric strategy and capabilities, as well as those that it might transfer to its Axis of Resistance partners. Those include long-range strike (against land and naval targets), air defense, and naval denial capabilities. In addition, Iran might seek Russian assistance in military applications of AI, in electronic warfare, and in enhancing its suspected nuclear, IRBM/ICBM, ASAT, and CBW hedging capabilities.

Russia, meanwhile, will likely rely on Iran for ongoing needs in its Ukraine campaign, including for ammunition, UAVs, potentially missiles, and expertise on or assistance with the illicit procurement of Western-sourced components. Even though Russia has successfully indigenized the production of Shahed drones (and made its own improvements), Iran’s growing drone capabilities will likely remain a source of Russian interest, especially with a view to obtaining joint production capabilities. It is also conceivable that Russia may turn to Iranian missiles, depending on the future course of its Ukraine campaign. Overall, Russian needs from Iran will probably arise mostly from pressures to replenish inventories and will only extend to select niche areas of advanced Iranian capabilities.

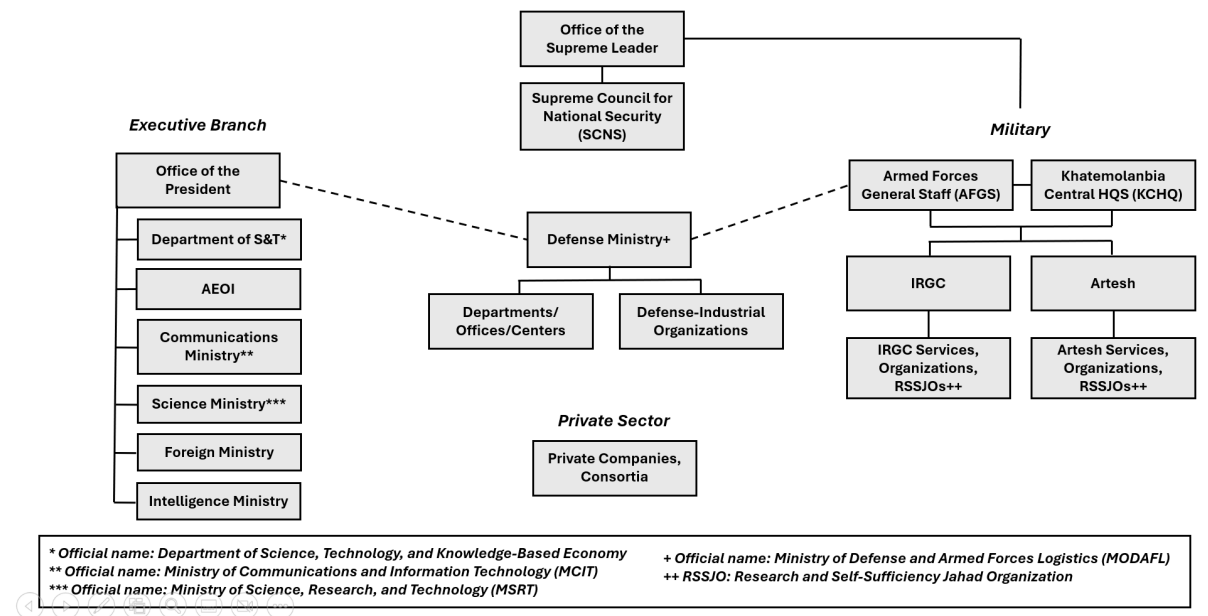
## About the Authors

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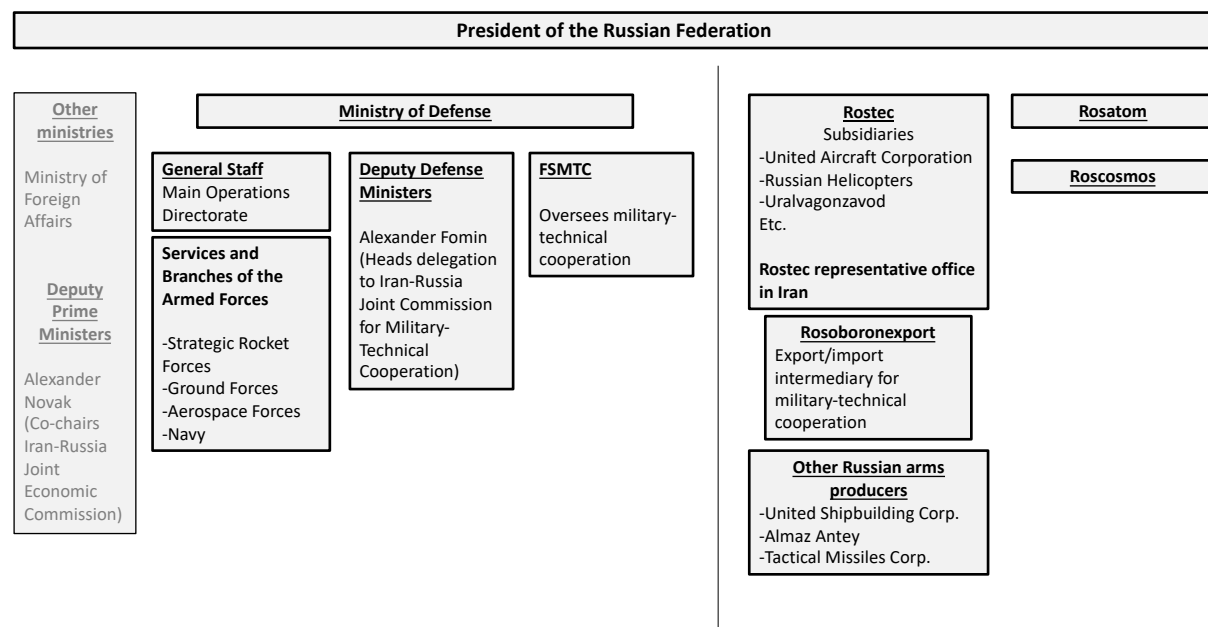
**Jim Lamson** is a senior research associate at CNS. His research focuses on Iranian weapons, space, and military issues, and Iran's security and arms control policies. Prior to joining CNS, he worked for 23 years as an analyst with the Central Intelligence Agency, focusing on Iranian weapons and military issues, and served for more than five years in the Middle East. Before that, he worked on nonproliferation issues at CNS, the Conference on Disarmament, the International Atomic Energy Agency, and U.S. Department of State. He holds an MA in international policy studies from the Middlebury Institute of International Studies at Monterey, an MS in national resource strategy from the National Defense University, and he is currently pursuing a doctorate in defense studies at King's College London.

## Appendix

**Figure A1. Iran-Russia Military-Technical Cooperation: Key Iranian Actors**



**Figure A2. Iran-Russia Military-Technical Cooperation: Key Russian Actors**



**Table A1. Summary of Pre-2022 Iran-Russia Military-Technical Cooperation**

| Area of Cooperation                                               | Examples                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Conventional Weapons: Ground, Aerospace, and Naval Domains</b> | Negotiations and Russian transfers of tanks, armored vehicles, anti-tank missiles, combat aircraft, air-to-air and air-to-surface missiles, anti-radiation missiles, helicopters, SAMs, electronic warfare (e.g., radars and jamming systems), submarines, and torpedoes; reported Iranian interest in Tu-22M bomber |
| <b>Missiles</b>                                                   | Russian low-level assistance in ballistic missile technologies; reported Iranian interest in Iskander-E and Tochka-U SRBMs, Yakhont and Granit ASCMs                                                                                                                                                                 |
| <b>UAVs</b>                                                       | Russian interest in acquiring Iranian UAV technology and joint UAV development                                                                                                                                                                                                                                       |
| <b>CBW Technology</b>                                             | Iranian efforts to acquire CBW technology and expertise                                                                                                                                                                                                                                                              |
| <b>Nuclear</b>                                                    | Russian assistance in areas of nuclear power plant and research reactor, nuclear fuel cycle technologies, training, possibly weaponization                                                                                                                                                                           |
| <b>Space</b>                                                      | Russian assistance in satellite development and space launch, reported access to Russian satellite images and to GLONASS for missile targeting                                                                                                                                                                       |

**Table A2. Key Iranian Political/Command-Level Actors Potentially Involved in Future Iran-Russia Military-Technical Cooperation**

| Political/Command Organization               | Selected Key Elements                                                                                                                                                                                                                                                                                                                                              | Examples of Key Officials                                                                                                                                                                                                                                                                                          |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Office of the Supreme Leader                 | Office of Military Advisors                                                                                                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>- Supreme Leader Khamenei</li> <li>- Head of the Office of Military Advisors: Ali Shahbazi</li> <li>- Senior military advisor: Sayyed Yahya Safavi</li> <li>- Advisor for Artesh affairs: Amir Hatami</li> <li>- Advisor for defense industries: Hossein Dehghan</li> </ul> |
| Supreme Council for National Security (SCNS) | <ul style="list-style-type: none"> <li>- SCNS Defense Committee</li> <li>- SCNS Staff for Countering Sanctions</li> </ul>                                                                                                                                                                                                                                          | <b>SCNS Secretary: Ali Akbar Ahmadian*</b>                                                                                                                                                                                                                                                                         |
| Office of the President                      | <ul style="list-style-type: none"> <li>- <b>Department of S&amp;T and Knowledge-Based Economy*</b></li> <li>- Ministry of Communications, which oversees the Iranian Space Agency (ISA)</li> <li>- Ministry of Science, which oversees Iran's state-run universities</li> <li>- <b>Ministry of Foreign Affairs*</b></li> <li>- Ministry of Intelligence</li> </ul> | <ul style="list-style-type: none"> <li>- <b>Interim president: Mohammad Mokhber*</b></li> <li>- Communications minister: Isa Zarepour</li> <li>- Science minister: Mohammad Ali Zolfigol</li> <li>- <b>Acting foreign minister: Ali Bagheri Kani*</b></li> <li>- Intelligence minister: Esmail Khatib</li> </ul>   |
| Defense Ministry                             | - Departments, offices, and centers involved in overseeing defense                                                                                                                                                                                                                                                                                                 | - <b>Defense minister: Mohammad-Reza Ashtiani*</b>                                                                                                                                                                                                                                                                 |



|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                          | R&D, production, and international cooperation<br>- Defense Ministry's R&D and production organizations                                                                                                                                                                                                                                                                                                                                                                                    | - <b>Deputy defense minister: Sayyed Hojatollah Ghoreishi*</b><br>(also the head of the board of directors of Qods Aviation Industries)<br>- Deputy defense minister for coordination: Mehdi Khajeh Amiri<br>- <b>Assistant to the defense minister for strategic affairs: Said Shabanian*</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Armed Forces General Staff (AFGS)        | - Departments and offices involved in overseeing military strategy and planning, defense R&D and production, and international cooperation<br>- <b>Department of International Cooperation*</b><br>- Operations departments/offices<br>- Department of Logistics and Industrial Research<br>- Logistics departments/offices<br>- <b>Industrial research departments/offices*</b><br>- Department of Science, Research, and Technology<br>- <b>Department of Intelligence and Security*</b> | - <b>AFGS chief: Mohammad Bagheri*</b><br>- <b>Head of the AFGS chief's office: Abolghasem Forutan*</b><br>- <b>AFGS deputy chief: Aziz Nasirzadeh*</b><br>- <b>AFGS deputy for coordination: Ali Abdollahi*</b><br>- <b>Deputy for international cooperation: Mohammad Ahadi*</b><br>- Deputy for logistics and industrial research: Mohsen Dareh Baghi<br>- <b>Head of the Office of Research and Industrial Development: Mohammad Azizi-Delshad*</b><br>- Deputy for science, research, and technology: Mohammad Mehdinejad Nouri<br>- <b>Deputy for intelligence and security: Gholamreza Mehrabi*</b><br>- <b>Deputy for operations: Mehdi Rabani*</b><br>- Deputy for strategic planning: Farajollah Moradi<br>- Passive Defense Organization head: Gholamreza Jalali |
| Khatemolania Central Headquarters (KCHQ) | - UAV Assessment Group<br>- Cyber and Novel Threats Headquarters                                                                                                                                                                                                                                                                                                                                                                                                                           | - KCHQ commander: Gholam Ali Rashid<br>- KCHQ deputy commander: Hossein Hassani Saidi<br>- Head of the KCHQ's UAV Assessment Group: Hossein Khorram Faal<br>- Commander of Cyber and Novel Threats Headquarters: Mostafa Izadi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Islamic Revolutionary Guard Corps (IRGC) | - IRGC Aerospace Force, Navy, Ground Force, and Qods Force<br>- Departments and offices involved in overseeing military strategy, planning, and defense R&D and production<br>- IRGC defense R&D and production organizations, including RSSJOs<br>- IRGC Counter-Intelligence Organization, other intelligence departments/offices                                                                                                                                                        | - IRGC commander: Hossein Salami<br>- IRGC deputy commander: Ali Fadavi<br>- IRGC deputy for coordination: Mohammad Reza Naghdi<br>- <b>IRGC-ASF commander: Amir Ali Hajizadeh*</b><br>- <b>IRGC-ASF senior advisor: Ali Balali*</b><br>- IRGCN commander: Alireza Tangsiri                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

|        |                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                 |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |                                                                                                                                                                                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>- IRGC-GF commander: Mohammad Pakpour</li> <li>- IRGC-QF commander: Esmail Ghani</li> </ul>                                                                                                                                                                                                                              |
| Artesh | <ul style="list-style-type: none"> <li>- Artesh Air Force, Air Defense Force, Navy, and Ground Force</li> <li>- Departments and offices involved in overseeing military strategy, planning, and defense R&amp;D and production</li> <li>- Artesh defense R&amp;D and production organizations, including RSSJOs</li> <li>- Artesh Counter-Intelligence Organization, other intelligence departments/offices</li> </ul> | <ul style="list-style-type: none"> <li>- Artesh commander: Abdolrahim Musavi</li> <li>- Artesh deputy commander: Mohammad Hossein Dadras</li> <li>- Artesh deputy for coordination: Habibollah Sayyari</li> <li>- IRIAF commander: Hamid Vahedi</li> <li>- <b>IRIN commander: Shahram Irani*</b></li> <li>- <b>IRIGF commander: Kiumars Heidari*</b></li> </ul> |

\* Reportedly has been involved in Iran-Russia military-technical cooperation  
(Sources: CNS research and analysis)

**Table A3. Key Iranian Implementation-Level Actors Potentially Involved in Future Iran-Russia Military-Technical Cooperation**

| Implementation Organization | Selected Key Elements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Examples of Key Officials                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Office of the President     | <ul style="list-style-type: none"> <li>- <b>Department of S&amp;T and Knowledge-Based Economy*</b></li> <li>- <b>Atomic Energy Organization of Iran (AEOI)*</b></li> <li>- <b>Iranian Space Agency (ISA) and its Iranian Space Research Center (ISRC)*</b></li> <li>- Ministry of Science and its state-run universities</li> <li>--Ministry of Foreign Affairs: Department of Legal and International Affairs</li> <li>- <b>Iranian embassy in Russia*</b></li> <li>- Ministry of Intelligence</li> </ul>                                                                                                                   | <ul style="list-style-type: none"> <li>- <b>Vice president for S&amp;T and Knowledge-Based Economy: Ruhollah Deghani Firuzabadi*</b></li> <li>- AEOI head Mohammad Eslami*</li> <li>- <b>ISA and ISRC director: Hassan Salarieh*</b></li> <li>- Deputy foreign minister for legal and international affairs: Reza Najafi</li> <li>- <b>Iranian ambassador to Russia: Kazem Jalali*</b></li> </ul>                                                                                                                                                                                                         |
| Defense Ministry            | <ul style="list-style-type: none"> <li>- <b>Department of International Affairs*</b></li> <li>- <b>Department of Logistics and Research and Industrial Affairs*</b></li> <li>- Logistics departments/offices</li> <li>- <b>Counter-Intelligence Organization*</b></li> <li>- Training and Research Institute of the Defense Industries (TRIDI)</li> <li>- Domestication Center and domestication offices</li> <li>- SAMTA Center</li> <li>- Defense Research and Innovation Organization (SPND)</li> <li>- Malek Ashtar University of Technology (MUT)</li> <li>- <b>Aerospace Industries Organization (AIO)*</b></li> </ul> | <ul style="list-style-type: none"> <li>- <b>Deputy defense minister for international affairs: Sayyed Hamzeh Ghalandari*</b></li> <li>- <b>Deputy defense minister for logistics and research and industrial affairs: Afshin Naderi Sharif*</b></li> <li>- <b>Counter-Intelligence Organization head: Rahim Yaghoubi*</b></li> <li>- <b>AIO director: Nader Khun Siavosh*</b></li> <li>- <b>AVIO director: Afshin Khajehfard*</b></li> <li>- <b>QAI director: Qasem Damavandian*</b></li> <li>- HESA director: Mehdi Gogerdchian</li> <li>- HESA's director of UAV manufacturing: Hossein Aini</li> </ul> |

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | <ul style="list-style-type: none"> <li>- <b>Aviation Industries Organization (AVIO)*, including its Qods Aviation Industries (QAI)*</b>, Iran Aircraft Manufacturing Company (HESA), and Design and Manufacture of Aviation Engines Company (TEM)</li> <li>- Iran Electronics Industries (IEI), including its Shiraz Electronics Industries (SEI)</li> <li>- <b>Defense Industries Organization (DIO)*, including its Ammunition and Metallurgical Industries Group*</b> and Rocket Industries Group</li> <li>- Marine Industries Organization (MIO)</li> <li>- National Geographic Organization (NGO)</li> <li>- Defense Ministry defense attaches</li> </ul> | <ul style="list-style-type: none"> <li>- TEM director: Hassan Parvaneh</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| IRGC           | <ul style="list-style-type: none"> <li>- Operations departments/offices</li> <li>- Logistics departments/offices</li> <li>- Industrial research departments/offices</li> <li>- Research and self-sufficiency jahad departments/offices</li> <li>- RSSJOs</li> <li>- Imam Hossein University (IHU)</li> <li>- Electronic Warfare and Cyber Defense Organization</li> <li>- <b>IRGC-ASF's Shahed Aviation Industries Research Center (SAIRC)*</b></li> <li>--IRGC-ASF's Center of Command and Control, Radars, and Missile Systems</li> <li>- IRGC military attaches</li> </ul>                                                                                  | <ul style="list-style-type: none"> <li>- IRGC-ASF deputy for operations: Mohammad Fallah</li> <li>- IRGC-ASF missile commander: Mahmoud Bagheri Kazemabad</li> <li>- IRGC-ASF UAV commander: Said Aghajani</li> <li>- IRGC-ASF air defense commander: Reza Shabani</li> <li>- IRGC-ASF commander for air operations: Shamsoldin Farzadipur</li> <li>- IRGC-ASF space commander: Ali Jafarabadi</li> <li>- <b>IRGC-ASF RSSJO chief: Abdollah Mehrabi*</b></li> <li>- <b>SAIRC head: (FNU) Riyahi*</b></li> <li>- <b>Head of SAIRC's UAV section: (FNU) Nasr Esfahani*</b></li> </ul> |
| Artesh         | <ul style="list-style-type: none"> <li>- Operations departments/offices</li> <li>- Logistics departments/offices</li> <li>- Industrial research departments/offices</li> <li>- Research and self-sufficiency jahad departments/offices</li> <li>- RSSJOs</li> <li>- <b>Artesh military attaches*</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>- Deputy for operations: Sayyed Mahmud Musavi</li> <li>- Deputy for logistics and industrial research: Mohammad Davud Saremi</li> <li>- <b>Military attache at the Iranian Embassy in Russia: Reza Khosravi Moghaddam*</b></li> </ul>                                                                                                                                                                                                                                                                                                        |
| Private Sector | <ul style="list-style-type: none"> <li>- Iranian knowledge-based (<i>danesh-bonyan</i>) companies involved in defense and space R&amp;D and production</li> <li>- e.g., <b>Kosar Space Consortium, Omid Faza Company*</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>- <b>Head of the Omid Faza Company and Kosar Space Consortium: Hossein Shahrabi Farahani*</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                     |

\* Reportedly has been involved in Iran-Russia military-technical cooperation  
(Sources: CNS research and analysis)

**Table A4. Assessed Iranian Inventory of Needs to Support its Asymmetric Strategy**

| Assessed Need                                                                                                                                                                                                                                                           | Long-Range Strike | Air Defense | Naval Denial |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------|--------------|
| <b>Aerospace Domain</b>                                                                                                                                                                                                                                                 |                   |             |              |
| Advanced missile/UAV components (e.g., guidance, navigation, and control instruments, seekers) and materials (e.g., advanced metals)                                                                                                                                    | X                 |             | X            |
| Small turbine jet engines for cruise missiles and UAVs (e.g., turbojet, turbofan) and production technology, including assistance in fixing Iran's suspected problems with producing a domestic version of the R95-300/MS400 turbofan engine for use in cruise missiles | X                 |             | X            |
| Ramjet and scramjet engines, production technology, or assistance in their development, for use in supersonic cruise missiles                                                                                                                                           | X                 |             | X            |
| Improved maneuvering re-entry vehicles (MaRVs) for ballistic missiles                                                                                                                                                                                                   | X                 |             | X            |
| Improved standoff air-launched cruise missiles (ALCMs) (e.g., Kh-69), standoff glide bombs (e.g., FAB-series), mating Iranian ALCMs and glide bombs to Iran's Russian-made and other combat aircraft <sup>225</sup>                                                     | X                 |             | X            |
| Supersonic anti-ship cruise missiles (ASCMs) (e.g., Kh-31, Yakhont) or assistance in their development                                                                                                                                                                  | X                 |             | X            |
| Improved standoff air-to-surface missiles (ASMs) to attack land-based and naval targets as well as anti-radiation missiles (ARMs) to target radars (e.g., Kh-59MK2 ASM, Kh-35UE ASM, Kh-58UShKE ARM); mating ASMs and ARMs to Iranian aircraft                          | X                 |             | X            |
| Developing and improving ship-launched ballistic missiles                                                                                                                                                                                                               | X                 |             | X            |
| Air-launched ballistic missiles (ALBMs) (e.g., 9-S-7760 Kinzhal) or assistance in their development, including mating ALBMs to Iranian aircraft                                                                                                                         | X                 |             |              |
| Bombers for standoff missile strikes against land or naval targets (e.g., Tu-22M, Su-34)                                                                                                                                                                                | X                 |             | X            |
| Modifying ASCMs and surface-to-air missiles (SAMs) into land-attack cruise missiles (LACMs)                                                                                                                                                                             | X                 |             |              |
| Developing hypersonic missile systems and technologies (e.g., glide vehicles, warheads, propulsion, guidance and control, airframes)                                                                                                                                    | X                 |             |              |
| Developing submarine-launched cruise missiles (SLCMs)                                                                                                                                                                                                                   | X                 |             | X            |
| Improving anti-ship ballistic missiles (ASBMs), both SRBMs and MRBMs, especially enhancing their ability to strike moving naval targets at longer ranges                                                                                                                | X                 |             | X            |
| Access to Russia's satellite global positioning system (GLONASS) for military targeting and navigation                                                                                                                                                                  | X                 |             | X            |
| Decoy missiles/UAVs, used to fool or overwhelm enemy air and missile defenses (e.g., Kh-55)                                                                                                                                                                             | X                 |             | X            |
| Terminal phase countermeasures for ballistic missiles, cruise missiles, and UAVs (e.g., decoys, flares, chaff)                                                                                                                                                          | X                 |             | X            |
| Improving long-range anti-radar missiles/UAVs                                                                                                                                                                                                                           | X                 |             |              |
| Advanced uncrewed naval systems (surface and subsurface) for long-range naval strikes (e.g., RK-700, BBKN Dandelion), or assistance in their development                                                                                                                | X                 |             | X            |
| Improving over-the-horizon (OTH) situational awareness and targeting against naval ships, to support long-range naval strikes using ASCMs, ASBMs, and anti-ship UAVs                                                                                                    | X                 |             | X            |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |   |   |   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|
| --Enabling quick, dynamic targeting for long-range strikes<br>--Use of Iranian and Russian satellite imagery for targeting<br>--Radar systems to detect and track targets (e.g., OTH-backscatter, OTH-surface wave, target acquisition, and fire control radars)<br>--Radar technology to support Iran's domestic OTR radar R&D and production efforts<br>--Improved use of UAVs for OTR targeting<br>--Improved data sharing between sensors and shooters<br>--Improved sensor-to-sensor and sensor-to-shooter cueing<br>--Enabling missiles/UAVs to update targeting data during flight, instead of only attacking pre-programmed targets |   |   |   |
| Improved air defense radars or assistance in their development (e.g., to detect, identify, track, and engage aircraft, cruise missiles, and UAVs)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   | X |   |
| Cruise/ballistic missile defense systems (e.g. S-500) or assistance in their development                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |   | X |   |
| Technology across multiple elements of Iran's "space technology cycle" ( <i>cherkheh-ye fanavari-e fazai</i> ) relevant to targeting<br>--High-resolution imaging satellites or assistance in their development<br>--Navigation/positioning satellites or assistance in their development<br>--Launching Iranian satellites to orbit<br>--Improved processing and exploitation of satellite imagery and satellite navigation/positioning data<br>--Acquiring high-resolution Russian satellite imagery (including time-sensitive images of targets)                                                                                         | X |   | X |
| Counter-electronic warfare/jamming for missiles/UAVs, including improving onboard systems that protect against electronic attack (e.g., anti-jam, anti-cyber, electronic protection systems, electromagnetic shielding/hardening)                                                                                                                                                                                                                                                                                                                                                                                                           | X | X | X |
| Stealth (low observable) technology for missiles/UAVs to enhance their ability to defeat air and missile defenses (e.g., Kh-69 cruise missile technology)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | X |   | X |
| Use of artificial intelligence (AI) to enhance the technical and operational capabilities of ballistic missiles, cruise missiles, UAVs, uncrewed naval systems, and electronic warfare systems<br>--e.g., to enable swarming attacks with UAVs, formations of uncrewed naval systems, hybrid ( <i>tarkibi</i> ) attacks using multiple types of systems, altering missile/UAV trajectories during flight, avoiding radars and air defense sites, improving target detection and recognition, and sharing data among strike systems                                                                                                          | X |   | X |
| Increasing the reliability of missiles and UAVs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | X | X | X |
| Improving the operational use of long-range strike weapons, including hybrid ( <i>tarkibi</i> ) operational use—combining ballistic missiles, cruise missiles, and UAVs in strikes                                                                                                                                                                                                                                                                                                                                                                                                                                                          | X |   | X |
| Enhancing the survivability of Iran's long-range strike forces to decrease vulnerabilities to attack and enhance deterrence<br>--Increasing Iran's passive defense ( <i>padafand-e gheyr-e amel</i> ) capabilities, including hardening, dispersal, concealment, camouflage, and deception<br>--Improving the use of underground facilities, missile silos, and mobile launchers<br>--Employing novel deployment concepts                                                                                                                                                                                                                   | X |   | X |
| Advanced surface-to-air missile (SAM) systems (e.g., S-400), assistance in their development                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   | X |   |

|                                                                                                                                                                                                                                                                                                          |   |   |   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|
| Advanced combat aircraft for air defense (e.g., Su-35)                                                                                                                                                                                                                                                   |   | X |   |
| Advanced air-to-air missiles (AAMs) (e.g., Vympel R-74M, Vympel R-77-1, and Vympel R-37M), integration with Iran's combat aircraft                                                                                                                                                                       |   | X |   |
| Electronic warfare: Advanced jamming and spoofing systems (e.g., R-330Zh), as well as tactics for their use, especially against U.S./Western satellite-guided missiles and munitions                                                                                                                     |   | X |   |
| Electronic warfare: Advanced systems (e.g., Krasukha-2 and Krasukha-4) as well as tactics, to disrupt enemy airborne and space-based radars to protect Iranian assets from air attack                                                                                                                    |   | X |   |
| Acquiring Western weapons and technologies captured by Russia in Ukraine<br>--1. To develop countermeasures and/or 2. To reverse engineer to develop its own weapons/technologies<br>--Especially those that might help to improve Iran's asymmetric capabilities vis-à-vis the United States and Israel | X | X |   |
| Russian advanced technical training, education to Iranian experts; e.g., in advanced areas of concern (e.g., missile technology, electronic warfare, hypersonics, AI, etc.) <sup>226</sup>                                                                                                               | X | X | X |
| <b>Naval Domain</b>                                                                                                                                                                                                                                                                                      |   |   |   |
| Submarines or submarine technology, e.g., air-independent propulsion (AIP) technology and nuclear propulsion                                                                                                                                                                                             |   |   | X |
| Advanced torpedoes and mines, or assistance in their development                                                                                                                                                                                                                                         |   |   | X |

(Source: CNS research and analysis)

## Key Technical and Operational Parameters Driving Iranian Needs for Long-Range Strike

Over the years, Iranian officials have identified important technical and operational parameters for long-range strike weapons, which provide hints about the types of technical and operational support Iran may seek from Russia. Such parameters highlighted by Iranian officials, organized by the general phases of strikes, include:<sup>227</sup>

Pre-strike operational strategy and preparation:

- Enabling retaliation (*moghabeleh be mesl*) and a quick response;
- Increasing the range of detection;
- Enhancing monitoring of the target area;
- Preventing surprise as well as creating strategic, operational, and tactical surprise;
- Punishing the attacker and imposing heavy costs;
- Enabling targeting of the enemy's "origins" of attack and its vital and sensitive areas;
- Converting the enemy's tactical success into strategic failure;
- Reducing preparation time for firing.

Launch and flight:

- Hybrid (*tarkibi*) operations combining ballistic missiles, cruise missiles, and UAVs;
- Standoff attack, accurate firing from depth and from passive defense locations;
- Mass volume, mass attack;
- Simultaneous launch of multiple systems;
- Firing while moving;

- Simultaneous operations against the same target, simultaneous striking of the target, attacking the target from 360 degrees;
- Firing from different ranges and areas of the country;
- Attacking using directions and routes;
- Changing the target after launch and during the missile/UAV's flight;
- Attacking the strategic or operational depth of the enemy.

Terminal phase:

- Attacking enemy targets from variety of higher and lower altitudes;
- Improving maneuverability and radar evasion of missiles/UAVs to overcome air/missile defenses;
- Attacking moving targets;
- Protecting missiles/UAVs from electronic warfare;
- Enhancing the accuracy, “point-strike” (*noghteh-zan*) and “accurate-strike” (*daghigh-zan*) capabilities of missiles/UAVs (“one shot, one target”);
- Increasing the destructive power of missile/UAV warheads.

**Table A5. Assessed Iranian Inventory of Strengths/Capabilities**

The list below includes assessed Iranian technical and operational strengths and capabilities created over the past decades, some of which might be of interest to Russia to meet its needs or as the basis of mutual cooperation.

|                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Nuclear</b>                                                                                                                                                                                                                               |
| Developing nuclear fuel cycle technologies, including uranium enrichment                                                                                                                                                                     |
| <b>Ballistic Missiles</b>                                                                                                                                                                                                                    |
| Development/production of relatively inexpensive ballistic missiles                                                                                                                                                                          |
| Developing families of increasingly capable ballistic missiles based on a single platform (i.e., modifying/improving existing systems)                                                                                                       |
| Developing short-range and medium-range anti-ship ballistic missiles (ASBMs)                                                                                                                                                                 |
| Converting long-range unguided artillery rockets to guided missiles                                                                                                                                                                          |
| Converting ground-launched ballistic missiles to ship-launched                                                                                                                                                                               |
| <b>Cruise Missiles</b>                                                                                                                                                                                                                       |
| Development/production of relatively inexpensive cruise missiles, both ASCMs and LACMs                                                                                                                                                       |
| Developing families of increasingly capable cruise missiles based on a single platform (i.e., modifying/improving existing systems)                                                                                                          |
| Converting ASCMs to LACMs                                                                                                                                                                                                                    |
| Converting ground-launched cruise missiles to air-launched                                                                                                                                                                                   |
| <b>UAVs</b>                                                                                                                                                                                                                                  |
| Development/production of relatively inexpensive UAVs                                                                                                                                                                                        |
| Developing families of increasingly capable UAVs—both armed and suicide—based on a single platform (i.e., modifying/improving existing systems)                                                                                              |
| Developing anti-ship suicide UAVs                                                                                                                                                                                                            |
| <b>Long-Range Strike in General</b>                                                                                                                                                                                                          |
| Technical and operational insights gained from the use of ballistic missiles, cruise missiles, UAVs, and uncrewed naval systems by both Iran and its Axis of Resistance partners (e.g., Yemeni Houthis, Lebanese Hezbollah, Iraqi militants) |
| Reverse engineering entire systems and key technologies (e.g., propulsion)                                                                                                                                                                   |
| Transferring production technology of missiles/UAVs to state and non-state actors                                                                                                                                                            |
| <b>Deployment, Basing</b>                                                                                                                                                                                                                    |
| Expertise on underground facilities, missile and UAV underground “cities,” mobile launchers, buried launchers, and commercial launchers for missiles and UAVs                                                                                |



|                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Decreasing the footprint of missile/UAV launchers (e.g., integrating radars and fire control systems into launchers)                                                                               |
| <b>Strategy and Operations</b>                                                                                                                                                                     |
| Emerging expertise on mass launches (ballistic missiles, cruise missiles, UAVs)                                                                                                                    |
| Emerging expertise on the hybrid use of strike systems (ballistic missiles, cruise missiles, UAVs)                                                                                                 |
| <b>Advanced Conventional Weapons</b>                                                                                                                                                               |
| Development/production of relatively inexpensive SAMs, anti-tank missiles, artillery rockets, and other munitions                                                                                  |
| Developing families of increasingly capable conventional weapons—including SAMs, anti-tank missiles, and artillery rockets—based on a single platform (i.e., modifying/improving existing systems) |
| <b>Space</b>                                                                                                                                                                                       |
| Development of solid-propellant SLVs and their critical technologies, by both the Defense Ministry and IRGC                                                                                        |
| <b>Hedging</b>                                                                                                                                                                                     |
| Creating and improving latency in key technology areas of concern (e.g., nuclear, IRBM/ICBM, ASAT, CBW)                                                                                            |
| <b>Defense Industries: Evading/Overcoming Trade Sanctions, Export Controls, Foreign Actions</b>                                                                                                    |
| Expertise in reverse engineering systems and their critical subsystems and components                                                                                                              |
| Mixing acquisition strategies (e.g., foreign purchase, technology transfer, reverse engineering, improving existing systems, and domestic design and development)                                  |
| Conducting illicit procurement of controlled and commercial technologies                                                                                                                           |
| Transferring production capabilities to state and non-state actors                                                                                                                                 |
| <b>Enabling Capabilities of Axis of Resistance Partners</b>                                                                                                                                        |
| Expertise in supporting, training, equipping Iran's Axis of Resistance partners (e.g., Lebanese Hezbollah, Yemeni Houthis, and Iraqi militants)                                                    |

## Endnotes

<sup>1</sup> Benoit Faucon, Nicholas Bariyo, and Matthew Luxmoore, "The Russian Drone Plant That Could Shape the War in Ukraine," *Wall Street Journal*, May 28, 2024, <https://www.wsj.com/world/the-russian-drone-plant-that-could-shape-the-war-in-ukraine-7abd5616>.

<sup>2</sup> "jadid-tarin mahvareh-ye Irani be faza partab shod / etelaat-e 'khayyam' ramz-gozari shodeh ast / avalin dadeh-ye telemetri-e mahvareh-ye khayyam daryaft shod" [the newest Iranian satellite was launched to space / "Khayyam" data was encrypted / the first khayyam satellite telemetry data was received], *Mashregh News Agency*, August 9, 2022, <https://www.mashreghnews.ir/news/1406394/>; "Russia puts Iranian satellite into orbit," *Reuters*, August 9, 2022, <https://www.reuters.com/world/russia-launches-iranian-satellite-into-space-under-shadow-western-concerns-2022-08-09/>.

<sup>3</sup> "Fireside Chat with Williams Burns: Aspen Security Forum 2023," The Aspen Institute, July 20, 2023, <https://www.youtube.com/watch?v=FQPTNSyzLCs>.

<sup>4</sup> Ken Thomas, "Russia and Iran Military Ties Deepening Into Partnership, Biden Administration Warns," *Wall Street Journal*, December 9, 2022, <https://www.wsj.com/articles/russia-and-iran-military-ties-deepening-into-partnership-biden-administration-warns-11670614091>.

<sup>5</sup> Hanna Notte, "Russia's Invasion of Ukraine: The Iran Nuclear Price Tag," Friedrich Ebert Stiftung, February 2023, <https://library.fes.de/pdf-files/international/20083.pdf>.

<sup>6</sup> The BRICS group originally included Brazil, Russia, India, China, and South Africa and was expanded in January 2024 to include Egypt, Ethiopia, Iran, Saudi Arabia, and the United Arab Emirates.

<sup>7</sup> Hamidreza Azizi, "Why Russia is no longer Iran-Israel de-escalator in Syria," *Amwaj media*, March 9, 2023, <https://amwaj.media/article/why-russia-is-no-longer-iran-israel-de-escalator-in-syria>.

<sup>8</sup> Hamidreza Azizi and Hanna Notte, "Russia's Dangerous New Friends: How Moscow Is Partnering With the Axis of Resistance," *Foreign Affairs*, February 14, 2024, <https://www.foreignaffairs.com/russian-federation/russias-dangerous-new-friends>. The Axis of Resistance includes, besides Iran, Hezbollah in Lebanon, the Houthis in Yemen, Hamas, Palestinian Islamic Jihad, and Shia militias in Iraq and Syria.

<sup>9</sup> Explicit or "codified" knowledge includes that which can be written down, including in documents, plans, blueprints, drawings, work breakdown structures (WBS) and Gantt charts, bills of materials (BOMs), standard operating procedures, and facility drawings. See Ian Stewart, "The Contribution of Intangible Technology

Controls in Controlling the Spread of Strategic Technologies,” *Strategic Trade Review*, Vol. 1, No. 1 (Autumn 2015), pp. 41-55; Donald MacKenzie and Graham Spinardi, “Tacit Knowledge, Weapons Design, and the Uninvention of Nuclear Weapons,” *American Journal of Sociology*, Vol. 101, No. 1 (July 1995), pp. 44-99.

<sup>10</sup> Tacit or “implicit” knowledge includes that which cannot be written down, such as know-how, knowledge, expertise, skills, and judgment of engineers, technicians, managers, and military officials. See Stewart, *ibid.*, and MacKenzie and Spinardi, *ibid.*

<sup>11</sup> Sadegh Khosro, Ezatollah Ezati, and Rahim Sarvar, “tasir-e hamkari-ha-ye nezami-e Iran va Rusieh bar tahavolat-e zheopolitik-e mantegheh-ye Iran” [the effect of military cooperation between Iran and Russia on geopolitical developments in the Iranian region], *Negaresh-ha-ye No dar Joghrafia-ye Ensani* [New attitudes in human geography], Year 10, No. 39 (Summer 2018), <https://ensani.ir/file/download/article/1587882630-10264-98-338.pdf>, p. 86.

<sup>12</sup> Debra Cagan and Nicole Grajewski comments, “Iran-Russia alliance: Opportunities, limits, and conflict in the Middle East,” Atlantic Council, November 2, 2023, <https://www.atlanticcouncil.org/event/iran-russia-alliance/>.

<sup>13</sup> “dabir-e shura-ye ali-e amniyat-e melli: rabeteh-ye Iran va Rusieh rahbordi ast” [secretary of the supreme council for national security: the relationship between Iran and Russia is strategic], *BBC News Farsi*, August 26, 2016, [https://www.bbc.com/persian/iran/2016/08/160826\\_103\\_shamkhani\\_russia\\_iran](https://www.bbc.com/persian/iran/2016/08/160826_103_shamkhani_russia_iran).

<sup>14</sup> Michelle Grise and Alexandra T. Evans, “The Drivers of and Outlook for Russian-Iranian Cooperation,” *Perspective*, RAND, October 2023, [https://www.rand.org/content/dam/rand/pubs/perspectives/PEA2800/PEA2829-1/RAND\\_PEA2829-1.pdf](https://www.rand.org/content/dam/rand/pubs/perspectives/PEA2800/PEA2829-1/RAND_PEA2829-1.pdf).

<sup>15</sup> Michaela Domingo, “Russia and Iran: A Marriage of Convenience Doomed to Fail,” *Israel Journal of Foreign Affairs*, Vol. 17, No. 1 (2023), pp. 17-22.

<sup>16</sup> Alla Kassianova, “Russian Weapons Sales to Iran: Why They Are Unlikely to Stop,” PONARS Policy Memo No. 427, Program on New Approaches to Research and Security in Eurasia, December 2006, [https://csis-website-prod.s3.amazonaws.com/s3fs-public/legacy\\_files/files/media/csis/pubs/pm\\_0427.pdf](https://csis-website-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/media/csis/pubs/pm_0427.pdf), p. 2.

<sup>17</sup> Diaries of former President Rafsanjani, December 15, 1996, *Sardar Sazandegi: Hashemi Rafsanjani: Karnameh va Khaterat-e Sal-e 1375* [construction general: Hashemi Rafsanjani: records and memories of the year 1375 (March 1996-March 1997)] (Tehran: Daftar-e Nashar-e Mo’aref-e Enghelab [revolution education publication office], 1398 [March 2019-March 2020]), p. 620.

<sup>18</sup> For example, see Stockholm International Peace Research Institute, SIPRI Arms Transfers Database, [https://armstrade.sipri.org/armstrade/page/trade\\_register.php](https://armstrade.sipri.org/armstrade/page/trade_register.php); Michael Eisenstadt, “Russian Arms and Technology Transfers to Iran: Policy Challenges for the United States,” *Arms Control Today*, March 2001, <https://www.armscontrol.org/act/2001-03/iran-nuclear-briefs/russian-arms-technology-transfers-iranpolicy-challenges-united>.

<sup>19</sup> “Iran/Russia Wrap Up \$2 billion Arms Deal,” *Flight International*, July 15-21, 1992, p. 13; Edward B. Atkeson, “A Military Assessment of the Middle East, 1991-96,” Strategic Studies Institute, U.S. Army War College, December 7, 1992, p. 34.

<sup>20</sup> John M. Broder, “Russia Ending Deal on Arms Negotiated by Gore,” *New York Times*, November 23, 2000, <https://www.nytimes.com/2000/11/23/world/russia-ending-deal-on-arms-negotiated-by-gore.html>.

<sup>21</sup> “Soglashenie Mezhdru Pravitel'stvom Rossiiskoi Federatsii I Pravitel'stvom Islamskoi Respubliki Iran O Sotrudnichestve V Oblasti Podgotovki Voennykh Kadrov” [Agreement Between The Government Of The Russian Federation And The Government Of The Islamic Republic Of Iran On Cooperation In The Field Of Military Personnel Training], April 29, 2001, [https://www.mid.ru/ru/foreign\\_policy/international\\_contracts/international\\_contracts/2\\_contract/52255/](https://www.mid.ru/ru/foreign_policy/international_contracts/international_contracts/2_contract/52255/).

<sup>22</sup> “Dogovor Ob Osnovakh Vzaimootnoshenii I Printsipakh Sotrudnichestva Mezhdru Rossiiskoi Federatsiei I Islamskoi Respublikoi Iran” [Agreement On The Basis Of Relations And Principles Of Cooperation Between The Russian Federation And The Islamic Republic Of Iran], March 12, 2001, [https://mid.ru/ru/foreign\\_policy/international\\_contracts/international\\_contracts/2\\_contract/46488/](https://mid.ru/ru/foreign_policy/international_contracts/international_contracts/2_contract/46488/).

<sup>23</sup> “nakhostin dur-e mozakerat-e vaziran-e defa-e Iran va Rusieh dar Moscow bargozar shod” [the first round of negotiations between the defense ministers of Iran and Russia was held in Moscow], *Islamic Republic News Agency (IRNA)*, February 17, 2009, <https://www.irna.ir/news/8134104/>.

<sup>24</sup> “vazir-e defa: nezarat bar amuzhesh-e samaneh-ye mushaki-e ‘TOR M 1’ yeki az mozuat-e komision-e moshtarek-e Iran va Rusieh bud” [defense minister: monitoring the training of the “TOR M-1” missile system was one of the subjects of the joint commission of Iran and Russia], *IRNA*, December 26, 2007, <https://www.irna.ir/news/4888749/>. Note that, in Iranian press reporting from the 2000s, the commission was variably called the Joint Defense Cooperation Commission (*komision-e hamkari-ha-ye moshtarak-e defai*), Joint Military-Defense Commission (*komision-e moshtarak-e nezami-defai*), Technical-Military Cooperation Commission (*komision-e hamkari-ha-ye fani-nezami*), and Joint Defense Commission (*komision-e moshtarak-e defai*). Since the 2010s, Iranian reporting appears to have consistently used the term “military” (*nezami*) rather than “defense” (*defai*) to refer to the commission. It is unclear whether the commission was formally renamed or whether previous reporting was inconsistent or inaccurate.

- <sup>25</sup> Diaries of former President Rafsanjani, August 31, 1997, *Enteghal-e Ghodrat: Hashemi Rafsanjani: Karnameh va Khaterat-e Sal-e 1376* [transfer of power: Hashemi Rafsanjani: records and memories of the year 1376 (March 1997-March 1998)] (Tehran: Daftar-e Nashar-e Mo'aref-e Enghelab [revolution education publication office], 1398 [March 2019-March 2020]), p. 385.
- <sup>26</sup> Diaries of former President Rafsanjani, January 11, 1998, *Enteghal-e Ghodrat: Hashemi Rafsanjani: Karnameh va Khaterat-e Sal-e 1376* [transfer of power: Hashemi Rafsanjani: records and memories of the year 1376 (March 1997-March 1998)] (Tehran: Daftar-e Nashar-e Mo'aref-e Enghelab [revolution education publication office], 1398 [March 2019-March 2020]), p. 622.
- <sup>27</sup> Michael Dobbs, "A Story of Iran's Quest for Power," *Washington Post*, January 12, 2002, <https://www.washingtonpost.com/archive/politics/2002/01/13/a-story-of-irans-quest-for-power/7e457b89-bde8-4a3f-9114-c7d6974699fa/>; Michael Dobbs, "Collapse of Soviet Union Proved Boon to Iranian Missile Program," *Washington Post*, January 12, 2002, <https://www.washingtonpost.com/archive/politics/2002/01/13/collapse-of-soviet-union-proved-boon-to-iranian-missile-program/7d5ed9c8-363b-4d22-9af3-deaa3747cb3e/>; National Intelligence Council, "Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015," September 1999, <https://www.dni.gov/files/documents/Foreign%20Missile%20Developments%201999.pdf>; "Russian Missile Technology and Nuclear Reactor Transfers to Iran," Congressional Research Service, December 14, 1998, <https://www.everycrsreport.com/reports/98-299.html>; Fred Wehling, "Russian Nuclear and Missile Exports to Iran," *Nonproliferation Review*, Winter 1999, <https://www.nonproliferation.org/wp-content/uploads/npr/wehl62.pdf>.
- <sup>28</sup> "Iran's defence minister due in Russia on 1 October; major arms deal in offing," *Interfax News Agency*, September 26, 2001, *BBC Monitoring Middle East - Political*, September 26, 2001; "Russian military sources say cooperation with Iran good for regional stability," *ITAR-TASS News Agency*, October 5, 2001, *BBC Monitoring Middle East - Political*, October 6, 2001; "Russia sold missiles to Iran" (in Russian), *Gazeta*, October 2, 2001, in Siarhei Bohdan, "Limits of Defiance? The Role of Post-Soviet Nations in Modernisation of the Iranian Armed Forces and Defence Industries," dissertation, Free University of Berlin, 2017, [https://refubium.fu-berlin.de/bitstream/handle/fub188/24787/Siarhei\\_Bohdan-thesis-freigegeben-zum-druck.pdf?sequence=1&isAllowed=y](https://refubium.fu-berlin.de/bitstream/handle/fub188/24787/Siarhei_Bohdan-thesis-freigegeben-zum-druck.pdf?sequence=1&isAllowed=y), p. 82.
- <sup>29</sup> Director of Central Intelligence, "Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, 1 January Through 30 June 1999"; John Lauder, Director, DCI Nonproliferation Center, Central Intelligence Agency, in U.S. Senate, Committee on Foreign Relations, "Iranian Weapons Programs: The Russian Connection," October 5, 2000, <https://www.govinfo.gov/content/pkg/CHRG-106shrg69750/pdf/CHRG-106shrg69750.pdf>.
- <sup>30</sup> "Iran va Rusieh movafeghat-nameh-ye hamkari-ha-ye eghtesadi va tejari emza kardand" [Iran and Russia signed an agreement on economic and commercial cooperation], *IRNA*, December 17, 2004, <https://www.irna.ir/news/6751145/>.
- <sup>31</sup> "Russian Missile Technology and Nuclear Reactor Transfers to Iran," Congressional Research Service, December 14, 1998, <https://www.everycrsreport.com/reports/98-299.html>; Fred Wehling, "Russian Nuclear and Missile Exports to Iran," *Nonproliferation Review*, Winter 1999, <https://www.nonproliferation.org/wp-content/uploads/npr/wehl62.pdf>.
- <sup>32</sup> *Ibid.*
- <sup>33</sup> David Albright, Paul Brennan, Mark Gorwitz, and Andrea Stricker, "Russian Scientist Helped Nuclear Program?" *The Iran Primer*, United States Institute of Peace, November 17, 2011, <https://iranprimer.usip.org/blog/2011/nov/17/russian-scientist-helped-nuclear-program>.
- <sup>34</sup> "majera-ye talkh az dast yaftan-e sarmayeh-ha-ye 30 saleh-ye fazai-e Iran dar dolat-e Ahmadinejad" [the bitter story of the loss of 30 years of Iranian space investments in Ahmadinejad's government], *Khabar Online*, May 26, 2015, <https://www.khabaronline.ir/news/419802/>; "vazir-e erteibat va fanavari-e etela'at: mahvareh-ye mesbah avakher-e mehr mah partab mishavad" [minister of communications and information technology: mesbah satellite will be launched at the end of month of Mehr], *Mehr News Agency*, August 5, 2005, <https://www.mehrnews.com/news/214370/>.
- <sup>35</sup> "dastan-e san'at-e fazai-e Iran" [story of the Iranian space industry], video and transcript, *Mostazavin TV*, February 8, 2015, <http://www.mostazafin.tv/article/4361>.
- <sup>36</sup> Andrew Hanna, "Iran's Ambitious Space Program," *The Iran Primer*, United States Institute of Peace, June 23, 2020 (updated February 1, 2021), <https://iranprimer.usip.org/blog/2020/jun/23/iran%E2%80%99s-ambitious-space-program>.
- <sup>37</sup> Hanna Notte, "Chapter 2: UN Security Council Resolution 1929 on Iran: US-Russian Cooperation and the Quest for Diffuse Reciprocity," in Sarah Bidgood and William C. Potter (eds.), *End of an Era: The United States, Russia, and Nuclear Nonproliferation*, James Martin Center for Nonproliferation Studies, August 2021.

- <sup>38</sup> Nicole Grajewski, "Friends or Frenemies: How Russia and Iran Compete and Cooperate," *Russia Foreign Policy Papers*, Foreign Policy Research Institute, 2020, <https://www.fpri.org/wp-content/uploads/2020/03/rfp-1-grajewski-final.pdf>.
- <sup>39</sup> "Rossiya i Iran zaklyuchili soglashenie o voennom sotrudnichestve" [Russia and Iran entered into an agreement on military cooperation] *Ria Novosti*, January 20, 2015, <https://ria.ru/20150120/1043370621.html>.
- <sup>40</sup> "surat-e jalaseh-ye toseh va ijad-e zir-sakht-ha-ye hamkari--e fanavari bein-e Iran va Rusieh emza shod" [the minutes of the meeting on the development and creation of technology cooperation infrastructures between Iran and Russia were signed], *Sina Press*, November 23, 2015, <https://sinapress.ir/news/22562/>.
- <sup>41</sup> "mo'aven-e rais-e setad-e kol-e niru-ha-ye mosalah-e Iran vared-e Rusieh shod" [Iranian armed forces general staff deputy chief entered Russia], *Asr Iran*, December 10, 2020, <https://www.asriran.com/fa/news/703081/>.
- <sup>42</sup> "Iran pritsenivaetsya k rossiiskomu voenpromu" [Iran is eyeing the Russian military industry], *Kommersant*, February 15, 2015, <https://www.kommersant.ru/doc/2917271>.
- <sup>43</sup> Stockholm International Peace Research Institute, SIPRI Arms Transfers Database, [https://armstrade.sipri.org/armstrade/page/trade\\_register.php](https://armstrade.sipri.org/armstrade/page/trade_register.php).
- <sup>44</sup> "rais-e sazman-e enerzhi-e atomi-e Iran vared-e Moscow shod" [atomic energy organization of Iran chief entered Moscow], *IRNA*, September 28, 2021, <https://www.irna.ir/news/84485936/>.
- <sup>45</sup> Director of National Intelligence, "Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, Covering 1 January to 31 December 2011," February 2012.
- <sup>46</sup> "Russia Signs Deal to Build & Launch Iran Satellites," *Iran Times*, May 14, 2014, <http://iran-times.com/russia-signs-deal-to-build-launch-iran-satellites/>.
- <sup>47</sup> "Iran used Russian satellite navigation system during the attack on US military bases in Iraq," *UAWIRE*, January 20, 2020, <https://uawire.org/iran-used-russian-satellite-navigation-system-during-the-attack-on-us-military-bases-in-iraq>.
- <sup>48</sup> "mozakereh-ye farmandeh-ye niru-ye havai-e artesh-e Rusieh ba farmandeh-ye havafaza-ye sepah dar Tehran" [negotiations between the Russian air force commander and the IRGC aerospace commander in Tehran], *Mehr News Agency*, October 21, 2013, <https://www.mehrnews.com/news/2159416/>.
- <sup>49</sup> "saderat-e pahpad-ha-ye Irani be Rusieh / toseh-ye hamkari dar tarahi-e onva-e pahpad" [exports of Iranian UAVs to Russia / development of cooperation in design of types of UAVs], *Mehr News Agency*, July 23, 2017, <https://www.mehrnews.com/news/4038275/>.
- <sup>50</sup> "Rusieh shadidan donbal-e komak-e Iran baraye dastyabi be elm-e pahpad-ha-ye durbord ast" [Russia is strongly seeking Iran's help in acquiring the science of long-range UAVs], *Tasnim News Agency*, September 25, 2016, <https://www.tasnimnews.com/fa/news/1395/07/04/1195227/>.
- <sup>51</sup> Mehdi Khalaji and Farzin Nadimi, "Russia Uses an Iranian Air Base: Two Essays," PolicyWatch 2675, Washington Institute for Near East Policy, August 17, 2016, <https://www.washingtoninstitute.org/policy-analysis/russia-uses-iranian-air-base-two-essays-0>.
- <sup>52</sup> Grise and Evans, "The Drivers of and Outlook for Russian-Iranian Cooperation," p. 5.
- <sup>53</sup> President of Russia, "Meeting with President of Iran Sayyid Ebrahim Raisi," January 19, 2022, <http://en.kremlin.ru/events/president/news/67608>.
- <sup>54</sup> "Iran va Rusieh baraye emza-ye sanad-e rahbordi-e 20-saleh amadeh mishavand" [Iran and Russia are preparing to sign a 20-year strategic document], *IRNA*, December 24, 2021, <https://www.irna.ir/news/84588794/>.
- <sup>55</sup> Barak Ravid, "Scoop: Iran plans to limit range of missiles sent to Russia, Israeli officials say," *Axios*, December 12, 2022, <https://www.axios.com/2022/12/12/ukraine-war-russia-missiles-iran-limit>.
- <sup>56</sup> Dion Nissenbaum, "Iran Sends First Shipment of Combat Drones to Russia," *Wall Street Journal*, August 30, 2022; Defense Intelligence Agency, "Iranian UAVs in Ukraine: A Visual Comparison," October 27, 2022, [https://www.dia.mil/Portals/110/DIA\\_Iranian\\_UAVs\\_in\\_Ukraine-A\\_Visual\\_Comparison.pdf](https://www.dia.mil/Portals/110/DIA_Iranian_UAVs_in_Ukraine-A_Visual_Comparison.pdf).
- <sup>57</sup> Dylan Malyasov, "Iranian-made Mohajer-6 drone crashes in Russia," *Defence Blog*, May 27, 2024, <https://defence-blog.com/iranian-made-mohajer-6-drone-crashes-in-russia/>.
- <sup>58</sup> Elen Nakashima and Joby Warrick, "Iran sends first shipment of drones to Russia for use in Ukraine," *Washington Post*, August 29, 2022, <https://www.washingtonpost.com/national-security/2022/08/29/iran-drones-russia-ukraine-war/>.
- <sup>59</sup> Nakashima and Warrick, "Iran sends first shipment of drones to Russia for use in Ukraine."
- <sup>60</sup> Defense Intelligence Agency, "Iranian UAVs in Ukraine: A Visual Comparison."
- <sup>61</sup> "Russian General Claims Jet-Powered Kamikaze Drones on the Way," *Kyiv Post*, December 11, 2023, <https://www.kyivpost.com/post/25335>.
- <sup>62</sup> Deborah Haynes, "'Explosive' new attack drone developed by Iran for Russia's war in Ukraine," *Sky News*, January 10, 2024, <https://news.sky.com/story/explosive-new-attack-drone-developed-by-iran-for-russias-war-in-ukraine-13045093>.



- 
- <sup>63</sup> Nikita Smagin, "United Against America: Russia-Iran Military Cooperation Is a Looming Threat," *Carnegie Politika*, February 27, 2024, <https://carnegieendowment.org/politika/91825>.
- <sup>64</sup> "Iran agrees to ship missiles, more drones to Russia," *Reuters*, 19 October 2022, <https://www.reuters.com/world/exclusive-iran-agrees-ship-missiles-more-drones-russia-defying-west-sources-2022-10-18/>.
- <sup>65</sup> Joby Warrick, "Russian weapons help Iran harden defenses against Israeli airstrike," *Washington Post*, April 15, 2024, <https://www.washingtonpost.com/national-security/2024/04/15/iran-israel-russia-drones-missiles/>.
- <sup>66</sup> Main Department of Intelligence of the Ministry of Defense of Ukraine, "At the Syrian Shayrat airfield, UAV operators are being trained for the war against Ukraine" (in Ukrainian), February 12, 2024, <https://t.me/DIUkraine/3457>.
- <sup>67</sup> "Belarus Seeking to Manufacture Iran's Shahed Drones Near Ukraine's Border – ISW," *Kyiv Post*, August 1, 2023, <https://www.kyivpost.com/post/20083>.
- <sup>68</sup> David Albright, Sarah Burkhard, and Victoria Cheng, "Satellite Imagery Update on Alabuga Shahed-136 Drone Factory - No snow day for Russia's drone production!," Institute for Science and International Security, December 20, 2023, <https://isis-online.org/isis-reports/detail/satellite-imagery-update-on-alabuga-shahed-136-drone-factory>.
- <sup>69</sup> Dalton Bennett and Mary Ilyushina, "Inside the Russian effort to build 6,000 attack drones with Iran's help," *Washington Post*, August 17, 2023, <https://www.washingtonpost.com/investigations/2023/08/17/russia-iran-drone-shahed-alabuga/>.
- <sup>70</sup> Sam Skove, "Russia may be trying to build 10,000 attack drones a year for use in Ukraine," *Defense One*, February 7, 2024, <https://www.defenseone.com/threats/2024/02/russia-may-be-trying-build-10000-attack-drones-year-use-ukraine/394015/>.
- <sup>71</sup> Warrick, "Russian weapons help Iran harden defenses against Israeli airstrike."
- <sup>72</sup> Faucon, Bariyo, and Luxmoore, "The Russian Drone Plant That Could Shape the War in Ukraine."
- <sup>73</sup> Warrick, "Russian weapons help Iran harden defenses against Israeli airstrike."
- <sup>74</sup> Dion Nissenbaum and Warren P. Strobel, "Iran Sets Plan for Drone Factory in Russia," *Wall Street Journal*, February 6, 2023, <https://www.wsj.com/world/moscow-tehran-advance-plans-for-iranian-designed-drone-facility-in-russia-11675609087>.
- <sup>75</sup> Dion Nissenbaum and Stephen Kalin, "Russia's Iranian Drones Pose Growing Threat to Ukraine," *Wall Street Journal*, October 18, 2022, <https://www.wsj.com/articles/russias-iranian-drones-pose-growing-threat-to-ukraine-11666113607>.
- <sup>76</sup> Joe Gould, "Iranian drone trainers in Crimea to help Russians, White House says," *Defense News*, October 20, 2022, <https://www.defensenews.com/pentagon/2022/10/20/iranian-drone-trainers-in-crimea-to-help-russians-white-house-says/>.
- <sup>77</sup> "Iranian drone instructors spotted in Belarus – report," *Jerusalem Post*, October 24, 2022, <https://www.jpost.com/international/article-720425>.
- <sup>78</sup> "Iranian drone instructors spotted in Belarus – report."
- <sup>79</sup> In the case of Syria, Russian UAV operators of Iranian-made UAVs were reportedly being trained at the Syrian Shayrat airbase by the IRGC and Lebanese Hezbollah.
- <sup>80</sup> "Iran agrees to ship missiles, more drones to Russia," *Reuters*, October 19, 2022.
- <sup>81</sup> Paul Iddon, "Iran Might Be Waiting Until October To Supply Russia Deadlier Drones And Missiles For Ukraine," *Forbes*, January 8, 2023, <https://www.forbes.com/sites/pauliddon/2023/01/08/iran-might-be-waiting-until-october-to-supply-russia-deadlier-drones-and-missiles-for-ukraine/?sh=b2d6d8079f74>.
- <sup>82</sup> Barak Ravid, "Scoop: Iran plans to limit range of missiles sent to Russia, Israeli officials say."
- <sup>83</sup> Yuri Lyamin, "Vizit ministra oborony Rossii v Iran" [Visit of the Russian Defense Minister to Iran], Blog Post, September 21, 2023, <https://imp-navigator.livejournal.com/1143215.html>.
- <sup>84</sup> Michael R. Gordon, "U.S. Warns Iran Is Weighing Sending Short-Range Missiles to Russia," *Wall Street Journal*, November 22, 2023, <https://www.wsj.com/world/u-s-warns-iran-is-weighing-sending-short-range-missiles-to-russia-60f2c992>; The White House, "Press Briefing by Press Secretary Karine Jean-Pierre and NSC Coordinator for Strategic Communications John Kirby," January 4, 2024, <https://www.whitehouse.gov/briefing-room/press-briefings/2024/01/04/press-briefing-by-press-secretary-karine-jean-pierre-and-nsc-coordinator-for-strategic-communications-john-kirby-january-4-2024/>. The U.S. government defines CRBMs as ballistic missiles with a range of less than 300 km.
- <sup>85</sup> White House, "Press Briefing by Press Secretary Karine Jean-Pierre and NSC Coordinator for Strategic Communications John Kirby," January 4, 2024, <https://www.whitehouse.gov/briefing-room/press-briefings/2024/01/04/press-briefing-by-press-secretary-karine-jean-pierre-and-nsc-coordinator-for-strategic-communications-john-kirby-january-4-2024/>.
- <sup>86</sup> "Exclusive: Iran sends Russia hundreds of ballistic missiles," *Reuters*, February 21, 2024, <https://www.reuters.com/world/iran-sends-russia-hundreds-ballistic-missiles-sources-say-2024-02-21/>.

- <sup>87</sup> “Iran has supplied Russia with ballistic missiles, UK defense chief suggests,” *Politico*, March 5, 2024, <https://www.politico.eu/article/iran-has-supplied-russia-with-ballistic-missiles-uk-defense-chief-suggests/>.
- <sup>88</sup> Warrick, “Russian weapons help Iran harden defenses against Israeli airstrike.”
- <sup>89</sup> Dion Nissenbaum and Benoit Faucon, “Iran Ships Ammunition to Russia by Caspian Sea to Aid Invasion of Ukraine,” *Wall Street Journal*, April 24, 2023, <https://www.wsj.com/articles/iran-ships-ammunition-to-russia-by-caspian-sea-to-aid-invasion-of-ukraine-e74e8585>.
- <sup>90</sup> “Army of Russia Gets New Iranian Shells Straight From Conveyor and Old Russian Ones From North Korea (Photo),” *Defense Express*, January 29, 2024, [https://en.defence-ua.com/news/army\\_of\\_russia\\_gets\\_new\\_iranian\\_shells\\_straight\\_from\\_conveyor\\_and\\_old\\_russian\\_ones\\_from\\_north\\_korea\\_photo-9161.html](https://en.defence-ua.com/news/army_of_russia_gets_new_iranian_shells_straight_from_conveyor_and_old_russian_ones_from_north_korea_photo-9161.html).
- <sup>91</sup> “Iran secretly provides Russia with large number of rounds, artillery and mortar bombs,” *Ukrainska Pravda*, March 8, 2023, <https://www.pravda.com.ua/eng/news/2023/03/8/7392485/>.
- <sup>92</sup> “\$1.7M Contract Shows Iran-Russia Ammo Deal – Sky News,” *Moscow Times*, June 5, 2023, <https://www.themoscowtimes.com/2023/06/05/17m-contract-shows-iran-russia-ammo-deal-sky-news-a81398>.
- <sup>93</sup> Nissenbaum and Faucon, “Iran Ships Ammunition to Russia by Caspian Sea to Aid Invasion of Ukraine.”
- <sup>94</sup> “Iran secretly provides Russia with large number of rounds, artillery and mortar bombs.”
- <sup>95</sup> “Iran secretly provides Russia with large number of rounds, artillery and mortar bombs.”
- <sup>96</sup> “Russian Defense Ministry confirms use of Iranian 122mm HE-FRAG missiles in Ukraine,” *Army Recognition*, October 6, 2023, <https://www.armyrecognition.com/news/army-news/army-news-2023/russian-defense-ministry-confirms-use-of-iranian-122-mm-he-frag-missiles-in-ukraine>.
- <sup>97</sup> “Iran secretly provides Russia with large number of rounds, artillery and mortar bombs.”
- <sup>98</sup> “Iranskij jeksport vooruzhenij” [Iranian arms exports], Centre for Analysis of Strategies and Technologies, undated, [http://cast.ru/products/articles/iranskiy-eksport-vooruzheniy.html?sphrase\\_id=22310874](http://cast.ru/products/articles/iranskiy-eksport-vooruzheniy.html?sphrase_id=22310874).
- <sup>99</sup> “Kirby: Iran supplying Russia with glide bombs,” *Euromaidan Press*, November 23, 2023, <https://euromaidanpress.com/2023/11/23/kirby-iran-supplying-russia-with-glide-bombs/>.
- <sup>100</sup> “taslihat-e hava be zamin mojud dar niru-ha-ye mosalah-e jomhuri-e eslami-e Iran” [air-to-surface weapons that exist in the armed forces of the Islamic Republic of Iran], *Jangaavaran*, May/June 2022, <https://jangaavaran.ir/8332-2/>.
- <sup>101</sup> Ivashkiv Olena, “Iran supplied Russia with latest Qaem-5 guided aerial bombs – video,” *Ukrainska Pravda*, May 28, 2024, <https://www.pravda.com.ua/eng/news/2024/05/28/7457947/>.
- <sup>102</sup> Ministry of Foreign Affairs of Russia, “Declaration by the Russian Federation and the Islamic Republic of Iran on the Ways and Means to Counter, Mitigate and Redress the Adverse Impacts of Unilateral Coercive Measures,” December 5, 2023, [https://mid.ru/ru/foreign\\_policy/news/1919257/?lang=en](https://mid.ru/ru/foreign_policy/news/1919257/?lang=en).
- <sup>103</sup> “8 hozeh-ye hamkari-e nezami-e Tehran va Moscow / do keshvar cheh taamol-ha-ye siyasi-amniyati darand?” [8 areas of military cooperation between Tehran and Moscow / what kind of political-security interactions do the two countries have?], *Hamshahri Online*, May 13, 2024, <https://www.hamshahrionline.ir/news/851348/8>.
- <sup>104</sup> Mick Ryan, “Russia’s Adaptation Advantage,” *Foreign Affairs*, February 5, 2024, [https://www.foreignaffairs.com/ukraine/russias-adaptation-advantage?utm\\_medium=social&utm\\_campaign=tw\\_daily\\_soc&utm\\_source=twitter\\_posts](https://www.foreignaffairs.com/ukraine/russias-adaptation-advantage?utm_medium=social&utm_campaign=tw_daily_soc&utm_source=twitter_posts).
- <sup>105</sup> “Iran can teach ‘art of evading sanctions’ to others: Zarif,” *Mehr News Agency*, December 15, 2018, <https://en.mehrnews.com/news/140543/Iran-can-teach-art-of-evading-sanctions-to-others-Zarif>.
- <sup>106</sup> Daniel Salisbury, “Tomcat and Mouse: Iranian Illicit Procurement of U.S. Legacy Military Technologies, 1979–2016,” *Strategic Trade Review*, Vol. 3, No. 5 (Autumn 2017), pp. 25–46; U.S. Department of Justice, “Iran Ballistic Missile Procurement Advisory,” October 2023, [https://www.justice.gov/d9/2023-10/2023\\_iran\\_ballistic\\_missile\\_procurement\\_advisory\\_10-17\\_final.pdf](https://www.justice.gov/d9/2023-10/2023_iran_ballistic_missile_procurement_advisory_10-17_final.pdf); U.S. Department of the Treasury, “Treasury Targets Multiple Procurement Networks Supporting Iran’s Proliferation-Sensitive Programs,” March 20, 2024, <https://home.treasury.gov/news/press-releases/jy2194>.
- <sup>107</sup> “‘Pobeda’ obognet sanktsii” [‘Pobeda’ will bypass sanctions], *Kommersant*, May 2, 2024, <https://www.kommersant.ru/amp/6680459>.
- <sup>108</sup> Faucon, Bariyo, and Luxmoore, “The Russian Drone Plant That Could Shape the War in Ukraine.”
- <sup>109</sup> Aaron Arnold and Daniel Salisbury, “The Sanctions-Busting Architects: Moscow’s Preparations for the West’s Sanctions,” *Lawfare Media*, March 4, 2024, <https://www.lawfaremedia.org/article/the-sanctions-busting-architects-moscow-s-preparations-for-the-west-s-sanctions>.
- <sup>110</sup> Office of the Iranian Supreme Leader, “eblagh-e siyasat-ha-ye koli-e nezam dar mozu-e ‘khod-kafai-e defai va amniyati’” [statement of general policies of the system on the subject of “defense and security self-sufficiency,” December 19, 2012, <https://farsi.khamenei.ir/news-content?id=37922>; “eftetah-e namayeshgah-e nehzat-e ghateh-sazi” [the opening of the exhibition of the movement of part-manufacture], *Iranian Students’ News Agency (ISNA)*, September 3, 2020, <https://www.isna.ir/photo/99061309614/>.

- <sup>111</sup> Yuri Lamin: “Oboronnaya promyshlennost’ Irana: uspekhi i problemy v importozameshchenii” [Iranian defense industry: successes and problems in import substitution], Center for Analysis of Strategies and Technologies, 2022.
- <sup>112</sup> “Shoygu: vzaimodeistvie Rossii i Irana vykhodit na novyi uroven” [Shoigu: interaction between Russia and Iran is reaching a new level] *Kommersant*, September 20, 2023, <https://www.kommersant.ru/doc/6224555>; “vezarat-e defa-e Rusieh: sath-e tamas-ha dar hamkari-e nezami ba Iran ertegha miyabad” [Russian defense ministry: the level of contacts in military cooperation with Iran will increase], *IRNA*, August 23, 2023, <https://www.irna.ir/news/85208178/>.
- <sup>113</sup> “Russia’s military-technical cooperation complies with law — senior diplomat,” *Tass*, March 12, 2024, <https://tass.com/politics/1758583>.
- <sup>114</sup> “Russia says it’s working on major new agreement with Iran,” *Reuters*, December 12, 2023, <https://www.reuters.com/world/russia-says-its-working-major-new-agreement-with-iran-2023-12-12/>; “Minoborony Rossii anonsirovalo ‘bol’shoj dogovor’ s Iranom” [The Russian Ministry of Defense announced a “big agreement” with Iran] *RBK*, January 15, 2024, <https://www.rbc.ru/politics/15/01/2024/65a5250d9a79474b75fb9f9d>.
- <sup>115</sup> “safir-e Iran: hamkari-ha-ye defai ba Rusieh elaieh hich keshvar salesi nist; hoshdar be Tel Aviv” [Iranian ambassador: defense cooperation with Russia is not against any third country; warning to Tel Aviv], *IRNA*, April 18, 2024, <https://www.irna.ir/news/85449473/>; “8 hozeh-ye hamkari-e nezami-e Tehran va Moscow / do keshvar cheh taamol-ha-ye siyasi-amniyati darand?” [8 areas of military cooperation between Tehran and Moscow / what kind of political-security interactions do the two countries have?], *Hamshahri Online*, May 13, 2024, <https://www.hamshahronline.ir/news/851348/8>. In June 2023, for instance, a Russian missile destroyer docked at Iran’s Anzali port.
- <sup>116</sup> “kharid-e jangandeh-ye ‘sukho-35’ va balgerd-e ‘mil-28’ ghati shod” [purchase of the sukhoi-35 fighter and mil-28 helicopter were finalized], *Tasnim News Agency*, November 28, 2023, <https://www.tasnimnews.com/fa/news/1402/09/07/2996425/>.
- <sup>117</sup> “Deal Done, Iran to Get Mil Mi-28 Chopper, Sukhoi Su-35 Jet,” *Tasnim News Agency*, November 28, 2023, <https://www.tasnimnews.com/en/news/2023/11/28/2996773/deal-done-iran-to-get-mil-mi-28-chopper-sukhoi-su-35-jet>.
- <sup>118</sup> Yuri Lyamin, “Yak-130 VVS Irana” [Yak-130 of the Iranian Air Force] Blog Post, September 2, 2023, <https://imp-navigator.livejournal.com/1141432.html>.
- <sup>119</sup> Joby Warrick, “Russian weapons help Iran harden defenses against Israeli airstrike.”
- <sup>120</sup> Arie Egozi, “The growing cooperation between Russia and Iran in electronic warfare raises alarms in Israel,” *Zona Militar*, March 6, 2024, <https://www.zona-militar.com/en/2024/03/06/the-growing-cooperation-between-russia-and-iran-in-electronic-warfare-raises-alarms-in-israel/>.
- <sup>121</sup> “‘kobra V8’ jadid-tarin samaneh-ye jang-e elektronik-e keshvar ra bishtar beshanasid” [know more about “Cobra V8,” the newest electronic warfare system of the country], *IRNA*, March 7, 2022, <https://www.irna.ir/news/84674169/>.
- <sup>122</sup> Thomas Withington, “Cobra Shows Its Fangs,” *Armada International*, April 2, 2024, <https://www.armadainternational.com/2024/04/iran-cobrav8-electronic-warfare-system/>; Christopher Biggers, Post on LinkedIn, March 2024, [https://www.linkedin.com/posts/activity-7169434487074861056-FWas/?utm\\_source=share&utm\\_medium=member\\_ios](https://www.linkedin.com/posts/activity-7169434487074861056-FWas/?utm_source=share&utm_medium=member_ios).
- <sup>123</sup> Bryan Clark, “The Fall and Rise of Russian Electronic Warfare,” *IEEE Spectrum*, July 30, 2022, <https://spectrum.ieee.org/the-fall-and-rise-of-russian-electronic-warfare>.
- <sup>124</sup> “Above Us Only Stars: Exposing GPS Spoofing in Russia and Syria,” C4ADS, 2019, <https://c4ads.org/wp-content/uploads/2022/05/AboveUsOnlyStars-Report.pdf>.
- <sup>125</sup> Post on “X,” *IRNA*, September 4, 2023, <https://twitter.com/IrnaEnglish/status/1698591312755224712>.
- <sup>126</sup> Yuri Lyamin, “AK-133 i KL-133” [AK-133 and KL-133] Blog Post, June 11, 2022, <https://imp-navigator.livejournal.com/1073222.html>; “Iran’s Defense Ministry Unveils New Homegrown Rifles,” *Tasnim News Agency*, May 8, 2017, <https://www.tasnimnews.com/en/news/2017/05/08/1401295/iran-s-defense-ministry-unveils-new-homegrown-rifles>; “Iran Navy showcases Russian AK-103 Assault Rifles in Military Exercise,” *Army Recognition*, November 27, 2023, <https://navyrecognition.com/index.php/naval-news/naval-news-archive/2023/november/13827-iran-navy-showcases-russian-ak-103-assault-rifles-in-military-exercise.html>.
- <sup>127</sup> Arie Egozi, “Iran asking Russia to sell military ships, help build new designs: Israeli sources,” *Breaking Defense*, December 15, 2022, <https://breakingdefense.com/2022/12/iran-asking-russia-to-sell-military-ships-help-build-new-designs-israeli-sources/>.
- <sup>128</sup> “Iran Denies Report on Joint Production of Warship with Russia,” *Tasnim News Agency*, May 24, 2023, <https://www.tasnimnews.com/en/news/2023/05/24/2900742/iran-denies-report-on-joint-production-of-warship-with-russia>.



- <sup>129</sup> “Russia Eyes Boosting Cooperation with Iran in Manufacturing Airplanes, Choppers,” *Tasnim News Agency*, August 6, 2023, <https://www.tasnimnews.com/en/news/2023/08/06/2936741/russia-eyes-boosting-cooperation-with-iran-in-manufacturing-airplanes-choppers>.
- <sup>130</sup> Dion Nissenbaum and Warren P. Strobel, “Iran Sets Plan for Drone Factory in Russia.”
- <sup>131</sup> “Iran Prepares Pilots for Su-35 Operations Ahead of Arrivals from Russia,” *Defense Security Asia*, March 24, 2024, <https://defencesecurityasia.com/en/iran-prepares-pilots-for-su-35-operations-ahead-of-arrivals-from-russia/>.
- <sup>132</sup> “CIA director says Russia is offering to help Iran's advanced missile program in exchange for military aid,” *Business Insider*, February 27, 2023, <https://www.businessinsider.com/russia-offering-iran-missile-program-help-exchange-weapons-ukraine-cia-2023-2>; “Fireside Chat with Williams Burns: Aspen Security Forum 2023,” The Aspen Institute, July 20, 2023, <https://www.youtube.com/watch?v=FQPTNSyzLCs>.
- <sup>133</sup> Matthew Karnitschig, “Iran in secret talks with China, Russia to acquire sanctioned missile fuel,” *Politico*, April 12, 2023, <https://www.politico.eu/article/vladimir-putin-ukraine-war-xi-jinping-china-russia-in-secret-talks-to-supply-iran-missile-propellant/>.
- <sup>134</sup> Jason Brodsky on “X”, March 14, 2024, <https://twitter.com/jasonmbrodsky/status/1768247498693362024?s=51&t=0PHtVpMRfMbZ5FWAYb6J9g>; Gabriel Honrada, “Did Russia help Iran build a hypersonic weapon?,” *Asia Times*, November 12, 2022, <https://asiatimes.com/2022/11/did-russia-help-iran-build-a-hypersonic-weapon/>.
- <sup>135</sup> Natasha Bertrand, “Exclusive: Iran is seeking Russia's help to bolster its nuclear program, US intel officials believe,” *CNN*, November 4, 2022, <https://www.cnn.com/2022/11/04/politics/iran-russia-nuclear-program/index.html>.
- <sup>136</sup> “Russia, Iran to develop research equipment together — Kurchatov Institute,” *Tass*, November 29, 2023, <https://tass.com/science/1713731>.
- <sup>137</sup> “Russia puts Iranian satellite into orbit,” *Reuters*, August 9, 2022, <https://www.reuters.com/world/russia-launches-iranian-satellite-into-space-under-shadow-western-concerns-2022-08-09/>. For further details on the cooperation on Khayyam, see Anatoly Zak, “A Limping Giant: Russian Military Space in the First Half of the 2020s,” CNA Corporation, February 2024, <https://www.cna.org/reports/2024/02/A-Limp-Giant-Russian-Military-Space-in-the-First-Half-of-the-2020s.pdf>.
- <sup>138</sup> “vazir-e ertebatat: noskkeh-ye dovom, sevom va chaharom-e mahvareh-ye khayyam ra ba Rusieh khahim sakht” [communications minister: we will manufacture the second, third, and fourth versions of the khayyam satellite with Russia], *Etemad Online*, August 10, 2022, <https://www.etemadonline.com/tiny/news-567918>.
- <sup>139</sup> Yuri Lyamin, “Roskosmos i Iranskoe kosmicheskoe agentstvo podpisali memorandum o sotrudnichestve” [Roscosmos and the Iranian Space Agency signed a memorandum of cooperation], Blog Post, 14 December 2022, <https://imp-navigator.livejournal.com/1098929.html>.
- <sup>140</sup> “2 mahvareh-ye Irani-e bakhsh-e khosusi dar desambr 2023 be faza partab mishavand” [2 private sector Iranian satellites in December 2023 will be launched to space], *Tasnim News Agency*, March 5, 2023, <https://www.tasnimnews.com/fa/news/1401/12/14/2863189/2>; “asar-e angosht-e hameh-ye jangandeh-ha-ye F35 ra dar ekhtiar darim / mushak-ha-ye Irani be sarjangi-e pishrafteh mojahaz shodand / goftegu ba amir Rastegari” [we have the signatures of all F35 fighters / Iranian missiles were equipped with advanced warheads / interview with general Rastegari], *Tasnim News Agency*, April 25, 2023, <https://www.tasnimnews.com/fa/news/1402/02/05/2882538/>.
- <sup>141</sup> “Iran, Russia to jointly manufacture research satellite,” *IRNA*, May 1, 2023, <https://en.irna.ir/news/85098309/Iran-Russia-to-jointly-manufacture-research-satellite>.
- <sup>142</sup> Warrick, “Russian weapons help Iran harden defenses against Israeli airstrike.”
- <sup>143</sup> “Russian rocket successfully puts Iranian satellite into orbit,” *Associated Press*, February 29, 2024, <https://apnews.com/article/russia-iran-satellite-space-launch-vostchny-roskosmos-60e877149748b46a63c597c7e3714be0>.
- <sup>144</sup> Deborah Haynes, “Russia flew €140m in cash and captured Western weapons to Iran in return for deadly drones, source claims,” *Sky News*, November 9, 2022, <https://news.sky.com/story/russia-gave-eur140m-and-captured-western-weapons-to-iran-in-return-for-deadly-drones-source-claims-12741742>.
- <sup>145</sup> Ian Dudgeon, “Increased Iran-Russia Military Cooperation After the Ukraine Invasion: Impact of US/Western Sanctions,” Australian Institute of International Affairs, February 14, 2024, <https://www.internationalaffairs.org.au/australianoutlook/increased-iran-russia-military-cooperation-after-the-ukraine-invasion-impact-of-us-western-sanctions/>; Nadav Pollak, “Deepening Russia-Iran Relationship Should Worry Israel,” The Washington Institute for Near East Policy, December 28, 2022, <https://www.washingtoninstitute.org/policy-analysis/deepening-russia-iran-relationship-should-worry-israel>.
- <sup>146</sup> Analysis by Fabian Hinz, in “Interview: What Iran-Russia missile transfers could really mean,” *Amwaj media*, February 29, 2024, <https://amwaj.media/article/interview-what-iran-russia-missile-transfers-could-really-mean>.

- <sup>147</sup> John Paul Rathbone, Christian Davies, Roman Olearchyk, and Christopher Miller, “Missiles from Iran and North Korea boost Russia's onslaught on Ukraine,” *Financial Times*, January 14, 2024, <https://www.ft.com/content/1d1eb1dd-4fa0-4693-9512-23a219de5d77>.
- <sup>148</sup> Can Kasapoglu, “How the War in Ukraine Shapes Iran’s Strategic Gains and Ambitions,” Hudson Institute, February 8, 2024, <https://www.hudson.org/national-security-defense/how-war-ukraine-shapes-irans-strategic-gains-ambitions-can-kasapoglu>.
- <sup>149</sup> Stacie Pettyjohn, “Evolution Not Revolution: Drone Warfare in Russia’s 2022 Invasion of Ukraine,” Center for New American Security, February 8, 2024, [https://www.cnas.org/publications/reports/evolution-not-revolution?utm\\_medium=email&utm\\_campaign=Ukraine%20Drones%20Report%20Press%20Release%20Feb%208%202024&utm\\_content=Ukraine%20Drones%20Report%20Press%20Release%20Feb%208%202024+CID\\_9c4f31b70714ec6ddf86a1d63f31108c&utm\\_source=Campaign%20Monitor&utm\\_term=READ%20MORE](https://www.cnas.org/publications/reports/evolution-not-revolution?utm_medium=email&utm_campaign=Ukraine%20Drones%20Report%20Press%20Release%20Feb%208%202024&utm_content=Ukraine%20Drones%20Report%20Press%20Release%20Feb%208%202024+CID_9c4f31b70714ec6ddf86a1d63f31108c&utm_source=Campaign%20Monitor&utm_term=READ%20MORE).
- <sup>150</sup> Peter Waldman, Sheridan Prasso, and Simon Marks, “Iran’s Better, Stealthier Drones Are Remaking Global Warfare,” *Bloomberg*, April 8, 2024, <https://www.bloomberg.com/news/features/2024-04-08/iran-s-drone-tech-innovations-are-redefining-global-warfare>.
- <sup>151</sup> Joby Warrick, “Russian weapons help Iran harden defenses against Israeli airstrike.”
- <sup>152</sup> Laura Kelly, “Iran’s attack on Israel built on lessons from Russia’s war in Ukraine,” *The Hill*, April 15, 2024, <https://thehill.com/policy/international/4595937-irans-attack-on-israel-built-on-lessons-from-russias-war-in-ukraine/>.
- <sup>153</sup> Embassy of the Kingdom of Saudi Arabia in the United States, “Saudi Ministry of Defense: Aramco Attack Sponsored by Iran,” September 18, 2019, <https://www.saudiembassy.net/news/saudi-ministry-defense-aramco-attack-sponsored-iran>; “Saudi oil attacks: Drones and missiles launched from Iran - US,” *BBC News*, September 17, 2019, <https://www.bbc.com/news/world-middle-east-49733558>.
- <sup>154</sup> “sardar Hajizadeh: ghodrat-e jadidi dar sepah motevaled shod” [general Hajizadeh: a new power was born in the IRGC], *Jamran News*, January 15, 2021, <https://www.jamran.news/fa/tiny/news-1492021>.
- <sup>155</sup> Hamidreza Azizi and Hanna Notte, “Russia’s Dangerous New Friends.”
- <sup>156</sup> Hamidreza Azizi and Hanna Notte, “Russia’s Dangerous New Friends.”
- <sup>157</sup> Natasha Bertrand, “White House declassifies intel suggesting Wagner Group is preparing to provide air defense capability to Hezbollah or Iran,” *CNN*, November 21, 2023, <https://www.cnn.com/2023/11/21/politics/white-house-wagner-group-intelligence/index.html>.
- <sup>158</sup> Tal Beerli, “Latakia – Khmeimim / Bassel al-Assad International Airport – A new Iranian gateway for the transport of weapons and military equipment?,” Alma Research and Education Center, December 14, 2023, <https://israel-alma.org/2023/12/14/latakia-khmeimim-bassel-al-assad-international-airport-a-new-iranian-gateway-for-the-transport-of-weapons-and-military-equipment/>.
- <sup>159</sup> “tavanafoh-e hamkari-e amniyat-etelaat bein-e Iran va Rusieh dar Majles tasvib shod” [security-intelligence cooperation agreement between Iran and Russia approved in Majles], *Iran International*, December 10, 2023, <https://www.iranintl.com/202312101159>.
- <sup>160</sup> “safir-e Iran: hamkari-ha-ye defai ba Rusieh elaieh hich keshvar salesi nist; hoshdar be Tel Aviv” [Iranian ambassador: defense cooperation with Russia is not against any third country; warning to Tel Aviv], *IRNA*, April 18, 2024, <https://www.irna.ir/news/85449473/>; “8 hozeh-ye hamkari-e nezami-e Tehran va Moscow / do keshvar cheh taamol-ha-ye siyasi-amniyati darand?” [8 areas of military cooperation between Tehran and Moscow / what kind of political-security interactions do the two countries have?], *Hamshahri Online*, May 13, 2024, <https://www.hamshahrionline.ir/news/851348/8>.
- <sup>161</sup> Dov Lieber, Benoît Faucon, and Michael Amon, “Russia Supplies Iran With Cyber Weapons as Military Cooperation Grows,” *Wall Street Journal*, March 27, 2023, <https://www.wsj.com/articles/russia-supplies-iran-with-cyber-weapons-as-military-cooperation-grows-b14b94cd>.
- <sup>162</sup> Lilach Shoval, “J’lem fears Moscow may transfer advanced cyber capabilities to Iran,” Jewish News Syndicate, May 26, 2024, <https://www.jns.org/jlem-fears-moscow-may-transfer-advanced-cyber-capabilities-to-iran/>.
- <sup>163</sup> “Russian Missile Technology and Nuclear Reactor Transfers to Iran,” Congressional Research Service, December 14, 1998, <https://www.everycrsreport.com/reports/98-299.html>, pp. 7-9.
- <sup>164</sup> John Lauder, Director, DCI Nonproliferation Center, Central Intelligence Agency, in U.S. Senate, Committee on Foreign Relations, “Iranian Weapons Programs: The Russian Connection,” October 5, 2000, <https://www.govinfo.gov/content/pkg/CHRG-106shrg69750/pdf/CHRG-106shrg69750.pdf>; “Russian Missile Technology and Nuclear Reactor Transfers to Iran.”
- <sup>165</sup> Paul Kerr, “Ukraine Admits Missile Transfers,” *Arms Control Today*, Vol. 35, No. 4 (May 2005), p. 41.
- <sup>166</sup> Betsy Swan and Adam Rawnsley, “Ukraine Intel: We Caught Iranians Smuggling a Ship-Killing Missile,” *Daily Beast*, March 30, 2018, <https://www.thedailybeast.com/ukraine-intel-we-caught-iranians-smuggling-a-ship-killing-missile>.

- <sup>167</sup> “sarlashkar Bagheri: Amrikai-ha dar ijad-e nezam-e tak-ghotbi-e movafegh nabudeh-and” [general Bagheri: the Americans have not succeeded in creating a unipolar system], *IRNA*, December 3, 2022, <https://www.irna.ir/news/84960327/>.
- <sup>168</sup> “safir-e Iran: hamkari-ha-ye defai ba Rusieh elaieh hich keshvar salesi nist; hoshdar be Tel Aviv” [Iranian ambassador: defense cooperation with Russia is not against any third country; warning to Tel Aviv], *IRNA*, April 18, 2024, <https://www.irna.ir/news/85449473/>; “didar va goftegu-ye Ahmadian va dabir-e shura-ye amniyat-e melli-e federasion-e Rusieh” [visit and discussion of Ahmadian and secretary of the national security council of the Russian Federation], *Mehr News Agency*, April 24, 2024, <https://www.mehrnews.com/news/6088202/>.
- <sup>169</sup> “Vahidi: ertegha-ye tavanmandi-e diplomasi-e defai rahbord-e jadid-e vezarat-e defa ast” [Vahidi: increasing defense diplomacy capability is a new strategy of the defense ministry], *IRNA*, September 9, 2009, <https://www.irna.ir/news/7332120/>; according to an Iranian defense journal, “defense diplomacy” can be defined as “the implementation of negotiations and creation of relations between militaries...with the goal of influencing the environment in which the military operates”; the goal of defense diplomacy is to secure, using defense policy, the high goals of a political system in line with the country’s interests and national security (Mohammad Ahadi, “diplomasi-e defai-e jomhuri-e eslami-e Iran - osul va ahdaf,” *motaleat-e defai-e estratezhik* [strategic defense studies], No. 92 (Summer 2023), [https://sds.sndu.ac.ir/article\\_2418\\_7a9cea90a248fa5d29b62773cb459086.pdf](https://sds.sndu.ac.ir/article_2418_7a9cea90a248fa5d29b62773cb459086.pdf), p. 30.). According to Iran’s Defense Ministry, defense diplomacy is part of Iran’s overall diplomacy, links the military sector to other components of power, and can be used to—among other things—break sanctions and eliminate technological bottlenecks. (“barnameh-ha-ye chahar-saleh-ye vazir-e defa va poshtibani-e niru-ha-ye mosalah (ta 1404)” [four-year programs of the minister of defense and armed forces logistics (until 1404 [March 2025-March 2026])], official website of the Office of the Iranian President, August 2021, <http://media.dolat.ir/uploads/org/162903948669567500.pdf>).
- <sup>170</sup> According to the Iranian government, “technology diplomacy” includes “technological interactions between a country and other international actors that serve to advance the foreign policy of that country, or political relations between a country and other international actors that form the basis of science and technology interactions” (“markaz-e hamkari-ha-ye fanavari va noavari” [Center for Innovation and Technology Cooperation (CITC)], *IRKBN*, undated, <https://irkbn.com/center-innovation-technology-cooperation/>).
- <sup>171</sup> “huzur-e moaser-e Iran dar nemayeshgah-e nezami-e Rusieh / gharardad-ha-ye defai-e jadid monaghed mishavad” [Iran’s effective presence in Russian military exhibition / new defense contracts are concluded], *Defa Press*, August 15, 2022, <https://defapress.ir/fa/news/539598/>.
- <sup>172</sup> “tavafogh-e hamkari-e amniyat-e etelaat bein-e Iran va Rusieh dar Majles tasvib shod” [security-intelligence cooperation agreement between Iran and Russia approved in Majles], *Iran International*, December 10, 2023, <https://www.iranintl.com/202312101159>.
- <sup>173</sup> “Iranian delegation arrives in Moscow for discussions of cooperation between ground forces,” *Tass News Agency*, August 21, 2023, <https://tass.com/defense/1663049>.
- <sup>174</sup> “didar va goftegu-ye Ahmadian va dabir-e shura-ye amniyat-e melli-e federasion-e Rusieh” [visit and discussion of Ahmadian and secretary of the national security council of the Russian Federation], *Mehr News Agency*, April 24, 2024, <https://www.mehrnews.com/news/6088202/>.
- <sup>175</sup> Niloufar Goudarzi, “Contradictory Reports Cloud Iran-Russia Strategic Deal,” *Iran International*, June 11, 2024, <https://www.iranintl.com/en/202406119921>.
- <sup>176</sup> For a detailed overview of Iran’s participation in the 2023 “Army” Forum in Russia, see Yuri Lyamin, “Iranskaya ekspozitsiya na “Armii-2023” [Iranian exposition at Army 2023], Blog Post, August 18, 2023, <https://imp-navigator.livejournal.com/1138555.html>.
- <sup>177</sup> “moaven-e rais-e setad-e kol-e niru-ha-ye mosalah-e Iran vared-e Rusieh shod” [deputy chief of Iran’s armed forces general staff entered Russia], *Asr Iran*, December 11, 2019, <https://www.asriran.com/fa/news/703081/>.
- <sup>178</sup> Civilian nuclear and aviation cooperation is conducted under the two countries’ Joint Economic Cooperation Commission, and space cooperation falls within the mandate of the bilateral High Commission on Technology Cooperation. (“faaliyat-e komision-e moshtarak-e hamkari-e eghtesadi-e Iran va Rusieh dar ghaleb-e 15 kar-goruh” [the activity of the joint commission for economic cooperation between Iran and Russia in the form of 15 working groups], *Eghtesad Online*, March 4, 2018, <https://www.eghtesadonline.com/news/256035/>; “5 model-e hamkari-e fanavaraneh-ye Iran va Rusieh / pishravi-e diplomasi-e elm ta Eurasia” [5 models of technological cooperation between Iran and Russia / advancement of science diplomacy to Eurasia], *Mehr News Agency*, January 18, 2022, <https://www.mehrnews.com/news/5402514/>).
- <sup>179</sup> “amir Hatami be onvan-e moshaver-e farmandehi-e kol-e niru-ha-ye mosalah dar omur-e artesh mansub shod” [general Hatami was appointed as advisor to the commander in chief of the armed forces for Artesh affairs], *IRNA*, February 9, 2022, <https://www.irna.ir/news/84645165/>.
- <sup>180</sup> “magham-e nezami-e arshad-e Rus: hamkari-e nezami-e Iran va Rusieh dar oliaviat gharar girad” [senior Russian military official: military cooperation between Iran and Russia should be prioritized], *IRNA*, October 18, 2021, <https://www.irna.ir/news/84509080/>.

- <sup>181</sup> “ashenai ba shura-ye ali-e amniyat-e melli-e jomhuri-e eslami-e Iran” [familiarization with the supreme council for national security of the Islamic Republic of Iran], *Hamshahri Online*, February 24, 2009, <https://www.hamshahrionline.ir/news/75415/>.
- <sup>182</sup> “didar va goftegu-ye Ahmadian va dabir-e shura-ye amniyat-e melli-e federasion-e Rusieh” [visit and discussion of Ahmadian and secretary of the national security council of the Russian federation], *Mehr News Agency*, April 24, 2024, <https://www.mehrnews.com/news/6088202/>.
- <sup>183</sup> “Iran agrees to ship missiles, more drones to Russia,” *Reuters*, October 18, 2022, <https://www.reuters.com/world/exclusive-iran-agrees-ship-missiles-more-drones-russia-defying-west-sources-2022-10-18/>.
- <sup>184</sup> Nicole Grajewski, “The Iran-Russia Friendship Won’t Wither Under Raisi’s Successor,” *Emissary*, Carnegie Endowment for International Peace, May 21, 2024, <https://carnegieendowment.org/emissary/2024/05/raisi-death-iran-russia-relationship?lang=en>.
- <sup>185</sup> Masud Ghorbani Lachvani, “majmueh-ye ghavanin va moghararat-e niru-ha-ye mosalah” [compilation of armed forces laws and regulations] (Tehran: Chatr-e Danesh, 1398 [March 2019-March 2020]), <http://shop.chatredanesh.com/pdf/M.GH.NIROUHAYE.MASALAH.pdf>, pp. 15-33.
- <sup>186</sup> “ashenai ba setad-e kol-e niru-ha-ye mosalah” [familiarization with the armed forces general staff], *Hamshahri Online*, February 28, 2013, <https://www.hamshahrionline.ir/news/203464/>.
- <sup>187</sup> “majera-ye jodai az setad-e kol va darkhast-e sehbareh az rahbari / be felestin va ghezeh mostshar ferestadim / Hashemi dar jameh-ye velai tebh-e nazar-e khod amal mikonad / dovom-e khordadi-ha rasman tajdid nazar taleb budand / rageh-ha-ye tajdid nazar talebi dar dolat-e yazdahom ham dideh mishavad” [the story of separation from the general staff and a three-time request from the leadership / we sent an advisor to Palestine and Gaza / Hashemi acts according to his own opinion in the provincial society / 3rd of Khordadis were officially revisionist / revisionist streaks can also be seen in the 11th government], *Fars News Agency*, October 16, 2016, <https://farsnews.ir/news/13950723000259/>.
- <sup>188</sup> “2 mahvareh-ye Irani-e bakhsh-e khosusi dar December 2023 be faza partab mishavand” [2 private sector Iranian satellites will be launched to space in December 2023], *Tasnim News Agency*, March 5, 2023, <https://www.tasnimnews.com/fa/news/1401/12/14/2863189/2>.
- <sup>189</sup> “Iran i Rossiya budut sotrudnichat' v issledovaniyakh iskusstvennogo intellekta” [Iran and Russia will cooperate in artificial intelligence research], Iran.ru, September 5, 2020, [https://iran.ru/news/economics/116569/Iran\\_i\\_Rossiia\\_budut\\_sotrudnichat\\_v\\_issledovaniyah\\_iskusstvennogo\\_intellekta](https://iran.ru/news/economics/116569/Iran_i_Rossiia_budut_sotrudnichat_v_issledovaniyah_iskusstvennogo_intellekta).
- <sup>190</sup> For instance: Ministry of Defense of the Russian Federation, “Zamministra oborony Rossii Aleksandr Fomin vstretilsya s komanduyushhim sukhoputnymi voiskami Irana Kiumarsom Heydari” [Russian Deputy Defense Minister Alexander Fomin met with the commander of the Iranian ground forces, Kiumars Heydari], August 23, 2023, [https://function.mil.ru/news\\_page/person/more.htm?id=12476962@egNews](https://function.mil.ru/news_page/person/more.htm?id=12476962@egNews).
- <sup>191</sup> For instance: Embassy of the Islamic Republic of Iran in Russia, “Nachalas' vstrecha generala-leitenanta Bageri s nachal'nikom General'nogo shtaba VS RF” [A meeting between Lieutenant General Bagheri and the Chief of the General Staff of the RF Armed Forces has begun], October 20, 2021, <https://russia.mfa.ir/ru/newsview/655825>.
- <sup>192</sup> Website of the Federal Service for Military-Technical Cooperation: <https://www.fsvts.gov.ru/eng/>.
- <sup>193</sup> Rosoboronexport Website, Section “Cooperation with Iran” (in Russia), <https://roe.ru/export/iran/>.
- <sup>194</sup> “Russian automakers Sollers, GAZ, Kamaz plan to supply their products to Iran — ministry,” *Tass*, February 10, 2016, <https://tass.com/economy/855728>.
- <sup>195</sup> “Uralvagonzavod dvizhetsya v Iran” [Uralvagonzavod is moving to Iran], *Kommersant*, January 31, 2008, <https://www.kommersant.ru/doc/847767>.
- <sup>196</sup> Clement Charpentreau, “Russia signs deal with Iran in bid to boost aircraft sales,” *Aerotime*, September 7, 2021, <https://www.aerotime.aero/articles/28820-russia-signs-deal-with-iran-in-bid-to-boost-aircraft-sales>.
- <sup>197</sup> “Russia’s Almaz-Antey to modernize Iran’s aircraft navigation system,” *Tass*, December 7, 2016, <https://tass.com/defense/917299>.
- <sup>198</sup> “Iran assesses Baltic Shipyard, voices interest in joint projects – USC,” *Interfax*, June 17, 2022, <https://interfax.com/newsroom/top-stories/80334/>.
- <sup>199</sup> We define institutionalization here as the process of establishing formal, coordinated, and regular mechanisms to manage defense cooperation, based on: Alexander Korolev, “On the Verge of an Alliance: Contemporary China-Russia Military Cooperation,” *Asian Security*, Vol. 15, Issue 3 (2019), pp. 234-236.
- <sup>200</sup> “sarlashkar Bagheri: be raghm-e eghtedar-e niru-ha-ye mosalah bayad amadeh-ye jang-ha-ye na-hamtaraz bashim” [general Bagheri: despite the power of the armed forces, we must be ready for unequal wars], *Fars News Agency*, June 15, 2022, <https://www.farsnews.ir/news/14010325000776/>.
- <sup>201</sup> “Doktrin-e defai-ye Iran az ‘defa-e sarf’ be ‘afzayesh-e tahdid baraye doshman’ taghir yafteh” [Iran’s defense doctrine changed from ‘mere defense’ to ‘increasing the threat to the enemy’], *Tasnim News Agency*, October 1, 2016, <https://www.tasnimnews.com/fa/news/1395/07/10/1198210>.



<sup>202</sup> “magham-e moazam-e rahbari: tavan-e defai va tahajomi ra afzayesh dehid / gheyr az selah-e shimiai va hasteh-i, mahdudiati dar gostarsh-e sanaye defai nadarim” [supreme leader: increase offensive and defensive capability / other than chemical and nuclear weapons, we do not have a limit in the expansion of defense industries], *Asr Iran*, August 31, 2016, <https://www.asriran.com/fa/news/490989/>.

<sup>203</sup> For example, see “sarlashkar Salami: sepah be donbal-e estefadeh az hush-masnui dar mahsulat-e defai ast” [general Salami: the IRGC is pursuing the use of artificial intelligence in defense products], *Nour News*, June 6, 2023, <https://nournews.ir/Fa/News/140843/>; “niru-ye daryai-e sepah be mushak-ha-ye barkhordar az fanavari-e hush-masnui mojahaz shod” [the IRGC navy possesses missiles equipped with artificial intelligence technology], *IRNA*, August 5, 2023, <https://www.irna.ir/news/85189475/>.

<sup>204</sup> David Albright with Sarah Burkhard and the Good ISIS team, *Iran’s Perilous Pursuit of Nuclear Weapons*, Institute for Science and International Security, May 2021, Kindle edition, pp. 285-286.

<sup>205</sup> The U.S. Defense Intelligence Agency in 2019 cited Iran’s development of capabilities to track space objects and argued that its SLV development efforts “could be applied to developing a basic ground-based ASAT missile, should Iran choose to do so in the future.” (U.S. Defense Intelligence Agency, *Challenges to Security in Space* (Washington, D.C.: Defense Intelligence Agency, January 2019), p. 31.)

<sup>206</sup> The U.S. Government over the years has stated its suspicions that Iran maintains a capability to use its dual-use chemical and biotechnology industries to produce CBW “on demand” if Tehran made the decision to do so. (U.S. Department of State, “Compliance With the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction Condition 10(C) Report,” April 15, 2015, <https://2009-2017.state.gov/t/avc/rls/rpt/2015/243245.htm>; U.S. Department of State, “Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments,” April 2021, <https://www.state.gov/wp-content/uploads/2021/04/2021-Adherence-to-and-Compliance-With-Arms-Control-Nonproliferation-and-Disarmament-Agreements-and-Commitments.pdf>.)

<sup>207</sup> Bettina Renz, “Western Estimates of Russian Military Capabilities and the Invasion of Ukraine,” *Problems of Post-Communism*, Vol. 71, Issue 3, 2024.

<sup>208</sup> A RUSI report from February 2024 assesses ammunition manufacture to be “the most serious limitation for Russia.” Jack Watling and Nick Reynolds, “Russian Military Objectives and Capacity in Ukraine Through 2024,” RUSI, February 13, 2024, <https://www.rusi.org/explore-our-research/publications/commentary/russian-military-objectives-and-capacity-ukraine-through-2024>; see also Michael Kofman, Rob Lee, and Dara Massicot, “Hold, Build, and Strike: A Vision for Rebuilding Ukraine’s Advantage in 2024,” *War on the Rocks*, January 26, 2024, <https://warontherocks.com/2024/01/hold-build-and-strike-a-vision-for-rebuilding-ukraines-advantage-in-2024/>.

<sup>209</sup> It appears unlikely that Russia would turn to Iran for equipment. On the idea of Russia importing equipment from abroad, Dara Massicot recently argued that “...they’ve never done that. And I think that it would be a matter of national pride if they had to import equipment like tanks or some kind of armored vehicles. That’s a really out-of-the-box idea for them. It doesn’t even register, really, as a concept. They much prefer to increase their own capacity if they can.” Isaac Chotiner, “Why the Summer Could Be Disastrous for Ukraine,” *New Yorker*, May 28, 2024, [https://www.newyorker.com/news/q-and-a/why-the-summer-could-be-disastrous-for-ukraine?mbid=social\\_twitter](https://www.newyorker.com/news/q-and-a/why-the-summer-could-be-disastrous-for-ukraine?mbid=social_twitter).

<sup>210</sup> Samuel Bendett and Jane Pinelis, “How The West Can Match Russia In Drone Innovation,” *War on the Rocks*, January 25, 2024, <https://warontherocks.com/2024/01/how-the-west-can-match-russia-in-drone-innovation/>.

<sup>211</sup> See, for example, A. Malkov, V. Gumelev, and V. Shudrya, “Cheaper Does Not Mean Worse: A Brief Overview of Iran’s Unmanned Aerial Vehicle Fleet and the Organizational Structure of Iranian Military Unmanned Aviation” (in Russian), *Armeyskiy Sbornik*, December 2023; A. Malkov and V. Gumelev, “The Iranian Unmanned Aircraft ‘ABABIL-5’” (in Russian), *Armeyskiy Sbornik*, November 2023. According to this report, since 2022, the Ryazan Guards Higher Airborne School (RVVDKU), part of the Russian Ministry of Defense, has been analyzing the use of UAVs in ongoing wars. The report recommends “making a proposal to develop new models of domestic tactical airfield-based UAVs of the MALE category with a flight range of up to 150 km” and says “it would be rational to use the Iranian models ‘Mohejer-6’ or ‘Ababil-6’ as a prototype.”

<sup>212</sup> Pavel Luzin, “Russia’s Military Industry Forecast 2023-2025,” Foreign Policy Research Institute, April 30, 2023, <https://www.fpri.org/article/2023/04/russias-military-industry-forecast-2023-2025/>.

<sup>213</sup> For Russian plans regarding its strategic and non-strategic nuclear weapons, see Michael Kofman, Richard Connolly, Jeffrey Edmonds, Andrea Kendall-Taylor, and Samuel Bendett, “Assessing Russian State Capacity to Develop and Deploy Advanced Military Technology,” Center for a New American Security, October 2022, <https://s3.us-east-1.amazonaws.com/files.cnas.org/documents/CNAS-Report-RussianTechnology-Oct22-TSP.pdf>.

<sup>214</sup> Seth G. Jones, “In the Shadow of Ukraine: Russian Concepts of Future War and Force Design,” CSIS, September 29, 2023, <https://www.csis.org/analysis/shadow-ukraine>.

<sup>215</sup> “In the Shadow of Ukraine: Russian Concepts of Future War and Force Design.”

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<sup>216</sup> Samuel Bendett, “The Role of AI in Russia’s Confrontation with the West,” Center for a New American Security, May 3, 2024, <https://www.cnas.org/publications/reports/the-role-of-ai-in-russias-confrontation-with-the-west>.

<sup>217</sup> Matthew McInnis, “Russia and China Look at the Future of War,” Institute for the Study of War, September 14, 2023, <https://www.understandingwar.org/backgrounder/russia-and-china-look-future-war>.

<sup>218</sup> On the dismal outlook for the Russia military space program, which “entered the 2020s in a near-crisis mode caused primarily by its inability to lessen its dependence on foreign supplies or to stem the ‘brain drain’ of workers in this industry,” see “A Limping Giant: Russian Military Space in the First Half of the 2020s.”

<sup>219</sup> “A Limping Giant: Russian Military Space in the First Half of the 2020s.” Anatoly Zak writes: “...(As of early 2023) Russian propaganda cultivated the notion that some non-Western countries or groups of countries, such as BRICS, Iran, or North Korea, could help Russia out of its technological black hole. However, so far, little available evidence has supported that idea... : the examples of Iran and North Korea only illustrate how backward and limited in scope the Russian space program could become if Russia remains on its present course.”

<sup>220</sup> Chris Panella and Jake Epstein, “Russia’s jamming of American weapons in Ukraine is showing the US what it needs to be ready for in a future fight,” *Business Insider*, May 9, 2024, <https://www.businessinsider.com/russian-electronic-warfare-shows-us-needs-for-future-wars-2024-5>.

<sup>221</sup> “Forecasting Russian Military Innovation: The Role of Soviet ‘Zombie Weapons’,” Webinar, James Martin Center for Nonproliferation Studies, May 18, 2023, <https://nonproliferation.org/forecasting-russian-military-innovation-the-role-of-soviet-zombie-weapons/>.

<sup>222</sup> “A Limping Giant: Russian Military Space in the First Half of the 2020s.”

<sup>223</sup> Bendett, “The Role of AI in Russia’s Confrontation with the West.”

<sup>224</sup> Andrea Kendall-Taylor and Richard Fontaine, “The Axis of Upheaval,” *Foreign Affairs*, April 23, 2024, <https://www.foreignaffairs.com/china/axis-upheaval-russia-iran-north-korea-taylor-fontaine>.

<sup>225</sup> For instance, IRIAF aircraft such as the F-4, Su-24, and the newly purchased Su-35, and IRGC-ASF Su-22 aircraft.

<sup>226</sup> For instance, in the 1990s, Iranian experts reportedly received training/education from the Moscow Aviation Institute (MAI), Bauman State Moscow Technical University, and Baltic State Technical University (BSTU) in missile-related technologies (Wehling, “Russian Nuclear and Missile Exports to Iran,” <https://www.nonproliferation.org/wp-content/uploads/npr/wehl62.pdf>, p. 140). Also, in the 2000s, IRGC Air Force experts reportedly received missile-related training at Russia’s Samara State Aerospace University (“Ivanov denies reports on Iran missile experts training in Russia,” *Sputnik International*, June 30, 2006, <https://sputnikglobe.com/20060630/50724168.html>).

<sup>227</sup> Based on statements and interviews by Iranian military officials captured in Persian-language sources.



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