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Implications of A Survivable and Opaque Iranian Nuclear Program

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Introduction

As the political deadlock over the suspected activities of the Iranian nuclear program continues, the debate about whether a military option is viable, and for how long, continues to linger. However, the development of the Iranian nuclear program in the context of self-sufficiency in Iranian technical capacities to sustain its nuclear activities, its potential ability to do so in more clandestine ways than it may be doing already, and the physical survivability of its key nuclear facilities and assets from military attack and sabotage, create a complex scenario. This Special Report explores these major issues to understand how the Iranian nuclear program may or may not have already crossed a 'zone of immunity' by assessing ambiguities about the suspected or potential future activities by Iran in pursuance of a nuclear weapons arsenal, and how these may relate to a political decision that is ultimately resolved through a political exchange between itself and the United States, and how it could be emboldened to breakout in support of a weapons capability in the event of an attack.

Becoming a Nuclear Power

Since its inception nuclear technology has been seen the world over as a crowning symbol of national scientific capabilities – and nuclear weapons as a status symbol of 'major world powers.' For those with nuclear weapons programs, the combination of threat deterrence and national prestige it brings is unattainable through purely conventional capabilities. For Iran, nuclear weapons capability would lend it considerable prestige – particularly in its quest for leadership in the Islamic world – and because Iran would have managed to obtain that status in total defiance of its archrival the United States, whose repeated position has been to actively use any option to ensure Iran does not acquire that status. At a deterrence level, a nuclear weapons arsenal would assure Iran not only regime survival but allow it to exploit the opportunities that the wars in Afghanistan, Iraq, and tensions between the United States and Pakistan have created to potentially rebuild the regional order of power around itself.

Illustration 1: Becoming a Military Nuclear Power in Stages

- Scientific knowledge acquisition, proliferation, and internalization
- Enabling nuclear infrastructure
- Self-sufficiency in related and supporting industrial capacities
- Ability to pursue efforts covertly without international detection
- Physical protection, resilience, and survivability of nuclear and related facilities
- Resistance to punishments of non-compliance – political survivability
- Weaponization

For a nation pursuing a nuclear weapons capability, there are significant obstacles to overcome given the international nuclear non-proliferation regime and the international security *realpolitik* in which rivals and adversaries actively prevent the acquisition of such a capability by any means available. The first stage – preamble, even – of a nuclear program whatever its intended purpose is mastering know-how in nuclear physics, which requires a dedicated long term effort by an ably-equipped scientific community. This learning and education process must inevitably begin with a level of support from those that already possess that knowledge and are willing to share access to and allow its proliferation, and an enabling nuclear infrastructure. The process of knowledge acquisition and proliferation in the nuclear field is one which can take between at least ten to fifteen years, and once that prerequisite scientific knowledge is internalized across a large enough scientific research network, converting knowledge into real

world applications requires the development of a set of niche industrial capacities. Such industrial capacities must provide a largely self-sustaining and self-sufficient basis for the development and manufacture of related and supporting technologies – again, an effort which requires some degree of external intellectual sponsorship in order to initiate the necessary processes of technical capacity-building.

Once a nuclear program is able to deliver enriched nuclear material to its operators, for a state pursuing a nuclear weapons capability it must be able to pursue its efforts covertly and without international detection – and, perhaps most importantly, be able to protect its nuclear and related infrastructure from sabotage and attack in the event that it is detected. There also needs to be resilience in absorbing the political and economic costs of defying an international system that is coercive and punishes non-compliance in nuclear non-proliferation through enforced isolation, economic sanctions, and the use of force. Once weapons grade or near-weapons grade nuclear material can be delivered, it must be weaponized – and a reliable nuclear weapons delivery system is a separate technical effort altogether. For most countries, combining the time cost, financial resources, and political clout needed to develop a military nuclear program creates a sufficient disincentive to such pursuits in the first place, or compels program abortion at some point safely before a nuclear weapons program can deliver tangible outcomes in the form of a deliverable arsenal.

Assessing Iranian Nuclear Power

Iran however has managed to overcome both the obstacles to knowledge acquisition, proliferation and internalization, as well as challenges with developing a largely self-sufficient industrial capacity in the nuclear field. Where Iranian nuclear scientists stand today is the result of a decades-long pursuit in the nuclear field which begun with the Atoms for Peace program from the Eisenhower administration in the mid-1950s under the Shah of Iran. Iranian acquisition and proliferation of knowledge in nuclear physics began in the 1970s when the Iranian alliance with the West paved the way for its own scientists be trained under Western mentorship. By 1967, the Tehran Nuclear Research Center supplied by the United States was established, comprising a 5-megawatt nuclear research reactor fueled by high enriched uranium. In 1975, Mohammed Reza Shah Pahlavi acquired a 10 percent stake in Eurodif, a French-led European consortium supplying enriched uranium, and commissioned Kraftwerk Union AG, a subsidiary of German conglomerate Siemens AG, to build and complete by 1981 the first two of a planned twenty three nuclear power stations in Iran by 2000.

Following the revolution in Iran, international nuclear cooperation with Iran was cut off and Kraftwerk Union abandoned work on both power stations in Bushehr (one fifty percent complete and the other eighty five percent complete). After initially suspending the nuclear program, Ayatollah Khomeini decided that nuclear research activities ought to continue – but a slower, more deprived, Iranian nuclear program emerged, repeatedly targeted by Iraq during the Iran-Iraq war. The Bushehr Power Plant finally went operational in mid-2010 after a 1995 agreement between Iran and Russia to complete the project. By 2010 however the Iranian domestic nuclear program – which uses centrifuge-based, not reactor-based, uranium enrichment processes – had undergone considerable development.

With regards to its industrial capacity, Iran acquired the crash-prone P-1 and later the more advanced P-2 gas centrifuges from the AQ Khan network and North Korea in the 1990s. Today Iran produces the IR-1 (a domestically manufactured version of the P-1), and the IR-2m – believed to be derived from the P-2 and have approximately three times the output of the P-1.

Iran also claims to have developed a more advanced third-generation IR-4m, claimed to be capable of enriching uranium five times more efficiently than the P-1. The ability to manufacture its own gas centrifuges has brought Iran a significant capability because there are still no technical ways to discover an enrichment process based on gas centrifuges for separation. Enrichment through a gas centrifugal system gives off heat emissions per square foot comparable to a grocery store, making it invisible to infrared (I/R) sensing surveillance technologies. Gas centrifuge-based enrichment also has no chemical or electromagnetic signature detectable beyond the periphery of the facility. Moreover, a gas centrifuge enrichment process could be powered by a diesel generator in a space as small as a high school gymnasium, and fed by just one canister of uranium material to deliver a nuclear bomb. The nuclear programs of Russia, Iran, and North Korea whose enrichment capability was almost entirely built on centrifuge technology all dodged CIA efforts looking for evidence of centrifuge use for decades.

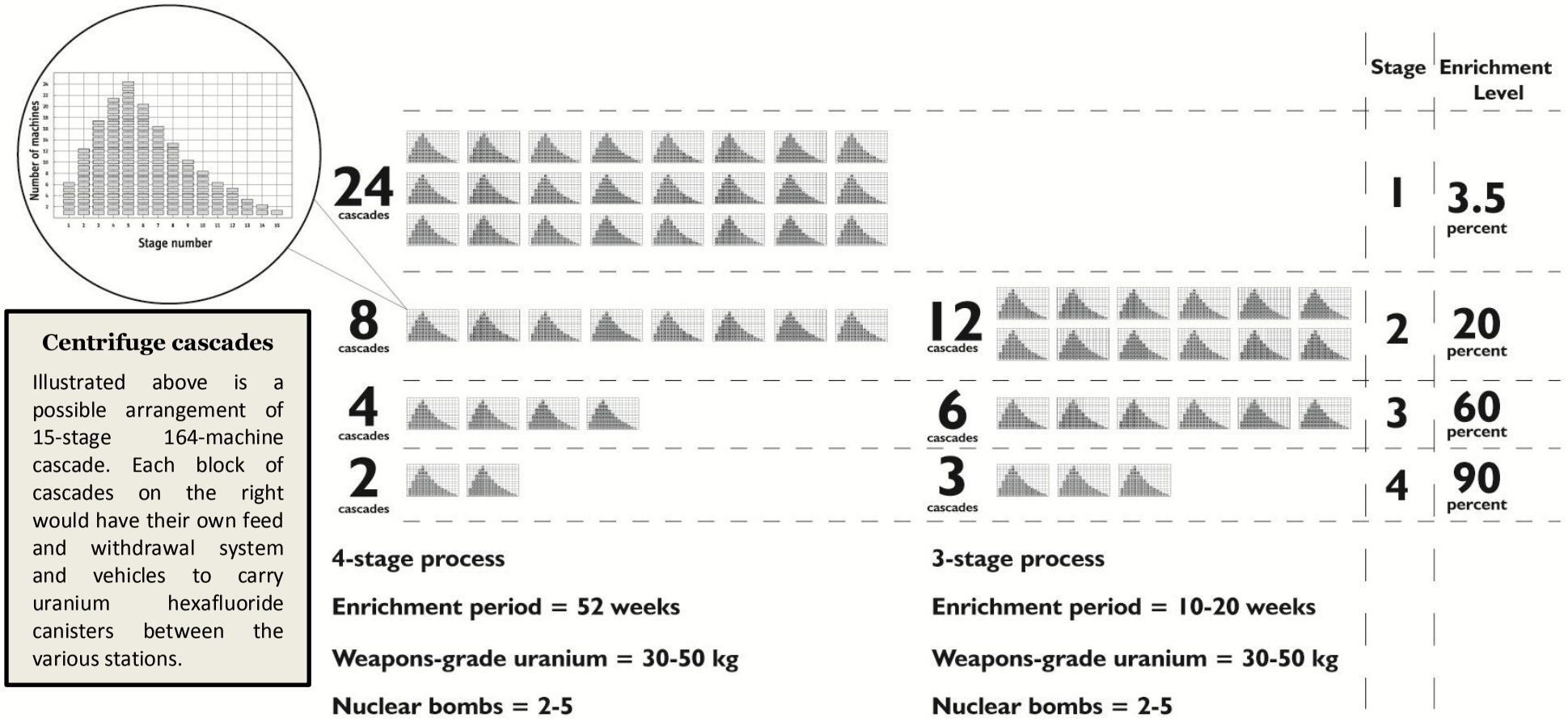
Illustration 2:

Iranian manufactured gas centrifuges

Although the claimed efficiencies of the IR-2m and IR-4m gas centrifuges domestically produced by Iran are unverified, their potentially profound impact on the future development of the Iranian nuclear program cannot be dismissed. Much depends on the Iranian manufacturing productivity of the IR-2m and IR-4m, but even the most conservative estimates would put that at least in the thousands, per month. Iranian centrifuge and related component production facilities are already widely dispersed and hidden – neither Israel nor the U.S. is certain of the locations of all such facilities, analysts at the Congressional Research Service have reported citing interviews with unnamed current and former U.S. government officials familiar with the issue. Unverified reports suggest uranium hexafluoride gas has been injected into four 174-machine cascades of IR-1 installed at Fordow that have begun enrichment of uranium to the 20 percent level. However, while President Ahmadinejad announced domestic production of the IR-2m centrifuge during his first term, in more than six years since Iran has installed just two cascades of these centrifuges – and only 8,000 IR-1 rather than the Iranian target of 50,000 were installed at Natanz by 2011. Such reports could suggest both Iranian challenges with manufacturing centrifuges, or that some production is being diverted to clandestine facilities. Importantly, too, Iranians are known to regularly encounter breakdown problems associated with the poor designs of their

Iranian missile capabilities, often showcased for the international audience, are already well known and whilst not all Iranian claims are verifiable or indeed believed, they pose a credible offensive threat to passive and active air defense systems. More important to the discussion of nuclear weapons however, in the early 1990s Iran acquired Soviet-made nuclear delivery warheads from Ukraine in the form of the nuclear-capable X-55 (called AS-15s by NATO) cruise missile, which has a range of roughly 2,000 miles. The sale of the X-55 to Iran (China was another customer) was confessed to have been made by the previous government by the sitting Ukranian President Viktor Yushchenko in 1995. Although the X-55 missiles were sold without nuclear warheads to Iran, Iran would have by now been able to either reverse engineer the missile for its own research and reproduction – or at least acquired important knowledge about integrating nuclear warheads onto a cruise missile. If and when Iran possess weapons-grade enriched uranium, its weaponization is unlikely to be a major delaying factor in any efforts to assemble a functional nuclear weapons arsenal.

Illustration 3: P-1 Centrifuge-based Uranium Enrichment

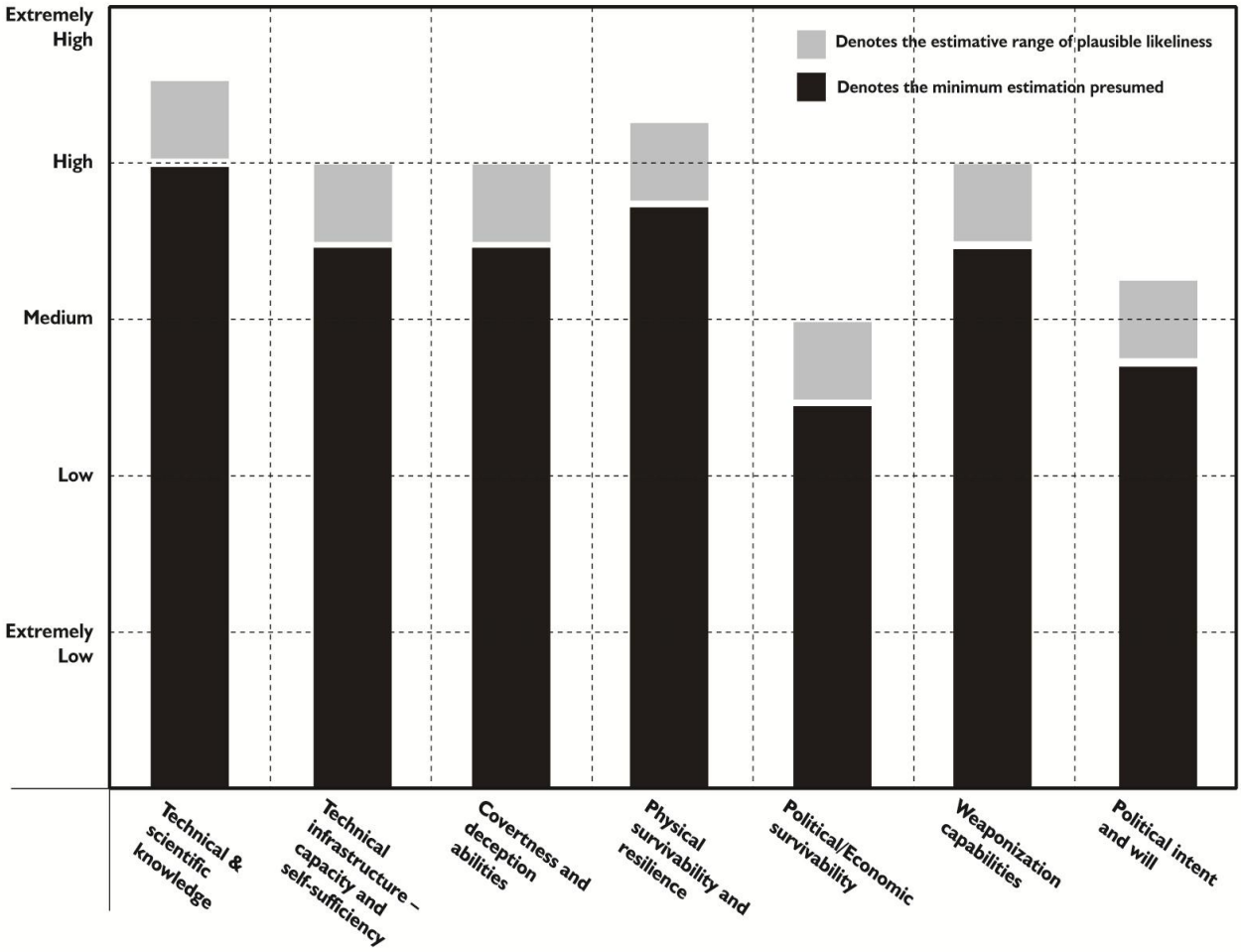


According to research by Washington-based think-tank ISIS, in a gas centrifuge-based uranium enrichment plant containing 5,832 P-1 centrifuges in 38 individual 164-machine cascades, a four stage process could yield 30-50 kg weapon-grade uranium within a year. However, making highly enriched uranium (20 percent enriched) from natural uranium takes roughly four times as much work as making highly enriched uranium from low enriched uranium (3.5 percent) – and requires as much as two third of all centrifuges within such a plant to be dedicated to that first stage. With sufficient stocks of low enriched uranium, the entire process could be hastened as the first stage is no longer necessary, and sufficient weapons-grade uranium could be produced for a crude nuclear weapon in as little as three months. Iran could achieve higher weapon-grade uranium outputs if it increased the enrichment output of its centrifuges and used higher tails assays – which it has, with the acquisition of P-2 and domestic production of IR-2m and IR-4m centrifuges – or built a clandestine plant where it could assign more cascades to the various stages.

Current Status and Questions about the Iranian Nuclear Program

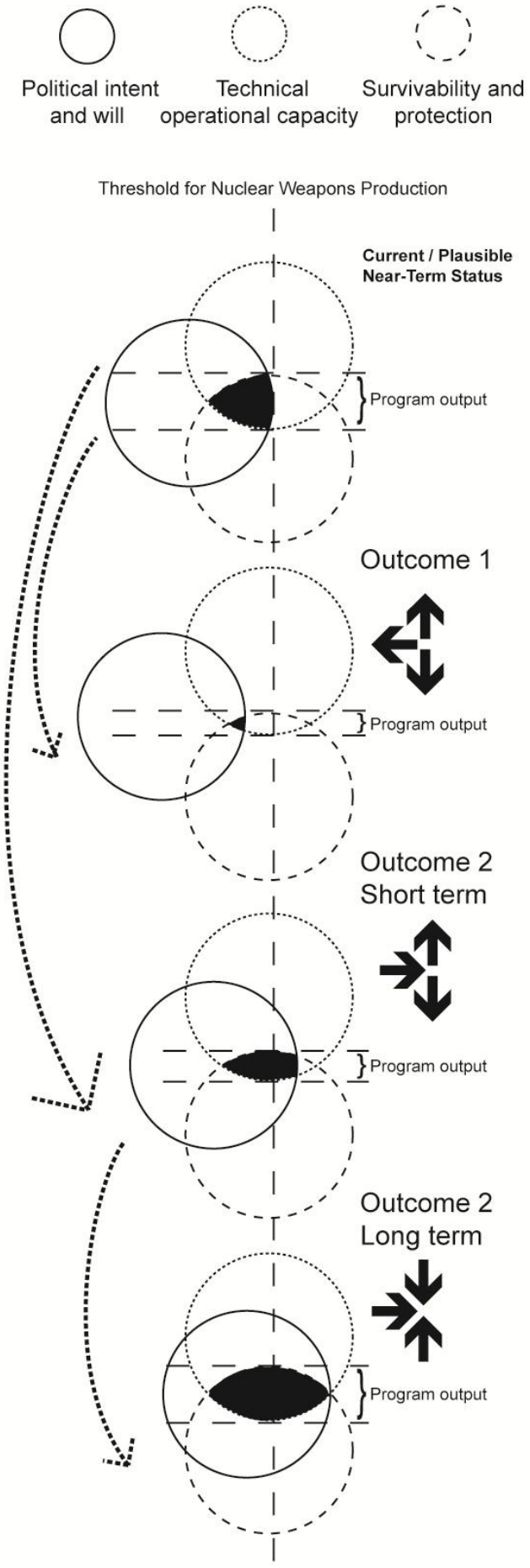
Over the past few years, the extent and sophistication of the Iranian nuclear program – which is overseen by the Supreme Leader through control of the powerful Iranian Revolutionary Guards Corps (IRGC) – has become apparent. Today, the Iranian nuclear program is dispersed across as many as 60 known sites and many more unknown around the country – many are buried deep underground and heavily fortified to protect against air attack. The Fordow enrichment facility, for example, is buried almost 300 feet under a mountain. As clandestine nuclear facilities operated by Iran and the clear intentions with which they were designed such as to avoid detection and remain protected from attack were discovered, and transparency and intentions of the Iranian nuclear program came into question – even in the evidential absence of an Iranian nuclear weapons program. More importantly however those successes on the part of the Iranian leadership created serious questions amongst foreign intelligence agencies as to how much they actually know about the hidden elements of the Iranian nuclear program and if, and how many, other facilities may exist which are unbeknown to outsiders. For these same reasons Iranians share a perception that regardless of how much they open up their program to international inspection, there will still be suspicions amongst its enemies as to what it may be doing covertly that is still unknown to them.

Illustration 4: Iranian Nuclear Program Capacity



Essentially it is that inherent lack of verification which can be enforced reliably about the Iranian nuclear program and the potential ability of Iranians to hide away, expand, and activate efforts for a nuclear weapons program more or less as they please which has led some intellectuals to

Illustration 5: Affecting Iranian Nuclear Program Outputs Risk Assessment



Current/Plausible Near-Term Status: A contentious topic, here it is the accuracy of intelligence reporting on the true status of Iranian nuclear activities and assessments on how close Iran truly is to the threshold for nuclear weapons production, determining if, how, and until when a potential military option remains viable. To avoid counter-productive and unintended consequences from a military intervention, it would be absolutely essential to completely rule out the possibility that Iran operates at this threshold and makes a political choice not to cross it, or be certain that any effort – military or otherwise – can reduce both the program output and future political will simultaneously. This illustration assumes that the Iranian nuclear program has the theoretical potential to operate at this threshold even if it is not doing so already, and that it is able to preserve that potential through dispersed and survivable covert facilities. In **Outcome 1**, it is presumed that military intervention and or raising the political and economic costs through international isolation and economic sanctions combined with sabotage operations to disrupt the operational capacity including the successful targeting of covert facilities which are thought by their operators to be unknown to the attacker, result in a reduced program output and ultimately a reduced political will for Iran to operate their nuclear program even at the threshold of nuclear weapons production. In **Outcome 2**, it is presumed that a partially successful military intervention and sabotage operations disrupt nuclear activities only temporarily, and combined with economic sanctions convince the Iranian leadership that the survivability of the regime and or the future of their nuclear activities have been critically threatened – whilst program output is reduced in the short term, political will to cross the threshold of nuclear weapons production increases leading Iran to assembling a small arsenal of weapons or conducting a nuclear test as rapidly it is able to do so. In the long term, program output recovers and a nuclear program with an active weapons production component is realized.

reconciling with the inevitability of a nuclear armed Iran – for them, it is a matter of when and not if. Although that line of thinking is attacked by those who insist that until it is proven that Iran has a nuclear arsenal – and perhaps nothing short of Iran testing a nuclear device may convince that group – that there is still time, albeit within a shortening window, to prevent it from doing so through military means. For others however the military option, even if it is still viable in theory, is risky because of how a failed military operation could be counter-productive as Iran is made to look like a victim of aggression and the will of the Iranian leadership to cross the threshold and weaponize nuclear material is thereby allowed to happen under some sense of legitimacy. Citing examples of successful Israeli attacks on the Iraqi reactor in 1981 and the Syrian reactor in 2010 are said to be grossly misleading because the Iranian program is centrifuge-based rather than the reactor-based Iraqi and Syrian nuclear programs, which makes it much easier to reconstitute. Indeed, Iranians have had many more years to acquire and stock critical equipment and raw materials to be able to make their uranium enrichment program resilient to attack, and it is in any case considerably more advanced, dispersed and hardened than the former Iraqi and Syrian nuclear programs.

The Iranian position continues to be that it is not actively seeking nuclear weapons but that nuclear research and technology, including autonomous control of the enrichment process, is its fundamental and non-negotiable right. Some point to the *fatwa* of Supreme Leader Ayatollah Khamenei which outlaws nuclear weapons as un-Islamic – although the Shi'ite tradition of *taqqiya* does make it lawful for the faithful to practice concealment of real intentions or beliefs where there is overwhelming danger of loss of life or property and where no danger to religion would occur in doing so. More importantly, however, Iranians make a distinction between a nuclear weapons capability and the capability to produce nuclear weapons – and whilst the former may be seen as unnecessary for Iran to protect their interests *at the present time*, the threshold of that breakout capability whereby nuclear weapons could be produced at short-notice is seen by them to be desirable – it is also a position the Iranians believe they have already reached. If that is indeed the case then three key conclusions can be derived from the present situation – firstly, that Iran has not taken the political decision to cross the nuclear threshold to produce a nuclear arsenal (a view shared for now by the International Atomic Energy Agency and even U.S. intelligence), secondly that Iran can be convinced to maintain such a position (which has more believers in the U.S. than Israel), and finally that the current economic costs Iran is confronting with sanctions – its currency lost half its value in the face of massive inflation when the latest round of sanctions took hold – provides a corridor for the United States to explore a political exchange between itself and Iran.

It appears that, ultimately, the most realistic goal for the United States may be to ensure that its own positions and actions do not drive the Iranian nuclear program underground and clandestine any further – rather, Washington is seeking essentially to work with Iran by harnessing a new transparency regime based on political and economic costs and benefits in order to reconfigure the Iranian nuclear program so that while Iran would be able to maintain it for civilian purposes, including uranium enrichment by Iran, within Iran, it is not poised to make weapons quickly. As such, the current negotiations between the P5+1 (the five permanent members of the UN Security Council plus Germany) and Iran are unlikely to see major breakthrough unless they can broaden the scope of discussions beyond nuclear disagreements – a movement that seems unlikely to happen any time before the U.S. presidential elections in fall 2012. Observers point out that much of what is at stake is driven by politics and, "all politics being local" – an adage of Tip O'Neil, a former Speaker of the House in the U.S. – that the logic of how productive or counter-productive a strike against Iran would be fades into the background. Indeed, when the Republican nominee to face-off with President Obama, Mitt Romney, criticized his opponent at a rally of being more frightened about the specter of a preemptive Israeli strike

against Iran than the possibility of a nuclear-armed Iran itself, he did so to applause.

Conclusion – Moving Forwards for the GCC

Although President Obama maintains all options including the military remain on the table, this possibility may have already been accepted as the least preferred option of all by U.S. policymakers for several reasons – many of which are not discussed here and concern the extent and nature of the Iranian military response to an attack on a regional level. A growing number of American strategists have lent credibility to the consideration that a military strike on Iran could be the least likely to lead a favorable outcome in the mid-term for wider U.S. interests, although this is far from certain and far from being the same as dismissing the possibility of reverting to the military option because that decision will ultimately be political. Just as the U.S. has in place contingency plans for the military option against the Iranian nuclear program, so too it will have – and will almost certainly be reviewing – plans for dealing with and containing a nuclear-armed Iran if prevention fails.

In such a scenario, the U.S. may seek to refocus its efforts back at regime change over the long-term, but will need to inevitably balance those objectives against dealing with Iran across a range of shared areas of regional interest as well as a new set of concerns in nuclear safety and security. If this happens, the GCC must work out ways to assert themselves in support of their collective security and strategic interests, vis-à-vis Iran, the U.S., and around the region, carving out new ad-hoc alliances to balance rather than endanger traditional ones for greater leverage and strategic depth. From 2013, leaderships around the GCC may wish to position the GCC alliance so that they themselves, allies, and adversaries can understand the range of costs and benefits of potential developments a nuclear-armed Iran would create – as a basis not only for future interactions between these players and the GCC, but also as a way to build their case in support of a nuclear weapons free zone in the region even more strongly in the meantime.

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