Verifying an agreement between Iran and the E3+3

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The IAEA has well-established and effective procedures for detecting illicit activities at inspected facilities. These procedures, or procedures fundamentally similar in nature, are likely to be adequate for verifying Iran's compliance with parts of any agreement that place limits on declared facilities and programs. In some cases the legal basis may be lacking—for example, the Additional Protocol does not give the IAEA the legal authority to systematically and routinely verify centrifuge production at workshops. However, legal shortcomings can be remedied with the cooperation of Iran through ad-hoc agreements included in any comprehensive agreement.

More difficult is the problem of covert facilities. A 2007 U.S. National Intelligence Estimate, representing the consensus view of 16 intelligence agencies, states, "We assess with moderate confidence that Iran probably would use covert facilities—rather than its declared nuclear sites—for the production of highly enriched uranium for a weapon."[1] This conclusion is also consistent with history: every illicit nuclear-weapon program in an NPT-signatory state has proceeded on a secret basis, and mostly at covert facilities. It is this challenge that will determine whether a final settlement can be effectively verified.

The Centrifuge Detection Problem

In general, there is a sound basis for worrying about undeclared centrifuge facilities, which have a long record of evading detection. For example, the United States never detected the Soviet centrifuge enterprise, despite its being ten times larger than any program in the West. The West learned of the program 34 years after its inception when Russia announced it publicly in 1991. The United States appears also not to have detected the Chinese centrifuge program for about 21 years. The IAEA never detected the Libyan centrifuge program, which was eventually uncovered by U.S. intelligence 16 years after its inception. The Iraqi centrifuge program completely escaped the detection of both the IAEA and U.S. intelligence; it was revealed as a result of UNSCOM/IAEA inspections in the aftermath of the first Gulf War.[2] Most recently of all, no entity detected North Korea's centrifuge facility at Yongbyon. Although the United States had accused North Korea of hiding a centrifuge program

[1] Iran: Nuclear Intentions and Capabilities, Key Judgments (unclassified), National Intelligence Estimate (National Intelligence Council, 2007), http://www.dni.gov/press_releases/20071203_release.pdf.
[2] The Soviet, Chinese, Iraqi, Libyan and North Korean cases are chronicled in: R. Scott Kemp, "The Nonproliferation Emperor Has No Clothes: The Gas Centrifuge, Supply-Side Controls, and the Future of Nuclear Proliferation," *International Security* 38, no. 4 (April 2014): 39–78, doi:10.1162/ISEC_a_00159.

in 2002, the intelligence community was unable to assess the status of the program or identify the location of facilities until 2010 when North Korea unveiled a centrifuge plant located near Yongbyon, which appears to have been constructed between 2008 and 2010. Given the speed with which the Yongbyon facility was constructed, it is very likely that North Korea had practice building and testing centrifuge plants at another location previously, reinforcing the presumption that one or more facilities have yet to come to light.[3]

The basic problem is that centrifuge programs produce no external signatures of a technical kind that would enable reliable detection. This difficulty has been recognized for decades. As early as 1970, the CIA had concluded, "Analysis of all available data has produced no evidence of a centrifuge plant because there are no specific identifying characteristics of a centrifuge plant."[4] No technical advances have altered this fact; most detection limitations are fundamental limits imposed by physics.

Rather, the few clandestine centrifuge programs that have been detected were uncovered because of organizational connections to entities outside of the country in question. This is how the Pakistani, Iranian, Libyan, and North Korean programs were discovered.[5] The 2005 report of the *Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction* reviewed this history and stated that a "disproportionately large volume" of intelligence has been related to procurement activities, implying that there has been inadequate information about internal activities; and concluded that the Intelligence Community "is not well-postured to replicate such success."[6]

The Iranian Case

In view of the evidence, it would be foolish to conclude that a *de novo* centrifuge program, not yet known to the world, could be readily detected by the IAEA or by national intelligence authorities. However, it is crucial to recognize that Iran fits into no earlier category. Although many technical aspects of the program would remain difficult to detect by technical means, the program is not new and Iran has long been suspected of harboring proliferation intent. Iran's nuclear organization has been the target of international intelligence activities for over two decades. There are several spectacular examples of the depth and quality of intelligence gathering in Iran, ranging from the revelation of Iran's clandestine facility at Fordow, to the extraordinary amounts of information needed for the successful execution of the

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[3] Sigfried S. Hecker, *A Return Trip to North Korea's Yongbyon Nuclear Complex* (Center for International Security and Cooperation, Stanford University, November 20, 2010), http://iis-db.stanford.edu/pubs/23035/HeckerYongbyon.pdf.

[4] U.S. Central Intelligence Agency, "Nuclear Energy," *Weekly Surveyor*, January 12, 1970, Digital National Security Archive.

[5] Kemp, "The Nonproliferation Emperor Has No Clothes."

[6] *Report of the Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction* (U.S. G.P.O., 2005), 253, 261.

Stuxnet attack.[7] Arguably, Iran's nuclear program is already the most transparent in the world.

Policymakers are faced with an ironic choice: while many dream of shutting Iran's nuclear program, that outcome might actually be the worst in the long run. The existing program is very well monitored, and though detection of a new clandestine activity cannot be assured, the chances are higher if there is a connection with an overt, monitored program. As a result, overall detection probabilities are probably already as high as possible. By contrast, shuttering the existing program would mean that any hacked computers would be turned off, any tapped phone lines would be disconnected, any informants would be laid off, and any foreign supply relationships would be terminated. If the current program in Iran were fully dismantled, and Iran decided to make a nuclear weapon, then it would build a new program from scratch. That program would then lack the intelligence penetration that makes the existing program so transparent. It would still lack the technical signatures needed for detection, and it would therefore be similar to the *de novo* centrifuge programs for which the historical record of detection has been miserable. Worse still, Iran's twenty years of practice means this hypothetical future effort would no longer need to go abroad for parts, equipment, or knowledge. This proliferation effort would also lack the linkages to the outside world that have been the only useful mechanism for detecting *de novo* clandestine centrifuge programs in the past.

Overall, the evidence indicates that the best opportunity to verify that Iran's nuclear activities remain peaceful involves keeping the current program intact but small. Perfect verification cannot be had; there will never be a way to prove conclusively that Iran is not producing nuclear weapons. But a high standard of verification is now within reach. The current negotiations provide something very near to the best possible outcome.

[7] International Atomic Energy Agency, *Implementation of the NPT Safeguards Agreement and Relevant Provisions of Security Council Resolutions in the Islamic Republic of Iran*, GOV/2011/65 (International Atomic Energy Agency, November 8, 2011).