The Strategic Dimension of Iran's Leap into Space

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In February 2007, Iran launched its first sub-orbital rocket that reached an altitude of 150 kms before falling back to Earth and deploying a parachute for recovery.[1] Iran claimed that the rocket was intended for research and part of its goal of launching Iranian manufactured satellites on Iranian manufactured rockets.[2] It is estimated that the rocket's operational range against a ground target might be 4,000 km.[3] Iran followed it up by launching a rocket designed to carry its first locally-made research satellite, Omid, which is expected to be launched by March 2009.[4] These launches, however, assume significance not only for Iran's satellite effort but also for the development of its long-range delivery systems. Any space launcher is in effect a potential Inter-Continental Ballistic Missile (ICBM) that could reach anywhere on earth with very little differences in their guidance systems.

Iranian Space Programme: Civilian and Military Dimensions

Much like other states that have benefited militarily from improvements in their space programmes, Iran is also using the development of its space programme to improve its conventional (WMD) delivery systems.[5] Iran began its space programme in 1998 with the stated purpose to develop new communications capabilities, improve weather forecasting, assist in disaster relief and provide other public services. Iran, apparently in a bid to fulfil the aforementioned objectives, approved a bill to create the Iranian Space Agency (ISA), which would subsequently serve as a

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policy-formulating organisation for space initiatives. The ISA carries out research and related activities on technology and remote sensing projects, develops national space equipment, and participates in the development of national and international space endeavours. In addition, the ISA also coordinates all space-related activities carried out by various research institutes, universities and several administrative agencies. These efforts play a major role in helping the ISA execute decisions from the Supreme Aerospace Council.[6]

The Supreme Aerospace Council was created in 2003 in order to approve various space-related programmes and promote important partnerships among other organisations.[7] This council functions with substantial inputs from senior government officials. The director of the ISA serves as the secretary while the country's president serves as the chairman, thus raising the profile of the ISA. Other significant members include the defence minister and four "space experts".[8] This arrangement raises concerns since there is a high possibility that one of the unspecified experts could also include a commander from the Islamic Revolution Guards Corps (IRGC), which manages the Shahab ballistic missile programme. Although the IRGC is commanded independently, its administrative functions are within the regular armed forces at the General Staff.[9] It is instructive that Iran avoided disclosing the IRGC or the council's efforts to safeguard security at the 2002 United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) meeting, possibly to minimise accusations that it wanted to exploit space for military purposes. This is because the military reforms of 1989 curtailed the independence of the IRGC from the defence ministry.

Iranian officials often discuss space and missile developments simultaneously, perhaps indicating the parallel nature of the programme. They have openly admitted that the Shahab missile system has been used as the basis for Iran's space launch vehicle.[10] In fact, Nasser Maleki, deputy director, Aerospace Industries Organisation (AIO) openly acknowledged that the same technology used for building a satellite launch vehicle could be used to manufacture

missiles.[11] In 2005, Brigadier General Ahmad Wahid, Chairman of the AIO, commented that Iran was developing its space programme for both military and civilian uses.[12] Both programmes fall under the organisational management of the AIO. It is directly responsible for developing the military aspect of the programme. Specifically, AIO develops guidance systems and solid rocket boosters that are used in any space launch vehicle and missile system. Iran uses its educational institutions to develop greater capabilities in missiles and space.[13] Much of the research (i.e. work on structures, aerodynamics, thrust effect, and vibrational characteristics) undertaken at these institutions could be used for a long range and/or guided missile programme. In 2005 Iran allocated $500 million for space projects for five years and also launched its first commercial satellite, Sina-1, into orbit from a Russian rocket. Iran is now intent on constructing its own satellite and rockets to launch them. In 2003, Rear Admiral Ali Shamkhani, Iran's then defence minister, had stated that in a few months time, "Iran will be the first Islamic country to penetrate the stratosphere with its own satellite and with its own launch system."[14]

Strategic Goals of Iran's Missile Programme

Iran's missile programme has been geared towards serving its security interests and has shown a steady progress in its range, precision, and sophistication. During the 1980s, it was Iraq that was Iran's main adversary and most of its missile capability was geared towards countering the threat from Iraq. During the eight year war with Iraq, most of Iran's major cities, including Tehran, came under repeated attacks of Iraqi Scud missiles. It used Oghab and Mushak-120 missiles against Iraq in the Iran-Iraq war and also sought short-range Scud missiles from North Korea. China, North Korea, and Russia have been Iran's primary partners in the development of missile capability. It purchased CSS-8 short-range ballistic missile from China in the late 1980s. From early 1990s, Iran's focus shifted towards the development of intermediate range Shahab-3 and Shahab-4 missiles. Shahab-3 has been flight tested at least six times since 1998 and is based on North Korea's No Dong

missile. It can carry a 1200 kg payload at least 1300 kms, giving Iran the capability to hit every major city in Israel and some in Saudi Arabia and Turkey. Though Shahab-4 has been characterised by Iran as a space launch vehicle, it could be used as a technical base for intermediate and intercontinental-range missiles. Shahab-4 is based on Soviet R-12 (SS-4 Sandel) technology obtained from Russia.[15]

As concerns about Iraq's WMD programme grew after the First Gulf War, Iran accelerated work on its own missile capability. Shahab-3 is seen as central to Iran's deterrent posture, particularly vis-à-vis Israel's nuclear capability. Iran is also keen on acquiring missile capability that counters hostile American foreign policy towards it and as tensions between the US and Iran have increased in recent years. Iran's efforts to acquire nuclear and concomitant missile capability have also gathered momentum. According to Shamkhani, the satellite launch would be in response to American actions: "The Persian Gulf was once a place from which constant threats against the Islamic Republic emanated. But now, with the resources that we are gaining, this region cannot be used against us by any outside force." This announcement was made because Tehran had figured out that it could be a likely target after Iraq since Iran was part of President Bush's "axis of evil". This could possibly explain Iran's persistence in possessing a space capability.

Even Iran's current missile arsenal of artillery rockets and short and medium range ballistic missiles give Iran a deterrent capability vis-à-vis the US as it can target US forces and infrastructure in Iraq and other parts of the Persian Gulf. Iran has officially declared that it had ballistic missiles with a range of 2000 kms and could produce ones with a greater range even as it has tried to maintain ambiguity on the specifics of its arsenal.

Iran's pursuit of nuclear weapons has gained momentum, and so have its attempts to acquire adequate delivery capabilities. And much like its nuclear programme, its missile programme is also shrouded in mystery. What makes Iran's recent test troubling is the concern that the

international community has about Iran's missile programme and about the possible nexus between that and their nuclear ambitions.

Iran's Nuclear Ambitions

Iranian nuclear programme has been under global scrutiny since August 2002 when the existence of two unknown nuclear sites, in Natanz and Arak, was revealed to the world by Alireza Jafarzadeh, a prominent Iranian dissident. While the pursuit of nuclear energy and weapons by Iran dates back to the reign of Shah Mohammad Reza Pahlavi, the recent revelations have brought Iranian nuclear ambitions into sharp relief and the international community, led by the US, has not been willing to give Iran the benefit of the doubt in an international security environment transformed by the events of 11 September 2001. In August 2002, the representative office of the National Council of Resistance of Iran in Washington revealed the existence of two top-secret nuclear sites in Iran and the clerical regime's new nuclear, biological and chemical weapons projects. On the surface, the Iranian regime's main nuclear activities are focused on Bushehr's nuclear power plant, but in reality secret nuclear programmes seem to be at work without the knowledge of the IAEA. One of these top secret projects is Natanz's nuclear facility, about 100 miles north of Isfahan. The other one is Arak's atomic facilities, in central Iran, 150 miles south of Tehran.

Iranian President Mahmoud Ahmadinejad announced in April 2006 that Iran had enriched uranium to 3.5 percent U-235 using 164 centrifuges, claiming that Iran has joined the group of states which have nuclear technology. He reiterated that the enrichment was performed for purely civil power purposes and not for weapons purposes. Later that month, the IAEA reported to the UN Security Council that Iran seems to have stepped up its uranium enrichment programmes during the period covered by the report.[16]

Iran's nuclear programme goes back many decades. In recent years global political developments have caused Iran's programme to fall

under intense scrutiny and even occasioned charges that Iran is seeking to develop nuclear weapons. Iran, however, has maintained that the purpose of its nuclear programme is the generation of power; any other use is a violation of the Nuclear Non-Proliferation Treaty (NPT), of which Iran is a signatory.

The foundations for Iran's nuclear programme were laid during the Cold War, in the late 1950s within the framework of bilateral agreements between the U.S. and Iran: A civil nuclear co-operation programme was signed in 1957 with the U.S. under the Atoms for Peace programme.[17] The Shah Mohammad Reza Pahlavi was ruling Iran at that time.

The 1979 Islamic Revolution in Iran, however, was to change the attitudes of the West towards the Islamic state for ever. The revolution was a turning point in terms of foreign cooperation on nuclear technology. Despite this, the Iran-Iraq war revived Iran's interest in the pursuit of nuclear weapons and after the first Gulf War, Iran was as shocked as other states with the revelations about the Iraqi nuclear programme that had advanced much beyond anyone's expectations. In the 1990s, Iran began to look outwards towards partners for its nuclear programme; however, due to a radically different global political environment and punitive U.S. economic sanctions, few candidates existed. Iran signed a secret nuclear-cooperation agreement with Pakistan in 1985, the provisions of which were not known at the time though it was detected by US intelligence. Iran's ties to the infamous A.Q. Khan network date back to this year. Iran purchased P-1 centrifuge blueprints from Khan's associates in 1987 and tried to acquire the parts and machinery needed to make centrifuges but failed. Iran returned to Khan and Pakistan in the mid-1990s and received components for P-1 machines, thereby laying the foundations for its own secret industrial uranium enrichment capability.[18]

As a result of this external help, Iran had launched the most rapidly expanding nuclear programme in the Middle East by early 1990s. There is a general consensus that Iran's efforts are focused on uranium enrichment, though there are some indications of work on a parallel plutonium effort. Iran claims it is trying to establish a complete nuclear

fuel cycle to support a civilian energy programme, but its critics argue that this same fuel cycle would be applicable to a nuclear weapons development program. Iran also appears to have spread its nuclear activities around a number of sites to reduce the risk of detection or attack. Though Iran had ratified the Nuclear Non-Proliferation Treaty in 1970, it is only since 1992 that it has allowed the IAEA to inspect its nuclear facilities.

Drivers of Iran's Nuclear Programme

It is not very difficult to comprehend why Iran might view the acquisition of nuclear weapons to be in its strategic interest. In a world where states have to fend for their own security, there is no better deterrent than a nuclear weapon. Nuclear weapons may not be popular with the public opinion in the West but all major states that have nuclear weapons know their importance and therefore have no intention of giving them up. Which states can be more secure than Britain and France today, and yet there are no indications that these states want to renounce their nuclear arsenal!

Compared to these states, Iran is highly insecure, located as it is in a highly volatile region. Its neighbours, India, Pakistan, and most importantly, Israel have long had nuclear weapons and do not seem to have done too badly for themselves. Moreover, after 11 September 2001 Iran has to contend with the presence of its biggest adversary in its very neighbourhood, with the US straddling Iran from both sides in Iraq and Afghanistan. It is also possible that the one lesson Iran may have learnt from the US intervention in Iraq is that the only way to prevent the US from invading is to acquire nuclear weapons as soon as possible. Moreover, the historical memory of the Iran-Iraq war – when Iran faced the onslaught of chemical weapons from Iraq – has long been a major factor in Iran's quest for an assured retaliatory capability.[19]

The global situation is also working in Iran's favour. The credibility of the US is at an all time low in the comity of nations after the Iraq fiasco. Few states will be willing to place their bets on American pronouncements

even if they are accompanied by evidence. Despite their agreeing to send the Iran case to the Security Council in July, Russia and China, two states with real leverage vis-à-vis Iran, are unlikely to support meaningful sanctions for the fear of hurting their own economic interests. Iran has carefully cultivated commercial and strategic relations with powers such as China and Russia in the last few years and that might now help it to counterbalance the threat of Western sanctions.[20] Meanwhile, Iran's standing in the Middle East seems to be at an all time high, especially after the perceived victory of Hezbollah over the mighty Israeli army. The West and many in the Islamic world are openly expressing their anxiety about the emergence of a "Shiite crescent" from Iran through the Persian Gulf to Iraq, Syria and Lebanon. Even without nuclear weapons, Iran now wields considerable influence in Lebanon, Syria, with the Palestinians, and in Iraq.

The intelligence estimates on how long it will take Iran to become a "nuclear weapon state" vary. The best guess of US intelligence agencies is found in a classified National Intelligence Estimate, released in 2006. It says that Iran is determined to build nuclear weapons if left to its own devices but it is unlikely that Iran could produce highly enriched uranium for a bomb before "early to mid-next decade." On the other hand, British officials claim that Iran will have the technology to enable it to develop a nuclear weapon by end of 2007, while Israeli estimates put it at 2008. The consensus seems to be that the earliest Iran might be able to produce enough highly enriched uranium for weapons is likely to be between 2008 and 2010.[21]

It is a classic case of latent proliferation in which a state while continuing to maintain a façade of adhering to its formal obligations under the NPT regime, gradually develops the capability needed for a nuclear weapons programme. Iran has remained within the NPT even as it seems to be maintaining the latent capability for the rapid realisation of nuclear weapons as a hedge against future threats. Iran is also at the centre of what has been termed as the first and second tier proliferation. First tier proliferation involves technology and materials sold or

stolen from private companies or state nuclear programmes that end up assisting non-nuclear weapons states in developing illegal nuclear weapons programmes. Second tier proliferation involves countries in the developing world trading among themselves to bolster one another's nuclear weapons efforts.[22]

Iran's case is symptomatic of the larger weaknesses in the non-proliferation regime in the face of the new kinds of challenges that it confronts.

External Assistance and Collaborations

The Iranian missile programme and the speed of its development would not have been possible without extensive assistance from North Korea, Russia and China. Iran receives outside assistance for both its space and missile programmes from Russia and China,[23] and has collaborated with North Korea and Pakistan on its missile programme.[24] For example they have cooperated to develop guidance systems, booster technology, airframes etc. as described below:

- **Guidance systems:** Russia has also helped Iran develop its missile guidance systems.[25] Chinese guidance systems are used in the Shahab missile systems. Possible transfers have been through the Khan network.[26] As mentioned earlier, the significant difference between a Space Launch Vehicle and an ICBM is in its guidance capability and this transfer helps the Iranian cause.
- **Airframes/motors/launchers:** In 2001, Iran purchased missile airframes, rocket motors, and ballistic launchers from North Korea. In 2002, Iran procured SCUD engine clustering and stage-adding technology from North Korea.[27]
- **Booster Technology:** Propellant motor for the Ghadr-101 and Ghadr-110 may be the Iranian variant of the Shaheen-I and Shaheen-II design of Pakistan, possibly transferred through the Khan network along with Chinese M-9, M-11 and M-18 technologies. Payload spin up demonstrated by the

Paeutusan-1[28] third stage solid propellant rocket motor appears in both, Pakistan's Ghauri-II and Iran's Shahab-III. Pakistan's long-range Ghauri missiles are based on N. Korea's No-dong missiles. In 2005, North Korea reportedly transferred No-dong B missiles.[29] The Tae-po-dong-2C/3 upper stage is a high-altitude version of the No-dong B.

- **Testing:** Russia has helped Iran with wind-tunnel testing of missile nose cones, the use of high-strength steels and special alloys, and manufacturing.[30] In November 1999, Iran imported 12 No-dong missile motors from North Korea. Less than a year later, on 15 July 2000, Iranian engineers tested a Shahab-3 missile fitted with a North Korean motor. On 17 January 2006, Iranian flight test of No-dong-1 for North Korea took place. Members of the Iranian Revolutionary Guards Corps also reportedly attended North Korea's 12 July 2006 Taepodong-2 missile launch.[31]
- **Facilities:** In the 1980s, North Korea built Iran's largest missile production facility at Esfahan using Chinese supplied technologies. The North Koreans also helped Iran develop a series of missile test facilities located around the Shahroud region.[32] The North Korean's helped Iran to develop a testing range and accompanying tracking system in Tabas.[33] In 1987, Chinese engineers built a second missile production plant, located in Semnan. Also in 1987, China built Iran's Bandar Abbas facility.[34]

The level of sophistication of Iran's ballistic missile programme and the speed of its development would not have been possible without extensive assistance from abroad, notably from North Korea, Russia and China. While North Korea furnished the basic hardware for liquid-fuel rocket propulsion, Russia supplied materials, equipment and training. China supplied help with guidance and solid-fuel rocket propulsion. Like India, North Korea, and Pakistan, Iran is not a signatory to the Missile Technology Control Regime (MTCR) and continues to advance its missile programme.[35] In addition to developing their own missile capabilities, they are also becoming sellers rather than simply buyers on the global arms market. North Korea, for example, is viewed as the

primary source of ballistic missile proliferation in the world today. Iran has supplied missile production items to Syria. Additional assistance with development has also been provided by Pakistan to Iran.

Furthermore, existing international technology transfer agreements recognize that an SLV could be converted relatively quickly by technologically advanced countries (in about one or two years) to a surface-to-surface missile.[36] Acquiring an ICBM capability by purchasing an SLV or its production technology is recognised as a purchase of a delivery vehicle, but the acquisition of an SLV does not establish an operational ballistic missile delivery system. The construction of preparation, maintenance, test, and launch facilities and associated equipment is a lengthy and technologically complex process beyond the capabilities of most countries without extensive foreign assistance. Iran has been successful at coordinating its efforts with North Korea, China, Russia, Pakistan, and others through its ballistic missiles and SLV programmes. Iran's space programme is likely a cover-up for Iran's development of longer-range missiles like the IRSL-X-2 and Shahab-6, and close coordination with other proliferators in possession of critical materials and knowledge is inevitable.

Implications of the Recent Space Launch by Iran

It is difficult to determine exactly which rocket/space vehicle Iran indeed launched. On 26 February 2007, Ali Akbar Golrou, deputy head of Iran's aerospace research centre said that Iran had launched a sub-orbital rocket for research purposes, not a space rocket to launch a satellite indicating internal confusion over the nature of the launch.[37] Some have argued that the rocket was "basically a sounding rocket… half-a-century-old technology"[38] and that the launch did not indicate any technological advances by Iran as it was merely intended to be a show of Iran's defiance by it being launched at around the same time as the United Nations Security Council's deadline to halt uranium enrichment.[39]

However, there is enough evidence to support the claim that Iran is close to having the capability of launching satellites. According to Alexsei

Arbatov, to put a satellite into orbit one would require a missile with enough power for an "intercontinental range", that is a range of greater than 5,500 Km.[40] Arbatov believes that Iran could have the technical capability now to accomplish this.[41]

The technology needed to construct a space launch vehicle (SLV) raises concerns since it is similar to what is needed to produce an Inter-Continental Ballistic Missile (ICBM). SLVs and the ICBMs use the same core technologies with very little difference in the guidance systems or fuel packages.[42] Therefore, the existence of an SLV programme is a possible indicator of an ICBM programme. In 1957, the Soviet Union developed an SLV to launch a four kilogram satellite into orbit, which also served to demonstrate the Soviet Union's ICBM capability.

As was noted earlier, countries have successfully masked their ICBM developments under the cover of their space programmes. Both programmes require extensive testing on booster, aerodynamics, and guidance systems, and both require the programming of ballistic trajectories. However, according to the Federation of American Scientists (FAS), it is quite difficult to mask a warhead re-entry under the guise of a space launch;[43] Nations with SLVs could be able to convert them into ICBMs quickly and with little or no chance of detection before the first flight test, provided the nation has developed a proper re-entry vehicle (RV). [44]

Although there is disagreement over the level of capability this launch demonstrated, it indicates progress towards an eventual satellite launch. In 2005, the Defence Intelligence Agency of the US assessed that Iran "will have the technical capability to develop an ICBM by 2015."[45]

Regardless of the technical characteristics of what was launched, the launch itself demonstrates Iran's continued intent to advance its delivery capabilities. Although the Iranians are determined to enhance their space programme they are equally focused on developing their long-range WMD delivery systems. Iran is following parallel paths with their civilian and military programmes to legitimise purchases and maintain

an ambiguous posture. It is apparent that any improvements in Iran's peaceful space programme will also benefit Iran's military programme and the broad trajectory of Iran's progress in its space programme remains clear which is to have capability to threaten the US and Europe even though the time-line as to when it might achieve that capability remains far from clear. idsa

Notes

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