NORTH KOREA'S EVOLVING NUCLEAR STRATEGY

SHANE SMITH

AUGUST 2015

NORTH KOREA'S NUCLEAR FUTURES SERIES

US-KOREA INSTITUTE AT SAIS

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Introduction[1]

Over the past two decades, North Korea's nuclear program has grown from a proliferation problem to a military threat to its neighbors and the United States. The country is now estimated to possess enough fissile material to build anywhere from six to about thirty nuclear weapons, depending largely on how much highly enriched uranium it has produced, and is poised to grow its stockpile, perhaps dramatically, over the coming years.[2] North Korea has conducted three increasingly powerful nuclear tests since 2006 as well as a series of missile launches, suggesting to some that it could sooner or later target the US homeland.[3] If that were not enough, the North has made excessively bold and even preemptive nuclear threats under the leadership of Kim Jong Un.[4]

While North Korea's nuclear capabilities and threats have grown, little attention has been paid to its emerging nuclear strategy for three reasons. First, there is a common caricature of North Korea as backward, unserious and incompetent that has led some to dismiss and downplay its nuclear efforts over the years. Only after its third nuclear test, in 2013, have many analysts begun to take North Korea's nuclear capabilities seriously. Second, there is a tendency for nuclear scholars to bypass North Korea because, as one suggests, "almost nothing is known about North Korea's nuclear arsenal or the doctrine by which those weapons might be employed."[5] North Korea and its nuclear program are far from transparent, but this is not a unique problem. US scholars struggled for two generations to understand nuclear thinking in the Soviet Union based on sketchy evidence. It would be a mistake now, just as it would have been then, to throw our hands into the air. Moreover, a surprising amount of evidence about North Korea's nuclear program actually exists from its past nuclear and missile tests, policy pronouncements and military parades as well as from commercially available satellite imagery.

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[1] This paper represents the author's personal views and does not necessarily reflect the views of the National Defense University, the Department of Defense, or any part of the US government.
[2] David Albright, "Future Directions in the DPRK's Nuclear Weapons Program: Three Scenarios for 2020," US-Korea Institute at SAIS, February 2015, http://38north.org/wp-content/uploads/2015/02/NKNF-Future-Directions-2020-Albright-0215.pdf.
[3] John Schilling and Henry Kan, "The Future of North Korean Nuclear Delivery Systems," US-Korea Institute at SAIS, April 2015, http://38north.org/wp-content/uploads/2015/04/NKNF_Delivery-Systems.pdf.
[4] "Second Korean War Is Unavoidable: DPRK FM Spokesman," *KCNA*, March 7, 2013.
[5] Vipin Narang, *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict* (Princeton, NJ: Princeton University Press, 2014), 1.

The third reason North Korea's nuclear strategy receives scant scholarly attention is that many analysts assume that non-military goals drive its nuclear decision making. Some argue that its program is primarily aimed at garnering international prestige or rallying domestic support around a leadership with few other claims of success.[6] Others see financial motivations; a North Korea bent on trading its technologies to countries like Iran and Syria.[7] Still others believe that its nuclear program is a bargaining chip or blackmailing tool to gain diplomatic concessions.[8] Such motivations do not lend themselves easily to rational-actor-based strategic analyses that explore connections between means and ends.[9] Yet, it would be a mistake to assume that North Korea's nuclear program is not guided by strategic logic. Its leaders must certainly weigh the costs and benefits of its nuclear investments and actions over time, given their resource limitations and the security risks they run by driving up military tensions.

To be sure, North Korea's leaders have consistently justified developing nuclear weapons for security purposes.[10] A small but growing body of work explores these military dimensions and how North Korea might operationalize and employ nuclear weapons.[11] Sorely missing, however, is a systematic treatment of the different nuclear strategies North Korea may consider in the coming years.

Building on a long and rich literature that has been advanced most recently by Vipin Narang, this paper offers an analytical framework for four alternative North Korean nuclear strategies:[12] 1) a strategy aimed at extracting international political or diplomatic concessions; 2) a strategy aimed at internationalizing crises on the Korean peninsula in a way that triggers US and/or Chinese intermediation; 3) a retaliatory strategy to deter regime-threatening attacks; and 4) a nuclear war-fighting strategy to offset conventional weaknesses vis-à-vis South Korea and the United States. The paper then assesses the limited evidence about North Korea's nuclear strategy—where it has been and where it is going.

In short, the available evidence makes it difficult to dismiss the idea that North Korea's past nuclear-related decisions may have been driven primarily by political or diplomatic motivations. During the 1990s and early 2000s, the North was willing to trade away significant elements of its nuclear program for various concessions at different times. While these trades never

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[6] Benjamin Habib, "North Korea's Nuclear Weapons Programme and the Maintenance of the Songun System," *Pacific Review* 24, no. 1, 2011: 43–64.
[7] Graham T. Allison, Jr., "North Korea's Lesson: Nukes for Sale," *New York Times*, February 12, 2013.
[8] Andrei Lankov, *The Real North Korea: Life and Politics in the Failed Stalinist Utopia* (New York: Oxford University Press, 2013), 149.
[9] Scott D. Sagan, "Why Do States Build Nuclear Weapons? Three Models in Search of the Bomb," *International Security* 21, no. 3 (Winter 1996–1997), 54–86.
[10] "Rodong Sinmun on DPRK's legitimate right to self-defence," *KCNA*, December 20, 2002.
[11] For instance, see Bruce E. Bechtol, Jr., "Planning for the Unthinkable: Countering a North Korean Nuclear Attack and Management of Post-Attack Scenarios," *The Korean Journal of Defense Analysis* 23, no. 1, March 2011: 1–18; Peter Hayes and Scott Bruce, "Translating North Korea's Nuclear Threats into Constrained Operational Reality," in Gregory J. Moore (ed.), *North Korean Nuclear Operationality: Regional Security & Nonproliferation* (Baltimore, MD: Johns Hopkins University Press, 2014), 15–31; and Terence Roehrig, "North Korea's Nuclear Weapons Program: Motivations, Strategy, and Doctrine," in Toshi Yoshihara and John R. Holmes (eds.), *Strategy in the Second Nuclear Age: Power, Ambition, and the Ultimate Weapon* (Washington, DC: Georgetown University Press, 2012), 81–98.
[12] Narang, *Nuclear Strategy in the Modern Era.*

amounted to "denuclearization," North Korea agreed to abide by measures that substantially—if temporarily—restrained its nuclear capabilities. To the extent that North Korea's nuclear decisions were primarily motivated by political and diplomatic goals in the past, however, those days appear to be gone for the foreseeable future.

Since the North's first nuclear test, the specter of nuclear war has hung over every crisis on the peninsula. With an ambiguous weapons capability, North Korea has made over-the-top nuclear threats that appear to be designed to grab headlines and international attention rather than to convey serious military warnings. These threats could be seen as part of a strategy to internationalize crises by raising the global stakes and compelling intervention by the United States or China or both to restore stability and restrain South Korea. However, a strategy that relies on third parties to intervene is inherently unsatisfying and likely untenable over time for any leader with options for a more robust nuclear strategy. Thus, North Korea indeed appears to be pursuing other options.

It now has in place investments and policies that suggest near-term ambitions for a survivable, second-strike capability to deter regime-threatening attacks and coercion. For instance, North Korea has a fissile material production infrastructure that could allow it to grow and diversify its arsenal in dramatic ways over the coming years. It has long invested in building short-, medium- and intercontinental-range ballistic missiles that are mobile and can therefore take advantage of mountainous terrain, tunnels and underground facilities to hide and protect them from a disarming conventional counterforce first strike. There is also evidence that North Korea is exploring both silo and submarine launch technologies, presumably to further increase survivability. Moreover, statements from North Korea's leadership and policy documents convey a strategy of "dealing deadly retaliatory blows at the strongholds of aggression."[13]

Pronouncements out of Pyongyang suggest, however, that North Korea could have its sights on even more ambitious plans with a role for nuclear weapons that would be in line with a war-fighting strategy. It would not be the first country to do that. Countries like the United States, Russia and Pakistan have all embarked at one time or another on a strategy to threaten rapid nuclear escalation in response to real or perceived conventional weakness. However, North Korea would face significant operational, technical and economic challenges as well as escalatory risks in adopting such a strategy. Whether it could ever overcome those obstacles is unclear.

Alternative Nuclear Strategies

While Pyongyang's emerging nuclear strategy may incorporate elements specific to its own unique circumstances, other small nuclear powers have essentially adopted one of four alternative strategies. The first is typically aimed at non-military goals, such as political, diplomatic or economic objectives. A second approach, called a "catalytic strategy," is designed to internationalize regional conflicts by threatening nuclear war to compel one or more great powers to intervene during crises, restrain adversaries and restore stability. The third approach is an assured strategic retaliation strategy, which is aimed at deterring high-end, regime-threatening attacks and coercion. The final and most robust nuclear strategy is a war-fighting

[13] "Law on Consolidating Position of Nuclear Weapons State," *KCNA*, April 1, 2013.

strategy intended to offset conventional inferiority by threatening to use nuclear weapons first on the proverbial battlefield rather than relying solely on blunt threats against strategic targets.[14] The four strategies are distinct from one another, differentiated by each one's primary objective, minimum requirement for execution—in terms of relative transparency, arsenal size and diversity, and operational or command and control (C2) complexity—and the major challenge specific to each strategy.

Political/Diplomatic: While many people might assume that states pursue nuclear weapons for military or deterrence purposes, not everyone agrees. On-again, off-again negotiations over North Korea's nuclear and missile programs over two decades suggest that its leaders have long used its nuclear program to extract food aid, energy assistance and other material concessions from the international community as well as to gain diplomatic bargaining leverage.

A nuclear strategy that is first and foremost concerned with extracting political, economic or diplomatic concessions has the lowest barrier to entry of the strategies under consideration because the development of weapons capability is unnecessary. This strategy only requires the technical elements of a nuclear weapons program that can then be traded for concessions from countries that do not want to see a nuclear-armed adversary. It might be advanced by demonstrating select capabilities for bargaining purposes at different times but does not *ex ante* require transparency. Rather, opacity itself can be traded incrementally for concessions. Since there is no weapons requirement and, thus, no arsenal, there are few demands in terms of operational complexity or command and control. The major problem for such a strategy, however, is a diminishing margin of return on investments, since the international community is likely to become weary of unending concessions.

Catalytic: A more ambitious nuclear strategy is designed to exploit the specter of nuclear war to draw in one or more great powers during crises to restore stability. This "catalytic" strategy is thought to have been adopted by South Africa, Israel and Pakistan at different times.[15] It requires a higher level of transparency than one that is primarily aimed at political or diplomatic goals because a third party must believe that nuclear war is technically credible. In the case of North Korea, this strategy would require Pyongyang to demonstrate that it could cross the nuclear threshold and raise the regional if not global costs of a potential conflict. Such a strategy could be adopted with only a few crude weapons on standby to create the impression that war could escalate. As such, the arsenal does not require much by way of operational sophistication. The main shortcoming of this strategy is that it is essentially a gamble on third-party intentions as well as the adversary's calculation that a third party will intervene to impose restraint and restore stability.

[14] Narang offers three nuclear strategies in *Nuclear Strategy in the Modern Era:* catalytic, assured strategic retaliation and asymmetric escalation. The framework offered here is expanded to include a strategy aimed at political or diplomatic goals and an important substitution of "war-fighting" for "asymmetric escalation" to convey the potential for intended compellence as well as deterrence effects. That is to say, "battlefield" nuclear weapons could be used to defeat, not merely deter, superior conventional forces.

[15] Avner Cohen and McNamee, "Why Do States Want Nuclear Weapons?" *The Cases of Israel and South Africa* (Oslo: Norwegian Institute for Defence Studies, 2005). Also see Narang, *Nuclear Strategy in the Modern Era.*

Assured Strategic Retaliation: This strategy is aimed at deterring regime-threatening attacks and coercion. It depends foremost on developing survivable second-strike nuclear forces that can credibly hold at risk an adversary's strategic targets and impose unacceptable costs. China is widely believed to have relied largely on this type of strategy for at least three decades.[16] A higher level of transparency is required to fully implement this strategy because the aim is to persuade an adversary that you can endure and retaliate against a first strike, though many aspects can remain ambiguous or hidden. For instance, China has long demonstrated the technical capability to strike high-value strategic targets (cities), but it has kept hidden operational details such as command and control, arsenal size and deployment patterns. Opacity here is thought to be part of China's effort to increase the survivability of its relatively limited arsenal.

This strategy calls for a larger arsenal than what is minimally necessary in the first two strategies because some redundancy is needed to ensure that enough weapons survive a first strike to threaten an adversary with unacceptable costs, whether that involves one, two or a dozen targets. The arsenal can be comprised solely of countervalue weapons since it does not need to hold at risk operational or tactical targets. It also requires a higher level of operational sophistication, since procedures for launching attacks would be in place to protect against disarming or decapitating strikes. Warheads and delivery systems do not necessarily need to be mated and ready for employment, but measures would need to be taken to guarantee the possibility of retaliation, such as dispersing, hiding or hardening weapons systems to withstand an attack and be operational in the aftermath—no easy feat. These measures would need to be exercised and tested to build confidence, while the resiliency and operationality of survivable forces would need to be telegraphed to adversaries to enhance deterrence. But command and control could still be highly centralized, at least during peacetime, with authority over weapons systems solely in the hands of the highest levels of political leadership.

The main problem with this strategy is a credibility gap for deterring lower levels of war against conventionally superior, nuclear-armed adversaries. In other words, a threat to destroy an adversary's cities in response to lower levels of aggression might seem incredible, especially when carrying out that threat would very likely result in a nuclear response. If the nuclear threat lacks credibility, a conventionally superior adversary might not be deterred from exploiting its advantage. North Korea, of course, faces a conventionally superior US-ROK alliance that is ultimately backed by US nuclear weapons. It might believe that a strategic retaliatory deterrent is necessary but insufficient for achieving its political-military goals against much stronger foes.

War-fighting Strategy: This strategy is designed to deter regime-threatening attacks as well as to offset conventional inferiority by threatening first use of nuclear weapons on the proverbial battlefield in the event of conflict. It perhaps requires a more robust survivable second-strike capability than assured retaliation because it must deter strategic-level attacks even in the fog of a nuclear exchange. But the distinguishing characteristic is the addition of so-called tactical weapons that can be used against opposing forces rather than relying on blunt retaliatory threats against major strategic centers. As such, a war-fighting strategy suggests an expanded role for

[16] M. Taylor Fravel and Evan S. Medeiros, "China's Search for Assured Retaliation: The Evolution of Chinese Nuclear Strategy and Force Structure." *International Security* 35, no. 2 (Fall 2010), 48–87.

nuclear weapons beyond deterrence. Since "battlefield" nuclear weapons could be used to defeat as well as deter superior conventional forces, this strategy is better suited than assured retaliation for achieving compellence effects.

This strategy is thought to require a relatively high level of transparency for deterrence purposes. To be credible under this strategy, North Korea would need to demonstrate not only a survivable second-strike capability but also the capability and will to use nuclear weapons first. The will to use nuclear weapons first is often thought to be more difficult to convey than capability because the potential consequences of crossing the nuclear threshold are so great. To overcome this credibility gap, countries in the past have forward deployed nuclear weapons to battlefield lines. Whether or not launch authority is ever delegated to lower echelons of political and military command on the front lines, the idea is to persuade the adversary that some automaticity is built into the system, rather than leaving it to rational calculations or deliberate decision making. Commanders in charge of tactical nuclear units confronting defeat would face a "use it or lose it" choice. While transparency might be necessary for deterrence purposes, military effectiveness might rely on surprise. Countries adopting a war-fighting strategy would likely attempt to balance those requirements with varying degrees of transparency and ambiguity.

To adopt this strategy, North Korea would need to demonstrate multiple technical capabilities, including complex deployment and command and control arrangements. To address varying conventional conflict scenarios, the size of the arsenal would likely be much larger and more diverse, including counterforce capabilities such as smaller-yield and higher-accuracy weapons to deal with military targets in theater or on the battlefield. The major shortcoming of this strategy is that maintaining a large, diverse arsenal with a complex operating system can be exponentially expensive. This strategy can also create significant pressures during crises that can lead to unintended escalation or loss of command and control.[17]

[17] Scott D. Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton: Princeton University Press, 1993).

The four alternative nuclear strategies are summarized in the table below.

Table 1. Alternative DPRK Nuclear Strategies At A Glance: Minimum Requirements for Four Models.

ALTERNATIVE DPRK NUCLEAR STRATEGIES AT A GLANCE: MINIMUM REQUIREMENTS FOR FOUR MODELS					
Nuclear Model	**Primary Goal**	**Relative Transparency**	**Relative Arsenal Size/Diversity**	**Operational Complexity**	**Problems**
Political/Diplomatic	Extortion/blackmail/ bargaining	Lowest -Demonstrate technical elements of a weapons program	None	None	Diminishing margin of return on investments
Catalytic	Internationalize a conflict and "catalyze" third-party assistance or intervention	Low -Demonstrate technical means for weapons but not necessarily operational capability	Small -Handful of crude weapons on standby	Low -Central authority -Weapons do not need to be assembled	Relies on adversary calculations about third-party intentions
Assured Strategic Retaliation	Deter regime-threatening attacks and coercion	Medium -Demonstrate survivable second-strike capabilities	Medium -Enough counter-value weapons to threaten unacceptable retaliatory costs	Medium -Central or delegated authority -Weapons may or may not be assembled -Prepared for crisis operations	Credibility gap against conventional threats
War-fighting Strategy	Deter or defeat a broad range of threats, including conventional attacks	High -Demonstrate survivable second-strike and first-strike capabilities/will	High -Large, diverse arsenal (counter force and counter value) for first use in a range of scenarios with reserve of second-strike forces	High -Prepared for pre-delegation and rapid deployment during crises -Planning integrated into military doctrine -High-alert status	Expensive and significant pressure on command and control that could lead to inadvertent escalation

North Korea's Evolving Nuclear Strategy

North Korea's behavior at times exhibits elements from all four strategies, and the one it adopts in the future may in fact be a hybrid. One reading of the limited evidence, however, suggests that its nuclear strategy has evolved over three decades and is on an ambitious and dangerous path. In the past, North Korea may have valued political and diplomatic goals above others. As one prominent North Korea expert writes: "on balance, this goal [diplomatic blackmail] seems to be even more important than using the nukes as a strategic deterrent."[18] Between 1994 and 2007, for instance, North Korea froze or disabled elements of its nuclear program in exchange for energy assistance, food aid, diplomatic talks, security assurances, sanctions relief and economic concessions. Some of those agreements, such as the 1994 US-North Korea Agreed Framework, significantly—if temporarily—constrained North Korea's ability to expand its nuclear capability. Since then, on-again, off-again negotiations and agreements have been reached, but they have generally been short-lived and none have produced a sustainable path toward denuclearization. Over time, the international community has grown weary of unending negotiations; presumably speaking for the Obama administration in 2009, Robert M. Gates, the defense secretary at the time, said, "I'm tired of buying the same horse twice."[19]

[18] Andrei Lankov, *The Real North Korea: Life and Politics in the Failed Stalinist Utopia* (New York: Oxford University Press, 2013), 149. In a recent conversation, however, he clarified that the primary motive for North Korea has shifted over time from military to diplomatic and back to military.
[19] David E. Sanger, "US Weighs Intercepting North Korean Shipments," *New York Times*, June 7, 2009.

To the extent that North Korea's nuclear decisions were primarily motivated by political, diplomatic or economic goals in the past, those days appear to be gone for the foreseeable future. Over the past few years, North Korea has emphatically claimed that its nuclear program is not a bargaining chip. It has further stated that it is "unimaginable" to expect Pyongyang to rejoin the Nuclear Non-Proliferation Treaty as a "nonnuclear state." Reporting on a March 2013 plenary meeting of the Central Committee of the Workers' Party of Korea (WPK), the Korean Central News Agency (KCNA), the state news agency of North Korea, stated that "nuclear weapons of Songun Korea are not goods for getting US dollars and they are neither a political bargaining chip nor a thing for economic dealings … [but are] the nation's life [and treasure] which can never be abandoned."[20]

North Korea's nuclear capabilities remained unproven and far from transparent throughout the 1990s and most of the 2000s while it engaged in negotiations with the United States and others and received serious concessions for elements of its program. Without much of an arsenal, there was no need to develop sophisticated command and control capabilities during that time. The Nuclear Chemical Defense Bureau, an organ of the Ministry of People's Armed Forces that reports directly to the supreme leader, was thought by some to have been responsible for managing the nuclear inventory.[21] As late as 2009, however, the International Crisis Group (ICG) assessed that the weapons still had not been transferred to the Korean People's Army. Rather, the ICG believed that the supreme leader closely guarded them through an independent yet still unidentified institution.[22]

It is possible that North Korea's nuclear strategy may have shifted toward a catalytic model shortly after its first nuclear test in 2006 with the threat of nuclear war becoming a more routine feature during crises on the peninsula. North Korea has made a number of over-the-top threats that appear to be more about grabbing headlines and international attention than conveying serious military warnings. By threatening to escalate crises to nuclear war, North Korea may seek to stimulate Chinese, US and even Russian intervention to restrain South Korea and restore stability in large part because the prospect of a wider, nuclear war with regional consequences that could even draw the major powers in on opposite sides would be extremely costly for all concerned countries. After the 2010 North Korean artillery barrage on Yeonpyeong, for instance, Gates writes in his memoir that he and US President Barack Obama, Secretary of State Hillary Clinton and Chairman of the Joint Chiefs Mike Mullen all called their South Korean counterparts to effectively talk them down from "disproportionate" retaliation because "we were worried the exchanges could escalate dangerously."[23]

At the same time, North Korea's nuclear program has become more transparent since 2006 through tests, military parades, media releases and public statements. It has demonstrated the technical elements of a weapons capability—the testing of three nuclear devices and a series of missile tests—even though questions remain about just how capable it is. Some analysts assess that North Korea could deliver a handful of nuclear warheads on short- to medium-range

[20] "Report on Plenary Meeting of WPK Central Committee," KCNA, March 31, 2013.
[21] Andrew Scobell and John M. Sanford, *North Korea's Military Threat: Pyongyang's Conventional Forces, Weapons of Mass Destruction, and Ballistic Missiles* (Carlisle, PA: Strategic Studies Institute, 2012).
[22] International Crisis Group, "North Korea's Nuclear and Missile Programs," *Asia Report no. 168*, June 18, 2009: 3.
[23] Robert M. Gates, *Duty: Memoirs of a Secretary at War* (New York: Alfred A. Knopf, 2014), 407.

missiles, albeit with low levels of accuracy and confidence.[24] While others have been skeptical about Pyongyang's actual capabilities and particularly its rhetorical threats of preemptive strikes against the United States, all of these developments have reinforced the perception that the North has the capability to use nuclear weapons if it chooses.

Leaders in Pyongyang have also recently signaled their intent to provide greater political and bureaucratic weight to nuclear operations and presumably establish a command and control system, with continued emphasis on centralized authority. In March 2012, for instance, North Korea upgraded the Missile Guidance Bureau in charge of short- and long-range missile developments to the status of Strategic Rocket Forces Command, which is somewhat autonomous from the Korean People's Army and reports directly to Kim Jong Un and the army's General Staff. Its commander was also elected to the WPK Central Military Commission, chaired by the supreme leader. Some North Korea watchers believe this new Command is now the home for North Korea's nuclear forces.[25]

Recent developments suggest that a catalytic strategy would be unreliable for North Korea over time. It may be that Chinese patience is wearing thin with Pyongyang's behavior, making Beijing less willing to intervene on the North's behalf.[26] Moreover, the North is likely to strive to lessen its reliance on such a strategy given its past up-and-down relations with China. Also, the 2013 US-ROK Tailored Deterrence Strategy and Combined Counter-Provocation Plan were reportedly developed in part to neutralize North Korea's nuclear leverage.[27] Additionally, South Korea has developed what some call a "proactive deterrence" posture, which reportedly promises to "take prompt, focused, and disproportionate retaliatory (and perhaps even preemptive) actions in order to raise the costs to North Korea of small-scale attacks" presumably before others can intervene.[28] As a result, it would be a real gamble for Pyongyang to rely on outsiders to restrain South Korea in any future crisis.

North Korea appears to have higher ambitions for its nuclear program that would allow it to move beyond a catalytic strategy to an assured retaliation doctrine. Pyongyang is thought to now have the infrastructure to more rapidly expand its stockpile of fissile material over the coming years. It is pursuing more capable, longer-range missiles that will sooner or later put targets in South Korea, Japan and the United States within reach. Moreover, those delivery systems are being designed with survivability in mind. The Nodong, Musudan and KN-08 as well as some of its short-range missiles are reported to be mobile and, therefore, can exploit North Korea's mountainous terrain, tunnels and underground facilities to hide and protect them from a disarming first strike. There is also evidence that the North is exploring both silo and submarine launch technologies, presumably also to increase survivability.

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[24] David Albright, "North Korean Miniaturization," *38 North*, February 13, 2013, http://38north.org/2013/02/albright021313/.

[25] National Institute for Defense Studies, *East Asia Strategic Review* (Tokyo 2013), 146.

[26] Jane Perlez, "Chinese Annoyance with North Korea Bubbles to the Surface," *New York Times*, December 20, 2014, http://www.nytimes.com/2014/12/21/world/asia/chinese-annoyance-with-north-korea-bubbles-to-the-surface.html?_r=0.

[27] Karen Parrish, "U.S., South Korea Announce 'Tailored Deterrence' Strategy," *American Forces Press Service,* October 2, 2013, http://www.defense.gov/News/NewsArticle.aspx?ID=120896.

[28] Abraham M. Denmark, "Proactive Deterrence: The Challenge of Escalation Control on the Korean Peninsula," Korea Economic Institute: Academic Paper Series, December 2011, http://keia.org/sites/default/files/publications/proactive_deterrence_paper.pdf.

Pyongyang has similarly adopted a declaratory policy that reflects the essence of such a strategy. In 2013, for instance, the Supreme People's Assembly (SPA) promulgated the Law on Consolidating Position of Nuclear Weapons State, which many experts believe codifies official North Korean nuclear policy and strategy. It states:

> [Nuclear weapons] serve the purpose of deterring and repelling the aggression and attack of the enemy against the DPRK and *dealing deadly retaliatory blows at the strongholds of aggression*…[29]

Kim Jong Un expounded on the strategic rationale in a speech before the SPA Law was issued, when he stated:

> When one is firmly equipped with the capability to make precision strikes with nuclear weapons against aggressors and strongholds of aggression, no matter where they are on the face of the earth, no aggressor can dare to attack recklessly, and the greater and more powerful the nuclear strike capability, the greater the power of deterring aggression will be. Especially in case of our country, whose opponent is the United States … it is necessary to firmly bolster the nuclear armed forces both quantitatively and qualitatively.[30]

As for operational planning, the SPA Law makes clear that launch authority remains highly centralized for the time being, when it states that "nuclear weapons of the DPRK can be used only by a final order of the Supreme Commander of the Korean People's Army…"[31]

While North Korea's investments and recent statements suggest that it may be building an assured retaliation strategy, there are signs that Pyongyang may have set its sights on a war-fighting strategy. Indeed, the SPA Law envisions an expanded arsenal and role for nuclear weapons in the future that goes beyond deterring high-end attacks to also deter and repel lower levels of aggression:

> The DPRK shall take practical steps to bolster up the nuclear deterrence and nuclear retaliatory strike power both in quality and quantity to cope with the gravity of the escalating danger of the hostile forces' aggression and attack.[32]

Similarly, Kim Jong Un's 2013 *byungjin* (parallel development of nuclear weapons and the economy) policy appears to suggest that nuclear weapons would, in the future, augment if not supplement the North's conventional forces, leading to the need for a more robust and diversified arsenal with new roles.[33] Moreover, some experts believe that North Korea has in place much

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[29] "Law on Consolidating Position of Nuclear Weapons State" (emphasis added), *KCNA*, April 1, 2013.
[30] Kim Jong Un at the March 31, 2013, plenary meeting of the Central Committee of the Workers' Party of Korea, *Korean Central Broadcasting Station* (in Korean) April 1, 2013, http://www.ncnk.org/resources/news-items/kim-jong-uns-speeches-and-public-statements-1/KJU_CentralCommittee_KWP.pdf.
[31] "Law on Consolidating Position of Nuclear Weapons State."
[32] Ibid., emphasis added.
[33] For one South Korean perspective, see Cheon Seong-Whun, "The Kim Jong-un Regime's "Byungjin" (Parallel Development) Policy of Economy and Nuclear Weapons and the 'April 1st Nuclearization Law,'" Korean Institute for National Unification Online Series, CO 13-11, April 23, 2013, http://www.kinu.or.kr/upload/neoboard/DATA01/co13-11(E).pdf.

of the infrastructure and investments to grow its arsenal to field a range of weapons for both countervalue and counterforce targets in order to address different conventional conflict scenarios while also bolstering a strategic deterrent.[34]

One potential hurdle facing the North is that a war-fighting strategy would require a sophisticated command and control system that would likely entail a high-alert status, some pre-delegated authority and integration of nuclear forces into its broader military doctrine. Indeed, the WPK Central Committee released a report one day before the SPA Law was adopted, recommending that the military begin such planning:

> The People's Army should perfect the war method and operation in the direction of raising the pivotal role of the nuclear armed forces in all aspects concerning the war deterrence and the war strategy, and the nuclear armed forces should always round off the combat posture.[35]

Building and integrating a robust nuclear arsenal into a broader military doctrine for a war-fighting strategy, however, would be expensive, technologically difficult and risky. North Korean leaders have a finite amount of resources—money, people, supplies—and are faced with perennial challenges such as the current drought that could test the new leadership's policies. Building and maintaining multiple weapons systems, not to mention the additional training and exercising necessary to integrate them into a broader military doctrine, would be costly. Technologically speaking, North Korea would presumably want to develop multiple warhead designs for different delivery systems and targets, potentially including miniaturization for artillery or short-range rockets as well as solid- rather than liquid-fueled missile systems for faster launch times. To bolster strategic deterrence for a war-fighting strategy, Pyongyang also might find it necessary to build and test a viable reentry vehicle for its medium- and long-range ballistic missiles as well as higher-yield weapons to demonstrate that it can pose unacceptable costs with even a few weapons on target.

Lastly, adopting a war-fighting strategy would come with significant risks. Putting nuclear weapons in the hands of lower-echelon political and military authority seems to contradict the peculiar hierarchical nature of the political-military system in North Korea. For a regime that might be concerned about internal rivals or maintaining a tight grip on the levers of power, relinquishing authoritative control over weapons that it calls "the nation's life" and "a national treasure" could expose internal vulnerabilities. Of course, there would also be external risks. For instance, as North Korea ramped up its nuclear capabilities there would likely be international political and economic consequences as well as increased military tensions, since the United States and South Korea would be expected to respond with their own heightened defenses. Adopting a war-fighting strategy with nuclear weapons on high alert and in the hands of lower levels of authority could also lead to unintended escalation during crises and even the loss of command and control. North Korea may be willing to accept these costs and risks, but it is unclear whether it can ever overcome the inherent obstacles of this strategy, even if it aspires to develop such capabilities.

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[34] Albright, *Future Directions in the DPRK's Nuclear Weapons Program.*
[35] "Report on Plenary Meeting of WPK Central Committee," March 31, 2013.

The table below summarizes the evolution of North Korean nuclear strategy.

Table 2. North Korea's Evolving Nuclear Strategy?

NORTH KOREA'S EVOLVING NUCLEAR STRATEGY?				
Nuclear Model	**Past**	**Present**	**Emerging**	**Over the Horizon Ambitions**
Political/Diplomatic	Trade elements of unproven program for concessions - 1994 Agreed Framework - Six Party Talks - Fuel and Food Aid (Yongbyon)	Increasing transparency, size and diversity of arsenal, operational complexity		
Catalytic		Demonstrated technical means but still ambiguous operations capability; over-the-top threats during crises to "catalyze" US and Chinese intermediation		
Assured Strategic Retaliation			Developing survivable strike capabilities targeting ROK, Japanese and US cities	
War-fighting Strategy				Parallel Development Policy of Economy and Nuclear Weapons and the April 1 Law on Consolidating Position of Nuclear Weapons State

What's Next for North Korea?

If Pyongyang follows the trajectory sketched above, we would likely see North Korea, in the words of Kim Jong Un:

> "increase the production of precision and miniaturized nuclear weapons and the means of their delivery and ceaselessly develop nuclear weapons technology to actively develop more powerful and advanced nuclear weapons."[36]

Doing so would provide some telltale signs, such as testing delivery systems and increasingly sophisticated weapon designs. Depending on how fast it would want to grow its arsenal for either an assured strategic retaliation or war-fighting strategy, North Korea could expand its fissile material production capacity. We might also increasingly see nuclear operations as part of routine military exercises as well as investments in command and control technologies and practices as the North integrates nuclear weapons into its broader military doctrine.

The first indicator that would suggest North Korea is determined to rapidly grow its arsenal for either an assured strategic retaliation or war-fighting strategy is the increased production of fissile material. David Albright offers three estimates of North Korea's nuclear arsenal in 2020 based on different fissile material production scenarios.[37] The low-end, medium and high-end estimates project roughly 20, 50 and 100 weapons worth of fissile material, respectively.[38] Albright takes

[36] Kim Jong Un at the March 31, 2013, plenary meeting of the Central Committee of the Workers' Party of Korea, Korean Central Broadcasting Station (in Korean) April 1, 2013, http://www.ncnk.org/resources/news-items/kim-jong-uns-speeches-and-public-statements-1/KJU_CentralCommittee_KWP.pdf.

[37] Albright, *Future Directions in the DPRK's Nuclear Weapons Program.*

[38] For the sake of comparison, the upper bound of those projections would put North Korea in the range of recently estimated stockpiles in Pakistan (120), India (110) and Israel (80). Hans M. Kristensen and Robert S. Norris, "Global nuclear weapons inventories, 1945–2013," *Bulletin of the Atomic Scientists* vol. 69, no. 5, 2013: 75–81.

a number of factors into consideration in his estimates. Some presumably would be observable, such as the operationality and burn rates for weapons-grade plutonium at the 5 MWe Reactor at North Korea's Yongbyon Nuclear Scientific Research Center as well as at an experimental light-water reactor that is under construction but could be operational in the 2015–2016 timeframe. Other factors might be less obvious, such as the number and quality of North Korean centrifuges for producing weapons-grade uranium.

The second indicator would stem from efforts to develop "more powerful and advanced nuclear weapons," as Kim Jong Un has vowed to do. Some have speculated for years that North Korea may be pursuing boosted fission or thermonuclear designs. Such sophisticated weapons would probably need to be tested for surety purposes, but it would not necessarily require many tests.[39] For instance, China tested a boosted weapon with only its third test and a thermonuclear design in its seventh test, while Pakistan claims to have included a boosted fission weapon in its first round of tests in 1998. Aside from building confidence, there are good deterrence reasons for testing higher-yield weapons. North Korea would presumably want to demonstrate to the United States and South Korea that it can pose unacceptable costs, even with only a few weapons. This is especially true for a war-fighting strategy, which requires that deterrence holds at the strategic level even after limited nuclear use.

North Korea might also conduct additional nuclear tests as it looks to produce miniaturized warheads for a range of weapons systems. As mentioned, some believe that Pyongyang might already be able to build a warhead for its Nodong missile that can hit regional targets, although with low confidence. Kim Jong Un, however, has identified the ability to strike the United States as a requirement for deterrence.[40] It may be logical that he would want to reinforce assured strategic retaliation by directly targeting the US homeland, but doing so presumably would be even more important for a war-fighting strategy. A war-fighting strategy also would likely lead North Korea to develop designs that are small enough for so-called tactical weapons, such as short-range rockets or artillery. Building reliable warheads that balance different yield-to-weight ratios for different weapon systems that are intended for targets ranging in distance from tens to thousands of miles away would not be easy without testing.

A third set of indicators would result from North Korean efforts to increase the range, accuracy and reliability of its delivery systems. Improvements in range would allow North Korea to strike US targets in Guam, Okinawa, Hawaii or the mainland, while increased accuracy would allow it to hit a broader set of targets besides cities and large military bases, and improved reliability would bolster confidence as well as deterrence. John Schilling and Henry Kan argue that ground and flight tests would be critical here, especially if the North seeks to upgrade its systems with

[39] Jeffrey Lewis, "Can North Korea Build the H-Bomb?," *38 North,* June 11, 2010, http://38north.org/2010/06/can-north-korea-build-the-h-bomb/.

[40] North Korean efforts to restart plutonium production could also be a potential indicator that it is pursuing miniaturization, since many experts believe that plutonium is better suited than uranium for missile delivery by providing better yield-to-weight ratios. See Siegfried S. Hecker, "North Korea reactor restart sets back denuclearization," *Bulletin of the Atomic Scientists*, October 17, 2013, http://thebulletin.org/north-korea-reactor-restart-sets-back-denuclearization.

high-performance engines and advanced reentry vehicles that would improve both reliability and accuracy.[41] They also suggest that such tests would likely require limited infrastructure, such as downrange ships able to monitor flight data.

Efforts to improve survivability would lead to a fourth set of indicators. As mentioned, North Korea has invested in delivery systems with survivability in mind. It has focused primarily on mobility to exploit terrain, tunnels and underground facilities that hide and protect missiles, but it could take additional measures. For instance, Pyongyang could build hardened silos, as some have speculated that it is doing near the Chinese border, reportedly to complicate US targeting and protect some of its nuclear forces from preemptive strikes.[42] It could also deploy a sea-based deterrent. In fact, a recent "ejection test" of a submarine-launched ballistic missile implies North Korean interest in a seaborne nuclear capability.[43] Lastly, North Korea's current arsenal of delivery systems is thought to be made up of liquid-fueled missiles with the exception of its short-range KN-02.[44] It could develop solid-fueled missiles to enable launch with a few minutes' notice as well as off-road mobility.[45]

The fifth and final set of indicators would flow from North Korean efforts to operationalize a more robust strategy. Details of such arrangements are usually closely guarded secrets, but there might be generic signs of a growing nuclear force and its integration into North Korea's broader military doctrine. For instance, we might see the expansion of training and certification of nuclear-specific personnel, the placement of communications technologies designed to survive nuclear strikes, or warning and assessment systems. Moreover, operational exercises would likely be increasingly important as the nuclear mission in North Korea grows. Assured retaliation requires measures such as dispersing or hiding weapons to withstand a first attack and making sure they can be operational in the aftermath. Given the complexity of such operations, Pyongyang would presumably want to exercise against different scenarios on a regular basis to build confidence as well as to send deterrence signals. Of course, should North Korea adopt a war-fighting strategy, we might see combined nuclear and conventional military exercises increase in regularity to prepare both leaders and soldiers for fighting in a nuclear environment.

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[41] Schilling and Kan, *The Future of North Korean Nuclear Delivery Systems.*

[42] "North digs silos for missiles in Mt. Paektu area: Government sources say nearness to China is strategic advantage," *Korea JoongAng Daily*, October 10, 2013, http://koreajoongangdaily.joins.com/news/article/article.aspx?aid=2978649. A search of the literature, however, does not provide reliable evidence, such as satellite images, of these reported silos.

[43] Joseph S. Bermudez Jr., "Underwater Test-fire of Korean-style Powerful Strategic Submarine Ballistic Missile," *38 North*, May 13, 2015, http://38north.org/2015/05/jbermudez051315/.

[44] John Schilling, "An Assessment of the North Korean KN-08 ICBM (if it really exists)," *Arms Control Wonk*, May 6, 2012, http://lewis.armscontrolwonk.com/files/2013/01/Schilling-KN-08-Assessment-small.pdf.

[45] Schilling and Kan, *The Future of North Korean Nuclear Delivery Systems.*

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