

효과적 비핵화 검증을 위한 초기 전략

Initial Strategies
to Effectively Verify Denuclearization

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Background

- First Step of Denuclearization
: Verification of Initial declaration of a target state

- Purpose of this study is,
 - ① To introduce situations when discrepancies occur during the verification process and the potential technologies that can be used to confirm its deliberateness.
 - ② Analyzes activities verifying Iraq's nuclear program as a reference case to extract factors explaining unintentional and deliberate discrepancies
 - ③ Propose scenarios of discrepancy initial declaration and verification results
 - ④ Offering technology that can be used for each scenario and implications for NK

Basic Framework of Verification Treaties

The basic framework of verification treaties includes elements such as

- (1) declarations of data-baseline, periodic and final compilation, analysis and cross-checking of declared data and/or other information**
- (2) verification of declared information, remote and/or on-site through continuous monitoring and/or on-site inspections**
- (3) cooperative measures**
- (4) clarification mechanisms in case of technical ambiguities**
- (5) fact-finding missions or challenge on-site inspections**

Verification Techniques

Elements of Verification Framework are undertaken by following categorized techniques.

Type	Techniques	Characteristics
Remote	Information/data declarations, exchanges, notifications	Provide information related to compliance
	National Technical Means(NTM)	Nationally owned or operated technologies/techniques used to monitor obligations of another state
Remote & On-site	Fact-Finding Missions	Range from conducting interviews, gathering evidence outside the State's territory to intrusive inspections
On-site	On-site Verification (routine, short-notice, random, challenge inspection)	Provides information necessary to operate verification process Supplements or helps confirm data from other sources

Verification Techniques

	Technology	Characteristics
Space-based	Government, Commercial satellite	Allows remote monitoring No permission required Time, type of monitoring flexible
	Aircraft, helicopter	Closer proximity to the ground Requires permission of the state
Aerial Surveillance	Unmanned Aerial Vehicles(UAV)	Can carry a variety of sensors, has wide coverage, fly for long periods Expensive
	Ground-based sensor	Continuous monitoring w/o human intervention Detects change in monitored items
Ground-based	Environmental sampling	Detect environmental traces
	Tagging	Continuous monitoring w/o human intervention Specifies permitted items(useful for random sampling)
	Tamper-proof seal	Continuous monitoring w/o human intervention Ensures equipment/rooms remain untouched

Case Analysis(Iraq)

- In the 1980s, Iraq secretly developed a nuclear weapons program while being party to the Nuclear Non-Proliferation Treaty (NPT) and IAEA Safeguards Agreement.
- Iraq pursued several methods of enrichment and sought to obtain plutonium through reprocessing to develop an intermediate-level implosion.
- To inspect Iraq's compliance with policies concerning its nuclear weapons and WMD program, the United Nations Security Council passed Resolution 678 (April 3, 1991) establishing the United Nations Special Commission(UNSCOM)
- Iraqi leadership's lack of cooperation with UNSCOM led to the US and UK to launch air strikes known as operation Desert Fox.
- Afterward, the United Nations Security Council passed Resolution 1284 (December 17, 1999), creating the United Nations Monitoring, Verification and Inspection Commission(UNMOVIC), which mission lasted until 2007.

Case Analysis(Iraq)

- Authoritarian systems are extremely concentrated in power which allows leaders such as Saddam Hussein to be less constrained by institutional limits.
- In these systems, leaders prefer to form nuclear or WMD decision-making with a small group of loyal advisers which leads to the compartmentalization of information.
- This also erodes information processing as advisers, officials, and bureaucrats commonly misrepresenting one's true preference to show submission or loyalty to the leader.
- In Iraq's case, while there were coordinated efforts to conceal their nuclear weapons and WMD program, there were also cases of incompetence and disobedience
 - Lack of a clear guideline on how to cooperate with UNSCOM inspectors led officials to sometimes omit information that was in the initial declaration.
 - Despite explicit orders from the leadership to hand in items and documents, officials kept them for their gain.



Scenarios of Discrepancy

From the previous Iraq's case, assumed 4 scenarios for discrepancy in verification.

V : Verified data (data gathered by verification activities)

D : Declared data (data submitted by the inspected state)

A : Actual data (real data based on state's real activities)

Scenario	Actor	Explanation for Discrepancy	
		Unintentional	Deliberate
1	$V > D = A$	OSI equipment produces results within the error range	Political interests of the verification team
2	$V < D = A$		
3	$D > V = A$	Misinformation Incompetence	Diversion Smuggling
4	$D < V = A$		Bluffing

In case of Scenario 1, 2

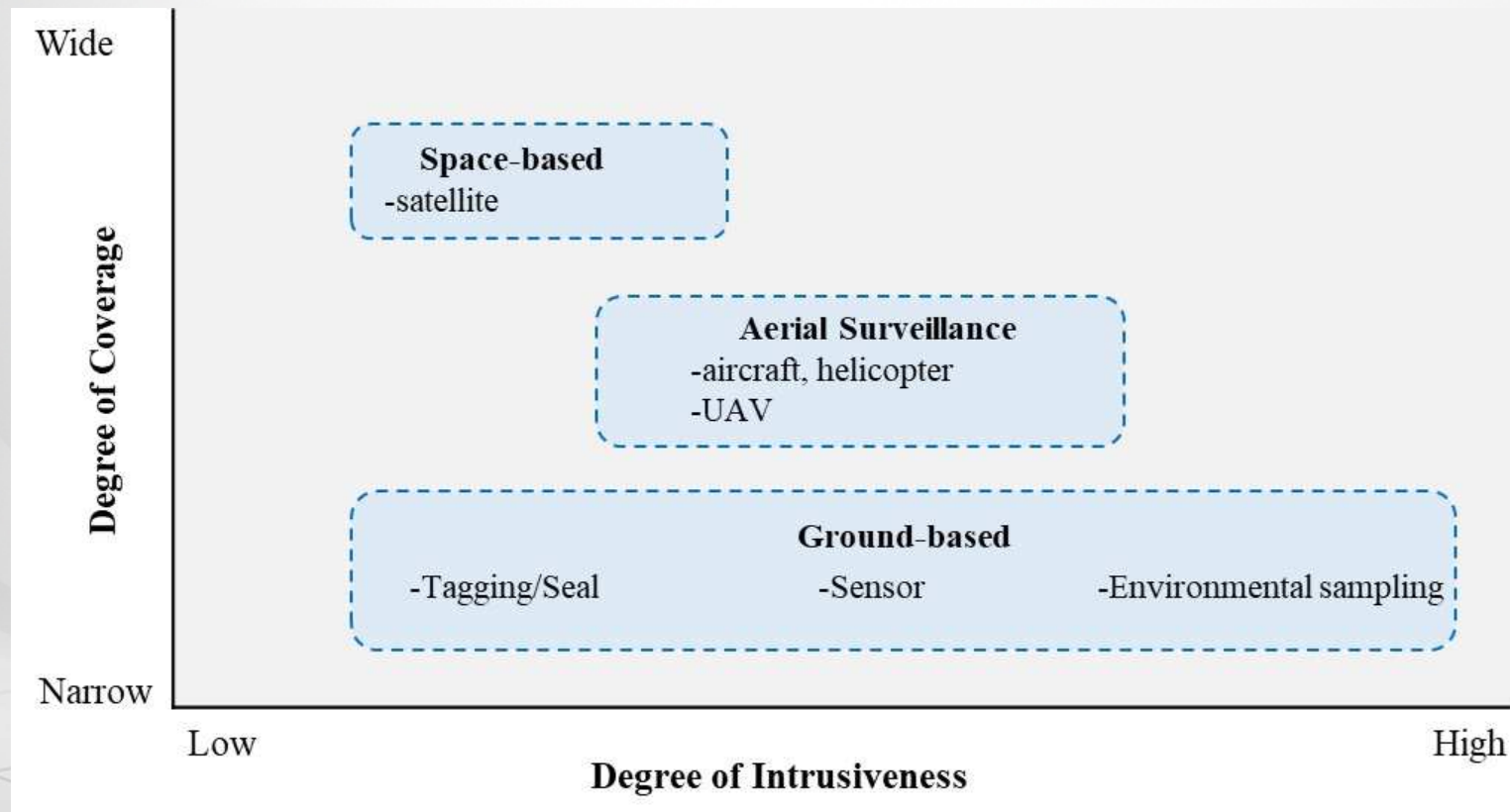
- The verified data should equal the declared data since the information in the Host State's declaration is true.
- However, the results of the verification are greater or smaller than the declared data due to errors caused by the verification team.
- Unintentional errors can be explained by technical errors from the verification equipment.
- The political interests of the individuals within the verification team can make them biased during the verification process, deliberately recording the verification results differently from what they observed.

In case of Scenario 3, 4

- The verification results accurately reflect the data existing within the state, but the initial declaration fails to reflect these due to an error on the Host State's part. If this was unintentional, it may be due to misinformation based on characteristics of the authoritarian system or incompetence and/or disobedience caused by individuals.
- However, if this was deliberate, it can be divided into two situations:
 - when the verification team found less than the declared data, which could indicate the possibility of diversion. In this case, undeclared materials and facilities within the Host State territory may exist. Also, individuals may have smuggled treaty-specific items for their gain.
 - when the verification team found more than the declared data, this could indicate bluffing. For instance, the Host state may have exaggerated its nuclear capabilities to ensure deterrence against regional adversaries.

Implication

- For prevent deliberateness of discrepancies in such scenarios,
 - verification techniques can be used based on the degree of intrusiveness and coverage



Conclusion and Future work

- Verification of Denuclearization for NK
 - different from other typical arms control verification
- From the Iraq's case, selecte technology for verification that is less intrusive
 - Possibility to induce more cooperation from NK
 - while avoiding unnecessary conflict that could potentially derail the verification process
- It is important to find **acceptable "correctness range"** that satisfied both the host state and verification team.