THE POSSIBLE USE OF NUCLEAR WEAPONS TO PUSH THE ENVELOPE OF MILITARY RISK MANAGEMENT

Dr. Hans Liwång, Associate Professor, Swedish Defence University, Stockholm, Sweden

Introduction

According to often described military risk management principles, risk management should be integrated cyclically and continuously into all phases of missions and operations and risk decisions should be made at the appropriate level.[1] In such a decision perspective, military aims, tactics, technology, laws, ethics, and values need to be integrated. It is all these aspects together that create military capability. (Liwång et al., 2023).

Military Risk Management

Risk management is the systematic application of management policies, procedures, and practices to the task of analyzing, evaluating, and controlling risk.[2] As such risk analysis deals with assessing how hazards, threats, and actions lead to different consequences. The likelihood of these different consequences is in focus. Risk management is often defined by the following activities:[3]

A. Risk analysis, including scope or problem definition, threat and hazard identification, and risk estimation.
B. Risk evaluation, including risk tolerability decisions and analysis of risk reduction options. Often looping back to the risk analysis for also looking into identified risk reduction options.
C. Risk reduction and control, including decision-making, implementation, and monitoring.

Risk management is used in many situations of military decision-making. Examples include intelligence analysis, operational planning, and legal considerations. Risk management is scalable and contextual (i.e., different decisions require different considerations, inputs, assumptions, and simplifications). The possible and typical applications range from situations where the scenario to be assessed is well defined and there are known causes and effects between hazards, measures, and risks to situations where there are large uncertainties on the future scenario and on how different measures will affect the risk situation. The uncertainties are especially challenging when your decisions will interact with others, for example, an enemy or threat.

---

[1] Headquarters Department of the Army, “Risk Management” (Department of the Army, Washington D.C., 2021).
[2] Liwång H, Ericson M and Bang M, “An Examination of the Implementation of Risk Based Approaches in Military Operations” (2014) 5 J. Mil. Stud. 38, https://www.sciendo.com/article/10.1515/jms-2016-0189.
[3] Headquarters Department of the Army, n 1.

The assumptions behind military risk analysis are not explicitly stated in the doctrines, but from the definition of risk and the process described, it must be assumed that military risk-based approaches are based on the concept of probability as an objective representation of the frequency of the studied event with an expected linear relationship between the consequences studied and their utility assignments. This also means that behind the risk management is an assumption about systematic and/or rational decision-making.

Military risk management often deals with situations ranging from well-defined technical systems such as the pneumatic system in Figure 1.a to an operational, but limited, group risk decision as illustrated in Figure 1.b.

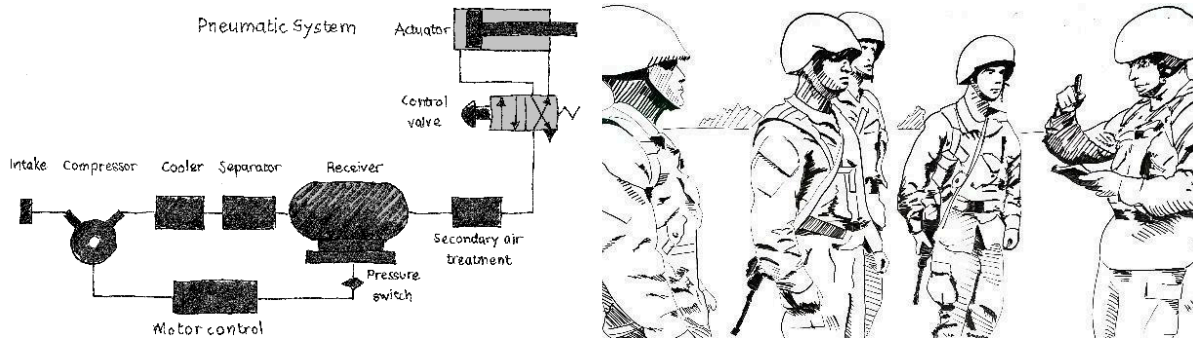

Figure 1. Two different risk decision situations. Left Figure 1.a with a pneumatic system and to the right Figure 1.b with a group risk decision. Illustrations: H. Liwång

To deal with challenges such as how to define the situation and deal with large uncertainties there is an ongoing development of a risk science, where challenges in risk management are researched[4], along with a parallel and equally important development of the scientific field of risk communication.[5] However, the links between such development and the development of military operational risk management are weak.

One of the major challenges in military risk management and military decisions on risk management is how to take unlikely but relevant futures into account. From a risk management perspective, low probability-high-effect futures need to be considered. The examples below frame such challenges in relation to military operational nuclear risk decisions:

- Example A. The decision about whether to use nuclear weapons in a conflict, especially in relation to escalation of the conflict. How should a possible escalation be judged? Are long-term future effects a part of the risk picture also in legal terms?
- Example B. Long-term decisions on a nation's nuclear arsenal consider the state as a functional state. It is unlikely that the state will consider a future where that state has failed. This despite the historic example of the Soviet Union shows us that it is a possible and relevant scenario in relation to long-term nuclear weapons risks.

[4] Aven T, "Risk Science Contributions: Three Illustrating Examples" (2020) Risk Anal.
[5] Boholm Å, "Lessons of Success and Failure: Practicing Risk Communication at Government Agencies" (2019) 118 Saf. Sci. 158, https://linkinghub.elsevier.com/retrieve/pii/S0925753518310476.

- Example C. Unintended use as mentioned by Hans Kristensen at the 2020 conference Nuclear Weapons and International Law where it was suggested that "the risk of unintended nuclear weapons use – resulting from human or equipment failure, or cyber intrusion – may be as great as, or perhaps, greater than the risk of intentional use."[6]
- Example D. The military use of civilian nuclear installations as a military weapon.

These four examples present substantial challenges for risk analysis and risk assessment, the effect of which is addressed in Section IV. Conclusions.

Risk management is a powerful tool, but it requires an understood and shared definition of risk and also a shared understanding of the role of risk management in relation to the decision-making process. Also, it is important to note that the negative outcomes and their probability (risk) as well as positive outcomes and their probability (expected gain) must be estimated and assessed. Risk can therefore only provide half of the picture needed for taking a decision, and it must be weighed against the expected gain with a certain action or operation.[7] Therefore, the risk analysis is an integral part of the decision analysis and cannot be separated, in time, space, or organizationally, from the decision-making process in general.

The problem definition, the scenario, has a central role in the assessment and will affect every aspect of the risk estimation. One of the most challenging aspects of the problem definition is to define and limit the time span to study. Also, there must be different problem definitions for different decision-making situations.

Only studying direct consequences, and ignoring indirect consequences, are extra troublesome for security risks analysis. This is because the consequences in one incident often must be assumed to affect the future intent of the threat and therefore change the problem.

In military organizations, the identification of social issues such as risk perception and cultural bias has shown to be weak[8] and the reasoning with respect to risk rationality differs at different hierarchy levels.[9] Therefore, an effective application of risk analysis places nontrivial responsibilities on the analyst as well as on the decision-maker. The decision maker has the responsibility to weigh different consequences against each other.

Shared risk awareness is needed throughout the organization, and it can only exist if the risk and uncertainty are assessed in a documented, structured, and standardized manner. Therefore, there must be an interaction between the risk analysis and other decision support activities and the decision-making.[10]

---

[6] Kristensen H, "Panel One: Nuclear Weapons Risks, Consequences and Responses. Hans Kristensen" (2020) 45 Fordham Int. Law J. 45.
[7] Bakx GCH and Richardson RAL, "Risk Assessments at the Royal Netherlands Air Force: An Explorative Study" (2013) 16 J. Risk Res. 595.
[8] Frosdick S, "The Techniques of Risk Analysis Are Insufficient in Themselves" (1997) 6 Disaster Prev. Manag. An Int. J. 165.
[9] Bakx and Richardson, n 7.
[10] Liwång H, "Risk Communication within Military Decision-Making: Pedagogic Considerations" (2017) 33 Def. Secur. Anal. 30, https://www.tandfonline.com/doi/full/10.1080/14751798.2016.1269389.

An important aspect not included in the military doctrines is how systematic errors, or biases, in the analysis, affect the decisions taken, the risk culture, and the perception of security. This aspect must be thoroughly thought through and communicated throughout the organization.[11]

Risk Assessment and Nuclear Weapons

There are important rules of distinction, proportionality, necessity, and precaution and the text below focuses on the principle of proportionality.

For a military legal adviser, legal assessments on proportionality will focus on the risks posed by the military operation to protect civilians. The assessment weighs the military advantage or value of hitting a specific military target, with the estimated risks of collateral damage to civilians or civilian objects. Applying this proportionality principle carries with it several difficult issues that need to be taken into consideration. One of the main issues of interest here is how a legal analysis of causality and risks is carried out.

Experience from the Balkan conflict tells us that a legal adviser who receives a plan for attack will do a qualitative assessment in order to review it pursuant to international humanitarian law, and specifically the principle of proportionality. Once the intended target is established as a military objective, the legal adviser will focus on the proportionality of the attack. This comprises three questions: What is the expected collateral damage? What is the concrete and direct military advantage of attacking the intended target? Is the expected collateral damage excessive in relation to that advantage? An attack that is expected to cause excessive damage to civilians or civilian objects must then be canceled.[12]

The analysis is conducted before an operation, so it is the expectation of collateral damages that is assessed. What are "expectations" built on, that is, what factors are considered? There are many possible factors: prior attacks against similar targets, intelligence regarding the intended target and the area where the target is located, the density of the civilian population in the target's vicinity, whether the defender is deliberately exposing civilians to risk (human shields), the timing of the attack, weapon accuracy, and so on. Although, if it is possible to objectively assess the accuracy and destructive capacity of specific weapons, the common denominator for most of the factors mentioned is that to a large degree, they build on subjective elements.

This is challenging in all situations. However, if the question relates to the use of nuclear weapons, the knowledge from previous similar attacks is limited or non-existent.

If the case relates to the use of nuclear weapons, an analysis needs to understand a lot of physics to investigate the destructive effect of the weapon. However, there are even larger possible concerns for assessing more long-term causes on the enemy, the region, the society, the conflict, and the war.

[11] Liwång et al, n 2; Liwång, n 10.
[12] Liwång et al, n 2.

In the end, we end up with questions, which we also see in other more traditional cases: What factors do we include or exclude in the weighing of expected collateral damage and military necessity? The risk assessment needs to be limited and finite, how can we limit the understanding of the use of a nuclear weapon when it risks changing everything we know?

The use of risk analysis and risk management assumes that there is a finite simplification of the reality that we can identify and analyze and that the process will then tell us something valuable about the future. However, the guidance is very limited on how to find such relevant a finite simplification of the reality for complex problems. There is here a collision between different understandings of our world. One perspective comes from the engineering world, for example, nuclear power plants, where the assumption is that we understand the causality of the system and its failure modes. However, that is far from the case of the deliberate use of a nuclear weapon. These challenges are more important when analyzing risk with nuclear weapons than traditional weapons.

Conclusions

We have seen a development of risk management in relation to both large terrorist attacks and cyber-attacks. That development has been pushing the envelope of risk analysis and risk management towards dealing with larger uncertainty and more complex problems. Looping back to the four examples in relation to military operational nuclear risk decisions:

- Example A. The decision on whether to use nuclear weapons in a conflict.
- Example B. A nation's nuclear arsenal if that nation fails.
- Example C. Unintended nuclear weapons use.
- Example D. The military use of civilian nuclear installations as a military weapon.

These four examples come with different and large uncertainties, all at least as challenging as the large terrorist attack or cyber-attack for a risk assessment. If an organization wants to be able to capture such challenges, that organization first needs to create and develop a shared risk understanding specifically for nuclear weapons and nuclear risks. However, here, more than ever, these aspects mean different things for different aspects of society.

A discussion on the risks related to nuclear weapon use will develop our understanding of the problem, the related risks, and how the identified risk relates to legal considerations.

The effects of nuclear weapons are not linear. One nuclear detonation, even if not deliberate, may completely change everything we know about a conflict. That turns the notion of a rational and systematic decision process upside down. Risk analysis and risk management can provide some input, but it is a challenging task.