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Artificial Intelligence Beyond Weapons: Application and Impact of AI in the Military Domain

2 December 2024, HRAIM 2024

Sarah Grand-Clément, UNIDIR

Examining AI in the military domain

- Understanding the military context and elements of a military operation
- Looking beyond weapons – applications of AI within the military context
- Impact of the application of AI in the military domain

Elements of a military operation

Military tasks

Command and control (C2)

Information management

Logistics

Training

Upstream tasks

Command and control (C2)

1. Undertake target analysis (i.e., identifying the most relevant targets)
2. Determine choice of weapons and weaponeering
3. Assess weapon capabilities and effects (e.g., munition fragmentation patterns, secondary explosions, etc.)
4. Estimate protection, collateral damage, and risk mitigation, including non-strike entities (e.g., civilian patterns of life, time of attack)
5. Develop mission implementation plan (e.g., identification of courses of action and pathways, etc.)
6. Plan for contingencies (e.g., loss of equipment, loss of communication, etc.)
7. Plan and adapt manoeuvres in the battlefield based on available information, intelligence and data collected real time in the land, air, naval, space and cyber domains
8. Continuous impact assessment of the campaign (including assessing public opinion, etc.)

Information management

9. Clean, filter, and fuse data collected via intelligence, surveillance and reconnaissance (ISR)
10. Analyse data collected through ISR across the land, air, naval, space and cyber domains
11. Analyse own, friendly and adversary capabilities (e.g., manpower, equipment, training, facilities, status of equipment, etc.)
12. Analyse the environment (which includes terrain, infrastructure, non-strike entities, impact on civilians, etc.)
13. Synthesise the key points emerging from the analysis of the data collected
14. Disseminate information across the chain of C2
15. Manage information and communication security

Logistics

16. Logistical support of deployment (i.e., acquisition of necessary material/equipment, plan deployment of personnel, plan transport of equipment and personnel, manage force protection)
17. Assess operational effectiveness of people and equipment (i.e., real-time monitoring of performance and status)

Training

18. Undertake training and simulation (i.e., educate military personnel and undertake individual and collection training)

Potential applications of AI beyond weapons within the context of a military operation

Task 1: Undertake target analysis

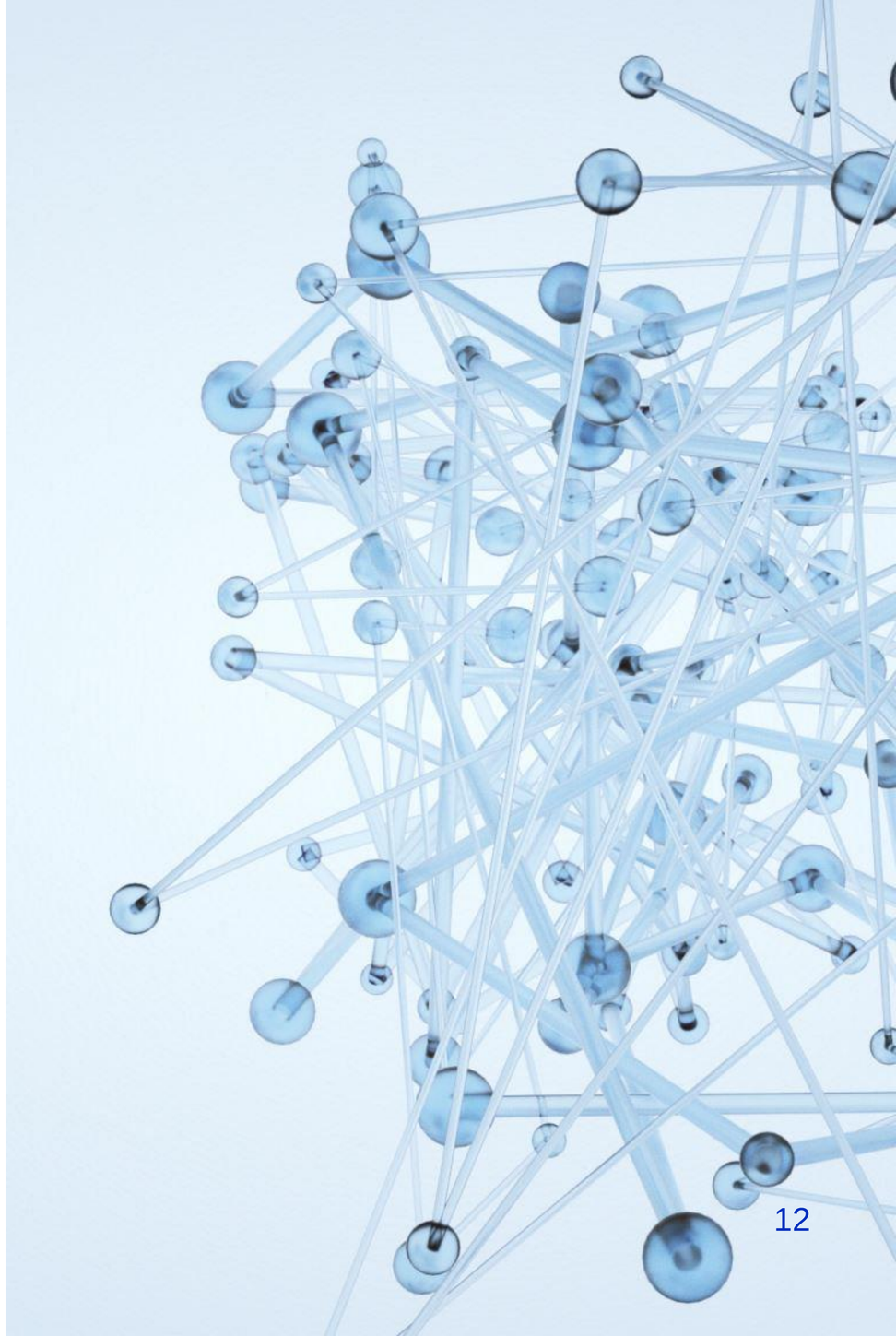
Current AI capabilities	Feasible near-future AI capabilities
• **Network mapping** to identify highly valuably targets within a network, based on, for example, pattern recognition and analysis of communication means	• **Assessment aid** as to whether the selected targets abide by the stated objectives, desired effect and rules of engagement
• **Calculation and assessment** of inter-dependencies between different targets	• **Prediction** of contextualized opponent behaviour
• Identification of individuals and objects via **image recognition or other data types** (e.g., individuals of interest, buildings, military vehicles) to include both targets to engage and those to avoid	• **Provision of several courses of action** or recommended courses of action based on the mission's strategy and intended targets
• Automation of agents and their actions in **wargaming simulations** and synthetic environments for training and planning	• **Simulations and extrapolations** of future outcomes based on data and assessments stemming from the target analysis
• Identification of targets (human or other), via **motion of points, bodies, and systems of bodies and patterns of life**	• **Prioritisation, filtering, and triage of information** in a faster manner regarding operational conditions and data
• Application of AI to the **analysis of synthetic aperture radar data** from space-based assets, particularly in instances of adverse weather conditions	• Enhanced provision of support to **red teaming** (i.e., undertaking a challenging function to existing plans)
	• Provision of **initial and rapid legal advice** as 'first opinions' ahead of human military legal advisers, such as to assess whether there are contradictions between on-the-ground action and legal and regulatory frameworks

Task 16: Logistical support of deployment

Current AI capabilities	Feasible near-future AI capabilities
• **Analysis** of the best paths and transport modes for a given mission and environmental and traffic conditions	• **Assessment of equipment needs** and provision of acquisition **recommendations**
• **Provision of recommendations** on the best paths and transport modes for a given mission and environmental and traffic conditions	• (Improved) **prediction of equipment resupply needs** based on patterns of use and stockpile management data
• Organisation of staff rotation (i.e., **scheduling**)	• **Optimisation of logistical supply chains** (e.g., faster or more efficient routes, early warning when supplies low, etc.)
• **Moderation and overview** of optimal or desired energy utilisation	
• Assistance with **automated planning and scheduling** of personnel and logistics	
• **Identification of equipment maintenance needs** via image recognition (e.g., cracks in propellors or blades)	

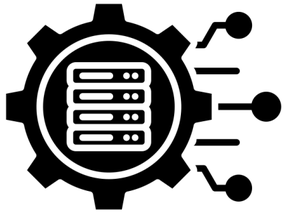
Overarching unknowns linked to AI applications in the military domain

- Existence of a capability does not imply it will be applied
- Two intertwined issues:
  - Barriers to the integration of AI within the military domain
  - Opaqueness regarding actual applications of AI



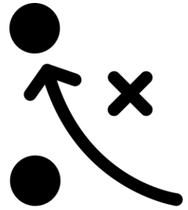
Impact of AI in the execution of military tasks

Strengths and opportunities emerging from the integration of AI capabilities



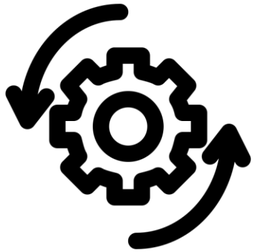
Big data analysis

Speed of analysis and communication



Planning

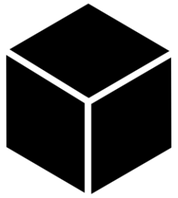
Safety and security



Personnel efficiency

Limitations and challenges of AI integration in upstream military tasks

Lack of (good quality) data

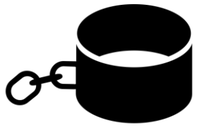


Black box decisionmaking

Meaningful human control

Reasoning capability

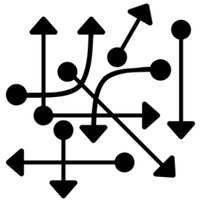
Cyber vulnerability



Excessive reliance

Skills degradation

Impact to operational tempo



(Lack of) harmonisation

Unknown impact

Final reflections

- The expectations assigned to AI may not be realistic in terms of the anticipated technological progress but also the realities of AI integration into operations
- Inferences on the impact of AI on the operational tempo is a recurrent one; however rapidity of the operational tempo will still be determined by humans and their roles in the observe, orient, decide, act (OODA) loop
- The impact of AI on the upstream military tasks shows many similarities in the discussion pertaining to downstream tasks
- The operationalisation of AI further upstream is less visible, discussed, and controversial, and thus the barriers to operationalization may be lower
- AI governance discussions should reflect on all AI applications in the military domain – taking into account both upstream and downstream military tasks

Thank you

sarah.grandclement@un.org

twitter.com/unidir

instagram.com/unidir

linkedin.com/company/unidir

youtube.com/@unidir

facebook.com/unidirgeneva

UNIDIR

Palais de Nations

1211 Geneva, Switzerland

WWW.UNIDIR.ORG

Discussion and Q&A