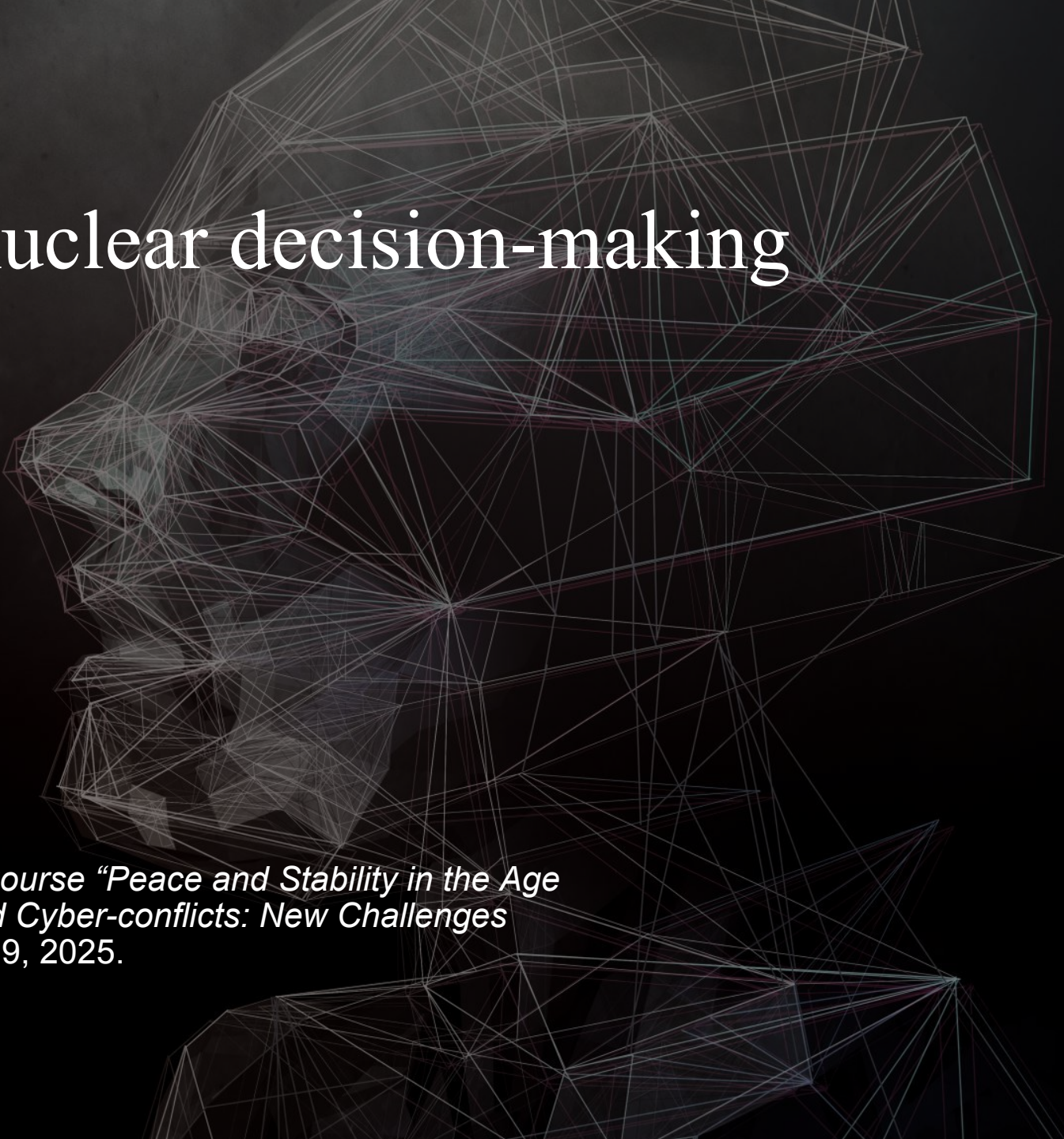




AI and nuclear decision-making

Alice Saltini

63rd ISODARCO Course “Peace and Stability in the Age of Militarized AI and Cyber-conflicts: New Challenges and Risks”, August 9, 2025.

Research scope and disclaimers



I focus my research on today's cutting-edge AI



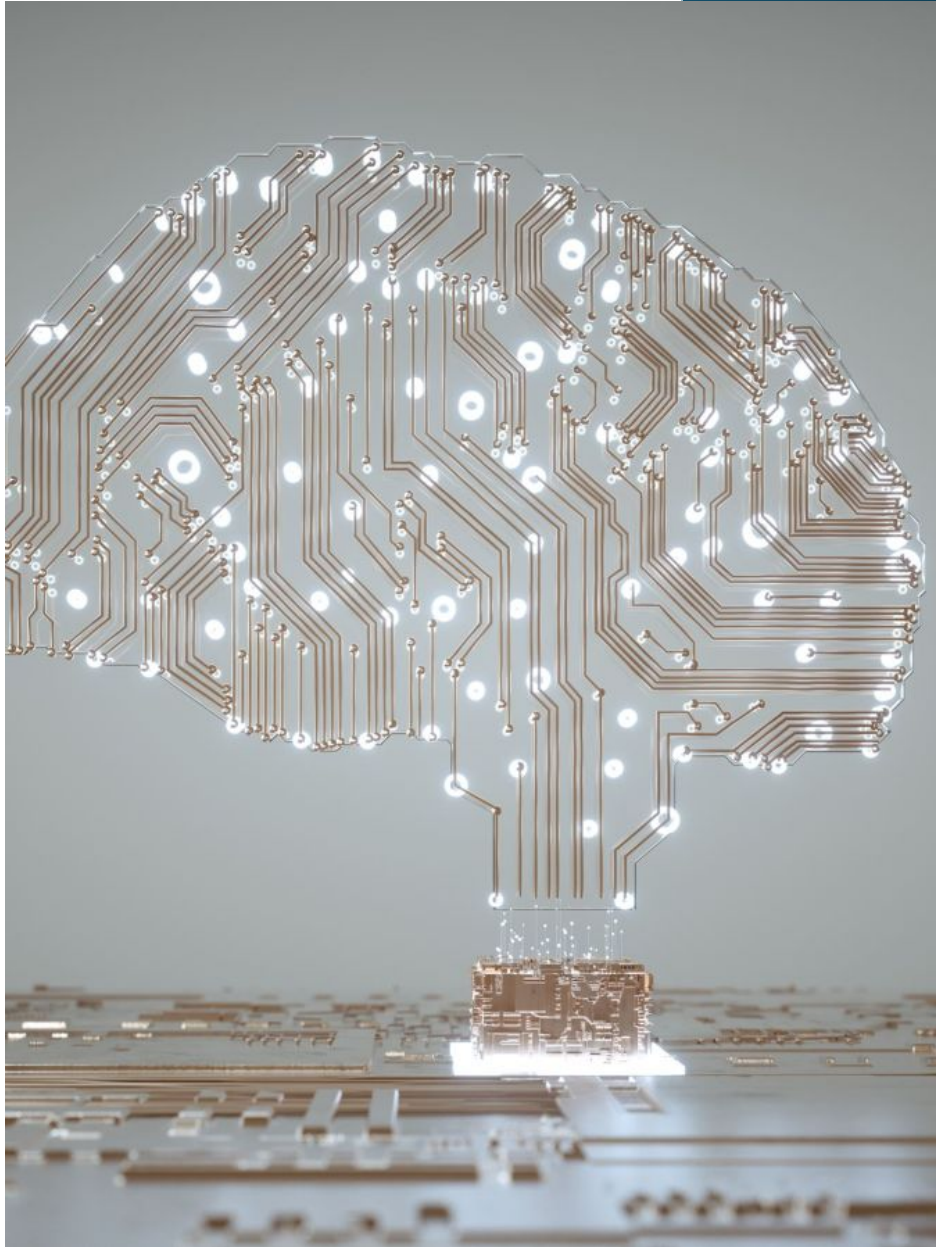
Scope of discussion is naturally limited due to opacity of NC3



This presentation provides a generalization to encompass all nuclear-capable states, but there are significant differences that merit in-depth analysis



AI-NC3 is only one part of the AI-nuclear conversation



Core points

1. AI is not a panacea.
2. The extent of AI capabilities and its implications are not fully understood.
3. Implications of AI integration are **not** black and white. There is a wide range of implications and risks which depend upon:
 - Types of AI technology considered for integration;
 - Specific NC3 areas where AI is integrated;
 - Level of human control and redundancies.

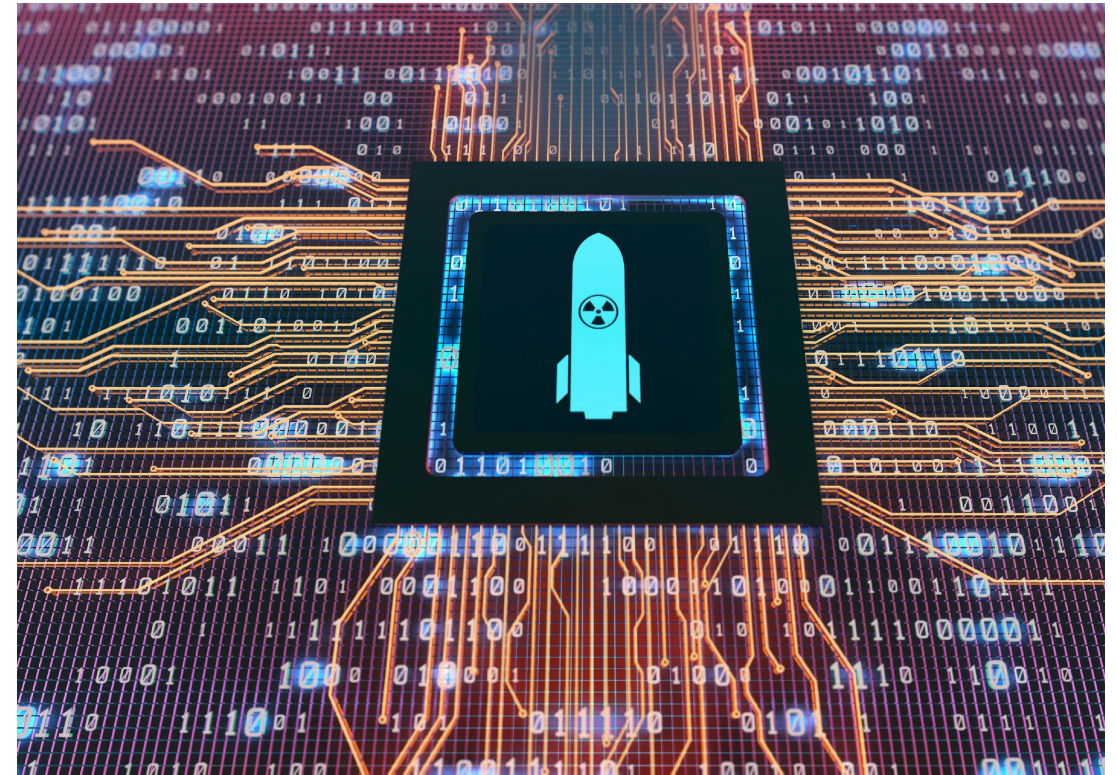
Setting the scene

AI is advancing very rapidly and is at the center of geopolitical competition
(Example: DeepSeek's R1 vs. GPT-4o)

AI promises immense benefits for society but also immense risks

All nuclear-capable states have the desire to gain a strategic advantage

AI integration can occur both directly into NC3 or in adjacent systems, but it still impacts nuclear



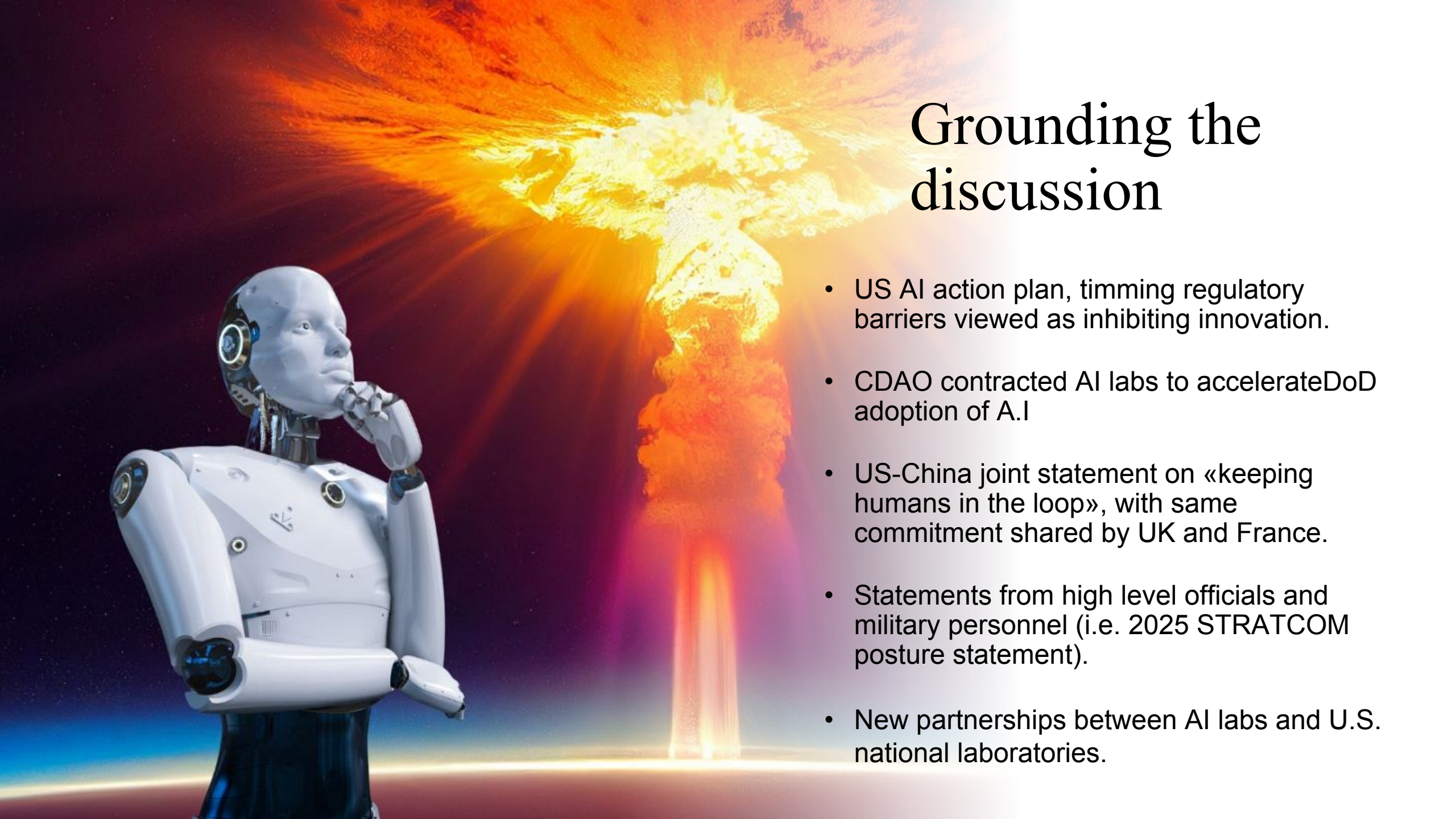
What is NC3?

NC3 designs vary by national doctrine and provide the infrastructure, protocols, and systems for leadership to control nuclear forces and communicate decisions.

NC3 as an interconnected decision, forming a continuous data→analysis→action loop, where AI can simultaneously enhance many NC3 functions.

Ongoing modernization offers a window to improve safety, resilience, and efficiency, incentivizing AI adoption to maintain or gain strategic advantage.

Classified NC3 details force researchers to infer AI entry points from modernization briefings and open-source data.

A white humanoid robot with a blue visor and mechanical joints is shown in a thinking pose, with its hand on its chin. The background features a large, intense nuclear explosion with a bright yellow and orange mushroom cloud rising from a dark, smoky base. The scene is set against a dark, starry sky.

Grounding the discussion

- US AI action plan, timming regulatory barriers viewed as inhibiting innovation.
- CDAO contracted AI labs to accelerateDoD adoption of A.I
- US-China joint statement on «keeping humans in the loop», with same commitment shared by UK and France.
- Statements from high level officials and military personnel (i.e. 2025 STRATCOM posture statement).
- New partnerships between AI labs and U.S. national laboratories.

Examples of AI use cases



Situational monitoring:

Multi sensors fusion for increased speed and automation of early warning systems
Classification of adversaries' behaviour
Damage assessment
Discern potential targets



Decision-support:

provide courses of action
Generate real-time operational plans



Force management:

Training and simulations
Facilitating secure communication

Network Tactical Common Data Link

Contact
Chris Flood

Business
Electronic Systems (Inc.)

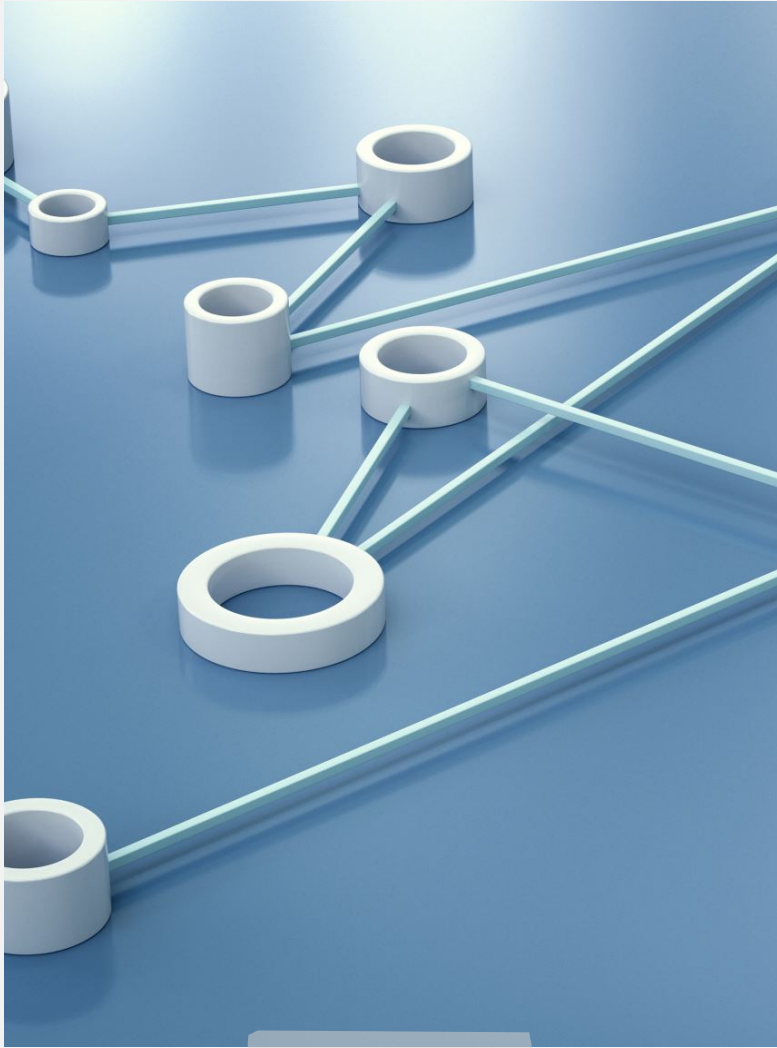
NTCDL allows for the exchange of mission critical information when it matters most. The system provides U.S. Navy operators with the ability to simultaneously transmit and receive real-time intelligence, surveillance, and reconnaissance (ISR) data from multiple sources and exchange command and control information across separate or independent networks.

Our system goes a step further by allowing data sharing, exchange, transfer, or distribution in real-time across military assets such as aircraft, ships, and unmanned vehicles. By bringing together a greater volume of data, our system allows operators to effectively communicate command and control protocols among forces to maintain an advantage.

Implications

It's difficult to understand how AI impacts escalation. This is due to 4 key challenges:

- AI can influence nuclear decisions even without direct integration into NC3 systems.
- Difficulty in understanding how AI will advance. Current limitations include:
 - Unreliability
 - Opacity
 - Vulnerability to cyber attacks
 - Misalignment
- Integrations will likely differ across nuclear-capable states, driven by specific doctrines, capabilities and threat perceptions.
- Lack of understanding of what constitutes a “safe” integration in the nuclear domain.



So what? Where are we at?

Our ability to mitigate risks today is inadequate.

Too many *ifs* and *whens* for the future.

Implications for AI integration into NC3 are exceptionally nuanced.

Probabilistic risk assessment techniques to quantify AI-NC3 risks?



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Beyond Human-in-the-Loop: Managing AI Risks in Nuclear Command-and-Control

ALICE SALTINI AND YANLIANG PAN
December 6, 2024



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