

Summary Report

for Breakout Session Organizers

3. Full Summary

Background & Objectives

Breakout Session:

Impacts of AI Technological Convergence on International Security

Background: Technologies are not developed and deployed in a vacuum. They exist within an ecosystem of other related – and unrelated – technologies. These technologies both enable each other and influence each other's trajectory. This is especially true for artificial intelligence which is both a technology per se and an enabler for other technologies. The fields of neurotechnology and synthetic biology promise to amplify and complexify AI's impact in the military domain and on international security. As they converge, technologies become hybrid systems whose impact becomes increasingly difficult to understand and predict. Technological convergence introduces increasing complexity, however, our understanding of the latter remains superficial, meaning that it is important to invest intellectual resources to understand these interactions and their security implications. AI's convergence with these various technological fields stands to potentially create new WMD threats. In this world of converging technological risk, truly responsible military AI can only be achieved with a more holistic understanding of the implications of its convergence with other disruptive technological fields.

Objectives: The primary objective of this session was to bring critical attention to and raise awareness for the topic of technological convergence and its effects on international security. Narrowly focusing on AI with no attention paid to which other disruptive technologies AI will converge with, will entail blind spots in how we understand AI's impact on the military domain, and how we prepare for it. This entails an increase in discussions on how other technological fields will interface with advancements in AI, could be militarized, and bring about new risks and opportunities. The session therefore sought to offer a more holistic understanding of how emerging technologies interface with international security. Therefore, a focus was on bringing attention to current developments in synthetic biology and neurotechnologies as well as the way in which these technologies interface with artificial intelligence. Additionally, the goal of the breakout session was to contribute to a clearer horizon scanning of new generation WMD threats, enabled by the technological convergence of AI and various other technological fields.

Main Discussion Points

A. Remarks from Panelists (Name / Title) :

Panelists:

- **Dr Kate Adamala**, Assistant Professor, Genetics, Cell Biology and Development, University of Minnesota, Polymath Fellow, GCSP
- **Dr Barry O'Sullivan**, Full Professor, School of Computer Science & IT at University College Cork, Polymath Fellow, GCSP.
- **Dr Renaud Jolivet**, Professor of Neural Engineering & Computation at the Maastricht Centre for Systems Biology at Maastricht University, Polymath Fellow GCSP
- **Mr Simon Cleobury**, Head of Arms Control and Disarmament, GCSP
- Moderator: **Dr Jean-Marc Rickli**, Head of Global and Emerging Risks and of the Polymath Initiative, GCSP

Remarks:

The panel discussed the consequences of technological convergence between artificial intelligence, neurotechnology and synthetic biology for international security and the military domain.

AI on the one hand is a multi-purpose technology that has the potential for groundbreaking advancements in certain fields. On the other hand, AI is facing significant limitations in other areas where it ultimately may not succeed, underscoring both its strengths and its boundaries. Neuroscience is at the nexus of a grand merger of technologies among adjacent fields, particularly with AI, neuromorphic computing, and brain-machine interfaces, all working together to understand, heal, augment and mimic the human brain. This revolution is driven by a combination of classical technologies (e.g. advanced electronics and computing, chip manufacturing, new materials) on one side, but most significantly by breakthroughs in biotechnology on the other side, enabling unprecedented possibilities to record and manipulate the brain at the cellular level. Many of these technologies have existed for decades, and we are likely on the verge of a neurotechnology revolution, both in terms of capacities and adoption, with several proof-of-concept methods already having been applied to human subjects. Eventually, the widespread use of neurotechnologies will have significant security implications due to the potential for hacking, with some companies currently already deploying devices to monitor employee performance or emotional state. While it is too early for regulation due to the uncertainties behind future advances, the creation of a large collaborative research centre, similar to the European Council for Nuclear Research (CERN), could foster responsible development and ensure fair participation in advancing these neurotechnologies while allowing for the scale of effort that is needed.

Biotechnology presents new and unforeseen challenges to both biosafety and biosecurity, particularly with the rise of the bioeconomy, where biological manufacturing is replacing petrochemical industries, introducing vulnerabilities in

the supply chain. The emergence of novel synthetic biology tools, coupled with predictive AI technologies, lowers the barrier of entry for potential bad actors to engineer new strains and pathogens without extensive expertise. Even imperfect efforts to increase pathogenicity and weaponize harmful organisms through AI or artificial evolution can result in large-scale consequences, as pathogens may continue to evolve once released. Given that pathogens do not respect borders, it is essential for the international community to cooperate closely to develop effective threat detection and risk mitigation strategies. Current biosecurity frameworks are insufficient to safeguard emerging synthetic biology technologies and the progress of the bioeconomy.

Furthermore, emerging technologies such as synthetic biology, neurotechnology or AI currently lack dedicated platforms for discussion within the arms control and disarmament architecture. Unlike conventional weapons, prohibiting or regulating AI technologies will require approaches beyond traditional disarmament treaties, as they merely act as enabling technologies rather than weapons themselves. Given their potential negative impact on international peace and security, and in particular strategic stability, it is crucial for the arms control community to find suitable fora for discussing these technologies and their impact. This could involve creating Science and Technology review mechanisms in existing treaties, such as the Biological Weapons Convention, or establishing a Group of Scientific Experts to provide recommendations on the responsible use of such emerging technologies.

B. Comments from the Floor :

Not applicable beyond audience reminding about the importance of functioning and effective governance systems

Key Takeaways

The breakout session highlighted the dual nature of AI, which offers significant potential for advancements but also faces limitations in certain areas. The integration of neuroscience with AI, neuromorphic computing, and brain-machine interfaces, is driving a potential neurotechnology revolution enabling us to better understand the human brain. However, these advancements are opening the door for unprecedented manipulation of the brain, raising security concerns around hacking and surveillance.

Advances in biotechnology pose new challenges to biosafety and biosecurity. Novel risks emerge as a result, especially with the rise of synthetic biology and AI, which lower the barrier for bad actors to engineer harmful pathogens. Even imperfect efforts to increase pathogenicity or weaponize organisms could lead to severe global consequences. International cooperation is critical to develop effective risk mitigation strategies, as current frameworks are insufficient.

Emerging technologies such as AI, neurotechnology, and synthetic biology currently lack dedicated platforms for discussion within arms control and disarmament frameworks. Regulating these technologies requires new approaches beyond

traditional disarmament treaties as they are enablers rather than direct weapons. Recommendations by the panelists included creating review mechanisms in existing treaties, establishing dedicated discussion platforms and expert groups on the responsible use of emerging technologies as well as collaborative research centers to ensure responsible development and global participation.

Remaining Challenges and Issues

The breakout session identified several key challenges and unresolved issues related to the topic of AI technological convergence, including:

- Uncertainty and existing limitations and boundaries around AI advancements
- Security concerns around misuse and hacking in neurotechnology
- Increased vulnerability and biosecurity risks from biotechnology
- Insufficient existing governance frameworks and lack of regulation
- Challenges in coordination global solutions and international cooperation
- Lack of dedicated platforms for discussion (e.g. emerging technologies and arms control)

Future Plans

i.e. publications, research, interview, etc.

Follow-up discussion at the next REAIM summit

Appendices (if applicable)

Please share any visual aids such as videos, photos, polls, etc.

Not applicable