

EXITING NORMAL: EMERGING DISRUPTIVE TECHNOLOGIES AND THEIR IMPACT ON MILITARY OPERATIONS AND EQUIPMENT





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Threats to the international security environment have never been faster to materialize. In addition to the current great power dynamic, quantum leaps in technological development, and ultra-connectivity are transforming how nations assess security threats, as well as engage with private sector stakeholders. From hypersonic systems to integration of machine-human teaming on the battlefield, the pages of science fiction are very much reflected today in operations and doctrine.

Against the backdrop of an ongoing struggle for domination in the fields of innovation, breakthrough capabilities as well as research and development (R&D) of critical future technologies, the stakes for democracies have never been higher. To address these features, the Sasakawa Peace Foundation and GLOBSEC assembled a collection of geographically diverse experts to explain both the opportunities and the challenges that emerging and disruptive technologies (EDTs) hold, how they impact the current security dynamic and ethical regimes, and how like-minded states can work together to build trust and interoperability platforms, while simultaneously leveraging their potential with private sector stakeholders.

SPEAKERS:

- ▶ **Dr. Stella Adorf**, NATO International Civilian, Head of Situational Awareness at the NATO Headquarters Situation Center
- ▶ **Ms. Anna Knack**, Deputy Lead of the Technology Disruption and Uncertainty research workstream, RAND Europe
- ▶ **Mr. Bonji Ohara**, Senior Fellow, The Sasakawa Peace Foundation
- ▶ **Colonel Masahiro Shizu**, Chief Director, Innovation Driving Office for Emerging Technology

KEY INSIGHTS:

- ▶ Increasing intelligence, autonomy, and interconnectedness, are raising many practical and ethical questions for nations to urgently address.
- ▶ The rapid pace of R&D through its bottom-up direction, are thresholds to adequately react to the latest abilities of the EDTs and formulate legal framework to minimize their adverse impacts.
- ▶ Countries who shun military confrontation should still invest in the most recent military equipment and trends to ensure some level strategic parity with allies and potential adversaries.
- ▶ The concentration of R&D in the hands of the private sector is further complicating the formulation of the regulations as well as the deployment of the technologies in the defence and security realm.
- ▶ Reaching a global agreement on new ethical frameworks vis-à-vis EDTs remains a work in progress due to their rapid development and concentration in the hands of the private sector as well as different acceptance levels of ethical standards including human rights by national actors.
- ▶ EDTs are exacerbating the issue of interoperability gaps among allies and partners. Varying fields of research and capability development across the globe are leading less technologically developed states unable to match allies and meet their future commitments.

- ▶ To leverage the potential of the EDTs, deeper cooperation and strengthening of mutual trust will be required. Not only between the state actors, but also the engagement of government, industries, and academia within the state (known as triple helix ecosystem) to enhance the innovation and responsible deployment of EDTs.
- ▶ Securing networks should constitute a baseline requirement for the progress in innovation and deployment of EDTs, as well as for the cooperation between like-minded countries.

DISCUSSION POINTS:

DEFINING THE EMERGING AND DISRUPTIVE TECHNOLOGIES AND THEIR IMPACT ON DEFENCE AND SECURITY

EDTs are actively shaping our sense of the world around us, including defence and security. They are rapidly progressing in their intelligence, autonomy, and interconnectedness, bringing up unprecedented challenges. From the perspective of North Atlantic Treaty Organisation (NATO), there are five areas among modern technologies with high priority: advances in machine learning and artificial intelligence (AI), harnessing the quantum mechanics, data security, and biological and synthetic materials. This assessment is based on the conclusions of the NATO Science & Technology Organisation, outlined in the Science & Technology Trends 2020 – 2040: Exploring the S&T Edge report.

Other speakers unanimously endorsed the game-changing potential of these technological areas introduced by Dr. Adorf, but highlighted the diverse impacts that AI holds. Specifically, based on the Chinese activities, Mr. Ohara argued it will substantially transform the current operations and tactics from network-centric into algorithm-centric warfare. Another shift will be from natural, technological, and social domains to cognitive domain. With its increasing maturity, complexity, and sophistication, AI will provide states with an abundance of strategic advantages. Ms. Knack outlined some of them, including but not limited to reducing harm on human operators, deploying humans in other conflict roles to gain advantages, cost efficiency, reducing collateral damage, or increased data and intelligence gathering. In contrast, there are increasing concerns about the legitimacy of automated decision making, attribution of activities, deception, misuse for disinformation campaigns, or spoofing, when an unknown person or program successfully identifies as trusted source to gain illegitimate advantage. She further added that these changes to operations and equipment can potentially increase escalatory dynamics through reduced risk of human life on the battlefield.

Based on these game-changing technologies, the future operational environment will be diverse and include both physical and non-physical domains. Both domains will be composed of public, private, state and non-state actors, and alliances, who will determine how to use military and non-military instruments of power. Defence and deterrence policy will need to address questions like; “Who or what must be critically defended?”, “Who are we determining?”, “Who will have weapons?”, “How will these weapons look like?”, and “How can we counter them?”. Dr. Adorf in this context specifically stressed the role of non-state actors, whose presence and capabilities are increasing. Evidence suggests that in the upcoming decades, they will be able to act more freely and with more unpredictably weakening the ability of the Alliance to react.

Not to be overlooked is the concept that EDTs are becoming cheaper and more readily accessible. Consequently, Colonel Shizu recommended immediate action to adopt EDTs in existing and future defence structures. Lagging behind in innovation and deployment of EDTs can lead to significant reduction in the security and defence advantage once these technologies become foundation technologies. Moreover, it can weaken the interoperability of the alliances such as the Quad. Even though countries like Japan have no intentions of offensive military action, for self-defence purposes they need to maintain some level of strategic parity and continue to follow global technological trends, according to Mr. Ohara.

Despite technologies being a permanent feature actively shaping the face of the war, their deployment today has reached unrivalled levels of impact. First, this transformational power is partly explained by the bottom-up

development and the pace in which they are brought to the market. Second, the EDTs can be simultaneously combined to leverage their individual potential. Mr. Ohara has specifically mentioned the combination and integration of AI and cloud computing, high-speed computing, or 5G network. Finally, EDTs are often dual use, meaning they can be repurposed for civilian application while also holding weaponizable features.

Against this backdrop, the like-minded countries have to define the baseline and how the activities will be aligned for defence and deterrence. Dedication of finances and manpower to conduct the research will be necessary as well. Given their relevancy to civilians, this intensifies the importance of policy makers going beyond the technological realm and considering their consequences outside of the military realm.

ETHICS AND RULES OF THE EDTS

Given their advanced capabilities, the deployment of EDTs is inherently interconnected to ethics and rules of engagement. Indeed, not every technology nor all the aspects of the discussed technologies trigger ethical dilemmas, but there are some future uncertainties such as integration of more precise systems or involvement of more mathematical processes that require reflection. The most controversial are lethal autonomous weapons (LAWs), which algorithms are given the possibility to execute both life and death decisions without human approval.

Among participants, there is a general agreement that humans should be kept in the loop of the decision-making cycle to prevent autonomous systems from making moral life-or-death decisions, and regulations are therefore highly desired. However, the challenge is that not all state and non-state actors share the same approach or commitment of human rights, which makes this issue a double-edged sword, as noted by Dr. Adorf. If there are competitors who are refusing to accept the otherwise generally accepted rules, the quagmire facing democracies is whether they should continue to develop these technologies and doctrine. Failure to keep pace with rivals could result in a strategic disadvantage but at the same time could install a race to the bottom that spawns dangerous outcomes. She further added that the U.N. Convention on Certain Conventional Weapons could possibly serve as a baseline for regulating the LAWs. Colonel Shizu endorsed the importance of the first step which may set a precedent followed by others and create space for dialogue.

Another reason why reaching a consensus on a global legal framework may be difficult to achieve stems from the extreme pace of technological evolution and its overlap with the societal sphere. Software is developing much faster than the hardware, and the incentives are coming mostly from the bottom, meaning that the society has access to the technologies sooner than the public sector, including the military. Mr. Ohara perceives this as a dangerous situation and warns that if like-minded states continue waiting other actors may already use the EDTs against them.

OVERCOMING THE TECHNOLOGICAL AND INTEROPERABILITY GAP

The nature of research and development of EDTs is raising a concern about the technological gap between states and harms to the interoperability. To prevent this gap from widening, the speakers have advocated several recommendations. First, it is the common understanding of the EDTs, its definitions, and capabilities. Second, states need to commit financial and human resources to drive the research and development. Third, development of the capabilities to scan the horizons, so that predictions can be made. Fourth, states should always have experts available, supporting internal competence in the innovation. Fifth, active discussion of the international policy and the framings of security and peace will be necessary. Finally, deeper cooperation also means strengthening the securement of the networks, so that they can be used by Allied countries while protected from adversaries.

Although still in the point of understanding the impact of the technologies, Ms. Knack has emphasized wargaming, modelling, or experimentation as a useful tool in creating scenarios about how they can be expected to develop and what their impact will be on different security levels. These practices can also strengthen the mu-

tual cooperation across domains and Allies through socialization, stress-testing, refining. The utility of the use of scenarios in planning and preparing for the future and impacts of EDTs was also emphasized by Mr. Ohara.

While mutual trust and deeper cooperation between states is of utmost importance, the cooperation between the different segments within the state should not be overlooked. Dr. Adorf accentuated the triple helix ecosystems that engage representatives of the public sector, industries, and academia. This utility of model was collectively endorsed by all speakers. Effective cooperation between these can help to boost innovation, deployment of EDTs, and prevent a growing interoperability gap. In this context, Ms. Knack added that the exercises and training should not include only the armed forces and ministries of defence, but also defence and commercial industry to ensure the resilience of the supply chains, and the accessibility and reliability of the supplies for the defence sector. These chains are also vulnerable to cyberattacks, hence transmitting the vulnerability to defence sector, which should be prevented.

Colonel Shizu emphasized the existence of common platforms for international cooperation and the importance of individual action, which he illustrated by the establishment of Innovation Driving Office for Emerging Technology in Japan. For operational interoperability, Mr. Ohara additionally accentuated the information sharing and the closer cooperation between the public and private sector to improve the procurement and deployment of EDTs.

Finally, Dr. Adorf declared that the trend of intensifying relationships and growing cooperation will continue. It will not be necessarily a matter of choice, but rather a matter of necessity. She draws a parallel with the ongoing pandemic, which demonstrated the interconnectedness of the world and how the events in one part of the world influence the global development, as a result of globalisation.

EDTS AND DEFENCE AND SECURITY IN 2040

Moving forward the impact of EDTs to actively shape the security environment will be profound. The speakers agreed that EDTs hold both positive and negative impacts on military operations and equipment. States and relevant stakeholders will be able to harness the benefits such as better information and planning for militaries, which will help the militaries to meet the goal of identification and destruction of adversary's weapons, while minimizing the own damage. But at the same time, it is necessary to be cognitive of the fact that states no longer hold a monopoly on destructive technologies that accessible and scalable.

The speakers shared a slightly pessimistic view about the future. They expressed their concerns about losing the control over the EDTs and its erosion of human dignity on the battlefield. Dr. Adorf is of the position that throughout the years we will come to a stricter regulation of EDTs, maybe alike the regulations of chemical or nuclear weapons. The human dignity must be clearly recognised and separated from the machines, which should not be able to make moral decisions.

Ms. Knack and Mr. Ohara are of the opinion that what will define the operations of the 21st century is whether the actors are able to disrupt the network systems that will be central to command and control, but also to majority of other human activities outside the military sphere. The presence of internet of things (IoT) is a representation of the closeness between the real and virtual world and increasing vulnerability to cyberattacks, which will grow on importance in operations.

Finally, Colonel Shizu warned that the EDTs we are concerned about today will be foundation technologies in 2040 and other new technologies will rise. We need to look forward, scan the horizon and ensure that allies and partners possess these technologies to build on.

REPORT RAPPORTEUR:

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