NATO PARLIAMENTARY ASSEMBLY

SUMMARY

OF THE MEETINGS OF THE

SCIENCE AND TECHNOLOGY COMMITTEE (STC)

Friday 20 and Saturday 21 November 2020

By videoconference

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ATTENDANCE LIST

OFFICERS OF THE SCIENCE AND TECHNOLOGY COMMITTEE

Chairperson	Kevan JONES (United Kingdom)
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	Sven KOOPMANS (Netherlands)
	Jean-Christophe LAGARDE (France)
Outgoing General Rapporteur	Susan DAVIS (United States)
Special Rapporteur	Leona ALLESLEV (Canada)

NATO PA BUREAU MEMBERS

Vice-President	Philippe FOLLIOT (France)
Secretary General	Ruxandra POPA

MEMBER DELEGATIONS

Albania	Myslim MURRIZI
Belgium	Leo PIETERS
Bulgaria	Nikolay TSONKOV
Canada	Ziad ABOULTAIF
	Peter BOEHM
	Cheryl GALLANT
	Nelly SHIN
Croatia	Ante BACIC
	Dario HREBAK
	Stjepan KOVAC
Czech Republic	Jan LIPAVSKY
Denmark	Flemming Moeller MORTENSEN
	Torsten Schack PEDERSEN
Estonia	Andres METSOJA
	Jevgeni OSSINOVSKI
France	Christian CAMBON
	Nicole Monique DURANTON
	Philippe MICHEL-KLEISBAUER
	(Rapporteur, Sub-Committee on Technology Trends and Security)
	Jean-Charles LARSONNEUR
	Patricia MIRALLÈS
	Laurence TRASTOUR-ISNART
Germany	Karl-Heinz BRUNNER
	(Vice-Chairperson, Sub-Committee on Technology Trends and Security)
	Jürgen TRITTIN
Greece	Konstantinos BARKAS
	Marietta GIANNAKOU
	Marios SALMAS
	Christos SPIRTZIS
Hungary	Laszlo György LUKACS
	Agnes VADAI
	Andrea VARGA-DAMM
Iceland	Willum Thor THORSSON
Italy	Cristiano ANASTASI
	Andrea CANGINI
	Giancarlo GIORGETTI
	Luca LOTTI
	Fabrizio ORTIS
	Adriano PAROLI

	Michele SODANO
Latvia	Aldis BLUMBERGS
	Ivans KLEMENTJEVS
Lithuania	Ausrine ARMONAITE
Luxembourg	Semiray AHMEDOVA
	Nancy ARENDT KEMP
	Sven CLEMENT
	(Vice-Chairperson, Sub-Committee on Technology Trends and Security)
Netherlands	Toine BEUKERING
	Tom Van Den NIEUWENHUIJZEN
Norway	Sverre MYRLI
	Christian TYBRING-GJEDDE
Poland	Przemyslaw CZARNECKI
	Joanna KLUZIK-ROSTKOWSKA
	Michal Roch SZCZERBA
	Wojciech ZUBOWSKI
Portugal	Maria Da Luz ROSINHA
	Olga SILVESTRE
Romania	Ion CUPA
	Nicu FALCOI
Slovakia	Ludovit GOGA
	Peter KMEC
Slovenia	Andrej CERNIGOJ
	Monika GREGORCIC
Spain	Maria Jesús CASTRO
	Begona NASARRE
	Victor RUIZ
	Maria Teresa RUIZ-SILLERO
Turkey	Nurettin CANIKLI
	Mevlut KARAKAYA
	Hisyar OZSOY
	Faik OZTRAK
	Kamil Okyay SINDIR
	(Vice-Chairperson, Sub-Committee on Technology Trends and Security)
	Zehra TASKESENLIOGLU
	Taner YILDIZ
United Kingdom	Stuart ANDERSON
	Harriett BALDWIN
	Alun CAIRNS
	Angela CRAWLEY
	Nusrat GHANI
	Lord JOPLING
	John SPELLAR
United States	Gerald E. CONNOLLY
	James COSTA
	Susan DAVIS
	Neal Patrick DUNN
	Brett GUTHRIE
	Rick LARSEN
	Gregory Weldon MEEKS
	Linda SANCHEZ
	John SHIMKUS
	Filemon VELA

ASSOCIATE DELEGATIONS

Austria	Andreas MINNICH
Azerbaijan	Malahat IBRAHIMGIZI
	Elshan MUSAYEV
Georgia	Irakli SESIASHVILI
Sweden	Kenneth G. FORSLUND
	Hans WALLMARK
Switzerland	Ida GLANZMANN-HUNKELER
	Mauro TUENA
Ukraine	Mariana BEZUHLA
	Yehor CHERNIEV

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European Parliament	Juozas OLEKAS

PARLIAMENTARY OBSERVERS

Assembly of Kosovo	Arberie NAGAVCI
Australia	Andrew WALLACE
Kazakhstan	Nurzhan NURSIPATOV
	Abay TASBULATOV

SPEAKERS

Stamatios M. KRIMIGIS	Head Emeritus and Principal Staff, Space Department, Applied Physics Laboratory, Johns Hopkins University, Chair of Science of Space, Academy of Athens, and Advisor, Minister of Digital Governance, the Hellenic Republic
Robert MURRAY	Head of Innovation, Emerging Security Challenges Division, NATO

INTERNATIONAL SECRETARIAT

Paul COOK	Director Economics and Security Committee
Steffen SACHS	Director, Science and Technology Committee
Anne-Laure BLEUSE	Coordinator, Economics and Security Committee
Serafine DINKEL	Research Assistant

Friday 20 November 2020

Joint Speaker: Economics and Security Committee and Science and Technology Committee

I. Opening remarks by Kevan JONES (United Kingdom), Chairperson of the Science and Technology Committee

1. **Kevan Jones** (UK) welcomed members to the meeting and thanked the secretariat of the NATO Parliamentary Assembly for organising the Annual Session. He then introduced the speaker.

II. Presentation by Dr Stamatios M. KRIMIGIS, Head Emeritus and Principal Staff, Space Department, Applied Physics Laboratory, Johns Hopkins University, Chair of Science of Space, Academy of Athens, and Advisor, Minister of Digital Governance, the Hellenic Republic, on *The Importance of Space in Security and Economy*, followed by a discussion

2. **Dr Stamatios M. Krimigis** introduced his presentation on "The Importance of Space in Security and Economy."

3. Dr Krimigis suggested that the global space economy stood at roughly USD 360 billion in 2018. The United States alone spent roughly USD 50 billion in 2018 on the space economy, including funding for the National Aeronautics and Space Administration (NASA). The total budget of all other governments combined is USD 30.5 billion.

4. The Speaker noted, however, that only 22% of the space economy consists of government expenditures. The remainder consists of commercial satellite services and equipment, satellite manufacturing, and satellite ground equipment. He added that the rate of growth of space expenditures is about twice that of the economy as a whole.

5. Dr Krimigis outlined the European Union's space-related investments. The most prominent programme is Galileo, which has consumed around EUR 22 billion since its inception in 1998. The next largest EU project is Copernicus, which collects climate change data. Copernicus has cost EUR 6.7 billion since its inception. Dr Krimigis explained how the Copernicus programme measures global temperatures and has thus become a critical tool for understanding climate change. The Copernicus programme also assess fire activity.

6. Dr Krimigis outlined the essential roles played by the European Space Agency (ESA). That body which rests on four pillars: science and exploration; safety and security; applications; enabling and support. Among other things, ESA is responsible for tracking space weather events, which can have an impact on European space assets and ground-based infrastructure.

7. The Speaker argued that space is undergoing a powerful transformation. He pointed to several key innovations: signal intelligence and reconnaissance from multiple sources; geolocation and spoofing technology; satellite communications from low Earth orbit (LEO); the "small satellite" revolution; and responsive launchers. Finally, he discussed the growing importance of the private sector and the catalytic role now being played by investors such Elon Musk and others. These entrepreneurs have driven the advance of game-changing space technology

8. Dr Krimigis elaborated on changing optical communications in Low Earth Orbit. New technologies allow have exponentially increased data speeds, which have moved from megabytes-per-second (Mbs) to gigabytes-per-second (Gbps). He elaborated on the possibility of using space technology for creating "near-real-time Google Earth." (This means that scientist can now immediately gather, and monitor date related to sea surface temperature, chlorophyll concentration, cloud fraction, and snow cover, among others.

9. The Speaker also discussed the Euro SWARM programme, which is funded by the European Defence Agency (EDA). The programme seeks to generate perimeter security by using drones incorporating satellite communications, 5G technology, and various Intelligence, Surveillance and Reconnaissance (ISR) assets. He also mentioned how new technologies can facilitate persistent monitoring with small satellite constellations. These technology breakthroughs make it possible to persistently monitor points on the surface of the Earth in near real-time.

10. The Speaker noted how many of these technological breakthroughs are transforming the defence sector and suggested several policies that might facilitate this process. First, he said that continued investment is needed in developing geolocation technologies and systems, including funding for the American Global Positioning System (GPS) and European Galileo. These systems make persistent terrestrial monitoring possible though satellites and advanced communications systems.

11. Dr Krimigis then spoke on the need for a European equivalent of the Defence Advanced Research Projects Agency (DARPA) in the United States. Such an agency would help more rapidly develop and deploy game-changing technologies that would help meet pressing capability needs. The Speaker finally recommended forging closer trans-Atlantic a space defence links. He thanked the audience for their attention and welcomed questions.

12. **Marietta Giannakou** (GR) congratulated Dr Krimigis on the international recognition of his work and thanked him for briefing the members.

13. **Ivans Klementjevs** (LV) spoke on Latvia's participation in the space economy. He recalled previous ESC visits to space-related organisations. He enquired about NASA's Space Launch System (SLS) and the possibilities for future space travel.

14. Dr Krimigis claimed that SLS could theoretically facilitate Moon travel by 2024. However, he said that Mars travel would be exceptionally difficult and require high levels of funding. He stated that a human mission to Mars could require collaboration among the world's governments. He suggested that travel to Mars travel would not likely take place until the late 2030s, in his view.

15. **Philippe Michel-Kleisbauer** (FR) spoke on the increasing complexity of space threats. He also noted how important space technology has become to advance environmental protection and to address the challenge of climate change. He drew attention to France's activities in the space domain, including cooperation with its transatlantic and European partners. He inquired about the Greek perception on the importance of space in economic and security terms.

16. Dr Krimigis said that Greece had a late start in developing its space capabilities. The country is now building a small space-related industrial base, with assistance from other European countries, including France and Germany. He suggested that Greece would be positioned to focus on building small satellites.

17. Kevan Jones (UK) asked about the proliferation of satellites. He inquired about the issue of "space trash" and asked about the risks of satellite collision? How could countries recover satellites and make sure that satellites re-enter safely?

18. Dr Krimigis drew attention to a recent United Kingdom programme, which has examined the possibility of de-orbiting space trash. In his view, space trash poses risks to the International Space Station (ISS) and other space-based systems. He said that the world's governments have so far failed to develop a common strategy on space trash. He expressed his hope for greater cooperation and suggested that a new US Administration would likely take a leading role here.

19. Mr Jones also asked about the legal agreements governing both government and private sector use of space. He speculated that this could be a contentious matter given the proliferation of private satellites.

20. Dr Krimigis spoke about the increasing involvement of private sector actors – including Elon Musk's companies – in the space economy. This has triggered a degree of uncertainty, with overlapping government interests and commercial stakes. There is clearly a need for more discussion on these matters, ultimately aiming for new international agreements.

III. Closing remarks by Ivans KLEMENTJEVS (Latvia), Chairperson of the Economics and Security Committee

21. Mr Klementjevs expressed his gratitude to Dr Krimigis for his excellent presentation and thanked members for their participation.

Science and Technology Committee - Meeting 1

IV. Opening remarks by Kevan Jones (United Kingdom), Chairperson

22. Kevan Jones (UK) reconvened the Committee meeting by welcoming the members, associates, and partners. He called the meeting of the Science and Technology Committee to order and listed the vacant positions open for election.

V. Adoption of the draft Agenda [176 STC 20 E]

23. **The draft Agenda [176 STC 20 E] was adopted.**

VI. Adoption of the summaries of previous meetings of the Science and Technology Committee held in London on 13 October 2019 [213 STC 19 E], and meetings held online on 6 July 2020 [122 STC 20 E] and 17 September 2020 [153 STC 20 E]

24. **Committee members adopted the summaries of the meetings held in London on 13 October 2019 [213 STC 19 E], online on 6 July 2020 [122 STC 20 E] and 17 September 2020 [153 STC 20 E].**

VII. Consideration of the *Comments of the Secretary General of NATO, Chairman of the North Atlantic Council, on the Policy Recommendations adopted in 2019 by the NATO Parliamentary Assembly* [056 SESP 20 E]

25. Mr Jones then drew the attention of the Committee members to the comments of NATO's Secretary General on the resolutions adopted by NATO PA in 2019. No comments were made.

VIII. Consideration of the revised draft Report of the Sub-Committee on Technology Trends and Security *Urban Warfare* [040 STCTTS 20 E rev.1] presented by Philippe MICHEL-KLEISBAUER (France), Rapporteur

26. The Rapporteur, Philippe Michel-Kleisbauer (FR), presented his updated draft report on *Urban Warfare*. He began by pointing out that urbanisation is one of the defining global trends of the 21st century. By 2050, nearly 70 per cent of the population will live in urban areas. Given the persistent instability on NATO's southern and eastern flanks, Allied forces will likely be involved in urban combat operations, he concluded.

27. Urban areas feature three characteristics that complicate operations for modern forces, the Rapporteur explained. Difficult terrain, vital infrastructure, and high population density pose serious

challenges for military planning and targeting. He underscored that the protection of the civilian population and respect for international humanitarian law are priorities for NATO forces. NATO adversaries may, however, not adhere to the same standards.

28. NATO has recognised the need to prepare Allied forces for future urban combat, Mr Michel-Kleisbauer said. In this context he reminded committee members that the North Atlantic Council had presented a global concept for "Joint Military Operations in Urban Areas" in 2019. In addition, NATO's Science and Technology Organisation (STO) has identified the most important technologies that influence urban combat in the future. Mr Michel-Kleisbauer stressed the importance of training and that NATO forces are adapting their training facilities accordingly. Moreover, the ability to maintain control of the information and cyberspace will be crucial for conducting future urban combat operations successfully, he said. Advanced information technology will be decisive for command and control as well as for the control of public information domain in combat operations.

29. Other technologies that can help NATO forces meet the challenges of urban combat zones include new types of sensors. These and unmanned aerial vehicles will promote better situational awareness. Robotics and new protective equipment will improve force protection. Artificial intelligence will increase the ability to compile, sort, prioritise and disseminate information, he added. Biometrics allows to identify hostile individuals and the NATO Communication. The Information Agency (NCIA) is developing an automated biometric identification system (NABIS) in the fight against terrorism.

30. However, the French delegate cautioned that technological progress, particularly in the commercial realm, also benefits adversaries. Non-state actors and terrorists such as the Daesh or insurgents in eastern Ukraine are already exploiting new technologies, in particular by using drones. The Rapporteur underscored that although artificial intelligence and autonomous systems could enhance the effectiveness of NATO forces in urban combat, their use raises ethical and legal issues. He welcomed the initiative of several Allies, including the French Ministry of the Armed Forces and the US Department of Defense, in elaborating guidelines for the ethical use of these systems.

31. To promote the development of new technologies that improve situational awareness and command and control, Allies should make more use of NATO’s science and technology network, including the STO. Moreover, he called upon Allies to collaborate in establishing binding international standards for the ethical use of artificial intelligence and autonomous systems in the military context. Finally, he proposed that Allies should cooperate more closely in the monitoring and regulation of the use and export of dual-use technologies.

Finally, Mr Michel-Kleisbauer said that he is willing to include several additions to the draft report which he had received from the Ukrainian delegation shortly before the meeting. He then explained the suggested additions which focus on the integration of NATO partner countries’ experience in urban warfare operations, including Russian cyber-attacks, and encourage working with partner countries to control dual-use technologies. No additional points were raised and **the draft Report of the Sub-Committee on Technology Trends and Security [040 STCTTS 20 E rev.1], as amended, was adopted.**

IX. Future activities of the Science and Technology Committee and of the Sub-Committee on Technology Trends and Security

32. The Chairperson then informed members about the planned activities of the Committee in 2021. The Committee reports will be on: Biological weapons, NATO S&T cooperation with Partner countries in Asia-Pacific, and Space. To generate information on these issues the Committee envisages three visits: to Spain, to Japan and to France or Germany. Mr Jones emphasised that the implementation of the visits will obviously depend on the evolution of the COVID-19 pandemic. The Assembly and the host delegations are monitoring the developments and the International Secretariat will update delegates accordingly, Mr Jones explained.

X. Consideration of the revised draft General Report *Hypersonic Weapons - A Technological Challenge for Allied Nations and NATO?* [039 STC 20 E rev.1] presented by Susan DAVIS (United States), outgoing General Rapporteur

33. **Susan Davis** (US) began the presentation by explaining that the revised version of her draft report on *Hypersonic Weapons* includes expanded sections on Russia and China as well as other countries.

34. The Rapporteur then reminded committee of the two types of hypersonic missiles: hypersonic cruise missiles (HCMs) and hypersonic glide vehicles (HGVs). HCMs are basically cruise missiles that can fly at hypersonic speed while the latter are launched from rocket boosters and glide towards their target at hypersonic speed after the boost phase. Unlike ballistic missiles, hypersonic missiles are maneuverable and do not follow a predictable flight path. The combination of speed and maneuverability poses a new challenge, as a hypersonic missile can bypass existing missile defences and greatly reduce the warning time for any targeted actor.

35. Ms Davis remarked that Russia and China have made great strides in their hypersonic weapons programmes. Russia is currently pursuing three hypersonic weapons programmes, *Avangard*, *Tsirkon*, and *Kinzhal*. Moreover, China is developing both HCMs and HCVs and conducts a vast amount of research on these technologies.

36. Several NATO Allies, with the United States in the lead, are also developing hypersonic technology, the General Rapporteur informed delegates. US hypersonic activities are designed to produce operational *prototypes* that can be used for the subsequent development of hypersonic weapons. In contrast to Russia, however, the United States is currently not considering or developing hypersonic weapons for use with a nuclear warhead, the Rapporteur pointed out. For now, US hypersonic efforts prioritise the development of short and intermediate range conventional precision strike capabilities.

37. Among several other countries pursuing research of hypersonic missile technology are European NATO Allies, France, Germany, and the United Kingdom, the US Congresswoman said. Outside of NATO, India, Australia, and Japan have also embarked on the development of hypersonic missiles. India has tested a hypersonic missile in September 2020; it is currently developing a hypersonic cruise missile with Russian support (*Brahmos-II*), which could reach mach 7.

38. Given the advances in hypersonic technologies NATO needs to evaluate the implications of hypersonic weapons for the Alliance, Ms Davis emphasised. This is particularly important for NATO's defence and deterrence posture but also for capability adoption, interoperability, as well as arms control and non-proliferation. While the development of hypersonic weapons poses security challenges to NATO, they also offer opportunities for NATO forces. For example, in a conflict conventionally armed hypersonic weapons could enable NATO forces to tackle road mobile ballistic missiles and anti-access/area denial (A2/AD) assets of potential adversaries from afar. Thus, having hypersonic missile capability at their disposal could signal reassurance and resolve to NATO Allies – and thereby strengthen deterrence. What is more, Allied hypersonic weapons could be used as leverage in pursuing arms control agreements beneficial to the security of NATO Allies. This could be analogous to the role that NATO's double track decision played in the negotiations that led to the INF Treaty, the Rapporteur said.

39. Ms Davis said that some NATO Allies are working on counter-hypersonic weapons technology. The United States, for example, evaluates the feasibility of putting a network of sensors in low-earth orbit that would track incoming hypersonic missiles. There is also an experimental *Glide Breaker* programme, which focuses on developing interceptors for hypersonic weapons or the development of directed energy weapons which would shoot down incoming hypersonic missiles.

40. The Rapporteur stressed that NATO and NATO Allies do not want to engage a new arms race. However, she underlined that NATO can ill afford to ignore the progress that Russia, China, and other nations are making in the development of hypersonic weapons. Hypersonic weapons could, if

unmatched, provide an adversary with the means to coerce NATO Allies and partners in times of crisis. NATO as an organisation needs to evaluate and discuss the implications of hypersonic weapons for deterrence, capability adoption, interoperability, and arms control.

41. NATO members should engage in the exchange of intelligence, research, design, and encourage overall closer cooperation among national research programmes. She emphasised that NATO's Science and Technology Organisation (STO) can help advance research on hypersonic technology.

42. Ms Davis also stressed that NATO needs to address the issue of proliferation by, for example, strengthening the Missile Technology Control Regime, and by devising a system that would prevent the proliferation of hypersonic know-how to adversaries. She concluded by informing Committee members that she had received several Ukrainian proposals for minor changes in the draft which she is willing to accept.

43. Following the presentation, **Mariana Bezuhla** (UA) thanked the Rapporteur for her willingness to include the comments of the Ukrainian delegation. She explained that the proposals underline that the *Avangard* system would pose a particular challenge to NATO's eastern flank and partner nations in that region; that hypersonic weapons of peer competitor nations increase the threat to NATO and partner nations; and that the Allies need to retain and foster the unity and cohesion of the Alliance.

44. The Rapporteur agreed to implement the Ukrainian amendments and affirmed that they emphasise the particular challenges hypersonic weapons pose, noting that NATO will indeed need to continue collaborating with Ukraine and other partners.

45. Before proceeding to the vote, the Chairperson noted that Ms Davis is leaving the Assembly as she is retiring from Congress. He acknowledged her important contribution to the Committee and thanked her for her work in the NATO PA. **The draft Report [039 STC 20 E], as amended, was adopted unanimously**.

Saturday 21 November 2020

Science and Technology Committee - Meeting 2

46. Mr Jones opened the second part of the meeting and welcomed Rob Murray, Head of Innovation, Emerging Security Challenges Division at NATO's HQ, as a guest speaker.

XI. Vote on the revised draft Special Report *COVID-19, International Security, and the Importance of NATO's Science and Technology Network* [090 STC 20 E rev.1] presented by Kevan JONES (United Kingdom), Chairperson

48. Before opening the floor to the voting procedure, Mr Jones thanked Committee members for their constructive comments on the original draft of the report and noted that he is willing to accept two proposals submitted by the Ukrainian delegation shortly before the session. Elaborating on the proposals he said that short additions emphasise that NATO should cooperate with partner nations to prepare for future pandemics and support partner countries in identifying existing weaknesses. No comments were made and **the revised draft Special Report [090 STC 20 E rev.1] as amended was adopted.**

XII. Panel discussion on *Defence Innovation and Disruptive Technologies*, Consideration of the revised draft Special Report *Defence Innovation* [041 STC 20 E rev.1] and consideration of amendments and vote on the draft Resolution *Defence Innovation* [167 STC 20 E] presented by Leona ALLESLEV (Canada), Special Rapporteur

49. Next, Leona Alleslev (CA) presented her report on *Defence Innovation* and related draft resolution. She stressed that necessary efforts to rebuild national economies, health systems and societies after the COVID-19 crisis must not come at the expense of security. Cutting defence spending would be a severe mistake that would be exploited by our adversaries. Rather, the right lesson from the pandemic is that NATO's collective defence must be strengthened and Allied nations' resilience improved.

50. Threats to NATO and its member countries have not simply faded away; the Alliance continues to affront the dual challenge of Russia's militant revisionism and China's ambitions. Moreover, these threats are exacerbated by the proliferation of asymmetric threats, including terrorism, cyber warfare, and disinformation, the Rapporteur added. NATO therefore needs to pursue a 360-degree approach to protecting member nations, relying on the full spectrum of robust, sophisticated, and adaptive technological capabilities to meet present and future security threats.

51. Both the report and resolution underline that NATO's technological edge has been pivotal to maintaining peace and stability, Ms Alleslev said. The Alliance remains in a technological adoption race – which will not necessarily by won by those with the best technologies, but those with the most agile and resilient organisations. Unfortunately, NATO's technological edge is eroding rapidly whereas its peer competitors augment their defence innovation efforts, she warned. She also emphasised the risks posed by commercial and dual-use technologies and the proliferation of these technologies to malign non-state actors and terrorist groups.

52. The good news is that NATO nations are, on aggregate, second-to-none in research and technology, due to the quality of innovation systems as well as the availability of financial and intellectual capital. However, new, and better ways are needed to leverage the potential of research institutes, technology companies, and scientists, she stressed. The private sector is an important driver for innovation, but complex procurement processes and a lack of funding may prevent technology companies from applying for military contracts. It is therefore necessary to better integrate non-defence firms, including small start-ups, in the defence innovation process, she argued. This is possible by facilitating their access to government contracts, streamlining bureaucratic processes, and ensuring reliable financial returns from public-private partnerships.

53. The Rapporteur proposed to enhance the NATO innovation agenda by developing a more strategic planning approach and fostering an agile, innovative, and risk-tolerant mindset. She suggested to share best practices across the NATO innovation community and explore financial tools, including supporting start-ups, to foster an Alliance-wide, systemic approach to innovation. The OECD's "Oslo Manual" can serve as a baseline "defence innovation yardstick" to measure the degree of defence innovation within NATO she added.

54. NATO countries should also leverage their intellectual capital and researchers more efficiently. She noted in particular that women continue to be underrepresented in science and technology (S&T), including in defence innovation. They should be encouraged to participate in defence innovation and S&T activities; this also applies to the young generation, she said.

55. Reminding Committee members of their crucial role in formulating national defence and finance policies, Ms Alleslev urged them to continue to provide sufficient financial resources for defence and ensure the most effective leverage of innovation potential. She warned that NATO adversaries are increasingly leveraging their technological assets to undermine the Alliance. NATO nations must not lower their guard when tackling the implications of the COVID-19 pandemic. Investing in defence innovation is comparatively cheap, she stressed. Ms Alleslev emphasised that vigilance and resilience are key to security in an unstable world.

56. Before yielding the floor to Mr Murray, Ms Alleslev proposed a few minor changes to the draft report. In this context she suggested to delete the last sentence in paragraph and accepted several proposals of the Ukrainian delegation which she read to the Committee.

- Presentation by **Robert MURRAY**, Head of Innovation, Emerging Security Challenges Division, NATO, on *Becoming Technology Ready: What Allies Should Consider*, followed by a discussion

57. **Rob Murray** (NATO) noted that the draft resolution covers important areas relevant to national security and innovation. He agreed with Ms Alleslev in emphasising that NATO is in a technological adoption race rather than a technological development race. He explained that the metrics for measuring innovation within NATO, such as the market value of tech firms, the number of patents or the quality of universities indicate a good level of technological development. However, as these achievements are not evenly distributed across the Alliance the central issue is technological adoption. He agreed with the Rapporteur that it is not those Allies with the best technologies who will win, but those with the most agile bureaucracies and organisations.

58. Mr Murray presented four recommendations for NATO to become technologically ready. First, he said that member countries need to "get digital". As they adopt cutting-edge technologies fed by data, governments, and Ministries of Defence must ensure that data is digitised and not siloed within different parts of the organisation. The compiled data should of course be adequately protected, he added. Second, Mr Murray underlined the issue of financing. He stressed that tax revenue alone will not be enough to develop new defence technologies and make them compatible with armed forces' legacy equipment. Therefore, creative financing mechanisms need to be developed. There has been progress and many Allies have already adopted public sector national security grants and venture capital funds. However, more needs to be done and the relationship with private companies will be critical, the speaker stressed. To support his argument, he said that the five major US technology companies have spent more on R&D in the first quarter of 2020 that the entire budget of NASA in that whole year.

59. Third, Mr Murray emphasised the need to develop common standards. He stressed that NATO must avoid becoming an Alliance of technological "haves" and "have-nots." Allies need to develop standards that support interoperability and enhance NATO's deterrence posture. In this context he argued that Allies had previously not accorded enough importance to the geopolitical implications of 5G networks. However, he underlined, innovation is no longer only a question for technicians but crucial in the political arena. Fourth, he underscored that developing technology alone will not suffice to win the technology adoption race. It is important to invest in people. People – beyond scientists – need to be educated to understand how to use and leverage these technologies.

60. In the ensuing Q&A session, **Jouzas Olekas** (EP) thanked the Rapporteur for her presentation and agreed with the need to invest in defence innovation and maintain the 2% GDP commitment. He inquired about how to regulate and potentially limit the use of artificial intelligence (AI) and the possibility of achieving an international agreement on this matter which would also bind NATO adversaries. **Karl-Heinz Brunner** (DE) asked how NATO parliamentarians can promote defence innovation within their countries and NATO more broadly.

61. Ms Alleslev responded that AI promises both benefits and risks. Therefore, a conversation on standards for its use is urgent. However, she warned that Allies should also consider that NATO adversaries are unlikely to bind themselves to the same standards. Mr Murray emphasised that the use of AI needs to be grounded in NATO's shared values and suggested that the principles of its responsible use are implied in these shared values of the Alliance. International fora for standard-setting already exist, for example the International Telecommunications Union (ITU) within the United Nations. However, he proposed that Allies may need to coordinate their position within these entities better. Mr Murray added that it is important to understand the benefits that technological innovations, and in particular AI, have for society as a whole, not just for defence and security. Fostering understanding of these technologies will require companies to become more transparent and accountable. They need to move away from "black box" algorithms towards "white box" alternatives. People need to understand how decisions are made. This is a challenge as

technology advances, he said and added that for an international organisation there may be the need of more coordination.

62. **Fabrizio Ortiz** (IT) pointed out that Italy had made great progress in cybersecurity and has established an operational cyber security and space centre. The Italian Senate is now considering the establishment of a single research centre. He added that the Italian delegation had proposed to add this to the report. **Nusrat Ghani** (UK) then inquired whether Allies have a clear understanding of disruptive technologies and where they stand compared to Russia and China. She also asked about possibilities to ensure that AI and drone technologies are not used in disruptive ways.

63. Regarding disruptive technologies, Rob Murray said that governments can use industrial policy to provide a framework. In contrast to the past, a large share of investments in new technologies now comes from the private sector. For example, in 1960 the US government provided 36% of global R&D technology investment, this now only amounts to 4%. Therefore, emerging technologies should be tied to industrial policy. Moreover, as the private sector is the main driver, new technologies have to be dual-use to allow companies to operate in markets large enough to drive innovation and competition.

64. Regarding drone technology, Mr Murray acknowledged that this difficult to legislate or regulate. Noting that the use of drones will increase in the future he said that technology may be able to integrate protection against the nefarious use of drones. Leona Alleslev agreed that industrial policy is crucial to resolving these questions. However, as private companies innovate more rapidly, security concerns may be less prioritised, she cautioned. Therefore, she suggested that private companies should be incentivised or legislatively bound to integrate security protocols and mitigate national security concerns. She also noted that an understanding for setting boundaries to the usage of tech needs to encompass both a legislative approach and a societal understanding of adequate behaviour. Both should be the guiding principle related to drone technology in her view.

65. **Agnes Vadai** (HU) raised the question of how to communicate to the population about the necessity to invest in technology when many experiences the economic hardship of the COVID-19 crisis. She argued that a convincing communication strategy is needed to explain the relevance of defence investment to populations. She also suggested that public acceptance could increase if the Alliance would improve cooperation on sharing knowledge and investment costs.

66. The Rapporteur replied that the report focuses on fostering understanding of current threats which include foreign influence, threats to democratic institutions and intellectual property amongst Committee members so they can educate their citizens. Ms Alleslev also emphasised that efforts of adversaries to undermine NATO Allies can weaken their ability to recover from the pandemic. Governments need to invest into digitisation, she added and noted that COVID-19 had driven small businesses online, which also can make them more vulnerable. Educating citizens why technology and information security matters to them personally has become more important, she explained.

67. Mr Murray added that governments communicate industrial policy, and it is important that citizens understand that new technology not only benefits defence but also the civil sector. Moreover, he said that Allies need to share a clear direction of where they want technological innovation to head. A common approach should not be seen from the perspective of sharing the cost but sharing the investment. This may allow to tighten the links between the government, private sector, and the military according to Mr Murray.

68. The Chairperson thanked Ms Alleslev and Mr Murray for their contributions. The Committee then proceeded to vote on the amended report. **The draft Special Report [167 STC 20 E], as amended, was adopted.**

- **Consideration of amendments and vote on the draft Resolution *Defence Innovation* [167 STC 20 E] presented by Leona ALLESLEV (Canada), Special Rapporteur**

69. The Committee then considered and discussed five proposed amendments to the draft resolution. Five amendments were presented. The following amendments were accepted: Amendments 1 and 3 (Cherniev, UA). Three amendments were rejected: Amendment 2 (Cherniev, UA), amendment 4 (Francken, BE), and amendment 5 (Frusone, IT).

70. **The draft Resolution [167 STC 20 E], as amended, was adopted unanimously.**

XIII. Election of Committee and Sub-Committee Officers

71. With the exception of Sven Koopmans (NL) who did not stand, all Committee officers eligible for re-election were re-elected. The following new officers were elected by acclamation:

Science and Technology Committee (STC)

General Rapporteur	**Nusrat GHANI** (United Kingdom)
Vice-Chairperson	**Agnes VADAI** (Hungary)
Special Rapporteur	**Karl-Heinz BRUNNER** (Germany)

Sub-committee on Technology Trends and Security (STCTTS)

Chairperson	**Philippe MICHEL-KLEISBAUER** (France)
Rapporteur	**Leona ALLESLEV** (Canada)

Ukraine-NATO Interparliamentary Council (UNIC)

STC Representative	**Philippe MICHEL-KLEISBAUER** (France)
STC Alternates	**Jean-Christophe LAGARDE** (France)
	Fabrizio ORTIS (Italy)

72. All current officers eligible for re-election were re-elected by acclamation.

XIV. Any other business

73. No other business was raised.

XV. Date and place of the next meeting

74. The Chairperson informed that the next meeting of the STC is scheduled to take place during the Spring Session in Stockholm from 14-17 May 2021. He expressed the hope that Committee members will be able to meet in person.

XVI. Closing remarks

75. Mr Jones thanked all Committee members and speakers for their active participation and the NATO PA staff and the interpreters for facilitating the meeting despite difficult circumstances. The meeting was adjourned.