

NATO-INDUSTRY FORUM 2021 REPORT

ROME, ITALY, NOV 17 - 18



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Foreword

The NATO-Industry Forum 2021 took place in Rome, Italy, on November 17-18. The event attracted almost 600 participants, including ministers, permanent representatives to the North Atlantic Council, National Armaments Directors, the Chair of the Military Committee, the Military Committee, Chief Executive Officers (CEOs) and senior representatives from leading non-defence companies. The industry participation was not only limited to the traditional defence industry but included also the big tech industry. Both are indispensable for further development of NATO and nations capabilities.

Sponsored by the NATO Secretary General Jens Stoltenberg, the Forum welcomed strategic leaders and thinkers from across the NATO Alliance, Nations and Industry and provided an important opportunity to contribute to the debate on the development of the new NATO Strategic Concept, which will be approved at the 2022 Summit in Madrid.

The first day of the Forum started by exploring practical solutions to improve the agility of NATO's acquisition of novel systems. A key note speech on the impact of Emerging Disruptive Technologies on the Alliance preceded plenary sessions on the challenges and opportunities of cloud networking, artificial intelligence and systems with autonomous functions.

The plenary sessions on the second day made strategic evaluations of the defence and security landscape, anticipated the capabilities that will be needed by our defence forces in the next decade and concluded with recommendations on how to improve NATO's resilience in the current geopolitical security environment.

The level of attendance and interaction clearly demonstrated the attractiveness of the NATO-Industry Forum as a key venue for open and frank debate on engagement and cooperation between NATO and Industry in the development of future capabilities. We express our profound appreciation to all participants, as well as to the Italian authorities for their superb support in making the Forum a success.



Philippe Lavigne
General French Air and Space Force
Supreme Allied Commander Transformation



Camille Grand
Assistant Secretary General
For Defense Investment

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Highlights From NATO Secretary General's Address

NATO Secretary General, H.E. Mr. Jens Stoltenberg, honoured the 2021 NATO-Industry Forum (NIF21) with a keynote address. Below are notable highlights from his address.

The NATO-Industry Forum is NATO's important platform to engage with industry, an engagement that is longstanding, important and mutually beneficial. NATO and Allies depend on industry to receive the capabilities they need, and industry depends on the decisions taken by NATO to shape the market.

NATO has additional roles of setting the guidelines for how much Allies invest in defence and what they spend the money on, agreeing the capability targets for every Ally and setting the standards that ensure interoperability.

At the 2014 Wales Summit, through the Defence Investment Pledge, Allies promised to stop the cuts, gradually increase respective budgets, and move towards spending 2% of GDP on defence within a decade. Back in 2014 only three Allies met the guidelines of spending 2% of GDP on defence, while in 2021 ten Allies, and the majority of Allies have plans in place to, meet that target.

By 2021 European Allies and Canada have boosted their combined defence budgets and have spent a cumulated US$260 billion extra on defence. This increased spending will ensure the Alliance continues to be innovative, and to maintain a leading edge of military technology in order to protect its almost one billion citizens, in a world that is increasingly more competitive and unpredictable.

The innovative spirit of industry is reflected in the recent developments of the Alliance Ground Surveillance (AGS), the Alliance Future Surveillance and Control (AFSC) capability to replace AWACS and continue to be NATO's new 'eye in the sky', maritime unmanned systems, the next generation of helicopters, helping Allies to operate emerging technologies seamlessly.

The Alliance's ability to innovate is seriously being challenged, with more countries around the world racing to develop new technologies, from artificial intelligence to hypersonic gliders. One of the main players is China, soon the biggest economy in the world, having already the second largest defence budget, changing the global security environment. Russia made considerable progress notably in hypersonic technology, cyber and space.

At the Brussels Summit in June 2021, NATO took bold decisions, including on innovation and emerging and disruptive technologies. NATO is setting a Defence Innovation Accelerator for the North Atlantic (DIANA) in order to facilitate transatlantic cooperation and exchange on critical technologies between Allies. A network of technology test centers and accelerator sites across the Alliance will work as part of DIANA to harness civilian innovation for our security.

Complementarily we are also establishing a NATO Innovation Fund, to invest one billion euros on emerging, disruptive and green technologies. As such NATO will leverage the pool of talent that exists in the 30 Allies, in the excellent academic institutions and in the creative companies. These efforts will be combined with the development of future capabilities using clean and green technologies.

The Secretary General closed by expressing confidence the new Strategic Concept will be a forward looking document, which will underline the importance of transatlantic unity, the importance of technology and of working with industry.



Executive Summary

NATO Secretary General, H.E. Mr. Jens Stoltenberg, sponsors the NATO-Industry Forum; he honoured the 2021 edition of the Forum with a keynote address. The Supreme Allied Commander Transformation (SACT) and the Assistant Secretary General for Defence Investment (ASG DI) jointly organize the NATO-Industry Forum. This year NATO-Industry Forum (NIF21) took place in Rome, Italy, on 17-18 November 2021, several months after the NATO Brussels Summit and several months ahead of the Madrid Summit.

The theme of the 2021 Forum was 'Strategic Challenges in view of the new Strategic Concept', theme aligned with NATO's current ambition to update its strategic concept. In updating the existing Strategic concept that was approved by Heads of State and Government at the Lisbon Summit in 2010, NIF21 represented a unique opportunity for industry to contribute to and inform the development of the new seminal document.

NIF21 followed two virtual precursors, called NIF-linked, which took place in May and September 2021, and that focussed on the NATO Warfare Capstone Concept, Mission driven capability development, and Agility and innovation in acquisition, and respectively, the Exploitation of Emerging and Disruptive Technologies (EDT), Flexibility, Adaptability and Agility of Data Mobility, and Innovating for Multi-Domain Operations. The NIF-linked events allowed participating industry to dive into the details of these very relevant topics in advance to the NIF, thus building already the necessary awareness for the even more concrete discussion in Rome.

As SACT expressed in his opening remarks to NIF-linked 2, "the more we work closely together [with industry], the stronger our military instrument of power is … and, therefore, the more secure we are!"

NIF21 combined technical debates and policy discussions in plenary sessions featuring the Chair of the Military Committee, national armaments directors and prominent executives from defence traditional and non-traditional industries.

Mr. Lorenzo Guerini, the Minister of Defence of Italy, joined the NATO Secretary General in delivering keynote speeches. Mr. Giancarlo Giorgetti, the Minister of Economic Development of Italy delivered a substantive national perspective on industrial cooperation, while Dr. László Palkovics, the Minister of Innovation and Technology of Hungary, shared from the national plans for promoting innovation, and particularly develop the domains of autonomy and artificial intelligence.

The overall level of attendance at the NIF21 was surprisingly high, not only given the fact that the COVID-19 pandemic was still putting all, and especially the host nation, under extreme strain. Almost 600 participants, of which half represented industry while the other half, nations and NATO, marked the relaunch of business and their profound interest in maintaining the dialogue between NATO, nations and industry, very active.

The plenary sessions in the first day focussed on Innovative Acquisition to maintain the military edge, followed by Combat cloud and the opportunities and challenges it may bring, and a deep dive into Autonomy and Artificial Intelligence. The sessions of the second day expanded on Strategic Challenges in view of the new Strategic Concept, Emerging technologies and innovative strategies for defence, and closed with a view on the expected defence capabilities for the future NATO.

The speakers recommended that any NATO modernisation effort should focus on personnel, policies and the development of capabilities. NATO's digital transformation should be seen as the pre-requisite for modernisation, and moving NATO in the digital era would require increased budget, a serious and thorough review of the 'rules' and taking actions to cultivate talent.

Data was identified as the most important NATO resource, second only to people, and ahead of technology. Data exploitation and the digital transformation could allow Allies and NATO to expand the solutions that currently have concrete application in industry, to broader and more strategic challenges, for example designing digital twins for supply chains that would help project their resilience, and understand and predict the impact of external factors.

Notions such as performance based requirements, outcome based contracting, anticipating by building skillsets for future programmes, data centricity, interoperability of data instead of platforms, shifting from integration of systems to federation of systems, were reiterated throughout the NIF21.

Recognising the various levels of digitalisation of the NATO enterprise was seen as key to the future digital transformation. "No matter how advanced, most likely not the entire organisation is in the same digital transformation place"

People were seen as both the most important resource, and at the same time, the main limiting factor in systems with human operators. However, it is also more socially acceptable to envisage systems that augment humans rather than systems that replace human. As platforms migrate towards smarter platforms, the limitations induced by the human operators could be reduced by the systems themselves, by requiring less supervision and control.

The dialogue between NATO and industry, which is the raison d'être of NIF21, expands the traditional triple helix of industry, government and academia, with a NATO fourth part of the resulting quadruple helix.

By expanding the level of engagement NATO has with industry, defence and non-traditionally defence companies, big and small, will allow a better understanding of the expectations from the military, and facilitate the move from platform centric operations to missions centric. Industry could also build new and strengthen existing alliances, connections to governments and with military services.

Modelling and simulation, development of synthetic environments alternating or combined with live and constructive, have the potential to facilitate NATO's efforts to go digital. The networks underpinning the digital transformation have to evolve from the existing ones to evolutionary constructs.

Many solutions already exist but they are constrained to the specific requirements that generated them in the first place. Innovative thinking may free the solutions by identifying new applications in domains that haven't been envisaged from the outset. Examples were given of satellite sensors that were initially designed for tracing missile launches, and lately used to detect wild fires, or even entire ecosystems of sensor-facilitator-operator that can be redirected to other uses, were showing that sometime existing technology could already offer unexpected or unintended solutions.

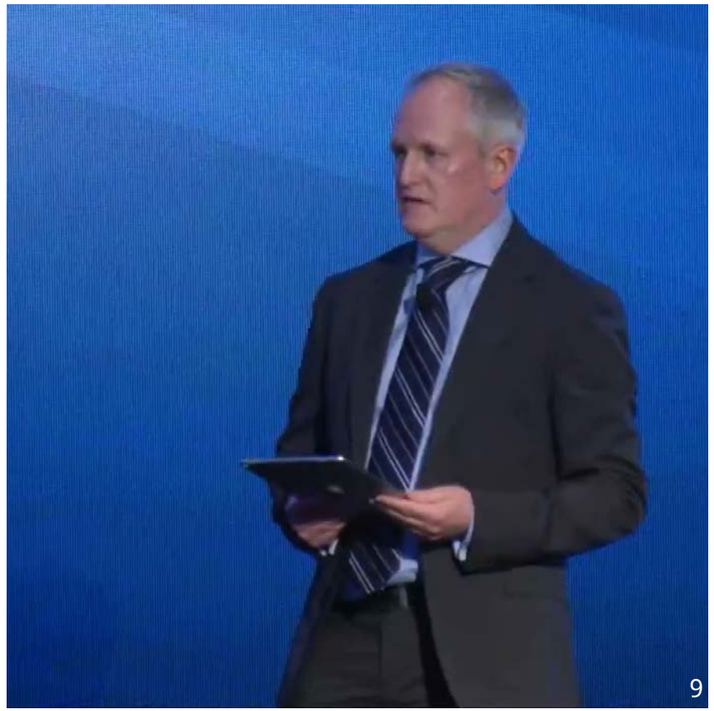
Innovation was seen as critical, and NATO could follow the model currently employed by the private sector: 10% of the workforce focussing on the challenges of the day after tomorrow, 20% on tomorrow and 70% on the current needs of the business. Moreover, innovation is not only technology, instead it represents these days primarily speed, flexibility, agility and complexity. Industry has to perform well at both incremental innovation which is less risky and easier acceptable, and also at disruptive innovation that leads to creating new markets.

The current trend where governments increasingly shift the risk to industry instead of sharing risk as a common responsibility, ultimately leads to industry losing appetite for innovation, to the detriment of 'playing safe'.
Ultimately, the speakers said, "collect ideas, establish priorities, add a sense of urgency, and make them happen."









Agenda

Wednesday, 17 November 2021

11:30 – 13:00 Networking lunch

13:00 – 13:05 Administrative remarks

13:05 – 13:20 Opening remarks by General Philippe LAVIGNE, Supreme Allied Commander Transformation (SACT)

13:20 – 13:30 Welcome remarks by Lieutenant General Luciano PORTOLANO, Italian Secretary General of Defence and National Armaments Director (NAD)

13:30 – 14:40 Plenary session 1 - Innovative Acquisition to maintain military edge
-Scene setter: Lieutenant General (Ret.) Tom SHARPY
-Moderator - Gordon B. (Skip) DAVIS JR., Center for European Policy Analysis
-Mrs. Stacy CUMMINGS, General Manager of NATO Support and Procurement Agency
-Major General Giandomenico TARICCO, Italian National Armaments Directorate, Director
-Armament Programs Coordination Department
-General Thierry CARLIER, Délégation Générale de l'Armement, Director of the International Directorate
-Mr. Rudy PRIEM, NATO Industrial Advisory Group, Chairman
-Mr. Jason BROWN, Google, Field manager–Public sector
-Mrs. Beth McGRATH, Deloitte, Managing Director

14:40 – 14:55 The future of Emerging Disruptive Technologies for NATO
Mr. David VAN WEEL, NATO Assistant Secretary General for Emerging Security Challenges

14:55 – 15:20 Networking coffee break

15:20 – 16:40 Plenary session 2 - Combat cloud: opportunities and challenges
-Scene setter: Mr. John NEUMAYER, Allied Command Transformation (via video link)
-Moderator – Lieutenant General (Ret.) Tom SHARPY
-Mr. Ludwig DECAMPS, General Manager of NATO Communications and Information Agency
-Major General Tom COPINGER-SYMES CBE, Director Strategy and Military Digitisation, Defence Digital UK Strategic Command
-Mrs. Domitilla BENIGNI, Elettronica, CEO and COO
-Mr. Chris BAILEY, Amazon Web Services, General Manager of Global National Security
-Mrs. Angela HEISE, Microsoft, Corporate VP Defense and Intelligence

16:40 – 16:50 Short break

16:50 – 18:10 Plenary session 3 - Autonomy and Artificial Intelligence
-Scene setter: Mr. Robert WEAVER, NATO Deputy Assistant Secretary General for Defence Investment
-Moderator – Dr. Andrea GILLI, NATO Defence College
-Mr. Robert WEAVER, NATO Deputy Assistant Secretary General for Defence Investment
-Mrs. Catherine WARNER, Director of NATO Centre for Maritime Research and Experimentation
-Dr. László PALKOVICS, Minister of Innovation and Technology of Hungary
-Mr. Christophe FONTAINE, GA-ASI Europe, Regional Director
-Prof. Mart NOORMA, MILREM Robotics, Director of Science and Development

18:10 – 18:20 Wrap up for Day 1 - Ambassador Mircea GEOANĂ, NATO Deputy Secretary General

18:45 Departure for the reception (7 min walk)
Evening Networking reception, hosted by H.E. Mr. Lorenzo GUERINI, Minister of Defence of Italy (Villa Miani)

19:15 Speeches by H.E. Mr. Lorenzo GUERINI, Minister of Defence of Italy and H.E. Mr. Jens STOLTENBERG, NATO Secretary General

End of Day 1

Thursday, 18 November 2021

09:00 – 09:20 Opening remarks by General Philippe LAVIGNE, Supreme Allied Commander Transformation (SACT)

09:20 – 09:40 Keynote address – H.E. Mr. Jens STOLTENBERG, NATO Secretary General

09:40 – 10:00 Keynote address – H.E. Mr. Lorenzo GUERINI, Minister of Defence of Italy

10:00 – 11:00 Plenary Session 4 - Strategic Challenges in view of the new NATO Strategic Concept
-Moderator – Mr. Camille GRAND, NATO Assistant Secretary General for Defence Investment
-Ambassador Francesco M. TALÒ, Permanent Representative of Italy to NATO
-Admiral Rob BAUER, Chair of the NATO Military Committee
-Mr. Alessandro PROFUMO, Leonardo Company, CEO
-Mr. James TAICLET, Lockheed Martin Corporation, CEO, President and Chairman
-Dr. Charles WOODBURN, BAE Systems, CEO

11:00 – 11:30 Networking coffee

11:30 – 13:00 Plenary Session 5 - Emerging technologies and innovative strategies for defence
-Moderator – Brigadier General (Ret) Marcela MONAHAN, Principal at Booz Allen Hamilton
-General Philippe LAVIGNE, Supreme Allied Commander Transformation
-Mr. Michael SCHOELLHORN, Airbus Defence and Space, CEO
-Mr. Theodore COLBERT III, Boeing Global Services, CEO
-Mr. Olli RUUTU, European Defence Agency, Deputy Chief Executive
-Mr. Erik EKUDDEN, Ericsson, CTO
-Mr. Nishant BATRA, Nokia, CSTO

13:00 - 14:30 Networking lunch

14:30 – 14:40 A national perspective – H.E. Mr. Giancarlo GIORGETTI, Minister of Economic Development, Italy

14:40 – 16:10 Plenary Session 6 - Defence capabilities for the future NATO
-Moderator – Mr. Ernest J. HEROLD, Executive Director of the International Institute for Strategic Studies
-Mr. Marc DARMON, Thales Secure Communications & Information Systems, CEO
-Mr. Ignacio MATAIX, Indra, CEO
-Mr. Éric BÉRANGER, MBDA, CEO
-Mr. Eirik LIE, Kongsberg Defence and Aerospace, CEO
-Mr. Frank HAUN, KNDS, CEO
-Mr. Fabio GALLIA, Fincantieri, General Manager

16:10 – 16:20 NIF21 Closing remarks by Mr. Camille GRAND, NATO Assistant Secretary General for Defence Investment

REPORT

General Read Ahead

NATO's fundamental and enduring purpose is to safeguard the freedom and security of all its members by political and military means. The evolving security environment increasingly requires us to address threats and challenges through the use of military and non-military tools in a deliberate, coherent, and sustained manner. NATO will take a tailored and structured approach. NATO uses a variety of non-military tools which support the Alliance's three core tasks.
The Allied Heads of State and Government noted at the 2021 NATO Summit: "We face multifaceted threats, systemic competition from assertive and authoritarian powers, as well as growing security challenges to our countries and our citizens from all strategic directions " recognizing that NATO's ability to protect its one billion citizens is continuously challenged.

Building upon the decision taken at the Brussels 2021 Summit and in preparation for the 2022 NATO Summit in Spain, the NATO-Industry Forum 2021 (NIF21) represents the opportunity for industry, joined by military, government officials and politicians, to debate on the main challenges facing NATO and industry, and the strategies to address them in the next decade, in order to inform the development of the new NATO Strategic Concept. NIF21 is one of the events contributing to shaping the fundamental concepts that will guide the Alliance in the following years. Decisions taken more than seven decades ago have changed the geopolitical landscape; decisions taken today will determine our future path.

COVID-19 crisis reignited the security debate from a different vantage point, even though not new: the resilience of our nations is dependent on a myriad of factors and global connections. Global connectivity and interdependency became acutely visible. Supply chains revealed their lowest tiers and the notion of prime-contractors has portrayed deeper and wider than previously known nets. The intricacies of supply chains, ranging from raw materials, rare earths, to microprocessors, PPEs and vaccines, have raised a new awareness among Allies.

This new perspective on the challenges elicits solid debates on adjustments to the development of future capabilities, including: adoption of new technologies and of different ways of using existing technologies; defining innovative solutions and ways of working; reviewing life cycle policies; adjusting processes and procedures; focusing in a renewed way on interoperability; designing potentially new ways to expand education and training of humans as a critical resource; using modelling, simulation, virtual and augmented reality, and digital twins in order to reduce the impact on climate change; increasing awareness on the impact of climate change to NATO operations.
The debate at the 2021 NATO-Industry Forum will also take place in the broader context of NATO2030 , and it is fundamentally relevant to the majority of its components: strengthened deterrence and defence; improved resilience; preserve our technological edge; combat and adapt to climate change; the next strategic concept; and investing in NATO.
By exploring technical and scientific challenges that transcend policy and political debate, which examine the relationship between technology advancements and the resilience of our nations and the Alliance, NIF21 aims to stimulate a conversation that will further propagate in nations and international organisations. Conclusions reached in Rome on topics such as next generation communication, artificial intelligence, automation and autonomy, their aggregation and adoption, will influence the next generations of capabilities, and will have global implications, for the military, academia, industry big and small, defence and nondefence.

The 2021 NATO-Industry Forum

The NATO-Industry Forum serves as the pinnacle of the Alliance's engagement with industry. The purpose of the Forum is to allow leaders to engage in a conversation that conducts to the reorientation of the future NATO capabilities, of the NATO-Industry partnership and ultimately lead to the Alliance's security and the preservation of its technological edge. The Forum is sponsored by the NATO Secretary General and co-organized by the Supreme Allied Commander Transformation and the Assistant Secretary General for Defence Investment. Hosted by Italy, the NATO-Industry Forum 2021 will take place in Rome on 17 and 18 November.

Throughout 2021 ACT and IS/DI organized virtual events called NIF-linked, during which participants addressed NWCC , the direct connection between capabilities incorporating emerging and disruptive technologies, and the multi-mission domain operations they are supporting, as well as agile ways to procure and deliver capabilities for the warfighter. Industry contributed with written materials and presentations, and helped build the way to the NIF21.

The Forum will feature a combination of panels and plenary sessions, through which NATO, national and EU representatives will engage at expert, policy and strategic level. On 17-18 November, the focus will be on the intersection between innovating acquisition processes to allow the adoption of combat cloud, AI and autonomy, political vision facilitating this innovation, and industry strategies for the next decade.





Plenary Sessions

Plennary Session 1: Innovative Acquisition to Maintain Military Edge

Read Ahead Session 1

"We need to develop a culture of innovation, become more agile, have more flexible governance arrangements and dare to take risks." -NATO Deputy Secretary General Mircea Geoană, June 2020

Innovation is pervasive in industry and defence organisations. Innovation is a necessity for industry in order to remain competitive in a highly inter-connected global economic system and for NATO to retain its technological edge against potential adversaries. The necessity to remain competitive often drives the pace of advances in technology as well as the development of innovative business models, procurement strategies, risk reduction development cycles and novel partnerships. For NATO this includes collaboration with industries not normally associated with defence, in particular where dual track technologies have been identified. Indeed, as the lines between defence and non-defence are increasingly blurred, industry may even deliver commercial products for specific defence uses.

NATO recognises the rapid evolution in the commercial world but implementing it within the Alliance presents a challenge to a consensus-based organisation at thirty. NATO can appear opaque to companies that do not normally seek defence contracts and yet these companies, especially start-ups, can be essential to the next generation defence industry. Thus, horizon scanning to identify the right partnering opportunities is critical as well as appropriate mechanisms for outreach and engagement, especially in non-traditional domains and disciplines. In parallel, horizon scanning to identify emerging technologies and collaborating to understand the risks and opportunities they pose for defence is a crucial baseline for an intelligent customer.

The rate of technological development also presents a challenge to the Alliance. NATO's current procurement governance model may not be optimised to handle rapidly evolving technologies and thus deliver capabilities at the speed of relevance. This presents potential risk for the Alliance and might deter some companies from engaging with NATO, especially those from fields not normally associated with security and defence.
NATO needs to explore agility and innovation at all stages of the capability development cycle, from formulating and sharing 'the problem', to articulating requirements, to development or co-development of capability, to acquiring the capability and managing it from cradle to grave. This presents a further challenge as rapid advances in technology can potentially undermine interoperability given the vast range of legacy capabilities NATO fields. NATO cannot afford interoperability gaps as the security environment gets ever more complex and adversaries challenge the Alliance in diverse, novel and asymmetric ways across all Instruments of Power.

Plenary Session 1 will explore these challenges thanks to the interaction between NATO representatives, industry leaders and national voices.

-What can NATO do differently to identify the right industry partners and build cohesive and empowered multi-stakeholder teams focused on timely delivery of military capabilities?

-To what extent can positive experience in innovative acquisition from the private or public sector be translated into the NATO procurement process and how?

-In adapting NATO procurement to these new commercial realities, what should change first, and where could most benefits be realised in terms of cost, schedule, risk and performance?

-How can NATO adopt its procurement processes to maximise through-life interoperability, especially with legacy systems?

-How can NATO allow for innovation across all stages of the procurement cycle, including operation and maintenance, updates and upgrades, technology insertions, and even retirement, dismantlement and disposal/recycle?

-How can NATO better refine the roles, responsibilities and authorities of the Headquarters, the Agencies, the Strategic Commands, the Nations, Committees and industry to ensure synergy, cohesion and improvement in acquisition?

Summary of Session 1

Following the scene setter provided by Lieutenant General (Ret.) Tom Sharpy, moderator Gordon B. (Skip) Davis JR engaged with a panel of experts representing national, NATO, and Industry perspectives.
The panel was composed of:

-Mrs Stacy Cummings, General Manager of NATO Support and Procurement Agency.

-Major General Giandomenico Taricco, Italian National Armaments Directorate, Director Armament Programs Coordination Department.

-General Thierry Carlier, Delegation Generale de l'Armement, Director of the International Directorate.

-Mr Jason Brown, Google, Field Manager-Public Sector

-Mrs Beth McGrath, Deloitte, Managing Director

The panel acknowledged that innovation is key to remaining competitive and maintaining a comparative advantage or military edge vis-à-vis potential adversaries or challengers. While there is no doubt that NATO welcomes innovation writ-large and is focused on adopting and leveraging Emerging and Disruptive Technologies as well as innovate concepts and practices, the core and relevant (provocative) question is to know if Innovative acquisition is possible in NATO and if so how to achieve it?

The key takeaways were:

-Innovative acquisition is possible in NATO, (certainly at the national and multinational levels where the vast majority of key capabilities are acquired and developed, but also collectively at 30 through common funded programs). NATO, Industry and nations need to pay close attention to and capitalizing on the digital aspects of technology; modularizing in capability development and acquisition.

-NATO should focus first on people (hiring training and retaining the right talents) and on policies and processes.

-Robust and regular dialogue with industry supported by early communication of needs and requirements should be encouraged.

-NATO should adopt a smart customer attitude that will ensure flexibility in defining requirements focused on objectives and outcome as well as rely on open system architectures.

- The Alliance must promote intra-European and transatlantic industrial cooperation to leverage the best of nations and ensuring interoperability by design; putting in place a framework to allow for classified discussions on technology.

-The NATO Industrial Advisory Group's expertise and views have to be maximized.

-NATO should enable teaming between developers, military and industry, end users and acquisition professionals, establishing a development capability ecosystem. There is a need for aligning requirements, funding, and acquisition via tailored pathways and spiral development.

-NATO should focus on elevating the importance of interoperability, ensuring export and IPR rules do not become an obstacle) and standardization (incorporating into requirements at outset).





Plenary Session 2: Combat Cloud – Opportunities and Challenges

Read Ahead Session 2

"Lack of information sharing impedes operational effectiveness. Information sharing restrictions and national caveats limit interoperability solutions and reduce operational effectiveness across the domains." -General André Lanata

The operational environment perpetually changes and continues to evolve rapidly. To meet the challenges this presents, NATO must be able to plan and execute operations collaboratively and simultaneously across multiple platforms and domains. This will call for a great amount of data to be analysed and transformed into actionable information at the speed of relevance to help achieve superiority in a contested environment. Agility is paramount and NATO forces have to address Combat Cloud solutions if they want to accelerate both the decision-making tempo and optimise the delivery of military effects.

The Combat Cloud is a vision and concept for how next generation systems (including sensors, command and control and weapons) will connect, collect and exchange data with each other, and how that capability will change the way we fight in complex threat environments. It is based on the transformation happening all around us with smart devices, the Internet and data. The ambition is for systems to connect and use data as easily as our smart phone applications do. However, the Combat Cloud is not exactly the same as commercial Cloud services. At this time, it is not the intention to buy data network and information services for weapons systems. However, the same industries that provide commercial services could help militaries integrate similar technologies tailored for the combat environment.

Data-analytics, faster decision-making, automation as well as integration are key processes for future warfighting. The ability to be 'informed as one and act as one' is a goal that the Alliance is constantly pursuing. NATO has a vested interest in making sure that the Nations and industry are developing and implementing capabilities that achieve this vision. Because Allied forces are a mix of new and legacy systems, we need to ensure that they can work together. Solutions created in isolation by Nations or single companies are too proprietary and will not deliver automated connectivity, interoperability, integration and security. The way ahead must be co-operative and agreed.

This session will explore this complex subject and consider:

-How legacy military systems can be modified economically to integrate into an automated data exchange architecture?

-Whether the Combat Cloud should involve all platforms using a single proprietary data exchange architecture or should we aim to integrate a modern but diverse set of systems?

-How we can adapt the growing list of convenient commercial technologies we use every day to the military operating environment whilst avoiding the associated vulnerabilities and risks?

-The challenges and opportunities of adapting commercially available versus bespoke military solutions.

-What NATO's role is in setting requirements and standards for nations and industry to develop and implement coherent Combat Cloud capabilities?

Summary of Session 2

Following the scene setter provided by ACT Cloud expert, Mr John Neumayer, moderator LtGen Tom Sharpy (Ret) engaged with a panel of experts representing NATO, the nations and Industry.
The panel was composed of:

-Major General Tom Copinger-Symes CBE, Director Strategy and Military Digitisation, Defence Digital, UK Strategic Command

-Mr. Ludwig Decamps, General Manager of NATO Communications and Information Agency

-Mrs Domitilla Benigni, Elettronica, CEO and COO

-Mrs Angela Heise, Corporate VP Defense and Intelligence

The panel addressed the critical question for the Alliance of how to ensure that we have the best data and information securely distributed among our forces in order to maintain military edge, overcome, outthink and defeat our adversaries. How do we go from where we are at to where we need to be? How can we better define requirements, how do we link legacy and next generation systems together and most importantly how can we learn from our own individual successes?
The key takeaways were:

-There is currently an unprecedented political focus on the benefits technology can bring.

-Combat cloud is vital to connect sensors and commanders for decision making.

-Military needs are not unique, their needs are 80% the same as the commercial sector.

-The cloud is now recognised as a more secure capability, however, cloud security is challenging, (managing sensitive data and the need to share information between the military and industry).

-There is a real sense of urgency, change is needed now, leadership must make it a priority.

-Every organisation struggles with digital transformation but with the right digitally empowered leadership they can do it.

-Transformation is about CEO not CIO.

-If leaders had the knowledge, they would ask the right questions.

-Leadership, coherence, education and outcomes are paramount.



-Train the specialists, train the generalists and train the leaders.

-Agile folk are very precise about the end state but very liberal about how they get there.

-Value data second only to the people.

-Industrial, national and military solutions, as well as capabilities, do exist; there is a need to make these pieces work together. Interoperability of data must be achieved; NATO should link what currently exists with other systems.

-NATO should leverage the industrial ecosystem that already exists, concurrently accelerate FMN spirals and build a roadmap with key player.

-There should be closer collaboration between competitive companies over threats.

-The military spends lots of time focussing on money; the focus should shift to time (which will save money). Speed is now the key when we consider our competition.

-NATO needs to define what it really needs, evaluate the risks of not moving forward and seize opportunities to leverage commercial success.

-The challenges of data sharing versus trust can be overcome with key partnerships and the right access; over time, those key partnerships should become extremely beneficial.

-There must be more sharing of information and blockages to sharing must be robustly challenged for relevance; minimum viable compliance.

-This is urgent, increase the rate of adoption, if you haven't started, start, if in middle, go faster. Take the Cloud Strategy and make it an Execution document.

-The day after the 'Madrid Summit,' we must review whether the challenge have we set for ourselves is adequate!


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Plenary Session 3: Autonomy and Artificial Intelligence

Read Ahead Session 3

"We face an uncertain future. But we face that future together. If we are bold enough to embrace innovation, smart enough to grow our agility and open to learning from Allied industries NATO, without doubt, win as a team. I'm excited for that future." -General Philippe Lavigne, Supreme Allied Commander Transformation

The evolution of Autonomy and Artificial Intelligence is changing the international security environment in which NATO operates and presents numerous risks and opportunities to the Alliance. Risks range from potential asymmetric advantage against traditional military capabilities to new hybrid threats, particularly as potential adversaries are not necessarily constrained by the ethics and values that underpin NATO. Conversely, these rapidly advancing technologies present considerable opportunity to help the Alliance retain its technological edge and perhaps more importantly safeguard its political cohesion and decision-making capacity.

The formal adoption of the NATO AI Strategy in October 2021 was an important enabling commitment by Allies to the necessary cooperation and collaboration needed to meet these challenges that will impact all three of NATO's core tasks. This is particularly relevant given the dual use nature of these technologies and much that enables them, thus making NATO's relationship with industry all the more critical.

The aim of NATO's AI Strategy is to accelerate AI adoption by enhancing key enablers and adapting policy, including by adopting Principles of Responsible Use for AI and by safeguarding against threats from malicious use of AI by state and non-state actors. These tenets apply equally to autonomous systems.

One of NATO's strengths is its enduring focus on interoperability and the development of common standards. However, the innovation ecosystems associated with AI and Autonomy involve different actors and faster technology lifecycles than typically included in traditional capability development systems that may require new or different partnering arrangements with industry.

Plenary session 3 will explore these challenges and identify:

-Whether NATO's level of ambition regarding autonomy and AI is reasonable given the pace of technological change?

-If the Alliance has identified the critical intersections between autonomy and AI from an industry perspective?

-Where industry AI and Autonomy R&D is currently focused and why NATO should pay attention?

-Whether NATO is taking the right approach to digital transformation?

-How NATO should approach the synergies between AI and Autonomy in military applications?

-How the Alliance can combine its diverse set of skills, capabilities and experiences to harness the vast possibilities of AI?

Summary of Session 3

Following the scene setter provided by Mr Robert Weaver DASG DI, moderator Dr Andreas Gilli engaged with a panel of experts representing NATO, the nations and Industry.

The panel was composed of:

-Dr Laszlo Palkovics, Hungarian Minister for Innovation and Technology.

-Mrs Catherine Warner, NATO Centre for Maritime Research and Experimentation.

-Mr Christophe Fontaine GA-ASI Europe.

-Professional Mart Noorma MILREM Robotics.

-Mr Robert Weaver NATO Deputy Assistant Secretary General for Defence Investment

The panel addressed whether Autonomy and Artificial Intelligence along with other so-called emerging and disruptive technologies will unleash a new technological revolution. The key question for NATO and its allies is whether their level of ambition is reasonable given the rapid technological advances in this field.

The key takeaways were:

-Technological advancements are moving at unprecedented speed; 25 years ago, China was not a threat. In 25 year time we may have systems that will replace not assist us.

-The key is not the platform, but how the data is used.

-Data is the most important resource after personnel.

-Data is fuel for AI, which is:

- Greedy, needs lots of data (AI is greedy)
- Fragile, data must be in a certain form, have meta data etc
- Opaque. Data must be explained. With machine learning, data can be used in a way which we cannot explain. (also AI is opaque)

-Gathering, cleaning, processing, storing and sharing data requires trained personnel and infrastructure.

-Education is and will remain a fundamental building block to enable the preservation of NATO's technological edge.

-For NATO, AI presents both an opportunity and challenges.

-Suggested 3 Phases of AI:

- AI will help individuals to be more efficient
- AI helping manned and unmanned vehicles working together in the field.
- AI used to help man control a huge number of unmanned systems from outside the battlefield, but where humans still lead for ethical reasons.

-The slow introduction of autonomous vehicles (started in 1989), highlights the necessity to win the moral and ethical battle within society on the home front to avoid allegations of creating 'killer robots' or they are 'stealing my job.'

-NATO's recent publication of an AI Strategy recognizes the challenge AI presents.

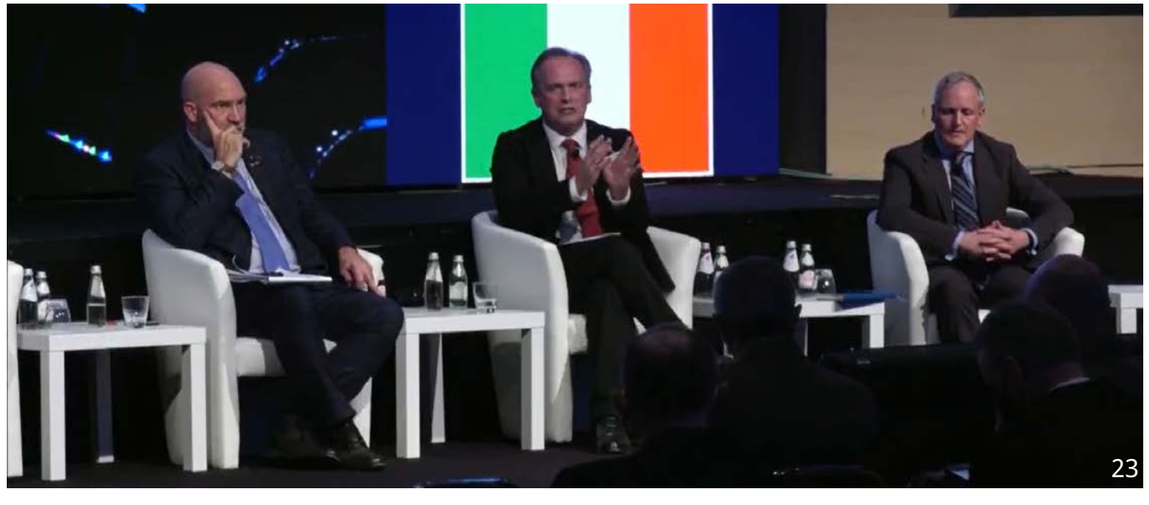
-NATO can help industry integrate AI and Autonomous Systems by sharing concepts and doctrine, through collaborating in experimentation and increasing inter-operability through standardization.

-NATO's experience of unmanned vehicles is promising: in less than twenty years, NATO Allies have successfully integrated unmanned systems and utilized AI to exploit their potential in a wide range of mission sets. The AI strategy pays particular attention to ethical issues, a NATO core value; it is important that they inform our actions and policies.

Victor Hugo said that "The future has many names: For the weak, it means the unattainable. For the fearful, it means the unknown. For the courageous, it means opportunity." NATO has reached an inflection point and must have the courage to embrace AI at speed.







Plenary Session 4: Strategic Challenges in View of the New NATO Strategic Concept

Read Ahead Session 4

Strategic Challenges in view of the new NATO Strategic Concept

Allied leaders agreed an ambitious NATO 2030 agenda to ensure the Alliance can face the challenges of today and tomorrow. They took decisions to strengthen political consultations, reinforce collective defence, enhance resilience, sharpen NATO's technological edge, uphold the rules-based international order, step up training and capacity building for partners, and address the security impact of climate change. They further agreed to develop NATO's next Strategic Concept for the summit in 2022. (NATO2030 agenda)

As part of NATO 2030, we also agreed to develop NATO's next Strategic Concept, which will give us an opportunity to chart the way ahead for the Alliance, and reaffirm the centrality of the transatlantic bond to our security and our defence." (Speech by NATO Secretary General Jens Stoltenberg at the 67th Annual Session of the NATO Parliamentary Assembly, 11 October 2021)

NATO's endurance as the most successful military organisation is a reflection of its agility and adaptability. Over more than seven decades, NATO continuously adapted to the evolving security environment, in order to protect its now more than one billion citizens.

The current NATO Strategic Concept, approved by Heads of State and Government in 2010, had been the guiding light for the last decade. The 2010 strategic concept has served NATO well, but the world has fundamentally changed. The new Strategic Concept that will be approved at the Madrid Summit in 2022, like all the previous NATO strategic concepts, will endeavour the impossible, which is to define lines of action in anticipation of an unpredictable future.

Aggressive Russian behaviour, new and more brutal forms of terrorism, more sophisticated cyber and hybrid threats as well as emerging and disruptive technologies and the impact of climate change on our security all represent new security challenges for the Alliance. Crucially, China's rise fundamentally shifts the balance of power. Strategic competition is rising. Looking to the future, we will have to prepare for a more competitive and unstable world.

The 2022 NATO Strategic Concept will reiterate the centrality of the Trans-Atlantic bond to the defence and security of the Alliance and offer an opportunity to underscore Allied unity, solidarity and cohesion.

It will also take account of NATO's significant military and political adaptation since 2014 and chart the way forward for the Alliance, towards 2030 and beyond.

NIF21 will inform the future deliberations on the new NATO strategic concept, and provide an opportunity for industry to make recommendations to NATO. Participants will have an opportunity to introduce ideas and concepts to NATO and to present new perspectives. This session will attempt to identify over-the-horizon challenges and suggest strategies to address them, including approaches that may lead to incremental improvements, major paradigm shifts or even demand for new perspectives or 'whole-of-government' actions.

The panel should attempt to address some of the following questions:

-Looking at changing strategic landscape, what would you identify as the top three security, defence or technological challenges over the next ten years? How do you evaluate the top risks and opportunities for maintaining the Alliance's edge?

-What implications do you think they may have for NATO, nations and for industrial actors? How would they reflect in the NATO-industry cooperation for the next decade? In particular:

- What new tasks for NATO in its interaction with industrial actors need to be considered?
- What new relationships, actors and sectors does this cooperation need to encompass? How to address the non-defence sector as well as start-ups?
- How will the transition to – and demand for - greater ecological sustainability affect NATO industrial cooperation? Given the speed at which technological breakthroughs are happening, how should NATO and industry rethink their respective roles in capability research, development and delivery?

-What new strategies, relationships and approaches should industry, Allies and NATO develop?

Summary of Session 4

Participants expressed concern regarding the urgency of measures needed to secure the Euro-Atlantic area. 'Time is not on our side anymore' said one speaker.
The debate dived into the potential changes that should take place in order to facilitate a better relationship between NATO and industry:

- New relationship would be the result of new strategic technological directions such as digitalization (including cloud/edge computing, next generation and deployable networks). The networks we currently exploit should be considered as the seed for some evolutionary and never-ending networking work.
- There is a need for new or updated alliances between companies, better connections to governments and the end users, usually the military.
- As we whiteness a constant move from platform centric capabilities to mission centric, that will drive significant changes in the way NATO and Allies will contemplate capabilities.
- There are technologies already available, which were considered under-utilized at NATO level, such as the use of synthetic environments, modelling and simulation, live-virtual-constructive.
- There is a long term need to develop common technological roadmaps in order to maintain capability
- Allies, as the main users of defence industry in this monopsony, are expected to manage to converge requirements, which would facilitate multinational cooperation, economies of scale, and improved management of the life cycle of capabilities.
- Defence industry, not surprisingly, is well placed to support NATO's efforts to combat the effects of climate change, both the impact of NATO on climate, as well as the effect of climate on military operations. Numerous examples from industry have shown a combination of dedicated developments to mitigate climate, and in some instances, re-purpose of existing capabilities developed initially for defence.
- Sensors for missile launches for example have been repurposed to detect wild fires. Low orbit geosync satellites can be used for determining weather patterns. Military helicopters have been repurposed for firefighting. As such, initially military capabilities have been, and could continue to be offered as services. Similar capabilities could cover carbon footprint measuring and reduction, water management, migrations, etc. These relevant actions shall be made communicated properly and to a greater extent to the wider public.

Industry expected that will face new and more acute challenges in the near future such as an increased difficulty to recruit, train, and retain personnel, knowledge and skills

Participants expressed their concern regarding the Western Alliances' ability to maintain a deterrent to Russia and China in the next 5-10 years. It should be noted that these concerns were expressed at the time of NIF, when Russia was only building up their capability at the border with Ukraine, and participants have hoped that the situation will not deteriorate further.

The panel concluded by highlighting that coherent actions are urgently needed to be included in the next NATO Strategic Concept, in order for NATO to preserve its edge and secure its deterrence and defence, to modernize networking and communication towards digitization, and the identify and promote measures to address climate change.






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Plenary Session 5: Emerging Technologies and Innovative Strategies for Defence

Read Ahead Session 5

Emerging technologies and innovative strategies for defence

In light of the pace, breadth, and scale of technological developments, as we further develop our forces and capabilities, we recognise the vital importance of research and development and innovation to exploit the opportunities and to address the challenges posed by emerging and disruptive technologies. This will help to ensure, individually and collectively, our technological edge now and in the future. (NATO Brussels Summit, 14 June 2021 – para 36)

For NATO and Allies, military-technological innovation has played an important role in maintaining strategic, operational and tactical superiority over adversaries, and ensuring a credible deterrence and effective defence. What it was once an undisputable advantage is currently eroding "due to the increased availability and use of high and low-technologies by both state and non-state actors".
Technology is a key ingredient for NATO capability development. Innovation is even more critical for the adoption of new technology, as well as to identify new uses of proven technology.
Complementary, innovative processes, procedures, standards, principles, and others elements are equally relevant to NATO capabilities, and consequently to its success now and in the future.
Notwithstanding, these elements can either develop quasi-naturally, or ideally by being planned and part of coherent strategies.

These strategies shall attempt to anticipate and, by doing so, will have the potential to influence the future geopolitical context, and pave the way for new legislation and regulation, the development of modern procurement procedures, the creation of advisory and consultation mechanisms, the expansion of existing cooperation mechanisms, or solutions to facilitate national engagement and contributions, all in innovative and imaginative ways. Maintaining the status quo is not an option.
Benefitting from the participation of executives from leading defence and non-defence companies from throughout the Alliance and Partner nations, this session shall attempt to address some of the following questions:

-What are the directions (technologic, strategic, geographic, etc.) in which industry plans to invest in order to secure their future business?

-To what extent is your company growing in new directions that were not part of the initial core business, and if the case, what are these directions and how fast is that taking place?

-How is your network changing and adapting to the new geopolitical realities. Are these systemic changes or linear developments?

-What should change in the innovation landscape surrounding your company in order to allow a better absorption of innovative solutions? What place would you see for your company in a wider NATO innovation ecosystem?

-What solutions (technology or otherwise) from the civilian world are migrating into the defence realm? Would you anticipate this trend to continue, to accelerate or to reverse? What steps should NATO take, in your view, in order to become an 'early technology adopter' and 'innovation friendly'?

-Are the developments within your company part of a bigger picture, at national and/or sectorial level? If not, to what extent should that happen and in which context?

-To what extent are climate change, security of supply and access to raw materials affecting the vision for your company, and what measures are you taking/ planning to take in the sense of reducing the carbon footprint and combatting the climate change in your own company, and regarding the capabilities you are delivering?

Summary of Session 5

The combination of representatives from both defence and non-defence companies demonstrated once again that the demarcation line between defence and civilian capabilities is increasingly blurred.

Companies that do not recognize themselves as 'defence' are actually enablers of numerous defence domains and activities, if we are to name only communications, networking, ICT. These are domains in which commercial companies manage to stay at the forefront of innovation, indirectly supporting NATO and Allies advance as well.

The core notions of the NWCC (NATO Warfighting Capstone Concept) explained by the Supreme Allied Commander Transformation, Gen. Lavigne, the connected warfare, layered resilience, influence and power projection, cross domain operations and multidomain defence, are equally valid for, and can be translated in the industrial world with minor tweaks. For example, the connected warfare is a direct application of what one of the panelists mentioned, that "the end game is not connection, it is in reality the digital application of the connection".

Technology as such may be overrated, as another speaker said "Technology is already here. A bigger challenge is the pace of its adoption and of transformation incurred by it."
Industry is currently taking a big leap from what it builds, to concentrate into how it builds, and this is expected to differentiate the western industries from the rest of the world, bringing innovation inside the company and within the supply chain. Supply chains and their security have become more visible during the COVID years, also due to a realization that 70% of the cost of capabilities goes to sustainment.

One speaker highlighted that "innovation rarely occurs at the center, but mainly at the edges". This requires a need to improve the conditions for the ecosystem to function, including regulations and experimentation, allowing for the development of common testbeds. Any major changes would have to be harmonized, since profound changes simultaneously at numerous levels in companies and organisations could be detrimental.

Most successful companies follow the 70-20-10 principles, where 70% of the workforce is dedicated to running the current business of the company, 20% on 'tomorrow' and 10% in the 'day after tomorrow'. Strategising and planning two steps ahead signifies the difference between hugely successful companies, and those managing well for the time being.

Reiterating the fact that people are the most valuable asset of the organisations, followed by data and then technology, speakers referred to the Moore's law well known for expressing the progression of computing power in time, and the need for a similar law to occur and apply to people as well. That followed a realization that the volume of work, information, exchanges, data, relationships, are increasing at such a faster speed which is not matched by similar increase of human resources, neither in numbers, nor in expertise.





Plenary Session 6: Defence Capabilities for the Future NATO

Read Ahead Session 6

Defence capabilities for the future NATO

We reiterate our commitment to maintaining an appropriate mix of nuclear, conventional and missile defence capabilities for deterrence and defence, and to the 2014 Defence Investment Pledge, in its entirety. We commit to the full and speedy implementation of ongoing work to further strengthen our deterrence and defence posture, and we pledge to continue to improve the readiness of our forces and to strengthen and modernise the NATO Force Structure to meet current and future defence needs. (NATO Brussels Summit, 14 June 2021 – para 6.b)

Perhaps lesser known than the Article V, Allies and NATO capabilities are underpinned by the commitment made under Article 3 of the Washington Treaty: "In order more effectively to achieve the objectives of this Treaty, the Parties, separately and jointly, by means of continuous and effective self-help and mutual aid, will maintain and develop their individual and collective capacity to resist armed attack."

The new NATO Strategic Concept that will be developed in consultation with Allies in the following months, and that will be approved at the Madrid Summit in 2022, shall guide the next decade for the
Alliance.

Benefitting from the debates in the prior sessions, this session of the NATO-Industry Forum should attempt to introduce new concepts regarding the future capabilities that are emerging and are becoming available. These concepts shall reflect on what industry anticipates as well as what they have already on their drawing boards. The potential future challenges which industry envisage for the years to come will occur in a technological context that evolves at an unprecedented pace, in which consecrated defence players are mixing with non-traditional ones, and in which the distinction between defence and non-defence is becoming increasingly blurred.
It is also fair to expect that the new capabilities that will equip the warfighter, will coexist to an extent with legacy equipment, raising at a certain point interoperability, sustainability, and life cycle management issues.
This session should attempt to address some of the following questions:

-To what extend the future capabilities will embed characteristics of the existing or even legacy systems? In other words, when could we estimate an inflexion point to occur, in which the equipment nations currently have in their arsenals, will be completely refreshed?

-When could it be expected that full digitization will occur? What would that mean for the warfighter?

-What new capabilities do industry explore and what are the estimated timelines?

-What shall we already start preparing in order to ensure the future technology is matched by novel training, new concepts of operations (CONOPS), new concepts of employment (CONEMP), new tactics, techniques and procedures (TTPs)?

-Is there going to be new expertise required to fully exploit the new technologies? Shall nations already consider creating new curricula for the future STEAM -oriented engineers and military? How can one synchronise skills with technology?

-Can we anticipate paradigm shifts requiring leapfrogging from linear modernization to nonlinear capability development?

-What options could Allies envisage in order to strengthen the trans-Atlantic defence technological and industrial cooperation?

Summary of Session 6

The session was moderated by Mr. Ernest J. HEROLD, Executive Director of the International Institute for Strategic Studies

-Mr. Marc DARMON, the Chief Executive Officer of Thales Secure Communications & Information Systems

-Mr. Ignacio MATAIX, the Chief Executive Officer of Indra

-Mr. Éric BÉRANGER, the Chief Executive Officer of MBDA

-Mr. Eirik LIE, the Chief Executive Officer of Kongsberg Defence and Aerospace

-Mr. Frank HAUN, the Chief Executive Officer of KNDS

-Mr. Fabio GALLIA, the General Manager of Fincantieri

The session started with a reference to Article III of the Washington Treaty that enshrines the responsibility of individual Allies to develop capabilities, suggesting efforts to maintain the quality and performance, hence innovativeness of such capabilities.

Further it built upon the intervention by the Deputy Secretary General, Ambassador Mircea Geoană, who referred to the known triple helix (government, industry, academia) as potentially being expanded with NATO as a new dimension. The resulting quadruple helix could lead to coherent and coordinated approaches to the development of innovative solutions to military needs. Such a quadruple helix could be the basis for further deliberations on NATO innovation, DIANA and Innovation Fund.

All companies are considered innovative in their own way, both big and small companies, defence or non-defence, well established or only being set up. The speakers highlighted that from their perspective innovation occurs in a wide spectrum of areas in addition to technology.

Participants recommended reconsiderations of the national rules and regulations that are hampering innovation and international cooperation. Strict rules usually determine industry to take more cautionary approaches, leading to incremental innovation at best. The real game changer is the radical innovation, and industry has to perform well in both.

Some CEOs highlighted that while novel solutions are clearly modern and innovative, the development of new solutions takes more time than it was the case 50 years ago, therefore called for NATO to identify options to speed up the process.

NATO should also find solutions for reducing the complexity of requirements, which usually lead to industry being obliged to provide complex solutions. Complexity reductions are also critical since the aim is to increase speed of delivery of capabilities; continuous increases in both complexity and speed usually "spells trouble" as one speaker said. A balanced approach should be pursued to include requirements for standardization of solutions, contrary to the popular belief held that 'standardization hampers innovation'.
Defence industry currently struggles, besides the previously known challenges of identifying, attracting, training and retaining people, with a new problem of image. The recent development of a 'taxonomy' by the European Union, that by non-inclusion portrays defence as non-sustainable, only exacerbates the lack of attractivity for the young generation.

Attracting the new generations was seen as essential as innovation is a two way street – it may be triggered by providers, and at the same time it is determined by consumers as well.

A recurrent topic from the recent NIFs was the need to harmonise requirements, and hare problems with industry rather than develop prescriptive, rigid requirements.

In addition, governments shall balance the risk in developing new capabilities, and adopt it as a shared responsibility together with industry. Pressure to transfer too much risk to industry usually decreases the appetite for innovation in favour of more conservative solutions.
One speaker's intervention summarized the next steps as "collect all ideas, establish priorities, add a sense of urgency and make them happen."



Closing Remarks

Mr. Camille Grand, the Assistant Secretary General for Defence Investment, closed the NIF21 with the following:

Dear participants to this wonderful edition of the NATO-Industry Forum,
I would like to congratulate you for your stamina, at the end of two days of intense discussions on critical topics for our Alliances.

In addition to the NATO Alliance, I would highlight the alliance between NATO and industry, which is continuously and solidly cementing, as we saw across these two days.

Personally, I think we had a great event, I took a lot from it, but don't take my word for it. You will let us know through your feedback how well we did, and what and how to do better next time.

Nothing would have been possible without the huge support from our host, the Italian Ministry of Defence. I would like to extend our gratitude to Minister Guerini and Gen. Portolano and their staff for making this possible. We benefitted from a superb support from Italy.

Let me also thank my co-organiser, Gen Lavigne, SACT, this is a fantastic partnership leading to one of the most ambitious NIFs we ever had.

Let me also thank all the panelists and the representatives from industry. Your contributions make the NIF the success it is.

I will try to capture these two days of NIF21 for those who are online, connected to our streaming.

First of all, if numbers were the main indicator, we established a new NIF record with almost 600 registered participants. By all standards, not only given the COVID restrictions, this is remarkable. Obviously, the beauty of Rome and the hospitality of our Italian hosts might have contributed for this success. But I would like to think that the topics we addressed these two days, as well as everybody's desire to see the business restarting, were the main drivers.

SACT opened the Forum yesterday with a call to be bold, smart and open. He said: "Let's be bold enough to embrace innovation, smart enough to grow our agility, and open enough to learn from Allies' industries." Having listen to all speakers, I think they were all bold, smart and open.

The debates these days were extremely reach. We had ministers, ambassadors, generals, admirals and many industry leaders of the key technology companies in the world, with us in the panels and in the room.

Mindful of the Chatham House rule we applied in order to allow for a substantive and open discussion, I will identify a number of personal takeaways from NIF.

First, I identified an appetite to deepen the dialogue with industry to address the technological and strategic challenges of tomorrow. The earlier NIF-linked events online kept the dialogues ongoing. The NATO Industrial Advisory Group (NIAG) and our Agencies are continuously maintaining this dialogue, but this is a debate that needs to be deepened and continued.

Second, we need to adjust our processes and train our people. Agility is a mindset and we need to continue to attract the best.

Thirdly, many ideas were shared about how to build the digital backbone and also guarantee interoperability for the future and in the long term. Both SACT and many other NATO players will take this initiative further as we think about the future.

Fourthly, in this context, we need to move to a data centric environment now, as a matter of priority, not in 10 years.

Fifth, a strong push and an invitation from industry to leverage the best practice from private sector, IT, logistics, not only on the way we do business, but more broadly, on how we operate.

Sixth, a call to address the challenges of climate change by leveraging and transforming defence technology and by recognizing that security is prerequisite for sustainability.

Last but not least the recognition that in a competitive environment in which the western technological dominance is no longer a given, we need as Allies and as an Alliance to work together and with our close partners, in order to remain the most successful Alliance in history. I expect this will be reflected in the next Strategic Concept to be adopted in Madrid next year.

This NIF21 demonstrated again that NATO is listening to its industry partners.

Together with Gen. Lavigne, the Supreme Allied Commander Transformation, we already started thinking about the next NIF. Please stay tuned and we will let you know where and when is the next Forum.

To all participants, thank you very much again, stay safe and healthy, and have a safe trip back home.

With this, Rome, NATO-Industry Forum 2021, is closed.



Recommendations

This year's NATO-Industry Forum combined topical discussions on disruptive technologies (combat cloud, autonomy and artificial intelligence) and debates on how to increase agility in procurement, with six high-level policy-strategy sessions and several important speeches. The conference truly benefitted from the participation of senior leaders from both the traditional defence sector and non-traditional industries as well as senior officials from NATO, Allies and the EU. It was clear that industry is also confronted to many of the challenges NATO is currently facing. Arising global competitors and emerging technologies are transforming the geopolitical and economic landscape and demand new and innovative approaches from both NATO and industry.

During the event, the participants recognized the importance of promoting intra-European and Trans-Atlantic industrial cooperation to leverage the existing creative ecosystems, while also mentioning the need for a framework that allows for classified discussions on technology and its applications.
The 2021 NATO-Industry Forum attracted over 500 participants from industry, military and governments. Interest in NATO's direction of travel was high and the willingness to engage strategically was tangible. Feedback about the event has been uniformly positive and we strongly believe we have a highly valuable touchpoint to help strengthen our collaboration with defence, security and tech industries.
In the context of the Alliance preparing the new Strategic Concept and other deliverables for the Madrid Summit the following key takeaways from the conference should be considered:

- Deepening of the dialogue between NATO and industry to address the technological and strategic challenges of tomorrow. Participants clearly indicated the need and the appetite to expand this dialogue beyond the NATO Industry Forum and other existing fora.

- The need for NATO, Industry and nations to pay close attention to, and capitalise on, the digital aspects of technology. NATO needs to both procure digital technologies at the speed of relevance and, where appropriate, apply them to optimise capability development and acquisition.

- Adjusting NATO processes to meet the future challenges timely and effectively requires agility, not only in procurement. NATO needs to become a "smart customer" to ensure flexibility in defining requirements and outcomes while relying on open system architectures.

- Capitalizing on an unprecedented political focus on the benefits technology can bring to the Alliance. However, NATO will not be able to leverage the advantages of this technology without attracting the best people or continually developing the people we have. Education of our leaders, specialists and generalists is and will remain a fundamental building block that enables the preservation of NATO's technological edge.

- Leveraging best practices and culture of innovation from the private sector.

- Expediting the establishment of a NATO digital backbone while ensuring the continued interoperability of legacy, current and future assets and systems. Enabling a rapid move towards a NATO data-centric environment. Data was recognised as NATO's most important resource, second only to its people.

- Working with the private sector and academia to address the challenges of climate change by leveraging and transforming defence technologies, while safeguarding security as a prerequisite for sustainability.

- Strengthening the frameworks for industry to work together with Allies and the Alliance, recognising that in the current competitive environment Western technological dominance is no longer a given. Further, NATO should incentivise closer collaboration between competitive companies over threats.

- Recognising the importance of working together with industry, should be reflected in the new Strategic Concept and would act as a strategic incentive for industry to continue to cooperate closely with NATO.

Both Allied Command Transformation and Defence Investment Division will continue to work with other NATO stakeholders to help take forward these recommendations, as they are integral to ensuring the Alliance remains capable of safeguarding the security of its members.



KEYNOTE SPEECHES



General Philippe Lavigne, Supreme Allied Commander Transformation – Day 1

Good morning and welcome to Rome and to Italy, our Host Nation for this year's NATO Industry Forum, or NIF, as we call it. It is my real honour and a great privilege for me, together with my co-host Mr Camille Grand, NATO Assistant Secretary General for Defence Investment, to welcome you to this live event. Thank you all for coming, since your participation and contributions are what made this event possible. And, thank you, above all, to the NATO teams and our hosts, the Italian authorities, for organizing this year's Forum in this wonderful place.

For this year's NIF, literally "all roads lead to Rome", as this event is a "great finale" for what we had been doing since the last NIF in Washington D.C. in 2019. I am particularly glad to have with us today so many distinguished representatives from the "production sector", both from what we call "traditional" and the "non-traditional defence industry." For that matter, I am convinced that the borders between these two will increasingly fade as we seek to address the requirements of our defence capability development. This is the result of changes in our security environment that continues to evolve at a tremendous pace, requiring us in turn (both NATO and Nations) to continuously adapt … in order to preserve our relevance.

When I was a kid, watching and reading science fiction, including popular movies, series and books you may also be familiar with, I was fascinated by the devices used to fight, communicate or transport, which were available to the characters in those stories. Lasers, holograms, instant communication, wide availability of data and information, Space, incredible speed … or artificial intelligence … everything looked so fantastic. Think just of HAL 9000 (a supercomputer with AI capabilities) from Stanley Kubricks' "2001: A Space Odyssey", with all its "intellectual" power, "social skills" and legal and ethical issues associated with him!

And, today, we are living with many of those "fantasies"! They are part of our everyday live. However, along with benefits that progress has brought us, we are also faced with a great many challenges … because this widely available technology can and often is used against us and our way of life. We observe today that the traditional lines between systemic competition, crisis and war are increasingly blurred. As are the former differences between forward and rear, between virtual and physical. Our environment is characterized by persistent competition, with competitors determined to shape the environment, challenge the liberal world order and who are investing heavily in their military capabilities, while also seeking to circumvent the deterrence we have built on our military power by remaining below "the threshold of conflict" to look beyond NATO's Article 5.

This is typified for instance by the form of "Unrestricted warfare", the concept which two senior Chinese colonels developed in their 1999 book. This "asymmetry" causes conflict to expand into new domains where physical borders are irrelevant, like Cyber, Space or the cognitive domain, where a number of new or existing players can challenge our military instrument of power and our societies, often anonymously, especially since attribution may prove challenging or even impossible.
This is, certainly, challenging for the military, since we need to understand the broader context in which our military instrument of power will be developed, and create the frameworks to proactively shape the environment in which this instrument will be used.

To illustrate our challenge, think of the fragment of verse written by the 7th-century BC Greek poet Archilochus, which reads: "the fox knows many things, but the hedgehog knows one big thing." Obviously, we, the military, are the hedgehog.

However, while the "one big thing" we need to know is how to provide efficient deterrence and defence, we also need to know the "many things", that may offer challenges, but also opportunities that relate to a central, all-embracing system of security and defence. And, this is why, facing this "extension of conflictuality", we expand our engagements in other operational domains, even when they are not "weaponized" in the classical sense of that word. And, this is where we need you, our industry partners.

I consider our defence industrial base an integral part of our (military) instrument of power, particularly for the development of our defence capabilities. Industry is therefore a genuine part of the Alliance's Deterrence and Defence Posture. And, this is the reason why we need to maintain a quality dialogue with our "industrial eco-system" about the "production" of our defence capabilities.

For us, in NATO, it is vital we understand the prospects of new technologies and in particular their potential to become disruptive regarding security. And in so doing, it is vital that we encompass both dimensions of this technology … technology as a challenge (potential threat) and technology as an opportunity. However, the fact is that the defence sector no longer has the exclusive control over the development and availability of defence technologies, since so much innovation and technology progress is now driven by the market. And, for most of these developments, we are no more than customers.

But our intent is to use these security relevant technologies, implement them in our capability development, ensure they are interoperable and make sure they are used in the most effective way possible. That will require we out-think our adversaries and avoid strategic surprises. Which is why the transformation of our capabilities and of the way we conduct war must be a permanent process (as it is the essence of adaptation), and it implies a permanent dialogue between the actors of that transformation – warfighters and producers.

ACT, by representing the capability needs of warfighters, is paving the way for Allied Command Operations to be successful today and tomorrow, by integrating Nations' efforts in warfare development. That way, we support ACO by building the "capability blocks" and dealing with legacy systems, by integrating them into the Alliance's new capabilities, whenever possible.

Being a part of NATO's "big wheel" responsible for defence planning and facilitation of Alliance's capability development, ACT is also responsible for identifying military requirements. We are, therefore, the catalyst for adapting NATO's military instrument of power. In cooperation with industry, we want (1) to make sure we (NATO) are able to move from a platform-centric development to a system-centric approach, and (2) to solve, together with Industry, what needs to be done to be more agile collectively to ensure quicker delivery.

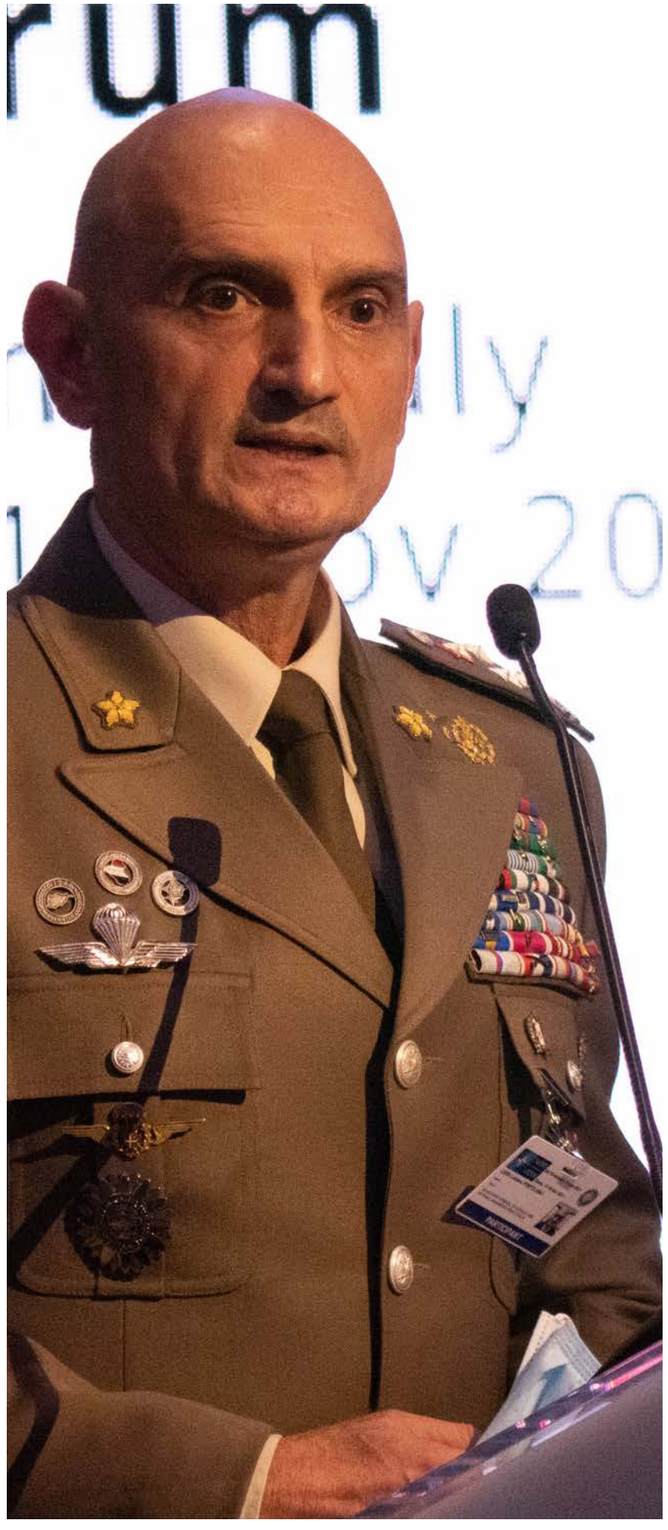
ACT (and NATO as a whole) needs industry to help it maintain this new defence and security ecosystem. ACT, and other NATO stakeholders responsible for capability development, are therefore a part of one shared community with Industry. We need you, you need us!
We face an uncertain future – but we face it together. My message to my NATO's colleagues is, therefore: Let's be bold enough to embrace innovation, smart enough to grow our agility, and open enough to learn from Allies' industries. We can win (only by working) together - as a team, and I am excited about that shared future.

Ladies and gentlemen, I count very much on our exchanges today and tomorrow, and I am sure they will be fruitful. ACT is open to cooperating with you to facilitate the future work you and the NATO member Nations can carry out. And, just to remind you, ACT is a NATO stakeholder with the largest established network of partners, including industry, academia, COEs, and scientific and innovation community.

I strongly believe that this Forum allows us to reinforce the bonds – bonds that go beyond a simple business partnership - that strengthen our instruments of power. And, doing so, contribute to our security.

I wish you all promising and fruitful exchanges during this event. I expect fresh and new ideas, and I am sure that this event will lead to concrete outcomes.

Thank you very much for your attention!



Lieutenant General Luciano Portolano, Italian Secretary General of Defence and National Armaments Director

Good morning to all the participants of this edition of the NATO-Industry forum, which Italy is honored to host.

Being the first Italian representative to speak in this venue, I would like to immediately thank the highest authorities of the alliance that so strongly wanted this event to take place, from the NATO Secretary General, who will reach us tonight at the host nation dinner, to the two co-organizers, general Philippe Lavigne and mister Camille Grand.

Also, let me extend Italy's and my personal welcome to all the illustrious guests who are already present here or who are going to join us later on, from the NATO Deputy Secretary General to the permanent representatives of the North Atlantic Council, from the members of the Military Committee, led by their chairman, to the Deputy SACT, to the other assistants of the Secretary General, and to all of you, institutional representatives and members of the industrial world who have granted your presence here today.

Excellences, general Lavigne, mr Grand, dear guests, please allow me to begin my introductory remarks with a short story:

In 1942 Albert Einstein was teaching in Princeton, at the Institute for Advanced Study. One day, while he was walking through the campus after examining students who were attending the final year of his physics course, his assistant approached him and said: "professor Einstein, but the exam paper you have just given the students, is it not the same that you gave them last year? "
Pleased by his question, Albert Einstein replied: "yes, yes ... it's the same." at this point, baffled by his answer, the assistant asked: "but professor Einstein, how could you give the same task to the same students for two consecutive years?" "well," Einstein replied, "the questions are the same, the students are the same, but the answers have changed."

If in 1942 the answers to physics questions changed from year to year, today, in light of the current scenarios characterized by innovation, digitalization and technological competitiveness, the answers change even faster.

In a rapidly transforming international context, in which technology and geo-politics are realities strongly connected to each other, the alliance's capability to create innovation, also in the defence field, is undoubtedly synonym of a strategic advantage. In 2019, the Alliance clearly identified the emerging and disrupting technologies on which to concentrate its joint efforts, according to a common roadmap. Technological innovation is an extraordinary multiplier for economic and social development, but it is also a goal to reach dominance.

Moreover, nowadays there is a higher awareness of the neutral nature of technology itself. Over the years, in fact, there has been a radical change of the technological transfer process flow to a bidirectional logic, which has favoured constant and mutual technological enrichment.

I am not here to list them, but I would like to focus your attention on a perspective that joins progress in apparently divergent sectors such as autonomy and artificial intelligence compared to biotechnologies and human enhancement: that is to say the centrality of the commander, the soldier, the sailor and the airman, both in the decision-making process and in the operational one; an approach that blends in the service-man, holder of the ethical values, the progress of science and technology.

Regarding the technological plan, much of the technologies are dual-use, because they can be employed both in the civilian and military fields as well as in the security one.

Dual-use technologies, thus, contribute to develop and produce innovation, satisfying a range of demands that, today, require the adoption of adequate supporting policies.

There is also the need for a different approach/strategy or, better yet, a change of mentality.

To this end, the civilian-military technological transfer should be inspired by the same development models of the civilian society, that is aiming at the adoption, by the military world, of the open innovation model.
The two initiatives of the "defense innovation accelerator for the North Atlantic" and of the "NATO Innovation Fund", presently undergoing the negotiation phase, are following this approach. In this sense, they should aim at optimizing the integration of allied centers of excellence, assuring a wide-spectrum cooperation among strategic commands, allied nations armed forces and industries, all supporting elements and pillars of a country's system.

The expected final result is the growth of the industrial sector, the small and medium enterprises and the academic research and development world.

Today we share the need to set up new cooperation's, with the objective of rationalizing resources and creating the necessary synergies among allies and supranational bodies as, for example, synergies with the European Union within the NATO-EU joint declaration.

Thinking about the future, it is an exercise of absolute value; anticipation, in fact, is an innovative version of strategic thinking, arising from the need to face changes, constantly growing in speed and complexity.
Let me explain this concept: reacting to a crisis when it is already underway strongly limits the possibility of action; therefore, an advanced approach allows to identify and address risks before they become unmanageable, formulating more flexible, conscious and adaptive decision-making strategies, eventually building stronger systems.

Finally, please allow me to end my short speech with a thought: the polycentric character of today's society is reflected in a fragmented panorama, in which the particular identity is much stronger than the sense of general belonging. Unfortunately, excessive individualism prevents the construction of shared and applicable rules, of solid and lasting structures, of a long-term strategy to compete within the international community. These needs, therefore, require the individual, the particular identity, to make a step back in the name of the collective interest.

In conclusion, taking into account that "the victorious strategists have already triumphed before giving battle, while the losers have already given battle before seeking victory", and that "plans are only good intentions if they do not transform themselves in effective work or products",
The opportunity offered by the NATO-Industry Forum this year constitutes a chance to follow up a new alliance strategy, in a relationship of complementarity with the European Union, in order to avoid overlapping and duplication.

Thanks for your attention; I wish you all a good work.



Mr. David Van Weel, NATO Assistant Secretary General for Emerging Security Challenges

The future of EDTs in NATO

Technological progress has been growing at exponential rates. I mean this literally. One of the typical markers of the pace of innovation is Moore's Law: the doubling of processing power every two years. This is already impressive. But when we apply this to emerging and disruptive technologies, that's where we see the staggering pace of innovation:

- The computational power used to train AI models is increasing exponentially, doubling at least every three months.
- DNA sequencing doubles every ten months, creating powerful enablers for biotechnology advancements.
- •Some also argue that quantum computers are growing at a doubly exponential rate, given that both computational power and improvement of quantum processors are both growing exponentially.

What this means is that the sand is constantly shifting beneath our feet. In the amount of time it takes just to draft a requirement, quadrupled processing power may undermine our understanding of the state of the art. So we're not just talking about our systems being obsolete by the time we field them. We're talking about our systems being built on obsolete assumptions even before we start to develop them. This is why I'm here in Rome to speak with you today: to encourage us to collectively challenge our assumptions.

For instance, our acquisition systems are still built on the assumption that governments are the ones driving innovation. We've created incentives to build high-end, incredibly sophisticated systems from scratch – in a way that assumes only a small number of highly specialised prime contractors can deliver on. But the flip side is that we've ended up disincentivising adoption of modular systems that can be delivered to our operational end users at the speed of relevance.
By following the status quo, we are actively disincentivising large parts of our innovator bases from working with us.

Let's face it: for most, defence is viewed as a "black box." Companies are unsure of where to start and who can help. Many are scared off by the perception of overly cumbersome government rules and regulations. Small numbers of large companies can afford to dedicate resources to jump the hurdles and navigate the mazes that we create in the defence sector. But if we force everyone to develop this highly specialised expertise, then we are always going to be expensive. We face geopolitical drivers to become less expensive, too. In the realm of emerging and disruptive technologies, we see competitors and potential adversaries, particularly China, rapidly accelerating dual-use adoption.

For decades now, China has been adopting a policy of military-civil fusion, meaning that civilian entities play an active role in supporting the military and defence apparatus.

- •Today, China invests an estimate for 1.6 billion dollars in AI.
- •Recent open-source estimates show that 60% of the PLA's AI suppliers have been around for fewer than ten years – and what is more, half of these start-ups are less than five years old.
- •Most of these contractors have fewer than 50 employees and a registered capital of less than 1 million dollars.

Needless to say, this is not where we are. Clearly, something has to change. Either our business models are going to be disrupted by our adversaries and our competitors, or we can disrupt ourselves and bring urgent change to the way we do business.
I truly see this as an inflection point. If we do not act now, we risk more than just our technological edge as a deterrent and source of our military excellence. We risk ceding the technologies developed within our Alliance to our competitors and potential adversaries.

I think I can safely speak on the behalf of everyone here today when I say this is obviously a vision of the future we want to prevent. None of us want to see a situation where our adversaries and competitors are outpacing us. But before I get too doom and gloom, the good news is that our innovation ecosystems have all the ingredients it takes to create incredible technologies – powering advancements like exponential growth in innovation.

- •Nine of the world's top 10 universities are in Allied nations. Fifteen of the world's top 20 Universities are in Allied nations.
- •And over half of the world's unicorn companies are from Allied nations.

Yet we have a fragmentation of researchers, academia, start-ups and government across the Alliance. Bringing them together into a triple helix is central in fostering the development of breakthrough, deep-tech solutions that can be transferred to meet defence and security challenges.

As such, the Alliance currently finds itself not in a technological development race, but rather, in a technological adoption race. The likely winners of this adoption race are those with agile bureaucracies. To go a step further, I'd even argue that it's about the agility of entire innovation ecosystems for defence and security. In this race, the winners are not necessarily those with the most exquisite technology. When we talk about the state-of-the-art, complexity is not necessarily the answer. So while the public sector is compelled to change the way we do business, this call also has to extend to industry. Industry must adapt to the realities of today to not make exquisite equipment for the ideals of yesterday.

Take vendor lock as an example. When we get locked in

 – maybe it's because that vendor has the data rights or intellectual property, and maybe it's because industry consolidation leaves us with fewer alternative suppliers – we end up putting more money into programmes that don't necessarily focus on the right solutions for end users.

Qualitatively we may have an output, but that does not mean that our processes are optimising for the right advancements. So we will always be bound by the same cultural and institutional assumptions that got us here in the first place. This, too, is a barrier to entry that promising non-traditional innovators must face. We miss out on opportunities to leverage these advantages because of a deep disconnect between the ecosystems where this breakthrough innovation takes place, and the defence and security sector.

This leads to other strategic gaps that we must address to maintain our technological edge.

- We see a capacity gap amongst Allies in their respective abilities to adopt interoperable new technological solutions for Allied militaries; and
- And we also face a policy gap to protect these EDTs against technology transfers to competitors and potential adversaries.

At NATO, we see collaboration as part of the solution to fill these gaps. Deepening our cooperation to find solutions to our defence and security challenges is vital to our future ability to deter and defend. We know that commercially driven innovation does not necessarily stop at state borders. As I'll get back to, this of course means we need to protect promising dual-use innovations from undesirable technology transfers by our competitors and potential adversaries. But I'm also glad to share with you today that, in the Alliance context, this is actually a tremendous opportunity. We should see transatlantic connections as an advantage.

Our goal is to adopt emerging and disruptive technologies as quickly and uniformly as possible – while reflecting the values of the Alliance, and adhering to principles of responsible use.

NATO has a number of strengths that offer it a remarkable competitive advantage in terms of innovation.

- We have plurality and diversity.
- As I've cited, our Alliance is made up of talented individuals and world-renowned research institutions – the bedrocks of innovation.
- And here's a key point: we are able to leverage a network of 30 NATO nations, each of which contribute with its own strengths in different areas of innovation.

But just because we have the necessary ingredients does not mean that we are automatically set for victory. NATO is actively addressing these issues. During this summer's NATO Summit, Allied Heads of State and Government agreed to two key deliverables. We agreed to:

- Launch the Defence Innovation Accelerator for the North Atlantic, or DIANA, to broaden our transatlantic innovation ecosystem focussed on defence and security; and
- Establish the NATO Innovation Fund, a multi-nationally funded effort to provide venture financing to cutting-edge start-ups developing dual-use technologies.

Let me start with DIANA. DIANA will be a transatlantic

innovation initiative that accelerates the adoption of dual-use technological solutions to critical defence and security challenges. It will do so by networking together innovation entities – including national Test Centres, Accelerator sites – in spaces where competitively selected innovators can iterate on their solutions alongside operational end users and agile capability developers.

We are looking mostly at Technology Readiness Levels 4 and higher – and our aim is to de-risk the maturation of these technologies with adoption pathways for Allies to be able to ultimately take advantage of. We also envision that this acceleration of viable dual-use technologies for defence and security should include mentorship and education for deep-tech start-ups to sensitise them to defence and security – and so that we can inculcate a high-integrity environment of protection.

To protect technological developments across the Alliance, DIANA will also include a new trusted capital database so that Allied start-ups can access trusted sources of capital. This database intends to increase the transparency of existing screening programs and to establish trust with investors and start-ups alike. What this means is that DIANA will create new opportunities to become more accessible to innovator networks – by Allies, for Allies. We also see engagement as a key part of access to Allied innovation assets. Here, DIANA will also house Innovation Advisory Teams to provide advice not only to NATO Entities, but also to academia and the private sector across the Alliance.

This brings me to the NATO Innovation Fund, which the Allies agreed to launch to provide venture financing to start-ups whose dual-use technologies potentially have military applications.

Our aim of this multinational fund is to allow participating Allies to spotlight the particularly promising technologies that could attract private venture capital. So let me be clear: we're not trying to replace or compete with private capital, nor are we trying to match the high sums of capital that come from outside of government. Instead, we see opportunities to signal those particularly promising areas where we can crowd investment in.

When it comes to both DIANA and the Fund, the dual-use model is critical to the Alliance. We should not try to inculcate new generations of startups who have the government as their only – or, if I can say so, even main – customers. We want to stimulate the development of technologies that have civil, commercial applications, too. Take, for instance, green tech:

- When we think about the immense climate challenges that we will face tomorrow – and, honestly, that we already face today – then we see exciting potential where we can work with dual-use innovators and learn from industry.
- Through NATO innovation initiatives, we can align challenges that push dual-use technological solutions to help enhance our military readiness in evolving operational environments.
- But what's more, we can do this while simultaneously addressing challenges that are even larger. This is good for NATO, good for the innovators, and if we do it right, good for the planet.

There's another reason that we're interested in the commercialisation aspects, too. And that's the fact that commercial markets and, software-wise, open systems architectures too, can continue to drive incremental and breakthrough progress. If dual-use companies looking primarily at the commercial space can pull us toward their pace of innovation, then we can also pull their efficiency into our systems.

These are the types of areas we hope to see more collaboration on. With the breadth of challenges ahead, there is enough room for us to also learn from industry best practices on. I'd like to leave you with one last thought before wrapping up.

For us to produce new solutions, we need organisational novelty. Sometimes we get so wrapped up thinking about the what, that we lose sight of the how. This means re-organising our incentive structures and relations with innovators to optimise for the right kinds of solutions that will make a difference to our end users, and to maintaining our technological edge as an Alliance.

This is what we hope DIANA and the NATO Innovation Fund will help stimulate, helping drive a new era of competition in our transatlantic defence business models.

Now, I understand we will take a short break before moving into breakout groups on the combat cloud, and on autonomy and AI. In these sessions, I hope this message of organisational novelty can motivate creative ways of thinking about these important technologies.

Thank you and I look forward to the rest of the engagements at this NATO Industry Forum.



Ambassador Mircea Geoana, NATO Deputy Secretary General

Wrap up for day 1

Good afternoon and thank you to our Italian hosts for having us here in Rome. Thanks also to General Lavigne and Camille Grand for organising this event.

This is the first time I attend a meeting of the NATO-Industry Forum. I am not only delighted to be joining you in Rome, but also to have the opportunity to meet with all of you – in particular our defence and tech industry representatives. Thank you for taking part in this important conference. With some of you, from the more traditional defence companies, we have already established a robust partnership. But I am also glad that so many tech companies are also present at this conference.

We are broadening our partnership as we adapt to a fast changing and more digitalised world. There is great potential for us to do more together, and I am sure this is something that you have already discussed today. You have, no doubt, covered a lot of ground and had fruitful discussions on a range of issues that are relevant to NATO, and to all of us, including how to procure capabilities for NATO and for Allies in a smarter and more agile way.

Many of these issues pertain to innovation and emerging and disruptive technologies, including autonomy, artificial intelligence and cloud computing and its use in operations - as we call it 'combat cloud.' I take great interest in these issues. Not least because one of my responsibilities at NATO is to chair the Innovation Board. This body coordinates policy and cooperation on innovation across the entire NATO enterprise.

I am also working very closely with the NATO Advisory Group on emerging technologies, experts from academy and industry who work with NATO. And I am happy to see some of its members here today contributing to this Forum, and grateful to you for coming to NATO headquarters earlier this week.

NATO boasts a network of more than 6,000 scientists and engineers, and over 5,000 companies in our industrial advisory group. We have the world's largest collaborative defence and security research and industrial network. So we are supremely placed to help our 30 nations adapt to the digital age, by boosting transatlantic cooperation and innovation.

We are doing a lot of great work, and making great progress to ensure we keep pace with rapid technological changes.

Tomorrow, you will hear from the Secretary General, Jens Stoltenberg, about the efforts underway to accelerate innovation and ensure NATO keeps its technological edge in a more competitive world. To ensure we truly remain competitive, we need to work more closely together with those that drive innovation. With people like you.

Traditionally, developments in defence technology have been driven by the military sector, large defence corporations and governments. Today, however, the private sector, universities and start-ups often lead the way.

So I am absolutely convinced of the need to strengthen what I like to call the "triple helix" between government, industry, and academia. This is key to our enduring success. NATO could even play the role of the fourth helix, bringing together the energies of all 30 Allies and of our extensive network of partners.

So at the end of this first day of the Forum, it just remains for me to wish you a very good evening and an excellent continuation of your discussions tomorrow and beyond. I am confident that our important partnership will continue to evolve and strengthen. And I would be happy to continue the discussion with you at the reception hosted by Italy this evening.





General Philippe Lavigne, Supreme Allied Commander Transformation – Day 2

Good morning and welcome back to the second day of our NIF 2021.

Yesterday, we had lots of incredibly interesting presentations and discussions on technologies that affects and are, therefore, vital for NATO in ensuring its relevance and developing its capabilities.

We continue, today, with our plenary sessions focusing thematically more on our strategic context and "strategic NATO". I, therefore, consider it important to elaborate a little bit more on our security environment, following my yesterdays' introduction. In short, our security environment is characterized by its non-linearity. It is, instead, complex, which means that there exists no proportionality and no simple causality between the magnitude of responses and the strength of their stimuli. Sometimes, allegedly small changes, events that don't seem like a threat, can have striking and unanticipated effects, whereas great stimuli will not always lead to drastic consequences.

The lines between systemic competition, crisis and war are blurred, which is also the case for forward and rear, of virtual and physical. This leads us to prepare and act in a much different way than before. Today, and in the future, we will have to proactively shape our environment, contest adversarial behaviour and, if needed, fight. What used to be a war throughout history, is today rather competition or "conflictuality" of all kind, across the spectrum of operational domains. And war today has multiple faces, where an armed conflict is just one of them. This "conflictuality" also leads to extension of conflict into new domains for which physical borders are irrelevant, like Cyber, Space or the Cognitive domain, where any kind of actor can challenge our military instrument of power and our societies, often anonymously.

We also observe the combination of effects in these domains, which requires from us to be ready to engage in Multi-Domain Operations (MDO). However, while ability to engage in Multi-Domain Operations is vital for our Joint Warfare, we also face challenges of the irregular warfare, hybrid and grey zone conflicts or competition. And we have to deal with escalation/de-escalation scenarios, something we haven't done much in the last 20 years.

Our challenge is, therefore, to seamlessly manoeuvre through the entire spectrum of warfare, to include, of course, kinetic effects.

Along with these challenges in security environment, we see the fundamental shift in the technological paradigm with our adversaries challenging our edge and the civilian sector acting as the lead innovator, especially in the domain of data and computation. And, on "top of that", we are faced with so called "threats without threateners", such as pandemics and climate change, that will cause instabilities and represents the "threat multiplier". And, these long term challenges are in our focus too. For example, regarding NATO's commitments in facing the consequences of climate changes we see them as "dual".

It is to deal with (1) consequences, for example: with flooding of military bases, with openings the flows along the Arctic paths, immigration etc. … and (2) with causes. This includes support to "greening" of our defence capabilities and transitions in the area of operational energy, for example, when and where it is possible. All these developments in our security environment require from us to adapt. And, adaptation in NATO became an imperative for maintaining our relevance and ensuring our advantage … plus, to avoid strategic risk.

After 2014, we have observed the "return of geopolitics". This was triggered by the "Ukraine crisis" and deteriorated relations with Russia but later included concerns of the "strategic behaviour" of China. Consequently, we, in NATO, put higher focus, or, rather, "refocused" on so called warfare development. We also realized that we needed more concrete and straightforward tool to ensure the coherent, proactive development of our capabilities.

Hence NATO Warfighting Capstone Concept (NWCC) and the Concept for Deterrence and Defence of the Euro-Atlantic Area (DDA), and their respective implementation plans. These two concepts, agreed by Nations, allow us to launch key structuring works for the future of our forces. NWCC is envisaged to ensure flexibility, by adapting continuously to security environment in heading towards 2030. In implementation of NWCC, we intend to exchange actively with the Nations to synchronize these efforts, and identify the priorities which will make the difference tomorrow. Multi-domain operations should be central to this work.

For ACT, my Command, the main goal is to ensure the most relevant identification of military requirements, in support of NATO's adaptation. And, this is where Industry comes to play as an integral part of that capability development ecosystem, crucial both for deterrence and defence. The more we work closely together, the stronger our military instrument of power is … and, therefore, more secure we are!

In cooperation with industry, we want:
First, to make sure we (NATO) are able to move from a platform-centric development to a system-centric approach. In other words, we need to move from acquisition programmes developed independently from each other, operating, sometimes, in stove pipes, making us struggling to integrate them in a consistent global architecture. It is about designing an open architecture, in which our different systems can operate collaboratively in a multi-domain environment.
And, second, we want to work, together with Industry, on what needs to be done to be more agile collectively to ensure quicker delivery.

My conviction is that NATO's adaptation should focus on our ability to better understand our environment (and our adversaries), decide faster, which requires to be more agile, and be more connected and interoperable, to be stronger together. We need to adapt together and synchronize our efforts! And, in "understanding our environment", one important thing is to anticipate what is vital and where to focus our efforts to ensure credibility and relevance of our deterrence and defence.

One of these vital resources is data. What used to be oil (petroleum), especially during and after World War I, when it emerged as a strategic global asset … it is now, more and more, data! Today, the speed is of utmost importance, especially in decision making, and is crucial for the effectiveness and efficiency of our operational capabilities. Klaus Schwab, Founder and Executive Chairman of the World Economic Forum, is quoted as saying, "In the new world, it is not the big fish which eats the small fish, it's the fast fish which eats the slow fish."

Hence, data! Data fuels our processes and systems, and everyone goes after it. Data is relevant to one important capability that has to be developed in NATO to succeed and be effective in Multi-Domain Operations … and it is our C2, Command and Control, our communication and data backbone.

Here, we need a vision of a future C2 architecture, in which data is available in a cloud to allies and partners. We also need a transition plan from now to that vision, on how to operationalize it.

However, we have two problems to fully benefit from our collective data availability: (1) data are not shareable because of proprietary locks, which are imposed by developers, and/or (2) because of national policies, due to distrust and unwillingness to share them. These issues could be partly overcome by the fact that we don't need to share everything related to particular data, for example, its source … but what is relevant for everybody to get the "whole picture".

That's why, what we need is "data discoverability", to ensure that data format is not the most important requirement but its "shareability". This requires to develop technics to tag data and its meta-data to be able to share what we want.

The new digital infrastructure will also allow to move data not only "horizontally" across domains but also "vertically", and allies and partners would be able to access data according to their credentials.

Further progress in this domain would also be to develop algorithms for data analytics, to allow predictive C2 capability.

We need to progress ambitiously in developing this "Alliance's data backbone", and we can work on it via an incremental approach. And I am convinced that Nations will follow if they see tangible results.

My belief is also that we need to continue, even more ambitiously, with our innovation efforts in NATO.

That means we need to be more open, think through, and rethink our acquisition processes. Most importantly, we need to help creating a new mindset, to ensure more flexibility, agility and speed in our processes.

We also need to leverage the research development effort from industry, ensuring rapid prototyping. Innovation, however, is not an end state; it is a way to an end. And, we want these (innovation) efforts to be done in close cooperation among Allies' and partners' governments, academia and industry. The teamwork is crucial for success!

Take as an example quantum technology. We are interested in all the three major categories of this technology: quantum sensing, quantum communication, and quantum computing. In this field, our (ACT's) Maritime Science and Technology Programme of Work is impressive, where autonomous systems, AI technologies, and quantum sensing, developed through this programme are field-tested during exercises or through sea trials.

Since most of these technologies are still in the laboratory, we are very interested to follow its developments and, when possible, test it in the most realistic environment possible. Whether this technology will be applicable for civil and military use in three or ten years, we would like to understand it already, and know where to implement it in our existing capabilities.

We are also aware that our "innovation outcomes" have to be sustainable, deployable and robust, which is far more demanding than the technology developed for the market, because it will be immediately contested once used in potential conflict.

This is why we need a close cooperation between warfighters ("the customers") and producers of technology, to ensure that the innovations, technologies and the processes, which we implement in our capabilities, are fully relevant and benefit our operational requirements.

Ladies and gentlemen,

I have full confidence that we will have fascinating and enlightening debates during today's plenaries.

Thank you for your attention.



H.E. Mr. Jens Stoltenberg, NATO Secretary General

Good morning.

It is good to see you all – in-person. And it is a real pleasure to be back in Rome. Thank you Minister Guerini,and many thanks to Italy, for hosting this year's NATO-Industry Forum.
I have attended your last three events in Brussels, Berlin and Washington. And I very much value the opportunity to engage with industry leaders.

Thanks also to General Lavigne and his team for joining forces to set up such a high level event.

NATO's ability to innovate is what has guaranteed our military superiority for over seven decades. But today, more countries around the world are racing to develop new technologies. From artificial intelligence to hypersonic gliders. And often competing to dominate them.

NATO and individual Allies are front-runners in this race…still. But other players are catching up…fast. Some of them do not share our values. They do not play by the same rules. And they are challenging NATO's technological dominance.

One of the main players is China. It will soon have the biggest economy in the world.

And it already has the second largest defence budget. China has the ambition to become the world leader in artificial intelligence by 2030. And to have the most technologically advanced armed forces in the world by 2050. Given the record of progress the Chinese have made in recent years, this ambition is not rhetorical – it is very real. Indeed, we see Beijing investing heavily in new modern capabilities, and rapidly integrating advanced technologies into its military.

Russia is in the race too. Making considerable progress notably in hypersonic technology. Investing in artificial intelligence. And in space. In fact, Moscow and Beijing are collaborating on a high-tech endeavour, with plans to develop a joint lunar research station.

Faced with growing competition from authoritarian regimes, our partnership with the defence and tech industry – across Europe and North America – is even more critical. We already have a long-standing engagement with you, including through the NATO Industry Forum.

Working with industry, we have developed cutting-edge capabilities that integrate some of the latest technologies. Such as the Alliance Ground Surveillance system, that provides high-quality radar imagery and operates from its base in Sicily. We are currently working on the Alliance Future Surveillance and Control system. To replace our AWACS. And be our new 'eyes in the sky'.

We are also testing maritime unmanned systems. And developing the next generation of helicopters. By working together, we help ensure Allies are able to operate different technologies seamlessly, between their forces, and with each other.

Looking ahead, we have to do even more. And do it more together.

Our new military capabilities cannot rely on the same sources of fuel and energy that we have used for the past century. I was just at COP26 in Glasgow, where I met with other world leaders, and discussed the tremendous threat climate change poses to everyone's security.

NATO, the military, and industry, all have a part to play in addressing this threat. Together, we must deliver new, innovative, sustainable capabilities, that contribute towards the goal of net-zero emissions. We must also better harness the opportunities of emerging and disruptive technologies. And ensure we remain the most technologically advanced military alliance. This is key to the freedom and security of our one billion people.

At the NATO Summit in Brussels in June, we took bold decisions. To future-proof our Alliance.

Accelerate innovation. Sharpen our technological edge, cut military emissions, and adapt our Alliance to a world changed by climate.

We decided to set-up a Defence Innovation Accelerator for the North Atlantic – or DIANA. To facilitate transatlantic cooperation and exchanges on critical technologies between Allies. As part of DIANA, Allies are committed to provide a network of technology test centres and accelerator sites across the Alliance, to better harness civilian innovation for our security. And strengthen the technological bond between Europe and North America. Some of these facilities will be in place next year.

DIANA is one part of a bigger picture. In tandem, we are also establishing a NATO Innovation Fund. Just a few weeks ago, 17 Allies signed up to take the lead in developing this new fund. And I expect more to join. The Fund will invest one billion euros, with innovators across the Alliance, working on emerging, disruptive and green technologies. It will ensure Allies do not miss out on the latest technology. So that we stay ahead of our competitors.

Both DIANA and the Fund will leverage the pool of talent that we have in our 30 open, democratic nations. We have an abundance of excellent academic institutions. The finest researchers. Creative companies. Many of which are in the audience today. With the best minds, in free societies, we have a significant advantage in the development of new technologies. We must use it fully.

In addition to all this, we are putting in place strategies on technologies that are most relevant to security and defence. Just a month ago, we agreed our first-ever strategy on artificial intelligence. It sets standards for responsible use of artificial intelligence, in accordance with international law. It lays out how we will protect this technology. And it addresses the threats posed by the use of artificial intelligence by adversaries. In the coming months and years, we will be developing other similar strategies on key technologies. Including autonomy, quantum and biotech.

In all these areas of work – DIANA, the Fund, the strategies, climate change, and more, we want to work even more closely with partners that share our values. Including in the private sector. With people like you, in the defence and tech industry. There is great potential for closer cooperation. So I want to invite all of you to continue to work with us. Only by working together, can we preserve our technological edge.

As we take these initiatives forward, and strengthen NATO through innovation and technology, we need more resources. The good news is that the defence-spending trend is up. European Allies and Canada have increased spending for seven consecutive years. With 260 billion dollars more invested on defence since 2014.

That is billions of dollars to maintain and upgrade our existing capabilities. But also for new equipment. New investment in the latest technologies. And new research and development to make sure we remain at the cutting edge.

With this money, we can develop new standards, advance interoperability, and train our people to use new tools, like virtual reality. More money creates opportunities for our defence industries. And a thriving defence industry is more important than ever. To nurture innovation. And to develop and manufacture the capabilities we need, to increase our resilience, preserve our prosperity, and protect our citizens. So we must keep the defence-spending trend up.

Finally, a few words on NATO's next Strategic Concept. Which we will endorse at the Madrid Summit next June. The last Strategic Concept dates back to 2010. It envisioned a true strategic partnership with Russia. It did not mention China at all.

And it only briefly alluded to technology. But our security environment has significantly changed in the past ten years. Not least because of rapid technological advances. So I expect the new document to reflect these changes. Restate our values. And chart the way ahead for the Alliance.

Our meeting today is an opportunity to seek your contributions to the next Strategic Concept, which will shape NATO's future for the next decade.

As we look to the Madrid Summit, we will continue to work hard to speed up transatlantic innovation. And sharpen our technological edge.

I count on your continued support, to ensure we remain frontrunners in the global technological race.

Thank you very much,

And I wish you a very good conference.





H.E. Mr. Lorenzo Guerini Minister of Defence, Italy

Secretary General STOLTENBERG, civil and military authorities, representatives of industry, distinguished guests,
welcome on behalf of the Italian Government, the Italian Defence and myself.

Let me start by expressing Italy's gratitude to

-Secretary General STOLTENBERG,

-the Supreme Allied Commander Transformation, General Philippe LAVIGNE

-The Assistant Secretary General for Defence, Mr Camille GRAND,

-General Luciano PORTOLANO,

-the staff of the General Secretariat of Defence of the Italian Ministry of Defence,

and to all those who have tenaciously pursued the possibility of holding of the NATO Industry Forum 2021 here in Rome.
The pandemic has strongly affected our social life as well as our need to cooperate and to 'be allies' to protect our security. It has also posed an unprecedented threat to the resilience of our societies.

What is more, it has reinforced what the Brussels Summit of 2021 clearly recognised: that NATO's ability to protect one billion of its citizens is continually tested, with challenges due to mutable and multifaceted threats that come from all strategic directions and dimensions.

Of course, the COVID-19 pandemic has also shaken the convictions of the world's economy, particularly in liberal societies, and exacerbated nationalism and the generated a tendency towards a progressive regionalisation of crises and national strategies.

As a result, we may have partially lost focus on the global perspective and the synergistic and multilateral approach that the Western world needs to address its security, its prosperity, and the current challenges.

At the same time, the pandemic has forced us to realign the perception of our own security, rekindled the debate on our system of multilateral relations and the strategic interdependence in the current geopolitical scenario, a scenario that is increasingly complex, globalised and interconnected.

It is a scenario where we observe renewed competition - including military competition - among states and the assertive posture of certain international players. This is even more true in the industrial dimension, where our competitors exert increasing and penetrating influence, both economic and financial, to erode our technological advantage.

In short, through the COVID-19 crisis, a stronger need for our Alliance to be more solid, agile, and cohesive has emerged. We need an Alliance that is also able to control key technologies and production, including in the military field, and to protect its own strategic autonomy.
Our presence here today is, in my opinion, a strong sign of recovery for our community in what is certainly a model of cooperation and excellence. This is key to the security and economic growth of our countries and our Alliance.

This event, in particular, is the culmination of the mutual commitment between the Atlantic Alliance and its industrial dimension. Both are called to translate into strategic direction and future vision the notion that NATO will increasingly be required to preserve its technological edge, remain relevant, and ensure its citizens are secure.

This is the only way to maintain state-of-the-art military capabilities and to steer the process of innovation through events like today's. This is the only way our public opinions will be able to fully understand the fundamental importance of investing in technological development, defence capabilities, and NATO to protect their sovereignty, freedom, and prosperity.

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Let me also express the pride and satisfaction of the Italian Defence and my own for the fact that the NATO-Industry Forum is taking place in Italy.
First and foremost, Italy and its government attach a fundamental importance to the transatlantic link.
I am a convinced and mindful supporter of the deep relationship that binds Italy to NATO, an organisation called to the difficult task of adapting and evolving to meet new challenges while remaining a guardian of the values that we have defended for 72 years.

To this respect, let me quote Henry Kissinger from a book published a few years ago. He wrote that, and I quote "the Atlantic Community cannot retain its relevance simply by projecting forward what it has been."

On the contrary, if we intend to adapt to a world that changes quickly, we must remain aware of the high importance of the transatlantic partnership, keep it at the core of a constructive and productive debate, and continuously question its future to avoid the very partnership is given for granted, or other international actors can say it is outdated.

Cohesion in the West, with the Atlantic Alliance being its highest expression, is essential to maintain NATO's active and conscious role as an instrument of collective security and deterrence in a geostrategic scenario as complex and interconnected as the current and future one.

Such a perspective is also a central issue here at the NATO-Industry Forum 2021, were we are called to provide a decisive contribution to the decisions the Heads of State and Government made to implement the "NATO 2030" agenda and to define the new strategic concept that the Alliance planned to adopt in 2022.

What I have just mentioned applies to some core issues, namely:

- the future deterrence and defence capabilities,

- maintaining technological advantage, and
- the need to continue to invest in NATO as an accelerator of innovation for collective defence.

The European Union must also project itself into this future by implementing the Strategic Compass. It needs, first and foremost, bold and appropriate political choices to revive a real industrial policy dimension, also for the defence sector.

This cannot wait if the EU wants to aspire to become a global security instrument that is fully complementary to NATO.

It is no coincidence that both organisations are reviewing their respective strategic concepts. The constructive dialogue we need will only be achieved through a shared common vision and the continuous search for a balanced complementarity. This would avoid the tendency towards the subdivision or, even worse, the 'regionalisation' of roles to which I referred earlier.
In this respect, the integration of European defence, which Italy is firmly pursuing, represents the consolidation of the European pillar of the Atlantic Alliance and the further strengthening of a strategic dialogue on major global issues. Such dialogue is absolutely essential to maintain the competitive advantage of the West in the military, economic, technological, and commercial fields.

These are some of the topics discussed here at NIF2021.

These are also fundamental issues for Europe, which sees the consolidation and integration of its industrial and technological base as a key point for the development of its common defence system.

NIF2021 tries to affirm a new awareness of the need for transatlantic cooperation, a need that rests not only on fundamental political and cultural harmony, but also on the industrial and technological edge in the face of the crucial innovation challenge that we will face in the next two decades.
It is a challenge that goes beyond the purely political and

military dimension, that requires us to use our resources and capabilities - scientific, economic, and industrial - in a more inclusive manner. However, and I say this with a sense of responsibility, it is a challenge for which Defence will always be a fundamental and central enabling element in the political agendas of the nations and organisations concerned.

In this regard, and I go back to the importance of Italy's role as the host nation of this event, my country remains fully committed to support NATO against the challenges it will face.
The aim of this forum is to encourage the political, military, and industrial leaders of our countries and of the main multinational organisations represented at the highest level here to consider the Alliance's future capability needs and define the necessary lines of industrial development to be pursued through a real partnership between NATO and industry.

These are the same principles on which my recent Italian Directive on Defence Industrial Policy is based. It is a strategic guideline through which the Italian Defence, together with all government institutions, intends to liaise with the aerospace, defence and security industry, the scientific community, and the entire innovation chain. It contains a forward-looking vision to guarantee Italy preserves the technological sovereignty it needs to meet its security requirements and to present itself as a strategic partner at international level.

These are concepts that find their natural means of realisation in the multinational dimension of governmental and industrial cooperation, especially in the transatlantic context, is what translates these concepts into reality.

Italy is committed to promoting the technological development and competitiveness required to be an active member of the most advanced and innovative programmes that we promote with our allies and friends.

I am referring to the significant industrial cooperation opportunities created by Italian companies operating at the global level, namely Leonardo, Fincantieri, Iveco, MBDA Italy, Elettronica, Beretta with the main European, US and British champions.

Quite a number of SMEs and important actors of excellence have been involved, which have widened their scope of action across Europe, but also in the United States.

Despite the crisis, the Italian Government and Parliament have chosen to increase the Defence budget for this year and the nextto stabilise the growing trend through assured and lasting investments for innovation, development, and industrial cooperation.

These are important examples and I can say my country can act a as a bridge between Europe and the US, generate broader and more cross-cutting collaboration for the overall growth of an industrial system on which NATO and the EU can and must rely today.

Italy believes these assumptions depict the potential of this edition of the NATO-Industry Forum well. Only by developing effective synergies will we ensure effective institutional support for research and the consolidation of multinational collaborations for the sustainable pursuit of the Alliance's objectives.

The aerospace and defence industry are among of the most dynamic and competitive sectors for the transatlantic community. They are an incubator for research, development, and technological innovation that can combine the key aspects of international security with an industrial dimension that also represents a multiplier of investments and a driving factor for the possible economic recovery, especially in times of crisis such as the current one.

We need to interpret security and defence from the perspective of the closer and closer interconnection between the future multi-domain and multi-mission military capabilities of the future and the emerging and disruptive technologies such as the combat cloud, artificial intelligence, and autonomous systems.

I believe that the NATO-Industry Forum, where we discuss the new technological frontiers of the digital age, should have the primary objective of enhancing and relaunching the driving role the military can and must have on these issues. At the same time, we must also be aware of and consider that these innovative frontiers are no longer under the exclusive control of the West. We are therefore more vulnerable than our competitors, who are developing an important and penetrating advanced technological initiative.

This is a complex issue, especially in terms of collective awareness. It is also a difficult issue due to the huge investments needed and the impact of the health crisis we are still trying to overcome. The severe economic and social consequences of the pandemic require a greater effort to make many of our fellow citizens understand the demands of modernisation in the military field.

What we need is a convinced and united effort by governments and parliaments, so that the public opinion in our countries can clearly understand that such modernisation is key not only to safeguard the sovereignty and security of our community, but also to its economic recovery.

In this respect, the synergies NIF2021 is pursuing can help raise awareness of NATO's role for our countries, as an inseparable combination of institutional actors and industrial expertise that is based on "value" rather than costs.

These elements are crucial for us to create the synergies the West needs to preserve its leading role in the geopolitical challenges we face, not least through greater strategic interdependence with Europe.

The future of our industrial and military superiority will depend on our political will to pursue innovation through the synergistic concentration of investments in high-tech programmes and effective forms of cooperative procurement.

Of course, the opposite is also true. Among you are many representatives of industry: NATO must be able to count on the growing calling of civilian entrepreneurs for innovation and research.
The industrial world must therefore play an active role in this collaboration, not only to develop cutting-edge military capabilities but also to exploit their high-tech content, which can certainly also be used for civil applications.
Together, we must strive to optimise investments, and - above all - we must prevent that our know-how is dispersed due to antagonistic interests.

Technological innovation is also conducive to great opportunities: the ever-increasing integration of military and civil technologies requires us to remove all conceptual, financial, and programmatic distinctions between two sectors, between the large aerospace and defence industry and private start-ups.

In this regard, Italy's strategic vision is fully in line with the recent initiatives undertaken in the context of the Defence Innovation Accelerator for the North Atlantic (or DIANA) to increase common awareness of the potential, including military potential, of emerging technologies and facilitate their acquisition by defence.

This evolutionary path is very clear to me, which I also discussed widely at the national level. Through it, I can look forward with confidence to the substantial contribution that NIF2021 can make to shape the future of the Alliance.

Let me conclude by thanking Secretary General STOLTEMBERG once again, together with all those who made NIF2021 a reality. My appreciation also goes to General Lavigne, Mr Grand, and General Portolano for providing this important opportunity for dialogue and for bringing institutions and industry together.
Dialogue is certainly one of the substantial characters of our Alliance that is more and more an instrument for and a guardian of freedom, prosperity, and progress for our societies.

I wish you all a fruitful work. Thank you.





H.E. Mr. Giancarlo Giorgetti, Minister of Economic Development, Italy

Good afternoon

It is a great pleasure to be here with you today. I would like to thank the Secretary General Stoltenberg, the Supreme Allied Commander Transformation General Philippe Lavigne and the Assistant Secretary General for Defence Investment Mr Camille Grand. The Italian Ministry of Defence Secretary General Portolano and all the people who have made it possible to hold the NATO Industry Forum 2021 in Rome, despite all the limitations due to Covid-19.

The pandemic has highlighted the weaknesses of our economic and industrial systems. The crisis has changed the perception of our security and underscored how much has to be done yet to make our countries, institutions and Alliances more and more resilient. Whilst we are recovering from the pandemic, we are faced with the consequences of the climate change, a threat for our societies and economies that goes beyond any political and physical border. The reliability and security of our supply chains that feed our production systems including the health and defence are at the core of a new priority debate. Just think of the consequences during the pandemic of the supply interruption of the raw material of the semi-conductors and semi-finished products.

We can talk about the challenges as critical phases but also as opportunities. While facing a double transition, the digital and ecological transitions, the two expressions seem to be different in their causes but they integrate each order in tools and commitment. In Italy thanks to the tools provided by the next generation youth we are implementing with extraordinary commitment a plan with this double transition. The businesses and research communities will be a key player. And the defence who they is inclusively double dual military and civil or rather hybrids characteristics can play a decisive role.

The need to accelerate this digitalisation is now urgent. The availability and access to infrastructure for the rapid and secure exchange of data is a key factor of resilience and a key weapon in the fight against the epidemic spread. This has contributed in accelerating the reflection on the preservation of privacy, on the management of data production and the defence of the strategic infrastructure from cyberspace threats. Both the European Union and NATO are equipped with AI strategies, but digital technologies big data, AI and 5G are only a part of a wider spectrum of the emerging technologies rising during this historical time. The current world is facing a generational evolution of disrupting technologies ranging from quantum technologies to autonomous systems and space technologies intending to transform the industrial processes and the military capabilities and the consequence the geopolitical balance in the short and medium term.

In this scenario, we are witnessing competition amongst states inclusively in the industrial and technological dimension with inevitable consequences in the defence sector and foreign policy. To protect our technological sovereignty a solid and technologically advanced industrial base is therefore necessary in addition to the military instrument. Our countries are called to tackle a technological challenge where there is a stake the survival of our own productive sector. This challenge becomes a competitive discussion for the safeguard of our own values and lifestyle in a framework established on the respect of mutual rules and international legal references. Italy intends to invest in technological developments, resilience and defence of national infrastructure to protect its sovereignty, freedom and prosperity. We have already taken up the challenge on research and on EDT, which are strategic to the development of our economy and can count on the synergies resulting from being inserted in a cooperation context like EU and NATO. The NIF21 is a representation of the strategic dialogue between NATO and the best of the aerospace industry, defence and security in the Euro-Atlantic area. This is an opportunity for discussion that culminates in the common interest to preserve the technological and industrial advance of the Alliance to safeguard the security of more than a billion citizens.

At the national level, the government and Italian Ministries will continue to collaborate to insure our country and NATO the technological advance. Italy will put in place all the tools to be a fundamental point of reference in the transatlantic scenario of the aerospace, defence and security sector. Italian companies, some are represented here, are able to look at the future scenario's and representing technological platforms where and how innovation and organisational capabilities make the difference.

The Ministry of Economic Development is committed to giving support to the sub stub's ecosystems and innovative small and medium sized enterprises who are dedicated to the holistic approach. Today innovation needs to be intercepted faster by engaging and guarding the test start-ups intercepting and innovative small and medium size of enterprises from scratch along their growth and strengthening in cooperation with academia and research. In this direction, the Italian Government has supported the launch of the two NATO initiatives, DIANA and the Innovation fund. We are working to make Italy more attractive and easier to invest in through a normative system and a recalibration of the fiscal system in a more pragmatic way.

We are aware of the great expectations that the political, economic and financial environments have from Italy and national resilience recovery plan. Italy is among the latest contestants at the European level in a lot of sectors ranging from defence electronics, self defence, missile and artillery systems for defence, to the military shipbuilding and the space sector. Both at the investment level and the technological high profile. We are here, and we want to continue doing our part together with our NATO partners. Thank you again for choosing Italy for the NATO-Industry Forum.

Good works.

BIOGRAPHIES

Welcome Remarks, Key Notes and Host Nation Speakers

MIRCEA GEOANĂ



Mircea Geoană became NATO Deputy Secretary General in October 2019, after a distinguished domestic and international career. Mr Geoană is the first Deputy Secretary General from Romania, and the first from any of the countries that joined the Alliance after the end of the Cold War.
Mr Geoană was born in Romania on 14 July 1958. He studied at the Polytechnic University in Bucharest, the Faculty of Law of the University of Bucharest, the Ecole Nationale d'Administration in Paris, and he holds a PhD from the Economic Studies Academy of Bucharest. Mr Geoană has served as a diplomat and a politician, and in 2009 was his party's candidate to be President of Romania.
1991-1995: Director at the Ministry of Foreign Affairs, Romania
1993-1995: Spokesperson of the Ministry of Foreign Affairs
1996-2000: Romanian Ambassador to the United States.
2000-2004: Minister of Foreign Affairs
2001: President in Office of OSCE
2004-2016: Senator
2004-2008: Chair of the Senate Foreign Policy Committee
2005-2010: President of the Social Democratic Party
2008-2011: President of the Romanian Senate
2012-14: High Representative of the Romanian Government for Strategic Economic Projects and Public Diplomacy
2012-2014: Chair of the Parliamentary Committee for Romania's accession to the Schengen Area
Mr Geoană is a strong advocate of transatlantic integration and has held a number of international positions, including OSCE Chairperson-in-Office in 2001 and personal representative of the OSCE Chairperson-in-Office for Georgia in 2005. He is President and founder of the Aspen Institute Romania and has published extensively on domestic and international affairs.
In 2000, he was made a Commander of the National Order, The Star of Romania. He has also been awarded the French Legion d'Honneur and the Italian Stella della Solidarieta.
Mr Geoană is married to Mihaela, an architect by training and former President of the Romanian Red Cross. They have two children, Ana Maria and Alexandru.

He is fluent in English, French, Spanish and Italian.

CAMILLE GRAND



Camille Grand is Assistant Secretary General for Defence Investment since 4 October 2016.
He was previously Director and CEO of the Fondation pour la recherche stratégique (FRS), the leading French think tank on defence and security (2008-16). In that capacity, he served on several expert groups on the future of NATO (Advisor to the Group of Experts on the Strategic Concept chaired by Madeleine Albright in 2009-10, Member of the Group of Policy Experts for the Wales Summit in 2014). His research and publications focused on defence policy, NATO, nuclear policy, and missile defence.
He was also Deputy Director for Disarmament and Multilateral Affairs in the Directorate for Strategic, Security and Disarmament Affairs of the French Ministry of Foreign Affairs (2006-08). In that capacity, he was in charge of chemical and biological non-proliferation and conventional arms control, and served as French representative in several international negotiations and senior groups within the EU and NATO (HLTF).
Prior to that, he was Special Assistant for International Affairs and Deputy Diplomatic Adviser to the French Minister of Defence (2002-06), in charge of international defence and armament cooperation, policy planning, and nuclear and missile defence policies. He was also responsible for nuclear policy and non-proliferation in the policy branch of the French MoD (1999-2002), and was an associate fellow at the Institut français des relations internationales (Ifri) (2000-02).
He also worked with the European Union Institute for Security Studies (EU-ISS) as a visiting fellow (1999-2000), with the Institut des relations internationales et stratégiques as a research fellow and editor of the quarterly journal Relations Internationales et Stratégiques (1994-98), and with Ifri as a research assistant (1992-94).
Camille Grand was also an associate lecturer at the Paris School of International Affairs at Sciences Po Paris (1998-2016). Amongst other past teaching positions, he was a lecturer at the Ecole Nationale d'Administration (ENA, 2006-10) and an associate professor at the French Army Academy, Ecole spéciale militaire de St Cyr-Coëtquidan, (1995-2002).
He was also a member of the Conseil général de l'armement (National Advisory Board on Armament and Technology, chaired by the French Minister of Defence) from 2012, and a member of the United Nations Secretary General's Advisory Board on Disarmament Matters from 2014.
His publications include several books and monographs and numerous papers in European and American books and journals on current strategic affairs, primarily focused on defence policy, European security, NATO, nuclear policy, missile defence, non-proliferation and disarmament.
He holds graduate degrees in international relations, defence studies, and contemporary history, and is a graduate from the Institut d'études politiques de Paris. He also trained at the Institut diplomatique of the French Ministry of Foreign Affairs.
Camille Grand is married and father of three sons.

LORENZO GUERINI



MINISTER OF DEFENCE OF ITALY

The Hon. Lorenzo Guerini

Lorenzo GUERINI was born in Lodi on 21 November, 1966.
He graduated in Political Science from Milan Catholic University of the Sacred Heart with a dissertation on the history of political doctrines.
He served in the Army (military service was compulsory at that time) in Alpine Troops Battalion "Edolo", in Merano (Alto Adige) from June,1991 to March, 1992. He then served in the Mounted Artillery Battalion- Milan. He quit the Army having been declared suitable for the rank of Army Reserve Sergeant. He is an insurance consultant by profession.
In 2005 he was elected mayor of Lodi, and was confirmed for a second term in the 2010 elections. His previous mandate, that he also served for two terms, was as President of the Province of Lodi.
During his first terms as Lodi's mayor he chaired Anci (the National Association of Italian Municipalities) for Lombardy Region, and was a member of the Conferenza Stato-Città e Autonomie locali and Conferenza Unificata (State-Cities and Local Self-Government Conference and Unified Conference). Moreover, he was responsible for welfare for Anci at the national level.
He was Deputy Secretary of the Democratic Party at the national level.

PHILIPPE LAVIGNE



The nomination of General Philippe Lavigne to the post of Supreme Allied Commander Transformation was approved by the North Atlantic Council on 28 May 2021.
General Lavigne has accumulated a particularly diverse and robust operational experience. Having joined the French Air Force Academy in 1985, he qualified as a pilot in 1989, flew the Mirage 2000 during operations in the former Yugoslavia and in Iraq before assuming command of the 1/5 Fighter Squadron "Vendée" in 2001. He subsequently served within the Paris-based Joint Strategic Planning and Command Operations Centre (CPCO) where he contributed to the planning of several peacekeeping and humanitarian operations from 2003 to 2005. After serving in the Planning Office of the French Air Force Staff, where he was tasked with issues related to space and European cooperation in the field of simulation, he was selected to attend the Centre for Higher Military Studies (CHEM) in 2008 and the "Defence Policy" course at the Institute of Advanced Studies in National Defence (IHEDN). He was appointed Deputy Director at the General Secretariat for Defence and National Security in Paris in 2009, where he served for three years dealing with a number of sensitive and complex issues in an interagency setting with multinational entities. He served twice in high-level joint positions, first as the Information Director within the Joint Staff of the Armed Forces between 2012 and 2014 and then as Director of the French Chief of Defence's front office from 2016 to 2018. Between those two postings, he commanded the Kabul International Airport with its 5000 staff and 57 nationalities and supervised the transfer of military responsibility for the airport to the Afghan civilian authorities. On 31 August 2018, he was appointed Chief of Staff of the French Air Force, renamed as the French Air and Space Force in 2020, whilst under his command. General Lavigne was made a Commandeur in both the Légion d'honneur and the ordre national du Mérite, and awarded the Croix de la Valeur Militaire. He has accumulated over 2800 flight hours and flown 46 combat missions on the Mirage 2000. He is married to Isabella and they have three children. He continues to play rugby, a long-held passion, whose cherished values have inspired his motto: "Win as a Team".

MINISTER GIANCARLO GIORGETTI



Giancarlo Giorgetti was born, and still resides, in Cazzago Brabbia (province of Varese, Lombardy)
He graduated in Business Economics at the Bocconi University in Milan.
Member of the Chamber of Deputies since 1996, where he has served also as president of several parliamentary committees, he has been mayor of his town as well from 1995 to 2004.
Secretary of the Council of Ministers from June 2018 to September 2019, he has been later appointed Minister of Economic Development on February 13th 2021.
Member of Lega since the '90s, he is deputy secretary of the party since 2015.
Actively involved in the preservation of the fragile environment of Lake Varese, in 2013 he has been elected president of the local fishermen's association.

LUCIANO PORTOLANO



Secretary General of Defence and National Armaments Director

Lieutenant General Luciano PORTOLANO received his Commission as Infantry 2nd Lieutenant in 1981 from the Army Military Academy. Upon completion of his Officer's training he was appointed 1st Lieutenant while at the 27th Bersaglieri Battalion in Aviano (Pordenone). Lt. Gen. PORTOLANO has commanded at every possible level and has served in a wide variety of assignments, to include: - as a Company Grade Officer: rifle platoon leader, rifle Company Commander, HQ Company Commander while serving with 27th Bn, Ariete Armd Bde; - as a Field Grade Officer: Commander, 67th Bersaglieri Bn of the 18th Bersaglieri Regiment, Commander 18th Bersaglieri Rgt and Commanding General Officer, "Sassari" Mechanized Infantry Brigade; - as Staff Officer at the Army General Staff: Doctrine and Regulations; Training; Chief of Training and Regulations Section of the Doctrine, Training and Regulations Branch; Chief, Land Operations. From September 2012 to July 2014, he served at the Joint Operations Headquarters in Rome as Deputy Chief of Staff for Operations. In July 2014 Lt. Gen. PORTOLANO was appointed UNIFIL Head of Mission and Force Commander of the United Nations multinational pacekeeping force in Lebanon until July 2016 (UN SCR 1701). From September 1st, 2016 to September 1st, 2019, Lt. Gen. PORTOLANO served at the Joint Force Command Naples as Chief of Staff and Head of European Union Command Element. 2 On September 2nd, 2019, Lt. Gen. PORTOLANO was appointed Chief of Joint Operations and took command of the Italian Joint Operations HQ. During his tenure, he was in charge of directing and coordinating the support provided by the Italian Armed Forces in facing the COVID19 pandemic. On July 26th, 2021, as a result of the Italian Defence Command Structure Adaptation Process – in accordance with the content of the Chief of Defence Strategic Concept aimed at facing new threats and challenges applying the Multi-Domain Operations concept – Gen. Portolano was promoted 4-star General and took command of the Italian Joint Force Command. In this position, Lt. Gen. PORTOLANO directed and coordinated the operation named "Aquila Omnia", aimed at evacuating our fellow citizens and afghan civilians from Kabul airport, as a consequence of the Afghanistan collapse in August 2021. On October 9th, 2021, Lt. Gen. Portolano took office as Secretary General of Defence and National Armaments Director.
Lt. Gen. PORTOLANO has attended the following military schools and courses: Military Academy, Infantry Officer Basic and Advanced Courses, Basic Airborne School, Basic Mountain Warfare Course, Army Staff College, Army Senior Staff College and Joint Staff College, CBRN School, and the US Army Command and General Staff College - Ft. Leavenworth, Kansas -USA. In addition, he has attended various courses related to the position of Military Attaché in the Mediation and Negotiation, Information, Civil-Military interaction, Budget and Finance, Diplomatic Relations, and major international treaties domain. He has also taken part in Military Advisor for Human Rights and Geneva Convention, Disarmament, Demobilization, Reintegration Conferences and Courses.
From 2007 to 2010 he also served as Military Attaché at the Italian Embassy, in London, UK. Lt. Gen. PORTOLANO holds a University Degree in Strategic Sciences (University of Turin), a Human Resources and Complex Systems Management Master's degree (i.e. Studium) and a Master's degree in Strategic Sciences (University of Turin).
His operational tours include:
- UN IRAN-IRAQ Observers Group (1990-1991);
- UN IRAQ-KUWAIT Observers Group Plans Officer (1991-1992);
- Operation JOINT GUARANTOR (FYROM, 1999), Task Force Commander;
- Operation JOINT GUARDIAN (Kosovo, 1999), Task Force Commander;
- Operation ANTICA BABILONIA (IRAQ, 2003), Joint task Group Commander;
- Operation ISAF AFGHANISTAN - Regional Command West in Herat (2011-2012), Commanding General Officer;
- United Nations Interim Force in Lebanon (UNIFIL) Head of Mission and Force Commander (2014 – 2016).

Lieutenant General PORTOLANO has been awarded with several medals, to include:
- UN medals,
- NATO medals,
- NATO Meritorious Service Medal (2 awards),
- EUFOR medal,
- Legion of Merit – degree of Officer (2 awards),
- Order of Naval Merit – Degree of Grand Officer - Brazilian Navy,
- National Defence System of the Republic of LITHUANIA Medal Of Merit
- International Cooperation Slovenian Medal – Medaljo Za Mednarodno Sodelovanje.

Lieutenant General PORTOLANO speaks French and English fluently. He enjoys outdoor activities, playing piano and reading history books.

JENS STOLTENBERG



Jens Stoltenberg was born in Oslo on 16 March 1959. He spent his childhood years abroad, with his diplomat father, mother and two sisters. Mr Stoltenberg holds a postgraduate degree in Economics from the University of Oslo. After graduating in 1987, he started work in Statistics Norway.
1990-1991: State Secretary at the Ministry of the Environment
1991-2014: Member of Parliament
1993-1996: Minister of Industry and Energy
1996-1997: Minister of Finance
2000-2001: Prime Minister of Norway
2002-2014: Leader of the Norwegian Labor Party
2005-2013: Prime Minister of Norway

While Mr Stoltenberg was Prime Minister, Norway's defence spending increased steadily, with the result that Norway is today one of the Allies with the highest per capita defence expenditure. Mr Stoltenberg has also been instrumental in transforming the Norwegian armed forces, through a strong focus on deployable high-end capabilities. Under his leadership, the Norwegian Government has contributed Norwegian forces to various NATO operations. During his tenure as Prime Minister, Mr Stoltenberg frequently called for NATO to focus on security challenges close to Allied territory. Mr Stoltenberg is a strong supporter of enhanced transatlantic cooperation, including better burden-sharing across the Atlantic. He sees NATO and the EU as complementary organisations in terms of securing peace and development in Europe and beyond. Mr Stoltenberg has had a number of international assignments. These include chairing the UN High-level Panel on System-wide Coherence and the High-level Advisory Group on Climate Change Financing. He was also UN Special Envoy on Climate Change.
Mr Stoltenberg is married to Ingrid Schulerud. Together they have two grown-up children

DAVID VAN WEEL



David van Weel is NATO's Assistant Secretary General for Emerging Security Challenges.
He is the Secretary General's primary advisor on emerging security challenges and their implications for the security of the Alliance and a member of the Secretary General's senior management team.
The Emerging Security Challenges Division, which he directs and manages, aims to provide a coordinated approach by the Alliance to all new and emerging challenges. These include cyber and hybrid threats, terrorism, as well as emerging and disruptive technologies (such as AI and quantum computing), energy security challenges, including those posed by environmental changes, and data policy. The division also runs the Science for Peace and Security Programme, which promotes dialogue and practical cooperation between NATO and partner nations through scientific research, technological innovation and knowledge exchange.

The Division aims to provide innovative policy solutions for countering and defending the Alliance and Allies against these challenges and to maintain the innovative and technological advantage of the Alliance in conjunction with partners, industry and other multilateral organisations.
Prior to joining NATO, David van Weel was the Foreign Policy and Defense Advisor for the Prime Minister of The Netherlands (2016-2020). This position followed a long career in The Netherlands Ministry of Defence, where he ended as Director for International Affairs and Operations/ Policy Director (2014-2016) after serving as the Chief of Cabinet for the Minister of Defence and the Permanent Secretary (2012-2014) and as the senior policy officer for amongst others operations in Afghanistan and Libya, NATO, nuclear policy and disarmament, special operations and the preparation of the Defence Budget.
David started his career in the Royal Netherlands Navy, where, upon completion of the Naval Academy (1994-1999), he served on different frigates, served in the British Royal Navy as an exchange officer, worked as a Staff Officer for Middle and Eastern European countries in the Defence Staff and ended as a Primary Warfare officer and Navigation Officer.
David is married to Iris and has two daughters, Felice and Alix.

Moderators and Panellists

CHRIS BAILEY



General Manager, Global National Security,

Amazon Web Services, Worldwide Public Sector

Chris Bailey is the General Manager of Global National Security for AWS, Worldwide Public Sector. Mr. Bailey is responsible for driving transformation with non-US Global Defense, Intelligence Community and Public Safety Communities - leveraging commercial cloud technology to drive innovation, deploy rapidly and focus more investment in the mission. Mr. Bailey sets common strategy for these segments, pulls in expertise to accelerate engagement and delivers programs to accelerate transformation. Prior to this role, Mr. Bailey spent 6 years successfully leading the US National Security business.
Mr. Bailey is a public sector industry veteran with over twenty-five years of experience and has supported Civilian, Department of Defense, Intelligence Agencies and State and Local Government through his career. He joined AWS in 2014 to start a US Intelligence Community focused team. Prior to joining AWS, he was a Director at EMC overseeing US Intelligence Agencies. Before joining EMC, Mr. Bailey held executive management positions at Iron Mountain where he was Vice President, US Government Group and Brocade Communications where he was Executive Director, US Federal. Mr. Bailey began his career in software development/systems engineering with SAIC; supporting the US Federal Bureau of Investigation (FBI), US Army and US Navy. Mr. Bailey has a range of Government technology accomplishments including; building key software components of FBI criminal history systems (IAFIS), storage engineering for some of the world's largest super computers (US Department of Energy/ ASCI), and running teams that supported major technology programs across the US Intelligence Community.
He is an active member of Armed Forces Communications and Electronics Association (AFCEA), Intelligence National Security Alliance (INSA), Cyber, Space & Intelligence Association (CSIA) and several other organizations focused on Defense and National Security Missions. Mr. Bailey is currently serving on the Executive Committee of AFCEA International and on the Washington Alumni board for The College of William and Mary Mason School of Business.
Mr. Bailey earned a Bachelor's degree in Electrical Engineering (EE) from George Mason University and a Master's in Business Administration (MBA) from The College of William and Mary.
He and his wife live in London. They spend as much time as possible visiting their two adult daughters in New York and adult son in Philadelphia.

NISHANT BATRA



Chief Strategy and Technology Officer (CSTO)

Nishant is a global leader with broad experience in strategy and technology development and portfolio management, as well as in having significant profit and loss responsibilities across the telecom and enterprise sectors.
He has been intimately involved in bringing cutting-edge products to market across industry domains and has a deep understanding of the silicon, software and system requirements necessary for innovation.
At Nokia, Nishant is the Chief Strategy and Technology Officer (CSTO) with responsibility for corporate strategy, technology architecture and pioneering research at Nokia Bell Labs; Nokia's information technology (IT) infrastructure and digitalization initiatives; centralized security domains; and Nokia's venture capital activities.
His function lays the path for Nokia's future technology innovation and identifies the most promising areas in which Nokia can create new value. By setting the company's vision and understanding the evolving market and business dynamics, Nishant is responsible for developing a coherent businessstrategy, technology and architecture vision across the company and implementing it in partnership with the Nokia Business Groups. Furthermore, he is responsible for establishing a solid research foundation on which Nokia innovates new products and for providing the critical support infrastructure that ensures all Nokia business units can deliver that vision properly and securely.
Prior to joining Nokia in 2021, Nishant worked at Veoneer in Sweden, a worldwide leader in automotive technology, where he was Executive Vice President and Chief Technology Officer. Before this, he spent 12 years at Ericsson holding several positions, most recently as Head of Product Area Networks. Nishant holds an MBA from INSEAD; a master's degree in Telecommunications and a master's degree in Computer Science from Southern Methodist University in the US; and a bachelor's degree in Computer Applications from Devi Ahilya University in India.
Nishant is based in Espoo, Finland and has lived and worked in Asia, Europe and the US.

DOMITILLA BENIGNI



CEO, COO and Board member Elettronica

Domitilla Benigni is the Chief Executive Officer, Chief Operating Officer and Board Member at Elettronica. The company, founded in 1951, is one of the European leaders in the production of Electronic Defence equipment (EW). She joined Elettronica, in 1996, after obtaining her Master's Degree in Electronics Engineering.
Chairman of the subsidiary company Cy4Gate, a cyber warfare and cyber intelligence company.
She is a founding member, together with 30 other European key players, of the Women4cyber Foundation.
She has been a speaker in countless institutional initiatives focused on innovation. In 2019 she was ranked by Forbes among the 100 female leaders in Italy and voted as one of the top 50 Most Influential Women in Cyber Security by SC Media.
Married and mother of two, she lives in Rome.

ÉRIC BÉRANGER



Chief Executive Officer (CEO) of MBDA

Éric BÉRANGER was named Chief Executive Officer (CEO) of MBDA on 1 June 2019. Prior to joining MBDA, Éric was the Chief Executive Officer of OneWeb, scaling up this high technology, disruptive Unicorn aimed at offering affordable Broadband Internet access for everyone everywhere.
Since starting his career in 1988, he has held management positions in engineering, operations and finance at France Telecom, Société Générale, and Matra Marconi Space (now Airbus Defence and Space). At the inception of EADS in 2000, he was appointed Senior Vice President Marketing for all space activities and successfully led the negotiations of the Skynet 5-Paradigm secure satcoms PFI project with the UK Ministry of Defence.
He subsequently created Astrium Services in 2003. Under his leadership as the CEO, the company has grown its revenues and workforce more than 15 fold from 2003 to 2012 and achieved major successes with contracts including Skynet 5 (UK), Satcom BW (Germany), Yahsat (UAE), Passerel (France) and the acquisition of Vizada at the end of 2011.
In 2012 he became CEO of Astrium Satellites, and major milestones for earth observation satellites contracts were achieved. In 2014, as the head of Programs in the new organization "Airbus Defence and Space", his contribution led to the award of the first full electric propulsion commercial satellites contracts from SES and Eutelsat.
In 2006, he was awarded the prestigious Chevalier de la légion d'honneur for his accomplishments in developing space activities.
Born in 1963, Colonel in the citizen reserve of the French Air Force, he is a graduate engineer from the École Polytechnique and Telecom Paris.
Married with two children, his interests include flying -he holds a pilot's licence, sports and science.

JASON M. BROWN



Jason M. Brown is a Strategic Cloud Advisor at Google, where he supports public sector organizations navigate through their digital transformation. He leads Google's professional services team in delivering cloud-based solutions to U.S. federal agencies, including the Department of Defense.

Jason previously spent 26 years in the United States Air Force as an intelligence officer. During his Air Force career, he led large operational units, helped establish several innovation organizations, and created unique partnerships with emerging technology companies and the venture capital community.

He also founded the Air Force Artificial Intelligence Accelerator at MIT and led the humanitarian assistance/disaster relief initiative for the Department of Defense Joint Artificial Intelligence Center.

THIERRY CARLIER



Thierry Carlier is a General officer of the French Military Armament Corps.
On January, 1st 2018, he was appointed Director of the International Directorate of the DGA, the Acquisition Agency of the French Ministry of Defense, located in Paris.
IGA Carlier graduated in 1990 as an engineer from the French Engineering College Ecole Centrale Paris (speciality: Aeronautics and Space).
After a year of military duty as a Navy officer, he joined the French Defense Acquisition
Agency (DGA).
In 1993, he became head of the technical office for missile ramjet propulsion.
In 1998, he was appointed programme manager for the new generation of advanced ramjet-powered missiles for nuclear deterrence applications.
In 2000, he was appointed head of the procurement policy office of the DGA.
In 2003, he became programme manager for surface-to-air and air-to-air missile systems.
In 2008, he was appointed head of capability for strategic lift, intra-theater mobility, expeditionary logistics and support of the Strategy Directorate of the DGA.
In October 2013, he was appointed Deputy Director in charge of bilateral and multilateral cooperation and European development for the DGA.
He joined in May 2014 the General Secretary for Defense and Security (Staff of the Prime
Minister) as Deputy Director for international, strategic and technological affairs.
IGA Carlier has been awarded the ranks of Chevalier of the Légion d'Honneur and Officier of the Ordre National du Mérite.
IGA Carlier is married and has two children.

TOM COPINGER-SYMES



Major General T R Copinger-Symes CBE

Director Strategy & Military Digitisation, Defence Digital, UK Strategic Command

Tom spent his early career with The Rifles on operations in Northern Ireland, Bosnia, Kosovo, Iraq and Afghanistan – including with 4 RIFLES on Op TELIC 10 and 5 RIFLES on Op HERRICK 15 - as well as operational and strategy posts at PJHQ and MOD.
In 2014 he formed and commanded 1 Intelligence Surveillance and Reconnaissance Brigade, created to integrate the Army's intelligence collection and exploitation capabilities. In 2017, after a year as Assistant Chief of Staff Operations in Army HQ, he led a four-month project to develop the Information Manoeuvre concept to explore the benefits of integrating the Army's information-centric and digital capabilities.
In his next post, as General Officer Commanding Force Troops Command, he led 30,000 of the British Army's specialist soldiers delivering Information Manoeuvre and Theatre Enablement as central contributions to the British Army's approach to a new era of great power competition, culminating in the formation's re-designation as 6th (UK) Division and the move of the Theatre Enablers to 1st (UK) Division.
In August 2019 he took up his current post, newly created to accelerate Defence's Digital Transformation and increase its adoption and exploitation of data and digital technology. Subsequently he has also taken on both the Strategy and Digital Transformation portfolios.
Tom has a range of extracurricular responsibilities, including Assistant Colonel Commandant (Field Army) of The Rifles; Honorary Colonel of the First Aid Nursing Yeomanry; and President of Infantry Football. He also is an Advisory Board member of Nimbus Ninety and a Trustee of Heropreneurs.

STACY A. CUMMINGS



NSPA General Manager

Ms. Stacy A. Cummings was appointed as the NSPA's General Manager in September 2021.
Prior to joining NSPA, Ms. Stacy Cummings served as a career member of the Senior Executive Service in the Office of Secretary of Defense in the United States.
Most recently holding the position of the Principal Deputy Assistant Secretary of Defense for Acquisition (PDASD(A)), Ms. Cummings advised the Assistant Secretary of Defense for Acquisition (ASD(A)) on matters relating to the Department of Defense Acquisition System while advancing innovative, datadriven approaches across the acquisition enterprise.
From January 2021, Ms. Cummings was selected to perform the duties of the Under Secretary of Defense for Acquisition and Sustainment (USD(A&S)).
In this position, she was responsible to the Secretary of Defense for all matters pertaining to acquisition, contract administration, logistics and materiel readiness, installations and environment, operational energy, chemical, biological, and nuclear weapons, the acquisition workforce, and the defense industrial base. When serving as the Programme Executive Officer in the Defense Healthcare Management Systems (PEO DHMS), Ms. Cummings managed the delivery of healthcare and advanced data sharing through a modernized electronic health record for service members, veterans, and their families.
Ms. Cummings also held senior executive positions at the Department of Transportation, where she established strategic direction, provided executive leadership, and managed daily operations as the Executive Director for the Federal Railroad Administration and the interim Executive Director for the Pipeline and Hazardous Material Safety Administration.
Beginning her career with the Department of the Navy, she held senior positions at the Naval Air Technical Data and Engineering Services Command; the Command, Fleet Readiness Centers; the Programme Executive Office for Command, Control, Communications, Computers and Intelligence; and the Space and Naval Warfare Systems Command. Ms. Cummings holds a Master of Science in National Resource Strategy from the Industrial College of the Armed Forces and a Master of Science in Management/ Information Systems from the Florida Institute of Technology. She received her Bachelor of Science in Business Logistics from the Pennsylvania State University. Certified in both Programme Management and Acquisition Logistics, Ms. Cummings is a graduate of the Naval Air Systems Command's Senior Executive Management Development Programme and the Defense Senior Leader Development Programme.
Ms. Cummings received Meritorious and Superior Civilian Service Awards from the Department of the United States Navy, the Meritorious Public Service Award from the United States Coast Guard, the Office of the Secretary of Defense Medal for Exceptional Civilian Service, and the Secretary of Defense Meritorious Civilian Service Award.

MARC DARMON



CEO, Thales

Secure Communications & Information Systems
A graduate of the Ecole Polytechnique and Telecom ParisTech, Marc Darmon is a recognised leader in the technology, defence and security industries. He has spent most of his career in senior leadership roles in the Thales group.
Marc Darmon began his career in 1988 in Alcatel, where he held a number of engineering roles before being promoted head of the company's Defence Networks activity. In 1998 he joined the Thales Group as Infrastructure Networks Director and was subsequently appointed to more senior operational and strategy roles.
In 2004 he was appointed head of Joint Systems business, which combined Thales's communication networks and broadcasting systems activities. In 2006, Marc Darmon was successively appointed Managing Director of the communications business, Senior Vice President of the Naval Division, and finally Senior Vice President, of the Group's Audit & Internal Control function in 2010.
In September 2012, Marc Darmon was appointed Chief Executive Officer in charge of Secure Communications and Information Systems, and joined the Executive Committee of Thales.
He became Chairman of the security industry representative bodies, Conseil des Industries de la Confiance et de la Sécurité (CICS) in 2014, and the Comité stratégique de filière pour les Industries de Sécurité in 2018.
He was elected Chairman of GICAT, which represents France's land defence and security industries, on 1st July 2020.

GORDON B. SKIP DAVIS JR



Skip is currently a Senior Fellow at the Center for European Policy Analysis. He recently served as NATO's Deputy Assistant Secretary General for the Defense Investment Division after retiring from the U.S. military as a Major General. Skip's final positions included Director of Operations, U.S. European Command, Commander of Combined Security Transition Command – Afghanistan, and Director of Operations and Intelligence for Allied Command Operations. Most of Skip's career has been dedicated to NATO and European defense, including assignments and operations with U.S., NATO, and UN forces in Europe, Africa, Middle East and Central Asia. Skip brings a depth of practical experience and conceptual understanding of contemporary and emerging defense issues as well as executive-level experience in operations, intelligence, leader development, capability development, and policy development. Skip holds an undergraduate degree in nuclear physics and graduate degrees in international business, defense and military history, and strategic studies.

ERIK EKUDDEN



Senior Vice President, Chief Technology Officer and Head of Group Function Technology

As Group CTO, Erik Ekudden is responsible for setting the direction of technology leadership for the Ericsson Group. In 2017 he was re-located to Kista, Sweden, after nearly seven-year at Ericsson in Santa Clara, California.
His experience from working with technology leadership globally will influence the strategic decisions and investments in mobility, distributed cloud, artificial intelligence and Internet of Things. This builds on his decades-long career in technology strategies and industry activities.
Ekudden first joined Ericsson in 1993 working on mobile systems research. He has served as research area director and vice president of standardization. During his career, his team created technology and multimedia functionality that are now used in today's smartphones worldwide. This team also conducted some of the first work on virtual and augmented reality for mobile systems. He has worked to create global mobile systems for 3G, 4G and 5G in close collaboration with customers.
He holds a Master of Science degree in Electrical Engineering from the Royal Institute of Technology in Stockholm, Sweden.
Ekudden is since 2020, member of the Broadband Commission for Sustainable Development.

CHRISTOPHE "TARAZ" FONTAINE



Colonel, French Air Force (retired)

Regional Director, Europe International Strategic Development

General Atomics Aeronautical Systems, Inc.

As Regional Director of Europe for International Strategic Development at General Atomics Aeronautical Systems, Inc. (GA-ASI), Christophe "Taraz" Fontaine is primarily responsible for liaising with current customers and promoting opportunities for the company's full line of Remotely Piloted Aircraft (RPA) systems, radars, and electro-optic and related mission systems to European customers.
Prior to joining GA-ASI in 2018, Mr. Fontaine served in the French Air Force for over 30 years as an intelligence officer and retired as Colonel. At a tactical level, he was an intelligence officer in air defense, reconnaissance, RPA, and Combat Search and Rescue (CSAR) squadrons. At an operational level, he worked in the Strategic Air Command and was in charge of Intelligence, Surveillance and Reconnaissance (ISR), CSAR, and Targeting and Time-sensitive Targets; was an instructor in the French Air Warfare Center; and led targeting at the Joint Force Command in Naples. Finally, at a strategic level, he was in charge of ISR procurement and served as a NATO and French ISR doctrine writer (custodian of the latest version of AInt-P-16 IRM&CM) for the French Defense Intelligence Agency and French Air Force Staff. Mr. Fontaine was deployed 28 times around-the-world from 1992-2017 as support to French, NATO, and/or U.S.-led operations, including occupying the position of Deputy CJ2 ISR during Operation Inherent Resolve for six months in 2017.
Key to his current role with GA-ASI, Mr. Fontaine was appointed Squadron Commander of the 1/33 "Belfort" RPA Squadron flying the Harfang in 2011, and in 2013 he became the French Air Force's first MQ-9A Reaper Squadron Commander, conducting numerous anti-terrorist missions in Sahel, Africa. His last position before retiring was senior ISR Division Chief and Advisor to the French Air Force and the Joint Staff.
Mr. Fontaine is a graduate of the French War College and holds Master's degrees in Criminality (Paris ASSAS) and Modern History (Paris EPHE). He has written and published more than 30 articles on ISR. He also has been honored with 13 medals to include the U.S. Army Achievement medal (2018), the Légion d'Honneur (2015), the Légion du Mérite (2013), two gold national defense medals for combat action (2014-2015), and three letters of recommendation signed by the Joint Chief of Staff.

FABIO GALLIA



Fabio Gallia was born in Alessandria (Italy) on August 20, 1963. He is married, has two sons and lives in Rome. He graduated in Economics and Business Administration from the University of Turin in 1987. From 1989, he is a member of the Italian professional order of tax advisors.

HONOURS
In June 2013, he was named Chevalier de la Légion d'Honneur of the French Republic.
In May 2015, he was awarded the Order for Merit of Cavaliere del Lavoro of the Italian Republic.
In February 2019, he received a PhD honoris causa in Management, Banking and Commodity Sciences from La Sapienza University in Rome.

POSITIONS
He is General Manager of Fincantieri S.p.A. from September 2020.
He is board member of Edison (EDF Group), SisalPay (controlled by the private equity firm CVC Capital Partners), Telethon Foundation (leading research institution focusing on rare genetic diseases.
He held previous board positions in Borsa Italiana (Italian Stock Exchange), MTS S.p.A. (an electronic fixed income trading market provider), Ariston Thermo S.p.A. (heating systems and related products), Coesia S.p.A., Manifatture Sigaro Toscano S.p.A. and both in insurance and asset management businesses.

CAREER
In 2018, he founded a M&A advisory firm and from 2019 became Senior Advisor of Brookfield Asset Management, the leading alternative investment firm.
From July 2015 to July 2018, he held the position of Chief Executive Officer and General Manager of Cassa Depositi e Prestiti, the Italian sovereign wealth fund (with assets in excess of €400 bn), whose activities span from infrastructures to alternative investments (private equity and venture capital), export credit agency, real estate and lending.
Prior to joining CDP, from 2008 he was Chief Executive Officer and General Manager of BNL, BNP Paribas Group and member of the Executive Committee of BNP Paribas. From 2009, he was Chairman of the Board of Directors of Findomestic Banca and, from 2012, he managed the BNP Paribas Group in Italy (revenues of €5 bn, total assets in excess of €110 bn and more than 20k employees).
In 2002, he joined Capitalia Group, then Italy's third largest banking Group, as Co-General Manager and Chief Financial Officer in charge of the Group's Finance, Wealth Management and Distribution. In 2003, he was appointed Chief Executive Officer of Fineco (listed sub-holding of the Capitalia Group): in 2005, after a successful turn-around, Fineco was incorporated into Capitalia. From 2005 to 2007, he was Chief Executive Officer of Banca di Roma and Chairman of the Management Committee of the Capitalia Group. Prior to joining Capitalia, in 1990 he was employed by Ersel Asset Management Sgr, the then Italian leading independent asset management firm (Giubergia Group), where he covered roles of increasing responsibility, before becoming General Manager and Partner in 1999.
He began his career in Accenture in 1988.

ANDREA GILLI



Andrea Gilli is a Senior Researcher in Military Affairs at the NATO Defense College in Rome and an Affiliate of the Center for International Security and Cooperation of Stanford University in Palo Alto, CA. Andrea holds a PhD in Social and Political Science from the European University Institute (EUI) in Fiesole (Florence, Italy), an MSc in International Relations from the London School of Economics and Political Science (LSE) and a BA in Political Science and Economics from the University of Turin (Italy). Before joining NDC, Andrea held post-doctoral fellowships at both Harvard (Belfer Center) and Stanford University (CISAC) and visiting fellowships at both Johns Hopkins (SAIS) and Columbia University (Saltzman Institute for War and Peace Studies) and worked in various capacities for the U.S. Department of Defense's Office of Net Assessment, the Italian Ministry of Foreign Affairs, the Preparatory Commission for the Nuclear Test-Ban Treaty Organization, the Royal United Services Institute (RUSI), the European Union Institute for Security Studies (Paris, France), and the Center for Security Studies at Metropolitan University Prague (Prague, Czech Republic).

FRANK HAUN



CEO

KMW + Nexter Defense Systems N.V.

(KNDS)

Frank Haun, born in January 1959 in Marburg/Lahn (Germany), joined Krauss-Maffei Wegmann GmbH & Co. KG in 2003 as Member of the Board. In 2006 he became President & CEO and in 2012 as well President of the Management Board of Wegmann Unternehmens-Holding GmbH & Co. KG. Additionally he was also appointed Co-CEO of the German-French joint venture KMW+Nexter Defense Systems N.V. (KNDS) with its Headquarters in Amsterdam in December 2015, followed by his assignation as single CEO of the company in December 2020.
From 1979 – 1986 Frank Haun studied mechanical engineering at the Technical University of Darmstadt (Germany), where he earned a Master's Degree as Mechanical Engineer (Diplom-Ingenieur).
His professional career began in 1986 at Carl Schenck AG where Frank Haun held various national and international management positions. He started as a Project Engineer, followed by positions such as Director Division Powertrain, President of Schenck Italy (Milano, Italy), Director Sales & Marketing, President of Schenck Pegasus Corporation (Troy/Michigan, USA) and President of Schenck Pegasus GmbH (Darmstadt/Püttlingen, Germany). In 1999 he was appointed Member of the Board of Management and in 2000 President & CEO of Carl Schenck AG (Darmstadt, Germany). Additionally he was appointed Member of the Board of Dürr AG (Zuffenhausen, Germany) in 2001.
Frank Haun is member of the Advisory Board of Commerzbank AG (Frankfurt, Germany). In 2010 he became Member of the Advisory Council of the Munich Security Conference – a unique platform to support the dialogue between all nations and cultures. As a Member of the Board of Directors of the Atlantic Council, Frank Haun is also engaged in the promotion of the transatlantic cooperation and international security.

ANGELA L. HEISE



Corporate Vice President

Angela Heise ("Angie") is Corporate Vice President Defense and Intelligence at Microsoft. In her role, she leads the development and execution of Microsoft's strategy and go-to-market approach for the worldwide defense and intelligence industry. Angie previously served as President of Leidos Civil. In this capacity, she was responsible for providing solutions to U.S. Cabinet-level civil agencies and major elements of the public and private sector across the globe. Leading a 10,000-person business focusing on information technology and cybersecurity, air traffic automation, energy and the environment, federal infrastructure and logistics, and transportation security. At the Lockheed Martin Corporation, Angie served in the position as Vice President, Lockheed Martin - Commercial Cyber. In her role, she was responsible for the delivery of a portfolio of cybersecurity and information technology solutions and services to commercial Global 1000 customers. She was focused on accelerating growth in our commercial cyber business and structuring the business for scale. Angie also served as the Vice President of Enterprise Information Technology. In this capacity, she was responsible for leading the Corporation's information technology business serving the Department of Defense customers to operate and defend their global networks, managing eight major data centers, hosting 200 Air Force and Army mission applications, and providing IT support for senior leaders in the Pentagon. During her tenure in this capacity, her team was responsible for two major international wins to include the new NATO headquarters IT infrastructure design and implementation and the Australian Data Center Consolidation Program. Her organization consisted of over 3000 employees worldwide providing IT services to millions of users. Previously, she was Director for Lockheed Martin Corporation's Army Corps of Engineers – Information Technology program located in Vicksburg, Mississippi. In that role, she was responsible for leading a team of 800 engineers and technicians across the country providing innovative IT support, operating two major data centers, and supporting over 2000 field sites in a 24x7 setting from October 2010 to September 2012. Under her leadership, she significantly improved the IT service for the Army Corps of engineers across the country. Angie graduated from Southern Illinois University with a Bachelor of Science in Computer Science and completed Harvard's Advanced Management Program in 2018. She currently serves as a member of the board of directors of Essent Guaranty as a member of the Technology, Innovations and Operations Committee.

ERNEST J. HAROLD



Executive Director, International Institute for Strategic Studies-Americas

E.J. Herold leads the Washington, DC office of the London-based IISS. The IISS is a research organization that convenes the Shangri-La and Manama Dialogues, produces The Military Balance and the Journal Survival, among numerous publications. At IISS-Americas, he is responsible for promoting research and publications of the world-renowned research staff while developing a program of advisory and research activities.
Mr. Herold has enjoyed a career in international affairs study and practice, primarily between posts in the US and Europe. He served at NATO Headquarters as Deputy Assistant Secretary General for Defence Investment, is a retired US Army Colonel, and a former IBM Executive. More recently, he was an Adjunct Senior Fellow at the Center for a New American Security (CNAS). In addition to his native English, he speaks French and German, has lived more than 20 years in Belgium, France, and Germany, and has travelled in North Africa, the Middle East, Central Asia, China, and Australia.
Mr. Herold has a Bachelor of Science from the US Military Academy at West Point NY, a Master of Science in Foreign Service from Georgetown University, a Master of Science in Strategic Studies from the US Air Force Air University, and diplomas from the French Joint Staff and Armaments War Colleges in Paris.
In addition to his military awards and decorations, he has been recognized for significant contributions by the German, Italian and Ukrainian governments.

EIRIK LIE



Eirik Lie is Executive Vice President of Kongsberg Gruppen ASA (KONGSBERG) and President of Kongsberg Defence & Aerospace AS, a business area within KONGSBERG.

Kongsberg Defence & Aerospace is Norway's premier supplier of defence and aerospace-related systems and solutions. The company is a leading supplier of defence products and systems for command and control, surveillance, space, tactical communications, remote weapon stations and missiles systems. Kongsberg Defence & Aerospace also has extensive capabilities within advanced composite manufacturing and maintenance, repair and overhaul within the aircraft and helicopter market.
Prior to his current positions, Lie was the Executive Vice President of Integrated Defence Systems division for Kongsberg Defence & Aerospace. In this role he was responsible for Air Defence Programs, Integrated Naval Combat Programs, air- and land based C4ISR, and Ninox Remote Tower Programs.
Since joining KONGSBERG in 1990, Lie held different positions of increasing responsibility, including software development, systems engineering and several projects and departmental management positions.
He has also been head of the communication division located in Asker, Norway.
Lie is Chairman of the Board of Directors of Kongsberg Satellite Services (KSAT), a company jointly owned between KONGSBERG and Space Norway. He is also a member of the Board of Directors of Patria Oyj, a defence and technology company in Finland, where KONGSBERG owns 49.9% of the shares.
Lie holds a degree from Kongsberg College of Engineering, Data Engineering and has attended the Royal Norwegian Navy Officer Candidate School.
KONGSBERG (OSE-ticker: KOG) is an international, leading global technology corporation delivering mission-critical systems and solutions with extreme performance for customers that operate under extremely challenging conditions. We work with nations, businesses and research environments to push the boundaries of technology development in industries such as space, offshore and energy, merchant marine, defence and aerospace, and more. KONGSBERG has about 11,000 employees located in more than 40 countries, creating a total revenue of NOK 25.6bn in 2020.

MARCELA MONAHAN



Brigadier General, U.S. Marine Corps (Ret)

General Monahan supports clients in business development and strategic growth efforts, using her significant expertise and experience in military doctrine, force readiness and security requirements integration, as well as capacity building and sustainment programs and international relations. She delivers strong industry and military experience in strategic and risk assessments, foreign military sales, U.S. Marine Corps and joint capability program priorities, as well as force support, warfighting and logistics arenas.
In her 31 year career in the U.S. Marine Corps, General Monahan served in several key Command and Staff positions, including Assistant Chief of Staff, G-7 Engineer for Multi-National Force-West in Al Anbar Province, Iraq, Director, Joint Capabilities Assessment & Integration Division, where she supported the Assistant Commandant in identifying and setting USMC, Joint and Combatant Commander capability and programmatic priorities and recommendations, as well as Assistant Deputy Commandant, Combat Development & Integration, focused on developing fully integrated Marine Corps warfighting capabilities; including doctrine, organization, training and education, materiel, leadership, personnel, and facilities to enable the Marine Corps to field combat ready forces. At retirement General Monahan was serving as Director, Manpower Management, directing personnel actions, implementing Marine Corps plans and policies, and conducting analysis, planning and budgeting, in order to staff and maintain the 190K Force.
In addition to her Marine Corps career, General Monahan held various other industry positions to include, DRS Technologies, AM General, The Spectrum Group, Strategic Resilience Group, Motive International, Amazon and currently Booz Allen Hamilton. She has developed operational markets by working with senior Latin American political and military leadership to develop country-level and multi-national tactical mobility programs with life-cycle operational integration, interoperability, and sustainment. She managed several CONUS and OCONUS programs spanning Multi-National Force-Iraq, Army Sustainment Command, Joint Telemedicine, Defense Communications and Transition Systems, and Joint Improvised Explosive Device Defeat Organization.
General Monahan positions and empowers transformation with a service centered ethos while laser focused on fusing requirements and capabilities. She is a Team Rubicon Grey Shirt and member of Veterans of Foreign Wars. Her passion lies in helping others heal.

BETH MC GRATH



Honorable Elizabeth (Beth) McGrath Government & Public Services Leader Deloitte

Beth McGrath leads Deloitte's Global Government and Public Services practice, which includes the Defense, Security & Justice sector. Beth has broad, multi-disciplined, strategic and operational management experience acquired from 25+ years successful performance in the Federal Government, while in positions up to the Undersecretary level of the Department of Defense (DoD). She possesses exceptional interpersonal skills with specific expertise in strategic planning and performance management, investment reviews and program management, and thought leadership and transformation.
Prior to joining Deloitte, Beth was confirmed by the Senate as the Deputy Chief Management Officer for the U.S. Department of Defense (DoD). During her tenure, she addressed numerous management challenges, in part by instituting an investment review process for the Department's $7 billion of "business IT" systems, authoring the DoD's Strategic Management Plan (SMP) and overseeing needed improvements to the Department's business architecture and security clearance processes. She also advised the Secretary and Deputy Secretary of Defense on matters relating to management and the improvement of business operations. Beth was extraordinarily effective in transforming the approach to business operations away from short-term, risk averse, status quo behaviors to a more strategic, enterprise-focused environment. She brought a dedicated focus to improving the business operations, and her business-minded approach reaped great dividends for the DoD in the areas of strategic planning, performance management, change management, process improvement, and business information technology acquisition and investment management.
Beth served as the vice chair of the Federal Suitability and Security Clearance Performance Accountability Council overseeing government-wide security clearance process reforms. She has extensive experience designing, executing and overseeing complex interagency partnership programs involving Senior White House officials and multiple Heads of Agencies/Departments. She has developed strategies to modify national policy, streamline interagency practices and modernize IT capabilities in areas as diverse as suitability and security clearance processing and military and veteran's health services/information technology.
She also served as the Deputy Director for Systems Integration, Defense Finance and Accounting Service where she created a financial migration strategy that included a comprehensive architecture and identification of DoD-wide systems valued at more than $1 billion. Additionally, Beth held numerous business/acquisition roles within the Department of the Navy.
Beth holds a Bachelor of Science degree in economics from George Mason University and is a graduate of the Federal Executive Institute. She is Acquisition certified program manager, a member of the DoD Acquisition Professional Community; and a member of the National Academy of Public Administration. Her awards include: National Intelligence Meritorious Unit Citation, Presidential Rank Award, and Office of the Secretary of Defense Exceptional Civilian Service Medal. She twice received the DoD Medal for Distinguished Public Service. Beth has been recognized by Government Computer News with the Defense IT Executive of the Year award, and she has received multiple Federal 100 awards.
She holds a Top Secret Clearance.

IGNATIO MATAIX



CEO of Indra

Born in Madrid in 1962. He holds a Bachelor's Degree in Law and Economics (ICADE) and Master's degree, CEO International Programme (IESE Business School). He has a wide and varied professional experience, having held senior level positions at large multinational investment banks, leading engineering companies and high-tech manufacturers.
He began his professional career in ABN Amro Bank, where he became Managing Director in London. During its period in London he was in charge of co-manage the ABN AMRO Rothschild joint venture in equity capital markets and structured products for Latam.
On his return to Spain, he held the ABN AMRO General Management and he was CEO of the securities and exchange company.
In 2000, he was appointed General Manager of Corporate Development of SENER. In 2004, he joined ITP (Industria de Turbo Propulsores) as group CEO. He also has been Director in EUROJET Gmbh and Chairman in Europrop S.A. and Precicast Bilbao, S.A. On January 2018 he was appointed Executive Director of Indra and T&D business Senior Vice President and in May 2021 he has been appointed CEO of Indra.

MART NOORMA



Prof. Mart Noorma is the Science and Development Director of Milrem Robotics, and Professor of Space and Defense Technology at the University of Tartu, Estonia. He leads strategic research and development at Milrem Robotics, a manufacturer of unmanned ground vehicles for defence and civilian applications. Milrem Robotics works together with armed forces to be better prepared for the changes modern robotics technology will introduce to military operations.
Noorma is a member of the Institute of Electrical and Electronics Engineers' (IEEE) Autonomous Weapon Systems Expert Advisory Committee, Estonian representative to the NATO Science & Technology Organization's Applied Vehicle Panel, and team lead for several NATO Industrial Advisory Group and Science & Technology Organization study groups.

LÁSZLÓ PALKOVICS



Minister for Innovation and Technology of Hungary

László Palkovics was appointed Minister of the Ministry for Innovation and Technology of Hungary in May 2018 after serving as Minister of State for Higher Education between 2014-2016 and later as Minister of State for Education between 2016-2018.
On 1 February 2019 Minister Palkovics was appointed as Government Commissioner for the coordination of the tasks prescribed in Act XXIV of 2016 on the promulgation of the Agreement between the Government of Hungary and the Government of the People's Republic of China on the development, implementation and financing of the Hungarian section of the Budapest-Belgrade Railway Reconstruction Project.
In April 2020, he was appointed as Government Commissioner responsible for the automotive centre in Debrecen and the sustainable economic, educational and cultural development of its surroundings, as well as for the development of motorsport and road safety.
Since 5 September 2020 he has been also responsible for the complex development of the North-Eastern Hungarian Economic Development Zone as Government Commissioner.
Minister Palkovics held senior research positions at the Budapest University of Technology and Economics and the College of Kecskemét. Prior to that, he pursued an international, executive-level industrial career with Knorr-Bremse.
Minister Palkovics completed his master's degree and Ph.D. in engineering, specializing on vehicle mechanical engineering at the Technical University of Budapest. He received the doctoral title at Hungarian Academy of Sciences in 1998.
Minister Palkovics is a full member of the Hungarian Academy of Sciences.

RUDY PRIEM



Chairman of the NATO Industrial Advisory Group (NIAG)

Rudy joined the Raytheon Technologies (RTX) Government Relations team in Brussels on April 3, 2020. He is responsible for communicating the positions and concerns of RTX in matters of defense, security and space to policy and decision makers in Europe and at NATO. He also monitors and advises the business units of RTX on European and NATO policy decisions and business opportunities.
Between 2010 and 2020, prior to the merger between United Technologies (UTC)' aerospace businesses and the Raytheon company, Rudy served as UTC's Director for Government Relations EMEA & NATO in Brussels. In that position, he communicated the positions and concerns of UTC in matters of defense, security and space to decision makers in Europe, the Middle East, Africa and NATO. He also monitored and advised UTC's business units (Pratt & Whitney, Collins Aerospace and Carrier Fire & Security) on European, Middle Eastern, African and NATO policy decisions and business opportunities.
Prior to joining UTC in 2010, Rudy served as an Officer in the Belgian Air Force. During his military career, Rudy dealt mainly with operational and acquisition logistics. He lived and worked twice in the USA (as F-16 Liaison Officer at Hill Air Force Base in Utah (1990-1994), and as Defense Cooperation Attaché and Director Belgian Military Supply Office (for FMS + DCS Purchases) in Washington, DC (2005-2009). From 2005 to 2009, Rudy was the Head of the Belgian Delegation to the Defense MOU Attachés Group (DMAG) and founding member/ first Chairman of the Foreign Procurement Group (FPG)'s Foreign Commercial Procurement Working Group (FCPWG) in Washington DC. From 2000 to 2010, Rudy also provided legal advice to Belgian military leadership on HR- and acquisition-related matters. In 2010, Rudy retired from the Belgian Air Force in the rank of Lieutenant Colonel.
Rudy is a 1984 graduate of the Belgian Royal Military Academy, where he obtained a master's degree in Military and Aeronautical Sciences. In 2000, Rudy obtained a master after master's degree in Public and Military Administration and earned both the Belgian Chief of Defense's and the Belgian Joint Forces Staff College Alumni Association's Prizes as best student. Rudy is also an alumnus of the 2011 European Session for Armament Officials (SERA) course in Paris and of the 2012 UTC Emerging Leaders Program (ELP) course at the University of Virginia's Darden School of Business. Rudy holds the Meritorious Service Medal for meritorious non-combat service to the U.S.
Rudy successfully completed several other courses in Belgium and abroad, including the NATO Logistics Course (NATO Logistics School - Hamburg - Germany), the Security Assistance Management Foreign Purchaser Course (Defense Institute for Security Assistance Management (DISAM) at Wright-Patterson Air Force Base - Ohio), the Logistical Support of United Nations Peacekeeping Operations Course (UN Institute for Training and Research (UNITAR) - Dag Hammarskjöld Centre - New York) and the Basics of U.S. Commercial Contracting Course (Federal Publications Seminars - Washington DC).
From 2010 through 2017, Rudy served as the Deputy Head of the Belgian Delegation to the NATO Industrial Advisory Group (NIAG). Since January 2020, Rudy chairs the NIAG. He's also a member of the Economic, Legal and Trade (ELT) Commission within the European Aerospace and Defence Industries Association (ASD). Since November 2015, Rudy serves as Chairman of the American Chamber of Commerce to the EU's Security, Defence and Space Committee (AmCham EU SDC). In 2018, Rudy was awarded Fellowship of the Royal Aeronautical Society (RAeS); since October 2018, Rudy is a member of the RAeS Learned Society Board (LSB).
Rudy co-chaired two NIAG studies on Transatlantic Defense Technological and Industrial Cooperation (TADIC) and is author or co-author of several position papers and articles on total quality management, performance measurement and the U.S. export control regime. Rudy is a visiting lecturer in "NATO and EU Defense Acquisition Policies" at the Belgian Royal Higher Institute for Defence (RHID), the Institut des hautes études de défense nationale (IHEDN) in Paris and the U.S. Naval Postgraduate School (NPS) in California (U.S.). He's also a regular contributor to the Global Industrial Cooperation Association (GICA) conferences.

ALESSANDRO PROFUMO



Chief Executive Officer Leonardo

Alessandro Profumo is Chief Executive Officer of Leonardo S.p.a. since May 2017. He is also Honorary Chairman of AIAD (the Italian Industries Federation for Aerospace, Defence and Security), President of the Aerospace and Defence Industries Association of Europe (ASD), Co-Chairman of the Italy-Japan Business Group.
Born in Genoa (Italy), he holds a degree in Business Economics from Bocconi University. In 1977, he began his career at Banco Lariano. In 1987, he joined McKinsey & Company and in 1989 he joined Bain, Cuneo & Associati. In 1991, he was appointed General Manager in RAS - Riunione Adriatica di Sicurtà, responsible for the banking and parabanking sectors. In 1994, he joined Credito Italiano (today Unicredit), where he was appointed Deputy General Manager and put in charge of Planning & Group Control. A year later, he was appointed Chief General Manager and, in 1997, he was appointed Chief Executive Officer, a position that he maintained also with Unicredit Group till 2010. Under his leadership, Unicredit Group became a European leading player, growing from 15,000 to over 162,000 employees, with branches in 23 countries. From 2012 to 2015, he was Chairman of Monte dei Paschi di Siena Bank, and from 2015 to 2017 Board Member and Chairman of Equita SIM.
Profumo was appointed Cavaliere del Lavoro in 2004 and decorated Grande Ufficiale Ordine al Merito della Repubblica Italiana (Grand Officer Order of Merit of the Italian Republic) in 2005.

OLI RUUTU



Deputy Chief Executive EDA

Mr. Olli Ruutu was appointed Deputy Chief Executive of the European Defence Agency on 15 November 2017; he took up his duties on 16 March 2018.
Previously Mr Ruutu served as Deputy National Armaments Director at the Ministry of Defence of Finland and Director of Materiel Unit at the Resource Policy Department. He also chaired the Defence Administration Commercial Board and the Export Control Advisory Group and was Deputy Chairman of the Defence Materiel Steering Group, as well as a member of the Defence Forces' Technology Board and the Defence Administration's Industrial Cooperation Group.
Between 2009 and 2014 Mr Ruutu worked at the European Defence Agency, first as Principal Officer and subsequently as Deputy Head of Strategy and Policy Unit. Appointed by Dr Jussi Niinistö, the Minister of Defence of Finland, Mr Ruutu took part in the European Defence Agency's Long-Term Review in 2016-2017.
From 2006 to 2009 Mr Ruutu worked as Defence Counsellor at the Finnish Permanent Representation to the European Union, dealing with EU's Common Security and Defence Policy and defence capability development.
Between 2007 and 2009 he worked also as National Armaments Director Representative (NADREP) at the Mission of Finland to NATO.
From 2003 to 2006 Mr Ruutu held different positions at the Ministry of Defence of Finland, dealing with arms export controls and international armaments cooperation.
During 2001 and 2002 he worked for the Ministry for Foreign Affairs of Finland, dealing with international arms export controls and disarmament issues.
Mr Ruutu was born in Espoo, Finland, in 1976. He is married and has three children. He holds a Master's degree in Political Science (International Relations) from Helsinki University, Finland. In addition to his mother tongue Finnish, Mr Ruutu is fluent in English and Swedish and speaks French and German.
Mr Ruutu has been awarded the decoration of a Knight of the Order of the White Rose of Finland and a Medal for Military Merits.

MICHAEL SCHOELLHORN



CEO of Airbus Defense and Space

Michael Schoellhorn has been Chief Executive Officer (CEO) of Airbus Defence and Space since 1 July 2021 and is a member of Airbus' Executive Committee, responsible for Airbus's defence, space, unmanned air services and connected intelligence activities.
Previously, he was Airbus Chief Operating Officer (COO) and a member of the Company's Executive Committee. In this position, he led the production, quality, procurement and information management organisations, transforming and building the production system of the future.
Michael joined Airbus in February 2019 from BSH Home Appliances, where he was COO and a member of the company's Management Board from 2015 until his departure.
Michael began his career in 1984 in the German armed forces, where he served as an officer and a helicopter pilot until 1994, with assignments in Germany and the US. Michael worked in academia as a research assistant at the Helmut Schmidt University (University of the German armed forces) in Hamburg (1994-1999). He started out his career with Bosch in 1999 and held various senior management positions in the automotive sector in the US, the Czech Republic and Germany before being appointed EVP for Manufacturing and Quality in 2012.
Michael is a member of the presidency of BDLI (the German aerospace industries association), chairman of the Supervisory Board of Airbus Germany (Airbus Operations GmbH), Managing Director of Airbus Defence and Space GmbH, member of the Board of Directors of Airbus Defence and Space Inc US and member of the Board of Directors of Stratasys.
He holds a degree in Mechanical Engineering and a PhD in Control Engineering, both from the Helmut Schmidt University.

THOMAS J. SHARPY



Tom Sharpy has over 34 years of proven global leadership capabilities with the United States Department of Defense, leading thousands of men and women in peacetime and crisis operations. He culminated a distinguished military career as the lead North Atlantic Treaty Organization (NATO) senior executive responsible for developing operational and strategic capability requirements on behalf of 30 NATO nations. Additionally, he served as the Command Innovation Representative, Air Domain Cross-functional Champion, and Champion for NATO's Command and Control, Cyber Security and Joint Air Power Competence centers of Excellence.
Tom is a proven strategic team builder with a successful track record leading complex multinational organizations of up to 100,000 people. A skilled strategic planner adept at prioritizing multiple complex tasks, he painstakingly transformed operating bases and force structures across Europe, Africa and the United States, as well as oversaw the initial delivery of the newest US Air Force (USAF) tanker aircraft, the KC-46. As Air Mobility Command's Chief Financial Officer, he planned and allocated annual budgets in excess of $15B covering 1100 aircraft and 10 major installations. Capitalizing on exceptional international skills and experience, Tom led the task forces overseeing combat operations in Libya and the hurricane relief efforts in Puerto Rico. Perhaps most rewarding, he served as Senior Military Aide to the Vice President of the United States and was lauded by Vice President Cheney for swift and accurate actions instrumental to the Nation's response during the 9-11 attacks.
A Command Pilot with over 4,000 flying hours, Tom held command positions at Air Mobility Command, 18th Air Force, the 92nd Air Refueling Wing, and the 60th Air Mobility Wing at Travis AFB CA, the largest air mobility organization in the USAF, among other key command assignments. Tom also has a strong forte with human resources. At the Pentagon, he oversaw the executive development, talent management and career mapping for all USAF General Officers.
He and his wife Lori have been married thirty-one years and moved 21 times during their military career. They have two sons serving in the US Air Force, both pilots flying the C-17 strategic airlifter. Born in Dearborn Michigan, he is the youngest of eleven children and followed in the footsteps of his father who lived a life of service culminating as Fire Chief in Northlake IL. Tom graduated from the Air Force Academy with a Bachelor of Science in Management (1987), earned a Louisiana Technical University Masters in Business Administration (1994), is a graduate of the Industrial College of the Armed Forces with a Masters of Science in National Resource Strategy (2006) and completed the Senior Executive Fellowship at Harvard University (2011).

JAMES D. TAICLET



Chairman, President and CEO of Lockheed Martin Corporation.
James Taiclet is chairman, president and chief executive officer of Lockheed Martin Corporation. He became chairman in March 2021, after joining the company as president and CEO in June 2020. He has been a director on the Lockheed Martin board of directors since January 2018. Prior to joining Lockheed Martin, Taiclet was chairman, president and chief executive officer of American Tower Corporation, the fourth largest listed telecommunications company in the U.S. Under his leadership as CEO, the company's market capitalization grew from approximately $2 billion to over $100 billion. He guided the company's transformation from a primarily U.S. business to the only truly global player in its industry, with significant assets and operations in 19 countries around the world. Prior to joining American Tower, Taiclet served as president of Allied Signal, subsequently Honeywell Aerospace Services, conducting worldwide aircraft engine and component overhaul and repair, parts sales and distribution, space operations, and technical services. Prior to that he served as vice president, Engine Services at Pratt & Whitney, responsible for both military and commercial jet engine overhaul and repair. Taiclet began his career as a U.S. Air Force officer and pilot, where he logged over 5,000 flying hours as an aircraft commander, instructor pilot, and unit chief of Standardization and Evaluation. His rotational assignments included the Joint Staff and Air Staff at the Pentagon, and he served in the Gulf War and among other missions, was a pilot in one of the first transport aircraft deploying U.S. forces into Saudi Arabia during Operation Desert Shield, a Lockheed C-141B Starlifter. He holds a master's degree from Princeton University, where he was awarded a fellowship at the Woodrow Wilson School, and he is a distinguished graduate of the U.S. Air Force Academy with degrees in engineering and international relations. Taiclet is a member of the Council on Foreign Relations, the Business Roundtable, and the Business Council. He also serves as a member of the Board of Trustees of Brigham and Women's Health Care, Inc., and the Board of Directors of Catalyst. In August 2015, he was appointed to the U.S.-India CEO Forum, and, in October 2018, he was appointed co-chair of the U.S.-India CEO Forum by the U.S. Department of Commerce.

FRANCESCO M. TALÒ



Ambassador Francesco M. Talò
* Born in La Spezia, August 16, 1958
* Degree in Law (summa cum laude), University of Rome, 1982
* Lieutenant in reserve of the Carabinieri Corps
* Married with Ornella Romano and father of three children
* Enters Diplomatic Service on March 1st, 1984

2017 – Ministry of Foreign Affairs, Coordinator for Cybersecurity
2017 – 2018 Ministry of Foreign Affairs, Coordinator for the OSCE Conference against anti-Semitism
2012 – 2017 Ambassador of Italy to the State of Israel
2011 – 2012 Special Envoy of the Minister of Foreign Affairs for Afghanistan and Pakistan
2007 – 2011 Consul General in New York
2006 – 2007 Ministry of Foreign Affairs, Director for South America
2005 – 2006 Prime Minister's Office, Deputy Diplomatic Advisor
2002 – 2005 Prime Minister's Office, First Counsellor (Diplomatic Advisor's Staff)
1998 – 2002 Permanent Mission to the United Nations in New York
1997 – 1998 Ministry of Foreign Affairs, Minister's Office
1996 – 1997 Ministry of Foreign Affairs, General Secretariat
1995 – 1996 Task Force for the organization of the Italian Presidency of the EU
1991 – 1995 Embassy of Italy in Bonn
1987 – 1991 Embassy of Italy in Tokyo
1984 – 1987 Ministry of Foreign Affairs, Press and Information Service

GIANDOMENICO TARICCO



Minister of Defence Secretariat General of Defence & National Armaments Directorate

Major General Giandomenico TARICCO Director of 4th Department

Major General Giandomenico TARICCO was born in Turin on June the 8th 1964. He Joined the Italian Air Force Academy in 1983 (Centauro IV Course) and graduated in 1988. In the same year he was assigned to the 5th Wing equipped with F104S as All Weather Interceptor and then to Amendola AFB where he served as instructor on G91T aircraft.
In 1993 he was assigned to 155th Squadron of the 50th Wing in Piacenza where he got the Combat Readiness as all-weather Fighter Bomber and Electronic Tactical Suppression, flying on TORNADO IDS and then on the ECR version. He took part in NATO operations in Former Yugoslavia and Kosovo in 1999.
During his assignment in Piacenza, he held the post of Commander of the 416th and 364th Flights, of the 155th Squadron and also the post of Chief of the Wing Operations Office.
In 2001 he was assigned to the Air Staff in Rome as Deputy Chief of the Operations Office. In 2004 he was assigned to the 3rd Department of the Air Staff appointed as Chief of International Cooperation Office and Chief of the 5th C4ISTAR Planning Office.
In the period from 2008 to 2010 he commanded the 51st Wing equipped with AMX aircraft, deploying to Afghanistan in support of ISAF operation.
In 2010 he was assigned to the Joint Intelligence Centre where he firstly served as Deputy Commander and then, from 2013 to 2016, as Commander of the Centre and Deputy Chief of 2nd Department of Italian Defence General Staff.
In July 2016 he assumed the position of Chief of Logistic Branch of the Italian Air Force General Staff where, promoted Maj. Gen. in January 2018, on 27th April of the same year he assumed also the position of Chief of Economic and Financial Branch.
In date 10 July 2018 he left the position of Chief of 4th Department keeping the direction of the Economic and Financial Branch of the Italian Air Force General Staff.
From 01 March 2019, he has been appointed as Director of the 4th Department – Armament Programs Coordination within the Defence General Secretariat/National Armament Directorate in Rome.
Maj. Gen. TARICCO has over 3400 flying hours in training and combat aircraft including SF260, SIAI 208, MB339A/C/D, G91T, TF104-F104, TORNADO IDS-ECR, AMX and AMX-T and Grob G.103.
He attended the 57th Course at the War School in Florence in 1993 and the 98th Senior Course at the NATO Defence College in 2001.
In 2011 he attended the International Intelligence Directors in United Kingdom.
In August 2017 he attended at Defense Resources Management Institute of the Naval Postgraduate School in Monterey (CA) the Senior International Defense Management Course.
General Taricco has a degree in Aeronautical Sciences, in Political Sciences-International Relations and a Master in Geopolitics economic globalization and international institutions.
He is awarded with Decorations of Knight of the Italian Military Order, Officer of the Order of Merit of the Italian Republic, Mauritian Medal, Gold Medal for Long Command, NATO medal for operations in Former Yugoslavia, Kosovo and Libya and National Intelligence Meritorious Unit Citation.
He is married and has two daughters.

CATHERINE WARNER



Dr. Catherine Warner
Director, Centre for Maritime Research and Experimentation NATO Science and Technology Office
Catherine Warner is the Director of NATO's Centre for Maritime Research and Experimentation in LaSpezia, Italy. She was selected in 2017 following 25 years' experience in defence science and technology, studies, analyses, management, and operational test and evaluation.
Dr. Warner was the primary technical advisor to the Director, Operational Test and Evaluation within the US Office of the Secretary of Defense; her mission was to ensure the office fulfilled its statutory responsibility on the oversight and reporting of test and evaluation results for major weapons systems to Congress and senior Defence Department leadership. She was an active participant with academia and government researchers developing modern statistical methods for defense test and evaluation. She was responsible for developing executive training for military and civilian test and acquisition professionals in the fields of requirements development, design of experiments, reliability management and human factors. For the past two years, she was the technical director for the international procurement of high power ground based radars as part of major upgrades to the US open air test and training ranges.
In 2013 at the request of the Defense Information Systems Agency (DISA), Dr. Warner deployed to Kabul, Afghanistan for 16 months in support of NATO's International Security Assistance Force (ISAF) and the US Operation Enduring Freedom (OEF). She led a team of Information Technology specialists in advising Afghanistan's Ministry of Communications and Information Technology on enhancing national communication capabilities for the security and economic growth of the country. The primary focus of this team included supporting the completion of Afghanistan's National Fiber Optic Ring, Spectrum Management, and Cyber Security.
From 1991 to 2010, Dr Warner was a research staff member at the Institute for Defense Analyses in Alexandria, Virginia where she performed analysis of operational tests for Army, Navy, and Air Force systems. She was an Assistant Director and the lead for Air Warfare. Her analysis portfolio included major aircraft systems such as the F-22, F/A-18E/F, V-22, and H-1. Earlier, she was the lead analyst for Unmanned Aerial Vehicle (UAV) systems including Predator, Shadow, Hunter, and Global Hawk.
Previously Dr Warner worked at the Lawrence Livermore National Laboratory. She grew up in Albuquerque, New Mexico, attended the University of New Mexico and San Jose State University as an undergraduate and earned both M.A. and Ph.D. degrees in Chemistry from Princeton University.
During her career, Dr. Warner earned the NATO Meritorious Civilian Service Medal, DISA Exceptional Civilian Service Award, and the Presidential Rank Award.

ROBERT WEAVER



Since September 2021, Robert is NATO's Deputy Assistant Secretary General for Defence Investment.
He previously served as Deputy Assistant Secretary General for Emerging Security Challenges, working on Emerging and Disruptive technologies and their adoption at NATO, counter-terrorism, and all policy and practical issues on cyber defence.
Robert began his career at NATO Headquarters in 1995, having previously worked for the European Commission and leading his home region's representation to the European institutions.
His first positions at NATO involved relations with partners and evolved into a focus on designing, running and implementing the enlargement process.
From 2003 he led the development of NATO's relations with partner countries in the Balkans, the Caucasus and Central Asia. In 2006 he was selected as a member of the Secretary General's reform group, brought together to modernize how NATO works.
In 2009 he joined the Private Office of Secretary General Fogh Rasmussen in the new position of First Deputy Director and subsequently worked for Secretary General Stoltenberg.
Robert remained in that position until July 2017.
He is married with two children.

CHARLES WOODBURN



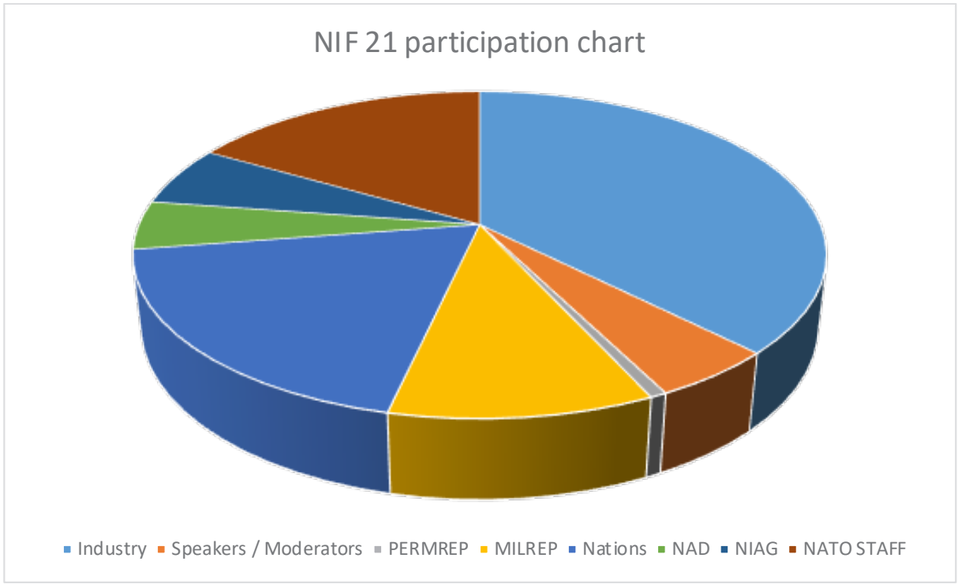
Group Chief Executive Officer

Charles is Group Chief Executive Officer of BAE Systems plc. He joined BAE Systems in May 2016 as Chief Operating Officer, Executive Director on the BAE Systems plc Board of Directors, Director on the BAE Systems, Inc. Board of Directors and became Group Chief Executive Officer on 1st July 2017.
Previously, Charles held a number of senior management positions in the oil and gas industry including Chief Executive Officer of Expro Group, an oilfield services business. During a 15-year career with Schlumberger, Charles worked in the Far East, Australia, France and the United States.
Charles holds a First Class Honours Degree in Electrical Sciences and a PhD in Engineering from Cambridge University. He also holds an MBA from Erasmus University, Rotterdam and is a Fellow of the Royal Academy of Engineering.
When he's not at work: Married with two children, Charles is a keen cyclist, skier and car enthusiast.

Conference Attendance

The total number of attendees for the NATO-Industry Forum 2021 in Rome, Italy was close to 600. A more detailed breakout is as follows:

Ambassadors, Permanent Representatives:	4
Military Representatives and their teams:	63
National Armaments Directors or their representatives:	29
NATO Industry Advisory Group members:	37



NATO Staff (International Staff, International Military Staff, but also some NATO Force Structure elements registered under this label):	101
Industry and other private organisations:	227
Speakers and moderators (Industry, think-tanks and academia, NATO and other senior officials):	42
International Organisations, Governmental Organisation, National military:	108

The total number of Support staff was 80. A more detailed breakout is as follows:

NIF Organising team:	18
Protocol, aides, personal assistants:	10
Host Nation Support:	52

NATO

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NATO-Industry Forum

Rome, Italy
17-18 Nov 2021

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