FOREWORD

The NATO-Industry Forum 2018 took place in Berlin, Germany, on November 12-13, under the theme: ‘Innovation and Disruptive Technologies’. The event attracted more than 450 participants, including National Armaments Directors, the Chairman of the Military Committee and Chief Executive Officers (CEOs) and senior representatives from leading defence companies.

Under the sponsorship of NATO Secretary General Jens Stoltenberg, the Forum welcomed the participation of the EU Commissioner for Internal Market, Industry, Entrepreneurship, and Small and Medium-sized Enterprises (SME), Elżbieta Bieńkowska, emphasising the strong NATO-EU cooperation on research and development, innovation and capability development.

The remarkable level of attendance, and the expertise demonstrated in the specialised breakout sessions, as well as in the policy and strategy plenary sessions, reflected the attractiveness of the NATO-Industry Forum as the consecrated venue to stimulate an open and frank debate on the engagement and cooperation between NATO and Industry in the development of capabilities.

The Forum continued to prove the need for NATO, national political and military leadership, to engage in a constructive dialogue with industry, academia and think tanks from Europe and North America. In the context of continuous and rapid change of the current security environment, the Forum highlighted innovation as critical to maintain the technological edge of the Alliance, and as a common effort needed throughout NATO, Europe and at trans-Atlantic level.

The contributions of the participants involved in the debates will inform the work of the Alliance, in the year leading to the next edition of the NATO-Industry Forum, which the United States graciously offered to host in Washington DC, in November 2019.

We express our profound appreciation to all participants, as well as to the German Federal authorities for their superb support in making the Forum a success.

André Lanata
General French Air Force
Supreme Allied Commander Transformation

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Disclaimer - The debates in the breakout and the plenary sessions were held under the Chatham House rules. The opinions quoted in this report reflect the views of individual participants, neither they are consensual nor necessarily represent NATO’s position.
HIGHLIGHTS FROM NATO SECRETARY GENERAL’S ADDRESS

NATO Secretary General, H.E. Mr. Jens Stoltenberg, honoured the 2018 NATO-Industry Forum (NIF18) with a keynote address. Below are the notable highlights from the address.

The NATO-Industry Forum plays a critical role in NATO long-standing engagement with industry and it is important to continue to work hand in hand to prepare for the future. Meeting with industry gives all a clearer picture on the future challenges and potential solutions, as well as how to increase our cooperation.

At the Brussels Summit in July, NATO took significant steps to further bolster deterrence and defence. NATO is now in the midst of its biggest adaptation since the end of the Cold War and working with Industry is an important part of it.

NATO will affect the future of the defence industry in many different ways; not just through the Allies’ pledge on Defence Investment, increasing the size of the defence budgets, but also how efficiently money is spent.

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. Actually, all Allies have stopped cuts and started increasing. More and more Allies meet the 2% baseline and the majority of them has put forward credible plans to reach 2% within a decade. In 2018, European Allies and Canada have boosted their combined defence budgets by 5.2% and just over the past two years, those same countries have spent a cumulated US$41 billion extra on defence. This increased spending will ensure the Alliance maintains a leading edge of military technology in a world that remains competitive and unpredictable.

The second way NATO is shaping the future of defence industry is by defining what we spend money on. What capabilities we buy and for what purpose. Allies have committed to invest 20% of all defence spending on major equipment, including on Research and Development. In 2018, figures should show NATO Allies spending over 250 billion US dollars on major equipment and associated Research and Development. More than 60 billion will be invested by European Allies, which represents an increase of some 10 billion over 2017. To ensure our armed forces have the right quantity but also the right quality of equipment, NATO identify priorities for defence across the Alliance. This is actually one of the most important things NATO does and what we call the Defence Planning Process. NATO needs to maintain an advantage in key areas such as Joint Intelligence, Surveillance and Reconnaissance, the Future Surveillance and Control, the Ballistic Missile Defence and Alliance Ground Surveillance. The projects in these areas bring together industries from both sides of the Atlantic.

The third point is about how efficiently Allies spend on defence. Allies must address the fragmentation of the defence industry, especially in Europe. This is a political and sensitive challenge that Allies can and must tackle to achieve greater efficiency by working more closely together and move forward on key capabilities. NATO also coordinates capability development with the EU and the renewed initiative by the EU leaders to strengthen cooperation with industry is welcome. It is essential that NATO and EU work together to ensure new EU initiatives are fully coordinated with NATO.

NATO has a long history of working with industry partners, which is underscored by the fact that the NATO Industrial Advisory Group is celebrating its 50th anniversary. It is essential that NATO and industry continue to work closely together to continue to defend our countries, uphold our values and preserve the peace.
EXECUTIVE SUMMARY

NATO Secretary General, H.E. Mr. Jens Stoltenberg, sponsors the NATO-Industry Forum; he honoured the 2018 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 organized this year NATO-Industry Forum (NIF18) in Berlin, Germany, on 12-13 November 2018, only several months after the NATO Brussels Summit.

In line with Allies’ ambition of maintaining NATO’s technological edge through further partnership with industry and academia, the NIF18 focused on “Innovation and Disruptive Technologies.”

This year’s edition combined technical debates in the form of breakout sessions, with policy discussions in plenary sessions featuring the Chairman of the Military Committee, national armaments directors and prominent chief executives from defence traditional and non-traditional industries.

Dr. Helge Braun, the Head of the Federal Chancellery of Germany and the Federal Minister for Special Tasks, Ms. Elżbieta Bieńkowska, the European Union Commissioner for Internal Market, Industry, Entrepreneurship and SMEs, joined the NATO Secretary General in delivering keynote speeches.

The level of attendance at the NIF18 was unprecedented, roughly 450 participants (half of which, from Industry, representing 85 companies), demonstrating the interest in the topics debated, and the importance of maintaining the dialogue between NATO, nations and industry. That dialogue was seen as critical, several participants recommending more meetings as senior level throughout the year, to maintain the momentum of such high-level engagement between the Alliance and industry.

The Honourable Ellen Lord, the US national armaments director, delivered a statement that included the offer to host the next NATO-Industry Forum in Washington, D.C., on 13-14 November 2019. The organisers warmly welcomed the announcement, as it also offers the opportunity of including the next NATO-Industry Forum in the sequence of celebratory events for NATO’s 70th anniversary.

On the first day, four breakout sessions concentrated on ‘Logistics & Sustainment’, ‘Enhanced Military Decision-Making’, ‘Disruptive Technologies’ and ‘Autonomy’. Below are notable takeaways from these sessions:

► Emerging technologies such as big data, data mining, IA and robotics will play an important role in the future of logistics. Additive manufacturing will also become a high value asset in logistics, especially as advancements lead to reducing its environmental footprint.

► The pathway to in-service capability is not clear for small- to medium-sized enterprises (SMEs). NATO should create a clearer route for industry that allows for continued innovation before, during and after initial operating capability (IOC) and even after the final operating capability (FOC).

► Complete automation in decision-making was not advised during the discussions. Human strengths such as intuition and cognitive reasoning must be part of the decision-making. The overall decision-making process must have attribution throughout, including attribution of source data and attribution of decision. This is particularly important in a more decentralized decision-making environment. Data centric decision making requires a baseline to allow the detection of potential ‘anomalies’.

"Looking to the attendee’s registration, I count more than 200 representatives for the industries, with some 20 we can qualify as belonging to small and medium sized companies who I want to warmly and especially welcome."

SACT Gen. LANATA - keynote address
NATO and nations should produce and share problem statements rather than capability requirements, with industry, allowing industry to propose innovative solutions, which could include emerging and disruptive technologies. Industry suggested NATO to develop an “innovation lab” by taking the ACT innovation hub to the next level, to propose rapid solutions to the end-users.

Industry suggested the idea of a NATO Open Innovation Alliance offering a framework of shared principles and values for open innovation agreements between SMEs, especially start-ups, and major defence companies, under the “moral umbrella” of ACT. Such a ‘NATO Open Innovation Alliance’ could offer a fertile environment for fruitful collaboration between start-ups and bigger companies to the benefit of NATO.

Participants debated the legal aspects of autonomous systems in defence. NATO should focus its efforts on the creation and integration of an Autonomy Governance Structure, applicable jurisprudence for the use of autonomous systems, and enhancing education and training on autonomous systems.

The debate in the plenary sessions on the second day led to several conclusions:

Industry recommended that NATO should define its capability needs, and refrain from being too prescriptive in defining requirements. Consequently, NATO was invited to approach industry with problem statements identifying the Alliance’s end capability objectives.

In today’s uncertain security environment traditional procurement models need to be adjusted, to become more effective. NATO should involve industry earlier in the capability development process, and working together will be able to define better capabilities adapted to the current environment. “It is not a question of if, but of when and how to work with industry earlier?”

The increasingly digital world we are living in suggests NATO must adapt and embrace digital transformation. Technology today allows capabilities to come with ‘digital twins’ thus allowing for simulation, virtualisation and immersive training. Digitalisation will allow NATO to achieve more with the available resources, and to increase speed; human involvement in the decision-making shall remain the norm.

Allies should embrace experimentation and be willing to accept failure, particularly in novel areas. Industry encouraged Allies to loosen regulation in the short term, in order to provide industry with the flexibility and manoeuvrability to contribute to NATO innovation. “To innovate, NATO needs some chaos.”

Industry suggested that NATO dedicate funds to foster innovation. To allow flexibility and imagination, the framework for the use of the funding should be less restrictive, and implement a ‘no rule’ policy.

Innovation and capability development in general, can be pursued non-sequentially. NATO needs sufficiently open and innovative architectures, incorporating the latest developments in academia and industry, and resulting from constructive dialogue between scientists, engineers and the military.

Industry believes that NATO should pursue a “user-centric” approach to innovation. It was recommended that NATO provide the framework for industry’s direct link to the end user, through which industry can interact with the end user sooner and work with, or train, the user, while collecting

"Europe must become a security provider and progressively acquire the capacity to ensure its own security. This is not in contradiction with NATO. On the contrary, a stronger Europe in defence means ultimately a stronger NATO."

EU Commissioner BIENkowski - keynote address
valuable data that can provide for continued innovation.

► Technology in the future may compensate for a lack of human expertise; however, the short-term incorporation of disruptive technologies into the defence sector is expected to require qualified end-users. NATO was encouraged to imagine ways to attract younger generations to enrol in Science, Technology, Engineering and Math (STEM) educational programmes.

► Even though there will be dedicated hardware and software needed for military missions, NATO should explore and exploit civilian solutions that can answer the military requirements. Moreover, “the military these days don’t buy kits, but services.” The time for “sale and forget is over.” We witness a “paradigm shift from selling a training aircraft to delivering a trained pilot.”

► Participants agreed that European nations must cooperate more, invest more, and move faster. Achieving “critical mass” is crucial for European companies if they are to cooperate on an equal footing with North American companies. NATO could play a stronger role in stimulating cooperation and investments in defence, and establishing a level playing field.

► No single Ally can innovate alone in today’s uncertain security environment. We need to have strong cooperation across nations, across governments, and across the defence industrial base. Industries must communicate among themselves, with nations and communicate as well with NATO. Communication is essential to innovative partnerships, the need for revised or new innovation policies was put forward as a key innovation enabler.

► Trans-Atlantic Defence technological and Industrial Cooperation (TADIC), in the context of the cooperation with the European Union, is a critical pillar of the future security of NATO and EU territories and populations.

► NATO is the only organisation that can truly promote and demonstrate interoperability. Therefore, NATO should aim at developing systems that increasingly allow Allies to connect and contribute their capabilities.

"The development costs of complex and high-quality products can only be borne by joint procurement - and perhaps joint use. Only through holistic cooperation, we will be able to meet the future needs of our armed forces."  

Head of the Federal Chancellery Dr BRAUN - keynote address

1 The latest NATO Industrial Advisory Group update to the TADIC report identified key recommendations such as to involve industry way earlier in the requirement definition phase, to adopt standards that describe interoperability requirements in “output and performance” terms rather than in prescriptive terms and to consider interoperability and exportability as design features.
The NATO-Industry Forum (NIF) plays a crucial role in NATO’s long-standing relationship with industry. With the ongoing adaptation of the Alliance amidst the uncertainty of the modern security environment, the 2018 NIF (NIF18) served as the platform for essential discussions with traditional and non-traditional defence industries. These debates focused on the Alliance’s incorporation of innovative solutions and its perception of the disruptive technologies that erupted in the world and represent a challenge to NATO technological edge, in an attempt to identify solutions and options that will help the Alliance maintain its prominence.

Under this year’s theme of “Innovation and Disruptive Technologies,” the purpose of the NIF was to generate ideas that would shape the future of NATO capabilities and their means of delivery, the various NATO-Industry partnerships, to lead to improvements of the Alliance’s overall security. This edition attracted approximately 450 participants (half of which from Industry, representing 85 companies) who demonstrated genuine interest in the need for innovative solutions and transatlantic cooperation in overcoming the threats of an uncertain security environment, and identifying the opportunities offered by the emerging technologies. Not only the NIF served as a platform for cooperation, but was a launch pad for further learning and collaboration toward tomorrow’s processes, procedures, and partnerships that would help accelerate the delivery of capabilities.

At the NIF18, four breakout sessions provided industry with insight into the Alliance’s ambitions, and at the same time, they allowed NATO to learn from industry. Prominent panellists provided their views in three plenary discussions that addressed technical, policy, strategy and political requirements for NATO’s adaptation and innovation. Overall, this year’s NIF served again as a dedicated platform for learning, information exchange, partnering and innovation, for both industry and NATO.

The NIF18 theme of “Innovation and Disruptive Technologies” resonated with the outcomes of the recent Brussels Summit, in which NATO leaders agreed to “further develop our partnership with industry and academia from all Allies to keep pace with technological advances through innovation.”

Industry identified several opportunities for NATO to become the “catalyst for change” in transatlantic defence innovation. Industry also encouraged NATO to set the standards for interoperable digitalization, as well as adopting a “user-centric” capability development approach that encourages experimentation, big data analytics, and stronger industry-user relations for continued innovation. NATO was additionally encouraged to promote a culture of joint experimentation, ideally with nations establishing their own collaborative incubators, which shall be connected, and in close dialogue and cooperation, with the current NATO ones.

For innovation to take place, industry must understand NATO’s end state capability needs and objectives. As present-day capability requirements may not translate into future defence scenarios, some panellists encouraged NATO to communicate its capability requirements in the form of problem statements that describe the Alliance’s end state capability objectives. The digitalisation of the capability development process would allow to deliver capabilities faster. With digitalization standards and a user-centric approach in place, NATO and industry could facilitate a better user’s requirement understanding and feedback. Through such innovative approaches, the Alliance would spend less, but spend better and achieve more.
NIF18 BREAKOUT SESSIONS

Four breakout sessions in the first day of NIF were designed to allow more participants to engage directly and according to their expertise, in extensive debates on the following topics:

► Logistics & Sustainment
► Enhancing Military ‘Decision-Making’
► Disruptive Technologies
► Autonomy

These sessions represented an informal environment, at staff-level, favouring a more open exchange of information, for NATO to learn from industry, and industry from NATO. The discussions touched upon technologies, processes and trials of the future, as well as the outcomes that NATO and industry would like to see in terms of adapting the process of capability development, NATO’s role in innovation, and the human role as technology evolves.

Logistics & Sustainment

NIAG, in liaison with ACT, is working to develop an industrial community of interest for Logistics & Sustainment with the purpose of analysing current and future challenges to NATO logistics and areas where solutions can be developed with industry together.

It was recommended that NATO allow industry to bridge capability gaps that stem from fiscal constraints and force structure reductions. In order to integrate industrial services into military operations, it is essential to build mutual trust. Improving trust entails assuming the risk associated with external contracting. NATO was encouraged to improve its ability to manage projects by breaking contracts down into key segments that allow a variety of companies to compete based on their own core competencies. To this, NATO should refine policies and procedures to break down barriers to entry for small companies and to facilitate the inclusion of large companies willing to assist without incurring additional cost.

NATO should work to improve coordination inside the Alliance by harmonizing national criteria for capability requirements. For example, when requirements to build a camp for 1,000 soldiers are issued, there is a common understanding among all nations regarding the standards that must be met in terms of life-support and amenities. Through harmonising criteria for capability requirements NATO and industry will ensure that expectations are synchronized with results.

Emerging technologies such as big data, data mining, and Artificial Intelligence are expected to play an important role in the future of logistics by providing NATO with the ability to anticipate requirements and dynamically reroute supplies based on changing priorities. In addition, additive manufacturing will reduce the logistic footprint as the technology matures over the next years. Sustainment requires a balance between Allies, NATO and Industry that can support full spectrum of operations (Hybrid to High Intensity Conflict) that is scalable to meet challenges in a time-constrained environment.

The TIDESPRINT workshop (20-25 March 2019) in Split, Croatia will be the next event where NATO and industry will explore in depth the outcomes of the Logistics & Sustainment discussion.

Enhanced Military ‘Decision-Making’

Participants of the “Enhanced Military ‘Decision-Making’” session discussed NATO’s capability development process and determined that NATO’s pathway to In-Service Capability is not clear for SMEs. A clearer investment pathway for industry that allows continued development before, during and after IOC and FOC, is needed. Changes to the NATO capability development process should be made so that industry can be informed at the early stages of the process.
Industry urged NATO to consider its strengths as an organisation, then partner with organisations that cover the weaknesses (gaps in expertise or technology, etc.). True partnerships require communication and shared responsibilities. Intellectual Property can be maintained but must be agreed during partnership negotiations.

In terms of digitalised decision-making, the participants advised against complete automation of the decision-making process, since it should be for humans to make the final call. There are human strengths that must be maintained in the decision-making, such as intuition and cognitive reasoning. Often human frailties (persistency, repeatability, Ops team shift handovers, subjective bias, etc.) play to the strengths of automation and data management systems.

The introduction of advanced analytics needs an initial clean data pathway to build onto over time. Sources of data must be analysed more thoroughly prior to system ingest, not just based on cost.

‘Bad data’ is normally worse than no data. Data-centric decision-making requires a baseline for the system and operators to differentiate ‘the normal’ data from ‘the abnormal’ data. Overall, the decision-making must allow for attribution throughout the process. This includes from the attribution of source data down to the attribution of the decision. Attribution is particularly important in a more decentralised decision-making environment.

Artificial Intelligence learns over time and therefore gets better over time. Given the pace of technological developments, the criteria for deployment and acceptance into service must change (IOC and FOC). NATO shall consider MVP (Minimum Viable Product) to be produced by industry and allowed to be put earlier the hands of the user, as a method to develop capabilities faster, that are up to date and in sync with the challenges, as a future capability deployment criteria. Delegates even questioned whether Full Operating Capability is ever reached.

Disruptive Technologies

The participating industries shared their views on how NATO could better understand and more rapidly exploit emerging and disruptive technologies. There was a large consensus that persistent horizon scanning ought to be performed by dedicated teams from NATO, nations and industry. A sound understanding of emerging technologies and their potential applications and impact was seen as influencing industry investments.

NATO and nations were encouraged to produce “problem statements/needs” of sizes that are manageable by industry, from large corporates to SMEs. Problem statements have the advantage of remaining solution-agnostic, thus offering industry a greater ability to propose innovative solutions.

Many viewed as essential the ability to rapidly develop solution demonstrators and put them into the hands of users as a way to prime spiral development and accelerate delivery. This suggests a paradigm shift, from the “need to adapt” to the “will to adopt” technology early. This underpins the need for a better balance between top-down requirement and bottom-up technology push more driven by opportunities. This approach will require the development of a different business model that should complement the more traditional sequential model suitable for large acquisition programs. Such a model should promote the acceptance of risk and a culture of testing/experimenting. NATO should develop an "innovation laboratory" similar to industry "Innovation Labs" that are increasingly sprouting. This Lab should have rapid prototyping capacities and offer to final users and solution providers an environment to interact and design "user centric" solutions, this environment including notably a "data sandbox". The ability to work on "NATO data" was viewed as an essential enabler for industry.

All recognized the essential role of small and medium-sized enterprises that should be able to contribute to these initiatives. They should be part of an innovation ecosystem based on trust, the protection of intellectual property, a spirit of partnership and aligned expectations from the onset. The notion of an “Innovation Alliance” similar to a number of successful national models
was put forth as a way to create an environment conducive to a fruitful collaboration between start-ups and bigger companies for the benefit of NATO.

Finally, the need to review and possibly create new policies was viewed by many as a prerequisite to efficiently and effectively develop capabilities in the future. For instance, access to data (and the ability to use them) was considered as one of the major impediments for developing innovative solutions. In addition, beyond urgent policy work to accelerate capability development and procurement, there is also a need to fundamentally change culture and habits, particularly pertaining to risk-taking (towards risk management) and the willingness to share between stakeholders.

**Autonomy**

The participating industries shared their perspectives on how NATO can better prepare and harness autonomous capabilities in operations and develop ways of improving NATO’s awareness of the opportunities presented by autonomous systems.

Referring to the 2018 NIAG study on Autonomy’s Impact on Planning Operations, participants suggested that NATO should create a single “Autonomy Governance Structure,” which integrates applicable jurisprudence for the use of Systems with Autonomous Functions (SAF). NATO should integrate autonomous technologies within guidance frameworks and doctrinal methods (e.g., NATO Doctrine and CONOP’s), and expand/revise rules of engagement (ROE’s) Participants believed that a lack of policy on Autonomy and a common understanding at the international level hampers NATO in its ambition to move forward in exploiting new technologies.

Industry would like to see NATO enhance education and training on autonomous systems. Integrating Autonomy into NATO Education Training Exercise and Evaluation (ETEE) at all levels was recommended by participants. Expanding from this, NATO must consider developing criteria for Qualification, Verification, Validation, and Certification of AI-based systems.

Participants saw the early involvement of industry as a key enabler for Autonomy-driven transformation. Industry suggested that NATO should develop an Autonomy Gap Analysis and Action Plan, involving industry from the beginning. Including industry’s technical expertise upstream can assist NATO in identifying whether a potential solution is achievable, and assess its effectiveness toward reducing development costs and risks. According to participants, both traditional and non-traditional industries are necessary for NATO’s integration of autonomous solutions.

Industry urged NATO to consider man-machine teaming aspects within the Autonomy development process. Meaningful human control remains an essential prerequisite in NATO’s ambition to harness autonomy. Participants agreed that humans must maintain some level of control of autonomous systems, regardless of the progress and abilities of technology.

According to the participants, NATO’s role in Autonomy could be to define its “military’s boundaries”, which will represent a cultural change on the use of autonomous systems, therefore suggesting a wider public engagement plan.

**NIF 18 PLENARY SESSIONS**

The Supreme Allied Commander Transformation opened the second day with the speech on the “State of the NIF” (speeches in annex) followed by keynote remarks by NATO Secretary General and distinguished guests.

Three plenary sessions featured prominent CEO’s from traditional and non-traditional defence industries, the Chairman of the Military Committee and NATO Armament Directors. While the traditional defence industry included some of the most representative companies in the world,
the non-traditional defence industries represent a novelty for the NIF.

The entire edition of the 2018 NATO-Industry Forum was dedicated to innovation and the impact of disruptive technologies; the first plenary session focussed particularly on these, and on the technical aspects of maintaining NATO's technological edge.

The second session debated the “Trans-Atlantic Policies and Strategies for 21st Century Capabilities”, while the third session summarised the discussion on “NATO and Industry – Ready for Novel Challenges”.

NIF18 explored the political challenges to European and transatlantic defence innovation and the hurdles the Alliance must overcome to strengthen partnership with industry, in order to accelerate the capability development and delivery, and to foster innovation.

Several conclusions provide the Alliance with food for thought as it advances with its ambition of harnessing disruptive technologies and to engage on the path of accelerating innovation and the delivery of capabilities.

**NATO as the Framework for Innovation**

Industry encourages NATO to set the example for innovation, by providing the framework for continuous learning, experimentation and partnership. Industry pointed to its own successful joint ventures, noting how shared culture and values led to innovation. NATO’s partnerships should not be limited to traditional defence industries but include non-traditional defence companies, of all sizes. Sometimes innovative ideas are found in the least likely of sectors.

Industry suggested that NATO reserve money to foster innovation through ideation, solutions research, development of proofs of concept and experimentation. The only rule for the use of reserve experimentation funding should be precisely “no rule.”

NATO’s objective should be to gain insight from the best innovative minds from across the Alliance. To do this, industry suggested that Allies develop a network of national innovation hubs, over which Allied Command Transformation (ACT) could have a facilitating/coordinating role. Through the NATO-Command Structure Adaptation, NATO has developed a new capability development model, establishing for ACT a pivotal role in the management of common funded capabilities. Industry encouraged ACT, through this new role, to set an example of how to inject innovation into capability development.

**New Policies for Partnership and Procurement Models**

With the security environment adapting quickly, new policies and procurement models are needed to keep NATO relevant in a technology-driven world. New NATO policies should allow industry participation earlier into the capability development process and provide SMEs with a clearer path for partnerships. Outdated military procurement models should be updated to stimulate innovation.

Industry advocated for a new NATO-Industry partnership to foster innovation. “It is not a matter of if, but of when and how to work with industry.” Industry urged NATO to take risks and accept failures in experimentation, and learn from failures to improve upon capabilities. First, NATO should spend small and allow industry to prove the concept, to experiment, and deliver a “minimum-viable product” that would improve based on operational feedback. Not only would this decrease the budget needed for capabilities upfront, the budget only growing in the operations and maintenance (O&M) phase, but it would ensure that NATO only pays if the capability works. With a “We cannot fight the advancement of disruptive technologies with standard methods.”
direct line between industry and the user, industry can deliver “minimum-viable products” faster and develop them along NATO’s specific needs, adapting to the security environment together with the Alliance.

A User-Centric Approach and Capability Problem Statements

Industry recommended that NATO develop a user-centric approach to capability development, in which NATO provide the framework for innovators especially from industry to interact with and learn from the capability end-user. Through early interaction with the users, industry would also be able to collect data for future improvement of the capability. Overall, plenary participants agreed that the incorporation of end-user data was further needed in the NATO capability development process.

Given the rapid pace at which technology evolves, NATO’s capability requirements today may not produce the desired end-state objectives of tomorrow. One panellist requested that NATO communicate user case study data rather than capability requirements, as NATO currently does. A more immediate solution would be for NATO to communicate its capability needs in the form of problem statements. Industry suggested that with earlier involvement in the capability process and identifying NATO’s capability “pain points,” industry could better serve the Alliance and develop capabilities appropriately matched to future threats.

NATO as a leader on interoperability

“We need to be working closely with industry to ensure we develop capabilities, with exportability and interoperability built into the program from the beginning. That has not always been the case in the past, but it must be the model for the future.”

Participants agreed that industry has to be able to export in order to be sustainable. That requires innovation, work on the development and fielding of capabilities, analysis of the impact of the deliverables, and efforts to stimulate and implement interoperability at all stages.

Digitalisation

Across the board, industry agreed on the value of data and the central role that data will have in future capability development. Already, NATO has a wealth of data of immense operational value. Industry encouraged NATO to set the standards for data governance and the principles for data use. Big data analytics have allowed companies to work smarter for less money. Big data analytics and digitalization of the capability development process can help NATO achieve more with the existing resources.

We must embrace digital transformation. Digitalization can help NATO to shorten the capability development and delivery cycles. Digitalisation allows complete solutions to be offered to customers, together with digital twins, thus allowing for simulation and immersive training. Through digitalisation and a user-centric approach, industry can provide training and evolve capabilities based on the data generated through the interaction with the end-user.

While there are many benefits to digitalisation, industry raised a warning signal regarding the digitalisation of the entire capability cycle. Humans are expected to continue to play a significant role in decision-making and provide operational leadership in the digital future. If structured correctly, however, digitalization can facilitate continuous learning and operational independence. The use, and the extent of digitalization would remain a decision for NATO Allies.
Skilled Workforces
It has been debated that while technology advances so fast and so far, it may compensate the lack of human abilities, therefore the future operators could be less skilled. Others argued that the opposite, that NATO’s incorporation of disruptive technologies in a digitalised world is expected to require increasingly qualified people. Today, there is a dearth of technical expertise in government. Talent is lacking in Science, Technology, Engineering and Math (STEM), therefore industry suggested that NATO imagine ways to attract the young generation to enrol in STEM, that explore new frontiers and help NATO to advance capabilities in new or developing fields. Without knowledgeable customers and governments, the Western world will have a difficult time competing.

Diversified Partnerships for Innovation
NATO’s partnership with industry must expand to include non-traditional defence companies and SMEs, where disruption occurs and could influence the development of NATO capabilities. Industries often find themselves partnering with SMEs outside of their traditional markets. An example was given as to how industries in agriculture can assist with logistics. NATO could engage in partnership with non-traditional defence companies, but equally in non-traditional partnerships with traditional defence and security companies. As such, new cultures and values are formed and leading to innovation.

Communication and Trust
Industry agreed that there must be strong cooperation across nations and the defence industrial base. The steps being taken by the European Union to consolidate the European defence industrial base were discussed and praised; however, it was noted that Europe must do more to harness its own ingenuity and rapidly innovate. Multinational cooperation has significant potential following the implementation of the Defence Investment Pledge and recent EU funding initiatives, but nations are expected to preserve their sovereignty and protect their domestic industries. Panellists hoped that Allies would maintain their commitments to defence innovation and openness.

Industry encouraged NATO to develop a culture of transparency with industry, based on trust. As already noted in previous editions of the NIF, insufficient trust between industry and NATO could be prejudicial to both and be the source of a significant increase in costs. Through trust and communication, industry, NATO, and the EU have the possibility to define a better future together.

Trans-Atlantic Defence technological and Industrial Cooperation in NATO capability development
“Without question, Trans-Atlantic Defence Industrial Cooperation is the essential prerequisite for delivering the capabilities NATO and Europe needs, and we must keep it high on the NATO agenda.”

The development of NATO capabilities should not be sequential. One participant gave the example of AFSC (Alliance Future Surveillance and Control capability that is the follow on capability to AWACS) and the fact that it should not be excluded to result in a combination of

"To attract STEM students we need to imagine some fantastic challenges for them."
transatlantic participation, and European funds. What was critical in this speaker’s view was that the architecture developed is sufficiently open and innovative, and supporting interoperability.

NATO needs to continue to think and operate cross-domains, and across the entire Euro-Atlantic area.

“NATO-Industry Forum is providing the venue for longstanding and valuable engagement between government and industry. These opportunities are increasingly essential, and we need to utilize them thoughtfully to maximize Trans-Atlantic cooperation and innovation.”

Considering the recent significant developments that took place on both sides of the Atlantic, the NATO Industrial Advisory Group produced a report informing the debate at the NATO-Industry Forum on the Transatlantic Defence Technological and Industrial Cooperation (TADIC) with a focus on:

- Evaluating the progress of TADIC since the last NIAG study performed in 2014.
- Recommending the Adoption of Common Industry Partnership Policies and Practices based on Best Commercial Practices
- Impact of the European Union defence dynamics
- Importance of Technological Interoperability within the Alliance

The NIAG made a number of recommendations to NATO, the Conference of National Armaments Directors (CNAD), National Armaments Directors (NADs) and Industry. Key recommendations are to involve industry earlier in the phase of capability requirements definition, to adopt standards that describe interoperability requirements in “output and performance” terms, rather than in prescriptive terms, and to consider interoperability and exportability as design features.

CLOSING REMARKS

Mr. Camille Grand, Assistant Secretary General, Defence Investment

Mr. Camille Grand, the Assistant Secretary General for Defence Investment, closed the 2018 edition of the NATO-Industry Forum.

He emphasised that any discussion about the future of the Alliance’s capabilities should start with the evaluation of the security environment, which will influence the determination of the ‘needs’. It shall take into account the budgetary constraints, noting that NATO is currently delivering on its ‘part of the deal’ through the implementation of the Defence Investment Pledge.

The Assistant Secretary General reminded the audience that NATO does not create industrial policies, nor export controls, but forums like NIF are appropriate venues to identify instances where current legislation and export control procedures in particular, create difficulties for defence and industrial cooperation at transatlantic level, and raise them at the appropriate political level for resolution.

The Alliance can be a catalyst for innovation and change, by providing transparency of processes, and prioritising the capability needs through the defence planning process, throughout the capability lifecycle.

Technology is moving rapidly therefore “time is of the essence” for Allies and Europe in the pursuit of innovation. NATO must be transparent with industry about its capability needs, and define them as problem statements; further work to incorporate the solutions that will help the Alliance achieve its objectives with the available resources. Nations must work together, bridging the divides in the industrial base, allowing NATO to benefit from interoperable products, of better quality, faster and smarter. NATO can maintain pace with the evolution of the technology only
if working closely together with industry.

On behalf of the NATO co-organizers, the Supreme Allied Commander Transformation, General André Lanata, and himself, he expressed deep gratitude to all participants to the Forum, the participants in the breakout sessions as well as the distinguished panellists, for their substantive engagement in debates throughout the two days, on NATO’s future capabilities development and delivery, innovation and adaptation.

By thanking again the German authorities for superbly hosting and for their outstanding support, the Assistant Secretary General applauded what he considered a successful event, and invited all participants to join the next edition NATO-Industry Forum in Washington DC, on 13-14 November 2019.
AGENDA

Monday, 12 November 2018

NATO-Industry Forum Opening Remarks
► General André LANATA, Supreme Allied Commander Transformation (SACT)
► Mr. Benedikt ZIMMER, State Secretary of the German Ministry of Defence

Breakout Sessions, Round 1

Breakout Session 1, Logistics and Sustainment
Co-chairs:
► BGEN Wolfgang GÄBELEIN - DEU MOD, Head of Division, Forces Policy II
► COL William J. CAIN Jr. - ACT, Branch Head of Logistics, Development & Sustainment

Breakout Session 2, Enhancing Military ‘Decision-Making’
Co-chairs:
► COL Richard BLUNT - ACT, Section Head Intel & Environmental Disciplines, JISR
► COL Thierry GODFROID - ACO, Branch Head of Planning Support, J5 Operations Planning

Breakout Session 3, Disruptive Technologies
Co-chairs:
► Dr. Thomas H. KILLION – NATO Chief Scientist, Chair of Science and Technology Board
► Mr. Pierre DUBOIS – Research, Technology & Innovation, Rockwell-Collins France

Breakout Session 4, Autonomy
Co-chairs:
► MGEN William B. HICKMAN – ACT, Deputy Chief Of Staff, Strategic Plans & Policy
► Mr. John JANSEN – Chairman of the NATO Industrial Advisory Group (NIAG)

Breakout Sessions, Round 2 (Same as Round 1, audience changed session)

Breakout Session 1, Logistics and Sustainment
Breakout Session 2, Enhancing Military ‘Decision-Making’
Breakout Session 3, Disruptive Technologies
Breakout Session 4, Autonomy

Evening Reception hosted by the German Ministry of Defence

Welcome addresses:
Dr. Peter TAUBER, Parliamentary State Secretary, Federal Ministry of Defence, Germany
Admiral Manfred NIELSON, Deputy Supreme Allied Commander Transformation
Mr. Gordon ‘Skip’ DAVIS Jr., Deputy Assistant Secretary General for Defence Investment
Tuesday, 13 November 2018

NATO-Industry Forum Opening, Day 2
► Administrative remarks by Dr. Christian Mölling, Deutsche Gesellschaft für Auswärtige Politik (DGAP)

State of the NIF
► Speech by Gen. André Lanata, Supreme Allied Commander Transformation (SACT)

Keynote Addresses
► Dr. Helge Braun, Head of the Federal Chancellery of Germany, and Federal Minister for Special Tasks
► Ms. Elżbieta Bienkowska, EU Commissioner Internal market, industry, entrepreneurship and SMEs
► H.E. Mr. Jens Stoltenberg, NATO Secretary General

Plenary Session 1 - Innovation and Disruptive Technologies
Moderator: Dr. Christian Mölling, DGAP
► Dr. Thomas Enders – CEO Airbus
► Mr. Patrice Caine – CEO Thales
► Mr. Alex Karp – CEO Palantir
► Mr. Kurt Ove Hakon Buskhe – CEO Saab
► Mrs. Nikola Hagleitner – CEO DHL Industrial Solutions
► Dr. Michael Holm - CEO Systematic Inc.
► General André Lanata – Supreme Allied Commander Transformation (SACT)

Plenary Session 2 - Trans-Atlantic Policies and Strategies for 21st Century Capabilities
Moderator: Dr. Christian Mölling, DGAP
► Air Chief Marshal Sir Stuart Peach – Chairman of the NATO Military Committee
► Vice Admiral Carsten Stawitzki – National Armaments Director (NAD), Germany
► Lieutenant General Caroline Laurent – National Armaments Director (D/NAD), France
► Mr. Marc Allen – President, Boeing International
► Mr. Frank Haun – CEO KMW and Co-CEO Knds
► Mr. Antoine Bouvier – CEO MBDA
► Mr. Camille Grand – Assistant Secretary General for Defence Investment (ASG/DI)

Statement
► Hon. Ellen Lord, US National Armaments Director (NAD)

Plenary Session 3 - NATO and Industry - ready for novel challenges
Moderator: Dr. Christian Mölling, DGAP
► Ms. Marillyn Hewson - CEO Lockheed Martin Corp.
► Mr. Armin Papperger – CEO Rheinmetall and President BDSV
► Mr. Charles Woodburn – CEO BAE
► Mr. Alessandro Profumo – CEO Leonardo
► Ms. Susana de Sarría Sopeña – CEO Navantia
► Mr. Temel Kotil – CEO Turkish Aerospace Industries
► Mr. Camille Grand – ASG/DI

NATO-Industry Forum Closing Remarks
► Mr. Camille Grand, ASG/DI
KEYNOTE SPEECHES
GENERAL ANDRÉ LANATA

Supreme Allied Commander Transformation

" State of NIF

Head of the German Federal Chancellery and Federal Minister for Special Affairs, Doctor Helge Braun,

Ambassadors from Croatia, Mister Mario Nobilo, and France, Madame Hélène Duchêne,

Assistant Secretary General for Defence Investment, Mister Camille Grand, mon cher Camille,

EU commissioner for Internal Market, Industry, Entrepreneurship and Small and Medium-sized Enterprises, Mrs Elżbieta Bieńkowska, your presence with us today reaffirms the strength of the link between NATO and UE.

Chairman of the NATO Military Committee, Air Chief Marshal Sir Stuart William Peach,

Senior Industry leaders from all around the world,

National Armement directors,

NCIA General Manager, Mister Kevin Scheid,

Generals, Admirals,

NATO and EU colleagues,

Distinguished Guests,

I hope you enjoyed the evening reception as much as I did and were responsible consumers of German beer and wine because I still need you today and you will understand why in a few minutes!

I want to start by thanking the German authorities for hosting this event with the professionalism and friendship that has always characterized your country’s relation with NATO.

I am glad the NATO-Industry Forum has become such a capstone event and an important forum of exchange where we can freely share ideas and views.

I am convinced that together, Industry, whether it works in the field of defence or not, companies of all sizes, NATO Members and Partner Nations, agencies, EU representatives, academia, think-tanks and many others, all here gathered, will produce real deliverables.

Looking to the attendee’s registration, I count more than 200 representatives for the industries, with some 20 we can qualify as belonging to small and medium sized companies who I want to warmly and especially welcome.

I am also happy to meet in Berlin, the symbol of the reunification of a great Nation and one of Europe’s most inspiring cities.

As we just celebrated the centenary of the end of WWI, I think it is appropriate to also reflect today on how NATO guaranteed the security and peace of Europe for almost 70 years, especially as our security is increasingly being challenged.

This unity at 29 is the key to our security and our prosperity in the Euro Atlantic area.

That’s why our meeting makes even more sense today.

I do not intend to give you a lesson on geopolitics, but I do want to share a few context thoughts that seem important to me.

Since NATO’s inception in 1949, our military power was essentially based on our technological superiority.
However, we have to observe that these times have changed.

Increases in Defence spending and the availability and proliferation of technologies, have provided our rivals and potential adversaries with growing capabilities and the ability to challenge the Alliance technologically, militarily and so, politically.

Part of the increased modernization of our potential competitors’ military capabilities is supported by a rapid and easy access to emerging and disruptive technologies.

Above all, innovation in the commercial sector, especially in the digital domain, has driven a massive acceleration of the pace of technological development.

A number of state and non-state actors are developing new capabilities, by combining and exploiting available technologies with disruptive tactics and concepts.

To underpin this, let me tell you this story about a Ukrainian officer who developed in 2013 an Uber software-like artillery “app” which was extremely effective for coordinating fires.

In 2014, this app was contaminated by a malware able to retrieve data.

It led to the identification of accurate locations of some Ukrainian artillery units..., which were then engaged.

What this illustrates is the unprecedented and extremely dynamic possibility for anyone to develop and field a capability solution, including its countermeasures, which is solely derived from the civilian world.

In several key military areas, not all of course but several, the gap between NATO Allies and the rest of the world has narrowed, testing our ability to respond.

As a former Chief of Staff of the French Air force, I know how much our aerial operations are deeply dependent on our AWACS.

They were a key element for example, of the US, France and UK joint strikes in Syria, last April, in response to chemical attacks by the Syrian regime.

The increase in the threat level displayed by our peer competitors has made areas of operations less permissive, I mean much more contested than in the past.

This must lead us to ask ourselves: do we want our C2 and surveillance capabilities to rely on very high value assets such as AWACS?

As we initiate the process for their replacement, are other solutions available to cover this requirement?

I will come back to this question later on.

To achieve that, we must radically change our methods and our mind-sets, especially in domains where the commercial sector has taken a strong technology development lead.

Each modern organization has to adapt, change and exploit opportunities in order to best cope with a dynamic environment. This is a necessity and a matter of urgency!

This is what our forum those days is all about!

Some of you may have doubts when I am talking about NATO’s adaptation.

You may think: “NATO is a bureaucratic Institution with a slow consensus decision making process at 29, which is so difficult to work with”.

Yet, it is precisely this unity at 29 Nations that makes our strength!

A decision at 29 is a strong warranty for sustainability and stability.

In addition, those Nations have pledged to respond to the new security context.
As a result, western defence military budgets are actually increasing while the share devoted
to capabilities is also increasing. It is a fact!
This opens up many perspectives and should generate increasing business opportunities.
And, that is good news for all of us including Industry…
Since 2016 the pace has accelerated again.
At the NATO Warsaw Summit, Member Nations agreed to “identify advanced and emerging
technologies, evaluate their applicability to the military domain, and implement them through
innovative solutions.”
They decided an evolution of the deterrence and defence posture to ensure “an Alliance that
is fit for purpose”.
This led to the adaptation of the NATO Command Structure (NCS-A), a big step forward to
clarify roles, responsibilities and authorities between the two NATO Strategic commands.
As part of this adaptation, NATO has adopted a new governance model for Common funded
capabilities delivery, which will allow us to be more agile and more convenient to work with you.
Since the NIF 2016, building upon the recommendations of last year’s event, NATO has worked
tirelessly to further improve relations with your companies and to spread a culture of innovation
internally, with ACT being one of the major force driving Innovation for the Alliance along with
DI.
Following the Brussels Summit last July, we made some commitments, and we have delivered.
Here are just two examples:
- Three NIF-branded events, dedicated to Logistics & Sustainment, Distributed
  Networks and Cyber were conducted;
- The approval, last year of the second spiral of the Federated Mission Networking.
  It will be followed, this month, by the third spiral.
  These 3 spirals, in 2 and a half years are an incredible progress.
  It allows our armed forces to implement interoperability standards in a
  synchronised manner, in order to achieve “Day Zero Interoperability”.

![Meeting room](image-url)
Finally, following last year’s NATO Innovation challenge, we are currently working with the winner on how to transform their innovative idea into an operational capability.

Through this quick loop, this challenge, of which we had the third edition here in Berlin yesterday, has proven to be an excellent way to develop future products faster, and improve the defence and security posture of the NATO Alliance.

Moreover, two weeks ago, the Trident Juncture Exercise in Norway, where we worked, shoulder to shoulder, with more than 15 companies from 9 Nations, illustrated the way we adapt.

Let me highlight some of the 21 experimentations we conducted in Norway, alongside 50,000 soldiers, sailors and airmen deployed within the exceptional framework of this exercise:

- Autonomous systems for logistics and base force protection associated to “Amazon-like” special delivery, by drones, of 3D printed spare parts directly to our deployed troops, using a simple “online order” to replace broken pieces of equipment (not only plastic or glass fibre but steel, carbon and even concrete…);

- The Information Environment Assessment project, which is one of the lines of efforts of our recently developed Emerging and Disruptive technologies roadmap, is federating our ability to profile the information environment.

It will advise operational and senior political leaders about how NATO messaging is received by our audiences or how it should adapt to address on the adversary’s message at the speed of relevance.

As you can see, NATO is moving forward and we will not stop here of course!

Along those examples, ACT, with NATO Headquarters and diverse entities, such as agencies and Science and Technology Organisation, has been a major innovation driving force within the Alliance for some years now, but great challenges are ahead of us.

We will continue to seek new and imaginative solutions and improvements.

While large projects will of course remain important, we believe the traditional capability development model must also be complemented by a new, more flexible one.

I said complemented, not replaced…

A model that allows us to make the most out of civilian innovation to rapidly reinforce our military.

Our goal is to deliver faster the right capabilities to the War fighters, through a paradigm shift:

- From stove pipes to open communities of interest, with a strong emphasis on bringing operatives, solution providers, I mean from researchers to major companies, and capability designers, that is to say procurement agencies or plan and programs entities, closer together;

- From platform-centric to data-centric capability architectures, paving the way to what I call the “collaborative connected warfare”. Typically, this is the approach that I am convinced we need to adopt for the Alliance Future Surveillance & Control (which will replace our AWACS), on the basis of the outcomes of the distributed networks NIF-branded event I mentioned earlier;

- From traditional top-down, V-model, risk-adverse approaches, to bottom-up, spiral development.

Doing so, we have to accept that risk is part of exploratory phases, with the multiplication of proofs of concept and experimentations.
Nevertheless, this is quite easy to accept, instead of realizing too late that we get partially unadapt product.

We then can seize the opportunities offered by solutions coming from the civilian domain. We can react to the concrete problems end users are facing, and rapidly deliver operational capabilities through successive increments, in a “mobile app” philosophy.

This new paradigm can become a reality only through a renewed partnership with you, the industrial community – traditional defence industries, large groups, Small and Medium Enterprises and start-ups.

This is the main purpose of this event.

I have already noted a few takeaways from yesterday’s Breakout Sessions:

- The idea of taking ACT innovation hub to the next step, making it a real “lab” by giving it rapid prototyping capacities;
- The idea of a NATO Open Innovation Alliance offering a framework of shared principles and values for open innovation agreements between SMEs, especially start-ups, and major defence companies, under the “moral umbrella” of ACT.

I expect the next three plenary discussions will generate additional fresh ideas for new mechanisms, initiatives as well as recommendations for amending or creating required policies.

What, in your view, is hindering innovation in NATO?

The common thread during this Forum is Emerging and Disruptive Technologies.

With that in mind, I need to hear from you what are the critical technological areas we need to investigate together, both from the opportunity and threat standpoints.

Beyond that, I also count on you, as solutions providers, to share with us your ideas.

You have yourselves, in your own organizations, faced these challenges, how to leverage these new technologies in future systems or new services, to provide cutting edge capabilities.

As I said before, NATO is an Alliance of countries and values.

And, without ignoring the reality of industrial competition, we, 29 Nations, with our increasing military budgets, with the best in best competences in terms of technology and industry, will succeed.

I have no doubt.

The solutions are at our fingertips. We have to create the conditions to make them accessible, fast, faster...

And for that, there is only one answer: we must work together with the innovators in industry to maintain the edge.

This has allowed the Alliance to guarantee peace and security in its territory for 70 years.

This is our common ultimate goal!

To extend this dialogue, Henry Kissinger used to joke: “Europe? Give me a name and a phone number!”

Well, I am here to tell you that if you want to call NATO about Innovation, Capability Development Requirement and management, my name is André Lanata, at ACT Norfolk, and my phone number is +1 (757) 747-3400!

Thank you for your attention.
DR. HELGE BRAUN

Head of the Federal Chancellery of Germany, and Federal Minister for Special Tasks

Mr. Secretary General of NATO Jens Stoltenberg,
Commissioner for Internal Market, Industry and SMEs Elżbieta Bieńkowska,
Honourable NATO/EU state representatives,
US-National Armaments Director Ms. Hellen Lord,
Members of the Defence Innovation Board of the USA,
CEOs/representatives of defence industry, Ladies and gentlemen,

On behalf of the Federal Government let me first thank the Supreme Allied Commander Transformation General André Lanata for the invitation and for carrying out this year's NATO-Industry Forum (NIF) in Germany.

NATO was founded in 1949 in a rather clearly defined security environment. Shortly thereafter, the Korean War presented the first necessity to adjust defence planning: The presence of troops in Europe, defence spending and procurement were increased.

This was followed by the development of NATO's military structures and NATO's enlargement with the accession of additional members. Finally, in the 1990s, we experienced radical changes to the European landscape following the collapse of the Soviet Union and the Warsaw Pact.

Resulting in a fundamental reorientation of the alliance, which was reflected - among other things - in the Eastward enlargement of NATO. In the Federal Republic of Germany and in many other member states, a significant reduction of the armed forces as part of a peace dividend was the consequence of the new circumstances and threat perceptions. NATO engaged substantially in crisis response operations like in Afghanistan – that required different capabilities unlike those during the Cold War.

Then the financial crisis hit. Throughout most NATO allies and in the Federal Republic of Germany, priorities were shifted and defence spending was cut even further.

However, the annexation of Crimea and the power projection of Russia vis-à-vis the Eastern flank of our alliance, the terror of the IS and the increasing destabilization of Africa have significantly worsened the security situation. NATO, the EU and, in these frameworks, Germany have responded also by increasing defence spending.

From its foundation up until the 1990s, NATO’S focus of armaments technology was on conventional, almost static means due to the assessed conflict scenario.

Changed conflict patterns and the technical developments of recent years have again significantly increased the complexity of the security environment. At the same time, the financial constraints of recent years have made it difficult for many NATO allies to adapt their capabilities to the current technical environment.

With regard to defence spending, Germany has taken significant steps in the past years regarding the increase of defence spending, we call it a true turnaround to the policies of the past years. While defence spending according to NATO criteria was still around EUR 35 billion in 2014, we will increase defence spending to approximately EUR 47 billion in 2019! We are thus moving closer to NATO's two-percent target and will continue on this path.

Our focus is on a comprehensive and lasting process of improvement of our equipment, both in terms of capability or quality, but also in terms of the needed quantity. This process includes the provision of personnel appropriate to the tasks at hand and an increase in armaments-investment spending.
The armaments policy consequences result from the so-called capability profile, describing what an operational Bundeswehr must look like, what capabilities, what scope, what structures the Bundeswehr needs in order to carry out its tasks effectively and efficiently. It aims to implement the planning goals agreed with NATO and among its allies via interim targets in 2023, 2027 and 2031.

Germany is the second-largest provider of troops in NATO missions and operations. With the future Joint Support and Enabling Command on German soil, we will add significant value to the Alliance’s operational readiness, realizing that Germany will be the important logistic hub and corridor to move troops through this central position in Europe and to welcome additional forces from overseas. Germany is one of the framework nations, in NATO's enhanced forward presence in the Baltic States. Germany will stay engaged in multiple missions in UN, NATO, and EU context for a sustained period of time.

The technical developments ahead are likely to offer even greater potential for disruption and cause more uncertainty than in the past. Let me give just a few examples:

- Quantum technology will soon not only increase today's computing capacity. It will also enable much more secure communication.
- The development of autonomous platforms is already well advanced today and will advance further.
- New forms of artificial intelligence will also influence the military decision-making process.

In addition to political, legal and ethical questions, such as the attribution of cyber-attacks or the handling of autonomous weapon systems under international law, there will also be the question of how the Alliance will confront and meet these developments technically in all military domains - land, sea, air, space and cyberspace, and I might even add: in additional fields like logistics and digitalization.

One thing is already certain today: only if the member states act together, if NATO acts jointly with the EU and we seek and create a closer cooperation with industry - we will be successful.

This year's NIF focus highlights the need for close cooperation between NATO and the EU:

"Emerging and disruptive technologies with a particular emphasis on NATO's engagement with non-traditional defence industry for purposes of developing capabilities based on new digital architectures; as well as innovation in the framework of NATO-EU relations."

Germany's commitment to strengthen and further develop the EU's Common Security and Defence Policy (CSDP) is always guided by the aim to remain a reliable ally creating effectively a stronger European pillar in and for NATO. A strong Europe as a capable security provider will strengthen NATO in the long term and make the transatlantic security architecture more robust for the times ahead. Europe can and must make a relevant contribution to security in the world, complementing and in coherence with NATO, without duplication.

Therefore, the European Defence Fund (EDF) aims to promote and strengthen the European defence industry base and will create the necessary financial incentives for more European cooperation and technological innovation - in terms of research, development and procurement. For the first time, research and development for defence will have a share in the future EU budget. The EU Commission's proposal to allocate 13 billion euros for the period 2021 to 2027 would turn the EU into the fourth largest investor in research and development in Europe.

The consistent further development of military capabilities, as well as technological and industrial policy cooperation within the EU, help us to jointly remedy our commonly identified deficits.
In NATO, the "ACT's Emerging & Disruptive Technologies Roadmap" is an essential contribution to positioning ourselves for the future.

The Roadmap sets the framework for NATO's adaptations to the new technological challenges. Above all, however, it highlights the risks and opportunities of disruptive technologies for the Alliance. Coordination among NATO partners is particularly important in creating standards for new technologies. Only if we manage to achieve true interoperability NATO will be able to act as a counterweight to hostile governmental and non-governmental structures.

An essential prerequisite for the success of NATO is a strong and connected industry in NATO and the EU.

By this, I mean companies in the traditional defence industry as well as companies in logistics and the IT sector.

First and foremost, it will depend on a functioning structure consisting of small, medium-sized and larger companies that combine and connect research development and production efficiently and purposefully. Small and medium-sized enterprises are the nucleus of innovation in Germany and many other countries. They are creative, flexible and extremely agile and offer invaluable potential for the development of new NATO and EU capabilities.

Germany has already given a lot of impetus to supporting young companies that want to gain a foothold in the security and defence sector with fresh and innovative ideas. The latest project this year is the founding of an agency to promote innovation in cybersecurity. The aim is to close a gap in the German research landscape today and specifically promote high-risk projects with a high potential for disruption. I would like to thank our American colleagues: DARPA was a role model here.

Hardly any defence projects in NATO or the EU will in future be able to be developed or implemented by just a handful companies in isolation. In the future, small, medium-sized and large manufacturing and research companies will (have to) cooperate across national borders – which is already the case today if you look at large defence projects.

For the defence industry - as for industry in general - it will also be a matter of taking up the challenges but also the potential arising from global developments. I have already mentioned some keywords, such as artificial intelligence. And I see merit in drawing the proper military solutions from opportunities in the civilian market like Industry 4.0, end-to-end logistics, Digitalization, remoteness and autonomy.

Governments in the EU and NATO must also cooperate more closely. The development costs of complex and high-quality products can only be borne by joint procurement - and perhaps joint use. Only through holistic cooperation we will be able to meet the future needs of our armed forces.

To this end, politicians must create a reliable framework, provide the necessary budget and a solid legal background.

The NIF is intended to provide a platform for this. Here the various actors are given the opportunity to exchange ideas in order to better understand and cooperate with each other.

Compared to NATO's foundation, the Forum is still in preschool as it was founded in 2013. However, I am sure that it will already generate considerable added value today and will gain in importance in the coming years.

I would ask you to make active use of this forum and to get involved. And I would like to stress once again how much we appreciate that this year's Forum is taking place in Germany and that so many companies and officials have taken part.

Thank you very much – I wish you an enjoyable day at this Forum.
Dear Secretary General,

Minister,

Ladies and gentlemen,

I would like to thank Secretary General Stoltenberg for inviting me to this year's NATO-Industry Forum.

This exchange between the industry, EU and NATO is timely at a moment when we are making ambitious moves towards more defence cooperation in Europe.

To tackle the defence challenges of today and tomorrow, we need a vibrant, competitive, and innovative defence industry.

And we need industrial cooperation across borders.

This is true for NATO and its allies; it is also true for the EU as a whole.

This is why interactions between industry, national governments, NATO and the EU – in fora such as this one - are extremely important.

And this is why, among the various initiatives launched by the EU in the area of defence, a key pillar relates to industry and technology.

This is what the European Defence Fund is about.

The challenges

But, ladies and gentlemen, let me first mention the background against which the Fund has been launched.

The security challenges that Europe is currently facing are complex, sustained and fast evolving. And the consequences are potentially huge, for instance in terms of hybrid threats and terrorism.

The distinction between internal security and external defence is becoming more and more blurred.

No Member State is strong enough to meet those challenges on their own.

Europe must become a security provider and progressively acquire the capacity to ensure its own security.

This is not in contradiction with NATO.

On the contrary, a stronger Europe in defence means ultimately a stronger NATO.

Yes European cooperation in defence is moving forward at an unprecedented speed. We have achieved more in last two years than in the last 60 years on that topic.

However this should not be feared, but looked at as an opportunity: this means that Europe is becoming an even more credible partner for its allies.

And this is the reason why, at each move, we have always made sure EU/NATO relationships were strengthened starting with the landmark EU NATO Joint Declaration in Warsaw.
This launched a new era of EU-NATO cooperation, which resulted in unprecedented working relations between our two organisations during the past years.

Today our cooperation is operational on a set of very concrete actions for instance on cyber, on countering hybrid threats, but also on capabilities and industry. And it is working.

However we hear the need to explain even more to all the Allies and industrial partners the different initiatives currently being set-up at EU level, between the European Defence Fund, PESCO, CARD.

I am convinced these EU level initiatives deserve to be explained in an even open and transparent way. This is what I have been personally doing by participating to several NAC meetings at the invitation of the Secretary General. And this is also why today’s forum is important.

What we have done so far

Ladies and gentlemen,

Our plans for industrial cooperation in defence have moved forward rapidly. This is indeed urgent and necessary.

Today, the EU defence market is fragmented. There are lot of inefficiencies and duplications in the way public money is spent on defence. Having, for instance, 17 different types of main battle tanks or 20 different types of combat aircraft is far from efficient from an industrial and economical point of view.

We cannot afford this anymore in Europe. Cooperation must therefore become the norm and not the exception.

That’s why we proposed last June the European Defence Fund.

Our objectives are clear:

• We need to invest more on defence R&D in Europe otherwise we risk to fall behind in the future in terms of innovative defence technologies and systems.

• But we need to spend better by spending together and more efficiently in order to avoid unnecessary duplications

The European Defence Fund is not just words, an idea or on paper. This is now very concrete and already up and running through two pilots:

Since last year, we have been funding defence research actions. We have €90m for three years.

The first grant agreements for 5 research projects were signed earlier this year.
Among them, there is OCEAN 2020, a project which supports a large technology demonstrator on maritime surveillance (with 42 partners from no less than 15 Member States!). They will provide ships for the demonstrations, one of which will take place in the Mediterranean and the other one in the Baltic Sea. The NATO ship Alliance will take part in the demonstration. The NATO Centre for Maritime Research and Experimentation, based in Italy, is also one of the partners in the project and ensures the interoperability with NATO. The Centre receives funding for its contribution and cooperation.

This shows that the EU, with its programme for European defence cooperation, is clearly open to the possibility for direct cooperation with NATO.

In March, a second set of calls for proposals was published and proposals are now being evaluated in domains like high powerful lasers, or cyberdefence technologies.

We expect grant agreements to be signed at the beginning of next year. We will launch a further set of calls early next year, especially a part on disruptive technologies.

We then continued in 2017 with the proposal of the European Defence Industrial Development Programme (EDIDP), for which we reached an agreement in June this year in a record time by the EU standards decision making.

With this programme, we now have € 500m to co-finance as of 2019, the development of specific defence capability projects. This is a game changer: This means that as of next year we will finance common development projects in defence.

Finally, in June this year, we tabled a set of unprecedented budgetary proposals for defence as part of the new EU budget over 7 years:

- The creation of a €13bn European Defence Fund
- €6.5bn in support to military mobility as part of the infrastructure budget
- 10.5bn off budget for the EU Peace Facility proposed by HRVP Mogherini in support with the Commission.

This is historic budgetary commitments at European Level towards defence. This is Europe clearly taken its share of the burden for its own security.

**The European Defence Fund**

I would like now to focus a bit more into details on the European Defence Fund

With our proposal we are in fact scaling up to a higher level of ambition the initial initiatives we took these two last years

The legislative discussions within the Council and the European Parliament are going well.

We hope that a compromise will be reached by March thanks to efficient Austrian and upcoming Romanian Presidencies and committed Rapporteurs and shadow rapporteurs.

With € 13 billion the EU will become one of the top 4 defence investors in Europe. At the same time the European defence Fund, will be the main instrument supporting defence cooperation in Europe.

Indeed, it is a programme designed to fund collaborative defence projects all along the research and development parts of the lifecycle.

The first part is the research phase for which we foresee €4.1 billion. Eligible research projects will get full and direct financing from the EU budget. This will help Europe close the technological gap and ensure it stays on top of the technological development.

The second part is the development of defence capabilities with €8.9 billion, where the Fund
will co-finance 20% of the total costs of the development of prototypes. This means the rest of the money will have to come from Member states.

Additionally, and this is new, 5% of the budget will be dedicated to support disruptive technologies and breakthrough innovation that will ensure Europe’s technological leadership over the long term. We want the Fund to be a game-changer for innovation in the defence sector.

The other main features of the Fund are the following:

**First**, this Fund is about cooperation:

- A project eligible for the funding will have to involve at least three participants from three Member States.
- We will only co-fund the development of those prototypes where Member States commit to buying the final product and where there are harmonised technical specifications.
- And this Fund is not only for the big Members States and big defence companies - broader participation of SMEs is one of the key principles of the programme through specific incentives. Our objective is clear: we want to open up the defence value chains in Europe.

**Second**, the European Defence Fund does not operate in isolation, especially with other defence initiatives:

- PESCO capability projects may be eligible for a higher EU co-financing rate.
- The priorities in terms of capabilities will be set by Member states in the Framework of the Capability Development Plan, and also in liaison with regional and international processes, especially the NATO one (NDPP).
- This is an important point: coherence. The Fund, through the Member States, will aim at ensuring a degree of coherence with the NATO priorities. This means that NATO priorities may also be taken into account, provided of course that these are line with the priorities agreed under the EU's Common Security and Defence Policy. In any case, at the end, projects to be financed by the European defence Fund will have to be agreed in liaison with the Member states.
- Moreover, cross-border cooperation will generate more interoperable systems. Member States' armies will be in a better position to operate together and with allies. This aspect as well can only benefit NATO.

**Finally**, I would like to say a few words on an important element: who can get access to the Fund.

Understandably, the European Defence Fund focuses on cooperation within the EU.

The general rule is therefore that the Fund is open for companies based in the EU and which are not subject to a control by a non-EU entity.

But we also have opened up the funding possibilities for entities in EFTA countries that are members of the European Economic area.

Also companies established in Europe but foreign-controlled will be able to access the Fund provided that guarantees are provided that the security interests of the EU and its members will be preserved. There are therefore strict conditions to meet.

We are mindful of the international industrial cooperation that exists today. And our international commitments need to be taken into account.
So the criteria for eligible entities under the European Defence Fund will allow for cooperation with entities not established in the EU provided that the security interests of Europe and its members are protected.

In clear, the European defence Fund is not a protectionist tool. This is not about excluding partners.

We are not, for instance, changing in any way the EU Defence Procurement Directive to restrict supplies from non-EU countries.

But, and it is normal, we just want to make sure that the security interests of the EU and its Member states are preserved. And for this, any company willing to benefit from it will have to strictly comply with the security conditions of the Fund.

Conclusion

Secretary General, Minister, ladies and gentlemen,

To conclude, the EU is putting forward a serious and ambitious response to the defence challenges we collectively face.

The Commission, for the first time, is proposing to target substantial funding to European defence and to do so covering all stages of product development.

This is breaking a major taboo but one we have done in full support with Member States.

I sincerely believe that with such a proposal, we are at a turning point of the European project delivering on a collective ambition towards a credible Defence Union.

A Defence Union that protects Europeans and a Union that can make an even greater contribution to NATO.

Our determination is to work together. The strategic partnership between the EU and NATO is fundamental for addressing the security challenges and is complementary and respectful of each other’s mandates, competences and roles.

More fundamentally, I strongly believe Defence will be a corner stone of the Future of Europe ahead of the European Elections. We cannot therefore fail.

Thank you.
Good morning. It’s great to see you all.

Let me start by thanking Germany for hosting our conference this year.

And for being a major driver in technology and innovation.

Let me also thank all of you for being here and for joining us at this NATO Industry Forum. A very important platform for strengthening the cooperation between NATO, NATO allies and Industry, which is so important for the whole Alliance.

I would also like to thank commissioner Elżbieta Bieńkowska for being here today I think that’s a great example of how we are strengthening the cooperation between the European Union and NATO.

The NATO-Industry Forum plays a critical role in our long-standing engagement with industry. And it is important that we continue to work hand in hand as we prepare for the future.

You are helping NATO to translate our standards and capability targets into practice.

Meeting you gives us all a clearer picture of how to increase our cooperation.

This is especially important as NATO continues to adapt to fast-changing security challenges.

At the Brussels Summit in July, we took significant steps to further bolster deterrence and defence.

With a new readiness initiative – Which we call the Four Thirties:

- 30 mechanised battalions
- 30 air squadrons, and
- 30 combat vessels
- Ready to use within 30 days or less.

And this readiness initiative comes on top of all the other things we have done to increase the readiness of our forces. With tripling the size of the NATO response force and also by the fact that for the first time in our history we have combat ready forces, four battlegroups in the three Baltic Countries and in Poland and we also increased our personnel in the South East of the Alliance. So we are now in the midst of the biggest adaptation of the Alliance since the end of the Cold War and working with Industry is an important part of that adaptation.

We also decided at the Summit in July to adapt our command structure.

With a new Atlantic command in Norfolk, Virginia.

And a new command for support and logistics here in Germany in Ulm.

Both commands will help our forces become more mobile enabling rapid reinforcement within the Alliance ensuring the right forces in the right place at the right time, with the right readiness.

For our forces to be ready, they must be well-trained but also well equipped. And again the Industry is key to make sure we have the right equipment.

Our biggest exercise since the end of the Cold War, Trident Juncture, Has been taking place in Norway.

All 29 Allies participated.

Along with our closest partners, Finland and Sweden.
This is a defensive exercise.
Not directed against any country.
But it sends a clear message to any potential adversary that NATO is there to protect and defend all Allies. That we have the resources and capability to do so and by doing that we prevent conflict.
Trident Juncture included around 8,000 German troops. Because Germany will lead NATO’s Response Force next year. And through Trident Juncture we were able to test and certify the German troops being the lead troops for Very High Readiness Joint Task Force in 2019.
And it also included thousands of troops from the United States and Canada.
Demonstrating the enduring strength of bond between Europe and North America.
Trident Juncture was also a showcase of NATO's ability to innovate.
From micro-drones and robotics to 3D printing.
For instance our commanders noticed that vehicles were breaking down more frequently due to the cold. It was actually not so cold but it was colder than in Brussels. It can be cold in Norway, that's what I'm trying to say.
We started using 3D printing to make spare parts. These could be distributed immediately so we avoided the wait for spare parts to arrive from distant suppliers.
We also tested one of the smallest drones in world. A drone which can see in the dark.
Many of these technologies are about reacting and responding more quickly, seeing further and detecting threats well in advance.
Technologies like these could change the way we protect troops and conduct our operations.
We must continue to ensure that our skills and equipment are second to none.

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NATO is likely to shape future of the defence industry in many different ways.
But let me mention three:
How much Allies spend on defence.
What we spend on.
And how efficiently we spend the money we have.
First, how much we spend.
As you all most likely know, we made a defence investment pledge at the Summit in Wales, in 2014. We promised to stop the cuts, gradually increase, and then move towards spending 2% of GDP on defence within a decade.
And to be honest, just to be able to stop the cuts was a great promise. Because you have to understand that the starting point was that almost all Allies had cut defence spending, almost every year, for many years, since the end of the Cold War.
At the end of the Cold War we spent almost 3% of GDP that was the normal level of spending
across Europe. 3% of GDP on Defence.
And now we are below 1.5%.
And it is extremely difficult to get political support on Defence because then you have to spend less on something else. It is easy to be in favour of spending more on something, it is much more difficult to identify what will get less, or to advocate for higher taxes.
So actually, just to stop the cuts was really a change. We have delivered, meaning that all Allies have stopped cuts, all Allies have increased.
And more and more Allies meet the 2% target. And the majority of Allies have put forward a credible plan to reach 2% within a decade.
We also have to remember that we did not promise 2% next year, we promised within a decade.
So I am not saying we have delivered everything we shall already but I am saying that the whole Alliance have really turned a corner from reducing defence spending and now starting to increase defence spending. We have made significant steps in the right direction. The picture is still a bit mixed but at least it is much better than it was just a few years ago. In 2014 it was three Allies who met the 2% guideline now it’s 9 Allies. And the majority has put forward plans to be there within a decade.
So we will continue to address the issue of Defence spending.
This year European Allies and Canada have boosted their combined defence budgets by 5.2%
And just over past two years, those same countries have spent a cumulated US$41 billion more on defence.
We will have the national plans by the end of the year. And how to reach the 2% guidelines will be discussed by Defence Ministers next February so we must keep up the momentum.
If all European Allies and Canada met the 2% spending guideline, that would mean an extra 100 billion dollars every year for defence across Europe and Canada. That is roughly the equivalent of the combined defence spending of the United Kingdom and France.
So we speak about big money and this is also money that will sooner or later end up in the defence industry. At least some of it, not all, because we have to pay some salaries to the soldiers too. But a lot of it will be spent on equipment and research and development.
This will ensure Alliance remains at the leading edge of military technology in a world remains competitive and unpredictable.

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The second way NATO is shaping the future of defence industry is: what we spend money on. What capabilities we buy and for what purpose.
Allies have committed to invest 20% of all defence spending on major equipment.
Including related Research and Development.
In fact, this year NATO Allies are expected spend over 250 billion US dollars on major equipment.
And associated Research & Development.
More than 60 billion will be invested by European Allies.
Which represents an increase of some 10 billion over the last year.
And even more expected in the coming years.
To make sure our armed forces have the right quantity.
But also the right quality of equipment.
We identify priorities for defence across the Alliance.
And provide guidance to nations about where they should direct their investments.
This is actually one of the most important thing NATO does and this is what we call the Defence Planning Process where we identify the different capabilities that different Allies are supposed to deliver into our collective defence efforts.

We need to maintain an advantage in key areas such as Joint Intelligence, Surveillance and Reconnaissance.
The alliance Future Surveillance and Control system.
Our Ballistic Missile Defence system.
And Alliance Ground Surveillance.
These projects are funded together, planned jointly and implemented cooperatively.
By several or all Allies.
And they bring together industries from both sides of Atlantic.
We also need to stay on top of new wave of technology.
Like artificial intelligence, machine learning, future computing techniques, and big data. This is a great challenge because we are challenged not only Russia but also China in these domains.
Restructured NATO Command Structure, we are setting up a Cyber Operations Centre in Mons, Belgium.

But we depend on our industry partners help stay ahead.
For example in the cyber domain we partner closely with industry to enhance capabilities.
So we can respond to increasingly complex cyberattacks.
Germany is a good example.
With the creation of Agency for Innovation on Cybersecurity.

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Let me turn to the third point:
And that is how efficiently we spend our defence dollars, euros, pounds, and krone.
Many of you will have heard me say this before, but we must address the fragmentation of our defence industry, especially in Europe. We can and we must achieve greater efficiency by working more closely together.
For instance in Europe there are 17 different types of main battle tanks.
In the United States there is only one.
In Europe 13 different types of Air-to-Air Missile.
United States has three.
And European nations 29 different types of naval frigate.
United States has four.
This is something I addressed. But I also appreciate or welcome the fact that European leaders have addressed this again and again, the fragmentation of European defence industry. Difficult, political and sensitive but we need to address the challenge in one way or another.
By planning and spending together, we spend smarter.
For decades, through the tried and tested NATO Defence Planning Process.
We define requirements and set capability targets.
For individual Allies. And for NATO.
Better coordination of Allies’ requirements allows us to move forward on key capabilities.
Like precision-guided munitions.
Strategic airlift.
And air-to-air refuelling.
We also coordinate capability development with the EU.
And I welcome the renewed initiative by the EU leaders to strengthen cooperation with industry.
This is an important element of the EU’s Global Strategy and the European Defence Action Plan.
It is essential that we work together to ensure new EU initiative is fully coordinated with NATO.
Which is one reason I very much welcome presence, once again, of Commissioner Bieńkowska at this Forum.
Elżbieta, your participation underscores your commitment to transparency and collaboration with NATO.
And I appreciate that very much.
It is important for NATO and important the European Union.

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NATO has long history of working with industry partners.
Which is underscored by the fact that NATO Industrial Advisory Group is celebrating its 50th anniversary.
It is essential we continue to work closely together.
Now and for many decades to come.
I put my trust in knowledge, skills and ingenuity of our partners in industry and academia.
Industry is full of extraordinary people.
By harnessing their talents and ideas.
By putting the most advanced technologies in hands of our brave men and women in uniform.
And by working effectively and efficiently together.
We will continue to defend our countries, uphold our values and preserve the peace.

So I wish you a successful debate at this Forum.
PREPARATION
"Our ability to meet the challenges of a changing security environment is underpinned by an array of robust, sophisticated, and evolving capabilities across all domains, including heavier, more high-end, fully-supported and deployable, sustainable, and interoperable forces and capabilities that are held at high readiness to perform the whole range of Alliance tasks and missions... We will further develop our partnership with industry and academia from all Allies to keep pace with technological advances through innovation."

Brussels Summit Declaration, Para. 31

Emerging & Disruptive Technologies

Disruptive technologies are increasingly highlighted by NATO’s peer competitors in their strategic messaging. In front of an assembly of students, Russian President Vladimir Putin highlighted the influence that he estimates AI will have on world order, stating “Artificial intelligence is the future, not only for Russia, but for all humankind. [...] Whoever becomes the leader in this sphere will become the ruler of the world.”

China has made clear its ambitions to become the AI world leader by 2030, in its ‘Next Generation Artificial Intelligence Development Plan.’ The Plan identifies AI “as a major strategy to enhance national competitiveness and safeguard national security.” With disruptive technologies moving to the forefront of the modern security environment, NATO is developing an Emerging & Disruptive Technology Roadmap to guide the Alliance’s current work on disruptive capabilities. AI, quantum computing, block chain, autonomy, big data and other technologies will fundamentally change the way that NATO is conducting business and will foster the strength of the Alliance now and throughout the future.

Individual Allies and partners have already set a trend of innovation by tailoring defence ministry structures, policies and investments to maintain technological momentum. National contributions to NATO have increased to support the timely implementation of robust and sophisticated capabilities that provide for the Alliance’s strength. Allies turned a corner on defence pending in 2014, as a consequence of Russian aggression in Eastern Europe and Allies’ agreement to the defence investment pledge, signed at the NATO Summit in Wales. As noted in the Brussels Summit Declaration, “Allies have started to increase the amount they
spend on defence in real terms [and] more than half of Allies are spending more than 20% of their defence expenditures on major equipment, including related research and development."5 Direct and indirect contributions to NATO capabilities continue to rise as NATO adapts to incorporate a wider breadth of capabilities; however, interoperability and greater sharing of data among Allies remain pre-requisites to success.

The 2018 Framework for Future Alliance Operations, published jointly by Allied Command Operations (ACO) and Allied Command Transformation (ACT), notes that "as the greatest advances will likely come from commercial entities […] relationships with […] industry become more critical to maintaining military advantage."6 Industry, at the forefront of technological development, is best poised to inform NATO about the opportunities, risks and responsibilities associated with disruptive capabilities. Harnessing industry’s insight “includes sharing information and building trust with traditional and non-traditional entities, such as non-defence industry.”7 The interconnectivity of capabilities through the 'Internet of Things' entails mobilizing intellectual capital from non-traditional defence sources. Considering the range of defence technologies today, the strategies supporting NATO’s ambitions are best guided by a wide range industrial experts, partners, as well as Allies.

Innovation Together - Allies, Partners and Industry

Collaboration and interoperability between Allies, industry and partners is central to the strength of the Alliance’s capabilities. Over the past two years, the European Union (EU) and individual Allies have taken strategic measures to enhance collaboration among defence industries and promote investments toward early-stage research and development (R&D). Allies and partners are making strides toward innovation through complementary capability development initiatives that support the Alliance’s security.

As reiterated at the Brussels Summit, a stronger Europe “will lead to a stronger NATO.”8 With 90% of the European population residing within NATO’s borders, NATO and the EU inevitably share common security interests. The EU has made great strides in strengthening European defence capabilities by promoting competition within the European defence industrial base and contributing funds to defence R&D. For the next long-term budget (2021-2027), the EU is planning a 13 Billion Euro European Defence Fund to finance competitive and collaborative research.9 Of the new European Defence Fund, 5% will be committed to disruptive technologies.10 Such initiatives, including the Permanent Structured Cooperation (PESCO), provide a catalyst for innovation within Europe. However, despite the EU’s exceptional progress, the EU cannot protect Europe by itself; it has to be a transatlantic effort.

U.S. policymakers are working to support European security amid evolving threats from disruptive technologies. The Congressional Research Service has found that threats posed by disruptive technologies have concerned U.S. policy makers for over a decade. Despite trade concerns, the 2017 U.S. National Security Strategy pledges that the U.S. “will nurture a healthy innovation economy that collaborates with allies and partners, improves Science, Technology, Engineering and Mathematics (STEM) education, draws on an advanced technical workforce, and invests in early-stage research and development (R&D).”11 Apart from agile and robust Allies, a strong U.S. defence industrial base will also provide for transatlantic security. The National Security Presidential Memorandum Regarding U.S. Conventional Arms Transfer

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5| Brussels Summit Declaration, Para. 3
7| Ibid
8| Brussels Summit Declaration, Para. 71
10| Ibid
Policy encapsulates this logic, stating "[…] the defence of our interests require[s] a strong military, capable allies and partners, and a dynamic defence industrial base […]". NATO’s adaption to incorporate emerging technologies is essential to today’s security in both Europe and the US.

The NIF18

The NIF18 serves as the pinnacle of the Alliance’s engagement with industry. The purpose of the NIF18 is to produce real outcomes that shape the future of NATO capabilities, the NATO-Industry partnership and the Alliance’s security. The NIF18 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 Germany, the NIF18 will take place in Berlin from 12 to 13 November 2018.

The Alliance can no longer afford to hold off on innovation, but must incorporate emerging and disruptive technologies into its operations and policies. In breakout session and plenary formats, participants will be encouraged to share lessons learned and best practices associated with the inclusion of disruptive technologies in business operations, as well as options to include disruptive technologies in NATO’s concepts and requirements. The NIF18 is an opportunity for industry to share its latest concepts, visions and strategies in front of the world’s leading defence organization and learn about NATO’s defence requirements. Together with industry, NATO can maintain security and ensure the prosperity of its Allies, now and into the future.

**BREAKOUT SESSIONS**

*Breakout Session 1*

**Logistics & Sustainment**

The enablement of the Supreme Allied Commander Europe’s (SACEUR) Area of Responsibility (AOR) is critical to the success of future operations to act quickly in the event of a crisis as emphasized in the Brussels Declaration in July 2018. The Supreme Allied Commander Transformation (SACT) is currently working with stakeholders to improve resiliency for infrastructure and Host Nation Support (HNS). The commander also requires operationally agile tools to make informed decisions in a rapid and condensed planning cycle that requires shared awareness to visualize operations. Additionally, these systems must remain persistent despite cyber threats and hardware failure. The following topics will be examined during this session:

- **Enablement of SACEUR:** Border Crossing and Readiness reporting needs to be streamlined within the alliance to enable employment and freedom of action for the 30 major naval combatants, 30 heavy or medium maneuver battalions and 30 kinetic air squadrons, with enabling forces, at 30 days readiness or less (30/30/30/30).

- **Resilient Infrastructure & Host Nation Support:** A redundant infrastructure is required to ensure basic necessities remain available to conduct operations. These essential functions are made up of power, communications, ports, and water. It is also vital to address the needs of the national population and displaced individuals.

- **Shared Awareness:** As a commander your primary function is to visualize the battlefield and all logistics involved, so that you can describe what needs to be done and direct operations. A shared awareness allows you the ability to see what is going on and run modelling and simulations to assist in making better decisions and anticipating second and third order effects.

- **Operational Agility & Persistent Systems:** The supporting systems must be modular, deployable, adaptable and interoperable with nations and industry ready to use Artificial Intelligence to aggregate information that remain functional 24/7, even during cyber and hardware anomalies.

The way countries provide logistical support to their formations continue to evolve as resources become more constrained. Germany implemented a new approach to logistical support that has shifted the paradigm away from organic support and are leveraging contractors to support military operations by contracting of 100 percent of their logistical requirements for the Battle Group supporting the enhanced forward presence in Europe. Additionally, Germany is the frame work nation for the Joint Support and Enabling Command (JSEC) which is located in Ulm, Germany. The JSEC follows a coordinated approach with the NATO nations to assist with the movement of personnel and material including its force protection. These functions are critical with reception, staging, onward movement, and integration (RSOI) along with routine border crossings. Interested parties from industry will be invited to continue exploring these topics periodically with Allied Command Transformation in future working groups. These groups will be presented at the NIF for continued coordination with industry partners.

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Breakout Session 1 – Co-chairmen:

- 1. Brigadier General Wolfgang GÄBELEIN  
  – German MoD, Head of Division, Forces Policy II

  – Allied Command Transformation, Branch Head of Logistics, development & Sustainment

Logistics situational awareness is key to supporting military operations. Do we have the right systems that are resilient to effectively operate in a contested environment?
Breakout Session 2

Enhancing Military “Decision-Making”

Our dynamic, complex and globally interconnected, all domain security environment, requires NATO to adapt its political and military strategic level decision making so that it is continuous and able to, rapidly respond to the challenges of all 3 core tasks simultaneously. However, the current central decision-making process at both the political and military strategic level is Crisis Response, optimised for discrete, operational activity involving military forces conducting activity in the physical environment. Therefore, the decision-making processes must be considered for adaptation to meet today’s challenges of hybrid warfare.

With this in mind, the Information age and advances in technology also provide opportunities that could force changes to NATO’s decision-making process. The ideas behind the change have been grouped into 4 Themes for this NIF as follows: Connected to these themes is the role that Modelling and Simulation can have, particularly that of modelling human and population behaviours in a predictive sense to enhance both the sense making and planning functions.

Figure 1 The 4 Themes of COTC Syndicates and their relationship between them.

Themes for the Breakout Session

Theme 1 – Sense Making to Create Strategic Awareness. Awareness today can be distilled from large quantities of data from multiple sources, including our own, and goes beyond our ‘known, unknowns’. This is where the field of Data Science, focusing on specific data-related skills and techniques, has the most potential to transform our sense making. To develop this further, NATO must leverage and learn from Allies and partners, particularly industry supporting data driven decision making in other sectors such as corporate insurance and the stock markets.

Theme 2 – Planning for Synchronised Effects. Strategic decision-making needs to continuously assess scenarios and plan synchronised activities. This is as opposed to discrete planning for a particular crisis or operational mission where planning options are decided upon at the strategic and political levels (eg GRP, and COPD methodology).
Theme 3 – Creating Effects with Effectors and Effects Synchronisation: There must be a more tangible link between strategic effects and tactical activity in both the physical and virtual environments across the Alliance. There should be synchronised cross over of all activities in terms of creating an effect be it in the virtual information space or physical effect.

Assess Outcomes of Desired and Undesired Effects: Not a Theme but warrants specific interest is the need to assess the desired and undesired outcomes and whether the strategic goals/objectives are being achieved. Because assessment is taking place in the same time and space as NATO is generating effects (eg STRATCOM), assessment must also differentiate between organic changes in the environment and changes caused by NATO activities.

Theme 4 – Enabled by Data Science. ACT is currently considering the role of data science as an enabling function. Initial analysis has concluded that in order to implement the opportunities presented by data science, significant changes need to occur in terms of Culture, People, Process and Technology. Of those 4, technology should be thought of as providing a supporting role to the others. In today's information technology space, the most relevant technology is likely to be a COTS solution that is matched to the process. In the past, technology has been developed and then data applied to it. A data centric methodology reverses that paradigm where data becomes the main focus and technology is then applied to it. The implications are that data must be seen as a strategic asset, the foundation of NATO’s technology development and resourced appropriately.

Potential solutions and possible way forward. This approach, at the Strategic and Political level may enable NATO organisations to coherently and continuously task, direct, monitor and assess the progress of activities required for the enhancement of their decision making process in all phases of conflict. The effects need be achieved across a holistic capability development perspective, and will include updating policies, procedures, supporting technology, competencies, training and organisations, infrastructure and interoperability.

Potential Questions for the breakout session:

► How have industry approached the role of data centricity in their own decision-making process that might be applicable to NATO’s decision-making process? What best practices can NATO use to improve decision making?
► How do you see technology and the interoperability of that technology support an enhanced decision-making process at the speed of relevance?
► Assuming data centricity and the provision of data services as paramount in this approach, how do you see the balance of funding between Capability Development and Operation and Maintenance change?

Breakout Session 2 – Co-chairmen:

- 1. Colonel Richard BLUNT
   – Allied Command Transformation, Section Head of Intel & Environmental Disciplines
   Joint Intelligence, Surveillance & Reconnaissance Branch

- 2. Colonel Thierry GODFROID
   – Allied Command Operations, Branch Head of Planning Support, J5 Operations Planning
Breakout Session 3

Disruptive Technologies

In the business domain, disruptive innovations create a new market and value network and eventually disrupt an existing market and value network, displacing established market leading firms, products, alliances and business models. Correspondingly, disruptive technologies in the military domain enable new concepts and capabilities, shift the operational balance, and negate or disrupt existing capabilities. In today’s environment, these technologies are generally being heavily driven by commercial investments and interests, but clearly must be leveraged to meet military capability requirements and minimize vulnerability to potential threats.

There are a variety of lists of disruptive technologies forecast to reshape our day to day lives and/or our future defence and security environment. Some of those that appear on many such lists include: autonomy; artificial intelligence; hypervelocity/hypersonic; quantum technologies; nano-/bio-technologies; meta-materials; and human performance enhancement.

During this breakout session, we will address a number of aspects of this list.

► 1. Is this a credible list of what you see as (potentially) disruptive technologies? Is there something on the list that you would delete (e.g., it does not appear to satisfy the criteria)? Is/are there one or more technologies that you would add? What are some of the key applications and impacts that you expect to see from these technologies?

► 2. How do you, as an industry partner, see your role in promoting/exploiting such technologies? Do you partner with government or academia pursuing research in these areas? Do you have a plan for incorporating them into existing or future systems? Are you pursuing (in-house) corporate R&D to develop potential products?

► 3. Many of these technologies are being pursued for commercial purposes (vice defence specific applications). What is your investment strategy vis-à-vis these technologies? Do you pursue specific partnerships with leading commercial firms? Do you work with them to adapt/shape the technology to meet defence needs? Do you pursue independent R&D on defence applications?

► 4. Given the competitive market and the life cycle for commercial technology introduction/updates, how can defence industry keep pace with technology advances and effectively introduce them into military systems in a timely fashion?

► 5. Finally, Allied Command Transformation has embarked on an effort to develop a Disruptive Technologies Roadmap. What would you want to see in such a Roadmap? Would this be a product of use/interest for you? More generally, what role do you see NATO playing in the disruptive technology space?

Breakout Session 3 – Co-chairmen:

• 1. Dr. Thomas H. KILLION
  – NATO Headquarters, NATO Chief Scientist and Chair of the NATO Science & Technology Board

• 2. Mr. Pierre DUBOIS
  – Rockwell-Collins France, Head of Research, Technology & Innovation

Introduction
Within the realm of civilian and military technology, systems with autonomous functions and capacities are quickly maturing and evolving. Autonomy represents an opportunity for NATO to mitigate the operational and economic challenges associated with manned systems by facilitating new approaches to readiness, precision, persistence and reach.

Autonomous solutions have the potential to play a key role in numerous military capability areas such as C2, logistics, force protection and cyberspace. At the forefront of NATO capability requirements, NATO Allied Command Transformation (ACT) recognises the importance of close cooperation with the industry in harnessing autonomous solutions that facilitate the future of NATO’s capabilities. Industries perspectives on technological trends, interoperability challenges, risks, constraints and limits of the emerging technologies add value to the security of the Alliance.

ACT Autonomy Programme
In 2017, ACT initiated the Autonomy Programme to understand the opportunities and challenges presented by Autonomy, and to establish a framework for the coherent development of autonomous solutions throughout NATO’s capability development process. To achieve this, the Programme focuses on the standardisation of concepts, doctrine and procedures; Command, Control, Intelligence, Surveillance and Reconnaissance (C2ISR); Education Training Exercise and Evaluation (ETEE); counter operations and protection; ethics and abidance with international law.

The ideal end state foresees best practices to the development and use of autonomous solutions in place across NATO’s operational domains: air, land, maritime, cyberspace and space. Furthermore, success implies that NATO Directives and Policies related to Autonomy are compliant with the Laws of Armed Conflict (LOAC) and principles for interoperability are well established across NATO members and with partners.

NATO acknowledges industry’s steadfast role in contributing to the understanding and integration of Autonomy capabilities in future Alliance operations. An ongoing study included in the Programme examines industry’s perception of NATO’s capability and procedural gaps in terms of NATO’s ambition of acquiring and employing autonomous solutions, and the perceived impact that Autonomy has on the future of NATO planning and operations. NATO turns to industry to learn how it can best prepare to harness autonomous solutions and the implications that such technologies will have on NATO’s ability to meet its future challenges.
In today’s security environment, NATO faces simultaneous challenges across all four of the Alliance’s recognized operational domains – land, air, maritime and cyberspace. The asymmetrical effect of warfare today has been amplified by the rapid tempo of technological advancement and the availability of diverse technologies to aggressors who seek to test our ability to protect NATO populations, territories and core values. The immense speed at which state and non-state aggressors have proven to develop these tactics implies that the Alliance faces the risk of falling behind on key capabilities in decisive military areas. Sustainable partnerships with industry are crucial for the Alliance to conform to today’s pace of modernization. NATO’s relationship with industry is key to its ambitions of harnessing emerging and disruptive technologies.

NATO is pursuing disruptive technologies to maintain a technological edge in today’s multi-domain security environment. The process of integrating such technologies as artificial intelligence (AI), big data analytics and blockchain systems into the Alliance’s operations and mission requires steadfast collaboration with those at the forefront of technological progress. The diversity of technologies utilized in modern day warfare suggests the importance of including both traditional and non-traditional defence industries in NATO’s capability partnerships. By exploring the art-of-the possible together, the Alliance and industry can work in unison to respond more rapidly and effectively to emerging crises and conflicts.

This panel explores the types of technologies and business models required to compete in a complex, multi-domain security environment. It will analyse how NATO and industry are adapting to today’s rapid speed of innovation, and how industry’s adaptation and challenges impact and drive change in NATO. As technological advancements determine the evolution of the security environment, NATO is working to harness sustainable disruptive technologies that will maintain the Alliance’s technological edge. Enduring collaboration with industry, research establishments and like-minded institutions, such as the European Union, will be key to the longevity of the Alliance’s relevance in a technological world.

NATO Adaptation in the Process of Harnessing Disruptive Technologies

In this increasingly complex security environment, NATO has initiated several modernization efforts to ensure that its Headquarters and Command Structures are fit for purpose when confronted with future crisis or enduring conflict. Strengthening NATO’s 360-degree approach to security across all operational domains – land, air, maritime and cyberspace - will reveal new capability priorities and an increased need for interoperability.

NATO’s evolution foreshadows an increased demand on industry and partners to contribute to the Alliance’s effectiveness and strength. Already, Allied Command Transformation (ACT) has adjusted its internal structure to better foster partnerships and manage capability development from cradle to grave, establishing clarity and guidance on NATO’s capability requirements. Furthermore, the Supreme Allied Commander Transformation (SACT) launched an ‘Emerging and Disruptive Technologies Roadmap,’ to steer NATO’s exploitation of disruptive technologies, gain a better understanding of the risks and opportunities associated with disruptive technologies, and set the conditions by which NATO should adapt.
Designing an Innovative Business Model for the Future

Defence capabilities are moving from reliance on classic infrastructure to complex, technology-packed architectures that require frequent upgrades, reconfiguration and adaptation in rhythm with demand. As NATO pursues a 360-degree approach to the Alliance’s security, the technological solutions introduced to NATO’s capability inventory will need to be interoperable by design and sustainable to support the Alliance’s readiness. NATO’s adaptation, agreed to by leaders at the 2018 Brussels Summit, is an opportunity for the Alliance to design a sustainable business model that meets the demands for interoperable and rapid solutions and allows for the incorporation of disruptive technologies and innovative solutions into the Alliance’s processes, procedures and operations.

NATO’s support missions, exercises and internal operations must sustain pace with today’s technological advancements. Disruptive technologies will inevitably cause the Alliance to evolve, bringing changes to NATO’s business model. Industry is best poised to inform the Alliance’s transformation, having done it themselves to remain profitable in rapidly evolving defence markets. Given the broad range of technologies utilized in modern warfare, NATO aspires to diversify its network with industry to include those external to the defence market. For this network to prove fruitful, non-traditional defence industries must find common ground with the Alliance.

Sustainable Partnership and Innovation

NATO remains determined to defend its territory and protect its populations. The Alliance aspires to apply disruptive technologies and innovative solutions to collective defence, crisis management, and cooperative security. With growing responsibility on a 360-degree front, NATO seeks to apply the latest advancements in technology to all of its operational domains. At the 2018 Brussels Summit, NATO leaders declared their commitment to “further develop the Alliance’s partnership with industry and academia to keep pace with technological advances through innovation.” This includes partnership with industry in the development of interoperable solutions to, for instance, enable SACEUR’s Area of Responsibility, improve logistics, and enhance decision-making.

Together with industry, NATO can achieve interoperability, develop capabilities at the speed of relevance, and deliver effect in a multi-domain security environment. With its ongoing adaptations, the Alliance has been given an opportunity to tackle impediments in policy and procedures that stifle productive partnerships and hinder common, innovative capability development. By learning from its network of traditional and non-traditional industries, including industries in the civilian domain, the Alliance can develop new strategies that will foster the Alliance’s adaptation and support the sustainable exploitation of disruptive technologies to assure that the Alliance remains ahead of the curve.

This Plenary Session will explore the following key themes and questions:

► Industry’s adaptation in a multi-domain security environment: How does today’s security environment affect industry’s strategies, business models, and priorities? How is industry adapting to the change of pace generated by new/emerging and disruptive technologies? How are companies adapting to disruptive technologies and the Internet of Things in order to remain competitive? What models do companies utilize for the rapid delivery of capabilities to customers?

► NATO’s adaptation in a multi-domain security environment: From industry’s standpoint, how should NATO adapt to successfully harness disruptive technologies and maintain pace with technological development? What does industry see as the main challenges facing NATO’s innovation and disruptive technologies goals? What things should NATO include in
its strategy to exploit disruptive technologies? What are the key enablers that would make a
new business model possible? How can NATO ensure interoperability of its capabilities while
rapidly incorporating disruptive technologies?

► Expanding innovative and effective partnerships: What options can NATO explore to
ensure civilian solutions in the area of disruptive technologies are rapidly adapted to the
defence sector?

Panellists

• 1. Dr. Thomas ENDERS
  – CEO, Airbus SE

• 2. Mr. Patrice CAINE
  – Chairman & CEO, Thales

• 3. Mr. Alex KARP
  – CEO Palantir

• 4. Mr. Kurt Ove Håkan BUSKHE
  – President, CEO & Director, Saab AB

• 5. Mrs. Nikola HAGLEITNER
  – CEO of Industrial Projects, DHL Global Forwarding Inc.

• 6. Dr. Michael HOLM
  – CEO, Systematic Inc.

• 7. Supreme Allied Commander Transformation, Gen. André LANATA
Plenary Session 2
Trans-Atlantic Policies and Strategies for 21st Century Capabilities

New policies and strategies
Policies and regulations are fundamental for businesses to thrive. They are reactive to the evolutions of their subject matter, as is the case of Artificial Intelligence (AI) and technologies generically named ‘emerging’ or ‘disruptive’. Across the Atlantic, policies and regulations that steer the European and American defence industrial bases differ. While the American defence market is regulated federally, the European defence sector is regulated at the national level. New policies proposed by the European Union (EU) provide incentives to integrate the relatively fragmented European defence market.

In a globalised world, the impact of an organization’s policies has the possibility to ripple far beyond national boundaries, whether intentionally or not. The introduction of the EU Permanent Structured Cooperation (PESCO), for example, divided Allies at the Munich Security Conference in February 2018, as it drew into question the potential protectionist motives of the policy. While it remains clear that the PESCO initiative is not meant to duplicate NATO initiatives and that the EU and NATO will work together to develop capabilities, the pressure applied by U.S. President Donald Trump at the 2018 NATO Summit in Brussels on Allies to increase defence spending within the year seems to be turning the tide within Europe on Allies’ industrial reliance on US defence suppliers. With a risk to European and American defence collaboration, concerns about NATO’s interoperability and innovation loom.

NATO capabilities are not developed in isolation. NATO and the EU are often mentioned together, “two unique and essential partners”. NATO and EU are not only unique, but also complementary: they share 22 Members; both are force multipliers, and drivers in fostering and coordinating Nations’ investments; they have a single set of forces; and both are faced with similar threats. NATO capabilities are developed in coordination with those of the EU, and there is a close sharing of information regarding the defence planning of the two organisations aimed at avoiding duplications and ensuring coherence. Closer NATO-EU cooperation and complementarity is crucial: more than 90% of the people living in EU countries live also in a NATO country.

Recent initiatives on both sides of the Atlantic indicate steps being taken to foster innovation through the creation of new strategies and the upgrade of existing policies. The launch of the European Defence Fund and Permanent Structured Cooperation (PESCO) are examples of initiatives that the EU has taken toward innovation and the development of critical capabilities. The new National Security Strategy, the updates to the Conventional Arms Transfer policy, and Foreign Investment Risk Review Modernization Act (FIRRMA) are similar examples within the US. Such initiatives are expected to facilitate programs, and lead to increased access to financial resources and markets for the defence industrial base.

Innovation
At the NATO Summit in Wales, Allies agreed, as part of the Defence Investment Pledge, that 20% of a nation’s defence budget should be allocated to “major new equipment, including related Research & Development (R&D).” With more funding available for R&D, NATO plans to foster innovation to maintain technological edge in a complex security environment. At the Brussels Summit this year, NATO leaders declared: “We will continue to foster innovation to maintain our technological edge” and “we will further develop our partnership with industry and academia from all Allies to keep pace with technological advances through innovation.”
Indeed, the Alliance’s innovation is a product of collaboration between Allies and NATO partners, such as industry and the EU.

In May of this year, the European Commission communicated its guidelines for the establishment of a policy framework intended to strategically direct procurement to support innovative solutions. The EU’s Guidance on Innovation Procurement was adopted in the context of “A renewed European Agenda for Research and Innovation – Europe’s chance to shape its technological leadership.” Renewed policy coupled with such initiatives as the European Defence Fund (EDF) have the potential to make the EU one of the biggest investors in defence research and technology in Europe. For NATO, this is expected to assist with the development of new military capabilities, improve cooperation and reduce duplication, as well as to offer new opportunities for investing the additional financial resources resulting from the implementation of the Defence Investment Pledge.

The 2018 EDF, among other innovative initiatives from the EU, are viewed as efforts to lead to European strategic autonomy, and implicitly reduce the reliance on US defence industry. Indeed, the EDF could be viewed as Europe’s belated response to the US Third Offset Strategy, with which the US set the parameters of the future capabilities, including human machine teaming, autonomy, AI, and big-data. To strengthen the European defence industrial base, the EDF, for example, intends to stimulate nations to engage in collaborative programmes that lead to industrial cooperation, which in turn should increase competition, strengthen the EU defence market, and reduce fragmentation. A stronger and collaborative European industrial base would represent a strengthened European pillar for NATO’s capability development, and interoperability. As stated in the 2014 Wales Summit Declaration, “a strong defence industry across the Alliance, including a stronger defence industry in Europe and greater defence industrial cooperation within Europe and across the Atlantic, remains essential for delivering the required capabilities.”

NATO-Industry Forum 2018
NATO Allies rely on competitive defence and security industries. Industry drives, and also benefits from, technological advances, regardless if they are disruptive or non-disruptive. Strategic guidance and coherent decisions, made by nations individually and by the EU and/or NATO, are therefore critical to long-term industrial projections, regulatory frameworks and industrial and innovation policies. NATO and EU are working to harmonize capability development processes to avoid unnecessary duplication and to stimulate complementarities. As agreed to at the Brussels Summit, “The capabilities developed through the defence initiatives of the EU and NATO should remain coherent, complementary and interoperable. They should be available to both organisations, subject to the sovereign decisions of the countries that own them.”

This Plenary Session will explore the following key themes and questions:

► NATO-Industry Partnership: How can NATO, individual nations and industry work together to stimulate and facilitate more innovation and in which directions/domains? What does industry consider as the domains that would benefit from new or updated policies, strategies and directions?
► Capability Development: What impact would the policies and strategies mentioned have on NATO, EU and national capability development? What other policy steps should be taken and in which directions, to favour the development and early adoption of disruptive technologies?
► Regulations: More policies or more freedom for industry – where is the winning balance? To what extent should disruptive technologies be regulated? How does today’s security
environment affect industry's strategies, business models, and priorities? What could be NATO's role in the development of policies and strategies that support innovation and the adoption of novel technologies?

Panellists

1. Air Chief Marshall Sir Stuart PEACH
   – Chairman of the NATO Military Committee
2. Vice Admiral Carsten STAWITZKI
   – National Armaments Director, Germany
3. Lieutenant General Caroline LAURENT
   – Deputy National Armaments Director France
4. Mr. Bertrand-Marc ALLEN
   – President, Boeing International
5. Mr. Frank HAUN
   – President & CEO KMW and Co-CEO KNDS
6. Mr. Antoine BOUVIER
   – CEO MBDA
7. Mr. Camille GRAND
   – NATO Assistant Secretary General for Defence Investment

22| Chicago Summit Declaration on Defence Capabilities: Toward NATO Forces 2020, Para 6.
23| NATO-Industry Forum Report, ‘Executive Summary,’ Pg. 5
Plenary Session 3
NATO and Industry – Ready for Novel Challenges

Defence Spending and Capability Development

The balance and boundaries between governance and management in the delivery of common funded capabilities was the subject of a new capability delivery model endorsed at the 2018 Brussels Summit by the Heads of State and Government. The purpose of the new model is to allow NATO to deliver shared capabilities faster by:

- raising the level of oversight by Allies to an appropriately strategic level, introducing greater separation between governance and management and to reduce the number of decisions by consensus;
- reducing committee micromanagement and strengthening management accountability, “through-life management” and the use of “management by exception” and “tolerances”;
- improving management of information and risk, in an effective “trust but verify” framework;
- accelerating the delivery of technology intensive projects which will receive special focus, to diminish complexity by delivering iterative components as services, or by using the “Adopt, Buy, Create” ABC approach;
- hiring a number of skilled and experienced personnel, especially civilians. Allies are fully aware of the need to compete in the global “war for talent”. New personnel are needed to ensure effective performance and continuity for key tasks such as the definition of clear military requirements.

These elements are expected to contribute to better capability delivery through common funding. NATO is an influencer in military capability development. The Alliance is a facilitator of the convergence of national sovereign plans, in delivering security, peace and stability. However, common funding facilitates a small portion of NATO capabilities, their vast majority being developed by Allies nationally or cooperatively.

At the 2014 Summit in Wales, Allies committed to spending 20% of their defence budget on new equipment, to include Research & Development. So far, more than half of Allies have reached or surpassed this commitment, and according to their plans, more than 24 Allies will meet the 20% guideline by 2024.

NATO & Industry

The Declaration of the 2012 NATO Chicago Summit was the first to recognize industry as an essential element of NATO capability delivery. Allies agreed that “maintaining a strong defence industry in Europe and making the fullest possible use of the potential of defence industrial cooperation across the Alliance remain an essential condition for delivering the capabilities needed for 2020 and beyond.” At the follow on Summits, Allies recognized industry, including small- to medium-sized enterprises, as crucial to the Alliance’s capability development and innovation. This year in Brussels, Heads of State and/or Government deemed NATO’s relationship with industry as crucial to the Alliance’s innovation, harking back to the Defence Investment Pledge made at the 2014 Summit in Wales.

At the last NATO-Industry Forum in 2016, participants “agreed that NATO should leverage industry’s innovative capacity during the earliest phases of capability development.” The Framework for NATO Industry Engagement (FNIE), noted by the North Atlantic Council in 2013 and formally launched the same year at the first NATO-Industry Forum, set the parameters for dialogue and cooperation with industry. The FNIE states the importance of communicating NATO’s capability requirements to industry in a clear and even-handed manner. A recent NATO Industrial Advisory Group (NIAG) study on Trans-Atlantic Defence Technological and Industrial Cooperation (TADIC) recommended NATO “to involve industry in a substantive way
earlier in the requirement definition phase to allow a more pragmatic approach on utilisation of industrial ideas, technology and standards that could meet NATO requirements and promote a more effective interoperability (and exportability). While setting the NATO requirements for capabilities has been, and should perhaps remain a military function, solid awareness of what will be available from industry in the mid to long term seems to increasingly be recognised as critical.

‘Military requirements informed by industry advice’ is a concept gaining traction in NATO, as reflected in the development of the follow on capability to AWACS. The Alliance Future Surveillance Capability (AFSC) has been a demonstration of industry’s willingness to contribute far upstream in NATO capability development. First discussed with industry in 2014 in the NATO Industrial Advisory Group (NIAG) Study Group 189, more than two decades before the alleged retirement of AWACS, AFSC quickly became the symbol of modern NATO capability development, commonly funded at this stage, and of the early interaction with industry. With the adoption of emerging and disruptive technologies, more examples of NATO engaging early with industry are likely to arise. The Alliance continues to deem the NATO-Industry relationship as vital to the success, the readiness and the interoperability of its forces. NATO seeks to strengthen this relationship, but in doing so, relies on the advice and input of industry, to ensure efficient working relations towards the ultimate goal of delivering capabilities and harnessing emerging and disruptive technologies.

This Plenary Session will explore the following key themes and questions:

► What business models for capability development, procurement, engagement with industry could industry propose, which could succeed in organisations such as NATO?

► What measures can NATO take to strengthen the trans-Atlantic link and the trans-Atlantic defence industrial cooperation? How to stimulate multinational cooperation between nations, as well as between companies? To what extent is industry willing to contribute spontaneously to NATO capability development and innovation?

► Allies introduce new constructs to explore technologies and capabilities, practices and operations, and people and culture. Innovation is not just about science and tech, but to a large extent it is about people and culture. What mechanisms should NATO and industry put in place to allow finding solutions and embrace innovation that will inherently impact on the security of our societies and our military?

Panelists

1. Ms. Marillyn HEWSON
– Chairman, President and CEO, Lockheed Martin Corp.

2. Dr. Armin PAPPERGER
– Chairman of the Executive Board, Rheinmetall AG

3. Mr. Charles WOODBURN
– CEO, BAE Systems

4. Mr. Alessandro PROFUMO
– CEO, Leonardo

5. Ms. Susana de SARRIÁ SOPEÑA
– Chairwoman, Navantia S.A., S.M.A

6. Mr. Temel KOTIL
– CEO, Turkish Aerospace Industries

7. Mr. Camille GRAND
– NATO Assistant Secretary General for Defence Investment
BIOGRAPHIES
WELCOME REMARKS
AND HOST NATION RECEPTION

Mr. Benedikt ZIMMER
State Secretary at the Federal Ministry of Defence

Benedikt Zimmer was appointed State Secretary at the Federal Ministry of Defence (FMoD) in Berlin on 5 April 2018.

He is responsible for the Directorates-General “Equipment”, “Cyber/ Information Technology” and “Planning”.

Previous Assignments
State Secretary Zimmer joined the Bundeswehr as a soldier with Tank Battalion 54 in Hessisch Lichtenau on 1 July 1981. While serving as an armour officer, he held several command assignments in the armed forces, including as Commander of Tank Battalion 214, of Mechanized Infantry Brigade 41, and of Division SOUTH.

He completed two tours of duty in the Balkans as a member of the KFOR NATO mission.

In his staff assignments, he was employed in a wide range of areas, including personnel planning, mission and operations planning, as well as concepts and further development. Particularly worthy of mention in this respect are his assignments in the Army Staff and the Armed Forces Staff, as well as his assignment as Division Chief within the Directorate-General for Planning at the FMoD.

Before being appointed State Secretary, he served as Director-General for Equipment at the FMoD from 2014 to 2018.

Professional Career
Between 1982 and 1986, State Secretary Zimmer completed a course of studies in Electrical Engineering at Bundeswehr University Munich and received his degree as a Diplom-Ingenieur (graduate engineer). Besides general staff officers’ training at Bundeswehr Command and Staff College (1994–1996), he has also completed British general staff officers’ training at Joint Services Command and Staff College in Bracknell, United Kingdom (1998–1999).

Personal Data
- Year of birth: 1961
- Place of birth: Soltau
- State Secretary Zimmer is married and has two grown-up sons.
Dr. Peter TAUBER

Parliamentary State Secretary at the Federal Ministry of Defence

Born 22 August 1974 in Frankfurt/Main.


2000 to 2001 research fellow at Collaborative Research Centre 435, "The Culture of Knowledge and Social Change", Goethe University Frankfurt; 2001 to 2003 regional manager of the Junge Union (CDU/CSU youth wing) in Hesse; 2003 to 2004 personal assistant to Karin Wolff, Minister of Education of Hesse; 2004 to 2007 doctoral studies under Prof. Lothar Gall, History Department, Goethe University Frankfurt; 2007 to 2009 press officer of Deutsche Vermögensberatung AG in Frankfurt/Main.

Since 1992 member of the Christian Democratic Union (CDU); 2003 to 2009 regional chairman of the Junge Union in Hesse; 1993 to 2007 Wächtersbach town councillor; since November 2005 district councillor in Main-Kinzig; since October 2009 member of the German Bundestag; December 2013 to February 2018 Secretary-General of the CDU; since 2018 Parliamentary State Secretary to the Federal Minister of Defence.

Board member of the Konrad-Adenauer-Stiftung e. V., Keltenwelt am Glauberg, Freundeskreis Yad Vashem e. V. and Deutsches Kinderhilfswerk e. V.;

Member of the Synod of the Regional Protestant Churches of Hesse Electorate-Waldeck, of the Gelnhäuser Tafel and of the Bundeswehr Reservist Association;

Patron of the association Hand in Hand für schwerst- und krebskranke Kinder e. V.

Admiral Manfred NIELSON

Deputy Supreme Allied Commander Transformation

Admiral Nielson was born February 25, 1955 in Dorsten, Germany. He joined the German Navy as a reserve officer candidate and graduated from Helmut Schmidt University of the Bundeswehr in Hamburg in 1978 and completed underwater weapons specialist training in 1981.
Early assignments included tours as a watch officer on coastal minesweepers Koblenz and Wetzlar, minehunters Flensburg, Cuxhaven and Koblenz and subsequently command tours of Tübingen and Paderborn. He also served as an action officer for the Armed Forces Staff at the Federal Ministry of Defence and Deputy Commander of the 6th Minesweeper Squadron in Wilhelmshaven.

Admiral Nielson has commanded units at all levels. From 1996 to 1997 he commanded the 6th Minesweeper Squadron and following his promotion to Rear Admiral (lower half), served as Commandant of the Naval Academy in Flensburg from 2003 to 2005 where he deployed to Commander Task Force 150 during Operation Enduring Freedom. Promoted to the rank of Vice Admiral in 2010, he was appointed Commander in Chief of the German Fleet in Glücksburg.

Other significant tours include service as Chief of Division I Personnel, Social Services and Central Affairs Directorate of the Federal Ministry of Defence and later as the Director of Armed Forces Staff. In April 2012 he was appointed Chief of staff Joint Support Service of the Bundeswehr and in April 2016 he assumed duties as Deputy Supreme Allied Commander Transformation in Norfolk, Virginia, USA.

Admiral Nielson holds a Master Degree in Economics and Organisational Sciences and is a graduate of the Admiral Staff Officer Course at the Bundeswehr Command and Staff College in Hamburg. His personal awards including the Badge of Honour of the Bundeswehr in Gold, German Armed Forces Deployment Medal and the German Flood Service Medal.

Admiral Nielson is married and has an adult son and an adult daughter.

Mr. Gordon ‘Skip’ DAVIS Jr.

Deputy Assistant Secretary General for NATO Defence Investment

Gordon B. “Skip” Davis Jr. has been NATO’s Deputy Assistant Secretary General for Defence Investment Division since September 2018. He previously served as Director of Operations, U.S. European Command in Stuttgart, Germany, before retiring from the U.S. Army as Major General after more than 37 years of service.

Skip’s professional life has been characterized by operational and institutional military assignments interspersed with study and practice of international affairs and defence issues, primarily in Europe. Most of Skip’s career has been dedicated to NATO and European defence, including numerous assignments and operations with NATO forces and headquarters. Skip brings an unusual depth of practical experience and conceptual understanding of contemporary defence issues.
KEYNOTE REMARKS

H.E. Mr. Jens Stoltenberg

NATO Secretary General

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.
Dr. Helge BRAUN

Head of the Federal Chancellery and Federal Minister for Special Tasks

Dr Helge Braun was born in Gießen in 1972.

After obtaining his Abitur (higher-education entrance qualification) at Liebigschule Gießen and completing compulsory military service in Koblenz, he returned to Gießen where he studied medicine from 1994 to 2001, going on to work as a research assistant in the Department of Anaesthesiology, Intensive Care Medicine and Pain Therapy at University Hospital Gießen from 2001 to 2009. He completed his doctorate in 2007 on the topic “The impact of intraoperative tachycardia on the postoperative prognosis”. He was a member of the German Bundestag from 2002 to 2005 and then again from 2009. From 2009 to 2013 he served as parliamentary state secretary at the Federal Ministry for Education and Research, during which time he was responsible for issues concerning young researchers, research in the life sciences, general and vocational training and the internationalisation of education and research. From 2013 to 2018 he served as Minister of State to the Federal Chancellor.

Since 14th of March 2018 he has been serving as Head of the Federal Chancellery and Federal Minister for Special Tasks.

Ms. Elżbieta BIEŃKOWSKA

European Union Commissioner for Internal Market, Industry, Entrepreneurship and SMEs

Elżbieta Bieńkowska has been the European Union Commissioner for Internal Market, Industry, Entrepreneurship and SMEs since 2014.

Prior to this, she was Deputy Prime Minister and Minister of Infrastructure and Development. From 2007 to 2013 she was Minister of Regional Development of Poland. Elżbieta Bieńkowska has a post-graduate diploma from the Polish National School of Public Administration and a Master’s degree in oriental philology from the Jagiellonian University.
The Honourable Ellen M. Lord currently serves as the Under Secretary of Defence for Acquisition and Sustainment (A&S). In this capacity, she is responsible to the Secretary of Defence 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 defence industrial base.

Senate confirmed in August 2017, Ms. Lord served as the last Under Secretary of Defence for Acquisition, Technology and Logistics from August 2017 – January 2018.

Prior to joining the Department of Defence, Ms. Lord served as the President and Chief Executive Officer of Textron Systems Corporation, a subsidiary of Textron Inc, from October 2012 – June 2017. In this role, she led a multi-billion dollar business with a broad range of products and services supporting defence, homeland security, aerospace, infrastructure protection, and customers around the world.

Ms. Lord has more than 30 years of experience in the defence industry, serving in a variety of capacities, to include Senior Vice President and General Manager of Textron Defence Systems, now Weapon & Sensor Systems; and Senior Vice President and General Manager of AAI Corporation, now known as Textron Systems’ Electronic Systems, Support Solutions, and Unmanned Systems businesses. Earlier in her career, Ms. Lord served as Vice President of Integration Management for Textron Systems and Vice President of Intelligent Battlefield Systems for Textron Defence Systems, in addition to other business and operations positions.

Ms. Lord is a former Vice Chairman of the National Defence Industrial Association, as well as a former Director of the U.S. – India Business Council. She has served on the industry steering committee for the Center for New American Security’s (CNAS) task force on “Strategy, Technology and the Global Defence Industry,” as well as CNAS’s DoD-Industry collaborative project “Future Foundry: Forging New Industries for Defence,” which was formed to examine key technological trends and challenges facing the global defence industry. Ms. Lord has also served on the Board of Trustees of the U.S. Naval Institute Foundation.

Ms. Lord earned a Master of Science degree in chemistry from the University of New Hampshire, as well as a Bachelor of Arts degree in chemistry from Connecticut College.
BREAKOUT SESSION 1 – LOGISTICS & SUSTAINMENT

Colonel (COL)
William J. CAIN Jr. (USA)
Allied Command Transformation (ACT), Branch Head of Logistics, Development & Sustainment

Graduate of the University of Arkansas with a bachelor’s degree in transportation and commissioned as a Transportation Corps officer in 1992. He received a master’s degree in management from Webster University in 2002, and a master’s degree in logistics management from Florida Institute of Technology in 2004, and is a graduate of the US Army War College. COL Cain Jr. has commanded at the company and battalion level in Fort Campbell, Iraq, and Kuwait. He deployed in support of Operation NEW DAWN and served in several key staff positions to include the Assistant Chief of Staff Operations, 595th Transportation Brigade, Surface Deployment and Distribution Command (SDDC), where he supported the Operation ENDURING FREEDOM (OEF) surge. He has served with the Defence Logistics Agency distribution as a strategic planner supporting U.S. European Command (USEUCOM) and U.S. Central Command (USCENTCOM). Prior to his job with NATO, he was the Director of Installation Logistics and managed $1.3 Billion program responsible for all installation logistics at 78 Logistical Readiness Centers located worldwide.

Brigadier General (BGEN)
Wolfgang GÄBELEIN (DEU)
German Ministry of Defence, Head of Division – Forces Policy II

Brigadier General Wolfgang Gäbelein is Head of Division in the Directorate for Forces Policy in the German Ministry of Defence, which has a special focus on operational readiness of the armed forces. He is responsible for a broad variety of support tasks: from Logistics to Bundeswehr Organization and Structure, from Territorial Tasks, including Host Nation Support, to Bundeswehr Stationing.

Besides this, Brigadier General Wolfgang Gäbelein is German Military Representative and member of different International Committees, e.g. NATO Logistic Committee or the NSPA Supervisory Board.
BREAKOUT SESSION 2
– ENHANCING MILITARY “DECISION-MAKING”

Colonel (COL) Richard BLUNT
(UK)

Allied Command Transformation (ACT), Joint Intelligence, Surveillance & Reconnaissance Branch, Section Head of Intel & Environmental Disciplines

First joining the British Armed Forces as an Army officer in 1992, his first roles were as a Combat Engineer before specialising as a Geospatial officer in 2001. In his most recent appointment, he commanded 42 Engineer Regiment (Geographic) and, having attended the Advanced Command and Staff Course, took up his current appointment and is responsible for a range of NATO JISR, STRATCOM and CIED programmes with the focus currently on OSINT and Information Environment Assessment.

Colonel (COL) Thierry GODFROID (BEL)

Allied Command Operations (ACO), Branch Head, Planning Support, J5 Division

Colonel Thierry Godfroid is currently posted at Supreme Headquarters Allied Powers Europe (SHAPE) as Branch Head of Planning Support within the J5 Division. J5 is responsible for Operations Planning at the strategic level. The Planning Support branch is inter alia responsible for major documents about crisis response, i.e. the NATO Crisis Response System Manual (NCRSM) and Comprehensive Operations Planning Directive (COPD).

Before his position as Branch Head, which began in July 2016, Colonel Godfroid had the opportunity to serve in most of the operational functions of a Cavalry officer of the Belgian Army: platoon leader, instructor, squadron commander of a reconnaissance parachutist unit, planner at Operational level, MA to the Belgian Chief of Defence (CHOD), Battalion commander and G2 of the Belgian Army Operational Command.
BREAKOUT SESSION 3
– DISRUPTIVE TECHNOLOGIES

Dr. Thomas H. KILLION (US)

NATO Headquarters (NATO HQ), NATO Chief Scientist and Chair of the NATO Science and Technology (S&T) Board

As of 1 October 2016, the North Atlantic Council (NAC) appointed NATO Chief Scientist is Dr. Thomas Killion (USA). In this role, he has three major responsibilities. First, he serves as Chair of the NATO S&T Board (STB), where he acts as the STB’s representative to the Secretary General and the NAC, provides oversight of the NATO S&T Organisation (STO), and is responsible for the effective coordination of NATO’s S&T programmes. Second, he serves as the senior scientific advisor to NATO leadership, ensuring that appropriate and timely S&T based advice is provided to NATO senior decision makers. Finally, he leads the Office of the Chief Scientist at NATO Headquarters.

His previous executive assignments include: Director of Technology at the Office of Naval Research (2012-2016); Director of the Biometrics Identity Management Agency (BIMA) (2010-2012); Deputy Assistant Secretary of the Army for Research and Technology [DAS(R&T)] / Army Chief Scientist (2004-2010); Director of Technology in the Office of the DAS(R&T) (2002-2004); and Director for Personnel Technologies in the Office of the Army Deputy Chief of Staff, G-1 (2002).

Mr. Pierre DUBOIS (FRA)

Research, Technology & Innovation, Rockwell-Collins France

An employee of Rockwell-Collins France since 2001, Mr. Dubois was formerly a Technical Director on Advanced Avionics Products before becoming the Head of Research, Technology & Innovation. Mr. Dubois has been in his current role for over 8 years. His responsibilities include:

• Identification of Disruptive Technologies and Technology insertion into existing Products (Demonstrators TRL 3-5).
• NTIIGA membership. Actively participating into the NATO AFSC Pursuit.
• Participation into various NIAG group as Member or Team Leader.
• EU PoC for AVSI AFE87 Research Project (Certification of on-board A.I.-based systems) led by Rockwell-Collins US.
• Member of the Fr NIAG Delegation.
• Preparation and participation to Business Development events.
• Preparation and participation to large scale NATO events (Tide Sprint, COTC, CAX).

Mr. Dubois holds a Master degree in Applied Mathematics and Computer Science and a Bachelor degree in Computer Science. He is certified in Management of Cross-Cultural Teams, Techniques of Information Warfare, Deception and Manipulation, and Cambridge Course (CPE).
BREAKOUT SESSION 4 - AUTONOMY

Major General (MG)
William B. HICKMAN (US)

Allied Command Transformation, Deputy Chief Of Staff, Strategic Plans & Policy

Assigned as the Director of the Strategic Plans and Policy Directorate in July 2017, MG Hickman oversees the coordination of 10 branches that are functionally grouped to focus on: Strategic Foresight, Strategic Plans and Policy, Strategic Issues and Engagement, Strategic Partnerships, Concept Development, and Defence Planning and Policy Analysis. MG Hickman coordinated the efforts behind the NATO Command Structure Adaptation, orchestrating work across all ACT Directorates, and in close collaboration with Allied Command Operations in Mons, Belgium. His efforts have also contributed to the enhancement of ACT partnership activities, which included the co-led Partnerships360 Conference with the NATO HQ Political Affairs and Security Policy Division (PASP). In the past year, he has led the publishing of the Strategic Foresight Analysis 2017 and the Framework for Future Alliance Operations 2018, which identify trends and challenges that the Alliance will face in the future and how the Alliance should focus warfare development to meet these challenges. MG Hickman earned his bachelor’s degree in Business Administration from Vanderbilt University in 1983 and was commissioned as a second lieutenant through the ROTC program. He later earned a Master’s Degree in Business Administration from Vanderbilt University and a Master’s Degree in National Security and Strategic Studies from the Naval War College.

Mr. John JANSEN (NLD)

NATO Headquarters, Chairman of the NATO Industrial Advisory Group

2018-2019 Chairman NATO Industrial Advisory Group

2017 - : Senior Advisor EU Affairs at the Foundation for Netherlands Defence and Security Industries (NIDV).


2002-2005: Vice Chairman Western European Armaments Group (WEAG), Brussels

1995-2002: MoD NL, Head of the Department for International Relations within the Office of the NL National Armaments Director (NAD), encompassing all bilateral, NATO and European relations as well as export support to NL defence industries.
1985-1989 MoDNL, Policy Advisor for International Relations within the Office of the National Armaments Director (Directorate-General for Materiel).

Other:

He holds a Masters degree in Electrical Engineering from the Delft University of Technology (1976).

He graduated from the NATO Defence College Senior Officers Course nr 66 (1985) and the NL Defence Top Management Course (2000). Also he attended the Session Européenne des Responsables d’Armement (SERA 8). In addition, from 1996 - 2010 he served as NL Board member of the SERA and from 2002- 2010 as the President of the SERA (Alumni) Association.

He is a member of both the Allied Forces Communications and Electronics Association (AFCEA) Chapter The Hague and the Security and Defence Committee in the NL European Movement.

MODERATOR

Dr. Christian Mölling

AREAS OF EXPERTISE

Security and defence
Military capabilities
Defence industry
Security and defence policy of Germany and other major European countries
EU Common Security and Defence Policy
NATO

Christian Mölling became deputy director of the Deutsche Gesellschaft für Auswärtige Politik’s (DGAP) research institute in February 2017.

Before joining the DGAP, he held research and leadership positions with the German Marshall Fund of the United States (GMF), the International Security Research Division at the German Institute for International and Security Affairs (SWP), the Center for Security Studies at ETH Zurich, and the Hamburg Institute for Peace Research and Security Policy.

He has been a visiting fellow at the European Union Institute for Security Studies in Paris, the Royal United Services Institute (RUSI) in London, and the Paris-based Fondation pour la recherche stratégique.

He studied politics, economics, and history at the universities of Duisburg and Warwick and holds a doctoral degree from Ludwig Maximilian Universität Munich.
PANELLISTS
– INNOVATION AND DISRUPTIVE TECHNOLOGIES

Mr. Kurt Ove Håkan BUSKHE

Chief Executive Officer, SAAB

Håkan Buskhe is the president and CEO of the Swedish defence and security company Saab AB.

Mr Buskhe took up his position on September 1, 2010.

Mr Buskhe brings to Saab more than 20 years of experience in programme and operations management and business development from national and international commercial industries. Most recently, he served as the President and CEO of E.ON Nordic AB and E.ON Sverige AB. E.ON is the world’s largest investor-owned energy company with a European presence that is unique in the energy industry (nuclear, hydro etc).

Before entering into the energy business, Mr Buskhe had along experience of the fast moving Transport and Logistics Business. Among other things, Mr Buskhe was responsible for Schenker in Europe.

Several years as Head of Production at the Falcon Brewery made him an expert in beer.

Since 2015, he is member of the Board of Nefab, a provider of packaging solutions. During 2017, he became Vice chairman of the Board of ASD - AeroSpace and Defence Industries Association of Europe. Previously, he was member of the Board of Vattenfall and Chairman of the Board of the transportation company Green Cargo AB, and also served as Chairman of the Oskarshamn Nuclear Power Plant.

As a result of his military service as armament technician, he gained experience of different armament systems today related to Saab (Bofors, AA40/48, RBS70 etc.).

Mr Buskhe holds a Master of Science from Chalmers University of Technology in Gothenburg and graduated as Licentiate of Transportation and Logistics. His Master's degree was focused on Mechanical Engineering.

Mr Håkan Buskhe was born in 1963 in Örnsköldsvik in the northern part of Sweden. He currently resides in Stockholm and Falkenberg, Sweden. He is married to Camilla and has three daughters.
Mr. Patrice CAINE

Chairman and Chief Executive Officer, THALES

Patrice Caine is a graduate of the École Polytechnique and the École des Mines de Paris and holds the rank of Ingénieur en Chef of the Corps des Mines. He began his career in 1992 with the pharmaceutical group Fournier before becoming an adviser on mergers, acquisitions and corporate strategy at Charterhouse Bank Limited in London.

From 1995 to 2000, he held several executive positions in the French administration. From 2000 to 2002, he served as the technical advisor on energy at the cabinet office of the French Minister for the economy, finance and industry.

In 2002, Patrice Caine joined the Thales Group's Strategy department before being appointed to manage the following operating units - Air & Naval, Communication, Navigation & Identification, Air Systems, Radio-communication Products, and Network & Infrastructure Systems and Protection Systems.

In February 2013, he was appointed Senior Executive Vice-President, Chief Operating Officer and Chief Performance Officer and joined the Executive Committee.

Patrice Caine was appointed Chairman and Chief Executive Officer of Thales in December 2014.

After being awarded the National Defence Medal, he was named Knight of the National Order of Merit in 2014 and Knight of the Legion of Honour in 2017.

Dr. Thomas ENDERS

Chief Executive Officer, Airbus

Dr. Thomas ("Tom") Enders was appointed Chief Executive Officer (CEO) of Airbus SE, on 1 June 2012, after having been CEO of the Airbus Commercial Aircraft Division since 2007. Before that he served as Co-CEO of EADS between 2005 and 2007. He was Head of the Group's Defence Division from 2000 to 2005. He has been a member of the Executive Committee of Airbus S.E. since its creation in 2000.

Prior to joining the aerospace industry in 1991, Enders worked, inter alia, as a Member of the “Planungsstab” of the German Minister of Defence and in various Foreign Policy think tanks. He studied Economics, Political Science and History at the University of Bonn and at the University of California in Los Angeles.

In 2014, Enders joined the Advisory Council of the Munich Security Conference as well as the Senate of the Max-Planck-Gesellschaft. He is patron of the German Mayday Foundation which
supports airmen, women and their families in times of need.

Tom Enders is a member of the BDI Board (German Industry Association) since 2009, the Governing Board of HSBC Trinkhaus since 2012, the Joint Advisory Council of Allianz SE since 2013 and the Supervisory Board of Linde AG since 2017.

Current mandates:

• Chief Executive Officer of Airbus SE
• Member of the Board of Directors of Airbus SE
• Member of the Executive Committee of Airbus SE
• Chairman of the Shareholder Board of Airbus SAS
• Chairman of the Supervisory Board of Airbus Helicopters SAS
• Chairman of the Supervisory Board of Airbus DS Holding B.V.
• Chairman of the Supervisory Board of Airbus Defence and Space Deutschland GmbH
• Member of the Presidential Board of the BDI (Federation of German Industry)
• Member of the Advisory Board of HSBC Trinkhaus
• Member of the International Advisory Board of Atlantic Council of the US
• Member of the Joint Advisory Council of Allianz SE
• Member of the Board of Directors of WORLDVU Satellites Ltd. (OneWeb)
• Member of the Supervisory Board of Linde AG
• Member of the Advisory Counsel of EDB

Mrs. Nikola HAGLEITNER

Chief Executive Officer, Industrial Solutions, DHL

Nikola Hagleitner is the global CEO Industrial Projects, which is part of the DHL Global Forwarding division.

In this global role, she leads a team of 600 industry experts, performing end-to-end project logistics for O&G, Mining, EPC, Renewables, Engineering & Manufacturing customers.

She has been with the DPDHL Group since 2005, and has held various executive positions across 3 different divisions – DHL Management Consulting, Express as well as Global Forwarding. Most recently before her current role she was EVP of Global Business Strategy for DHL Global Forwarding. Nikola is based on London.

Nikola holds a law degree from the University of Innsbruck, Austria; as well as an MBA in International Management from Thunderbird, the School of Global Management School in Phoenix, AZ, US.
Dr. Michael HOLM

Chief Executive Officer, Systematic Inc.


Member of the board of the Danish Defence & Security Industries Association (FAD), under the Confederation of Danish Industries (DI).

Awarded the Danish “Entrepreneur of the Year” in 2003 and appointed “World Entrepreneur of the Year” by Ernst and Young in 2004.

Michael Holm has received King Frederik the Ninth’s Merit Award for promoting Danish Exports and was appointed "Business Man of the Year" in 2010 by Aarhus Business community.

Dr. Alex KARP

Chief Executive Officer, Palantir

Alex Karp co-founded Palantir in 2003 and became CEO in 2005.

He has a Ph.D. from the University of Frankfurt and a law degree from Stanford. An avid cross-country skier, Alex practices Chen-style tai chi daily.

Gen. André LANATA

Supreme Allied Commander Transformation

General André Lanata was appointed Chief of Staff of the French Air Force on September 21, 2015.

He joined the French Air Force Academy in 1981 and graduated with a Master’s degree in Aeronautical Science in 1983. Qualified as a fighter pilot in 1984, he acquired extensive experience both as a pilot and as an operational commander, having cumulated 3,300 flying hours on Mirage F1CR and Mirage 2000D aircraft, including 146 combat sorties over Chad, Iraq, the Former Republic of Yugoslavia, and Kosovo.

Both bilateral and multinational engagements have been a constant through his career. In addition, he ran several transformational challenges both in the Air Force and in French armed forces.

After attending the French Joint Staff College, he was appointed commander of the fighter and
attack squadron "Champagne". He deployed to NATO Allied Forces South Headquarters in Naples during Operation Joint Endeavor in 1997. He also took part in many other NATO or coalition operations and exercises both as a pilot and as a staff officer. He later served as commander of the Djibouti Air Force Base, where he developed his ability to engage and operate with partner nations in projecting stability efforts.

Back in France, he served as chief of plans division in the Air Force Staff, where he was in charge of capability development and transformational issues. Following his nomination as a Brigadier General, he was assigned at the Secretariat for National Defence and Security, where he reported to the Prime Minister, and later, as deputy director for International and Strategic Affairs. He contributed to interagency works and committees relative to national security work strands such as Ballistic Missile Defence requirements, capability studies, pre-crisis analysis documents for Libya or Sahel, and NATO engagements in the context of France’s return in the NATO Command Structure.

He joined the Joint Staff in 2011 as Assistant Chief of Staff - Operations, where he oversaw the development of bilateral defence agreements, such as the Combined Joint Expeditionary Force with the UK, while taking part in the transformation efforts of the Ministry of Defence. He assumed a leading role in the preparation, execution, lessons learned and analysis process of several coalition or national operations, in Libya, Mali, and the Central African Republic.

In 2013, he served as Deputy Chief of Staff - Defence Planning, where he was in charge of capability development and force generation for the French Armed Forces.

He became Chief of Staff of the Air Force in September 2015, which strengthened his relationships with Air Chiefs through the Alliance and Partner nations. In this capacity, he implemented an ambitious transformation plan for the French Air Force.

He has been awarded the rank of Commander in the French Legion of Honor and in the French Order of Merit, and earned two War Crosses and the Cross of Military Valor during his operational deployments.

General Lanata is happily married to Christine since 1990 and is a father of five children. He is a keen reader, enjoys fishing, scuba diving, and classical music.
Mr. Bertrand-Marc (Marc) ALLEN
President, Boeing International

Marc Allen is president of Boeing International and a member of the Boeing Executive Council. He is responsible for the company’s international strategy and corporate operations outside the U.S., overseeing 18 regional offices in key global markets. His responsibilities include forming new business and industrial partnerships, overseeing international affairs, enhancing Boeing’s local presence and providing global functional support. Allen reports to Boeing Chairman, President and Chief Executive Officer Dennis Muilenburg.

Previously, Allen was president of Boeing Capital Corporation, a wholly owned Boeing subsidiary that arranges and provides financing for Boeing’s products.

Prior to that, Allen served as vice president of Boeing International and president of Boeing China, responsible for leading the company’s business in China from its Beijing headquarters.

Allen earlier served as Boeing vice president for Global Law Affairs and general counsel to Boeing International, leading the company’s international legal practice group. He was responsible for cross-border trade regulation matters and international legal policy matters including the U.S.–E.U. World Trade Organization dispute on aircraft subsidies.

He received his law degree from Yale Law School and his bachelor’s degree summa cum laude from Princeton University, majoring in political science with a certificate in economics.

Mr. Antoine BOUVIER
Chief Executive Officer, MBDA

Antoine Bouvier was appointed Chief Executive Officer (CEO) of MBDA in June 2007.

From January 2002 until joining MBDA, he was CEO of ASTRIUM Satellites. Prior to that, he was Executive Vice President in charge of Eurocopter’s Commercial Helicopter Division.

In 1990, Antoine Bouvier joined Aerospatiale’s Commercial Aircraft Division. In 1991, he became the Division’s Director of Strategic Analysis. From 1992
until 1994, he was Secretary General and Industrial Director of the ATR GIE. Between 1994 and 1998, he was ATR’s Vice-President Operations, going on to become President of the ATR GIE from 1998 until 2001.

Antoine Bouvier started his career as an auditor at the Cour des Comptes (similar to the UK’s National Audit Office).


Antoine Bouvier was born in Paris in 1959. He is married with five children.

Mr. Camille GRAND
Assistant Secretary General, Defence Investment (NATO)

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.

Mr. Frank HAUN

*Co-CEO KMW+Nexter Defence Systems N.V.,*

President & CEO Krauss-Maffei Wegmann GmbH & Co. KG,

President Wegmann Unternehmens-Holding GmbH & Co. KG

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 Defence Systems N.V. (KNDS) with its Headquarters in Amsterdam in December 2015.

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 Vice President of the Federal Association of the German Security and Defence Industry (BDSV/Berlin, Germany) and of the Association of the German Army e.V. (Berlin, Germany). Beyond that he holds various functions in committees and advisory boards such as the Bavarian Economic Advisory Council (Munich, Germany), the German Association for Defence Technology (DWT/Bonn, Germany), Commerzbank AG (Frankfurt, Germany) and the trade magazine European Security & Technology (Bonn, 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.
Lieutenant General

Caroline LAURENT

*French National Armaments Director*

Caroline Laurent was appointed Director of the Strategy Directorate in the Defence Procurement Agency of the French Armed Forces Ministry on December 1, 2014.

She graduated in 1987 Armament Engineer from Ecole Polytechnique and from Supaéro (Advanced National School for Aeronautics and Space).

She started her career at the Space and Missiles Directorate in DGA (General Directorate for Armament) where she was manager for research projects in the area of satellites for oceanographic and reconnaissance missions.

From 1994 to 1995 she was responsible of the space research for the ministry of industry and was a key member of the committee in charge of the French space policy.

In 2001, she was appointed Syracuse Program Manager and was at the head of all French military satellite communications related programs.

She was graduated Brigadier General (Armament Corps) and served from 2007 to 2011 as Director of the Aeronautical Programs. Her unit was in charge of military transport aircraft, mission aircraft (such as AWACS or Maritime Patrol Aircraft) and in service fighter aircraft (as Mirage 2000). She was the French representative to the A 400M program committee in OCCAR.

From 2011 to 2014, she served as Director of the Space and Information Systems. His Unit was composed of 450 persons invested in the management of all the C4ISR projects in France, from communication systems, information and intelligence systems including space sensors up to the treatment of all information data and the command and controls systems.

She has been graduated Lieutenant General from the Armament Corps on December 2014 and appointed Director of the Strategy Directorate. She is in charge of preparing all future armament programs and in charge of the management of the French defence industrial policy. She is the French representative in the CNAD and acts as well as NAD in other European and multilateral forums.

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ACM Sir Stuart PEACH

*Chairman of the Military Committee (NATO)*

Air Chief Marshal Sir Stuart Peach was born in 1956 in the West Midlands. He was educated at Aldridge Grammar School, the University of Sheffield (BA), University of Cambridge (MPhil in International Law and International Relations), RAF Staff College and the Joint Services Command and Staff College (HCSC). He holds three honorary Doctorates from UK Universities: Kingston, Sheffield, and Loughborough, in
Commissioned into the Royal Air Force in 1977, he flew Canberras in the photographic reconnaissance role assigned to FIVEATAF in Italy prior to three successive tours on Tornado GR1 in the UK and Germany, qualifying as a nuclear, weapons and electronic warfare instructor assigned to TWOATAF. He commanded IX (Bomber) Squadron at RAF Brüggen in Germany 1994-1996 acting as Brüggen Strike Wing Leader for NATO response missions both nuclear and conventional. Staff tours include personal staff officer to the Deputy Commander and Commander-in-Chief in RAF Germany, Executive Officer to Commander TWOATAF and Director Defence Studies Royal Air Force where he acted as an author for UK and NATO doctrine. He has written widely on defence issues.

Operational service includes Belize, Hong Kong and Germany in the 1980s, Deputy Commander British Forces in Turkey (Op Warden), UK Head Military Coordination Centre Zakho (Iraq), Detachment Commander in Saudi Arabia (Op Jural), Commander British Forces in Italy (Op Engadine) and Battle Staff Director NATO CAOC Vicenza, Air Commander (Forward) in HQ KFOR (NATO) in Kosovo and Deputy Senior British Military Adviser in US HQ Central Command 2001-2002.

He commanded the Air Warfare Centre at RAF Waddington from 2000 to 2003, where he was also UK Director of Electronic Warfare in support of NATO (and is a Gold Medal “Old Crow”). As Director General Intelligence Collection in the Ministry of Defence 2003-2006 and Chief of Defence Intelligence and Deputy Chairman of the Joint Intelligence Committee 2006-2009, he held the UK seat at the NATO Intelligence Board. He held the appointment of Chief of Joint Operations at PJHQ(UK) from March 2009 to December 2011 commanding all UK Force Elements in support of NATO operations in Afghanistan, Iraq and Libya before becoming the first Commander of the UK Joint Forces Command from December 2011 to Apr 2013. He was Vice Chief of the Defence Staff from May 2013 to May 2016 and was responsible for all UK military personnel in NATO. He was Chief of the Defence Staff (ChoD) from July 2016 to June 2018 and assumed the role of Chairman of the Military Committee of NATO in June 2018, his fourth four-star appointment.

Air Chief Marshal Peach is married with two children. He is Chairman of the Imperial War Museum in London, and Deputy Lieutenant of the County of Lincolnshire. He was awarded the Queen’s Commendation for Valuable Service in the Air in 1990, an operational CBE for command in the Balkans in support of NATO in 2001, knighted by HM The Queen (KCB) in 2009, and became a Knight Grand Cross of the British Empire (GBE) in 2016. He has been awarded the Joint Staff medal by Italy, the Order of Abdulaziz (First Class) by the Kingdom of Saudi Arabia, the Defence Intelligence Medal by the United States, and is a Commander of the Legion of Merit of the United States.
Ms. Marillyn A. HEWSON
Chairman, President and Chief Executive Officer, Lockheed Martin Corp.

Marillyn A. Hewson is Chairman, President and Chief Executive Officer of Lockheed Martin Corporation. She previously held a variety of increasingly responsible executive positions with the corporation, including President and Chief Operating Officer and Executive Vice President of Lockheed Martin’s Electronic Systems business area.

Ms. Hewson joined Lockheed Martin more than 35 years ago as an industrial engineer. During her career she has held several operational leadership positions, including President of Lockheed Martin Systems Integration; Executive Vice President of Global Sustainment for Lockheed Martin Aeronautics; President and General Manager of Kelly Aviation Center, L.P., an affiliate of Lockheed Martin; and President of Lockheed Martin Logistics Services. She has also served in key corporate executive roles, including Senior Vice President of Corporate Shared Services; Vice President of Global Supply Chain Management; and Vice President of Corporate Internal Audit.

Ms. Hewson has served on numerous boards and currently sits on the Board of Directors of DowDuPont, the Congressional Medal of Honor Foundation, the Board of Governors of the USO, and the Board of Directors of Catalyst. She is a member of The University of Alabama’s President’s Cabinet and also serves on the Board of Visitors of the Culverhouse College of Business.

Ms. Hewson is former Chairman and a current Member of the Executive Committee of the Aerospace Industries Association, a Fellow of the Royal Aeronautical Society, and an Associate Fellow of the American Institute of Aeronautics and Astronautics. She serves on the National Space Council’s Users Advisory Group, as a Director of the Atlantic Council’s International Advisory Board, and as a Vice Chair of the Business Roundtable. Ms. Hewson also serves on the Board of Trustees of both the King Abdullah University of Science and Technology in the Kingdom of Saudi Arabia and the Khalifa University for Science and Technology in the United Arab Emirates.

In 2017, Fortune magazine identified Ms. Hewson as No. 3 on the “50 Most Powerful Women in Business.” She has also been recognized as a Top 10 “Businessperson of the Year” by Fortune, as one of the “World’s 100 Most Powerful Women” by Forbes, and was named as the “2018 CEO of the Year” by Chief Executive Magazine.

Born in Junction City, Kansas, Ms. Hewson earned her Bachelor of Science degree in business administration and her Master of Arts degree in economics from the University of Alabama. She also attended the Columbia Business School and Harvard Business School executive development programs.
Mr. Charles WOODBURN

Chief Executive Officer, BAE Systems

Career story: Charles has been Chief Executive Officer of BAE Systems since July 2017, having joined the company in May 2016 as Chief Operating Officer and Executive Director on the BAE Systems plc Board of Directors. Charles brings with him over 20 years’ international experience from the oil and gas industry gained in a number of senior management positions.

Before joining BAE Systems, Charles was Chief Executive Officer of Expro Group, an oilfield services business. During a 15-year career with Schlumberger, Charles held a number of senior management positions 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 later completed an MBA at Erasmus University, Rotterdam.

When he’s not at work: Married with two children, Charles is a keen cyclist, skier and car enthusiast.

Prof. Temel KOTIL

Chief Executive Officer, Turkish Aerospace Industries

Prof. Temel KOTIL

Born in 1959, Mr. Kotil graduated from Aeronautical Engineering Department at Istanbul Technical University (ITU) in 1983. He received his Ph.D. degree from the University of Michigan, Ann Arbor, in 1991. After founding and managing the Aviation and Advanced Composite Laboratories of ITU, he also served as chair and associate dean of Faculty of Aeronautics and Astronautics Engineering.

He served as the Head of Research Planning and Coordination Department in Metropolitan Municipality of Istanbul.


Prof. Kotil started his career with Turkish Airlines in 2003, as the Deputy General Manager in Turkish Technic, Inc. He became the CEO of Turkish Airlines in 2005. Prof. Kotil has served on the Board of Governors of IATA since 2006. In 2010 elected as a Board of Governors of Association of European Airlines (AEA) and became Vice President between the years of 2012 and 2013. Soon after, Prof. Kotil has been appointed as the President of AEA in 2014.

He was appointed as President & CEO of Turkish Aerospace (TA) as of October 21, 2016.

Mr. Kotil, married with 4 children, has authored many articles and publications in the aeronautical science journals, and papers in seminars and conferences.
Dr. Armin PAPPERGER
Chairman of the Executive Board, Rheinmetall AG

Armin Th. Papperger was born on 30. January 1963 and is a German national.

- After graduating in Engineering (University of Duisburg), Papperger began his career in 1990 in quality management in the Rheinmetall Defence Group in Düsseldorf.
- From 2001 on, he acted as managing director of various subsidiaries of the corporate sector Defence.

In July 2007, Papperger was also appointed head of the Weapon and Munitions division.

- In early 2010, he took on responsibility for the Vehicle Systems and the Weapon and Munitions division on the Executive Board of the corporate sector Defence.
- Armin Papperger became Chairman of the Executive Board of the Rheinmetall Corporate Sector Defence in 2011.
- In 2012 he was appointed Chairman of the Executive Board of Rheinmetall AG starting 1 January 2013.

Mr. Alessandro PROFUMO
Chief Executive Officer, Leonardo

Alessandro Profumo is Chief Executive Officer of Leonardo S.p.a. since 16 May 2017. He is also Honorary Chairman of AIAD (the Italian Industries Federation for Aerospace, Defence and Security) since July 2017 and Chairman of the Fondazione Ricerca & Imprenditorialità since February 2018.

Born in Genoa, Italy on 17 February 1957, he holds a degree in Business Economics from Bocconi University.

In 1977, he began his career at Banco Lariano, where he worked for ten years. In 1987, he joined McKinsey & Company where he was in charge of strategic and organisational projects for financial companies. In 1989, at Bain, Cuneo & Associati, he was in charge of developing relations with financial institutions.

In 1991, he left the company consultancy sector to join RAS - Riunione Adriatica di Sicurtà, where he was responsible, as General Manager, for the banking and parabanking sectors. He was also in charge of the yield increase of that company's bank and of the other group companies operating in the field of asset management.

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 September 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.

In February 2012, he was nominated by the European Commissioner for Internal Market and Services member of the High Level Expert Group in Brussels to reform the structure of the EU banking sector.

From April 2012 to August 2015, he served as Chairman of Monte dei Paschi di Siena Bank. From September 2015 to May 2017, he was a Board Member and Chairman of Equita SIM. Furthermore, Profumo was Chairman of the European Banking Federation in Brussels and of the International Monetary Conference in Washington, D.C. He was also on the International Advisory Board of Itaú UniBanco (Brazil) and was a member of Sberbank’s Supervisory Board (Russia).

He was a member of Eni’s Board of Directors from 2011 to 2014, and from July 2015 to April 2017. He was also a member of Medio banca’s Board of Directors and Executive Board, and a member of Bocconi University’s Board of Directors.

Profumo was awarded the Cavaliere al Merito del Lavoro (the Italian Order of Merit for Labour) in 2004.

He serves on the Board of Directors of the Together To Go (TOG) Foundation.

Ms. Susana DE SARRIÁ SOPEÑA
Chairwoman of Navantia, S.A., S.M.E.

Professional Career in Public Sector:

She has developed her professional career in the Public Sector, highlighting the following positions in the Regional Government of Andalusia: General Coordinator of the Vice Ministry of Employment, Business and Trade (Feb.2017-July 2018) and General Deputy Director of Industry, Energy and Mines (2013-Feb2017); Promotion of rural development within the LEADER approach in the Service of Rural Development Programs in the Regional Ministry of Agriculture and Fisheries (2011-2013); Province Manager of the Andalusian Water Agency, Director of the Operational Centre for Forest Fires Prevention and Firefighting, and other management and technical positions, all of them in the Environmental Regional Ministry (1990-2011).

Academic Background and additional information:

Forestry Engineer by the Polytechnic University of Madrid.


Various technical courses and training in people management and leadership.
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