Harmonization of Research & Technology as a driving factor for potential Defense Aerospace Cooperation.

The global defense technology and innovation is expanding the last 50 years and is growing more complex and difficult to monitor. New ways of thinking about new dimensions of threat and the contingencies, competitions and missions will be required in order to mitigate risks.

Operational and strategic planners must integrate and empower novel alternative analysis methods that challenge existing assumptions and enable more flexible planning efforts to meet the opportunities of the future.

Some of the these technologies like artificial intelligence, big data analytics, additive manufacturing, advanced and smart materials, virtual and augmented reality, unmanned systems, remote sensing are central to most modern militaries' efforts to enable new effects and enhance the effectiveness of people, platforms and systems on the future battlefield.

Other technologies are more specialized, such as hypersonic and electro-magnetic weapons, quantum computing and directed energy. Fewer nations may be investing in different applications of these technologies, but the capabilities these technologies enable, are potentially highly-destabilizing to military and geopolitical competitions.

Ultimately, disparate development of disruptive technologies, both individually and collectively, portends radical shifts in the nature, properties and applications of future military capabilities. However, the future of technology and capability development is depending on different actors which will prioritize development of different technologies to be used in different ways to achieve potentially similar effects.

Militarily-relevant technologies are no longer being produced solely by the global defense industry, but are increasingly being developed by commercial firms, research institutes and academia, further contributing to the expanding focus of innovation in defense technologies.

Interaction with non-defense industry enterprises is seen as ever more vital, but also tricky. Reforming procurement and engagement models does not happen overnight, and most high-tech companies lack the institutional patience required to navigate Ministry and Department of Defense processes.

Commercial development of relevant technologies is just one of the growing pathways of military and dual use technology proliferation, a dynamic that is further diffusing the power to disrupt.

Many states are engaged in expansive and aggressive efforts to acquire advanced technologies and expertise through both licit and illicit means in order to stimulate innovation and help mature their defense industry. China's defense industrial base has made impressive strides in many militarily-relevant technology areas despite seemingly strong structural constraints against ground-breaking innovation.

Rapid development of unmanned systems, quantum computing, additive manufacturing and ballistic missile technologies, among others, have all benefitted from aggressive efforts to acquire dual-use Western technology, including through sharing of technologies between commercial and military arms of state-owned enterprises.

The Strategic Assessments and Futures Studies (SAFS) Centre was established in December 2013 to deliver these strategic solutions to help defense and intelligence communities as well as the defense industry better anticipate, plan for, respond to and even drive strategic and operational disruptions.

The high tech industry is a driving force for innovations across all industries. Also R&D is shifting more towards developing the hardware, firmware and software that enables and enhances the performance of any product, as well as developing services that companies can sell to support these products, providing customers with additional features and improved usability

Innovation is a primary source of competitive advantage for companies in essentially all industries and environments, and drives forward efficiency, higher productivity, and differentiation to fill a wide variety of needs. One particular perspective on economics isolates innovation as a core driving force, alongside knowledge, technology, and entrepreneurship.

Taking these two models into consideration, a business unit with a new product or service must consider the scale of investment in R&D, the projected life cycle the technology will likely maintain, and the way in which customers will adopt this product. By leveraging these models, businesses and institutions can exercise some foresight in ascertaining the returns on investment as their technologies mature.

Remaining competitive and technologically vigilant are virtually synonymous at this point in business development. Companies must prioritize their ability to assess their technological needs, particularly as they may relate to achieving optimal efficiency and productivity. There are various concepts that are typical of this managerial technology assessment strategy:

- ***Technology Strategy*** – identifying the logic or role of technology within the company.

- ***Technology Forecasting*** – identifying applicable technologies for the company, potentially through scouting.
- ***Technology Road-mapping*** – ascertaining the trajectories of technological advancement and applying business or market needs..
- ***Technology Portfolios*** – accumulating all technologies relevant to products to determine which are ideal for internal implementation.

All four of these strategies revolve both around information gathering and introspection into business operations and processes.

Businesses are tasked with the ongoing responsibility of keeping up with evolving technology trends to stay competitive. Trends in technology extend out like the branches of a tree: each new innovation creates the possibility for multiple new innovations. The field of Business Technology Management (BTM) arose to provide businesses with the best approaches for assessing and implementing these varying technological advances into their strategies.

BTM provides a bridge between previously established tools and standards within a business environment and newer, more operationally efficient tools and standards in technology. Alignment, in this respect, can be defined as how an institution's technology supports and enables technology while avoiding constraints in direct relation to company strategies, objectives, and competition.

Alignment is only the first step: the next step is synchronization. Like alignment, synchronization enables execution, but it also helps companies develop the capacity to anticipate and adapt future business models and strategies. This is generally accomplished by investing in research and development and staying ahead of the standard technologies by anticipating or even innovating past them. This business technology leadership role is long-term oriented and very effective in maintaining competitive advantages in any given industry, but it is particularly important for industries in the tech sectors.

Companies use four specific dimensions of BTM to achieve this understanding of current technologies and trends:

- ***Process*** – Companies must execute a set of fluid and repeatable processes that can be consistently scaled up through evaluation.
- ***Organization*** – Utilizing an organized business structure or corporate framework, often through Strategic Business Units (SBUs), provides substantial value in centralizing processes and assessing needs.
- ***Information*** – Scouting and assessing the current technological environment through extensive research teams is necessary to make the appropriate decisions.
- ***Technology*** – Finally, improving upon these processes within SBUs via leveraging the appropriate data and information will drive strategic acquisition of beneficial technological improvements based upon current trends.

Taken together, these four dimensions applied to alignment and synchronization of new technology can help businesses keep up with or ever stay ahead of current technologies and trends. Companies can benefit from the intrinsic opportunities technological progress provides while offsetting the intrinsic risks of external technological development.

Understanding current technologies and trends allows a company to align and synchronize operations to optimize returns on innovation.

Technology scouting is essentially forecasting technological developments through information gathering. Technology scouts can either be internal employees or external consultants specifically designated to the task of researching developments in a particular technological field.

Technology sourcing, or the pursuit of implementing new technologies within a business strategic framework, involves isolating and applying new technologies to current models. Technology can be developed internally or isolated through technology scouting and then implemented through technology transfer. In deciding which approach is optimal for them, organizations must consider such factors as the advantage of being first to market, research and developments costs and capabilities, and market research and data gathering costs.

Therefore the strategies behind sourcing technology can be complex, varying by industry, company size, economic strength, and the availability of easily implemented technology.

Stages in technology development:

Technology develops through a series of stages: basic technology research, research to prove feasibility, technology development, technology demonstration, system/subsystem development, and system test, launch & operations.

The European Union has launched numerous initiatives to boost and strengthen European security and defense. The European Defense Fund (EDF) as one of the core elements of these initiatives is entering a decisive phase during the Austrian Presidency of the Council of the European Union in the second half of 2018.

This conference is designed to provide full insight into the specific potential, the opportunities and the challenges of this unprecedented initiative. It will convene all the relevant stakeholders representing EU institutions, EU member states, industry, and the research and technology community. High-level representatives from the European Commission and the European Defense Agency will deliver keynote addresses, which will be followed by two panels.

The panelists, coming from all groups of stakeholders, will discuss expectations, strategies and further actions required to make the best use of this comprehensive instrument in order to ensure added value for the EU.

The most important technological field where a variety of R&D focused and billions of $ were spend the last 30 years, providing an integrated product is the Remotely Piloted Aircraft Systems (RPAS). This is the most characteristic example where the harmonization of research and technology becomes the driving factor for the success of a scientific effort.

The term Remotely Piloted Aerial System (RPAS) was proposed and approved by Transport Canada as the official term to replace the previous use of Unmanned Aerial System (UAS).

The rationale outlined suggested that RPAS is a better term from an inclusivity perspective, as the use of “Unmanned” suggested a gender bias. Another reason for the change in terminology is that Remotely Piloted Aircraft Systems does a better job of representing the nature of system-oriented operations.

Remotely Piloted Aircraft Systems (RPAS) have demonstrated their importance in recent military operations, particularly for surveillance and information gathering. RPAS can also offer a wide range of civil applications such as infrastructure surveillance, firefighting, disaster or environmental monitoring, as well as border control and management. RPAS have been earmarked as one of four capability development priorities by the December 2013 European Council.

The European Defense Agency (EDA) divided its work in the field of RPAS into five main areas:

- Integration of military RPAS in non-segregated airspace
- Harmonization of national processes for military RPAS airworthiness and certification
- Development of cutting-edge technologies for future European RPAS
- Development of synergies among Member States operating large military RPAS
- Support to the development of a European Medium-Altitude Long Endurance (MALE) RPAS to be operational by 2025

The EDA approach to the insertion of military RPAS in non-segregated airspace is twofold: Key, Air Traffic Integration (ATI) technology development and compliance with the Air Traffic Management System, particularly in the context of the Single European Sky.

EDA and its participating Member States are one of the main European contributors to the development and standardization of key technical enablers for the insertion of RPAS in European airspace. To that end, EDA supports its participating Member States in several R&T projects and promotes and manages other projects with its own operational budget. Besides, RPAS ATI is one of the areas of the Pilot Project in the field of defense research.

The main R&T projects are:

- MIDCAS-SSP: (MIDair Collision Avoidance System - Standardization Support Phase)
- TRAWA – Detect and Avoid – Remain Well Clear
- DeSIRE: Demonstration of Satellites enabling the Insertion of RPAS in Europe
- ERA: Enhanced RPAS Autonomy
- Remote Pilot Station Standardization
- Military RPAS Airworthiness Certification

European Military Cooperation

In 2013, EDA formed the "European MALE RPAS User Community". This forum was established to examine options for pooling and sharing in the MALE RPAS domain, but included countries who currently operated MALE RPAS or who consider getting the capability within a few years. The Community's objectives are to:

- Exchange information and facilitate cooperation among Member States who operate such systems in order to streamline resources;
- Exchange operational experience and best practices of operating MALE RPAS;
- Identify cooperation opportunities in the following enablers: training, logistics, maintenance of similar assets.

Originally, seven Member States (France, Germany, Greece, Spain, Italy, the Netherlands and Poland) were involved in this activity; however, in 2017/18, the group is likely to grow to include Belgium, the UK and possibly Switzerland who all share an interest in EDA's MALE RPAS Training Technology Demonstrator (RTTD) project. The RTTD project seeks to deploy low cost, generic MALE RPAS simulators in each of the Member States RPAS Schools as a means to develop tactics, harmonize procedures, approaches to training and to further deepen the links between the different national user communities. The simulators have been deployed at nine sites across Europe from November 2017 and will facilitate an ongoing exercise program to be jointly organized with the Member States, EDA and the European Air Group (EAG).

Future European MALE Capability

Considering the obvious operational added value of MALE type RPAS for armed forces, and that challenges related to the air traffic integration will gradually be overcome, there is an opportunity for Member States to prepare the next generation of European MALE RPAS in a cooperative way.

A Common Staff Target related to this capability was endorsed by the EDA Steering Board in November 2013. On that basis, four Member States

(Germany, France, Spain and Italy) decided in 2015 to move forward and launch within an OCCAR framework, a two-year €65 million definition phase to pave the way for a full-scale development phase.

Under the framework of the EDA-OCCAR (*Organisation Conjointe de Cooperation en matier d'Armament*) arrangement, EDA provides support to this program in the field of air traffic integration building on the work already achieved and on the on-going activities related to the integration of military RPAS in the Single European Sky approach. Meanwhile, the Agency also facilitates the entry of other European Member States into the program at the development stage.

Concluding my presentation, RPAS offer a wide range of civil and military applications. The market ranges from small tactical mini and micro aircraft to large sophisticated systems. Investment in RPAS at the higher end has the additional benefit of helping to sustain European aeronautic competences in the design and engineering necessary for future manned fixed wing aircraft.

Over half the cost of building a complex intelligence, surveillance and reconnaissance RPAS is related to sensing technologies and data exploitation capabilities; excellence in these areas will be necessary for future industrial competitiveness in the global marketplace. At present there is the risk that Europe could become dependent on third country suppliers for such technologies. All EDA's current activities in the RPAS domain are aiming at ensuring that this level of dependence is under control.

National Defense Industry has a lot of technological capabilities to create strategic alliances and cooperation with the big players and contribute to the economic growth of the country. HAI has performed successfully a variety of R&D programs with main importance its participation to the nEUROn UCAV with 6 European Industries. We are looking forward to participate also to MALE RPAS program with the governmental appropriate support.

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