

European Defence Matters



Innovation Shift? A new defence R&T reality



Interview: Dutch Defence
Minister Jeanine Hennis-
Plasschaert




Opinion: Michel Barnier
on the European
Commission's upcoming
Defence Action Plan

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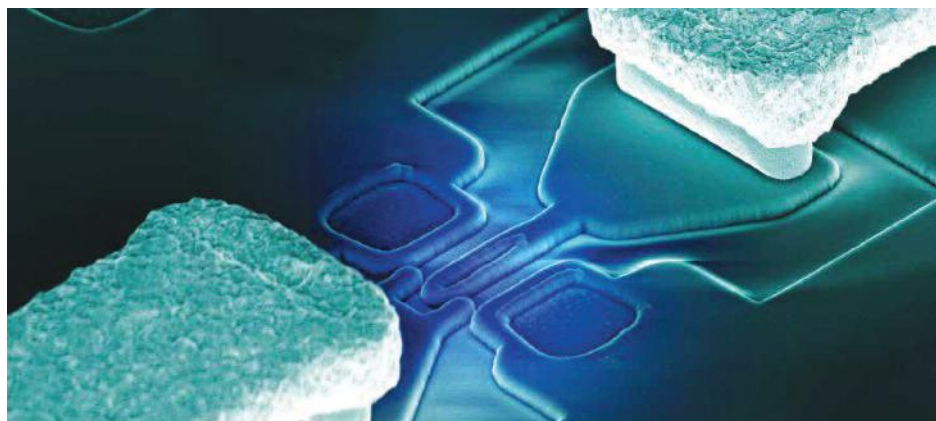
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Change ahead for defence innovation

As technological innovation is accelerating and diversifying, the European defence sector - producers and buyers alike - has to prepare for changes in the way future military capabilities will be conceived, developed and procured in the future

All industries have to cope with cyclic changes, that's the norm. While most are incremental and trivial, other changes occur more abruptly and can impact the core functioning of a whole industry. The latter type could be looming for the defence sector, not only in Europe but globally, as it could be facing a shift in the way innovation and R&T related to future military capabilities are driven and implemented.

Reason enough for *European Defence Matters* to focus the current edition on this important development and introduce some strategic foresight.

Whereas in the past, critical technology often emerged from the military first before being turned into civil-industrial applications, this trend has started to reverse: cutting-edge, high-tech innovations, including those with potential for military applications, are often driven by the civil commercial sector with start-ups and high-tech companies spending unparalleled amounts on R&T which cannot be matched by the military.


To be certain of capturing leap-ahead technologies, defence producers and Ministries of Defence may well have to increasingly engage and partner with these new players, even if this means entering uncharted territory. A new mindset combined with practical adaptations, for instance in defence procurement, are probably vital to allow for this cooperation between the military and the high-tech corporate world. Europe cannot afford to fail in this endeavor because it needs an innovative defence industry to maintain its military capabilities. Europe's strategic autonomy would be at risk if its military were to lose access to critical technologies. As Jorge Domecq, the

Chief Executive of the European Defence Agency (EDA) stresses in one of the articles, "the industrial and technological dimension is at the core of any security and defence-related capability".

In the following pages, we attempt to better understand the possible implications of this innovation shift, or the new 'industrial (r)evolution'. We asked EDA subject matter experts, industry representatives and academics to share their views on how changing innovation patterns might impact on European strategic autonomy, and what the prospects for Europe preserving its autonomy in critical R&T are. We also asked how Airbus Group deals with the challenge of strategic innovation, looked at the potentially most critical new emerging technologies and assessed the link between defence and civil research. Last but not least, we have given an update on the setting up of the Preparatory Action on defence research and the active role the EDA is playing in this respect.

More topics are touched upon in this issue of *European Defence Matters*. We spoke to Dutch Minister Jeanine Hennis-Plasschaert about defence cooperation, the upcoming Global Strategy and the Dutch EU Presidency. We also share Michel Barnier's views on the upcoming European Commission Defence Action Plan scheduled for this autumn. Finally, there is good progress to be announced in a much needed EDA project aimed at supporting Member States in enhancing their Personnel Recovery capabilities.

Should you have comments or suggestions to make, please contact us: info@eda.europa.eu.

Enjoy your reading! 

Eric Platteau Head of Media and Communication **Helmut Brüls** Editor-in-Chief

News

UK and France to jointly build combat drone

In March, the United Kingdom and France unveiled a series of defence co-operation projects including the joint funding of a €1.87 billion (£1.5 billion) collaborative Unmanned Combat Air Vehicle (UCAV) development programme known as the Future Combat Air System (FCAS).

The aim is to build a "prototype of the next generation of unmanned aircraft," the British Ministry of Defence said in a statement. Full scale development of prototypes is due to start in 2017. The FCAS is based on a €149



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million (£120 million) feasibility study which was equally funded by Britain and France and conducted by BAE Systems, Finmeccanica Airborne and Space Systems Division and Rolls-Royce on the British side, with Dassault Aviation, Safran's Snecma and Thales on the French side. Despite the Anglo-French co-operation in the FCAS project, both countries remain committed to the development of separate UCAV programmes. The UK through BAE Systems' Taranis demonstrator and France through Dassault's Europe-wide

Neuron programme.

As part of a cooperation policy of 'cross procurement', France also agreed to consider acquiring the MBDA Brimstone guided missile to arm the Tiger attack helicopter while the UK intends to equip its Type-45 destroyers with Aster Block INT surface-to-air missiles.

Furthermore, a statement of intent was signed to advance the Future Cruise/Anti-Ship Weapon (FC/ASW) to the joint concept stage before the end of 2016. ◀

Poland and Norway plan joint naval procurement

The Polish and Norwegian Ministries of Defence are planning to launch a joint procurement under which Poland's Navy would acquire three new submarines, and the Norwegian Navy a further six subs, according to press reports quoting the head of the Polish Defence ministry's Armament Inspectorate.



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The announcement came at the end of March following the signing of a deal on joint naval training activities by the two countries. Poland aims to acquire three new submarines to replace its outdated Kobben-class subs, which are to be decommissioned by 2021.

The Norwegian government has

declared it could provide one submarine to the Polish Navy to help Warsaw maintain its submarine capacity, according to the same press reports.

The Norwegian and Polish navies both operate the Naval Strike Missile (NSM) systems, which are produced by Norway's Kongsberg Defence Systems. ◀

News continued



Dr Javier Solana and EDA Chief Executive Jorge Domecq at the TTX exercise.

Hybrid Threats: EDA Table Top Exercise well received by participants

Recent terrorist attacks and the ongoing crises East and South of the continent have laid bare a dramatically changed security environment. Threats are challenging Europe as a whole, not only outside but also within European borders.

As a consequence, the traditional distinctions between internal security and defence are increasingly blurred, just as the separation lines between civil and military approaches and domains. Emerging threats of a different nature, commonly labelled as "hybrid threats", necessitate a rethink of defence within this new context. Do hybrid threats require new capabilities from the military? And if so, how should defence planners review their priorities?

Against this backdrop, Member States tasked the European Defence Agency (EDA) with conducting an "analysis of the implications of hybrid warfare for European defence capability development".

To this end, a Table Top Exercise (TTX) was conducted from 9-11 March at the EDA premises with more than 80 experts from 26 participating Member States (pMS) and representatives from the European Commission, the EEAS and other EU Institutions, as well as observers from NATO

participating. While many Member States are already tackling hybrid threats domestically, the aim of this EDA initiative was to offer a unique platform for discussing the various national approaches and to identify common best practices and possibilities for multilateral assistance.

For the first time, an analysis of the implications of hybrid threats on European capability development encompassed both the national and multinational dimensions based on a generic but realistic scenario and planning situations developed specifically for this TTX. The exercise was sequenced in two phases, both focusing on required military capabilities: firstly, by reviewing participating Member States' potential national responses to hybrid threats and secondly, by considering possible multinational support measures in response to hybrid threats.

The analysis focused on the areas of strategic awareness, comprehensive responses, building resilience, as well as prevention and recovery of state and military functions after an attack.

Preliminary results were then outlined to an audience comprising PSC Ambassadors and high-ranking representatives from national Ministries of Defence, the European

Commission and other relevant EU bodies as well as NATO. Dr Javier Solana, one of the founding fathers of the idea of European Security and of the EDA itself, delivered an inspiring key note address which sparked a lively and stimulating discussion.

Participants expressed appreciation for the EDA TTX which they considered as an ideal forum for exchanging and discussing national experiences and best practices, for the first time bringing together to one table all relevant entities with their varied inputs and expertise. The exercise was also deemed highly valuable in that it facilitated the analysis of third party support to national mechanisms as, by nature, hybrid threats disregard national borders. It was commonly agreed that some quite detailed work remains to be done to ensure Europe is in a position to effectively cope with persistently changing hybrid threats. Or, as Dr Solana stated: "Europe will have to accept and be prepared for a situation which in best case could be called Hybrid Peace".

Detailed findings of this first TTX were presented to the Ministers of Defence at their EDA Steering Board meeting this April. Building on the outcome of the first EDA TTX, a follow-on exercise will be conducted on 14-16 June, at expert level. **◀**

News continued



Global military spending up again

World military expenditure reached almost \$1.7 trillion in 2015, an increase of 1% in real terms from 2014 and the first rise in defence spending since 2011, according to new figures released in April from the Stockholm International Peace Research Institute (SIPRI).

The overall global picture is mixed though: continuing growth in Central and Eastern Europe, Asia and Oceania as well as some Middle Eastern states; stabilizing figures in Western Europe; and decreasing spending in the United States (US), Africa, Latin America and the Caribbean. The US nevertheless remained by far the world's biggest spender in 2015 despite its expenditure falling by 2.4% to \$596 billion, according to the SIPRI figures. Among the other top spenders, China's expenditure rose by 7.4% to \$215 billion, Saudi Arabia's grew by 5.7% to \$87.2 billion (making it the world's third-largest spender) and Russia's increased by 7.5% to \$66.4 billion.

Taken together, spending in Western and Central Europe was down by just 0.2% in 2015. However, in Central Europe alone spending was up 13%. There were particularly large increases in countries bordering Russia and Ukraine – namely Estonia, Latvia, Lithuania, Poland, Romania and Slovakia – which are those most concerned about Russia's

intentions following the crisis in Ukraine, SIPRI said.

The trend highlighted by the SIPRI figures is corroborated by the most recent EDA data on defence spending in its 27 Member States which increased for the first time after six years of continuous decrease. Indeed 2014 marked a turning point for the European defence expenditure, as the results of the EDA Defence Data gathering exercise reveal. After a continuous six-year-long decline, which started in 2008 following the outbreak of the global economic and financial crises, total defence expenditure of the 27 EDA Member States increased in 2014 by 2.3% from €190 billion to €195 billion, compared to the previous year. This was sufficient to overcome inflation and achieve a 0.6% or €1.1 billion real-term growth. EDA 2015 estimates suggest a further nominal increase of 2.6% or €5 billion to €200 billion, the level comparable to that before the crisis. In real terms, however, this increase translates into a 0.2% or €0.33 billion decrease.

Other notable global developments highlighted in the SIPRI report, include:

- Military spending in Asia and Oceania rose by 5.4% in 2015 and was heavily influenced by China. Heightening tensions between China and various countries in

the region contributed to substantial increases in expenditure by Indonesia, the Philippines and Vietnam, and triggered the start of a reversal of the long-term downward trend in Japan's military spending.

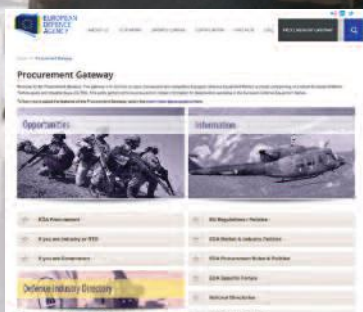
- Military expenditure in Latin America and the Caribbean decreased by 2.9%, largely explained by the huge fall in spending in Venezuela. Brazil's military expenditure also declined slightly as a result of its economic crisis. Spending continued to increase in Central America due to the growing militarization of the anti-drug war.
- Military expenditure in Africa fell by 5.3%, following 11 years of continuously rising spending.
- No spending estimates were published for the Middle East as 2015 data was unavailable for several countries. For those countries for which data was available, spending increased by 4.1% in 2015. Iraq's military expenditure rose by 536 per cent between 2006 and 2015—the largest increase by any country in the world during that period.

The full annual update of the SIPRI Military Expenditure Database is accessible at www.sipri.org

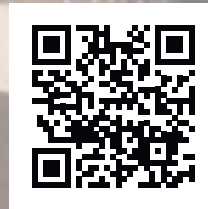
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› EDA introduces three year planning cycle

As of this year, the European Defence Agency (EDA) plans and organises its activities according to a Three-Year Planning Framework (3-YPF). The aim of the plan is to set clear work priorities based on available resources. By extending the planning cycle from one to three years, the Agency also expects to better meet the expectations of Member States

“**T**he Three Year Planning Framework allows the Agency and its Member States to plan and act more strategically without risking inflexibility. The new planning framework neatly connects the EDA's priorities with Member States' defence planning”, explains Jorge Domecq, the EDA's Chief Executive. “It is important for the Agency to remain a modern and output oriented organisation. In agreement with the Member States, we are additionally introducing a new project management environment by this summer. I am confident that both initiatives will further increase the efficiency of the Agency.”

The priorities set in the 3-YPF have been agreed upon in close co-operation with the Member States. “Importantly, the 3-YPF is not a list of new ideas. It really stems from the careful analysis of tasks set by the European Council,

Defence Ministers and the Member States and also by previously approved key strategies in the areas of research, industry and armaments cooperation as well as the Capability Development Plan”, says Jorge Domecq.

The priorities for 2016 thus include for example measurable and substantive progress in the four key capability programmes endorsed by the European Council in December 2013. For air-to-air refuelling for example, the Agency sets as one milestone to be achieved this year the signature of the acquisition contract for tanker aircraft by the MMF nations. In the area of governmental satellite communications, the delivery of a programme proposal and options including a business case are expected. Likewise, clear expectations are set for R&T, incentives, certification, space, airworthiness, energy & environment, Single European Sky, Security of

Supply and SMEs. Certainly a key priority for the Agency is its work on analysing capability implications through hybrid threats. A first table-top exercise took place in March with expert participation from European institutions and Member States. The 3-YPF also emphasises the ongoing need to dialogue and cooperate with NATO in order to avoid duplication.

“The advantage of the 3-YPF is that it sets measurable priorities; all too often the perception among Member States persists that cooperative programmes are complicated and take more time. We want to prove that the opposite can be true. Realistic planning, agreed priorities and timelines as well as confirmed resources are important building blocks for successful cooperation in defence. The 3-YPF represents one important step in this direction”, says Jorge Domecq. ◀



Innovate or risk disappearing

Defence adapts to changing innovation patterns

In the following dossier pages, *European Defence Matters* gives the floor to subject matter experts from various domains (industry, academia, the EDA) to shed further light on the fast changing innovation and Research and Technology (R&T)-related challenges the European defence sector has to cope with currently and more importantly – in the future



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The relationship between defence and civil research





The next industrial (r)evolution: What implications for the security and defence sector?

In times of ever faster technological change and constant emergence of new innovation and business models, the European defence sector has to adapt quickly if it wants to remain relevant

In 2016, more than ever, Europe needs to respond to short and longer-term security challenges both on its territory and beyond. The forthcoming EU Global Strategy will inevitably consider those developments, setting out European interests. Notably, for Europe's security and defence sector this means preparing for an age of relative uncertainty that is prone to strategic surprises: at the level of threats that have become increasingly diverse, hybrid and versatile; and at the level of emerging technologies that, beyond inducing new vulnerabilities, may well require the defence sector to adapt to changing innovation patterns, new mind-sets and corporate cultures.

In this strategic context, an innovative and competitive European Defence Technological and Industrial Base (EDTIB) is a strategic asset that supports the implementation of a credible and effective EU Global Strategy. "The industrial and technological dimension is not a mere

enabler, it is at the core of any security and defence-related capability", says Jorge Domecq, the Chief Executive of the European Defence Agency (EDA). This is why the so-called 'Key Strategic Activities', be they specific technologies, skills or industrial manufacturing capabilities, will also have to be supported at the EU level if Europe wants to retain the necessary freedom of action, be interoperable with key Allies, and participate in global standard setting.

As early as 2003, the Thessaloniki European Council underlined that the EDA was to aim at "promoting, in liaison with the Community's research activities where appropriate, research aimed at leadership in

strategic technologies for future defence and security capabilities, thereby strengthening Europe's industrial potential in this domain." Today, the question of how to achieve or safeguard leadership in strategic technologies is more pressing than ever. The EDA has enabled close to €700 million of investment in defence R&T projects, it has established synergies with the EU's Horizon 2020 Framework Programme, and it has participated in the identification of critical defence technologies, key enabling technologies and space technologies for European non-dependence.

And there is more to come: the preparation of the forthcoming Preparatory

"When putting its Global Strategy into action, Europe requires a long-term vision and effective technological and industrial policy that supports its freedom of action"

**Jorge Domecq,
Chief Executive, EDA**



"The key challenge for defence will therefore be to find a *modus vivendi* with this 'new economy', and to effectively integrate future innovations into defence development and production cycles"

Michael Simm, Policy Officer -
Strategic Foresight, EDA

Action for CSDP-related research and potential defence research programme that may follow within the next EU budgetary cycle may signal a paradigm shift. The EDA is playing its part by shaping the content, setting priorities and preparing for the implementation of future defence-related research at the EU level. The European Defence Action Plan announced by the European Commission for the end of 2016 provides a further opportunity to reflect on how Europe will capture future innovation and drive leap-ahead technologies rather than be taken by surprise by disruptive technologies emerging elsewhere.

Changing innovation patterns?

For Europe to successfully spearhead innovation, it has to deal with at least four accelerating trends: (i) global competition for the lead in technology; (ii) emerging knowledge domains and technology convergence; (iii) increasingly faster innovation loops; and (iv) the growing

importance of private investment in support of innovation. Each of these factors taken alone may hardly seem revolutionary, yet any combination and convergence of them in a fast-paced environment may prove to be so. The defence industrial and technological base is indeed part of a wider industrial and technological 'ecosystem' that is about to change dramatically, and this may lead to the disruption and far-reaching adaptation of public policy and traditional business models and practices. What has been qualified as a possible 'third industrial revolution' by 2030 is characterised by an ever-accelerating speed of technological change and the 'digitalisation of world markets'. The mastery, application and development of digital technologies and big data management will be a key ingredient of economic and industrial competitiveness. Already today US digital exports are estimated at €500 billion a year, and Europe is the main customer. 4% of US GDP is estimated to be related to the Internet and associated business

opportunities. Global revenues related to the 'Internet of things' (big data and data-mining, cloud computing and super computers) are estimated in the order of USD 14 trillion between 2013 to 2022. ICT technology in particular will help to catalyse innovative applications in the area of human/machines, human/human and machine/machine interfaces, in addition to the expected convergence of bio-, nano-, and information technologies, robotics, artificial intelligence, materials and energy over the 2025-2050 time horizon.

New players are emerging

Based on such convergence, disruptive applications are expected to emerge from highly innovative start-ups and fast growing players that are modelled on today's success of the so-called 'GAFA' (Google, Apple, Facebook, Amazon...). These players will share important characteristics. R&T spending levels will be high (20% and more of annual turnover). They will embrace a risk →





"The fact that innovation will increasingly flow from the civil to the defence sector does not mean that the defence sector should refrain from heavily investing in exploration, testing, adapting and integrating relevant innovations"

Jorge Domecq,
Chief Executive, EDA

culture and have access to venture capital. They will focus on prototyping, test and experiment with 'rapid prototyping', 'lean start-up', 'minimal viable products' and spiral development, all with reduced procurement cycles and manufacturing lead times. From Silicon Valley and 'Silicon Wadi' in Israel to Bangalore, "access to finance, R&D investment and flexible and fast development and production are the ingredients of ever-fiercer competition among global innovation centres", stresses Mr Domecq. The innovation models and philosophy of those commercial companies and start-ups has little in common with a highly regulated sector such as defence, which is characterized by the need for reliable, robust and complex systems, long-development cycles, public funding and a focus on quality control through customer engagement in design, production and servicing.

Yet, it is with these emerging players that both governments and defence companies will have to interact to stay ahead. Beyond defence-specific R&T, there will be increasing spin-in from commercial technologies being developed by highly specialised SMEs or

start-ups. Today, such companies may not even be thinking of interacting with the defence sector. Connected technologies will be among the most decisive factors in the development of security and defence-related technologies. "Robotics, automation, supercomputing, synthetic biology, data analytics and deep learning will play a growing role", according to Michael Simm, Policy Officer for Strategic Foresight at the EDA. Private actors will bear important responsibilities as to cyber security. This also implies a new way of looking at how drones and robots are networked with the increased integration among human and technological factors. Keeping a highly competitive defence industrial base with highly skilled workers will be all the more crucial if innovation is to translate into cutting-edge defence capabilities.

"The key challenge for defence will therefore be to find a modus vivendi with this 'new economy', and to effectively integrate future innovations into defence development and production cycles", Mr Simm states. It will be key for the defence sector to: (i) gain awareness of emerging leap-ahead

technologies; (ii) effectively get access to non-traditional sources of innovation; and (iii) ensure the reliability of trusted supply chains. Overall, the challenge is for governments to be able to counter threats and increase society's resilience while ensuring that the defence technological and industrial base remains a smart integrator of highly innovative products and technologies.

A matter of resources and prioritisation...

Innovation does not come free. The sharp drop in defence-related R&T in recent years puts Europe's standing at risk: the investment ratios in certain key domains such as electronic components being about 1:15 when compared to the US, clearly endanger Europe's status as a 'smart follower'. More investment, more cooperative investment and clear prioritisation in resource allocation are clear answers to that trend. Yet, more than today, an emphasis will also need to be put on 'whole-of-government approaches' and cross-sectorial technological and industrial strategies that strike the right balance and allow for a mutually beneficial relationship between the

defence and the civilian dimension.

Some of the more recently published national defence-related strategy documents indicate a growing awareness and provide inspiration regarding the need for increased foresight activities and refined analysis of innovation cycles; the need to craft industrial policies that are supporting key areas of security of supply with regard to industrial manufacturing capabilities, skills and critical technologies; or the need to launch defence-related innovation initiatives. As the UK Strategic Defence & Security Review (2015) recognises:

"...to secure operational advantage and control our costs into the future, we need to recognise and respond quickly to transformative ideas and technologies. These will come from outside the traditional national security field, [...] we must find, listen to and work effectively with new partners. We must test unconventional ideas rigorously against traditional ones, and be prepared to take risks [...] we do not have all the answers, but continuing with our traditional mindset will not work".

In the case of the UK, this assessment is supported by the creation of a national cross-government Emerging Technology and Innovation Analysis Cell and the establishment of a defence and security accelerator for government to help the private sector turn ideas into innovative equipment and services for national security users.

In a similar fashion, the US Third Offset Strategy recognises that many of the technologies that are potential game changers are no longer in the domain of DoD development pipelines or traditional defence contractors. Indeed, the DoD risks no longer having exclusive access to either the most cutting-edge technologies or the ability to control the development of them. This insight has led US officials to seek proposals from the private sector, including from firms and academic institutions outside the DoD's traditional orbit. Robotics in particular is seen as an area where commercial investment outpaces military spending. The DoD's ability to rapidly scout for and import commercial sector innovations and quickly develop new concepts of operation and doctrine is seen to be key. Numerous partnerships between the commercial sector and the US military, research and innovation centres, intelligence and law enforcement agencies exist to date.

The creation of a permanent DoD office – called 'Defence Innovation Unit X' – is part of this approach as is investment in promising technologies through a dedicated investment fund. Additionally, in March 2016 the US DoD announced the establishment of a Defense Innovation Advisory Board. The new board aims to enhance the DoD's culture, organisation and processes by tapping innovators from the private sector. DoD will also further implement its 'Better Buying Power Initiative' aiming, among others, at easing procurement procedures.

...but even more of changing mindsets

Yet innovation is not a mere matter of resources and stated policy objectives. It ultimately requires both the demand and supply side to have a capacity of early adoption of innovation.

As far as the demand side is concerned, the new environment may have an impact on acquisition choices and investment decisions and the defence customer will have to adapt to much higher innovation rates and to potentially shorter life-cycles for equipment. The new environment

may increase the need for plug-and-play systems, be a strain on obsolescence management or even change the type and way of procuring defence-related equipment and services. Modular Open System Architectures (MOSA) could be utilised to enable rapid incorporation of innovative upgrades throughout system lifecycles. A stronger focus on prototyping and experimentation may be a corollary to this approach. "The fact that innovation will increasingly flow from the civil to the defence sector does not mean that the defence sector should refrain from heavily investing in exploration, testing, adapting and integrating relevant innovations", insists Mr Domecq.

Prototyping and experimentation can allow the defence sector to keep pace with technology, to partner with industry and maintain critical industrial capabilities. Such efforts would help contextualise current capabilities in light of requirements and

technical feasibility of future acquisition programmes. An innovative and adaptive approach may also impact on wider operational concepts, interoperability with partners and standard-setting. "Ultimately, MoDs will have to constantly adapt their in-house skills base and working practices in order to interface with the commercial sector", explains Mr Simm. MoDs may also have to adapt procurement schemes (i.e. fast-track contracting vehicles), introduce more flexibility, shorten decision-making cycles and address certain perceived 'costs' (i.e. administrative burdens and IPR regimes), which may dissuade high-tech commercial firms from engaging with the defence sector.

Regarding the supply side, the change may be less fundamental and rather signal an acceleration of a longer-term trend. For some

time now, the most innovative components have been generated by SMEs. While traditional defence companies are likely to continue playing the role of intermediary towards governments, they will nevertheless increasingly rely on the ability to integrate technologies according to a non-linear open innovation model

based on a combination of internal and external knowledge, iterative shorter innovation loops and adding reliability and resilience to commercial technologies. This will mean increasingly monitoring cross-domain technology development. The role of a firm's internal 'gatekeepers' or 'boundary spanners' able to understand and adapt technological innovation will rise.

New partnerships, joint ventures

For example, with the aim of capitalizing on transformative technologies and business models in the high-tech sector, a big European Group has followed US defence industrial players in establishing a 'Technology and Business Innovation Center' in Silicon Valley. In parallel, the company has established a venture capital fund worth an initial US \$150 million in order to invest in promising, disruptive and innovative businesses generated around the globe. →



More widely, cooperation with non-traditional industrial players may take the form of partnering with high-tech companies in the ICT sector, joint business incubators or joint ventures according to the 'make, team or buy' paradigm. This may alter the very fabric of industry, leading to more complex supply chain management and, ultimately, requiring increased flexibility and fluid cooperation between primes, SMEs and entrepreneurs across sectors. At the same time, one may have to deal with some side-effects. Indeed, the defence industry could be facing additional pressures on prices and margins, unexpected forms of competition, plus a growing mismatch in skills.

Overall, both the demand and supply side, will have to develop a whole new risk culture: on the one hand, taking on more risk through a steady investment in expensive but potentially game-changing technologies; on the other hand, ensuring reliance on fully trusted and secure supply chains up in the context of a globalised and digitalised economy. It may imply changes to how one conceives of dual-use export (and import) control and the protection of sensitive technologies. The predominance of non-European and commercial software companies, clouds and cyber networks that are supposed to generate, manage and control big data may actually increase the vulnerability of European digital networks. The globalisation of R&T and commercial innovation is within the reach of players who can transform them into military relevant capabilities.

This risk needs to be counterbalanced by capability development focused on resilience such as 'rapid network recomposability' technologies or 'split fabrication' (i.e. ICT building blocks that are designed, developed, manufactured in Europe).

This is all the more important in the context of heightened hybrid threats, which may target the wider defence supply chain e.g. in terms of hostile takeovers (foreign investment), saturation of production capacities or second-round effect industrial sabotage (compromising single components or production processes).

Think big – act smart

Some of the aforementioned trends will develop, others may not. Yet, by failing to prepare for a potentially game-changing

(r)evolution, one may well be preparing to fail. "When putting its Global Strategy into action, Europe requires a long-term vision and effective technological and industrial policy that supports its freedom of action", underlines Mr Domecq. As with any other player in the world, Europe needs to acknowledge its industrial base as a strategic and economic asset alike, a cornerstone for safeguarding its influence and interests. This also means injecting the 'whole-of-government' concept with real content,

"MoDs will have to constantly adapt their in-house skills base and working practices in order to interface with the commercial sector"
 Michael Simm,
 Policy Officer -
 Strategic Foresight, EDA

"The industrial and technological dimension is not a mere enabler, it is at the core of any security and defence-related capability"
 Jorge Domecq,
 Chief Executive, EDA

notably in support of guaranteed security of supply and autonomy in areas deemed critical. There is a need for systematic technology foresight, more dual-use innovation clusters and technology incubators and long-term spiral development programmes. As competition for and access to cutting-edge technologies will increasingly be done across globalised and non-defence specific supply chains, both the 'E' (European) and the 'D' (Defence) dimension of the EDTIB may increasingly vanish. "This raises an essential question: how does Europe want to ensure mastery over technologies that will be critical in the future? This is not a question of industrial competitiveness alone but of Europe

remaining among the most capable defence players", insists Mr Domecq.

The EDA can contribute by raising awareness, being a platform for exchange and building concrete tools when it comes to identifying Key Strategic Activities to be supported by available European funding tools, supporting longer-term security of supply and European non-dependence. Ongoing work developed inside the EDA together with Member States on critical defence technologies, Technology Watch, strategic research agendas or key skills and competences contribute to this effort. The support provided to innovative dual-use SMEs in accessing European Structural and Investment Funds is a further key work strand. The EDA can also further provide a platform for innovative industry to engage with defence stakeholders on concrete projects, to present ideas and to understand defence-specific requirements.

In order to move to the next level, however, Member States should also make systematic use of the programmatic, financial and policy instruments offered by the EU. These instruments can support defence research, identify key enabling technologies and support their testing & experimentation in view of potential uptake in defence products. The forthcoming European Defence Action Plan should make a strong plea for a credible defence-related research programme within the next Multiannual Financial Framework. This should be further supported by a wider European Defence Innovation Initiative that facilitates the scouting of emerging technologies for defence, increases interaction between the defence community and commercial communities and promotes innovative SMEs. One will also have to move towards a careful mapping of critical and cross-sector supply chains. Increasing the resilience and security of related key technological and industrial assets that are considered as genuinely critical infrastructure may also be required.

As the defence sector will have to increasingly interact with players, processes and innovation models outside the traditional remit of defence, it will be all the more important to mainstream the defence dimension across available industrial policy tools, be they at the national or EU level. 2016 should provide ample opportunity to move ahead in this direction. 

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"A corporate mind-set favourable to innovation is critical"

How do key European defence companies approach and deal with the challenge of strategic innovation? We spoke to **Marwan Lahoud** who is Executive Vice President International, Strategy and Public Affairs of Airbus Group

Mr Lahoud, which lessons could you share with your peers regarding the specific features of strategic innovation in the area of defence?

A genuine and sustained dialogue between the armed forces, defence procurement agencies and our engineers is essential to defence innovation. Our armed forces need to respond to new threats as they arise. Defence innovation that is built around a genuine dialogue is not only more able to deliver the best and technologically superior equipment but also more cost effectively.

In defence, strategic innovation does not derive from incremental improvements but from a game-changer, a disruptor or a breakthrough. As Aesop's fable "The Lion and the Mosquito" shows, a strong defence posture constantly requires adaption to new threats. Even the mighty lion can be beaten by the tiny mosquito if it can be lured into the spider's web. That's where strategic innovation comes into play. If an adversary takes a decisive advantage on a niche technology that can inflict severe damage to its opponent – it could be game over.

Robotisation, big data and artificial intelligence are now widely recognised as defence disruptors. At Airbus Group, we are dedicating substantial resources to the area of 'autonomy', including Unmanned Vehicle Systems (UVS). Autonomous systems can better protect soldiers' lives, ease decision-making on the ground and reduce the overall cost of operations. Our latest example is the Zephyr, a High Altitude Pseudo Satellite (HAPS). The Zephyr runs exclusively on solar power and is thus able to fly autonomously for months, offering new solutions in military

intelligence, surveillance and reconnaissance.

Beyond the demand from the armed forces, what are in your view the main drivers or blocking factors for strategic innovation?

A corporate mind-set favourable to innovation is critical. To grasp strategic innovation, companies need swift decision-making, less-risk adverse behaviour, failure acceptance, and fast spiral development cycles. This is the recipe for strategic innovation. Many defence companies used to be like big ocean liners: slow to move ahead and slow to change trajectory. This is changing. Those who have not taken this seriously are bound to fail.

On top of that, to be innovative, companies need to talk to the right guys outside the company. At Airbus Group we place a high priority on a continuous dialogue with SMEs, universities and research centers, partners and start-ups. We are maintaining an ecosystem that fosters and grows our innovation capabilities. This has led us to support centres like the Ludwig Bölkow Campus, right from the start. This Campus is an international hub for ground breaking innovations, new ways of thinking, and practical training in the aerospace industry. Located near Munich, which has one of the richest traditions of technology development in Germany, the campus is a place where science, education, and industry come together and take innovative ideas off the drawing board and turn them into real products.

Defence innovation is also clearly shaped by regulation. Intellectual property rights (IPR) are a driver, and European defence

companies are more likely to engage in innovation if they feel that they can retain IPR for future market advantage. I am convinced that European support to defence industries should take this point into consideration. The limited Research and Technology (R&T) budgets for defence clearly diminish the European potential of innovation in defence which is one of the reasons why Airbus Group seeks a close interaction between innovation in defence and in the commercial area. Our business model is based on the duality of civil and defence which allows us to pursue innovation to the largest extent possible. Government investment in defence and research does however remain extremely important in driving innovation. Considerable pressures of course remain on public expenditure, which is why we applaud efforts by EU Member States to substantially improve their defence budgets. As a minimum it is absolutely crucial that Member States meet their commitment to the NATO Defence Investment Pledge (2% GDP on defence with 20% on major new equipment and R&D).

Should European defence companies find new ways to promote innovation? How do you evaluate the business model and success of digital companies or actors such as SpaceX in this respect?

Let's face it, Silicon Valley has been the source of major strategic innovations in the US for decades. Thanks to a strong initial push by the US Department of Defense (DOD), 15% of US patents are now produced in the valley but more importantly, major GAFAs-like companies were born there.

SpaceX and Google have undoubtedly

marked an evolution in the aerospace industry. With OneWeb, Google and Airbus Group (as industrial partners for the design and manufacturing of a new fleet of microsatellites) are entering the 'NewSpace'. OneWeb is about providing cheap internet access worldwide, thanks to an initial production of 900 satellites, each weighing less than 150 kilogrammes, for launch into low Earth orbit beginning in 2018. This industrial partnership clearly unites two of the world's best players and I am sure this kind of joint effort will be replicated in other areas. SpaceX is also a case in point. This company has made great progress in the development of launchers and has capitalized on all possible drivers of innovation. But we cannot be naïve about this new approach. Beyond all the merits of SpaceX we cannot ignore the massive public support it has received from billions of dollars injected by NASA.

Which measures should be taken to halt the reduction in R&D spending? Are cooperative programmes one of the vital solutions?

In tough economic times, cutting R&D spending is an easy solution. Yet, countries like France, and Germany have not fallen into this trap. This is a shrewd decision, which we both recognise and welcome. Hi-tech corporations recognise the importance of sustained research investment and even in difficult times, boards will do everything they can to protect this investment, not to do so can cut companies out of future markets for years to come. It is the same in defence, cutting research investment can allow adversaries the window they need to develop threat capabilities that we will not be able to match.

Yet, European Member States' cumulative R&D efforts are still way too low. With around 170 million Euros invested in defence R&T across Europe, representing 8% of total R&T expenditure of the Member States, European collaborative defence R&T barely exists. More worrying is that over the last ten years, European defence investment in R&D has declined by 30%. To the contrary, the US spent an average of €9 billion per year on defence R&T (i.e. four times European Member States' spending combined) and an average of €54.6 billion per year on R&D during the period 2006-2011. Thanks to its 'Defense Innovation Strategy' (DII), more

commonly referred to as the 'Third Offset Strategy' (3OS), this effort will even keep increasing. For the fiscal year 2017, the US Defense Secretary has announced that €67 billion will be requested in defence R&D appropriations.

The Russian defence R&D budget has also doubled between 2012 and 2015 while think tanks estimate that the Chinese defence research budget will surpass the US by 2022.

Against this background, the establishment of the EU's preparatory Action on defence research and its subsequent larger programme post 2021 is more than a

laudable effort. It is the right move even if we regret that it may take some time to happen. I expect this action to be translated into concrete collaborative, innovative programs, meeting the current and future needs of our armed forces. As an example, VTOL RPAS (Remotely Piloted Aerial Systems) could be a potential solution for a wide range of future military applications, including surveillance missions in the maritime environment, operation from naval platforms, or land operations. I am sure that the EDA is fully aware of the importance of the preparatory action and will play a crucial role in making this endeavour a success. ◀



Marwan Lahoud has been Executive Vice President International, Strategy and Public Affairs of Airbus Group, Executive Committee member since June 2007 and President of Airbus Group France.

Prior to joining EADS, Marwan Lahoud had run MBDA as Chief Executive Officer since January 2003. He began his career at the French Defence procurement agency DGA in 1989. In 1995, Mr Lahoud was appointed Special Advisor to the French Ministry of Defence. In May 1998, he joined Aerospatiale as Vice President Development where he was responsible for negotiating agreements with Groupe Lagardère for the Aerospatiale-Matra Hautes Technologies merger. In June 1999, he was appointed Senior Vice President Strategy and Planning for Aerospatiale Matra, where he also served as Senior Vice President Military Affairs. In 2000, Mr Lahoud was appointed Senior VP Mergers & Acquisitions of EADS. During his tenure, he oversaw the creation of Airbus, MBDA, Astrium and EADS.



Why critical R&T matters: the example of defence electronics components

As described in the previous pages, innovation patterns in the defence sector are rapidly changing with a growing importance of civil industries driving technological change. But how will this trend affect Europe's strategic autonomy in an area such as electronic components? We asked **Wolfgang Scheidler**, project officer on components technologies in the EDA's Innovative Research Unit

Industries driving the innovations of the internet of things have a strong impact on defence innovation especially in ICT applications. In the area of electronic components, the civil consumer market is very dynamic with innovative industries and global supply chains, generally aiming to achieve low cost, high volume products with relatively short life cycles.

All aspects of live are impacted by electronic components that enable today's

connected information world. Electronic and optoelectronic technologies form the foundation to support all sensors and IT products but also key functions such as mobility, home management and health. The problem is that the persistent trends towards more performance and multiple functionalities of devices and products in our daily life bear the risk that decision-makers take the availability of such component technologies for granted, without caring

about the origin of key enabling components.

Against this backdrop, the US and more recently Europe have recognized the importance of local manufacturing in order to develop a full-fledged value and knowledge chain and make economies of scale. They also launched initiatives to again support pilot manufacturing.

Nevertheless, the market for defence electronic component technologies is limited with specific requirements such as high-end

performance, reliability, resilience to harsh environments as well as low and sometimes volatile production volumes. A relevant driver pushing European innovation and industrial sources in critical or strategic defence electronic component technologies has been the need to secure access for European system integrators and defence procurement organisations. Other important defence innovation patterns are the technology-push and the system-pull approach. Through the technology push, the defence research institutes and industry develop ideas to push either disruptive technologies to higher maturity levels or enhance functionality or performance of electronic components to improve system capabilities. The system-pull approach defines system engineering requirements which the electronic components have to meet, driving innovation or further development in order to support a requested system capability. Both approaches and their interrelation are fundamental for innovation in the defence sector.

Can you name specific areas, including in electronic components, where these changes risk having the biggest impact for European defence capabilities?

Key enabling electronic components and building blocks for sensor payload technologies in Remotely Piloted Air Systems (RPAS) could be such an area. As RPAS across all sectors (military, government non-military and civilian) are forecast to grow significantly, Europe lags behind leading nations like the US and Israel. In this area, European technological non-dependency is at risk if Europe does not pursue investment in innovation and builds up or safeguards critical value chains.

A recent EDA study¹ analysing the European gaps in key enabling sensor payload technologies for RPAS concluded that strategic investments and medium to long-term spiral RT&D development actions in a wide spectrum of electronic components is necessary for Europe to reduce the technological and competitive shortfalls. Examples of such critical technologies are: multi-function radio frequency (RF) antennas, chip-on-board technology, Gallium Nitride (GaN) component technology and foundry capabilities, Silicon Germanium (SiGe)

component technologies, analog-digital & digital-analog converters.

To what extent do Member States, through the EDA, support strategic autonomy and European technology non-dependence in the area of electronic components?

Member States have invested in the past years in strategic technologies for European non-dependence in the domains of radio frequency (RF) and mixed signal technologies, digital processing for military and cybersecurity, photonics and optoelectronic systems and transversal technologies. A recent study² estimates that the overall European investments made in defence-related electronic and photonic components amount to €70 million per year of which about €15 million have been realized by co-operations within the EDA. Relevant investments by Member States in the recent past took place in R&T activities to enable or enhance military applications in the areas such as

radar, communication, EW systems, guidance, navigation or security. In concrete terms this has led, e.g. to several tangible deliverables, such as: (1) the development of a European supply and value chain for high power electronic components exploiting Gallium Nitride (GaN) on Silicon Carbide (SiC) wide band gap semiconductor technology; (2) the setting-up of a European supply chain for an advanced system on chip technology for military applications; (3) the development of high performance mixed signal circuits for ultrafast and wide bandwidth signal conversion; (4) progress in the field of innovate high performance optoelectronic components, and (5) the development of advanced 3-dimensional packaging for rough military applications. Since the creation of the EDA, MoDs together with industry and research institutes conducted about 24 projects (Cat.B) with an overall investment of about €180 million. The driver for most R&T activities has been to secure knowledge and access to critical defence

technology for Europe and thus to achieve strategic European technology non-dependence.


How important is EU funded research for developing critical electronic defence components? What a difference could it make in the future to have a dedicated EU defence research programme?

Whereas European R&T investments in technologies for components and modules (TMC) for defence went down from €100million per year in 2008 to €70 million in 2014, efforts made by the US DoD have increased by a factor of 2 over the same

period, which represents now a ratio of 15 to 1 between the US and Europe. Moreover, efforts in Europe are fragmented: a consolidated coordinated action has been in place over the past 12 years only in respect of a Radio Frequency (RF) Gallium Nitride (GaN) European supply chain. Joint investments should at least be extended to

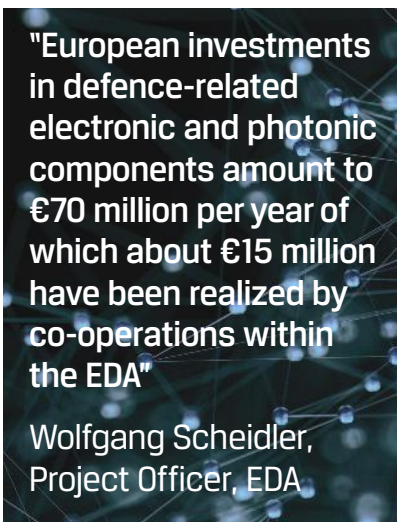
infrared (IR) detectors, anti-tamper and advanced system on chip for defence, crypto processors, microwave photonics and relevant transversal topic like cooling, thermal management and packaging for continuously higher integration densities and power levels in electronic components.

In order to foster optimization of supply chains, and to obtain economies of scale and compensate the big investment gaps with US and China, better exploitation of related technologies is required in Europe.

Therefore, the planned launch of a Preparatory Action (PA) to prepare a genuine defence research programme for the next Multiannual Financial Framework (2021-2027) is a real opportunity for defence research and, potentially, for defence research on technologies for components and modules. 

1. Non EU Dependencies: Investing in Key Unmanned System Technologies and Capabilities (2015)

2. European roadmap in Electronic and Opto Photonics Technologies, Components and Modules for Defence - CeeDeeS (2014)



"European investments in defence-related electronic and photonic components amount to €70 million per year of which about €15 million have been realized by co-operations within the EDA"

Wolfgang Scheidler,
Project Officer, EDA





Tomorrow's Technologies and how to find them

The ability to identify in time – or even better: ahead of others – the highest impact technologies of the future is critical for the defence sector, as it provides a considerable competitive and operational advantage to producers and governments. More than ever, knowing how to read the crystal ball pays off

Whenever experts try to assess which could be the most promising and influential technologies in the next 15 to 30 years, a few interrelated and synergistic concepts come up. Let's try to briefly analyse some of them.

Extreme Complexity

"The world's future can be characterized as an ocean of complexity, facing multidimensional, multifaceted, multicultural, interdisciplinary challenges and problems", says Ignacio Montiel Sánchez, EDA Project Officer for Radiofrequency Sensors Technologies. Technical solutions to solve those future problems should be based on "Systems of Systems" (SoS), methodologies and concepts that should be supported by Systems Engineering frameworks. Such extremely complex SoS cannot be developed by single companies and, as a consequence, specific methodologies have to be implemented to promote cooperation and exchange of information among different partners. Therefore, modularity, scalability and open architectures concepts will play a key role when facing the complexity issues.

Big Data

The global adoption of internet has entirely changed the way of dealing with information. New and evolving technologies will be needed to cope with endless volumes of information, which, if not digested properly, threaten to become useless. "As an encouraging sign, refurbished signal processing techniques, like Neural Networks, have shown their potential to optimise the extraction of information from huge amounts

of data through Deep Learning Techniques, which are revolutionising Artificial Intelligence developments and pave the way for new exciting progress in the field of machine learning", says Dr Montiel Sánchez.

Ubiquity Connection

This concept refers to a future situation wherein everything is connected and controlled, going beyond the concept of the Internet of Things (IoT), including in the loop autonomous means of transport, swarms of robots and Remotely Piloted Aircraft Systems (RPAS). The addition of these heterogeneous nodes increases vulnerability and demands standard cybersecurity measures.

Deep Intelligence

"As a result of the previous conditionings, a new kind of Artificial Intelligence will come into play. The outstanding and increasing availability of computer memory, processing capacity and broadband connection will enable the creation of algorithms that will learn from their experience and will cope with very complex problems, in a way humans cannot do", explains Dr Montiel Sánchez.

Nanotechnology

When technology comes into play, the burden of bulk systems is no longer accepted as users want devices that fit in their pockets and can be extended to any system that has to be smaller, lighter and with longer endurance. "Miniaturization

powered by nanotechnologies will also support the development of these new systems and the above mentioned concepts, enabling networks of nano-sensors to increase connectivity, raising situation awareness and increasing protection", says Patricia López Vicente, EDA Project Officer for Materials & Structures Technologies.

Impact on defence

All these developments will undoubtedly impact the defence sector as well, as they involve many emerging technologies with a significant dual-use character. Today's wide

and unprecedented technological availability offers large parts of the world population an immediate and almost unconstrained access to most of the newest technologies. This also entails serious security risks which should not be ignored. Threats involving the

misuse of emerging technologies are indeed growing and diversifying fast. As an example, the availability of System on Chip supported by additive manufacturing and COTS will allow individual researchers to create systems with top performance.

"How should governments react to the spread of new emerging actors? What will be the implications on defence?", Dr Montiel Sanchez wonders.

Related to these concepts, a recent EDA R&T Conference (*see box on right*) also touched upon the role of innovation in defence and how R&T activities support the

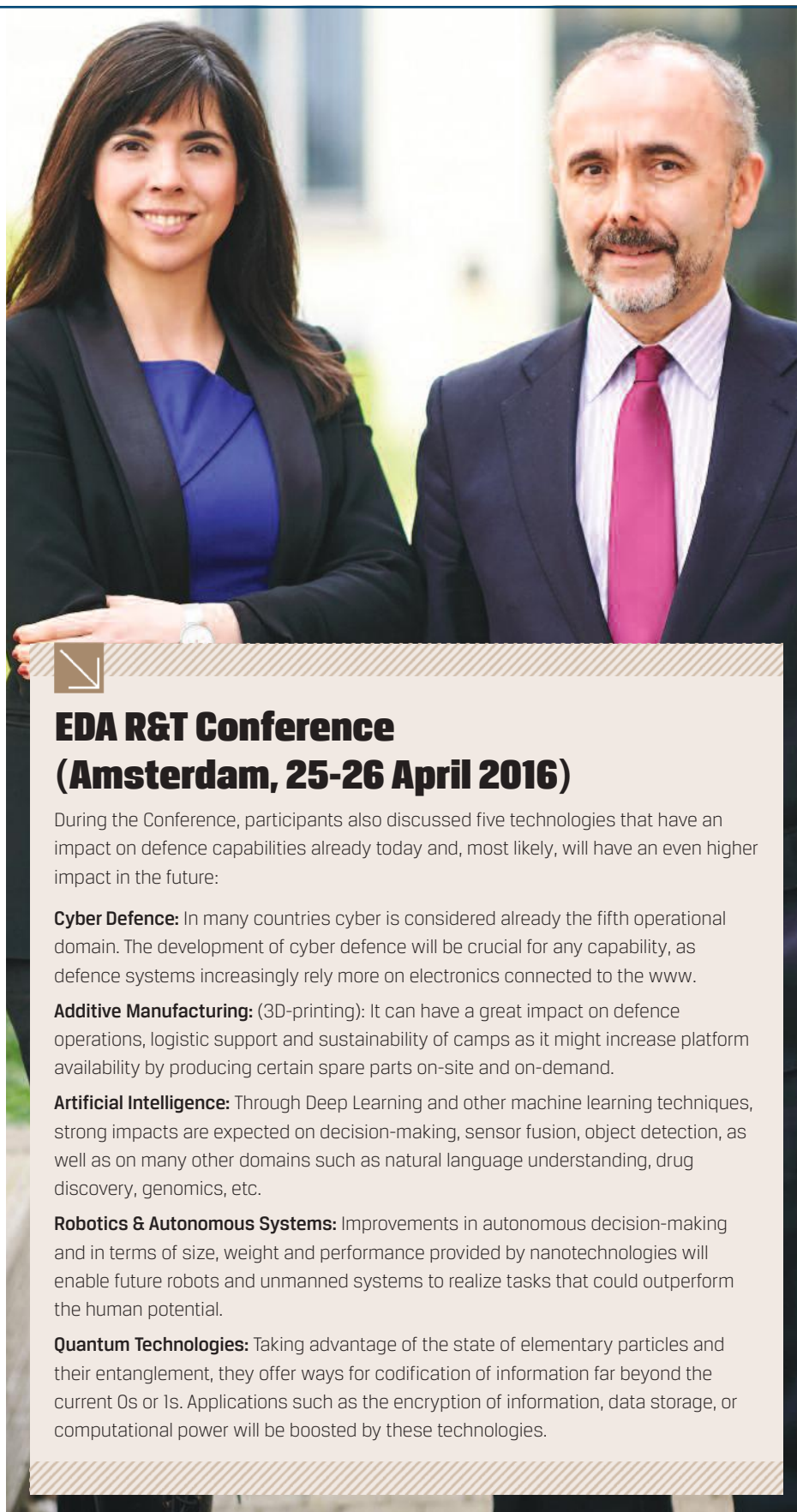


Armed Forces in coping with an unstable and challenging threat landscape. Timely identification of technologies, that will probably change the world, is extremely important to build resilience against any new threats that might arise, participants stressed. Furthermore, the speed of defence R&T planning and its alignment with capability development and acquisition plans, will be affected by the short development cycles of certain commercial technological solutions. Against this backdrop, the EDA has launched an exercise, organised through the CapTechs (Capability Technology Groups) to harmonise and support R&T planning within the EDA R&T community, based on a three-step-approach:

- 1. Technologies identification**, relevant to develop defence capabilities and the planning of future activities. This so-called 'Technology Watch' activity includes media monitoring, horizon scanning technology foresight, providing from short to long-term vision.
- 2. Assessment of technologies**, from the perspective of dual-use, suitability for European cooperation, interests for pMS, Critical Defence Technologies (CDTs), etc.
- 3. Prioritization of technologies and actions**, the CapTech Strategic Research Agendas (SRAs), which are bottom-up initiatives, cope with this challenge and provide priority areas for research cooperation put forward by participating Member States (pMS).

In addition to the bottom-up approach, there is also a need for a top-down approach, taking into account the capability needs defined by pMS. In order to include both approaches, the EDA is developing the concept of an Overarching Strategic Research Agenda (OSRA). This exercise is expected to ensure a coherent view between the EDA, pMS and other stakeholders, especially when considering future sources of funding.

The expected end product is a harmonized view of relevant European defence research priorities, in the context of the Common Security and Defence Policy (CSDP) and additional pMS priorities. "the EDA supports pMS in the adaptation to the challenges mentioned, applying innovative



EDA R&T Conference (Amsterdam, 25-26 April 2016)

During the Conference, participants also discussed five technologies that have an impact on defence capabilities already today and, most likely, will have an even higher impact in the future:

Cyber Defence: In many countries cyber is considered already the fifth operational domain. The development of cyber defence will be crucial for any capability, as defence systems increasingly rely more on electronics connected to the www.


Additive Manufacturing: (3D-printing): It can have a great impact on defence operations, logistic support and sustainability of camps as it might increase platform availability by producing certain spare parts on-site and on-demand.

Artificial Intelligence: Through Deep Learning and other machine learning techniques, strong impacts are expected on decision-making, sensor fusion, object detection, as well as on many other domains such as natural language understanding, drug discovery, genomics, etc.

Robotics & Autonomous Systems: Improvements in autonomous decision-making and in terms of size, weight and performance provided by nanotechnologies will enable future robots and unmanned systems to realize tasks that could outperform the human potential.

Quantum Technologies: Taking advantage of the state of elementary particles and their entanglement, they offer ways for codification of information far beyond the current 0s or 1s. Applications such as the encryption of information, data storage, or computational power will be boosted by these technologies.

approaches such as the OSRA, which will provide a full high-level description of a global R&T architecture, taking into account different views: technologies, systems,

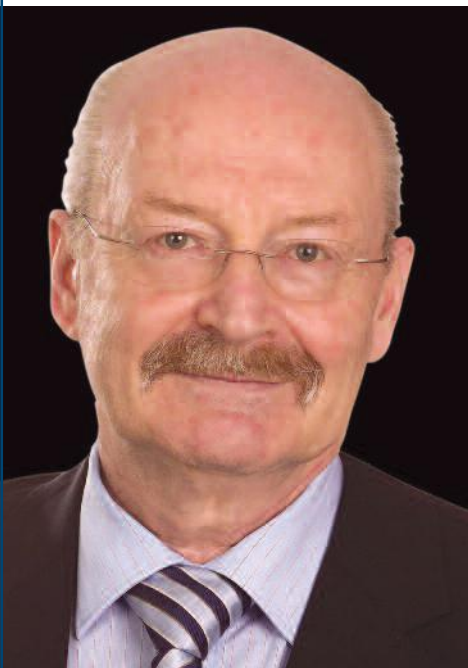
capabilities, etc., in order to be able to faster integrate new technologies in new and also existing platforms (upgrade of systems)", says Ms López Vicente. 





"The only way for Europe to preserve its strategic autonomy is to pull its resources together"

We spoke with *Prof. Klaus Thoma* and *Frédéric Mauro*, co-authors of the 'Future of EU Defence Research' study commissioned by the European Parliament and presented in March 2016, about the link between civil (security-related) and defence research, Europe's current status in global defence R&T as well as the outlook for the EU's strategic autonomy



"I don't see Europe being a leader in any defence technology sector. This is due to a fatal lack of investment for decades and our report clearly demonstrates it"

Prof. Dr. Klaus Thoma

Where do you draw the line between security and defence research?

Mr Mauro: The difference lies in the capabilities you seek to produce. The objective of defence research is to produce 'weapons' i.e. all sorts of devices and tools allowing military effects such as destroying or neutralizing enemies. As we have demonstrated in our report, defence research does not occur in a vacuum. It is the result of a defence planning process, the goal of which is to define what the capabilities needed are, in order to satisfy the level of ambition. Another important point is that defence research is aimed at giving a decisive operational advantage to the forces and thus concentrates on disruptive technologies, which is not always the case in security research.

That said, this distinction has limits. At low technological readiness levels (TRL), let's say from levels 1 to 3, there is no difference between defence research and security research, nor between those two and civilian research. It is all fundamental Science & Technology. Thus investing at those levels is as good for the prosperity of the European industry in general as for defence's sake. At somewhat upper TLRs' (3 to 5), although defence research is mainly 'capability driven', defence planners must scrutinize the solutions that civilian technologies could bring at a better value for money rather than systematically

pursue separate channels. Indeed, there is a new nexus between civilian and defence research which clearly gives the lead to the former and this is an important point to bear in mind.

So, does it still make sense to differentiate between security and defence research, and if so, is it different at national and at European level?

Prof. Thoma: It does when one speaks about technological studies linked to major equipment programmes from submarines to main battle tanks (MBT) and combat aircraft. In addition, a lot of technologies can be used only for defence purposes like missiles, precision-guided munitions, stealth technologies... R&D in the whole area of so-called 'complex weapons systems' hardly overlaps with non-defence R&D. That kind of R&D is essential for us to keep our 'freedom of action'.

This is why we need a robust and capable supply chain of energetic materials (explosives, propellants), research labs and production plants within Europe. In the same way, MBT need sophisticated kinetic energy (KE)-Rods for their guns, produced in specific metallurgical production lines. Unmanned Combat Air Systems (UCAS) need cutting edge stealth technologies.

On the other hand, a wealth of

technologies is 'dual use' and can satisfy more than one goal. Let us think about advanced computing, smart factories, photonics and robotics, 3-D printing and design, cyber, advanced electronics, biomedical, energy & power, materials, autonomy and sensors... All those technological building blocks have been identified for long as 'key enabling technologies' at a European level and they need to be developed at that level.

Indeed, no single European country can stand alone in the technological race. Let us just remember, with regard to defence research that under the 'Third Offset Initiative' the US plans to spend €64 billion on R&D in 2017. China's yearly defence R&D is estimated at more than €20 billion. In comparison, the participating Member States of the EDA spend all together only €7.5 billion per year.

The European country which spends the most on defence R&D, France, only spends a little bit more than €3 billion per year, including on nuclear.

In which technology domains of relevance to defence including commercial innovation do you see Europe globally as either a 'co-leader' or a 'smart-follower', or rather in a 'perilous position'?

Prof. Thoma: I don't see Europe being a leader in any defence technology sector. This is due to a fatal lack of investment for decades and our report clearly demonstrates it.

Europe is sometimes what we could call a 'smart follower', and even occasionally a pioneer with regard to space. This is true for launchers, as well as satellites and some space missions. Ariane, Galileo, Copernicus, Rosetta, exoMars are names that Europeans can be proud of and that would not exist without the Union.

Europe is in a perilous situation in many industrial sectors critical for defence such as robotics, artificial intelligence, swarm weapons, embarked lasers, drones, optronics etc. All of those technologies, which are disruptive today, will be generic in ten years' time. If we do not plant the seeds today, we will not pick the fruit tomorrow. Let's come back to the UCAS: the first flight of the Boeing X-45 occurred in 2002. Its European competitors are ten years late, but at least they are there, thanks to the efforts made in the 1990s and at the beginning of the 2000s. If we carry on reducing defence budgets, in ten

years' time, we will not have ten years' delay. We will simply not be there. 'Strategic autonomy' will be an empty word.

Precisely, how to ensure strategic autonomy and adequate coverage of military capabilities needs in a context in which innovation cycles are driven by industry 4.0 and getting ever faster?

Mr Mauro: First and foremost, the only way for European countries to preserve or to restore their strategic autonomy is to pull their resources together. This can be done most efficiently through the European Union budget. There is no alternative. Lonely roads lead nowhere.


Second point, military capabilities needs do not come out of the blue. They must be derived from the Global Strategy that is poised to be presented by the High Representative by June. The EU must build the missing link between this Global Strategy and a renewed Capability Development Plan in order to answer the question: what is the EU's level of ambition? What does it want to be able to achieve militarily? This supposes that a 'defence sub-strategy' or a 'white book' or a 'white paper' - call it what you want - should be derived from the Global Strategy

Last but not least, how to take into account the increasingly important technological push due to faster innovation cycles? There it is where the European Defence Agency has a crucial role to play. It must be a centre of excellence capable of doing for the Member States something they are not capable to do at home. The EDA must weave the fabric of the new strategic programmes with the yarn of the capability needs and the weft of the technological push. This supposes that the



"The EU must build the missing link between this Global Strategy and a renewed Capability Development Plan in order to answer the question: what is the EU's level of ambition? What does it want to be able to achieve militarily?"

Frédéric Mauro

participating Members abandon the de facto rule under which the EDA has been functioning and also that they accept a substantial increase of its budget. If they are not willing to do so, then the Union should consider other solutions like the creation of an ad hoc Joint Understanding/Joint Technological Initiative or the creation of a Defence Research General Directorate under the authority of a European commissioner. The choice is for the Member States to make. 

Prof. Dr. Klaus Thoma is an independent expert who, by means of his outstanding achievements, has played a major role in the German defence and security research over more than 30 years. For 18 years he was the Director of the Fraunhofer Ernst-Mach-Institut in Freiburg and acted as Honorary Professor at the University of the German Armed Forces in Munich and at the Technical University Dresden. Since his retirement in 2015, he works as scientific advisor in the area of defence and security.

Frédéric Mauro is a lawyer at the bars of Paris and Brussels specialised in dealing with complex advocacy relating to defence and the operations, legal matters and costs relating to it. He is a former French civil servant and has a strong understanding of French policy in this area.

Prof. Thoma and Mr Mauro are the co-authors of the 'Future of EU Defence Research' report published at the request of the European Parliament in March 2016.

[www.europarl.europa.eu/RegData/etudes/STUD/2016/535003/EXPO_STU\(2016\)535003_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2016/535003/EXPO_STU(2016)535003_EN.pdf)

Step by step – Preparing the ground for EU defence research

Investment in R&T is at the heart of ensuring a strong European defence and technological industrial base. Since national research expenditure is in persistent decline, the need for common EU-funded defence-related research becomes increasingly pressing. Good progress has been made in recent months aimed at moving progressively from exclusively civilian-focused research (Horizon 2020) towards a next Multi-annual Framework in which defence research has its own dedicated chapter

It is widely accepted that EU cooperative defence research is essential for sustaining and fostering key military capabilities in Europe, and for addressing capability shortfalls.

However, given the numerous specificities of the defence sector, it is all but a straightforward undertaking to amend the current Horizon 2020 rules – which limit EU research funding to civilian R&T – and have a fully-fledged dedicated defence component included in the next Multi-annual Financial Framework (2021-2027). Therefore an incremental, three-step process aimed at progressively introducing EU-funded defence

research over the next four years is being taken.

From the Pilot Project to the Preparatory Action

The important first step was made on 23 March when a call for proposals for the Pilot Project (PP) for defence research was published in the EU Official Journal. With a total budget of €1.4 million, it covers three topics: the development of unmanned heterogeneous swarm of sensor platforms; inside-building awareness and navigation for urban warfare; and the standardisation of Detect-And-Avoid (DAA) for Unmanned Aerial Vehicles (UAV). On

the basis of a European Parliament initiative, the 2015 and 2016 budgets adopted by the Council and the Parliament earmarked expenditure for it. The PP will be run and managed by the European Defence Agency (EDA) on behalf of the European Commission – which is a novelty – based on a delegation agreement signed between the Agency and the Commission in November 2015. While its impact in terms of R&D output might be limited (due to the relatively small size of the projects), the PP is nevertheless crucial insofar as it will, for the first time, test the conditions for defence research in an EU framework and, more importantly, pave the way for the second

important phase of the process: the launch of the Commission's Preparatory Action (PA) on defence research in 2017.

Designed to run over a three-year period (2017-2019), the PA will be the acid test for proving the added-value of defence research within an EU framework. Its primary operational aim is therefore to produce successful research cases which could underpin the development of military technologies and which would normally not be conducted by Member States acting alone.

Busy months ahead

Discussions aimed at setting up the PA have been ongoing for a number of years with the EDA – in close cooperation with the European Commission – organising regular consultation with Member States and the

industry to reach a common understanding on defence research in the next Multi-annual Framework. Yet, the next twelve months or so will be pivotal for the final shaping of the programme, says Inge Ceuppens, Dual-Use Technologies Project Officer at the EDA. "Most of the programme details will have to be decided upon in the course of the next few months. By the end of 2016, there should be clarity about what exactly the PA will do, how it will function and with which budget", Mrs Ceuppens stresses.

Priorities

The list of open issues to be solved before the launch of the programme is impressive though. Firstly, there is a need to agree on the research priorities the PA will focus on. A wide range of possible research topics and areas are at offer; difficult choices will →



"The EDA has definitely a role to play in helping Member States to identify PA's potential research priorities"

Denis Roger



Three questions to Michael Gahler, Member of the European Parliament and speaker of the EPP Group on security and defence

Over the coming months, important features of the PA will have to be decided upon: priorities, budget, participation rules, implementation modalities, etc. Where do you see the most contentious points?

The most contentious matter is whether we are ready to spend EU money for defence because this idea seems to be quite new for some of us. For all the other subjects I am confident that we will find reasonable solutions. However, I'm concerned about finding an agreement in the European Parliament and the Council on the appropriate budgets for 2017 to 2019. This will depend on the arguments and suggestions put forward by the Commission on how to run the PA, satisfying the various stakeholders from national capitals and industry.

As a Member of the Group of Personalities on defence research, how confident are you that the PA will be a success and open the way for permanent defence research in the next Multi-annual Framework?

We created the right conditions for a success: we have political support from the highest level of Member States and support from the European Parliament. Therefore I see there is a more than 50 percent chance that we will succeed, so it's worth trying. Unfortunately, the crises and conflicts around Europe give us good reasons to cooperate more and better. As shown in a recent EP study potential adversaries are increasing their defence



research budgets while the EU's Member States continue their uncoordinated cuts. Indeed, EU funding of defence research could have a catalyst effect on future EU defence capability cooperation. But first things first, now it is up to the European Commission and the EDA to prove through the PA's implementation that there is European added-value.

How would you describe the overall support in the European Parliament for an ambitious and well-funded future EU defence research programme?

Let me be frank, it has been the European Parliament who turned words into deeds. After the Commission's first proposal in 2013, parliamentarians have supported the idea of EU funded defence research in various resolutions. In 2014, MEPs initiated an EU budget line for the first time with the pilot project on CSDP-related defence research. I hope that MEPs being concerned about our security and defence will build on this initial support and try to reach out for broader support. Both the Pilot Project and the PA will be the litmus tests whether the Parliament and the Council will be ready to embark on further defence research activities.



"Most of the programme details will have to be decided upon in the course of the next few months. By the end of 2016, there should be clarity about what exactly the PA will do, how it will function and with which budget"

Inge Ceuppens

thus have to be made. Much is at stake during this crucial selection phase because the chosen projects will have to prove nothing less than the added value of EU-funded defence research.

No easy task, not only because defence research covers a wide range of areas from which it will be difficult to anticipate and pick the most promising ones, but also because available funding will be unavoidably taut in the present budgetary context and therefore only allow for a limited number of projects. "The EDA has definitely a role to play in helping Member States to identify PA's potential research priorities", insists Denis Roger, Director at the EDA's European Synergies & Innovation Directorate (ESI). "With all its experience in prioritising capability and research needs with tools such as the Capability Development Plan and Strategic Research Agendas, as well as in organising working groups on topics such as critical defence technologies, complemented by new work-strands such as Technology Watch, the EDA has to be a key contributor to this important preparatory work for the PA", Mr Roger says.

PA coordination meetings are being held at the EDA with Member States, but also with Industry and Research & Technology Organisations, throughout this year to exchange and share ideas on priority objectives for the PA.

Rules of participation

Another important topic that will have to be addressed in the course of this year are the rules for participation in the PA. Provisions are set to be made to make sure research results exclusively benefit to EU participants which means that information sharing and dissemination will be somehow restricted. Intellectual Property Rights (IPRs) are probably the most important and tricky issue to solve. "The IPRs applicable to the PA cannot be identical to those in the EU's current Horizon2020 programme given the different nature of defence research", explains Mrs Ceuppens.

The PA's IPRs will indeed need to accommodate both the interests of the governments – which ought to have access to research results to develop their defence programmes – and the legitimate claim from



The Group of Personalities' (GoP) main recommendations on the PA

Full text: http://www.iss.europa.eu/uploads/media/GoP_report.pdf

- The PA must complement and supplement other research activities at the European, national or NATO levels, and does not lead to duplicated efforts at any level;
- The governance approach adopted for the PA should be derived from Horizon 2020, with some essential adaptations to address defence specificities;
- Close cooperation between governments, industries and R&T organisations is crucial to ensure that research activities lead to market uptake and the development of required new capabilities;
- Only legal entities in the 28 EU Member States (plus Norway) should be eligible to participate in the PA. Eligibility criteria should be clearly defined to assure the effective control of the technology developed;
- The PA should aim at providing full 100% coverage of the eligible direct costs, plus a percentage higher than 25% for additional costs. Options for co-funding by Member States should also be considered.
- The PA and the future EU Defence Research Programme (EDRP) should be part of a broader European defence

policy framework – based on the EU Global Strategy and the Commission's Defence Action Plan – aimed at facilitating and enabling defence cooperation at all levels;

- A total of €75-100 million should be earmarked for the PA. It would also be appropriate to allocate the total required funds for all three years from the start;
- The PA should lead to a major dedicated EDRP as part of the next Multi-annual Financial Framework (2021-27). The EDRP will need a total budget of at least €3.5 billion for the period 2021-27 in order to be credible and make a substantial difference.



industry to protect its knowledge and technological expertise.

The IPR issue, which is both technical and legal in nature, is already being dealt with in a small specialised working group; a draft proposal for a new set of IPR rules will be discussed afterwards by all Member States.


Budget & Implementation

The PA's budget, too, is yet to be agreed upon. The Group of Personalities (GoP), which was set up in March 2015 by Commissioner Elżbieta Bieńkowska (Internal Market, Industry, Entrepreneurship and SMEs) to give strategic advice on the set-up and on the governance of the Preparatory Action and which published its final report and recommendations in February (see box below), recommends that a total of €75-100 million should be earmarked for the programme.

The GoP also considers it appropriate to allocate the total required funds for all three years (2017-2019) from the start, taking into account the long timeframe of defence industrial projects. The group's position on the budget is backed by the EDA which advocates

a meaningful and substantive programme which has the financial means to meet the programme's ambitions.

Once the participation rules and budget of the PA are known, the Commission will need to reflect on the most appropriate implementing mechanism. The EDA is widely considered as the most suitable partner for the Commission in executing the programme. With its expertise in defence research and its vast network of experts, the Agency is also called to play a role in the programme committee as well as in the advisory group where the EDA can provide both strategic guidance and factual expertise. A special unit, to be developed according to the needs and available funding, has been set up within the Agency to focus on both the Pilot Project (PP) and the PA.

The Commission is expected to decide by the end of the year on all aspects of the Preparatory Action which, if everything goes to plan, could be launched in mid-2017 with the objective that defence research could become part of the next Multi-annual Financial Framework in 2021. 

Pilot Project: Call for proposals published

The call for proposals for the Pilot Project for defence research was published in the EU Official Journal on 23 March. The objective of the call, to which interested parties are invited to respond until 20 May, is to award grant agreements worth almost €1.4 million for two defence technological development projects and one R&D project linked to certification of UAS for military and civil uses. It is the first time that defence research is funded through the EU budget.

More information:
<https://www.eda.europa.eu/procurement-gateway/opportunitites/eda-procurement/procurement-view/call-for-proposal-for-the-pilot-project-on-defence-research>



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> EU-funded defence research will boost common understanding of Europe's strategic needs

Nobody could have anticipated how critical the timing was going to be for the new openings introduced by the December 2013 European Council, related to cooperation in security and defence policy – writes Teija Tiilikainen

In 2013, the primary request for more efficient defence policy cooperation came from the economy. Better synergies between national defence policies, including more coordinated capability planning, was assumed to lead to increased cost-efficiency in times of severe budget constraints. This was one of the primary goals of the 2013 agenda which broadened the approach of the Union's defence policy cooperation from the key competences of the CSDP to the issue of European

capabilities and the development of a European military-industrial base. The aim was to achieve integration synergies by bringing European defence policy closer to other EU policy domains and involving key actors such as the European Commission.

Since the historical European Council meeting, the political need for a more solid CSDP has been accentuated by a continuously worsening European security environment. While the EU has shown that it can successfully carry out joint tasks in the framework of external crisis management – or conflict prevention – its resoluteness concerning the joint defence of common borders or territories is ambiguous at best. The December 2013 European Council pushed forward many political projects whose value became more obvious against the backdrop of increasing threats to European security. The EU leaders called, among other things, for an EU Cyber Defence Policy Framework and a Maritime Security Strategy and looked for means to enhance synergies between CSDP and Freedom, Security and Justice to tackle terrorism and organized crime.

The persistent need to foster a common approach to Europe's security and defence takes the whole project of

European integration to its roots. More than that: this time, a joint policy is needed to keep Europe together. With the risks of fragmentation and even disintegration increasing in the EU, successful common security responses to common threats provide the whole Union with highly significant political support in a critical moment. The unambiguous consent shown after France's request to activate the Union's mutual defence clause (TEU 42.7.) in the aftermath of the Paris terrorist attacks is a sign of the solidity of the existing common ground.

The processes launched by the European Council in 2013 are now pushed forward in a new political environment with multiple new and old threats testing European defence policies. In this new challenging strategic context, in which it becomes increasingly difficult to distinguish between internal and external security, the EU seems to have finally gotten rid of its overwhelming legalism in interpreting its own role and now gives priority to the need to protect its common values and interests. However, even if Member States broadly share the need for a better coordinated European defence policy, differences in their historical identities, strategic cultures and alignments have turned into major impediments for a pragmatic deepening of the common policy.

What I hope to see as a result of these on-going new processes is first of all a stronger link to be created between the joint understanding of the threats and security challenges Europe is facing and the responses it can give in terms of policies and the planning of civilian and military capabilities. A key instrument in this respect is the EU Global Strategy on Foreign and Security Policy which is planned to be translated into a joint action plan on security and defence. Cooperation should be intensified before a specific threat becomes aggravated and not merely as a reaction as it has often been the case in the past.

 "The need to coordinate the development of European capabilities is much broader and a result both of a rapidly changing security environment and a rising global competition among defence industries" 



Teija Tiilikainen is the Director of the Finnish Institute of International Affairs (FIIA). Before her nomination to this position in 2010, Dr Tiilikainen was the Director of the Network of European Studies at the University of Helsinki (2003-2009). She has also served as Secretary of State at the Ministry for Foreign Affairs of Finland from 2007 to 2008 and was the Special Representative of the Prime Minister of Finland in the Convention on the Future of Europe in 2002-2003. She was also a Member of the Group of Personalities (GoP) which advised the European Commission on the Preparatory Action on the Preparatory Action for CSDP-related research. In her research Dr. Tiilikainen has focused on issues related to European integration (institutional questions, the EU's external relations incl. CFSP and CSDP) and on European security policy.

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The second change is related to European capabilities. In the current economic and political circumstances, European capability requirements cannot any longer be steered by immediate CSDP requirements only. The need to coordinate the development of European capabilities is much broader and a result both of a rapidly changing security environment and a rising global competition among defence industries. The capability processes launched together with the strengthening of the European defence-industrial base aim at a strategically more resilient Europe capable of sharing a larger burden of its own security.

Here, a vital and competitive European defence industry is key. In support of it, a genuine internal market for security and defence industries should be developed as well as a solid security of supply policy defining the critical capabilities in terms of procurement and services. To succeed in this endeavor, an EU-funded instrument for CSDP-related research will be needed. The possible forms of such an instrument were recently outlined by a Group of Personalities (GoP) tasked to advise the Commission on establishing a Preparatory Action on Common Security and Defence Policy-related research.

The proposed EU-funded research programme for defence is an important step towards a common European security and defence policy. A solid research budget as a part of the EU's Multiannual Financial Framework would first of all facilitate cooperation among European defence industries and other stakeholders relevant for defence R&T. Complementing national research funding with a European instrument will maximize the benefits of defence R&T and harness its European value-added. Joint projects, on the other hand, promote openness in the defence sector and make the value of a functioning single market more tangible. With a relatively small European investment - a

total budget of €3.5 billion has been proposed by the GoP for 2021-27 - it would be possible to create a stronger perspective for European defence-industrial cooperation which should benefit the whole European economy.

More importantly, a joint funding instrument managed by the European Commission and the EDA with the support of Member States and the European expert community on defence will facilitate the emergence, among the key stakeholders, of a more common view on Europe's strategic needs. A well-functioning funding instrument for defence-related research will thus contribute to policy-coordination by strengthening the necessary link between the planning and coordination of capability needs, on the one hand, and the supply of capabilities, on the other hand. To be able to strengthen the European defence industry and safeguard its competitiveness, EU Member States have to improve their joint understanding of the development of Europe's strategic challenges and their implications on capabilities.

The new comprehensive approach to European defence cooperation is extremely welcome as it will help Europe focus on the core issues of its own security and defence instead of losing time and efforts in long-standing struggles on institutional issues such as the need of operational headquarters or details of EU-Nato cooperation. It is in the EU's interest to help its Member States, as the key providers of capabilities for Europe's security and defence, to get the most out of their mutual cooperation to the benefit of the whole EU. ◀

> "Defence cooperation is not the easy option but it is the only way, if we want to retain our military capabilities"

Talking to *European Defence Matters*, Dutch Minister of Defence **Jeanine Hennis-Plasschaert** spells out the defence-related objectives of the current Dutch Presidency of the European Union, explains why the upcoming Global Strategy should be swiftly translated into actionable proposals to strengthen European defence cooperation, and shares her country's experiences and recommendations as one of the frontrunners among EU Member States when it comes to defence cooperation

Minister, one of your goals during the Dutch EU Presidency is to give a fresh boost to defence cooperation. What achievements do you strive for during the Presidency? Any first successes?

Defence cooperation is not the easy way but it is the only way, if we want to retain our military capabilities, especially the high end capabilities. Cooperation demands a continuous and active pursuit of possibilities for cooperation and requires a persistent and determined mindset to become successful.

The Netherlands would like to lead by example when it comes to defence cooperation. There are several examples of successful cooperation initiatives, like the France-UK cooperation under the Lancaster House Treaties, the Visegrad 4, NorDefCo and the Baltic Defence Cooperation, but I still think that we need more and closer cooperation.

We should go beyond the obvious

cooperation areas such as training, logistics and education. Joint training is a good start, but we have to go further. We should use small scale cooperation that works and build on those. The defence cooperation between Germany and The Netherlands could be used as an example. We are integrating a German tank battalion into a Dutch mechanized brigade, which itself will become part of a German armoured Division. This allows us to maintain our ability to fight with and against tank units, since we no longer have that capability ourselves.



Another example is the long standing maritime cooperation between Belgium and

the Netherlands, which has been developed to a high level. The cooperation between the BENELUX-countries in protecting their airspace is another promising example.

During our EU Presidency I try to promote all these types of European cooperation where I can. And let's not forget that these cooperation initiatives, be it for operational purposes or joint capability development, also

need some kind of political framework and strategic guidance.

This is why I attach so much value to the EU Global Strategy on Foreign and Security Policy which should be presented by HR/VP


 "We have experienced that extending the scope of cooperation beyond the purchase of equipment into operations, maintenance and organization helps too"




"The Netherlands would like to lead by example when it comes to defence cooperation"

© Dutch Ministry of Defence

Mogherini in June. And I strongly believe that this new strategy should immediately be translated into actionable proposals to strengthen European defence cooperation. A 'White Book like document' should describe the CSDP-related tasks and means we need to execute the Global Strategy.

It should give us a clear picture of which military capabilities we need the most and so guide our future cooperation efforts.

You mentioned the follow-up document to the Global Strategy, a 'White Book like document' as you call it. In your view, what should be its main elements?

We see the Global Strategy, a possible 'White Book like document' and finally the European Defence Action Plan as three closely related documents. Essential elements for a 'White Book like document' are a clear military level of ambition in line with

the Strategy, a description on the capability shortfalls and a proposal for a follow-up mechanism to monitor the progress at the political level.

The Netherlands are a forerunner in terms of defence cooperation. Your country has a history of successful cooperation with Belgium and Luxembourg for example. The latest example is the conclusion of far-reaching cooperation agreements with Germany. What are the lessons learnt?

We have learned that for cooperation to

be successful, partners should start as early as possible in the capability development process to identify shared interests. It is easier to find common ground when all options are still open.

We have experienced that extending the scope of cooperation beyond the purchase of equipment into operations, maintenance and organization helps too. Requirements become more aligned and the relationship for the long term is bound to contribute to successful cooperation.

Finally, it is important to have support →

Jeanine Hennis-Plasschaert is Minister of Defence in the Dutch government since November 2012. Previously, she worked for the Directorate-General for Enlargement of the European Commission in Brussels as well as in Riga, Latvia. She was a Member of the European Parliament for the VVD (People's Party for Freedom and Democracy) from 2004-2010. In June 2010, she was elected to the Dutch House of Representatives.



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The Netherlands are a forerunner in terms of defence cooperation

at all levels. After all, it is a matter of commitment and trust. This is why the political level, the policy level and the executive level should all be involved.

But you are also active in many multinational programmes through EDA. What type of cooperation do you think gets most out of taxpayers' money?

As an ideal, the taxpayers' money would be best spent when a programme is aimed at addressing a shortfall at the European level, which corresponds to the national needs of a large number of Member States. A good example of such a combination of goals is the European Air Transport Command at Eindhoven.

Furthermore, taxpayers are, in the long run, best served by a well-functioning European Defence market and a strong European industrial base which are not hampered by barriers. If the market functions well, we are more capable of developing innovative, high-end military capabilities in Europe. I think this would benefit the taxpayer, but more importantly, it benefits our armed forces.

To what extent has the Dutch defence industry benefitted from the country's cooperative approach?


The Dutch defence industry consists mostly of medium and small enterprises that offer high quality contributions to capability development. However, our cooperative approach does not automatically benefit our own national industry.

We see that the defence industry in Europe is subject to national considerations. For SMEs especially, it therefore remains difficult to gain cross border access to defence and security contracts, even within the framework of cooperative programs. The result is that the competitive and innovative power of our European defence industry does not reach its full potential, something which we cannot afford if we really want to gain a degree of strategic autonomy in this market.

If you look at the upcoming Preparatory Action on defence research and the Commission's Defence Action Plan: how do you see these two major initiatives develop? Will they be a game-changer for the sector?

The Preparatory Action, as part of the European Commission Action Plan, will certainly be a game changer, if it succeeds in preparing the way for a dedicated European defence research programme. First of all, this initiative shows that the European Commission is involved and committed to

strengthen European defence. Secondly, investing in R&T makes it more attractive for the defence industry to focus on non-dual use technology, being commercially less attractive, but essential nonetheless.

Thirdly, the Preparatory Action and the subsequent dedicated research programme will serve as an incentive for joint capability development further down the line, when R&T efforts are used to develop real capabilities. 



"We have learned that for cooperation to be successful, partners should start as early as possible in the capability development process"



On 1 January 2016, the Netherlands took over the Presidency of the EU Council

A portrait of Michel Barnier, a man with white hair, wearing a grey suit, a light pink shirt, and a dark blue tie with a red pattern. He is looking slightly to the right of the camera. In the background, a European Union flag is visible, slightly out of focus.

› Stepping-up European security and defence

Michel Barnier, special adviser to the president of the European Commission Jean-Claude Juncker on matters of security and defence, shares with *European Defence Matters* his analysis on the EU's current and future security challenges and defence needs and gives an outline of the goals and ambitions of the Commission's upcoming Defence Action Plan

The spread of radical Islamist threat and terrorist attacks into the heart of our societies; the end of the US 'unipolar moment'; the rise of China; Russia's blatant disregard for international law; the still unfolding crisis in Ukraine; a Middle-East in flames; Syria, Yemen, Libya...

We should need no further convincing that the world around us is changing for the worse. That the EU operates in an increasingly volatile, fragile and unpredictable security environment. And that we need to react to it.

The security of the European continent is not a given anymore. Either we rise up to the task, or I fear the worse. →

What is needed is a profound update of our European strategic software. We need to think anew what collective security in Europe means, on the basis of the threats we are facing and then draw lessons from that in terms of our crisis management and security and defence instruments, as well as capabilities and technologies.

The security of Europe and the protection of our values are at stake. Bringing Member States and EU institutions closer together is a necessity to meet the expectations of our citizens.

2016 is a pivotal year in defining what we mean by this. Under the authority of the High Representative Mogherini, the new Global Foreign Policy and Security Strategy is due for June. It is the perfect occasion for the Union to define our interests and our collective priorities.

In parallel to similar efforts in NATO, the Global Strategy must initiate the EU's long-term adaptation by defining anew our overall military and civilian objectives.

This means assessing Europe's shared vital interests in the new security environment, the fusion of internal and external security, possible threat scenarios and the effectiveness of past and current

European missions and operations.

Thinking anew about collective security

The invocation of article 42(7) – for the first time in the history of the Union – is to me a watershed moment for European solidarity. Long deemed irrelevant, the EU's very own collective defence clause has come to life.

The activation of the clause should add a new political dimension to security and defence in Europe, from the Baltics to Cyprus. This must be seized upon.

European solidarity and collective security should become a critical cornerstone of CSDP, beyond crisis management operations. The EU should be able to defend its interest and values.

The question of the EU's future role in mutual assistance and collective security, not as an alternative but as a complement to NATO, must be put firmly on the political agenda. Article 5 of NATO is not a one size fits all solution to the threats we are facing. Collective security is a question of particular relevance for all Member States.

Beyond the immediate and bilateral responses to France's request, the EU's mutual assistance clause must now be operationalised as a European collective

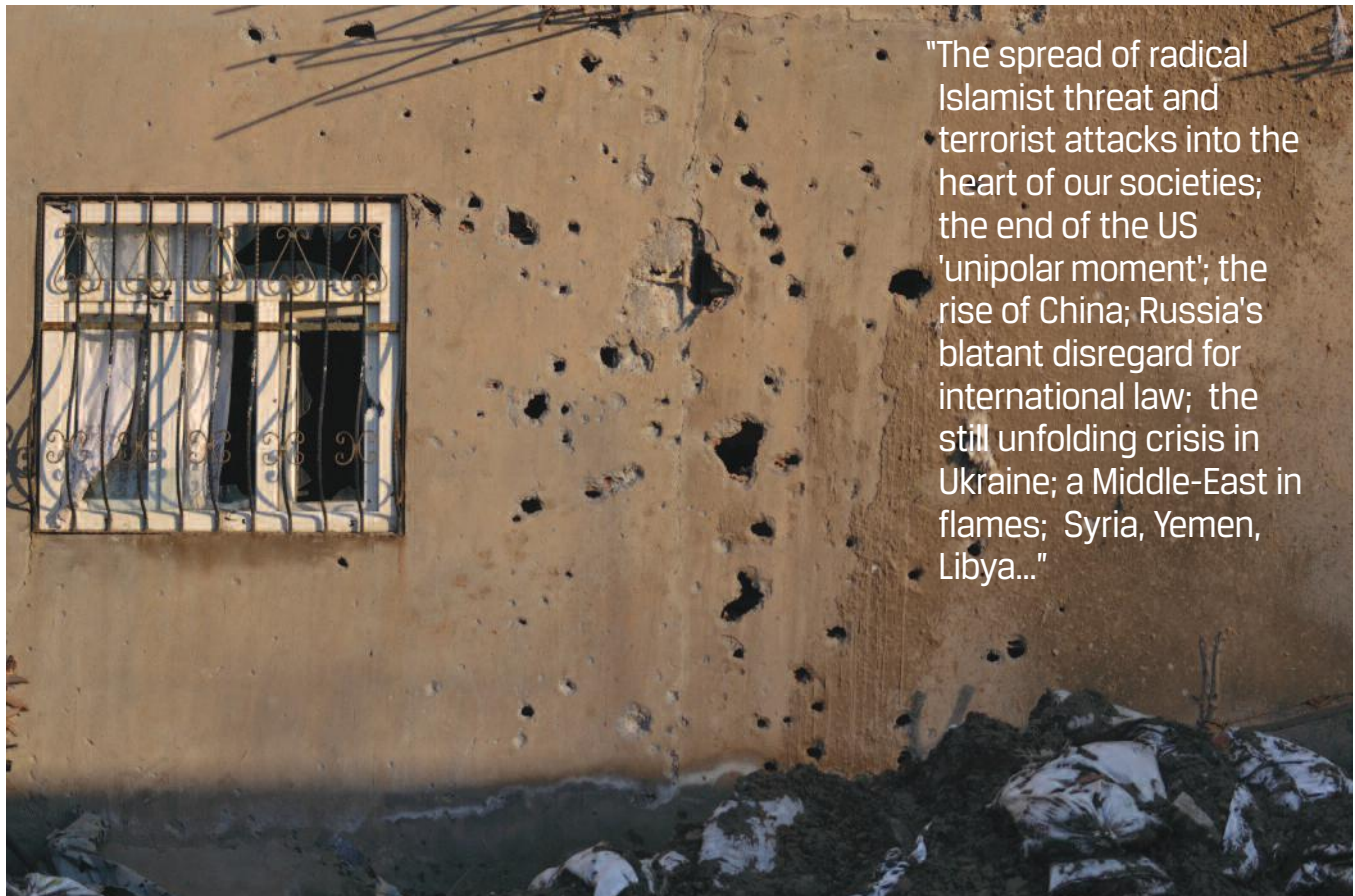
security clause involving also the EU institutions. Article 42(7) cannot be understood simply as a bilateral instrument. EU institutions can add value in joint contingency planning, coordination of intelligence and mobilisation of the full range of instruments. That will require much more, both in terms of military planning and capability development.

Making the CSDP the pivotal instrument and enhancing our military capabilities

The CSDP should be the pivotal instrument for the new Global strategy. Sanctions, diplomacy, overseas development aid... all are good, all are needed in a comprehensive approach.

But the CSDP is the key: because it is in itself a comprehensive tool, because it is both civilian and military, because it is our presence and intelligence on the ground, and simply because the EU now needs to move beyond the sterile opposition between soft and hard power. We need smart power.

Once the strategic ambition is set in the Global strategy, there therefore is an urgent need to revise and determine our ambition and means of action in common defence through a European Strategic Defence Review or



"The spread of radical Islamist threat and terrorist attacks into the heart of our societies; the end of the US 'unipolar moment'; the rise of China; Russia's blatant disregard for international law; the still unfolding crisis in Ukraine; a Middle-East in flames; Syria, Yemen, Libya..."

Defence 'White Book'.

The CSDP is today primarily a peace-keeping and crisis management instrument, but what about the EU's pledge to collective security in the context of increasing hybrid threats ignoring these borders?

If the EU is taking collective defence and security seriously, new scenarios must be given operational significance through contingency planning for different threats. The EU's standard military response capability was last defined at the Helsinki European Council in 1999, in other words, in the last century!

The needs of – and contributions to – a capable EU military instrument that can face today's crises, including through rapid response capabilities, must be defined anew.

This will in turn require new efforts on capabilities. The recent UK defence review presages a European capability upgrade across Europe. Renewed investment in defence must build on synergies and avoid costly inefficiencies and duplication. As far as possible, needs should therefore be identified in common by Member States, together with the EU and the European Defence Agency (EDA) not least. More is to be achieved together for example in the development of capabilities relevant to external and internal security, such as cyber capabilities, surveillance drones and space based assets.

Working in partnership

The Commission stands ready to contribute to this common effort and can

help enhance the EU's ability to be both an external and internal security provider.

Under the impetus of Commissioner Bienkowska, we are developing a Defence Action plan on capabilities and technology together with the External Action Service and the European Defence Agency.



"My conviction is clear: there can be no prosperity without security; there can be no strategic security without defence; no strategic defence without capabilities; no strategic capabilities without a competitive European defence industry"



In support of Member States, we can combine our efforts to:

- identify, on the basis of the Global Strategy and the EU level of ambition, critical European needs;
- design the right set of instruments to incentivise cooperation, combining policies, funding, fiscal incentives and regulatory measures;
- catalyse greater investment in Key Strategic Activities, including in critical technologies;
- propose a long term roadmap towards

more integration in key enablers such as certification, standardisation, training and simulation centres;

- define a process for strengthening the European capability development and Pooling & Sharing, on the basis of the Capability Development Plan;
- adjust existing instruments including the EDA and OCCAR, to best manage future European programmes;
- propose solutions for more defence integration among willing Member States, following recent examples such as between Germany and the Netherlands.

As the EU's Global Strategy on Foreign and Security Policy is being finalized, we must remember that this common effort in defence is also the vehicle for Europe's long term strategic autonomy. Europe is called upon to assume greater responsibility for its own security and in the context of the transatlantic partnership. It is our responsibility to secure our capability and freedom of action to remain a trustworthy partner.

My conviction is clear: there can be no prosperity without security; there can be no strategic security without defence; no strategic defence without capabilities; no strategic capabilities without a competitive European defence industry.

Considering the tragedies across Europe over the past months, security and defence should now be our collective top priority: under the authority of President Juncker, the Commission will play its role to the fullest.

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"Considering the tragedies across Europe over the past months, security and defence should now be our collective top priority: under the authority of President Juncker, the Commission will play its role to the fullest"

Prior to becoming special advisor to Commission president Juncker, Mr Barnier has been a minister in several governments in France, as minister of environment (1993-1995), European affairs (1995-1997) and foreign affairs (2004-2005). From 1999 to 2004, he was European Commissioner responsible for regional policy and institutional reform.

In 2007, French president Sarkozy appointed him minister for agriculture and fisheries. In autumn 2009, he became European Commissioner for internal market and services.

As Vice-chairman of the European People's Party (EPP), he was asked in 2015 to lead the party's work on European defence and security matters.

Personnel Recovery: A strong safety net for deployed personnel

Ensuring swift and safe recovery of personnel isolated, missing, detained or captured in a hostile territory has become a high-priority component of all EU-led Crisis Management Operations. Through its dedicated 'Project Team Personnel Recovery', the European Defence Agency (EDA) actively supports its participating Member States to enhance Personnel Recovery capabilities and improve interoperability – with tangible results

Any Common Security and Defence Policy (CSDP) military operation or civilian mission carries the risk of deployed personnel being trapped, isolated, captured and/or maltreated by enemy forces. If it occurs, such an incident can have an adverse impact not only on the operation's security but also on the troops' morale as well as general public support. It is therefore imperative to ensure the effective and quick recovery and reintegration of isolated personnel. In this regard, all possible diplomatic, civil and military options should be combined and utilised. "Keeping personnel recovery high on the EU's agenda conveys the right signal to our soldiers on the ground", EDA's Capability, Armament & Technology Director, Air Commodore Peter Round stressed. He further stated that "It is our responsibility to make sure that robust and effective personnel recovery capabilities and tools are in place and available, as an integral part of any deployment".

Since 2007 the EDA's Project Team Personnel Recovery (PT PR) has been working in support of its participating Member States (pMS) in order to enhance their Personnel Recovery (PR) capabilities and to effectively address these challenges. Under the German chairmanship and with the active participation of its 14 pMS, the PT has delivered tangible results and valuable studies. In its activities the PT is also supported by the European External Action Service's bodies; the European Union

Military Staff and the Crisis Management and Planning Directorate as well as of the newly established European Personnel Recovery Centre (EPRC), a close partner of the Agency.

As CSDP Crisis Management Operations (CMO) involve many different Member States, Third States and other partner Organisations there is a growing need for ensuring common PR principles, practices, standards and capabilities that are interoperable. As Major Constantinos Hadjisavvas, EDA's Project Officer on PR, underlines "developing a common personnel recovery culture supported by the



"Even with the most cutting-edge technology, personnel recovery cannot be successful unless you have trained and motivated personnel"

Constantinos Hadjisavvas
Project Officer on PR, EDA

relevant capabilities is vital in ensuring that an effective safety net is in place for those in need in the theatre of operations".

From conceptual framework to operational PR support

Personnel recovery is a complex process involving five main tasks: reporting, locating, supporting, recovering, and reintegrating. The first task, reporting, includes the recognition and notification that personnel have or may have become isolated. This information can be generated by an accountability mechanism,

visual sightings, intelligence, and reconnaissance or even through direct contact with the isolated personnel themselves. The second step, the locating task, includes actions to find and geo-locate the isolated personnel, immediately followed by the supporting task aimed at providing them with mental, physical and emotional support. It is only once these essential preparatory steps have been taken that the core part of any PR mission, the actual physical recovery, can be launched.

PR operations are finally concluded with the reintegrating task of the recovered personnel through medical assessments and debriefings before returning them back to duty and/or their families.

Situational awareness, information management, command and control aspects as well as appropriate capabilities are thus absolutely crucial for any successful PR operation. However, as Major Hadjisavvas stresses, "even with the most cutting-edge technology, personnel recovery cannot be successful unless you have trained and motivated personnel". Working on four different but interrelated work strands (Concept, Command & Control, Equipment and Training), the PT aims at addressing the full spectrum of PR; from the cultural and conceptual context through training aspects to the development of advanced technologies.

PR FAS ATD: an operational output of the EDA
PR provides the capability to safely recover





Personnel recovery is a complex process involving five main tasks: reporting, locating, supporting, recovering, and reintegrating.



The PR FAS Advanced Technology Demonstrator (ATD) is a software solution that can be provided with ruggedized, mobile hardware.

isolated personnel. However, it was identified that an operational technical solution to plan, launch and monitor personnel recovery missions was missing. To close this critical gap, the EDA has developed a conceptual framework which has led to the successful development of the Personnel Recovery Functional Area Service Advanced Technology Demonstrator (PR FAS ATD), one of the most important operational outputs of PT PR so far.

This ATD is an information management and Command & Control (C2) system designed to increase the efficiency of PR missions and operations. In fact, PR FAS ATD supports planners and controllers with numerous functionalities and a significantly improved situational awareness.

The system is portable and works on a 'plug and play' basis, so it can be used by directly connecting to a number of laptops or integrating into existing networks in command posts or headquarters. Significantly, the ATD does not need any additional client software due to access via an internet browser. This minimises the rollout effort and increases Information Technology (IT) security.

The demonstrator was successfully evaluated and tested during multinational courses in 2015. In mid-2016, an important milestone was reached when PR FAS ATD was finally distributed to all pMS. They can now use the tool as a web based and stand-alone system during national or multinational training and exercises.

Deployment support, training, new projects

At this stage, the PR FAS ATD is still only a demonstrator, albeit an advanced demonstrator. In order to achieve operational capability additional organisational and technical measures have to be taken. The most important tasks include interfacing existing air command and control systems as well as the provision of service support. The EDA is leading these tasks by providing deployment support to pMS, addressing the various aspects of the through-life management of the tool and ensuring its viability.



"Keeping personnel recovery high on the EU's agenda conveys the right signal to our soldiers on the ground"

Peter Round
Capability, Armament & Technology
Director, EDA


Furthermore, the Personnel Recovery Controller and Planner Courses (PRCPC), run by the six contributing Member States (Austria, Belgium, Germany, Hungary, The Netherlands, Sweden) as an EDA project ensures that trained personnel are available to support any future PR activities under CSDP. Seven editions of PRCPCs have taken place so far, the most recent in April at the EPRC in Poggio Renatico Air Base (Italy).

Additionally, by the end of 2016, pMS will also obtain a web-based e-learning tool for Survival, Evasion, Resistance and Escape

(SERE), based on the existing Swedish e-training tool. The SERE project aims to provide pMS with PR training for their military personnel before being deployed. Instead of developing a new tool, the EDA was authorised by the Swedish Armed Forces to translate the Swedish tool into English and disseminate it to all pMS. "SERE is a model of how Pooling & Sharing of assets and best practices can save time, resources and money", Major Hadjisavvas explains. This tool could also be useful for the personnel deployed in the context of CSDP civilian or other humanitarian missions.

Way ahead

The need for enhancing interoperability of European Armed Forces' PR capabilities will be further enhanced by the increasing multinational character of CSDP operations and the volatile environment that the EU is operating in. Topics currently under consideration in the EDA to further advance this important work includes among others, the contribution to the possible revision of the EU's conceptual framework for PR in support of CSDP and enhancing the PR efficiency with the Unmanned Aerial Vehicle (UAV) support.

Finally in November 2016 the Agency in cooperation with the Royal Netherlands Air Force (RNLAf) will organise a PR Conference in order to enhance awareness of the importance of PR in saving lives and protecting the EU's reputation. 

> COLD BLADE 2016: Mission Accomplished

It's no coincidence that COLD BLADE 2016, the latest helicopter exercise carried out under the EDA's Helicopter Exercise Programme (HEP), took place in one of Europe's most Northern areas, in arctic Lapland (Finland)



"European aircrews should never stop testing themselves and learning from each other. The Helicopter Exercise Programme (HEP) must continuously improve and search for better ways and means of meeting operational challenges"



Freezing temperatures, tricky and chilly winds as well as loads of ice and snow offered an ideal theatre for a joint helicopter training exercise designed to replicate real operational scenarios in adverse winter conditions.

10 helicopters – seven NH-90s, two

CH-53GAs and one MD500 – from the host country Finland and Germany were in action over the 10 days' exercise from 7th to 18th March at airbase Ivalo which mobilized some 200 military personnel: flying crews from Finland, Germany and Sweden (only as observers) as well as trainees from Italy who participated in a survival course. No less than

290 hours were flown in 156 different training missions all of which had the same overarching objective, namely to provide the participating crews with an opportunity to test their helicopters and to train and apply joint flying technics, tactics and procedures in difficult and challenging arctic circumstances.

The exercise included various day and →



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night flight sessions at low temperature, difficult navigation flights, severe white-out landings and multinational formation flights. Crews were also trained in performing maintenance duties at low temperatures and in particularly adverse environmental conditions. As an example, German Army NH-90 mechanics executed tests and exchanged information with their Finnish counterparts concerning winter maintenance, use of tools and NH-90 helicopter documentation.

Throughout the whole exercise, a particular emphasis was put on promoting dialogue and cooperation among the participating Member States as well as on the usage of joint Standard Operating Procedures in the conduct of flight planning and operations. A survival course was also held focused on teaching participant crews

how to survive in arctic conditions with their own equipment.

Building trust, enhancing interoperability, improving capabilities

At the end of the exercise, participants praised the usefulness of COLD BLADE 2016 in building trust among multinational crews, strengthening operational interoperability and enhancing European helicopter capabilities in view of future multinational operations. Special thanks were expressed to the Finnish Defence Forces who hosted the event. "The professionalism, enthusiasm and friendliness of our hosts allowed this exercise to develop and grow. We now look forward to building on this excellent foundation as we move forward to the next exercise in Belgium at the end of 2016", commented EDA's Helicopter Project Manager (HPM), Andrew Gray. "European

aircrews should never stop testing themselves and learning from each other. The Helicopter Exercise Programme (HEP) must continuously improve and search for better ways and means of meeting operational challenges and mitigating threats that our men and women might face. If we continue to work together in this spirit, exercises like COLD BLADE 2016 will help us to achieve this", Mr. Gray stated.



Key Quotes

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"The advantage of the EDA 3-Year-Planning Framework is that it sets measurable priorities; all too often the perception among Member States persists that cooperative programmes are complicated and take more time. We want to prove the opposite can be true. Realistic planning, agreed priorities and timelines as well as confirmed resources are important building blocks for successful cooperation in defence."

Jorge Domecq,
Chief Executive of the European Defence Agency

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"For Europe to successfully spearhead innovation, it has to deal with at least four accelerating trends: (i) global competition for the lead in technology; (ii) emerging knowledge domains and technology convergence; (iii) increasingly faster innovation loops; and (iv) the growing importance of private investment in support of innovation. Each of these factors taken alone may hardly seem revolutionary, yet any combination and convergence of them in a fast-paced environment may prove to be so"

Michael Simm, Policy Officer - Strategic Foresight, ED

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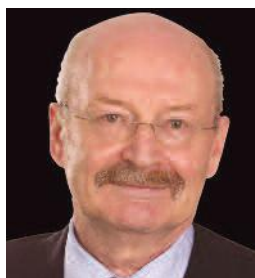
"In defence, strategic innovation does not derive from incremental improvements but from a game-changer, a disruptor or a breakthrough. As Aesop's fable 'The Lion and the Mosquito' shows, a strong defence posture constantly requires adaption to new threats. Even the mighty lion can be beaten by the tiny mosquito if it can be lured into the spider's web. That's where strategic innovation comes into play"



Marwan Lahoud, Executive Vice President International, Strategy and Public Affairs of Airbus Group

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"Europe is in a perilous situation in many industrial sectors critical for defence such as robotics, artificial intelligence, swarm weapons, embarked lasers, drones, optronics etc. All of those technologies, which are disruptive today, will be generic in ten years' time. If we do not plant the seeds today, we will not pick the fruit tomorrow"



Prof. Dr. Klaus Thoma, scientific advisor in the area of defence and security

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"There are several examples of successful cooperation initiatives, like the France-UK cooperation under the Lancaster



House Treaties, the Visegrad 4, NorDefCo and the Baltic Defence Cooperation, but I still think that we need more and closer cooperation. We should go beyond the obvious cooperation areas such as training, logistics and education. Joint training is a good start, but we have to go further. We should use small scale cooperation that works and build on those"

Jeanine Hennis-Plasschaert, Dutch Defence Minister

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"As EU's Global Strategy on Foreign and Security Policy is being finalized, we must remember that this common effort in defence is



also the vehicle for Europe's long term strategic autonomy. Europe is called upon to assume greater responsibility for its own security and in the context of the transatlantic partnership. It is our responsibility to secure our capability and freedom of action to remain a trustworthy partner"

Michel Barnier, special adviser to the president of the European Commission Jean-Claude Juncker on matters of security and defence



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