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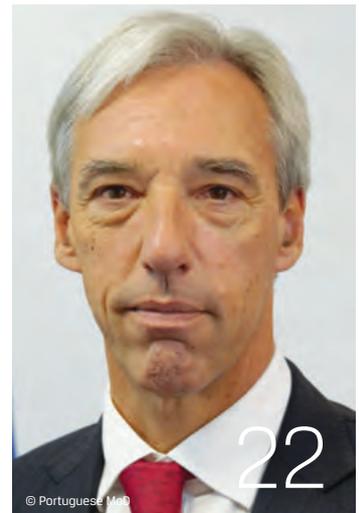
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Design

Simon Smith Associates

Printing

Drukkerij Hendrix NV
Kiezel Kleine-Brogel 55, B-3990 Peer
Belgium

This document is published by EDA in
the interests of exchange of information

Front cover image: © Bundeswehr /
Johannes Müller. Other images; EDA,
Shutterstock, Thinkstock

EDA is a member of the European Military Press Association

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Catalogue number
QU-AC-20-001-EN-N
ISSN (2443-5511)

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Staying on course

Unprecedented, unknown and unpredictable, the global Covid-19 pandemic has turned our everyday lives upside down. Overwhelming in many respects, this crisis has and still is requiring swift and decisive action from governments and international bodies, temporarily relegating long-term policymaking somewhat to the background. Yet, there are areas where ambitions and courses of action previously set deserve to be kept and even reinforced, notwithstanding pressing emergencies. EU defence cooperation is one of them.

As Jiří Šedivý, the Agency's new Chief Executive explains in this issue of European Defence Matters, it is essential to ensure business continuity and remain focused on the implementation of the EU's defence toolbox (CARD, PESCO, EDF) and collaborative capability development while, at the same time, deal with the effects of the Covid-19 crisis. The pandemic and its potential long-term repercussions on national and European defence are also assessed by key defence players and commentators to whom we give the floor in the first part of this magazine.

One important aspect of business continuity in defence cooperation is common training and exercises, a domain in which EDA holds a leading role since many years. Renowned as Europe's training pitch for Member States' Armed Forces, the Agency offers a wide spectrum of training and exercises, all of them directed at the same objective: to enhance European interoperability, be it for the benefit of CSDP, NATO or other multinational missions and operations. In the following pages, we give an insight into the most successful of them.

We also drill into the fascinating topic of Artificial Intelligence (AI) and speak to a senior representative of SAAB about how AI has already made its way into defence equipment. Moreover, we put a spotlight on a new promising project launched in cooperation with the European Space Agency (ESA) related to CBRN detection. Last but not least, NATO Deputy Secretary General Mircea Geoană shares with us his assessment of the current state of play of EU/ NATO cooperation.

We hope you will enjoy this magazine. Should you have comments or recommendations, please get in touch: info@eda.europa.eu

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Editor-in-Chief



Now, more than ever

However disruptive the economic and financial impact of Covid-19 might be, it will not obscure the need for Member States to strengthen Europe's full spectrum of defence capabilities, and to do it through cooperation. On the contrary: this crisis makes collaborative capability development even more indispensable and urgent, argues **Jiří Šedivý**, the European Defence Agency's (EDA) new Chief Executive, in the following opinion editorial.

This pandemic is far from over and the full scale of its repercussions still unpredictable. Yet, there are lessons to be learned already now as Europe must adjust to a new post-Covid reality. Defence is no exception. The budgetary shockwave caused by the pandemic may heavily weigh on some Member States' ability to sustain existing national defence programmes, let alone launch new ones. Which in turn threatens to further curtail Europe's security and defence clout.

There could be a plus side to the crisis as well, though: some of its effects might help speed up the process towards genuine EU defence cooperation. Looked

at from this angle, this emergency offers a unique and unexpected opportunity for making collaborative capability development the new norm in Europe. Rather than weakening national defence forces one by one, the new reality imposed by Covid-19 could advance the Europe of Defence as a whole.

Making a virtue of (budgetary) necessity

The follow-up costs of the pandemic are likely to squeeze national public spending across the board and for years to come, including spending on defence. What's more, the fiscal downturn hits at a time when Europe needs to invest more and better in its security and defence. The

many good reasons that led the EU and its Member States to raise the Union's level of ambition on security and defence in 2016 and to work towards European strategic autonomy as a long-term goal, are still valid. To drop or even lower this ambition is not an option, even under today's exceptional circumstances, as this would seriously undermine Europe's security role in the world.

How to square this circle?

Defence cooperation is the answer. Europe needs more joint defence planning and capability development. The call for Pooling & Sharing of resources and capabilities is not new, but it has become more



"All instruments and processes needed to enable and manage EU defence cooperation are already in place and ready to be used"

pressing today. When defence budgets come under pressure, the smartest way for Member States to safeguard or even increase their military resilience is to plan, develop, procure, maintain and operate their defence equipment together. Multinational capability development – be it under PESCO, EDA or any other format involving several EU countries – is more cost-efficient and impactful than national solo efforts done in isolation. Money saved through EU cooperation can compensate for expected cuts in defence spending, at least in the long run. Beyond the financial benefits, cooperation also pays off thanks to increased operational effectiveness and interoperability, for the benefit of EU, NATO or other multinational operations. Joining forces will allow those Member States under budgetary strain to do more, for their own defence and that of Europe.

Tools ready and fit for purpose

The other good news is that we don't have to start from scratch. All instruments and processes needed to enable and manage EU defence cooperation are already in place and ready to be used: updated European Capability Development Priorities, the Coordinated Annual Review on Defence (CARD), the Permanent Structured Cooperation (PESCO) and the

European Defence Fund (EDF). If Member States don't use the toolbox' full potential now, then when will they?

The same applies to EDA, the EU hub for collaborative research and capability development which currently hosts more than 110 research and capability programmes as well as some 200 other activities. Here too, Member States still have some leeway available if they want to use EDA's expertise and potential to the full extent.

Stronger emphasis on CBRN

The Covid-19 pandemic has also brought to light, indirectly of course, the enormous disruptive potential of biological substances. Although Chemical, Biological, Radiological and Nuclear (CBRN) threats have been on our radar for some time – the European Capability Development Priorities reviewed in 2018 under EDA guidance explicitly refer to the need to strengthen European capabilities in the CBRN domain – this crisis has nevertheless highlighted the urgent need to do more in order to be better prepared and equipped to deal with these kind of threats in the future. This is another important lesson to be learned from this dramatic experience. Given the magnitude of the challenge, it can only be mastered

together, i.e. through cooperation. Another example of why EU defence cooperation matters now more than ever. The same is true for other military assets which proved extremely helpful for our Member States during the most acute phase of the pandemic, such as medical and logistics support or cybersecurity. They, too, must stay high on our priority list for future cooperation.

A fresh look at strategic autonomy

Finally, and this is a third lesson, Covid-19 has shown the importance of maintaining strategic local production capacities able to provide critical material of high quality and in sufficient quantities when crises hit – in this case relatively basic commodities such as masks or other protection utilities. This has served as a reminder to all of us, including the defence sector, that European strategic autonomy cannot only refer to high-tech, high-end capabilities but also to basic but indispensable industrial expertise and production capacities. Maintaining critical industrial production capacities in Europe is thus a crucial prerequisite for building a Europe of defence and moving towards strategic autonomy. Here too, cooperation is the way forward as Europe's key strategic activities can only be sustained together. ❏

"Future defence budgets should be approached carefully"

Member States should bear in mind the important role the defence sector played in dealing with the Covid-19 pandemic when tackling the consequences of the crisis, says **Tomislav Ivić**, the Croatian State Secretary for Defence whose country holds the rotating EU Presidency in the first half of 2020, in the following interview.

How will the crisis impact defence spending, planning and capability development in Member States?

Covid-19 is an unprecedented global crisis that has affected every aspect of our society. Much has been already said about the short and long-term consequences of the pandemic on our everyday life and the economy, but we must not forget the security and defence dimension. The Armed Forces have provided various support from the very outbreak of the pandemic, from the provision of field hospitals, medical staff and expertise to the transport of patients, logistics and more. This support was of crucial importance in providing fast, professional and reliable support to civilian structures, both at national and multinational level. Among other means of support, as part of the Homeland Security System, the Croatian Armed Forces provided and set up the expeditionary camp and a communications tunnel adjacent to the Dubrava Clinical Hospital in Zagreb with the capacity to treat 220 critically ill patients. The role and capacities of the defence sector should therefore remain in our focus when designing future actions to tackle the consequences of the pandemic. Of course, when it comes to prioritisation, there are areas such as health and jobs that ask for a more urgent response. However, our decisions on future defence budgets should be carefully approached in order to avoid long-term negative consequences for

the defence sector. Moreover, we should use this situation to further identify and prioritise capabilities that could be improved and developed to address these and possible similar future challenges.

What effect could it have on EU defence cooperation?

Since 2016, we made huge steps forward in EU defence, including launching initiatives such as PESCO, EDF and military mobility. The current crisis should not lower our ambitions. Rather, we should see it as an opportunity to further explore our cooperation opportunities and thus take EU defence cooperation to a new level.

As I said, the use of military assets in countering the pandemic covers a wide range of actions at national and multinational level. The cooperation was crucial in order to establish safe transport corridors, organise repatriation flights and bring our civilian and military staff safely home. In case of Croatia, one example among many is the strategic lift we organised for our military personnel returning from Afghanistan, when we also provided transport for partner countries of Albania, North Macedonia and Montenegro. Also, the Croatian Government organised the transport for Croatian and German medical teams and medical equipment to NATO's enhanced Forward Presence (eFP) mission in Lithuania. There are numerous other cases of

similar cooperation which show coordinated efforts are a key element in prevailing this crisis. Unfortunately, like other areas, the defence sector will also feel the negative impact of the pandemic. To what extent remains yet to be seen. However, in our best interest we should try to ensure adequate resources and find novel approaches to maintain the momentum in EU defence cooperation.

What in your view are the most urgent steps to be taken to really unlock the potential of EU defence cooperation?

I strongly believe there is no other way than to continue developing and improving our defence cooperation. This is the only meaningful way to improve our defence capabilities. The threats we are facing are common to all of us and they know no borders. The Covid-19 pandemic is clear evidence on how quickly a crisis can escalate and change every segment of our life, and the defence sector is no exception to that. We can only win this fight if we cooperate and coordinate our efforts timely and in solidarity. This crisis is affecting us all; by using our defence capabilities jointly, we can complement our national efforts and use our resources smartly and in the best interest of our citizens.

One of the major priorities of the Croatian EU Presidency in the area of defence is to



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promote defence industry with a focus on cross border and small and medium-sized enterprises' cooperation. Together with EDA, we were planning to organise a high-level conference "Unlocking the Potential of European Defence Cooperation: New opportunities for an Enhanced European Defence Industry". The conference was originally to take place in March in Zagreb but due to the Covid-19 pandemic we had to postpone it, most probably until 2021. Its main objective is to discuss the potential of European defence cooperation through existing and future mechanisms as well as to encourage the involvement of SMEs in developing new and innovative defence technologies and capabilities. It will be also an opportunity to exchange views on best practices in developing and implementing collaborative projects, especially in the context of the EDF.

What is Croatia's assessment of the implementation of the new EU defence tools (CARD, PESCO, EDF) so far?

One of the key priorities of the EU, as outlined in the 2016 Global Strategy, is to protect its citizens. In order to be able to fulfil this priority and to respond to new emerging security threats, several EU defence initiatives were launched. It is evident that none of the Member States can face challenges such as illegal migration, hybrid and cyber threats, terrorist threats and climate change alone. Tools such as PESCO, CARD, EDF and military mobility are the right answer to enhance EU defence cooperation and respond to existing or emerging crises, including the Covid-19 pandemic. We have managed to create a unique defence cooperation platform: from defence planning through CARD and the Capability Development Plan, strengthening defence cooperation and efforts with PESCO

to enhancing and developing necessary defence capabilities through PESCO projects and EDF. In order to complete this cycle our efforts should now focus on implementation and concrete results, quality over quantity and on cooperation in order to avoid duplications, especially with NATO.

Any major adjustments needed, in your view?

There is always room for improvement. The ongoing PESCO Strategic Review is a good opportunity to assess the progress made so far and to identify areas where we could do more and do better, including the implementation of PESCO projects. We see that some projects are performing better than others. Now is a good time to assess our methodology for launching and managing the projects with the aim to improve them in future.

The experience from the first EDIDP call will also be relevant for future EDF calls, especially in terms of involving SMEs and encouraging cross border cooperation. One of the most important things in order to deliver desired results is to ensure coherence of our initiatives and tools. One of the first steps is to integrate the EU defence tools into national defence planning, a topic that Member States discussed in February at the workshop that the Croatian Presidency organised with EDA. Another step is of course cooperation at EU level, where tools such as CARD, CDP and PESCO can help Member States identify joint areas for cooperation to develop required capabilities and technologies. In addition, we must not forget the importance of cooperation with strategic partners, especially NATO which is →



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the main framework for common defence. It is clear that any further development of EU defence capabilities contributes to both organisations.

What is your long-term vision on European defence cooperation? Does Croatia support a genuine European Defence Union?

If we hadn't had a long-term vision of the EU defence cooperation, we wouldn't have launched the current EU initiatives and tools in the first place. If we take a look at PESCO, EDF or military mobility, their guiding principles are cooperation and sharing the same values and interests. This is exactly the idea of a Defence Union, and in this regard, we are already working like that. Open and constructive dialogue, solidarity and support – these are the elements that we should continue to strive for and which we have been promoting as the EU Presidency. However, and especially in the context of the ongoing crisis, we must not forget the long-term funding. Without adequate resources it will be difficult, if not impossible, to achieve our objectives. We also shouldn't duplicate capacities that already exist within NATO.

What about EU-NATO cooperation. Are you satisfied with the way the Joint Declaration has been implemented so far?

There is always room for improvement

and in this sense, we should continue to strive for even better and more tangible results. But in general, EU-NATO cooperation has made huge progress since the Joint Declaration. This is especially evident in areas such as military mobility, strategic communication and countering hybrid and cyber threats. Here we work both on political and technical levels where experts from both organisations share experiences and best practices. There are also successful examples of operational cooperation, such as in operation Althea under the Berlin Plus arrangement, and between EUNAVFOR MED and NATO's Sea Guardian operations. In the area of military mobility, we are also closely cooperating to ensure transport infrastructure and procedures that enable us to act swiftly and smoothly. There are areas where we could do more, such as exercises and exchange of information and I am sure that with the current momentum we can improve them as well.

In general, it is important that we implement the agreed 74 activities, that we communicate on every level, and that we conduct defence projects that will not lead to duplication but to interoperable capabilities and coherence. This is especially important since NATO is and will remain a cornerstone of the European collective defence. We also need to keep our shared focus on helping

our neighbouring partners strengthen their capabilities and resilience, which is especially true for South East Europe as the EU's immediate neighbourhood.

Croatia is among the smaller EU countries but has a dynamic and growing defence industry, mainly SMEs. How to make sure all Member States - small and big ones - have their role in building the Europe of Defence?

Yes, indeed, we need to give more attention to our SMEs. Let me give you a few successful examples from Croatia. HS Produkt Company has been very successful globally with its polymer-based pistol for the last 20 years. Demining company DOK-ING has become a trendsetter in mine clearance systems. It is represented on almost all continents. Croatian soldiers can provide a first-hand testimony about the quality of and the demand for military helmets by Šestan-Busch Company which are worn by soldiers and members of security forces worldwide.

Navy shipbuilding in Croatia is a centuries old tradition. Its current flagship project is the new 'Omiš' Class Coastal Patrol Vessel which stands as an example for Croatia's new navy capacities powered by the country's defence industry. The vessel was designed by Brodarski institut Company with design upgrades and production by Brodosplit Shipyard.

We also believe that the IT industry will become more actively involved in the defence component of the economy in the near future. Croatian SMEs are a good example of how to integrate high-value and technologically advanced solutions into defence sector. At EU level we have established an excellent platform for using the potential of SMEs. Our next step should be to further encourage cross border cooperation and exchange of knowledge and expertise. To improve SMEs' access to Europe's defence market and supply chains, we should look into the possibility of making the current procurement regulations for dual use products more flexible. ❏



"EDF can help alleviate impact for defence industry"

What can the European Commission and its new Directorate General for Defence Industry and Space (DEFIS) do to help Europe's defence industry come through the Covid-19 crisis and its repercussions? We asked **Timo Pesonen** DG DEFIS' Director General, in the following exclusive interview.

Even though the Covid-19 crisis is not over yet, projections of its likely economic impact surpass those of the 2008 financial crisis. The defence industry will certainly feel it as well. How does DG DEFIS plan to support the sector?

The Covid-19 crisis will have unprecedented consequences on jobs, skills and supply chains. We should strive to help the industries overcome its impact in the short-term. We should also ensure their global competitiveness while third countries are massively supporting their industries. The Covid-19 crisis has shown the importance of reducing dependencies on non-EU sources in strategic areas. This definitively

applies to defence. We should develop critical technologies in Europe, optimising our industrial competencies and skills, thus safeguarding our crucial industrial and technological sovereignty.

The Commission, with DG DEFIS in lead for the defence sector, is doing everything in its competence to support the defence industry in the aftermath of the Covid-19 crisis – including short term support. In June, the Commission hopes to be in a position to unlock more than €200 million to fund the first batch of projects under the two-year European Defence Industrial Development Programme (EDIDP).

Pre-financing margins will be used to the full. DG DEFIS is delivering according to plan in spite of the crisis.

President von der Leyen presented a historical package on 27 May. The reinforced proposal for the next multi-annual financial framework, including a massive recovery instrument called Next Generation EU worth €750 billion, offers many tools to alleviate the consequences of the Covid-19 crisis. A new Strategic Investment Facility, built into InvestEU, has a €15 billion budget to generate investments of up to €150 billion to boost the resilience of strategic sectors. We should encourage the EU defence →



industry – that generates many positive externalities and civilian applications – to profit fully from the possibilities that will be offered by the revamped EU budget.

For the future resilience and viability of the defence industry, it is vital that European countries keep investing in the development of future defence capabilities. We should learn lessons from the consequences of the 2008 crisis. Uncoordinated efforts had led to major cuts in R&D that impacted the global competitiveness of the European industry; to renationalisation of defence investment that generated duplications and redundancies; and to a massive sub-investment in defence. The European Defence Fund (EDF) with an updated budget amount of €9 billion (current value) is a major tool to maintain public and private investment in R&D, foster industrial cooperation and solidify long-term planning in the development of technologies and equipment. We should use it to its full potential.

The EDF can also help alleviate the consequences of the Covid-19 crisis for the defence industry. It is spread over seven years (2021-2027) but the priorities and budgetary envelopes will be set annually, so that proposals can also be submitted for topical issues allowing flexibility and agility. This allows the Fund to cover topics like bio-defence capabilities or other categories linked to medical support and critical components, creating a great potential for a European-wide SME participation. Due to the high-tech nature of the defence industry, positive spillover effects on the civil sector (e.g. creation of highly skilled jobs, territorial development) are expected.

In preparing the funding priorities of the EDF for 2021, we will also propose focussing on support of the development of defence medical capacities of Member States, as the defence industry was largely mobilised in response to the crisis, mass-producing masks, ventilators and respirators.

Commission President Ursula von der Leyen has called the upcoming EU multiannual budget "the mothership of recovery" after Covid-19. Could this crisis also encompass opportunities for the defence industry?

Beyond its huge economic impact, the Covid-19 crisis has also highlighted the risks of being too dependent on third states for critical materials: global shocks have major disruption on international supply chains. We should therefore strengthen European security of supply.

In this regard, the idea that Europe needs more strategic autonomy in key sectors such as defence gains legitimacy. The new Strategic Investment Facility is also set-up with this idea in mind. The Commission's Industrial and SME strategies adopted recently urge to protect our defence supply chains and prevent losing technologies or companies critical for our security and defence. An important deliverable for DG DEFIS announced in the Industrial Strategy will be an Action Plan on synergies between space and defence eco-systems. Reinforcing our screening of foreign acquisitions will also be key. The Foreign Direct Investment Screening Regulation is a main tool to assist in such screening.

We have also seen that, in the context of humanitarian emergencies such as the current coronavirus crisis, having a good Trans-European network infrastructure can be critical for the Union's ability to respond to humanitarian emergencies. In the fight against the coronavirus, national defence ministries have been mobilised, notably by providing hospital facilities. It highlights the importance of the military mobility initiative: we are assessing where current infrastructure needs further upgrading, carried out in close collaboration with the EEAS, and funding such infrastructure to make it suitable for both dual civil-military purposes under the Connecting Europe Facility (CEF).

How do you see the defence industry developing in the coming years, and what

impact could the defence initiatives, especially the EDF, have on its future?

I expect that the European defence industry will strive towards more technological autonomy and become more resilient and agile. It has become increasingly clear that the European defence industry needs transformation: greater opening-up of the supply chains to create a better functioning defence internal market, greater cross-border involvement of SMEs, harvesting civil technologies (artificial intelligence, digital, space). We also need to protect our critical technologies and actors, and create new industrial dynamics, where there is a place for both big countries and small countries, and for big companies and small companies.

True to its original purpose, the EDF will further help Member States achieve more efficient spending in joint defence capabilities, strengthen security for European citizens and foster a competitive and innovative industrial base. It supports cooperative defence research and development projects and includes a



"I expect that the European defence industry will strive towards more technological autonomy and become more resilient and agile"

There are huge challenges ahead of us. My priority in the coming months, is to work hard to try and safeguard a robust budget for our defence programme, on the basis of the updated proposal tabled by the Commission, to make it attractive and achieve real added value. Obviously, EU Leaders will have to make arbitrage.

Equally important will be to implement the current running test programmes of the EDF, the EDIDP and the PADR, so that the projects funded by these programmes can kick-off and provide employment and business for the companies participating in these projects.

But 2021, when the EDF starts, is just around the corner. Another important task for DG DEFIS in the coming months will be to prepare the funding priorities for the year 2021.

In doing so, DEFIS ties up very closely with Member States since they are the end-users of capabilities. In this context, my priority is also to continue and future enhance the cooperation with the European Defence Agency (EDA) – that has a strong expertise. EDA is a natural partner for DG DEFIS. It is my firm believe that DG DEFIS and EDA should work hand in hand to carry out our respective missions. Let's not forget that defence is an investment in peace and stability in Europe. **■**

range of mechanisms to stimulate the opening up of cross-border supply chains. At the core of our interest is opening the cross-border supply chain to new entrants. SMEs' participation will be a key indication of success.

I am convinced that the EDF will help Member States to advance in developing those defence technologies and products that European countries need and where cooperative development can bring real added value. Its aim is to make a radical shift from the present situation where cooperative programmes between EU Member States hardly represent 20% for procurements and only 10% for research and technology development.

The EDF will be one of the pillars of the European Defence Union called upon by President von der Leyen. The results of R&D projects supported by the Fund should increase the ability of the Union to conduct operations and missions and better contribute to wider international efforts. And this European Defence Union will go hand

in hand with a strong EU-NATO Alliance, allowing much more substantial and quicker progress on a number of important priorities, such as military mobility, countering hybrid threats, cyber-security or medical capability building to support preparations for future military medical challenges.

What priorities have you set for DG DEFIS in the coming months and years?

DG DEFIS was created in January 2020. Under the authority of Commissioner Breton, our mission is to support the competitiveness and innovation potential of EU industry in the field of space, defence and aeronautics. To achieve this, we are in charge of implementing the EU space and defence programmes, fostering European value chains and facilitating cross-border cooperation

In the field of defence, DG DEFIS is responsible for supporting the competitiveness of the defence industry and stimulating the defence internal market, making use of both EU budget and enforcement of defence procurement rules.

Covid-19 should mean more European defence cooperation

The pandemic known as 'Covid-19' has rocked Europe to its core, leaving in its wake personal tragedy and economic crisis. Yet, the virus has also seen Europe's Armed Forces rise to the challenge in an exceptional way and it has proven the wider societal benefit of investing in Armed Forces and defence capabilities. The prognosis for defence budgets in Europe may not look so good, but this is a rare opportunity to maximise European defence cooperation, says **Dr. Daniel Fiott**, Security and Defence Editor at the EU Institute for Security Studies (EUISS), in the following analysis for *European Defence Matters*.

As the old saying goes, "never waste a good crisis". Of course, with the tragedy that Covid-19 has left in its wake there is nothing really 'good' about the global pandemic. We have witnessed incredible hardship in Europe's hospitals and the EU has scrambled to provide Member States with the resources and leeway required to manage the crisis, at least in the short term.

As Europe moves towards an 'exit strategy' from the pandemic, longer-term economic solutions will be required. Most academics and commentators paint a gloomy picture of geopolitical struggle between the United States and China, the end of globalisation as we know it, new or aggravated conflicts in the near and wider neighbourhood and more. The reality is, however, that even if many had warned that a global pandemic would emerge at some point there is no accurate way of telling how events will unfold from here on in.

The indispensable role of defence forces

What we do know, however, is that public services are being rightfully thanked for their role in dealing with the virus. Europe's medical professionals, police, security services and Armed Forces should rightfully be applauded for their tireless efforts,

especially as many have themselves contracted the virus. We should also not forget the citizens ensuring the provision of basic services. In particular, Europe's Armed Forces have dramatically helped the situation. In Italy, the Air Force has airlifted patients to hospitals and medical centres. 'Operation Balmis' in Spain has seen the army perform health checks on homeless people and provide mobile hospitals. In France, the army continues to deliver hand sanitisers and face masks to hospitals under 'Operation Resilience'. In Germany, the Bundeswehr are delivering food and medical supplies as well as making military hospitals available. In Ireland, the defence forces are helping civil authorities with their response. The full list of examples is too long to recite here.

Budgetary pain on the horizon?

Despite these heroic efforts, however, one of the medium to longer-term consequences of the pandemic is the strain that will be placed on defence budgets in Europe. The reality is that economic shocks are not good for defence spending, even if initial contractions in national budgets could lead to an artificial and short-lived inflation of defence spending as a share of GDP. After the 2008 financial crash, for example, close to €24 billion was

wiped off of European defence budgets in the space of six years – only Russia's invasion of Ukraine halted the downward trend. Such a decrease in spending resulted from a -4.5% fall in overall GDP growth for the euro area in the space of a single year from 2008 to 2009. Today, various analysts estimate that Europe may suffer between a 7% to 12% loss in GDP growth in 2020, which means that a multi-billion euro loss in defence spending could be on the cards.

Safeguarding Europe's defence industry

The consequences of such a drop in spending should not be underestimated. While governments will likely continue to invest money in pre-existing capability programmes, resources for new projects may be crowded out. This could adversely affect the modernisation of Europe's Armed Forces. Furthermore, lower defence budgets in the EU could negatively hit R&T and R&D projects at a time when Europe needs to protect its scientific, industrial and technological base. Planned European investments in critical defence capability programmes in the aerospace and land domain could be stopped in their tracks. There is no clarity about how the global pandemic could affect defence supply chains either. What is more, any 'post-corona' economic recovery



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European Armed Forces have responded to the call from civil authorities to assist in the fight against COVID-19

package in the United States – without an adequate European response – could make it harder for Europe's firms to compete in the global defence market, and European defence firms may be vulnerable to take-over bids from third parties.

Immunising European defence

Yet, need the outlook be so pessimistic? One of the positive aspects for defence is that the EU has already put in place a range of mechanisms that are designed to boost European defence cooperation. In fact, even before the pandemic it was recognised that only greater cooperation could overcome duplication and fragmentation, enhance strategic autonomy and deal with mounting geopolitical challenges. If the predictions about falling defence budgets come true, then there is at least no need to reinvent the wheel when it comes to cooperative frameworks. Permanent Structured Cooperation (PESCO), the Coordinated Annual Review on Defence (CARD) and the European Defence Fund (EDF) already allow EU Member States to offset budgetary pressures and unnecessary costs. There is then even more reason to engage with the EU's defence 'toolbox' today.

These initiatives are already delivering too. So far, we have seen 47 projects launched under PESCO and, while they could be affected by budgetary cuts in the face of Covid-19, the projects allow the EU to fill critical defence capability gaps. There will be a life after the

pandemic, and European governments will still require the full spectrum of capabilities. CARD has also begun a process that can allow for greater synchronisation of defence budgets, and the review could become a vital tool in avoiding uncoordinated budget cuts and scoping out the potential for future collaborative defence projects.

Although we have to see what financial envelope is ultimately allocated to the EDF after the multi-annual financial framework negotiations, through its preparatory programmes the Fund has already invested €23 million into cutting-edge defence research projects – as well as €160 million for defence capabilities in 2020. These investments are European by design because they support defence firms and research institutes of all sizes across the Union. For example, the Preparatory Action on Defence Research (PADR) has already invested €23 million into seven projects that involve 65 firms and institutes from 15 Member States. Furthermore, it is important to keep in mind that both PESCO and the EDF's preparatory programmes are already supporting projects related to countering chemical, biological, nuclear and radiological threats and cybersecurity, which are crucial capacities to have during public health crises.

Cooperation, the only vaccine

All of the tools to weather the coming budgetary storm are in place at the EU

level. Now is the time for EU Member States to use them to their full potential. After the 2008 financial crash, the European Defence Agency reported that European collaborative equipment procurement actually increased by about €2 billion in the space of two years and collaborative defence R&T shot up by about €86 million in the space of a year. Single national responses may seem attractive in the short run, but this collaborative impulse is precisely the behaviour that is required to manage the defence-related consequences of Covid-19. Europe has all the tools necessary to immunise defence from the economic consequences of the pandemic. It need now only swallow the necessary medicine. **K**



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"Recovery should not come at the expense of defence"

Public spending cuts expected throughout Europe to finance post-pandemic recovery programmes should spare the defence sector which has already suffered from reduced funding in the past despite growing security threats and persisting capability gaps, says **Jan Pie**, the Secretary General of the AeroSpace and Defence Industries Association of Europe (ASD) in the following opinion editorial.

The Covid-19 pandemic represents an unprecedented crisis and has led to a sharp downturn of the world economy. Serving exclusively public customers and operating with long programme cycles, the defence sector has not yet faced the same market meltdown as many other industries. However, defence companies do not operate in isolation. Most of them have also civil activities or belong to wider industrial holdings that operate in commercial markets. Links are particularly strong between defence and civil aeronautics, which is facing a worldwide dramatic drop in demand of commercial aircraft. The crisis in commercial markets therefore also affects the defence business in many ways.

Slowdown

At the same time, Covid-19 has also hit defence companies directly: Like all manufacturing industries, they have been impacted by supply chain disruptions,

restrictions of the general lockdown, additional health & safety measures and infections of staff. All this has led to production and delivery difficulties, which created severe cash flow problems in particular for lower-tier companies and SMEs. The short-term challenge for companies is, therefore, mainly to protect the continuity of ongoing projects. Avoiding, or at least limiting, the slowdown of these projects is important for both mitigating companies' financial problems and backing up Member States' defence capabilities.

Despite these difficulties, many defence companies have actively contributed to the fight against the virus. Not only have they continued supply and support of equipment that Armed Forces used to assist public authorities (e.g. helicopters, secure communication, UAVs,...), they have also used their facilities for manufacturing protective material and intensive care equipment.

Three reasons to avoid defence cuts

However, the full impact of Covid-19 on defence markets may well come with delay. Mitigating the economic and social consequences of the pandemic will put public budgets under extreme pressure. The political risk is high that this comes along with defence budgets cuts. We see at least three reasons why this should be avoided:

First, there are no indications that the security environment in and around Europe will improve after the Covid-19 crisis, on the contrary. At the same time, our Armed Forces face severe and urgent capability gaps that will not go away with the Covid-19 crisis. Hence, it would be unwise to reduce the already limited defence spending in Europe again. This is true for Member States, but also for the European Union. The proposed European Defence Fund (EDF) is a crucial catalyst for defence cooperation, which will become even more important in a post-corona financial environment.





© Geoffrey Lee

Eurofighter final assembly at Manching, Germany

Secondly, the Covid-19 pandemic has shown the vulnerability of global supply chains and the risks from over-reliance on third-country suppliers in times of crisis. In strategic sectors like defence, the political lesson from Covid-19 must therefore be to reduce Europe's dependency on non-European sources for the most critical systems, products and technologies. Investing in the development of much needed defence capabilities would not only help Europe to protect its interests, it would also increase technological sovereignty and decrease unwanted non-EU dependencies.

Thirdly, the EU and its Member States have already announced their intention to invest massively to help the economy recover from the Covid-19 shock. Investments in the development and procurement of modern defence capabilities would sustain industrial activities in hi-tech sectors and, thereby, contribute towards boosting the economy in general.

Increased investment needed

Any post-crisis recovery plan should, therefore, not come at the expense of the defence sector. On the contrary, European governments should increase the investment part of their defence budgets to strengthen the European defence industrial base. This would stabilise the hi-tech ecosystem of which defence industries are an integral part and reduce Europe's strategic dependence in future crises.

Although decisions on defence capabilities and budgets are the sole responsibility of Member States, the European Union can make an important contribution towards supporting the European defence industry. In the short- to mid-term, we consider three points as particularly important:

- Ensure implementation of the Preparatory Action on Defence Research (PADR) and European Defence Industrial Development Programme (EDIDP). It is crucial for

industry that all ongoing EU funding programmes continue during this crisis. At the same time, implementation of these programmes should be adapted to current realities, which make cross-border cooperation extremely challenging.

- Get the EDF ready for 2021 and maintain the budget at the level initially proposed by the European Commission (€13bn). Under the next MFF, the EDF will be the centrepiece of the European Union's support for Europe's defence industrial base. It should therefore receive the appropriate priority in terms of timing and budget.
- Strengthen PESCO and CARD as key drivers for European defence cooperation. Both instruments have great potential which must be fully exploited. To make a difference, it will be crucial to make PESCO, CARD and the EDF work together effectively. The work programme of the EDF will be an opportunity to put this in practice and should not be missed. 

Sharing know-how, building interoperability

The Agency's expanding training & exercise portfolio - now stretching from helicopter, fixed-wing airlift and RPAS operations to countering improvised explosive devices, cyber defence and energy management - pursues one overarching goal none of its Member States can achieve cost-effectively on its own: to enhance Armed Forces' interoperability for joint operations, be it under the EU's Common Security and Defence Policy, NATO or any other format.

Yet, at the same time, EDA's ambition is not to become a permanent training provider. Once specific training gaps at European level are identified and assessed, the Agency helps to jump start and mature a collaborative activity up to the point it can be handed over to a group of Member States. A unique and successful model of European defence cooperation!

In the following pages, we put the spotlight on some of EDA's most prominent training and exercise activities.



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Rotating in unison

Helicopters are core assets in most if not all military or crisis management operations. Deploying rotary-wing aircraft in high numbers does not always do the trick, though. At least of equal importance are the crews' level of training and interoperability, core requirements past CSDP missions sometimes fell short of. In 2009, Member States agreed to work towards the Pooling & Sharing of helicopter training and operational best practices at EU level.

It was the birth of the European Defence Agency's (EDA) biggest training activity to date, encompassing three separate workstrands: the Helicopter Exercise Programme (HEP) including, as subprojects, the Composite Air Operations (COMAO) planning course and the Electronic Warfare (EW) course; the Helicopter Tactics Instructor Course (HTIC) and the Helicopter Tactics Course (HTC).

A decade later, the result is impressive: some 300 helicopters, 3,000 aircrew and over 12,000 military staff participated in training and exercises held under the Agency's auspices in France, Spain, Italy, Portugal, Finland, Belgium, Hungary and the Czech Republic. 834 aircrew members from 17 countries have graduated from the 66 EDA Helicopter Tactics Courses performed. In addition, 100 helicopter crew members from six different countries have graduated from the Helicopter Tactics Instructors Course.

Helicopter Exercise Programme (HEP)

With 14 Member States participating (Austria, Belgium, the Czech Republic, Germany, Greece, Finland, Hungary, Italy, Luxembourg, The Netherlands, Portugal, Sweden, Slovenia and Norway), the HEP improves the operating skills of helicopter crews across Europe which, in turn, helps

to increase the EU's deployable helicopter capability for contingency operations.

It is built on three main pillars: use of common Tactics, Techniques and Procedures (HEP Standard Operating Procedures or HEP SOP) for the performance of all our training, the annual helicopter tactics symposium and the delivery of yearly multinational helicopter exercises.

The latter are the most visible part of the HEP: its annual 'BLADE' exercises are not only impressive by the numbers of participating helicopters and crews from across the continent but also by the added value they provide to Member States.

13 exercises have taken place so far (the total would stand at 14 had SWIFT BLADE 2020, initially planned to be hosted by the Netherlands and Belgium in April of this year and expected to become the largest and most complex Blade ever performed, had not cancelled its Live Exercise phase (LIVEX) due to Covid-19 crisis):

- **GAP 09** in France, the first exercise attended by five countries (Belgium, the Czech Republic, Spain, France and Hungary) focused on training in a hot and high environment
- **AZOR 10** in Spain provided hot, high and dust training to a high number of crews

many of which were later deployed to Afghanistan/ISAF

- **ITALIAN CALL 11** in Italy trained multinational crews and staff to operate in a hot, dry and dusty environment adopting common procedures. The focus was laid on crisis response operations with the ISAF theatre used as exercise scenario
- **HOT BLADE 12** in Portugal introduced COMAO training and included over-watch missions to replicate operational practices
- **GREEN BLADE 12** in Belgium included special operations for the first time and was an integrated ground and air exercise
- **HOT BLADE 13** in Portugal further developed COMAO planning, execution and evaluation in a hot, high and dusty environment. HEP SOP were introduced for the first time as a common rule. A mentor team consisting of HTIC graduates was used to provide expertise
- **HOT BLADE 14** in Portugal focused on joint interoperability training with a setup similar to previous editions. Mentor team tasks and responsibilities were expanded
- **ITALIAN BLADE 15** in Italy continued to develop joint interoperability training through the integration of multinational elements, both in air and on the ground, in a hot and dusty environment





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- **COLD BLADE 16** in Finland focused on flying in demanding cold and snowy conditions
- **BLACK BLADE 16** in Belgium focused on joint interoperability training with special operation forces
- **FIRE BLADE 17** in Hungary focused on live firing. European helicopter units executed national training combined with challenging COMAO scenarios in Hungarian training and shooting ranges
- **HOT BLADE 18** in Portugal continued to focus on COMAO training in a hot and dusty environment and also included evasive training and electronic warfare threats
- **DARK BLADE 19** in the Czech Republic continued to enhance multinational interoperability on COMAO with the performance of complex mission involving multiple threats in air and on the ground, with the use of HEP SOP and support by EDA mentor team.

Helicopter Tactics Course (HTC)

The course, which currently involves seven countries (Austria, the Czech Republic, Germany, Finland, Norway, Portugal and Sweden), delivers operational helicopter tactics training for crews preparing for deployment. It focuses on the crews' understanding of a constantly changing operational environment, providing them

with modern cognitive training necessary to cope with those challenges. The course consists of both theoretical lessons and realistic missions conducted in a synthetic environment, using a dedicated advanced helicopter mission simulator. To date, 834 crewmembers from 17 different countries have gone through this training.

Helicopter Tactics Instructor Course (HTIC)

Given the high demand in HEP and HTC trainings, the need arose to create additional capacities by 'training new trainers' in the Member States. Hence the launch of the Helicopter Tactics Instructors Course providing national aircrews with the skills and knowledge to deliver tactics and training within their own organisations and to assist in the delivery of the HEP, HTC and HTIC. Successful graduates are awarded a qualification mutually recognised by Member States. The best of them can be part of the EDA Chief Instructor Team which delivers some of the Agency's helicopter training, provides expertise, leads the mentor team during the exercises and updates the HEP SOP. To date, six HTIC courses have been delivered with, as a result, some 100 qualified instructors operating in their respective countries. 2020 HTIC, which was expected to be performed this year also had to be cancelled due to the Covid-19 crisis effects.

COMAO Planning Course

They usually run for two weeks and cover both theoretical and practical Composite Air Operations planning with a focus on rotary operations. The trainees are mentored and instructed by Helicopter Tactics Instructors and other selected specialists. The course is also joined by aircrew and specialists from numerous other platform types including fast-jets, AWACs, Attack Helicopters and Intelligence Surveillance and Reconnaissance (ISR). So far, four such courses have been delivered; they will be held in the future twice a year.

Electronic Warfare (EW) Course

The two-week course aims to provide selected personnel with an understanding of the basic theory of on ground and airborne EW systems and threats. The syllabus includes basic EW theory and doctrine, Radio Frequency (RF) and Infra-Red (IR) threats, warning systems and countermeasures. It also covers general principles of employment of aircraft equipment and Defensive Aids Systems (DAS) and addresses interoperability issues. Whilst the focus is on rotary issues, a range of other platforms, both land and air based, are studied throughout the course. To date, three EW courses have taken place; they will be held in the future twice a year. ◀



Fully-grown EDA helicopter training spreads its wings

Setting course for

Having to let go of something close, doesn't need to have a sense of loss. When the European Defence Agency (EDA) sees its home-grown Helicopter Exercise Programme, its Helicopter Tactics Course and its Helicopter Tactics Instructors Course move to the new permanent Multinational Helicopter Training Centre (MHTC) in Portugal by the end of 2022, after many successful years at EDA, it does so with a feeling of 'mission accomplished'.

It is a basic principle underlying all training activities run by EDA: as soon as a programme reaches a sustainable level of support, maturity and output, the aim becomes to transfer it to a permanent facility hosted and managed by one of Member States involved. For the Agency's ambition is not to become a permanent training institute but to serve as a catalyst and facilitator for collaborative training activities which later on will be taken care

of by a Member State or an organisation – allowing the Agency to free resources and engage in other training projects.

The move in June 2017 of EDA's European Air Transport Fleet training programme to the new permanent European Tactical Airlift Centre (ETAC) in Zaragoza/Spain, after six years of busy activities at EDA – 87 aircrews trained, 50 tactical instructor pilots graduate, 94 European transport aircraft

involved – stands out as a shining example of this policy (*see following article*).

It will be followed soon by the Agency's three multinational rotary-wing training programmes: the Helicopter Exercise Programme (HEP), the Helicopter Tactics Course (HTC) and the Helicopter Tactics Instructors Course (HTIC). Launched in 2009 and supported by 15 countries (Austria, Belgium, the Czech Republic, Germany,



"The objective is to make this MHTC a permanent European centre of excellence for advanced helicopter training"

Sintra

Greece, Finland, Hungary, Italy, Luxembourg, the Netherlands, Portugal, Sweden, Slovenia, Norway as well as the United Kingdom – up till Brexit), this trio has since become one of EDA's most dynamic and successful training activities, highly appreciated in Europe's rotary wing community.

By the end of 2022, their new home will be Sintra/Portugal: that's what the Agency's Steering Board decided in August 2019 when it green-lit the setting-up of a new Multinational Helicopter Training Centre (MHTC).

A new permanent home

The objective is to make this MHTC a permanent European centre of excellence for advanced helicopter training. It will

deliver administrative and training functions to serve both as a central hub for the coordination of helicopter training across Europe, but also as the provider of the next iteration of the HEP, HTC and HTIC programmes currently run by the Agency.

The centre is expected to reach initial operational capability (IOC) by the end of 2022, although the Covid-19 crisis impact may alter this date, and it is estimated it will operate for a period of 15 years, which can be extended to 30 years following the agreement of its contributing Member States.

The next major milestone in the preparation is the harmonisation of the MHTC Technical Agreement, expected by the beginning of

2021, and the build-up of the infrastructures in Sintra which should be finished before the IOC MHTC.

Gradual hand-over starting this summer

The move to Sintra will be gradual, starting soon – this summer with the transfer of EDA's helicopter training centre from its traditional location, RAF airbase Linton-on-Ouse in the United Kingdom (in the process of being dismantled), to Sintra Air Force airbase which will already be operational, on a provisional basis, between mid-2020 and the end of 2022 when it will fully take over its new MHTC role. The full set of training equipment will be moved from Linton-on-Ouse to Sintra, except the helicopter simulator which is being replaced with a new one. ◀



"Sintra is being turned into the rotary wing hub of the Portuguese Air Force that is expected to be fully operational by 2023"

Multinational Helicopter Training Centre (MHTC) in Sintra

"An opportunity to strengthen European cooperation"

Portugal is actively preparing to host the MHTC which it considers a priority and "strategic investment", says the country's Minister of Defence, **João Gomes Cravinho**, in an exclusive interview with *European Defence Matters*.

How are preparations going for the transition of the current EDA helicopter programmes to Sintra in 2020 and for the creation of the MHTC in 2022?

Currently, and until 2023, EDA helicopter programmes will take place in Sintra as part of a transition process for MHTC while ensuring the continuity of all EDA helicopter training. Portugal has received the helicopter simulator formerly based in the UK and will provide support for academic and simulator courses in existing infrastructures, specially adapted for that purpose, while the MHTC project is under development. Since November, multiple site surveys have been made in Sintra to check the current infrastructures. The flight simulator hardware is already in Portugal, waiting for INZPIRE representatives to be able to travel to Portugal and start the required assembly as soon as possible. Of course, we and all the other countries involved in the Agency's helicopter training have also been affected by the Covid-19 pandemic which has required

partial and full lockdowns, including in Portugal. This resulted in the cancellation of two courses, planned for May and June 2020. Nevertheless, Portugal has been actively engaged with EDA and Member States to mitigate the impact of Covid-19 in the helicopter programmes. In close coordination with Member States a contingency plan has been agreed that should allow these courses to take place in the future.

What makes Sintra the perfect site for it?

Sintra is being turned into the rotary wing hub of the Portuguese Air Force that is expected to be fully operational by 2023. We hope this will provide relevant synergies, and this is in itself proof that we believe Sintra is indeed a great location for this type of infrastructure. There are large modular spaces adapted to the needs of a structure like this. The accommodation, the courses and the simulator area will, of course, be in accordance with EDA's requirements and will all be within easy walking distance of

catering and leisure spaces. Additionally, because there is more to life than work, the air base is very close to the historic town of Sintra, to Lisbon and to the beaches of Cascais, meaning there is no lack of opportunities for leisure or physical exercise in the vicinity.

How big an effort (infrastructure, staff, budget, etc.) is this for Portugal to become the host nation of this important training activity?

The Portuguese government is committed to a responsible management of the State budget, but we are also committed to strategic investments. We see the MHTC project as an opportunity to strengthen European cooperation in addressing a key operational capability that has often been found lacking and is vital to provide support to ongoing and future CSDP missions. Once Full Operational Capability is achieved, Portugal has committed, through the Portuguese Air Force, to support not only →



Sintra, Portugal – new home for the Helicopter Exercise Programme, the Helicopter Tactics Course and the Helicopter Tactics Instructors Course

the infrastructure exclusively dedicated to the MHTC academic and simulator courses, but also all student logistical support (lodging, meals). Regarding staff, the MHTC will have ten permanent positions, plus temporary personnel responsible for the academic and simulator courses. In principle, the Portuguese Air Force will be responsible for about 50% of these permanent posts, with full time dedicated personnel. We are currently assessing the best options for hosting our foreign partners involved in permanent posts in the MHTC. In conclusion, this is a significant effort, but we see it as a priority, as a strategic investment.

How will this influence Portugal's own involvement in EDA's helicopter programme where it currently participates in the Helicopter Exercise Programme (HEP) and the Helicopter Tactics Course (HTC). Any plan to join the Helicopter Tactics Instructors Course (HTIC)?

The involvement of the Portuguese Air Force in EDA's helicopter programmes (HEP and HTC) has been very successful in developing and consolidating rotary wing operational

capabilities. Portugal is currently not involved in the HTIC, but this is an interesting programme and will be considered in future discussions regarding available investment in this area.

Portugal is a very regular host of the BLADE multinational helicopter exercises, at least during the 2012-2022 period. Will you remain central and host of this exercise even beyond 2022?

We are working on it. As you know, we are the organiser of the BLADE exercise in 2021. And Portugal in fact holds the record as the host country for BLADE exercises. I believe this is the result of Portugal's ability to organise these exercises effectively, as well as the fact that it has, in relative terms, a very flexible airspace and ideal meteorological conditions. Portugal has made clear its availability for hosting the BLADE helicopter exercises in 2024, 2027 and 2030. Now it is up to EDA and the other Member States to decide, but Portugal is very committed to continuing to invest in cooperation with its European allies and partners in this vital operational capability. ◀

"We see the MHTC project as an opportunity to strengthen European cooperation in addressing a key operational capability"



Three questions to... Colonel Jose Luis Romero

Previous Commander of the European Tactical Airlift Centre (ETAC)

You played a central role in the transfer of EDA's fixed-wing airlift training activities to ETAC in Zaragoza. How would you describe the way this process was handled?

I think the process was handled properly. Properly means that it followed a clear road map with milestones. First, as a newcomer, I had to become gradually involved in the project. I therefore attended the two ETAC Steering Board meetings prior to the ETAC opening, as well as the last trainings run by EDA and the Agency's ad hoc working group on Operations & Training. Secondly, it was crucial to have the right training material and syllabi ready and tested well ahead of the opening of the centre. It took almost five years to develop and test the material, but before the ETAC was opened. This level of preparedness was certainly key for its success. Finally, a well-defined division of labour combined with a collaborative spirit and approach are paramount.

In addition to that, the European Air Transport Command (EATC) and EDA had developed a good and very flexible framework which, supported by the strong determination of some leading Member States, made the process very easy. We really benefited from low bureaucracy and a high level of willpower.

Are there lessons you learned – positive or negative – that could be used for future transfers, such as the setting up of the Multinational Helicopter Training Centre (MHTC) in Portugal by 2021?

I would make only one recommendation, linked to a point I already made in my previous answer: the real homework needs to be done before the opening. Because once it will be open, the MHTC won't have time anymore to think about itself and work on its own internal structure and functioning. Instead, it will have to serve its stakeholders, i.e. the nations, right from the start. Therefore, it will

be necessary to have a work programme and the curricula in place for at least two years when the centre is opened. Otherwise it will be difficult to manage.

I imagine the centre will be manned in a way that will allow it to deliver practical results rather than just to 'think'. My experience is that Member States expect such multinational training centres to be hands-on executors rather than think tanks.

Which are the biggest benefits for Member States' Armed Forces, and European Defence in general, of having a permanent training centre such as ETAC?

I see plenty of benefits. Cost-savings, for instance. To be able to use a joint air transport training facility offers a low-cost solution for Member States. For some of them, it is even the only way to obtain tactical training. Another advantage of joint training centres is that they have the means to create realistic training scenarios which most nations couldn't create on their own, at least not several times a year.

Moreover, the centres give the participating nations the possibility to learn from each other. Three weeks of joint training together allow the crews to exchange best practices and gain in experience. And more experience means more maturity. Then, the centre not only offers training in doctrine and procedures but also helps to put in place technical standards which would otherwise be lacking.

One last aspect which should not be underestimated is the fact that such permanent multinational training centres help to create and further improve mutual confidence between nations. And mutual confidence is the basis for joint action.



Countering improvised explosive devices
(C-IED)

JDEAL leads the way on common forensics

Despite the regular rhetoric in recent years about the need to Pool & Share capabilities among European militaries, there have not been a lot of lasting undertakings to support the idea. One of the more convincing and sustainable examples, however, is the European Defence Agency's (EDA) collaborative effort known as 'JDEAL', the Joint Deployable Exploitation and Analysis Laboratory.

Nestled in the quiet belt of pine trees surrounding the central Dutch town of Soesterberg, JDEAL's setting may be serene but the subject matter it deals with is not: improvised explosive devices (IEDs) and how to counter them.

JDEAL's infrastructure, equipment and, above all, the expertise of its staff are devoted to helping Europe's militaries detect, analyse, trace and train against these homemade weapons, which can

range from simple but deadly mixtures of readily available commercial ingredients to bombs that incorporate high-grade military components.

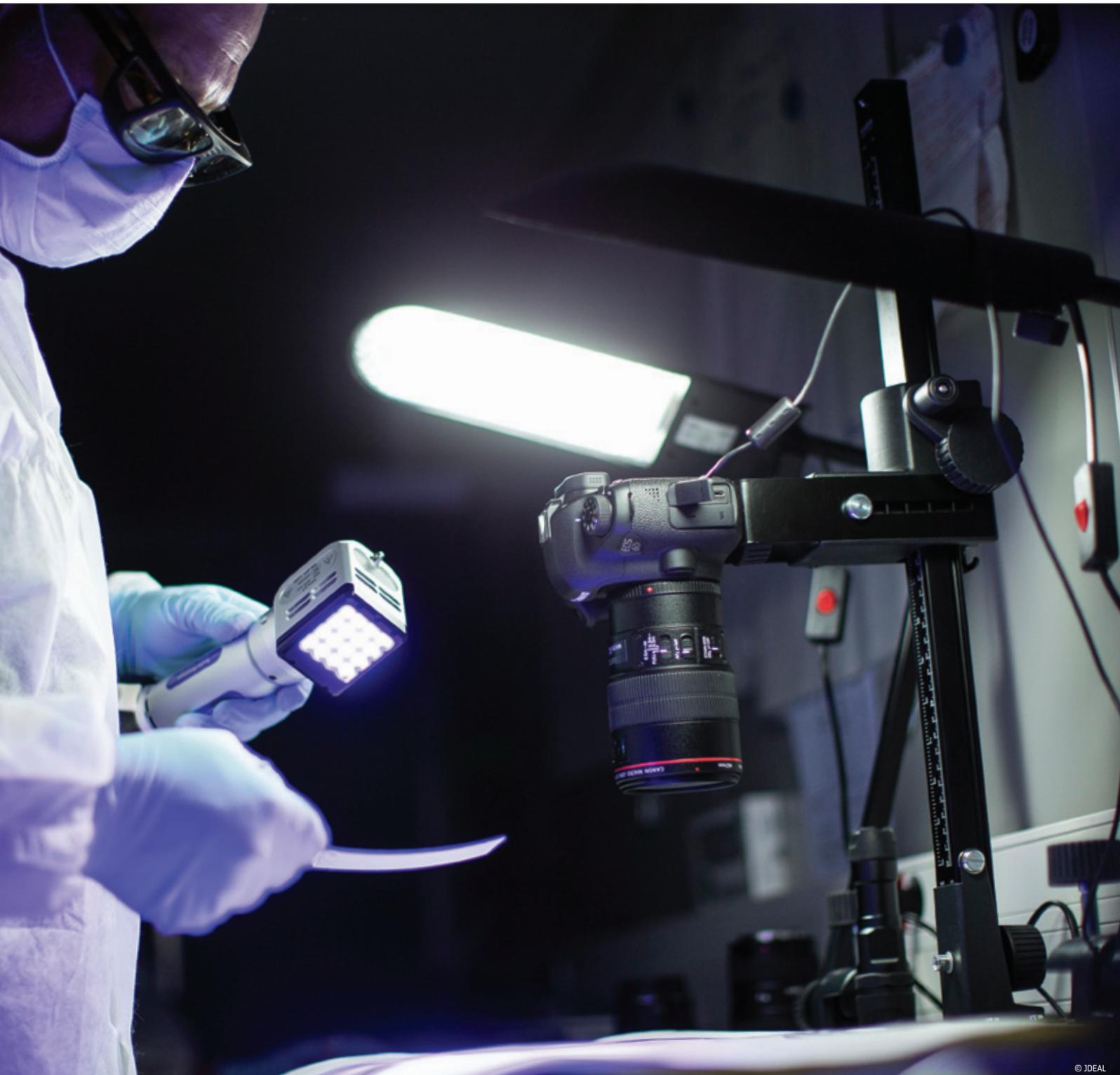
Teaching the art of C-IED

"To put it plainly, JDEAL is testament that the Pooling & Sharing formula works," said Paco Cifuentes, EDA's project officer for counter-IEDs. "Otherwise, it wouldn't have trained so many people from so different countries across all the tasks involved."



Currently supported by 13 countries (Austria, Belgium, France, Germany, Hungary Italy, Luxembourg, the Netherlands, Norway, Portugal, Romania, Spain and Sweden), the site has instructed more than 700 operators since 2015 in various levels of expertise, from basic C-IED operational training to highly specialised forensic techniques.

JDEAL was created from a previous EDA endeavour known as the Multi-national Theatre Exploitation Laboratory



© JDEAL

Demonstrator (MNTel), which was deployed in 2011 to provide C-IED support to NATO's ISAF mission in Afghanistan. After four years of in-theatre service, the lab was dismantled and transferred to the Netherlands, which took on the lead-nation task of ensuring that MNTel's accumulated experience and C-IED documentation was not lost, by carrying it over into a new iteration.

Growing demand

That became JDEAL, which got off the

ground as a three-year pilot project in 2014. Its activity was extended with a renewed 'Phase 2' mandate in 2017, which now runs until 2021.

"We're cautiously optimistic that we'll get a more permanent Phase 3 footing after that," Major Francesco Martinotti, JDEAL's training branch chief, told *European Defence Matters* during a site visit to JDEAL in spring 2020. "Phase 3 would mean, among other things, making our permanent staff more robust.

We are currently undermanned with only four full-timers. We need 18."

And the reason? "Because of growing demand," he said. Currently, JDEAL runs two-to-three basic courses each year to orient previously qualified operators, and half a dozen special courses annually to qualify operators in specific functional areas, in addition to other courses. These dive into techniques such as instructing non-qualified operators how to extract →



biometrics from IED devices, materials, artifacts and traces, or how to analyse circuit-boards and electronics or how to take forensic-oriented photographs of evidence.

Ambitions for more

In total, JDEAL delivers around 24 weeks of training activities each year. But more is needed, according to Martinotti, who



Major Francesco Martinotti
JDEAL Training Branch Chief

pointed to the fact that many nations are starting to set up their own C-IED structures, and thus seek more advanced training.

"You might need a succession of three 20-man C-IED teams to meet a military's rotational schedule. With more JDEAL personnel here we could, for example, provide chemical specialists from across Europe's armies with the ability to apply a standard protocol (i.e. exact technical approach) for analysing homemade explosives in a safe way," he said.

Martinotti and the team aim to launch JDEAL's first 'Chemical Exploitation of Explosives' course in September, in fact, which would be followed by another new course in October on forensic photography.

New threats, new courses

JDEAL's training curriculum is also expanding to include the hot topic of drone forensics. "The threat of IED-bearing drones is an obvious one, and there's growing demand about how to counter or analyse them," observed Cifuentes, adding that JDEAL plans to offer a five-day course specifically oriented to exploit recovered drones regarding their media and electronics

components, GPS modules and other operational aspects. However, this and other courses depend to a certain extent on how the current Covid-19 pandemic affects travel in the future.

JDEAL's specialised training in C-IED forensics is wide, spanning the entire network of IED forensic research and investigation, from chemical and electronic analysis to photographic, document and media analysis, all the way through to evidence custody. These are expressed both intellectually in JDEAL's training curricula, and physically in the form of joint deployable capabilities (JDC).

Two labs ready to deploy

Indeed, what makes JDEAL unique is not just its common training approach for participating Member States, but also its research and knowledge base and, crucially, its stand-by deployable C-IED laboratories. All three complement each other, with JDEAL's pre-deployment and set-up courses designed, for example, to prepare experts to head out with JDC.

JDEAL's stand-by deployable capabilities are stored in an anonymous-looking but sizeable warehouse sitting aside a small



The first JDEAL special training course on MEDEX

road in the woods. Inside are shelves of pre-stocked supplies and parts at one end and, dominating most of the single interior space, all the modular kit and housing needed to deploy a C-IED laboratory to the field: tents and climate-control systems, power generators, forensic equipment and standard shipping containers.

The warehouse is stocked to enable the rapid deployment of two fully operational Level 2 C-IED exploitation laboratories, which can be tailored to a specific mission in terms of size, capability and staffing needs. These can be ready to deploy with five days' notice, including spare mission-essential equipment and consumables. The JDCs have been deployed, in both their smaller tent – and container configurations, to national, multinational, European and NATO exercises on both sides of the Atlantic since 2015, for example.

Pulling in the same direction

C-IED capability is not just about cutting-edge equipment or training, however. Good forensics hygiene demands interoperability of technique, equipment, knowledge and especially procedures. Getting all forensics operators working from the same page will save lives.

"We have an SOP (standard operating procedure) for everything that enters and leaves the laboratory. You get the manual to equip your lab, how to run it and how

to extract the best forensic results," said Cifuentes. "This is internationally recognised, and further proof that the Pooling & Sharing formula works to everyone's advantage." 

ECMAN: Collaborative handcraft that saves lives

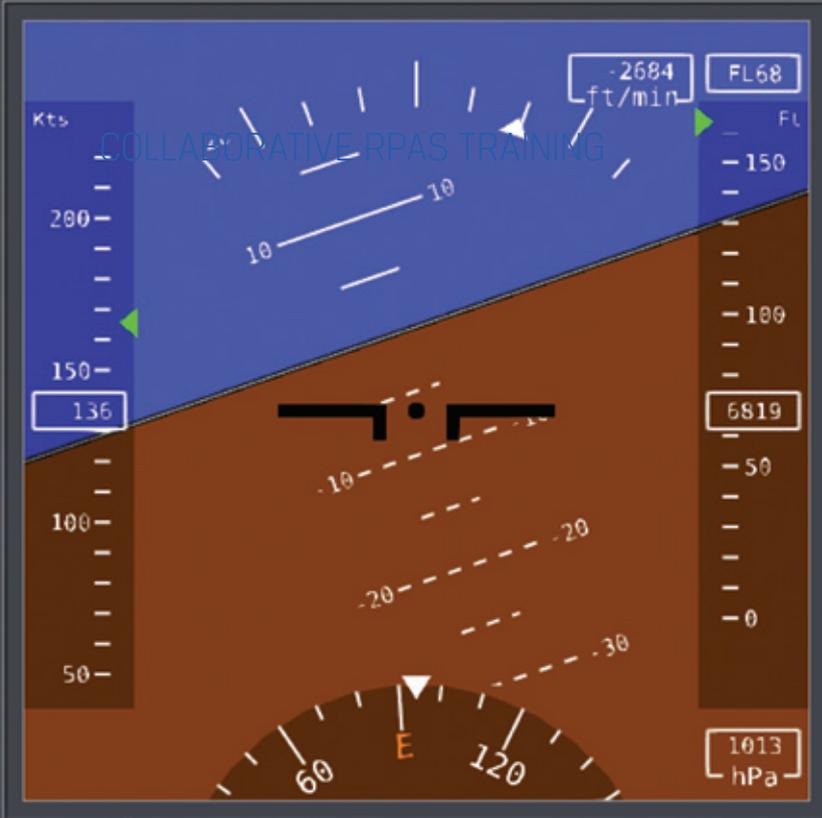
The European Centre for Manual Neutralisation Capabilities (ECMAN) is another success of EDA's pioneering work in the C-IED field. Hosted by the Austrian Armed Forces' Logistics School in Vienna since February 2018, ECMAN grew out of the Agency's previous Programme on Manual Neutralisation Techniques Courses and Exercises (MNT C&E), which ran from 2014 to 2018. To date, seven Member States support the Centre: Austria, Germany, the Czech Republic, Finland, Ireland, Italy, and Sweden.

Manual neutralisation techniques represent the most advanced IED disposal skills. They enable experienced, specially trained operators to access, diagnose, and manually dispose of IEDs and other hazardous material.

These tactics and techniques are used when the application of normal explosive ordnance procedures or energetic weapons are deemed inappropriate. Manual IED neutralisation is thus the last, and particularly dangerous, resort when other approaches fall short of what must be done – hence the need for proficiency training and exercises.

ECMAN helps its participating Member States develop and share expertise and best practices in this critical domain through joint education and training sessions. These range from developing doctrine and equipment to testing and concept validation to practical exercises.

The Centre has both permanent and non-permanent staff from the participating countries based at its premises in Vienna.



SATCOM



SATCOM

Activated

CRASH AREA STOP

LOS

Activated

RETURN TO BASE STOP

Remote yet tog

When seven EDA Member States established a Working Group in 2013 to improve collaboration and information-sharing in what was then a small and totally fragmented European Medium Altitude, Long Endurance, Remotely Piloted Aircraft Systems (MALE RPAS) domain, they instantly realised that cooperation on education and training offered the biggest potential for tangible results. Seven years on, there is a very tangible outcome: a joint RPAS Training Technology Demonstrator deployed to ten Member States.

The Working Group started with an in-depth analysis of the varying national approaches to RPAS crew training. It revealed that the paths into the RPAS aircrew pipeline varied significantly from country to country with disparate entry standards, methodologies and qualifications everywhere. Aligning the various approaches did not seem to offer any obvious immediate operational benefits to the front line crews involved, a problem further compounded due to the remote

and segregated nature of their daily tasks (often highly classified) which offered very few opportunities for multinational interaction.

Against this backdrop, in late 2015, the Working Group reached a consensus that the only viable way forward was to construct a generic common MALE RPAS training platform that would be independent of bilateral obligation and not directly challenge national approaches. Instead,

the common training platform would serve as a catalyst for slower convergence of training approaches, as a tool for improved interoperability as well as a framework for structured sharing of lessons, improved procedures and for general capacity development. The quest for improved interoperability was not unique to EDA, nor the Working Group itself, and, in early 2016, the European Air Group (EAG) was invited to contribute to the workstream as they had a strong interest in practical operator level



ether!

improvements to interoperability, doctrine and procedures.

RPAS Training Technology Demonstrator (RTTD)

The joint approach proved fruitful, and with funding support from EDA's operational budget, a plan was developed to build a RPAS Training Technology Demonstrator (RTTD), the results of which would be shared across all EDA participating Member States.

Practically speaking, the RTTD project would equip each of the national training establishments with a desktop MALE RPAS simulator comprised of separate pilot, sensor operator and instructor consoles – all of them connected over a virtual private network that would enable both local and distributed training and the opportunity to test how interoperability could be improved through regular joint exercises and an annual face-to-face meeting of operators and instructors.

EDA took care of the provision of the equipment and initial systems training, whereas the EAG focused on structured exercise collaboration and the tactical procedural dimensions to author a dedicated training manual through a parallel effort to be called the Interoperable MALE RPAS ISR Trainer (IMRIT) project. EDA rapidly progressed with the writing of a technical specification for the RTTD and opened a contract call in late 2016 for a four-year framework contract to provide the hardware, software and associated →



The RPAS Training Technology Demonstrator, currently deployed to ten Member States

support services. The contract was awarded in February 2017 to DCI and DIGINEXT, a French consortium, who specialised in military simulation and had already developed a stand-alone system for the French Air Force.

First deployments to France, Italy, Spain

After several operator led design review and acceptance meetings, the first console was deployed in December 2017 at the French Air Force, Drone Centre of Excellence at Salon de Provence, followed quickly by deployments to the Italian Drone Centre in Amendola and the Spanish RPAS Training School, in Salamanca, Spain. The system immediately proved popular for local training and inter site communication, file transfer, debrief and replay functions were tested.

The remaining deliveries to Belgium, the Czech Republic, Germany, Greece, the Netherlands, Poland and the United Kingdom (prior to Brexit) were conducted as soon as possible between March 2018 and February 2019. Issues were resolved as they came to light and Full Operational Capability was declared in March 2019.

Desert, maritime and Middle East scenarios

Aside from the equipment deployment, the first MALE RPAS symposium was held at High Wycombe in the UK in November 2018 and the Member States and the EAG began work on designing three operational scenarios covering desert, maritime and Middle East based urban storyboards to form the framework for increasingly complex operational challenges.

Each scenario was developed over three levels of difficulty: basic, advanced and advanced plus. Member States were each allocated a scenario in groups of three and four with the objective of refining the scenarios and further improving operational procedures. The EAG offered a vision of running a large collaborative personnel recovery exercise in late 2020 called VOLCANEX, but planning is currently held up due to the Covid-19 pandemic.

Unique training network for MALE RPAS operators

Results from the RTTD/IMRIT project will be made available to all EDA participating

Member States in late 2021 with a view to reviewing the membership and scope of the Working Group and to perhaps continue the Demonstrator project as a longer lasting endeavour.

Initial impressions of the joint project have highlighted several significant benefits including the value of mentoring in terms of capability development, language and cultural context as

drivers for change, the value of low cost simulation employing commercial off-the-shelf gaming technologies and the very high degree of fidelity achievable using common locally shared environments and synchronisation tools.

Although Covid-19 has enforced a regrettable operational pause to further system development, the demonstrator has already proved its worth enhancing

both local and networked training but, perhaps more importantly, establishing an ongoing and trust based dialogue between European MALE RPAS operators.

Training together in peacetime should be the normal approach to delivering success on deployed operations and in that respect the RTTD/IMRIT has already broken down several cultural barriers that in time will improve deployed operational capability. 

Three questions to...

1st Lieutenant Abrás Benjamin

B-Hunter (RQ-5)
Mission commander
Belgian Air Force

What is the benefit of the RTTD/IMRIT to the Belgian Armed Forces?

First of all, the demonstrator allows us to provide education and training to our crews even when, for whatever reason, it is impossible to fly with our unmanned air systems outside under real conditions. The main gain for us with the RTTD is the real time video on the payload operator side that our RQ-5 simulator is lacking. Furthermore, we also use the RTTD/IMRIT to practice the initial Crew Resource Management (CRM) capability of our crews or to develop and train routines or new techniques, tactics and procedures (TTP). As a result, our UAS flight hours have become more efficient since the CRM and TTPs basics are learnt even before we really fly the UAS. We also use the demonstrator to help visitors learn about our RPAS operations. Going forward, we could also use the RTTD/IMRIT for the selection of future UAS crews.

As far as the medium and long-term benefits are concerned, being part of the network allows us to regularly meet our European UAS or RPAS colleagues in the different RTTD/IMRIT and EDA/EAG meetings. This kind of meeting is very rare in the unmanned community because RPAS are relatively new, or sometimes not available at all, in some European Air Forces inventory. During these meetings we exchange views and best practices on all aspects of our capacity, which is not only interesting for the usage of our current UAS but also, and perhaps even more, for the operation of future new RPAS. And, last but not



least, these encounters contribute to building a European RPAS community.

Where and who will use the RTTD equipment?

The RTTD/IMRIT equipment is installed in the 80 UAV Sqn's building at Florennes Air Base. This unit is currently flying the RQ-5A B-Hunter and will operate the MQ-9B SkyGuardian in the near future.

There is a collaborative exercise planned for later in the year after the Covid-19 crisis has past. How important is collaborative training for Belgium in the RPAS domain?

The collaborative exercise planned later in the year is very important for Belgium, not only to fully exploit all the possibilities of the RTTD/IMRIT equipment but also to further work with our European RPAS colleagues and to learn from each other in different domains like operations, training, safety, etc. since there are big differences in terms of experience amongst the European nations. Beyond executing the collaborative scenario, the emphasis is put on the development of a quality debriefing and mission preparation so that we can enlarge the training cycle from inputs to outputs. Mutual understanding inside the European MALE RPAS operator community is also paramount to improving and enhancing interoperability and cooperation between participating Member States and developing a capable and effective defence capability.

Joint quest for future defence applications

Artificial intelligence (AI) has been around for a long time since the first, if crude, modern calculating machines were created more than a century ago. However, it is only in the past ten years or so with the advent of deep-learning techniques that AI has started to come into its own, with profound implications for the defence world.

The European Defence Agency (EDA) aims to marshal its Member States' research and development (R&D) in this sector in important ways, from creating a common set of AI references and terminology to pinpointing logical areas for their cross-border collaboration to framing the most important areas of AI for Europe's strategic autonomy.

"AI is not new for the defence world. There have been a lot of expectations pinned to it since the end of the Second World War: many trends and crazy predictions that have promised so much, only to fade away," said Panagiotis Kikiras, EDA's head of unit for technology and innovation.

"We have avoided jumping on these trends by taking a very cautious approach. That said, this latest wave in AI's evolution has been different. Enablers that were not around in the 1980s and '90s such as massive processing power and huge databases of near-real time information are accelerating. This wave of innovation stands in sharp contrast to previous advances in AI capability and makes possible new deployable solutions," he said. "That is what we want to capitalise on as we look ahead."

Taking stock

To do so first requires getting a solid idea of how military AI is being researched across the EU, what it has to offer Europe's militaries – including its limitations – and, just as important, a common technical language for analysing it.

"In our discussions with Member State experts over the past few years, we saw a lot of discrepancies or divergent interpretations about what AI and 'deep learning' actually mean," said Ignacio Montiel Sanchez, EDA's project officer for information technologies research.

Virtual testing for real-life military AI solutions

AI products and services need standardisation and certification if they are going to be readily accepted into the military sector. One idea EDA has proposed to its members is to create a repository, or 'data lake', of less sensitive but anonymous military operational data on vehicles, air platforms and so on. By giving research and technology organisations, SMEs and large industry access to it, these players could devise new AI solutions such as platform-specific smart software.

"Let's say you have a company working on predictive maintenance for a helicopter type and it has developed a great algorithm. How to test it? Traditionally, they would have to go to the manufacturer or military user, where it can be difficult or slow to get the right data sets for testing and validation," said Kikiras.

With the repository, however, a company could go to EDA as the trusted third-party to link the innovator with the Member State that controls and owns the operational data needed. "This would create a one-stop shop for testing AI products. But first we have to see whether our militaries will be willing to do this. France is already moving in that direction with its own repository, for example," he said.



Thus, the Agency decided three years ago to launch a preliminary blueprint to promote and coordinate AI innovation across its Member States. This was approved by its board in February 2019, and has been unfolding in phases since then.

A first phase was to develop a common understanding of AI related to defence. "Everyone needs to read from the same 'sheet of music' so that all refer to and use AI terms and definitions the same way," observed Montiel Sanchez. "This domain is really extensive, so we decided to demystify which AI elements are relevant for defence and which were not. That meant putting together a common definition, a technology taxonomy relevant to defence, and a glossary of terms in order to produce a clear vocabulary for everyone within EDA."

Common definition, taxonomy, glossary

For instance, a first task was to set out the limits to AI and then converge on a common definition of it. "We saw too many divergent concepts, so the common denominator we settled on was, in brief: the capability of algorithms to select optimal or quasi-optimal choices to achieve specific goals," he said.

With that done, EDA could then begin framing its AI taxonomy. "As we built the taxonomy, for example, we did not find a comprehensive taxonomy anywhere else. The Finnish Ministry of Defence is doing some work in that area, but it has not been completed yet to the best of our knowledge," he said.

The goal was not, however, to create a full taxonomy but instead "to do what was feasible within the EDA framework by focusing on what areas of activity could be clustered to help us further develop AI-related projects and programmes," said Kikiras. In the end, EDA's taxonomy was structured along three lines: algorithms, functions carried out by algorithms, and support or related areas such as ethics, hardware implementation or learning techniques.

EDA's AI definition, glossary and taxonomy were completed in December 2019. Since then these touchstones have been proving their worth, particularly regarding the AI taxonomy. The latter's utility is such that other EU entities such as the European Commission's research policy department, known as DG RTD, have expressed their appreciation and interest in following the evolution of this work.

Moreover, the taxonomy will be a living document. "We will soon have a dedicated place on our website for the taxonomy where it can be regularly updated," said Kikiras.

Identifying defence applications

The second phase has been to identify and analyse applications within the scope of EDA's research work that are relevant to the military and which can be affected by AI.

"This is less about identifying technology and more about addressing the lack of awareness of knowledge about AI at all levels of defence planners," said Kikiras. "They are trying to use it to incrementally improve their current systems and scenarios, something that is desirable and increases operational capacities. However, AI will transform the future battlefield far beyond that. For example, to survey the Arctic, ships are used supported by satellites. But this could be done more nimbly with unmanned systems. We need a new generation of planners who understand the optimisations AI can induce to their systems, and who think differently."

Looking for synergies

The blueprint's third phase is also its most strategic: to get an overview of the AI's →

military status and strategies across the Member States, and to propose ideas where more AI synergies between them might be possible.

"We know from the recent study that EDA commissioned on the subject that not many Member States have a dedicated AI strategy for defence: most have a more general reference to defence in their national AI strategies. The important thing is that the study identified the gaps and patterns of potential collaboration such as data management, the ethical dimensions, certification of AI applications and systems or standardisation," he said. (see box on page 34). "We now need to get our CapTech groups of national experts to identify how

AI can be folded into their work, and to ensure they have a better understanding of what other Member States – and third countries such as the USA, Singapore and China – are doing in the sector."

Ultimately, the challenge will be to tackle all these things the right way, top-down as well as bottom-up. "There are different levels of AI maturity across the Member States, and that is a concern for us. While the experts within our CapTechs are eager to find solutions – and there are a lot of projects possible – once you move to the strategic level, it becomes more difficult," said Kikiras.

Montiel Sanchez added: "At the tactical level, AI is more about the intelligent

automation of functions, like those on platforms aiming for autonomous systems. But at the strategic level, this goes straight to (AI-enabled) intelligence and support to decision-making, which immediately gets more complicated for cooperation, given the sensitivities from the different parties."

AI Action Plan

This third phase includes a new EDA draft AI action plan, based on the Member States' requirements and identifying how they could collaborate to develop AI for their militaries. National capitals have until May to comment on the action plans, after which it will be formally validated by end-2020. 

Artificial intelligence vs. machine learning: what are the differences?

The commingling is found everywhere, whether in articles for the layman or scientific texts. The terms 'artificial intelligence' (AI) and 'machine learning' (ML) are used so interchangeably that it suggests a complete synonymy between them, and thus the same concept. But this is certainly not the case, and it is important to understand the differences between them to avoid confusion.

Artificial intelligence is the broad and overarching term. It encompasses various algorithms and techniques which exploit the huge power of computers (in their widest sense) to quickly make an immense number of calculations to solve specific goals. This capability can provide useful responses that can be construed as or equivalent to those coming from an intelligent human being. However, that is not a very precise or useful definition.

Many AI definitions refer to human intelligence (itself not a well-defined term), reasoning (not clearly described either), concepts such as perception, cognition, intelligence or vague allusions to applications such as 'computer vision', 'natural language understanding' or 'problem solving'.

To avoid confusion and establish a common reference, EDA has settled on a 'minimum common denominator' definition of the functional perspective of AI. For example, AI is very good at proposing the best option among a range of choices regarding a decision needed. The Agency has thus adopted the following definition:

AI is the capability provided by algorithms of selecting, optimal or sub-optimal choices from a wide possibility space, in order to achieve specific goals by applying different strategies including adaptivity to the surrounding dynamical conditions and learning from own experience, externally supplied or self-generated data.

This definition helps clear the way for EDA to support European defence cooperation in AI.

As for machine learning, this can be understood in two ways related to the AI domain. One is that ML represents the ability of certain algorithms to learn without being explicitly programmed to do so. The other way refers not to their learning ability but to the algorithms themselves.

For EDA, machine learning means the ability of algorithms "to model systems by learning from the data these systems produce". These models identify and extract patterns, thus acquiring their own knowledge and inferring from the data how to predict the outcome of new inputs not previously seen.

An exemplary illustration of ML would be so-called deep learning algorithms such as 'Convolutional Neural Networks' or 'Recurrent Neural Networks'. These have produced spectacular results and are behind the explosion of AI in the last ten years regarding image- and voice-identification (Google, Facebook, Apple, etc.). They are also the reason why ML is erroneously taken as the whole body of AI when, in fact, it is only a part of it. Why? ML is a subset of AI because many AI algorithms do not have ML's self-learning ability.



Christian Hedelin has been Saab's Chief Strategy Officer since November 2018

"AI has significant potential for autonomous systems"

How is artificial intelligence changing defence capability development and production, and how does Europe's defence industry adapt to this challenge? We asked **Christian Hedelin**, the Chief Strategy Officer of SAAB.

AI represents a paradigm shift in technology that in a very short time has had a major impact on large swaths of society. Will it also change defence and the nature of future warfare?

Yes, it will and it already does. We have only seen the beginning of the transformation that AI and machine learning will entail in our business and elsewhere. But AI is already integrated and working in today's systems. It is here in some basic implementations already now, and will become more and more sophisticated in the future.

At Saab, we have several platforms today that leverage AI. Many of the platforms we are developing can use AI as support for decisions, with AI analysis of massive amounts of sensor data helping make the right decisions.

In which concrete domains or applications do you see AI's biggest defence potential, today and in the future? Can you give concrete examples?

Traditionally, AI is often used for decision support, but we see a growing importance

for anomaly detection and predictive maintenance. In the future, one very important area will be autonomous systems, where AI will have a significant potential in all domains – land, sea, air. In defence applications, where we often need predictability and traceability from stimulus to action there is also a strong need for 'explainable AI' or XAI, removing any arbitrariness in the decision processes.

What are Saab's vision and strategy as regards AI?

Our first steps in this area date back more than 25 years.

Today, AI is one of Saab's five strategic areas of innovation, research and development. AI has and will have a key role as we develop future platforms. We see many applications, both within defence and civil security. We come from a world where we throw away most of the data just to find certain signal characteristics, to a future where we will be able to squeeze so much more information out of the data that our sensors gather.

Which are Saab's most promising AI defence applications?

We see more than 20 areas where this technology will come in to our products.

In areas such as sensors where we gather huge volumes of data, AI will revolutionise performance.

One of the most promising AI defence applications is within intelligence gathering and situational awareness. Saab has developed a solution that can enhance products through the fusion of massive amounts of sensor data from land, sea, air and space. It will allow users to view and compare big data from a wide range of sources simultaneously. The new solution will also fuse satellite data with information from other systems such as Saab's airborne early warning platform GlobalEye, the Giraffe family of surface radars and the 9LV combat management system.

Furthermore, we see great results from using AI algorithms to improve our different design processes. We can test millions →



Saab's Double Eagle SAROV unmanned underwater vehicle

of design variants and, thanks to AI, find the optimal solution in a relatively short period of time, something that would have been virtually impossible a few years ago.

Another area that we explore is autonomous systems (land, sea and air), which automatically adapt their behaviour in response to changing situations, replicating the role of an experienced human operator, but with much more agility and perseverance.

Looking at the wider picture, would you say that Europe's defence industry in general is well positioned to embrace this technology?

We see heavy investments and rapid development of AI in other parts of the world, not least in China. There are good

prerequisites and opportunities in Europe, but we need to put even more effort and investments into AI and machine learning.

What should be done in order to keep Europe's defence industry in a leading position within AI in the future?

One area where EU could make a difference is additional support for research programmes in the area of autonomous systems. This would include infrastructure for more computational power, both for crunching of Big Data and for training of Deep Learning networks. The EU could invest in Super Computer Centres for both the industry and the EU's Member States Armed Forces to use for testing different platforms. It would be very costly for companies to develop these themselves on a large scale. That could make a huge difference. 

"AI has and will have a key role as we develop future platforms"



Joint EDA/ESA 'AUDROS' project edges closer to demonstration

© VTU

The detection and identification of chemical, biological, radiological, nuclear and explosive (CBRNe) threats has traditionally been a costly and painstaking endeavour for the military and for other civilian actors such as protection forces (border police, fire brigades etc.). Aside from the obvious risk of exposure for counter-CBRNe personnel, neutralising the threats demands complex sampling and analysis procedures, particularly in the bio- and chemical areas, to avert or mitigate their effects.

If the time, expense and personnel required to carry out such tasks could be telescoped, the world would be a far more secure place. Indeed, new technologies – and new combinations of existing technologies – hold great promise in that regard.

The European Defence Agency (EDA) and the European Space Agency (ESA) aim to do just that with their novel approach to the CBRNe sector, one that promises high levels of deployability, safety, speed, accuracy

and reliability for detecting and identifying threats. The two Agencies have supported European industry in developing a concept, which is only a step or two away from the industrial production stage, meaning it could be rolling out to Europe's defence and civil first-responder communities in just a few years.

Welcome to AUDROS ('Autonomous Drone Services in the CBRNe operations'), the joint EDA/ESA project that combines satellite-

based services with Remotely Piloted Aircraft System (RPAS) technologies. The resulting capability would have a wide range of applications for many different users, ranging from defence forces to first responders (police, emergency response, firefighters, etc.) to industry (transport, energy, critical infrastructure security, etc.).

Joint call for proposals

AUDROS has evolved over several stages and is now poised to tackle the core of →



its development work. Its two sponsoring partners laid down the project's initial groundwork with a preceding Implementing Arrangement, signed in March 2017. This was followed by a workshop open to defence and civil stakeholders and subsequent interactions in order to assess the requirements of all the interested Member States. EDA's CBRNe research and technology expert network played a central role in capturing defence specific needs and requirements.

That, in turn, saw the definition of a joint call for proposals to study the design and function of a prototype system. "We received a solid number of proposals, matching our requirements for new CBRNe detection-identification-monitoring capabilities and

services, making it a genuine success," said Shahzad Ali, EDA moderator for CapTech CBRN & Human Factors¹.

AUDROS was one of the awarded teams of the one-year feasibility study contract worth €350,000. The Consortium was made up of four partners: the two Czech companies BizGarden (as prime) and GINA Software, the Polish company Cervi Robotics, and the Czech Ministry of Defence research institution known as VTU. "The main purpose of the study was to look at AUDROS's technical analysis, economic viability, the added value brought by the space-based data, new possible applications and, of course, the crucial ability to deal with CBRNe threats," observed Ali.

RPAS hangar system

Starting in early 2018, the joint EDA/ESA team analysed the solutions proposed by industry to meet user needs for CBRNe countermeasures, with the study's results assessed in December of that year. It laid out the definition of an RPAS hangar system. The ultimate goal? To enable fully autonomous beyond-visual-line-of-sight drone operations equipped to carry out day or night-time detection of persons and equipment, and search and map radiation sources, chemical warfare agents or toxic industrial pollution.

The joint team then witnessed in late 2018 the successful demonstration of a proof-of-concept system for AUDROS. This comprised a modified off-the-shelf



"The combination of sophisticated detection-identification and monitoring suites with the diverse array of satellite services promises to produce a powerful dual-use CBRN-protection capability for Europe's military and civil users"

quadcopter RPAS with a maximum take-off weight of 25 kg (including payload of up to 9 kg) and a hangar. Equipped with lightweight sensors for radiation and gas detection, AUDROS' test scenario focused on detecting a chemical near a large industrial site by sending the drone to 'sniff out' the agent's molecules and location. This was demonstrated during the prototype system's outdoor flights around the facilities of project partner VVU.

"Space technologies are a crucial component of AUDROS", said Beatrice Barresi, ESA's Project Officer. "Satellite Navigation allows us to command the RPAS and to monitor the position of the rescue team in the field. That is not all: satellite imagery are needed to visualise the situation and to provide best available data to command the RPAS. Last but not least, satellite communication protects data transfer towards remote dispatch/command."

Just as important was the study's recommendations for the design and construction of AUDROS's drone hangar. The prototype's portable hangar, which was connected to a fixed power source, was designed to enable the drone to autonomously re-charge its battery. Expanding on this design in future to enable auto-switching of detection suites, for example, would significantly increase the flexibility and duration of AUDROS-based missions, particularly if several drones and hangars were deployed at the same time.

Towards deployment

That, however, is for the project's next and crucial phase, namely the deployment of AUDROS in a fully operational scenario.

The payload will be modular in design and industrially scalable for commercial production.

The Czech-Polish consortium is expected to receive a new contract to build the pre-operational service, which will be financially supported by EDA and ESA.

"The Covid-19 pandemic has fortunately not adversely impacted the rolling out of the project, namely because AUDROS's demonstration budget had been earmarked," said Ali. "Thus, this 18-month contract will go ahead as planned, with the idea of signing off on it by the summer."

"Engaging projects swiftly is a critical means at our disposal to respond to the pandemic's adverse effect on the economy at large and the space industry in particular. ESA, with its partner EDA, is therefore fully engaged to proceed as soon as possible with agreed projects in order to channel much needed resources to protect Europe's essential industrial base in these unprecedented times", added Florent Mazurelle, ESA's Principal Security Strategy Officer.

The demonstration project will expand the prototype's technical design by incorporating drone payloads for the mapping and visual day/night detection of persons, as well as situational awareness from integrated satellite services. Its hangar will be able to either recharge a drone's battery or swap it out for a newly recharged one. Doing so would mean that a fleet of drones, combined with one or more hangars, could carry out 24/7 execution of CBRNe-missions across a relatively wide operational area.

"Indeed, the combination of sophisticated detection-identification and monitoring suites with the diverse array of satellite services promises to produce a powerful dual-use CBRN-protection capability for Europe's military and civil users. And it would have many cross-over links to other EDA research goals in the areas of counter-terrorism, harbour protection, protection of critical infrastructure, logistics and in-theatre medical surveillance, to name just a few. The spill over benefits, in other words, could radiate out in many directions", concluded Ali.

Fruitful cooperation

EDA's research collaboration with ESA got off the ground in June 2011 when the two organisations signed their Administrative Arrangement on cooperation, which, above a tightly knit policy dialogue, has now given birth to cooperative projects in countless domains such as cyber defence, critical technologies for European non-dependence, Earth observation, secured satellite communications, to name but a few.

AUDROS was a logical outgrowth of the EDA's Joint Investment Programme on CBRN Protection, which it launched in 2012 to stimulate R&T work in the defence sector among its Member States and their industries. 

¹ The European Defence Agency's work in the Research & Technology domain is in line with the Agency's mission to support Member States in their efforts to improve defence capabilities. EDA organises its R&T priorities in different Capability Technology Areas (CapTechs), which are networking fora for experts from government, industry, small and medium enterprises (SME) and academia, moderated by EDA.

Stronger Together

Since the end of World War II, NATO and the European Union have been the twin pillars of European and transatlantic stability and success. Alone, neither organisation can maintain freedom or prosperity. But together, they are a formidable force for good, for our citizens and for the world, says NATO Deputy Secretary General **Mircea Geoana** in this exclusive article for *European Defence Matters*.

NATO and the European Union are natural and indispensable partners. We share many of the same members, and all the same values – a deep commitment to freedom, democracy and the rule of law. We share much of the same history and geography, as well as the task to ensure the security and wellbeing of many millions of people.

We also share the same challenges. Challenges which are too great for any one nation to face alone. These range from violence and instability across North Africa and the Middle East and the fight against terrorism, to the ongoing actions of an assertive Russia. Today, we are also tackling the Coronavirus pandemic.

Preparing for future crises

On Covid-19, there is regular top-level contact, briefing and information sharing. High Representative Josep Borrell recently attended the NATO Defence Ministers meeting and the Secretary General and I regularly attend EU meetings. Our strategic communications teams work together to combat disinformation and propaganda, and the NATO and EU disaster response coordination centres are in regular contact as they respond to requests for help.

The pandemic has also shone a light on national resilience, for which both

organisations play important supporting roles. We should consider what more we can do to ensure our nations and our partners are better prepared for, and can more quickly recover from, future crises.

Wide range of cooperation

Cooperation between NATO and the EU has reached unprecedented levels across many areas. We are working together to respond to the migrant and refugee crisis, improve military mobility, counter hybrid and cyber threats, coordinate our exercises, and improve our strategic communications. We work closely together in the Western Balkans, Afghanistan and in Iraq. Our partnership delivers in actions, not just words.

Altogether we cooperate in over 70 different areas, captured in two high-level declarations signed by the NATO Secretary General and former Council and Commission Presidents. We will soon publish the 5th Progress Report on the implementation of the declarations, and there is much to report in all areas, including the development of defence capabilities.

Coherence of priorities and output

NATO Allies and EU Member States only have one set of forces. So work is underway to ensure coherence of priorities and outputs within our respective defence planning

processes, including the NATO Defence Planning Process (NDPP) and Partnership for Peace Planning and Review Process (PARP), the EU Capability Development Plan (CDP) and the Coordinated Annual Review on Defence (CARD).

Last year, NATO and the European Defence Agency co-hosted the first European Air-to-Air Refuelling conference. Air-to-Air Refuelling has become a flagship of NATO-EU cooperation and an area where European nations are deploying new capabilities. Later this year, the first two of ten new air-to-air refuelling aircraft, jointly acquired by six nations, will be delivered.

We share information on our projects and coordinate our activities, be it on capability development, military aviation, standardisation or working with industry. There are many other examples of defence technological and industrial cooperation between the nations of North America and Europe. These include Remotely Piloted Aircraft Systems, Air-to-Ground Precision Guided Munitions, and Maritime Unmanned Systems.





"Together, NATO and the EU have ensured more than seven decades of peace and prosperity in Europe"

has welcomed these complementary efforts on many occasions. They mean increased defence spending, more investment in new capabilities, and less fragmentation in the European defence industry.

This is good for Europe and it is good for NATO. With around four in every five people in the European Union also living in a NATO country, the stronger the EU, the stronger the Alliance.

So when a new drone, a new plane or a new tank is developed through the EDF or PESCO, it should also be available for NATO operations. And these new forces and capabilities need the fullest possible involvement of non-EU NATO Allies.

Twin pillars

NATO and the European Union, the twin pillars of European and transatlantic success, are stronger and closer than ever. Looking ahead, there is tremendous scope for further increasing the degree and depth of our cooperation.

In time, this pandemic and its consequences will be overcome. However, other challenges and crises will continue to confront and challenge us. This is why NATO and the EU must continue to deepen and broaden our strategic partnership.

Together, NATO and the EU have ensured more than seven decades of peace and prosperity in Europe. We need to work together because together we are stronger. The safety of our citizens demands it and our ability to thrive in a more uncertain world depends on it. 

New cooperation domains

We do a lot, but it is important to look together at what more we can do together.

We can increase our cooperation in areas such as space and disruptive technologies, including Artificial Intelligence and Autonomous Systems. These are areas where competition is growing. Russia is developing new advanced hypersonic missile capabilities and we all see how China aspires to be a global leader in technologies such as 5G and AI.

Faced with such competition, Europe and North America need to maintain an edge and focus on not only developing these new technologies, but also adopting them at speed and at scale. Only together can we fully grasp the incredible opportunities such technologies present for our security. But also better face the risks they pose.

To meet the challenges of a more unpredictable world, European NATO Allies have significantly increased their defence spending. That is billions of euros for new equipment, new investment in the latest

technologies, and new research and development to make sure we remain at the cutting edge.

Investing in defence

The economic volatility triggered by the pandemic will significantly increase pressure on national budgets and deficits. While restoring our economies to growth, we must continue to maintain our vigilance, our resilience and our deterrence and defence capabilities.

One of the lessons of this pandemic, for both NATO and the EU, is that geo-politics and geo-economics cannot be treated in isolation. Investing in our security, returning to growth and being ready for any situation in the future are facets of the same challenge. As we move forward, we should do so comprehensively and synergistically so we are up to any future challenges.

EU defence initiatives

The EU is also stepping up its efforts to strengthen European defence through initiatives such as PESCO and the European Defence Fund. The NATO Secretary General

