

European defence cooperation on Education, Training and Simulation



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Education, training and simulation

Executive summary

European defence cooperation on education, training and simulation has many important advantages to enhance skills, share European military culture for our military men and women, and reduce costs. The importance of cooperative training and the intention to make training an element of the permanent structured cooperation has been agreed in the Lisbon Treaty. This intention was reinforced in more recent papers on European cooperation, but omitted in the European Defence Fund. Simulation technology for training goals was never mentioned. Hence, we believe cooperation on education, training and simulation needs more attention.

In this document of EURODEFENSE and the Federation of European Defence Technology Associations (EDTA) the most important potential areas of cooperation are described as well as technological and funding opportunities.

Main conclusions is that cooperative education and training improves procedural and cultural interoperability in the European armed forces. It promotes similar responses to the same situation and facilitates mutual understanding, integration and team building. For individual military men and women it builds lifelong personal networks that will help them to better understand their fellow Europeans.

Recommendations:

In military education the specific military culture is created and camaraderie is born. To stimulate European cooperation exchange programmes should be expanded throughout all Member States. Especially in regions with overlapping cultures and bridgeable language barriers. National identity should however be recognised in basic training.

To better organise training throughout Europe, training should be integrated in just a few major European Commands. The issue of sovereignty is less important in training and exercises and other hurdles that often hamper cooperation in actual operations are also absent in these circumstances. The training model for naval ships and task forces in use by FOST in the UK could be applied for European armies and air forces.

Simulation for training has become an essential tool to meet training needs of forces in a national and multinational context. Technical developments have made simulation more realistic than actual training and exercises in many cases.

Realistic training through simulation should be stimulated Europe wide. A European technological advantage in this area could be achieved by making the R&D window of the European Defence fund available. NATO panel and US dominance should be avoided where Europe pursues strategic autonomy.

Some training needs to be performed in large and complex facilities. It could be effective to use private funding for investment in these expensive systems. The use of these facilities could then be shared between military and other users on a pay-per-use basis.

Education, training and simulation

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Education, training and simulation

1. Introduction

The importance of cooperative training and the intention to make training an element of the permanent structured cooperation has been agreed in the Lisbon Treaty¹. This intention was reinforced in the European Union Global Strategy for the European Union's Foreign and Security Policy². The Reflection Paper on the Future of European Defence briefly indicates in a bit more detail that a shared European military culture would be fostered through joint education, training and large-scale exercises³. Funding for training and simulation is however **excluded** from the "capability window" of the European Defence Fund as mentioned in the Defence Action Plan⁴. The most recent Communication on the European Defence Fund only mentions a need to develop an incentive to trigger cooperative procurement⁵. Simulation was never mentioned.

European cooperation on education, training and simulation however needs more attention as it has many important advantages to improve European cooperation, enhance skills and share European military culture for our military men and women, and reduce costs.

In the next chapters the most important potential areas of cooperation are described as well as technical and funding opportunities.

The aim of this document is to identify opportunities that will allow enhancing cooperation in the education, training and simulation domains.

¹ Treaty of Lisbon ,17 december 2007, page 155, first paragraph reads : « Member States participating in permanent structured cooperation shall undertake to.....bring their defence apparatus into line with each other as far as possible, particularly by harmonising the identification of their military needs, by pooling and, where appropriate, specialising their defence means and capabilities, and by encouraging cooperation in the fields of **training** and logistics »

² Global Strategy for the European Union's Foreign and Security Policy (EUGS, June 2016) – Pages 45 and 47

³ Reflection Paper on the Future of the European Defence, European Commission, 7 june 2017, page 13

⁴ European Defence Action Plan, European Commission 30 Nov 2016, page 6, note 24.

⁵ Communication on Launching the European Defence Fund, European Commission, 7 june 2017, page 11

2. CSDP policy state of affairs on education, training and simulation

*“An appropriate level of ambition and strategic autonomy is important for Europe’s ability to promote peace and security within and beyond its borders” ... “Member States will need to move towards defense cooperation as the norm” ... “The EU will deepen its partnership with NATO through coordinated defense capability development, parallel and synchronized exercises and mutually reinforcing actions” ...*⁶

Now that the stage is clearly set by the European Commission and agreed by EU’s Head of States and Governments, it is our strong belief that time has come to enhance the effectiveness of the European cooperation by our military men and women. This could be achieved from the early start and throughout their career by improving cooperative education, training and simulation. Cooperative education and training brings people from all Member States together and will help them to understand colleagues from other Nations and establish a pan-European network of military men and women with similar duties, also enhancing interoperability. In this document, this documents this personal growth in an international European environment is defined as “individual social benefits”.

To that end, one should first recognize the work done since several years within the European Defence Agency as highlighted by its active role in the organization of multinational exercises and training events in various domains. For example, initiatives aimed at increasing interoperability between armed forces are ongoing in various sectors such as military air transport, helicopter operations, or counter-IED techniques⁷. Yet more needs to be done and this requires stronger engagements by Member States.

The same applies but to a lesser extent, for what is done through the European Commission, for example with cyber defense, for which joint exercises are organized regularly. But when it comes to education one needs to acknowledge that clear barriers still exist. For example, whilst the Erasmus programme – in existence since the late 1980’s – has been a very effective exchange programme for students allowing for cross border cooperation it has not been – up to now – possible for the European Union to implement this in a broad sense⁸ in the security domain let alone in defence.

Finally, NATO and the EU have recently enhanced their cooperation in the training domain as highlighted by the December 2016 Joint Declaration⁹. But it is still hindered by legal issues preventing

⁶ Global Strategy for the European Union’s Foreign and Security Policy, European Commission, June 2016, Pages 6, 22 and 23.

⁷ <https://www.eda.europa.eu/what-we-do/activities/activities-search/exercises-and-training>

⁸ Positive examples are a few foreign European candidate officers in our Military Colleges (Belgian Navy Cadets in Netherlands Naval College) and most War Colleges have since long inter-EU exchange programs. These are however exceptions, not the rule.

⁹ http://www.nato.int/cps/on/natohq/official_texts_138829.htm - Implement parallel and coordinated exercises (PACE) as a pilot project for 2017 and 2018.

exchanges of classified documents. By nature, this is a highly political issue, but only when solved, can further progress be made to deepen the overall NATO/EU partnership.

To conclude, it is our assessment that, building on the needs but also on previous achievements within the EU framework, many opportunities lie ahead and should be taken seriously. One of those is to rapidly implement -in very concrete terms- the newly adopted EU policy on training for CSDP¹⁰, bearing in mind that it clearly says that “training for CSDP is a shared responsibility between EU’s Member States, its institutions and dedicated bodies”.

Other good intentions to improve long term European cooperation by education, training and simulation should be implemented, and not be allowed to drift away in lost intentions, footnotes and bureaucracy.

¹⁰ <http://data.consilium.europa.eu/doc/document/ST-7838-2017-INIT/en/pdf> - 3 April 2017

3. Need and effectiveness of cooperative education, training and simulation

In this chapter the three windows of this important type of cooperation for European military men and women are described.

3A. Cooperative education

There is no doubt that personal relationships established during an education or training period last beyond their duration. Likewise, the acquisition of common knowledge promotes similar responses to the same situation, facilitates integration and team building and helps to create a common "culture". The positive aspects of cooperative education were already identified by the European Union at the Nice Council in 2000. Among the permanent political and military structures then created, was the European Security and Defence College (ESDC)¹¹. This institution consists of a network of national academies and schools that aims to provide Member States personnel with the appropriate knowledge to work on CSDP related issues.

Having said that, in education we must distinguish two differentiated areas: "basic" and "advanced" education. Basic education is the one given in the Academies and Military Schools in order to form the future officers, non-commissioned officers and soldiers of their respective services. Advanced education includes all postgraduate courses given to military personnel to acquire knowledge and skills in the specific subjects needed to perform a certain position or job.

In the scope of "basic" education, full integration is difficult to achieve, because of the students' different cultural and linguistic backgrounds. However, it is also in this area that deeper collaboration would have the greatest impact. Indeed, it is generally during "basic" education that the specific culture of each country's military is created and that the bonds of cohesion and camaraderie in each corps are born. Thus, greater integration of this "basic" education across member states would make it possible to incorporate collaboration with other Europeans into the creation of that culture from the very start. The earlier cooperation begins, the better it is.

In this area, a number of meaningful bilateral initiatives already exist in many countries which exchange students during all or part of the school year, or even during the entire training period. Another interesting example is the initiative created in 2008 under the auspices of the ESDC called "European Initiative for the Exchange of Military Young Officers" (EMILYO)¹², inspired by the Erasmus model. However, most of these programmes are either bilateral, or limited in scope and number of participants. **It would be beneficial to extend existing multilateral frameworks to include more students and more countries.** Moreover, there is ample potential for improvement in bilateral collaborations, especially in regions and between nations with overlapping cultures and bridgeable language barriers. In basic training national identity and culture should however be recognised.

¹¹ <https://eeas.europa.eu/topics/common-security-and-defence-policy-csdp/4369>

¹² <http://www.emilyo.eu>

But it is in the field of “advanced” education that the model of the ESDC is perfectly applicable in order to set up an annual catalogue of learning opportunities. That is, to create a coordinating body that would determine the areas and requirements of this cooperative “advanced” education, and a network of national military schools and institutions that would offer to national and foreign students the courses suitable to those areas. Duplication (or multiplication) in this area of education could also be researched. If “advanced” schools or courses currently exist in two or more nations they could cooperate or even be combined to achieve cost benefits for the Member States and individual social benefits (as defined above) for the students.

3B. Cooperative training

While it is understood that most interventions by the EU will need to be comprehensive, military capabilities should be ready to be deployed at all times. To be seen as “military capable” underpins the early diplomatic initiatives and has a deterrent effect supporting the daily efforts to promote and protect the values and the interests of the Europeans. Contrary to many civil services the military have a long tradition in realistic international training. As shown by NATO, that training can be made very visible, is well perceived by the public at large and expresses the will and the capacity to act if need be. The European Union should make an effort to make progress in this field also as a tool to promote itself, underlining the better spending of the large but still limited financial assets, visualizing the “spent better before spending more” principle.

Another important benefit of cooperative training is the resulting inherent convergence to interoperability of procedures and systems. In addition, the individual social benefits (as defined above) for individual military are of relevance.

On top of this it must be recognized that today the national Military Armed Forces of the Member States of the EU do, individually, very often not have the size nor the complexity for effective realistic training.

International and national military staffs are better equipped and are more competent than international think-tanks to spell out in detail how this better, **more visibly European and more efficient training has to be conducted.**

An excellent example of cooperative training is the “school for Navy ships”, maintained by the Flag Officer Sea Training (FOST) of the Royal Navy. Naval ships of many nations already perform command team training and naval task force training together for decades. **This FOST model for international training at company or battalion level could be pursued for European armies and air forces too.** It would fit seamlessly in the proposal for European training commands in the next paragraph.

3C. European training commands

What follows are possible pragmatic ways ahead to **improve the military training cooperation** in the European Union environment. The examples are highly symbolic, can yield visible results in the very near future. They would be as many positive pro-European Union signals, so very much needed in these times of doubt and Euroscepticism. The additional costs of these pragmatic measures will be minimal.

The need to better protect the Europeans and their vital interests is high. Several successful recent military cooperation schemes in a European environment have proved successful. The Eindhoven Air Transport Command can stand as a model for surface movements of military assets and even for broader naval and land logistics. A similar effort should also be made **to structure European Common Military Training** among the member states focusing also on the high-end intensity employment of the capabilities. In this structure the need of a civil-military approach and an improvement of rapid operational decision making, also at the political level, should be implemented.

Referring to the articles 42 and 46 of the Lisbon Treaty on structured cooperation and to the Bratislava declaration¹³ it is suggested that progress should be attempted in four fields: Military Planning Command and Control, Navy, Army and Airforce.

- Military Planning Command and Control:

Transform the Eurocorps Headquarters in Strasbourg into a European Operational Headquarter by further internationalisation (more combined) and by making it more joint (inter service). The Eurocorps Command Structure is also a much appreciated and several times used NATO “Deployable Army Corps Command” evaluated and validated by SACEUR (NATO ACO). We might want to keep that option and that should be possible by using a necessary “reach back” when part of it is deployed as Force Command. Can this Operational Command take responsibility for **tactically evaluating some of the earmarked European military forces**?

- Navy:

Bring together all deployable assets of the European Union Navies in two Operational Commands **responsible for their training**. One in the north (North Sea, Baltic Sea, Atlantic Ocean, Arctic Ocean) and one in the south (Mediterranean Sea, Indian Ocean). Submarines can often be considered as special “special forces”, they may merit an **independent common “Combatant Command” for training**. Also, the Maritime nuclear deterrent component(s) is (are) to be considered separately.

Because of its huge relatively recent experience based on the Falklands War (1982) and the subsequent operational sea trainings provided to a great number of European Navies’ warships a special relationship is to be maintained with the Flag Officer Sea Training (FOST) of the Royal Navy.

¹³ Bratislava Declaration of the European Council, 16 September 2016 inciting the “European Council to decide on a concrete implementation plan on security and defence”

- Army:
Bring together “Special Operations Forces” on the one hand and “Rapid Deployable Forces” on the other hand in separate **Joint Operational Commands responsible for their training.** (in three **Operational Commands responsible for their training.**) Each Command should be responsible for the training of a force having at least a size guaranteeing the possibility of eventually executing operations also of a longer duration. (at least a three-brigade size force.) The Special/Rapid Deployable Forces Commands for training should address deployment, employment, extraction, combat support and combat service support.
- Air Force:
Maximize the common maintenance, **common instruction and common training** of the ever-decreasing number of military aircraft in the inventory. It is understood that this effort will be type committed (common major maintenance tools, common instruction simulators, common spare part stocks) and is applicable for fighter aircraft, for helicopters (NH90) and for transport aircraft (AM400). The Air (Fighter) Commands for training will have to create a deployable CAOC (Combat Air Operation Centre).

As concluding considerations, it can be underlined that the above-mentioned **Commands, responsible for training**, shall be instrumental in proposing common specifications for future equipment requirements.

It would also be important to keep active NATO member United Kingdom involved and on board.

3D. Cooperative simulation

NATO and Member States face significant challenges regarding training and exercises: current and future operations are multinational in nature (e.g. Syria, Mali, Iraq, Afghanistan..), the missions and the systems are becoming more complex (e.g. F35, UxV, Urban Ops, Cyber, Hybrid warfare) and require more detailed preparation and rapid adaptation to changing circumstances (e.g. peacekeeping, peace enforcement). At the same time, opportunities for (live) training and exercises with partner nations are reduced due to lack of sufficiently available resources (people and materiel, training areas) and limited time span between the political decision-making and the deployment. In the light of decreasing exercise budgets, decreasing availability of assets for live exercises and difficulty in realistically representing the complex threat environment in a live context, many NATO and partner nations have started developing and adopting national simulation capabilities (e.g. US Distributed Mission Operations (DMO)).

Many combat situations and other military procedures can nowadays be simulated better in a virtual world than in real life. Dangerous events in the air, at sea or on the ground, urban environments with many civilians, uncertainties in the fog of war, can now be realistically simulated to a level that is impossible in “real life” training environments. An urban training village should not be destroyed in the real world, but this is very acceptable in a simulator. Near collision situations in mid air or at sea can only be trained realistically in a simulator.

Operators can easily train in far away environments and use niche-assets of other Member State(s). Netherlands Navy operator can already practise the use of Tomahawk cruise missiles and SM3 BMD interceptors, while the political acquisition decision is still pending.

In many cases training by distributed simulation is highly effective: multinational teams can train daily while remaining on their own base and work with military colleagues from all Member States. In addition to operator and team training, distributed simulation will teach them to cooperate and bridge language, procedural and cultural barriers.

In other cases it is more effective to perform training in large facilities with advanced training systems. Sharing these facilities will reduce cost for individual nations and cater for larger and more advanced facilities. Interoperability will be tested and enhanced, both in technology and in procedures. In such a common European environment trainees will be immersed in Europe-wide cooperation and use their acquired skills as standard procedures in war.

An additional advantage of cooperative training is that those Member States that lack their own facilities for training can avoid considerable investments and use common training systems on a pay-per-use basis.

4. Technical opportunities for cooperative training and simulation

Technology is developing rapidly. Particularly in the area of simulation and training software. Multiple civilian gaming technologies could be used to train military personnel. Cooperative development of specialised military adaptations could save costs. Examples are driver training software for heavy military vehicles and in-flight command and control training software for aircraft.

High end and specialised training systems with mechanical components could be developed and used Europe-wide. Example is the 6 degrees of freedom motion simulator Desdemona developed to train fighter pilots, but also used to train rollover situations of heavy armoured vehicles and other complex motion experiences.

The importance of simulation for training is recognised by NATO and national authorities. NATO developed and agreed on a Modelling and Simulation Masterplan (NMSMP)¹⁴ to guide national efforts. In these plans targets are given for training to be provided through simulation¹⁵.

Mission Training through Distributed Simulation (MTDS) is recognized as critical to mission readiness. NATO and national studies resulted in an MTDS vision and initial Concept of Operations (CONOPS), which should lead to a persistent MTDS capability to support the warfighter in achieving increased mission readiness. National MTDS efforts are aligned with partner nations in the NATO Modelling and Simulation Group (NMSG) to deliver cost effective means to enhance operational readiness for future Coalition operations. The NMSG mission is guided by the NATO masterplan which states as one of its main objectives the requirement to develop a "Common Technical Framework" to enable simulation interoperability and reuse. The NMSG has the formal mandate regarding Modelling & Simulation (M&S) interoperability standards development in the NATO alliance and publishes recommended standards guidelines¹⁶ and STANAGs¹⁷.

Simulation technology has clearly made significant progress over the past decades due to theoretical studies (e.g. behaviour modelling), formal methods (e.g. training needs analysis, verification and validation), interoperability standards (e.g. High Level Architecture (HLA), STANAG 4603 [3]) thanks to hardware advances pushed by civilian demands (e.g. computational power, networks, image generation). However, several key technologies and processes are still needed to further advance simulation capabilities in a Joint/combined military context.

The main topics are summarised in annex 1.

Research and development initiated by the government should address the above-mentioned technical and procedural gaps, which negatively impact on distributed simulation in support of exercises. Vendor independent open standards are needed as a baseline for industry to develop a European MTDS capability that is closely aligned with our NATO Allies through the NMSG.

¹⁴ NATO Modelling and Simulation Master Plan NMSMP v2.0 (AC/323/NMSG(2012)-015). See: [https://www.sto.nato.int/NATODocs/NATO Documents/Public/NATO_MS_Master_Plan_Web.pdf](https://www.sto.nato.int/NATODocs/NATO%20Documents/Public/NATO_MS_Master_Plan_Web.pdf)

¹⁵ Royal Netherlands Air Force Master Plan CLSK3.0 (2014)

¹⁶ NATO AMSP-01 (NATO Modeling and Simulation Standards Profile), Edition C version 1, NATO Standardization Office, March 2015

¹⁷ STANAG 4603 Edition 2, Modeling and Simulation Architecture Standards for Technical Interoperability: HLA, NATO Standardization Office, 17 February 2015

The European industry and R&D community should be engaged in this effort through the European Training and Simulation Association (ETSA)¹⁸ and the European Defence Agency (EDA). Not only the well-recognised large defence industry companies (Original Equipment Manufacturers (OEMs)), but also Small and Medium size Enterprises (SMEs) from the gaming industry and other relevant sectors. These R&D related activities could be an important goal in the future Research Window of the European Defence Fund.

The MTDS type of training provides simulation opportunities that are often more realistic than those conducted in non-artificial circumstances, thus enabling personnel to practise emergency procedures that could not be conducted with the actual systems, weapons or equipment.

A large exercise using MTDS training called Viking 18 is planned for 2018. Organised by the Swedish MoD, military and civilian participants from about 35 nations and 77 organisations will participate in this computer assisted peacekeeping exercise. See annex 3.

MTDS training provides insufficient training value when specialised training systems with complex mechanical components are needed. Like in aircraft pilot training. This type of training could be conducted in large facilities throughout the EU. Cooperation helps to create larger and more advanced facilities.

A good example is the NH90 full mission flight trainer in Den Helder, the Netherlands. Partly owned by the NL Mod and operated by the Italian company Rotorsim Srl¹⁹, a joint venture of CAE and AgustaWestland, daughter of Leonardo (former Finmeccanica S.p.a.). This simulator offers advanced NH90 training for a.o. the MoDs of the Netherlands, Norway, New Zealand, Belgium and Italy. The FMFT fully replicates the real helicopter, including all systems and subsystems, in terms of behavior, functionalities, accuracies, limitations and failure characteristics. Almost 80% of regular aircraft training is now performed in this simulator.

When not in use for NH90 military training the simulator can be changed into an Apache or Chinook simulator, or switched to a civilian mode to train pilots of other types of helicopters.

Live exercises will remain relevant, but more and more to serve as validation of skills that have been acquired and honed in simulation. Augmented reality or mixed reality technology will enhance live training to address its shortfalls resulting from limited complexity (e.g. number of live players) and risks or costs of weapon system deployment.

¹⁸ European Training and Simulation Association (ETSA) <http://www.etsa.eu>

¹⁹ <http://www.leonardocompany.com/en/customer-support/elicotteri-helicopter/training-solutions/rotorsim>. Click on NH90 JNTP.

5. Funding of cooperative facilities

Funding issues are always complex, particularly when taxpayers money is required to cross borders.

The need for a NATO- and EU-wide standard for Mission Training through Distributed Simulation (MTDS) was explained in the previous chapters and in more detail in annex 1. Similar standards and system development will be needed in the future when technology continues to progress. Funding of this type of applied research and development at lower to medium Technology Readiness Levels (TRL), should be made possible and stimulated within the scope of the research window of the European Defence Fund.

Developments for training and simulation systems on a higher TRL level and training facilities often would not need a large financial contribution from the European Defence Fund or Member States. The European Union or national governments do not need to own training systems. The armed forces should have unrestricted access to these services when necessary. This is not synonymous with ownership. The ownership with obligations of maintenance and adaptations could be outsourced and facilities used against a fee.

Privately owned training and simulation services could also be used by third parties when required in an adapted or limited manner and when not needed by the military. All users pay on the basis of actual use and their drawing rights. This concept would be conceivable for advanced simulation and training systems in use by several Member States and third parties.

A very good example is the Desdemona motion simulator²⁰. This advanced six degrees of freedom simulator was specified by the Netherlands MoD for research and training of military pilots in flight. Since its completion, the simulator has turned out to be very useful for many other purposes, like motion simulation of ships, vehicles and also for space flight simulation. The simulator is privately owned and contracted out to a number of private customers like Ferrari and XCOR Space Expeditions.

A clear vision on potential dual use at the start of a simulation and training project will attract private funding and hence reduce the need for government funds. High-end simulators could be used on a pay-for-use basis rather than build with considerable up-front government investments.

In the European cooperative defence environment this type of simulators would be particularly attractive when funded by private capital while their use is shared between multiple armed forces and private users. Private investments²¹ are not as much bound by borders and politics as Member State funding. Location issues would be of less importance and all Member States could use the facilities to the extent that they need and can afford.

²⁰ See www.desdemona.eu. Based on the Desdemona success of the last 10 years this advanced motion simulator was recently integrated in a partnership of multiple governments, universities, RTOs and private organisations called Aeolus – an ecosystem for Human Performance Innovation. See: <http://www.aeolus-hpi.org>

²¹ Private funding options are given in “Innovative funding for Defence”, Jan Wind (2015). See <http://www.wisernl.com/team/publications-jan-wind/innovative-funding-for-defence>

6. Conclusions and recommendations

Cooperative education and training improves procedural and cultural interoperability in the European armed forces. It promotes similar responses to the same situation and facilitates mutual understanding, integration and team building. For individual military men and women it builds lifelong personal networks that will help them to better understand their fellow Europeans.

In “basic” education the specific military culture is created and that the bonds of cohesion and camaraderie are born. It would be beneficial to extend existing multilateral frameworks to include more students and more countries. Especially in regions and between nations with overlapping cultures and bridgeable language barriers. The earlier cooperative training starts, the better it is. In basic training national identity and culture should however be recognised.

In advanced military education several exchange programmes exist throughout the European Union. These could be further developed and expanded throughout all Member States. This would stimulate the important element of military cultural integration. The European Security and Defence College (ESDC) could facilitate this process on behalf of the European Commission.

To better organise training throughout Europe, training should be integrated in just a few European Commands. The issue of sovereignty is less important in training and exercises and other hurdles that often hamper cooperation in actual operations are also absent in these circumstances. Examples would be a North- and South-European naval training command, three European Army training Commands, etc. The company/battalion level training for naval ships as is in operation for decades by the Flag Officer Sea Training of the Royal Navy could also be used as a model for European armies and air forces.

Simulation for training has become an essential tool to meet the training needs of military and security forces both in a national and multinational context. Technical developments have made simulation in many important aspects more realistic than actual training and exercises. The importance of simulation for training is strongly felt at NATO and national policy levels, but is undervalued in recent European Commission plans for the future of European defence.

A European technological advantage in training and simulation could be achieved by making the R&D window of the European Defence fund available for Modeling and Simulation research. This does not only lead to better trained military men and women, it also stimulates European cohesion by bringing Europeans together in an environment where cultural differences can be understood and bridged long before going on an actual mission. NATO panel and US dominance should be avoided where Europe pursues strategic autonomy.

Some of the training can only be performed in large and complex systems. It could be effective to use private funding for investment in these expensive facilities. The use of these facilities could then be shared between military and other users on a pay-per-use basis.

Annex 1. Mission Training through Distributed Simulation (MTDS) architecture

The MTDS Reference Architecture (RA) addresses the technical and procedural requirements and standards that are important in meeting MTDS needs. The purpose of the RA is to provide a “template” solution for more specific MTDS solutions used for training exercise instances. The RA is not an instruction guide on how to build a one-size-fits-all MTDS solution, but provides amongst others, key architecture building blocks with requirements and standards, architectural design patterns, and references to solutions for these building blocks. The architecture of a specific MTDS solution should generally be compliant with the RA. Improvements or extensions that are developed for a specific MTMS solution are incrementally merged back into the RA when these are considered sufficiently mature and tested. Simulation exercises (such as Viking 18) are typically used to test developed improvements.

MTDS Technology

Specific technical areas must be investigated to address issues that prevent an effective use of MTDS. This includes gateways and bridges needed to cope with the integration of existing legacy simulation systems, test and certification tools to verify the proper behaviour of simulation components, maintenance policies and methods, and tools for the discovery of suitable MTDS components in a shared repository.

MTDS Security

The MTDS infrastructure has to be open to NATO nations as well as to PfP nations and even non-governmental organizations. However, nations or organizations should not have access to data without the proper access privileges²². This implies that adequate security measures need to be developed and tested. A Multi-Level Security (MLS) capability is envisaged as the target objective. However, this can only be achieved in a phased approach from ‘System-High’, towards Multiple-Independent Levels of Security (MILS) towards Multi Level Security (MLS).

MTDS Planning and Deployment

The procedural aspects of planning and executing an MTDS event need to be addressed and result in a common CONOPS and recommendations for supporting tools (e.g. instructor tools, After Action Review etc).

MTDS Content

The issues related to the modelling and simulation of a consistent dynamically changing synthetic mission environment (e.g. damage to buildings and weather effects), as well as the simulation of specific cyber effects (e.g. GPS spoofing) must be addressed and investigated in experiments. Improved and more realistic behavior of simulated humans (opponents, allies and non-combatants) is required to replace trained role-players which are already very scarce or not available in live exercises.

²² An access privilege is a clearance to access certain information, servers or other data carriers. Usually a password and/or a token has to be used.

Environmental conditions

Specific needs related to individual training to prepare for extreme conditions also offer opportunities for joint research and pooling of expensive facilities. Examples are Disorientation training (e.g. Desdemona 6 degrees of freedom motion simulator to train fighter pilots or train rollover situations of heavy armored vehicles), extreme G-forces simulation (and other complex motion experiences), hypoxia-, hypobaric- and thermobaric- chambers (e.g. pilot or diver training).

Annex 2. International modelling and simulation organisations for defence purposes

NMSG

The NATO Modelling and Simulation Group (NMSG) is part of the NATO Science and Technology Organization (STO). The mission of the NMSG is to promote cooperation among Alliance bodies, NATO, and partner nations to maximize the effective utilization of M&S. Primary mission areas include: M&S standardization, education, and associated science and technology. The NMSG mission is guided by the NATO Modelling and Simulation Masterplan (NMSMP) [1]. The NMSMP vision is to “Exploit M&S to its full potential across NATO and the Nations to enhance both operational and cost effectiveness”. This vision will be achieved through a cooperative effort guided by the following principles:

- Synergy: leverage and share the existing NATO and national M&S capabilities.
- Interoperability: direct the development of common M&S standards and services for simulation interoperability and foster interoperability between Command & Control (C2) and simulation.
- Reuse: Increase the visibility, accessibility, and awareness of M&S assets to foster sharing across all NATO M&S application areas.

The NMSG is the Delegated Tasking Authority for NATO M&S interoperability standards. This is the rationale for the close relationship between NMSG and the Simulation Interoperability Standards Organization SISO, which was formalized in a Technical Cooperation Agreement signed in July 2007.

European Training and Simulation Association (ETSA)

ETSA is a Community Interest Company comprising Member organisations and Individuals from Industry, Government agencies and military end-users, Academia, Media and other Strategic Partners. As such, it is owned by the Members and operates for the benefit of the Members and the Modelling, Simulation and Training Communities in general.

ETSA has established itself as “The European Voice” of the MS&T community.

ETSA represents the European training and simulation community. It provides a non-partisan environment for government bodies, academia, users and suppliers within Europe to network, exchange opportunities, ideas, information and strategies on education, training and simulation technology and methodology.

ETSA undergoes, and coordinates, research, development and innovation work to promote and help instigate, improve and extend the widespread use and efficacy of modelling and simulation technologies (including virtual, augmented and mixed reality) and practices for training and other applications throughout the European community.

ETSA organises seminars, workshops, visits and interest groups. It runs an informative website, publishes regular Members’ Newsletters, and provides Member discounts/benefits at many major training & simulation exhibitions, conferences and events Worldwide.

Annex 3. MTDS exercise Viking 18



Exercise Viking 18 is the 8th in a series of major multi-functional civil-military exercises organized by Sweden over the past eighteen years. Viking is the largest civil-military relations exercise in the world. The previous edition, Viking 14, was conducted in April 2014 and saw more than 2600 participants representing 24 countries and 33 different organizations including NATO Allied Command Operations (ACO), Norwegian Defence International Centre (NODEFIC), Norwegian Defence Staff College, Swedish National Defence College and many others.



The aim of the Viking Mission Training through Distributed Simulation (MTDS) exercise is to train and educate participants - civilian, military and police - in planning and conducting a UN mandated Chapter VII Peace Support Operation, based on a comprehensive approach, and focusing on cooperation and coordination within an unstable environment, involving all stakeholders.



Figure 1 Viking18 Sites

The exercise is conducted by the Swedish Armed Forces and The Folke Bernadotte Academy supported by the United States as a strategic partner. Viking 18 will be conducted from 16-26 April 2018 in Sweden with sites in Brazil, Bulgaria, Finland, Ireland and Serbia. Several additional nations and organisations participate from sites in Sweden.

Viking uses distributed simulation technology based on the High Level Architecture (HLA), STANAG-6403. The information exchange in Viking 14 and Viking 18 is based on the NATO Education and Training Network (NETN) data model and federation agreements standards as developed in the NATO Modelling and Simulation Group activities MSG-068 and MSG-106 .



Figure 2 Viking18 high level setup

General information about VIKING 18 may be found at

<https://www.caxcis.mil.se/Pages/viking18info.aspx>

A speech by the Swedish Minister of Defence can be found at:

<http://www.government.se/speeches/2016/07/interoperability-platform>

A short news article can be found at:

<https://jfcbs.nato.int/page5964943/2017/project-manager-and-director-of-exercise-viking-18-visits-jfc-brunssum>



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Annex 5. Acknowledgements and contact

About EDTA

The Federation of European Defence Technology Associations (EDTA) was established in 1992 on the initiative of the ministers of the then Independent European Planning Group (IEPG) and aims to enhance cooperation and professional relationships among its members. It does so by information exchange, promotion of conferences and promotion of public interest in defence industry and technology. EDTA is mainly active in the defence technology and defence industry sector. The federation has 11 member associations in 10 European nations with a total of over 6000 individual and 400 corporate members. For more information: www.fedta.eu

About EURODEFENSE

Established in 1994, the EURODEFENSE network aims to foster the awareness of the common interests of European countries, to develop a greater sense of European defence and to support the implementation of the Common Security and Defence Policy. To achieve this goal, EURODEFENSE is mainly active in the defence and diplomatic sector.

The EURODEFENSE network has 14 national associations in as many European nations. For more information: www.eurodefense.eu (Fr) or www.euro-defense.eu (Eng).

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