EUROPE'S AIR TRANSPORT AND AIR-TO-AIR REFUELLING CAPABILITY
Examining the Collaborative Imperative

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Executive Summary

This paper examines the European requirements for air transport and air-to-air refuelling (AT/AAR) in the future operating environment. The paper does not attempt to assess the peacetime requirements, but focuses instead on Europe's ability to surge, particularly in terms of AAR during a time of crisis and therefore high demand. While the paper seeks to address the broader European questions, the authors have taken UK examples to examine how the community might evolve in the future. The paper is designed to promote debate ahead of the NATO summit in September and to raise awareness of this important enabling capability.

Operation *Unified Protector* over Libya in 2011 highlighted the critical shortage in European AAR and ISR assets, which to some extent limited the scope of the combat air campaign. It also brought home Europe's continuing reliance on the US (which currently comprises some 90 per cent AAR capability) for air-power enablers. The requirement for AAR is likely to increase in the future as there is a greater requirement for persistence. ISR and C2 assets, for example, are increasingly likely to demand AAR services to enhance situational awareness. According to current procurement plans, European nations will field around 100 tankers by 2025 which constitutes less than 40 per cent of the NATO requirement. European procurement programmes will rectify some of the shortfall in AT/AAR but as this paper makes clear, platform numbers alone will not be sufficient for Europe to have a truly standalone capability.

There have been a number of 'smart defence' and pooling-and-sharing initiatives in the Air Transport (AT) space, including the Movement Coordination Centre Europe (MCCE), European Air Transport Command (EATC), Strategic Airlift Capability (SAC) and the Strategic AirLift Interim Solution (SALIS). Set up in between 2006 and 2010, these were designed to ease Europe's AT capability gap – particularly in support of NATO's ISAF mission in Afghanistan. However, as NATO withdraws from Afghanistan and looks to future contingency requirements, initiatives such as these might be expanded to help pool and manage the collective AAR capability.

To that end, this paper recommends the following measures:

1. Only 60 per cent of European receiver nations currently own AAR assets. Cost-effective solutions for AT/AAR therefore need to be considered, in order to help European nations meet their requirements. ATARES (the Air Transport, Air-to-Air Refuelling Exchange of Services), which allows participating nations to trade in equivalent C-130 hours has been effective in helping to pool and share AT/AAR; however, a commercial mechanism is needed which allows nations to buy, and not just trade, spare capacity from a European or NATO pool.

2. There are more than twelve types of AAR platform and twenty types of combat aircraft operated by NATO forces. There is an urgent need to accelerate the AAR clearance processes in order to understand the broader multinational requirement, exchange technical information and allow multinational airspace certification for NATO nations.

3. There is a need for better and more collective AAR training to harmonise standards and share expertise. Collective training could facilitate familiarity with other NATO fleets and the European AAR Training (EART) exercise is a good step in this respect. A European training centre could also help nations without AAR expertise to develop a 'seed corn' capability and/or provide earlier entry into service for those nations wishing to buy new platforms as the training could be done in advance of delivery. The UK has fully embraced synthetic training and could provide training as a service to European nations operating similar platforms.

4. There should be better co-ordination and consolidation of multinational initiatives in AAR to provide a single, transparent structure with minimum bureaucracy. This may be achieved by combining EATC and MCCE, which are currently co-located in Eindhoven, the Netherlands.

5. European AT/AAR assets are already multi-role platforms typically employed in a transport role during peacetime and as an AAR platform during crises. Further capabilities might be squeezed from AT/AAR platforms by adding ISR sensors to provide additional intelligence while the platforms loiter above the battlespace. However, this must not compromise operational effectiveness. Additional functions always come at a cost, and no aircraft can be in two places at once.

The September NATO Summit is a good time for this discussion. The UK could position itself at the forefront of the debate by using its unique Voyager capability as a case study.

The RAF has procured a core fleet of nine A330-MRTT aircraft fitted with hose and drogue to meet existing requirements along with a 'surge' capacity of five additional Airbus aircraft, which are available if required for future operational requirements. The contract is delivered through a PFI financing structure, which allows AirTanker, the contractor to sell the surge capacity either to other allies or to civilian customers on the commercial market. At present, the first of the A330-MRTT surge fleet aircraft is on contract to Thomas Cook Airlines, which in the circumstances is rather regrettable.

This is not through bloody-mindedness on the part of the RAF or AirTanker. The UK is already a member of MCCE and has committed its core fleet of

nine aircraft to the scheme. It is also a participant in the European Defence Agency AAR work-strands. However, although the 'surge' fleet might be made available to NATO allies to help make up the existing shortfall, it requires a financial arrangement, which cannot work under the existing mechanisms. Unlocking this conundrum would not only help the UK offer an additional five aircraft to the alliance but might also help set up a broader European contracting mechanism, which could persuade the likes of Germany and Spain to retain 'surplus' A400M aircraft, which they are now looking to sell on the international market.

The success of European initiatives ultimately rest with the US. At present, nations can use spare capacity in the US fleet via FMS which costs them nothing more than the price of the fuel they receive. Commercial constructs cannot compete with this. If the US wishes Europe to stand on its own two feet, it also needs to make it cost effective.

European Air Transport and Air-to-Air Refuelling Requirements

> Of all air-power force-multipliers, Air-to-Air Refuelling (AAR) is amongst the most significant. It provides an essential capability that increases the range, endurance, payload and flexibility of all capable receiver aircraft, and is especially important when forward basing is limited or unavailable, or air base operations limitations impose constraints.
>
> (JAPCC, 'Air-to-Air Refuelling Consolidation: An Update', March 2014)

Although 2 per cent of GDP is a NATO target, few member states apart from the US meet this level. Moreover, following the 2007–08 financial crisis, European defence spending has continued to decline, leaving the US to fill the gaps much to the frustration of many in Washington. At present, the approximate ratio of European to US defence spending is 1:3.

Recent events in the Ukraine emphasise the need for a strong NATO in which all member states are able to contribute appropriately to collective defence, and this has already led to modest increases in defence spending by Eastern European states. With the US looking west to the Pacific Rim, Europeans will also increasingly need to take the lead in responding to crises in the NATO periphery. However, European nations are still feeling the effects of the global economic recession and defence is not (yet) an issue that will win votes. Modernisation will therefore require a fresh approach if it is to be cost effective.

There are currently two mechanisms for defence collaboration in the European context: NATO's Smart Defence initiative and the European Defence Agency's (EDA) Pooling and Sharing construct. The approaches are different, although both have a common aim: to increase collective capability – and plug gaps in capability – through collaboration. There have been efforts to co-ordinate these two initiatives. However, NATO and the EU continue to find integration of capability development difficult for political and bureaucratic reasons, notwithstanding their significant common membership.

This paper explores both the Smart Defence and Pooling and Sharing initiatives, and considers new constructs that member states might employ to improve the sharing of capacity, experience and resources. In this paper, we use the example of air transport (AT) and air-to-air refuelling (AAR), which we denote together as AT/AAR.[1] However, insights should also be applicable

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1. There are dual use platforms, which tend to be denoted ATAR but here we are talking about Air Transport OR Air-to-Air Refuelling. Some of the platforms we include in this category are therefore single-use rather than multi-role.

to other aerial capabilities, such as maritime patrol aircraft or remotely piloted air systems, and potentially to the maritime sector as well.

Future Trends

Predictions of the future security environment suggest continued instability along the European periphery. While the future involvement of European nations in military operations in East Asia is not clear, maritime security in the fullest sense includes assurance of access and will require a responsible European contribution beyond the immediate European hinterland. AT/AAR is a critical enabler in operations where forward basing is limited or extended range is required.

Rising defence costs compared to budgets will demand greater integration of military capabilities among European nations and resulting co-dependencies – particularly in the air and maritime domains, where the costs of platforms are leading to ever-decreasing numbers of platforms. Tackling this will require innovative means of procuring, operating and supporting military assets, and in training and supporting military personnel. For example, in combat air fleets, greater use of synthetic training would free up platforms traditionally reserved for training, while air-to-air refuelling assets can extend the range and endurance of these high-performance platforms.

The proliferation of military and dual-use technologies will be another factor in global security. NATO's future strategic concept and the EU's security strategy will both need to address these complexities in order to both mitigate the threats from dual-use technology, but also to exploit the opportunities. Many military support platforms, for example, are based on commercially available aircraft in order to reduce development costs.

Specific to the air environment, the proliferation of advanced air- and ballistic-defence capabilities may hinder the Western ability to intervene in emerging crises; man-portable air-defence systems (MANPADS), such as those flowing out of Libya, are also increasingly available to insurgent groups. These threats have wider implications for the global air community. Defensive aid suites will therefore be increasingly important for military support platforms, while stealth is fast becoming a pre-requisite for air forces wishing to maintain freedom of action in a high-threat environment.

Regarding AAR specifically, there has long been a presumption that refuelling would be conducted in relatively benign environments with high levels of air control. In future complex security environments with diverse asymmetric threats, however, the concept of the 'front line' is increasingly blurred; future AAR platforms are more likely to require defensive aids to permit versatile use.

European Dependence on the US
The US will face a similar challenge of falling defence spending in relation to rising defence costs. Notwithstanding the regional priorities of future administrations, the US will have fewer numbers of platforms. The issue is not one of dwindling capability, but rather of the ability to disperse sufficient military capability across the globe in a sustained manner as security threats emerge and change.

The defence and security priorities for the European members of NATO will not necessarily be the same as those of the US and Canada. While the US is not expected to abrogate its Article V responsibilities, nor turn its back on Israel and the Middle East, it seems increasingly likely in many situations that the US will not be the lead nation for such an operation. European militaries should therefore be prepared to provide a comprehensive range of capabilities.

Operation Unified Protector over Libya in 2011 highlighted a critical shortage of European AAR and ISR capacity – a shortage which severely restricted the number of combat air missions. The US, despite flying a quarter of the air sorties, supplied half of the aircraft and flew 80 per cent of the AAR and ISR missions, flying 4,407 tanker aircraft sorties offloading around 250 million pounds of fuel to more than 15,000 patrol aircraft.

Table 1 below is based on a table which appeared in a 2014 Joint Air Power Competence Centre paper on AAR. It outlines the requirement for AAR within NATO and the AAR assets available to NATO both at present and projected for 2020–25. The paper assesses that European nations would only be capable of undertaking a single 'air-heavy Small Joint Operation'. The problem is compounded because there are twelve different types of tankers which do not have 40 per cent of the necessary clearances for multinational air-to-air operations. There is also a shortage of boom-equipped (as opposed to probe) tankers.

NATO Roles and Requirements
Given the withdrawal from Afghanistan, NATO's 2010 Strategic Concept needs renewal. Events in Syria and the Ukraine are likely to prompt some refocusing of NATO's purpose as an alliance for regional security and away from that of global power-projection.

This is not to eliminate NATO's important continued role as a hub for military interoperability with partners and friends around the world, and as a repository for military standards and procedures. High-intensity combat capability, for deterrence against (re)emerging powers or to prevent military bullying or blackmail, will remain the force driver for its military capability. However, its force development and force-planning processes will need to

address those scenarios in which the US might not be the lead nation nor able to provide a large part of the combat service support, or other logistic support capabilities.

There are requirements to professionalise air power across the Alliance; to understand and introduce the requirement for stealth as the F-35 arrives in Europe; to understand how to maximise the use of combat air and associated support assets; a requirement to make up the shortfall in ISR and AAR and, as part of that, to integrate remotely piloted air systems more fully into European air space. The recent JAPCC paper on AAR notes that AAR capability has been identified as a NATO capability shortfall for 'more than a decade'.

The requirement has been broadened since the Cold War, which focused on support for long-range operations (strategic reach) and long-range strike. Now AAR services can support combat air, ISR, airborne command-and-control (C2) and maritime-patrol missions. The JAPCC paper also recognises the trend towards multi-mission aircraft and notes that tanker transport aircraft may in addition be used for aero-medical and ISR tasks. While this approach maximises value for money and provides operational flexibility, it has the potential to further stretch an already small fleet.

Table 1: NATO Tanker Inventory (Current) and 2025 (Projected)

State	Receivers	Inventory, 2014	Inventory, 2020–25
Albania	No		
Belgium	Yes		Purchase flight hours through EDA Pillar 42
Bulgaria	No		
Canada	Yes	4 CC-130H(T) (Drogue)3; 2 CC-150T (A-310 MRTT) (Drogue)	2 CC-150T 2 (A-310 MRTT) (Drogue)
Croatia	No		
Czech Republic	Yes		
Denmark	Yes		
Estonia	No		
France	Yes	7 C-160NG (14 aircraft capable but only 7 kits) (Drogue); 11 C-135FR (Boom and Drogue); 3 KC-135R (Boom and BDA)	10 A400M (U/W pods + 5 HDU) 12 A-330MRTT (Drogue and Boom?)
Germany	Yes	4 A-310MRTT (Drogue)	4 A-310MRTT (Drogue) 10 A400M (10 U/W pods + 6 HDU)

State	Receivers	Inventory, 2014	Inventory, 2020–25
Greece	Yes		
Hungary	Yes		
Italy	Yes	4 KC-767 (Boom and Drogue); 6 KC-130J (Drogue)	4 KC-767 (Boom and Drogue); 9 KC-130J (Drogue)
Latvia	No		
Lithuania	No		
Luxembourg	No		
Netherlands	Yes	2 KDC-10 (Boom)	Strategic Tankers under EDA Pillar 42
Norway	Yes		Strategic Tankers under EDA Pillar 42
Poland	Yes		Strategic Tankers under EDA Pillar 42
Portugal	Yes		
Romania	No		
Slovakia	No		
Slovenia	No		
Spain	Yes	2 B-707 (Drogue); 5 KC-130 (Drogue)	9 A400M (9 U/W pods + 3 HDU) Strategic Tankers under EDA Pillar 42
Turkey	Yes	7 KC-135R (Boom and BDA)	7 KC-135R (Boom and BDA)
UK	Yes	9 Voyager KC2 (A-330 MRTT) (Drogue)	9+5 VOYAGER KC2/KC3 (A-330 MRTT) (Drogue)
US	Yes	391 KC-135R/T (Boom and Drogue/BDA) 59 KC-10 (Boom and Drogue); 48 MC-130E/H/P (Drogue); 36 HC-130P/N (Drogue); 15 MC-130J (Drogue); 9 HC-130J (Drogue); 28 KC-130T (Drogue); 46 KC-130J (Drogue)	179 KC-46 (Boom and Drogue)5; 218 KC-135R/T (Boom and Drogue/BDA)6; 59 KC-10 (Boom and Drogue)7; 22 MC-130J (Drogue); 20 MC130H (Drogue); 36 HC-130J (Drogue); 74 KC-130J (Drogue)
Total		**698**	**697 + 31**
Excluding US		66	89 + 31
Europe only		53	70 +31

Notes

1. All numbers in current inventories are taken from the national declarations made during the NATO AAR Working Group in April 2013. The only exceptions are the C-130/KC-3 tanker numbers sourced from the USAF and US Navy.

2. We assume a minimum collective procurement of eight strategic tankers under Pillar 4 of the EDA initiative. The exact number has not yet been decided.

3. Forecast out-of-service date of 2020.

4. The total number of under-wing kits represents the total number of A400M tankers available. The additional Hose Drogue Units do not represent additional tankers.

5. Delivery of the KC-46 programme will be completed in 2028. For the purpose of this document, the 2025 timeframe includes all aircraft deliveries.

6. The estimated number of KC-135s still in service during the period 2020–25 is based on a one-for-one replacement by the KC-46.

7. The USAF is considering retiring its KC-10 fleet in the near future and delaying the retirement of the KC-135R.

8. Under the EDA's AAR Initiative (Pillar 3), the purchase of an additional thirty-one under-wing kits and fifteen HDUs will convert a further 31 A400M aircraft to the tanker role from the existing fleet; but, as of yet, no A400M state has signed up to this option.

Source: Based on JAPCC, 'Air-to-Air Refuelling Consolidation: An Update', March 2014. Figures as of July 2014

EU Roles and Requirements

While the EU Petersberg Tasks focus on the lower end of the spectrum of conflict, combat capability is required for its tasks of crisis management, peacekeeping and peace-enforcement, as well as conflict prevention. In the future, more complex security environment, it will be harder to distinguish high-intensity combat from these other tasks, particularly where there is a need for coercion and directed deterrence to prevent escalation through the ability to dominate in military capability.

Airborne presence and sustained availability will require AAR in particular for operations in the extended European periphery. AT/AAR will be an essential element of both rapid and sustained response – perhaps more so as the total number of combat aircraft falls across Europe and as the F-35 is introduced. (It is unlikely that F-35 will be used purely for quick reaction alert air-defence missions.)

National and Other Requirements

Some European nations will continue to have some obligations for autonomous military operations at range, which will require both AT and

AAR. France and the UK, for example, have overseas dependencies for which they have legal and moral responsibilities for defence and security, and have expeditionary defence strategies which may or may not be sustained into the longer term. Governments may also be motivated by a Responsibility to Protect (R2P) or protection of civilians mandate involving multinational or single-state interventions rather than using NATO or the EU. AT is likely to be a frequent requirement for humanitarian operations and disaster relief.

One of the most demanding responsibilities of individual European governments will be the evacuation of civilian nationals, for which the requirement may be very short notice and the military conditions very uncertain. AT may be the preferred or only option, and combat capability (including air strike and defence) with AAR may be necessary to prevent or dominate escalation. European nations typically will not be able to individually afford to maintain adequate levels of AT/AAR for so wide a range of scenarios.

However, a reliable source of supply will be particularly important in situations of obligation. This could be provided by multilateral or bilateral arrangements, or by partnering arrangements directly with industry.

The Proliferation of Multinational AT/AAR Initiatives

In order to meet Europe's AT/AAR requirements, European states have created various multinational initiatives. The multitude – both in number and set-up – of these initiatives is indicative of the different needs and customers. Moreover, it highlights that the delivery of an efficient and effective European AT/AAR capability is subject to national attitudes towards sovereignty, politics, law and finance. And as NATO does not have a single authority within its present structure to co-ordinate multinational AAR issues, lessons from operations have had to be re-learned. This section explores the various European AT and AAR structures in place and examines their merits.

The Movement Coordination Centre Europe (MCCE)
The MCCE aims to ensure effective and efficient co-ordination among its twenty-five member states in the fields of movement and transportation including AT, AAR, sealift transportation (ST) and inland surface transport (ISTR). Established in July 2007 through a technical arrangement merging the European Airlift Centre (EAC) and the Sealift Coordination Cell (SCC), the MCCE is governed by a steering board and a working board in which all member states are represented. Decisions are taken unanimously with each participant having one vote.

The MCCE brings together requester and provider members either through a Letter of Acceptance (LoA) or the Air Transport, Air-to-Air-Refuelling and other Exchange of Services (ATARES) system. As the basic means of co-operation between MCCE member states, a LoA sets out the conditions agreed between providing and requesting members for strategic lift or AAR support. ATARES provides a framework to facilitate mutual support in the realm of air-force activity through the exchange of services instead of financial payments. Several air force-related services are exchanged through ATARES, AT/AAR, maritime patrol, search and air rescue, and strategic air medical evacuation. Since 2001, AT/AAR has comprised more than 80 per cent of the services exchanged within the programme.

For AAR requests and offers, any co-operation may be compensated for the participating ATARES nations through a unit of measure called the Equivalent Flying Hour (EFH). One EFH is defined as one C-130/160 aircraft flying hour. Each tanker aircraft has a specific factor (EF –Equivalent Factor) as declared by the provider state. For example, if an MCCE/ATARES state is using a tanker which has a factor of 2.8, for every hour of flight service requested the requester state is charged 2.8 EFH in debt, whilst the providing state receives an equivalent credit of 2.8 EFH.

As the outcome of an EDA initiative, the UK has agreed to provide spare capacities of its 'core' A330 aircraft fleet – discussed in detail below – through the ATARES system to other participating MCCE nations. The US is currently assessing whether to join the ATARES mechanism, initially offering C-130 cargo aircraft which are assigned to EUCOM and based in Europe.

The European Air Transport Command (EATC)
The EATC is the participating nations' single headquarters for air transport, air-to-air refueling and aeromedical evacuation. Established in September 2010 with the aim of making more efficient use of European AT and AAR capabilities, the EATC exercises operational control over the aircraft assigned by the participating states to its combined structure. Beyond the direction of the force-generation process and the mission execution, the command also encourages harmonisation and standardisation of training and personnel while providing technical and logistical support.

In order to address the participants' sovereignty concerns, the EATC established three operating principles to guarantee assured availability of a state's aircraft. First, aircraft are flexibly assigned into the command's integrated structures through a Transfer of Authority (ToA) by the participating nations, which they may revoke at any time and as often as considered necessary. Second, the EATC provides specially built rooms – so-called 'black cells' – with national command structures on its premises. These rooms offer separate national telecommunication infrastructure to be used for sensitive national operations – such as evacuation and special-forces operations. National staff may temporarily be withdrawn from EATC structures to conduct operations from within these facilities. Third, each participating state can refuse to participate in a particular operation by showing a 'red card'. Interestingly, since its launch in 2010, no participating state has so far used either a 'black cell' or 'red card'.

The EATC's strategic fleet is comprised of two Dutch KDC-10s, five German A310s and A310 MRTTs, two French A340s and three A310s, one Belgian Airbus A321, as well as three Spanish B-707s to be taken over under EATC OPCON by the end of this year. Assuming Italy will join the EATC, the fleet may also have access to four KC-767As. In the tactical AT/ATR, about 110 to 120 A400M aircraft will in a few years' time fly under EATC operational control, making the EATC the biggest future A400M user. Of course, the numbers of aircraft quoted here present the entire EATC fleet and not the number of aircraft available on any given day. They should therefore not be translated directly into actual capability.

The EDA AAR Project Team
In December 2013, the European Council concluded that it 'remains committed to delivering key capabilities and addressing critical shortfalls

through concrete projects by member states, supported by the European Defence Agency.' It particularly 'welcomed the development of Air-to-Air refuelling capacity and called for 'progress towards increasing overall capacity and reducing fragmentation, especially as regards the establishment of a Multirole Tanker Transport capacity, with synergies in the field of certification, qualification, in-service support and training'. The EU's AAR initiative is led by the EDA AAR Project Team, whose four AAR work-strands have so far achieved somewhat mixed results:

The first work-strand seeks to explore commercial service solutions to address short-term AAR capability gaps until states introduce new AAR aircraft. Although the EDA has produced proposals, no member state has yet expressed any interest. This is arguably due to the general scepticism among nations to rely on commercial services in this domain – something outlined in more detail below. The EDA has therefore put this work strand in hibernation.

In the second work-strand, the EDA in co-operation with the EATC, MCCE and the Italian Air Force works to optimise the available resources of European states, including in terms of organisations and aircraft platforms. It further seeks to develop a common receiver clearance and certification process among member states. Both tasks, however, have so far faced significant setbacks due to the lack of consensus and standardisation across the twenty-eight nations of the EU as well as reluctance to share technical AAR data – a problem also discussed in more detail below.

Under the third work-strand, the EDA – supported by the Organisation Conjointe de Coopération en matière d'Armement (OCCAR) – developed a business case for the pooled procurement of an additional thirty-one AAR kits (comprising thirty-one under-wing pods and fifteen centreline Hose Drogue Units – HDUs) for Airbus A400M user states by the year 2017. It is uncertain at this stage if agreement can be reached to fund these additional kits (at a total cost of roughly €350 million) and whether this option is a viable solution to Europe's requirement. A400M user states have not expressed any interest to take up the EDA's business case. Accordingly, this work-strand has been made dormant.

Under the lead of the Netherlands, the fourth work-strand aims to increase the numbers of Multirole Transport Tanker (MRTT) aircraft by the year 2020 through pooled procurement and/or pooled operation. A respective Request for Information (RFI) has been sent to companies (Airbus and Boeing) regarding the A330 MRTT and KC-46 aircraft. Meetings are ongoing on a monthly basis to address operational, financial and legal issues. Participating nations seek to sign a Memorandum of Understanding (MoU) establishing the respective level of national contributions in 2015.

The Strategic Airlift Capability (SAC)

Established in 2008 through a MoU as an independent and multinational programme, the SAC initiative acquired three Boeing C-17 Globemaster III long-range cargo jets in support of participating state strategic airlift requirements. Governed by NATO's Airlift Management Programme Office (NAMPO) – an integral part of the NATO Support Agency – the aircraft are operated by multinational aircrews under the command of a multinational military structure, the Heavy Airlift Wing (HAW) based at Papa Air Base in western Hungary. The SAC nations consist of the NATO member states Hungary, Bulgaria, Estonia, Lithuania, the Netherlands, Norway, Poland, Romania, Slovenia and the US, and the NATO Partnership for Peace members Finland and Sweden.

Each participating state is accorded a share of the available C-17 flight hours (3,165 annually) in proportion to its financial and personnel contribution to the programme. This can be used for missions without needing to consult other SAC participants. Personnel contributed to the HAW are assigned to various missions (not only those requested by their state) but can be withdrawn from particular missions for national limitations. Command positions in the HAW are manned by the participants with the biggest share of flight hours – the US, Sweden, the Netherlands and Norway.

The Strategic Airlift Interim Solution (SALIS)

Under the SALIS initiative, a multinational consortium of twelve NATO countries (Belgium, the Czech Republic, France, Germany, Greece, Hungary, Luxembourg, Norway, Poland, Slovakia, Slovenia and the UK) plus two partner nations (Finland and Sweden) currently contracts with the private operator Ruslan SALIS – a consortium owned by Antonov and Volga-Dnepr airlines – for the provision of a minimum of 2,450 Antonov AN-124-100 Ruslan flight hours annually.

To deliver these flight hours, Ruslan keeps two Antonov aircraft on hand at Leipzig-Halle Airport for immediate use by the consortium members, with another two available on six-day notice and another two on nine-days notice. Strategic airlift co-ordination among participating states is carried out by the SALIS Co-ordination Cell co-located with but not part of the MCCE.

The contract's initial duration was for three years, but this has now been extended until the end of 2014. Finland and Poland have also now joined the SALIS programme. The SALIS contract was re-tendered in 2012 and Ruslan SALIS was rewarded a new two-year contract (2013/14) with an option to extend until December 2017. Whilst initially created as an interim solution, it seems sensible to argue that SALIS has become a de facto strategic AT solution.

The European Air Transport Fleet (EATF)
The European Defence Agency's EATF initiative aims to improve the usage of existing and future military airlift assets through cost-effective pooling, sharing, exchange and/or acquisition of various capabilities, including aircraft, training programmes, cross-servicing activities, cargo handling, maintenance activities and spare parts, among others. Austria, Belgium, Bulgaria, Finland, France, Germany, Greece, Hungary, Italy, Lithuania, Luxemburg, Netherlands, Norway, Poland, Portugal, Slovakia, the Czech Republic, Romania, Spain and Sweden contribute to the EATF.

It functions as a framework in which different projects, structures and types of assets can be federated, in order to synergise co-operation and co-ordination. The work of the EATF project team (PT EATF) is focused on air transport issues identified and prioritised to improve the efficiency of European air transport, avoiding duplication of effort and sharing outcomes and information with as many entities as possible.

Three Ad Hoc Working Groups (AHWG) are active under the umbrella of PT EATF: AHWG Governance to address the governance and legal issues; AHWG Operations and Training Tactical Air Transport looking at improving interoperability between partners; and AHWG Diplomatic Clearances (DIC) to develop a simplified/harmonised mechanism for diplomatic clearances inside and outside the EU.

Since 2012 the EDA has run, in close co-operation with the EATC, European Air Transport Training (EATT) within the EATF framework, as the only dedicated multinational European airlift training format. In 2014, aircraft and crews from eleven countries took part in the exercise, with a further eight countries sending observers. The next EATT is scheduled for 2015 in Portugal.

An Agenda for Reflection and Change

Whereas the aforementioned initiatives have indeed improved Europe's AT/AAR capabilities, thereby making it less reliant on the US, they still fall significantly short of its current and future AT/AAR requirements. According to current procurement plans, Europe will field fewer than 100 tankers and less than 40 per cent of NATO's stated requirement. Moreover, Europe still falls substantially short of the required level of interoperability within its AT/AAR portfolio. In order to address these capability gaps, the following five aspects are crucial for European AT/AAR stakeholders to consider.

Co-ordination, Consolidation and Advancement of Multinational Initiatives

The proliferation in the number of multinational AT/AAR initiatives suggests that central ownership for the future development of Europe's AT/AAR capabilities is far from imminent. Up to the medium term, it seems crucial to instead ensure that these disparate initiatives work collectively and at an appropriate operational speed. This will require an improved visibility of each other's work to minimise inefficiencies.

In the long term, however, it will be necessary to consolidate existing European initiatives. The EATC and SAC both provide actual capabilities in the AT and AAR domain. Furthermore, as multinational organisations based on common policy, they substantially enhance the interoperability of participating nations. They therefore appear to be natural cornerstones for the future development of European AT/AAR capabilities.

In addition, an eventual merger of the EATC and MCCE – both located on the same premises at Eindhoven – should be considered, given that the EATC already today represents almost half of the MCCE's air-transport co-ordination activities.

However, it also seems necessary to explore new means of co-operation beyond the ATARES mechanism. ATARES has certainly proven to be functional in the past, but spare AT/AAR capacity – the ATARES currency – is likely to be significantly limited in the future. Whereas during peacetime spare AT/AAR flying hours may be available among European nations, allowing ATARES to function as a viable tool of co-operation during times of crisis may not be sufficient.

It is essential that multinational organisations now provide a mechanism that allows nations which have either no or only limited spare AT/AAR capacities to pay with other 'currencies' for the use of multinational AT/AAR assets – preferably in hard cash, or through the pooling and sharing of other support assets, such as ISR.

Optimal Usage of Multi-role Assets

Many of the new aircraft currently being introduced, like the A400M, can physically perform both AT and AAR missions at the same time. However, the operational profile of wartime AAR missions significantly reduces these assets' simultaneous AT/AAR capability.

In such a scenario, tankers are required to fly to an orbit, remain there in support of fighter combat air patrols or strike packages, ingress/egress until empty, and then return to their home bases. Furthermore, strategic AT mission routings are seldom conveniently aligned with AAR tracks, thereby making it difficult to combine long AT legs with AAR tasks. This problem will only increase as the AAR requirement for other assets such as helicopters, C2 and ISR platforms emerge.

More fundamentally, existing doctrine assumes that whereas in peacetime, multi-role assets will primarily be used for training and AT, during large-scale conflict they will shift their tasking to cover increased AAR demand. This doctrine may generate capability shortfalls in the AAR domain, should operational requirements during large-scale conflict dictate a significantly higher demand for strategic airlift and/or air drops, tactical intra-theatre airlifts and special-operations missions. Accordingly, updated multinational doctrine, procedures and tactics are needed to ensure that both the AT and AAR demands can be satisfied simultaneously.

The challenge to make optimal usage of all multi-role assets in the multinational environment is even more complex, as the long endurance of newer tanker aircraft makes them usable for other combat support missions such as C2 support or ISR. Whereas multi-role assets can therefore be a valuable addition to joint operations and deployments – enhancing the flexibility and efficiency of expeditionary forces – their broad capability profile must not be used as an argument to not invest in new, dedicated and much-needed C2 and ISR assets. The employment of multi-role aircraft must always be a balance of priority within the overall capability requirement.

Collective AAR Training

There are currently no common European qualification standards for air-refuelling-system operators, AAR receivers or AT aircrews alike – though NATO manual ATP-56, which has also been accepted by a number of non-NATO states, provides aircrews with internationally standardised definitions, abbreviations and procedures to enable successful and safe AAR operations. This may pose a particular problem for tactical AT/AAR support, in which assets are more likely to be delegated to the local C2 level. Here the lack of standardisation may crucially affect interoperability and safety. The adoption of collective training standards would help to mitigate such risks inherent to multinational operations.

EATT has significantly advanced collective training in the AT domain with three exercises already conducted since 2011 and a similar AAR-centric collective exercise has just recently been created in the form of the European Air-to-Air Refuelling Training (EART).

The first EART was organised jointly by the EDA, EATC and the Dutch Air Force from 31 March to 11 April 2014 and held at Eindhoven Air Base. This first EART aimed to advance participants' proficiency in their qualifications with their dedicated assets and improve European AAR interoperability. To ensure a realistic training scenario within a modern air-combat environment, EART 2014 took place in co-operation with and in support of the Dutch-hosted Frisian Flag 2014 fighter exercise. The exercise brought together three key European AAR providers using three different aircraft – Germany (Airbus A310 MRTT), the Netherlands (KDC-10) and Italy (Boeing KC-767A).

The EART is an early indication that European states have begun to regard AAR as an integral element to be exercised rather than as an exercise enabler for other air assets. The challenge is to secure both the financial and personnel resources to further develop the EART into a permanent European AAR exercise format and expand on its lessons learned.

Given budgetary constraints placed on live-fly training, a complementary synthetic training environment is regarded as essential to maintain core AT/AAR capabilities. The AAR domain, in which boom operators of new aircraft physically control the boom from a remote station via a synthetic link, would lend itself to this sort of training. Accordingly, there is a need to balance the benefits of synthetic training against a minimum level of live-fly training that is required to ensure flight safety and give air crews the experience of the physical and psychological pressures of a challenging operational environment. Furthermore, given the significant costs associated with the procurement and operation of simulators, it seems necessary to optimise the usage of synthetic training facilities among European partners.

Acceleration of Technical and Diplomatic AAR-Clearance Processes
The improved interoperability of European AAR assets is fundamentally dependent on an accelerated technical and diplomatic clearance process.

At present, there are around a dozen AAR platforms operated by NATO states and over twenty receiver platforms, which presents a certification headache as each combat aircraft needs to be (nationally) certified to receive fuel from each AAR platform. As discussed earlier, EDA work-strand 2 has been trying to tackle this, but it is proving very difficult: the combination of an ignorance of multinational requirements, established national bureaucracies, concerns over intellectual property and industrial constrains in sharing data has led to lethargy in the European AAR clearance process. Technical clearance not only

encompasses the technical compatibility between the receiving and tanker aircraft, but also legal and financial aspects as well as the standardisation in employment, training, qualification and currency. As there is no internationally agreed standard for the technical clearance process, nations – acting as the owner of both the final overall clearance and operational risk – apply their own specific procedures.

The challenge to standardise or deregulate the diplomatic clearance process – an issue for all military aircraft, including passenger flights on the Military Asset Register – in order for tankers and receivers to cross national airspace boundaries under a single diplomatic clearance, rather than multiple clearances, is not an AAR problem per se. The issue sits rather with the receiving fighter aircraft in the tanker's trail, which still requires individual licenses for each national airspace they cross. Regardless of where the problem originates from, it obviously demands a solution.

Commercial AAR Services Revisited
Whereas the SALIS contract has proven useful to ease Europe's strategic AT capability gap, European nations have so far been reluctant to agree on a similar commercial service for the provision of a multinational AAR capability. Much of this reluctance rests on the calculation that during peace time, nations can access spare American AAR capacity relatively cheaply through the MCCE's LoA or ATARES mechanisms. However, given its own budgetary constraints and a declining political appetite to underwrite European capability, it seems questionable that the US will be able to sustain such low charges for its AAR capability in the future.

Commercial AAR firms require stable, long-term contracts in order to get a return on their own up-front capital investment in manufacturing and/ or procurement of the platforms. Thus, a commercial arrangement to contribute capacity for operations is only going to be cost-effective for both parties if the costs are spread over several years. Arguably, stable contracts are also in the interest of the military customer as they present a higher certainty over costs and allow the customer and supplier to build a strong relationship during peace time that enables them to work together more efficiently during contingency operations.

Some nations fear that budgets attributed to lease contracts in the short term will undermine new procurement programmes. Given fiscal pressures, they may feel they are presented with a binary choice: either to opt for a commercial service to fill a short-term capability gap, or to assign these resources to the acquisition of new aircraft for nationally/multinationally owned AAR fleets and thereby secure long-term capability gains. However, the SALIS contract has shown that commercial services might be considered as a permanent building-block of Europe's future AT/AAR capability that is

complementary to new acquisitions, particularly if those platforms will take a significant length of time to be introduced into service.

Moreover, the capacity for nations to own and operate large indigenous AT/AAR fleets has diminished over the years. We have already discussed that EDA is struggling to find buyers for its A400M AAR kits; in addition, Germany and Spain are now looking to sell a number of their A400M platforms and Turkey has delayed its order of A400M. PFI arrangements – an instrument to create 'public–private partnerships' (PPPs) by funding public projects with private capital –, such as the UK's Voyager programme, allow spare capacity to be sold on the open market or through collaborative programmes. This allows multiple nations to pay for services and therefore contribute to the through-life costs of ownership – essential if Europe is to retain the overall numbers of platforms that it needs. Indeed, it has even been suggested that Europe requires a 'Voyager-plus' arrangement, which would see future European ATAR capacity funded through an arrangement to sell spare capacity not only within NATO but also to the UN, or allies and partners, such as members of the NATO Partnership for Peace.

Another reason why nations have been reluctant to rely more heavily on commercial AAR services rests with their ability to operate in non-benign areas. Although both military and commercial tankers still tend to operate predominantly in benign areas outside of the threat area, the retrofit of commercial AAR aircraft with defence-aid suites (DAS) may make this less of a concern. For example, British Voyager aircraft equipped with a DAS operate regularly in and out of Afghanistan.

A more important limitation on the usage of commercial AT/AAR services within multinational structures rests with their potential involvement in 'kill-chains' where national caveats may apply. States would therefore need to make contractual arrangements allowing them to prevent unacceptable involvement (direct or indirectly) in such operations via their commercial partner. The military satellite constellation Skynet 5 is a PFI operated by Astrium Services on behalf of the UK Ministry of Defence (MoD), and demonstrates that these hurdles can be overcome though they need to be managed.[2]

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2.   Spare bandwidth over and above the MoD's requirement is sold off to NATO and, on a bilateral basis, to allied nations. Caveats are negotiated between governments at the outset of a contract and monitored to ensure compliance.

Examples of Future European ATAR Collaboration

The UK Future Strategic Tanker Aircraft (FSTA) Project
As an illustration of a commercial AAR service customer, in March 2008 the UK MoD signed a contract with the AirTanker consortium for its Future Strategic Tanker Aircraft project to replace twenty-four Tristar and VC10 aircraft. The service is based around fourteen Voyager A330 aircraft with nine aircraft in the 'core' and another five aircraft in a 'surge' fleet, and includes all the necessary infrastructure, maintenance and training. Crucially, AirTanker augments RAF crews with Sponsored Reserves thereby reducing reliance on RAF pilots.. This might be an attractive proposition to those nations who do not currently operate their own fleets.

Under the twenty-seven-year, £10.5 billion PFI contract, AirTanker owns the aircraft and provides the AT/AAR capacity as a service to the MoD, which is charged only at the point at which the aircraft are made available for service – though the contract is subject to guaranteed 'take or pay' arrangement with a minimum amount of 9,000 flying hours per year. Other than for inflationary increases linked to the Retail Price Index, costs are fixed throughout the contract's lifespan, with AirTanker assuming full responsibility for aircraft fatigue.

The UK prefers to retain sovereignty over its assets (rather than operating them through a multinational structure); however, at present, it does not have the requirement to operate any of the five 'surge' Voyager A330 aircraft. Given the current deficit of AT/AAR, it therefore seems sensible to consider offering them into a multinational structure – though it must be acknowledged that the Voyager is not boom-equipped and can therefore not be offered to certain nations – particularly as spare capacities of the 'core' fleet are already provided to European nations by the UK through the MCCE's ATARES mechanism. A similar offer for the 'surge' fleet would not only decrease the UK MoD's financial cost but also support the advancement of Europe's AAR capability. France is also interested in procuring A330/KC-2 aircraft and there is interest in the strategic tanking contract. Building a European mechanism for buying hours on the platforms would be a positive step.

The alternative under the contract is that the 'surge' fleet is made available to third-party commercial stakeholders for civilian use. As of 24 June 2014, AirTanker has already agreed in principle to an A330 civil leasing deal with Thomas Cook Airlines. Under the terms of the three-year agreement, Thomas Cook Airlines will lease a single A330-200 from the AirTanker 'surge' fleet, to support long-haul routes as part of its UK flying programme. Given that the UK government has not yet come forward with an offer of surge aircraft into multinational structures, this corporate decision is understandable. However,

from the perspective of broader European ATAR capability – particularly with regard to Europe's ATAR requirement during times of crisis, it is a rather disappointing outcome.

Beyond the additional AT/AAR capability generated by the provision of surge aircraft into a multinational structure, a decision to offer the 'surge' fleet into a multinational structure would also strengthen the UK's position as a lead actor in the wider European AT/AAR debate. Surge aircraft could be considered an instrument for the British government to shape discussions around the future of multinational AAR initiates – including the above identified aspects of multi-role, collective training, clearance and commercial services in general.

Both alternatives – the use of UK surge aircraft in a civilian version by third-party commercial stakeholders or the provision into multinational structures – are highly symbolic with concrete political implications. The former implies that the UK remains somewhat insensitive to Europe's multinational AT/AAR requirements and is still willing to predominantly rely on US spare capacity during contingency operations. The latter sends a clear message to the UK's European partners, and to the US, that the UK acknowledges the multinational imperative of European ATAR requirements, and intends to be a key stakeholder in this domain. Notwithstanding that depending on how the use of the 'surge' capability were to be considered, contractual negotiation with AirTanker could be required and additional costs might be incurred; from a military perspective, the preferred option seems to be obvious.

The Airbus A400M Atlas
In addition to the A330-200 Voyager aircraft, the introduction of the Airbus A400M Atlas aircraft will substantially increase Europe's AT/AAR capability. As a multi-role aircraft, the A400M will perform tasks such as the strategic deployment of over-size freight, intra-theatre mobility, airborne resupply, tactical air-to-air refuelling, aeromedical evacuation and fixed-wing support to special forces.

The European A400M Operators User Group (OUG) consists of Germany (with a fifty-three-unit order), France (fifty-two-unit order), Spain (twenty-seven-unit order), the UK (twenty-two-unit order), Belgium (seven-unit order), Turkey (ten-unit order) and Luxembourg (one-unit order). In addition, ordering four aircraft, Malaysia has become the first export customer for A400M aircraft.

With 90 per cent of the A400M's flight testing completed, the delivery of the 174-aircraft order book (including the Malaysian order) is now firmly underway. However, the Spanish decision to resell thirteen A400M aircraft,

as well as delays in the Turkish order, mean that the European A400M fleet may be smaller than had originally been anticipated.

Furthermore, as of March 2014, AAR kits have been purchased for only 18 per cent of the ordered A400M aircraft. Endeavours by the EDA to convince A400M operators to consider buying or leasing additional AAR kits for their platforms, in order to satisfy EU and NATO targets, have so far not been taken up.

Whereas budgetary pressures certainly play a role in this regard, it is likely that national AAR requirements have been met by other assets and there is therefore little incentive for A400M customers to convert these aircraft. Similarly, the EDA has so far failed to convince non-A400M operators to buy or lease A400M AAR kits for use on fielded platforms when contingency planning demands it. This reluctance by both A400M operators and non-A400M operators leaves a significant potential for supplementary tankers that should be addressed in due course.

More generally, in order to benefit from the inherent interoperability advantages of the A400M operator, nations must maintain a common goal of interoperability across all lines of developments throughout the aircraft's lifecycle. The EATC – with about 110–120 A400M aircraft eventually flying under its operational concept and therefore the dominant A400M user – has developed an interoperability framework document which was signed by OUG nations in 2013. The EATC was further tasked to coordinate and harmonise national pilot and loadmaster training as well as to work on common operations manuals. In June 2014, the EATC, in close co-operation with national subject-matter experts, finalised the A400M Common Ground Crew Training Concept which aims to harmonise ground-crew training amongst EATC A400M user states. This could be extended to AAR platforms too, although the multiplicity of European AAR and receiver platforms does make this particularly challenging.

The Way Forward: The Need for a Political Impetus

The post-2008 economic crisis has aggravated the dramatic, post-Cold War decline in European defence budgets. Yet the changing European security environment is causing NATO to rethink its collective defence posture, while globalisation will undoubtedly continue to place additional, unexpected demands on Western armed forces. The air environment in particular is increasingly contested because of the proliferation of MANPADS and advanced integrated air-defence systems.

Operation Unified Protector – the NATO campaign over Libya in 2011 – highlighted the critical shortage of European intelligence, surveillance and reconnaissance (ISR) and air-to-air refuelling (AAR) capabilities. Air transport and air-to-air refuelling (AT/AAR) is a fundamental enabler for air operations. It increases the range, endurance, payload and flexibility of all capable receiver aircraft, and is especially important when forward basing is limited or unavailable, or air basing limitations impose operational constraints.

The US fleet currently comprises 90 per cent of the current NATO AT/AAR capability and is diminishing owing to the effects of budget sequestration and aging platforms. As the US commitments to security in the Pacific Rim grow, it is sensible to assume that fewer US platforms will be available for the European theatre.

European platforms look to increase from fifty-eight to potentially over 100 aircraft by 2025, if nations buy into the A400M conversion programme. However, this is unlikely to meet the growing operational demands in the long term. And in the short term, more needs to be done to help spread the peacetime cost of ownership across all potential receiver states, to avoid them selling off their assets.

There have been a number of 'smart defence' and pooling-and-sharing initiatives in the AT space which have helped to fill some of the gaps, including the MCCE, EATC, SAC and SALIS. However, the AAR space requires further attention. This paper recommends the following measures.

There must be better co-ordination and consolidation of multinational initiatives to provide a single, transparent structure with minimal bureaucracy. This may involve combining EATC and MCCE, which are currently co-located.

The fact that only 60 per cent of European receiver nations own AAR assets means that more innovative and, crucially, cost-effective solutions for AT/AAR need to be considered, in order to help European nations meet their

requirements. Most importantly, a mechanism is needed which allows nations to buy, and not just trade, spare capacity from a European or NATO pool.

European states need to think clearly about the optimal usage of multi-role assets. While multi-mission aircraft in theory maximise the use of an expensive platform and provide additional flexibility, in reality such requirements tend to drive up the costs of procurement and decrease the overall size of the fleet. There is also the concern that this can decrease operational effectiveness if there are competing requirements.

There is a need for better and more collective AAR Training, with more emphasis on synthetic training to complement live-fly.

There is an urgent need to accelerate the AAR clearance processes in order to understand the broader multinational requirement, exchange technical information and allow multinational airspace certification for NATO nations.

Commercial solutions need to be investigated urgently to help make better use of existing AT/AAR fleets both within NATO and potentially extending services to other allies and partners.

At the September NATO Summit, the UK could position itself at the forefront of this debate by formally offering its remaining 'surge' fleet to NATO members. The UK also has extensive experience with PFI and PPP arrangements and so could provide advice on possible financing structures. However, a new type of structure might need to be proposed in order to cover both the operational and contractual arrangements as none of the existing structures are likely to be palatable for the UK, either commercially or politically. But as we have already pointed out, both EATC/MCCE and SAC might be suitable mechanisms were they to be expanded to allow for financial transactions and were they to become much less bureaucratic. Such a system might also usefully be expanded to allow other customers help pay for the capability, but would need to be competitive with commercial freight airlines.

Much of the argument presented in this paper stresses the need for a new political impetus in the European AT/AAR domain. The NATO Summit in September appears to be an opportune occasion to examine this issue.

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