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Integration as a Military Necessity for Alliance Capabilities

Multinational AMD capability development for small and medium-sized European countries based on Hungary as a case study

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Multinational cooperation in the field of air and missile defence is militarily indispensable for small and medium-sized European states, but it only becomes effective when political constraints, the degree of integration and capability development are systematically harmonised. The article examines the tension between national political control and the operational effectiveness of multinational ground-based air defence. Analysis is conducted on how selective and functional integration along the lines of sensors, Command and Control, and training and exercise enable military-relevant AMD capabilities without completely giving up national authority over the use of military force. KEYWORDS: Air and Missile Defence, Ground-Based Air Defence, Multinational Cooperation, Capability Development, Hungarian Defence Forces

Az integráció mint a Szövetség képességeinek katonai szükségszerűsége

Kis- és közepes méretű európai országok számára történő, többnemzetiségű lég- és rakétavédelmi képességfejlesztés – Magyarország esettanulmánya alapján

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A lég- és rakétavédelem területén folytatott multinacionális együttműködés katonai szempontból elengedhetetlen az európai kis- és közepes méretű államok számára, de csak akkor válik hatékonnyá, ha a politikai korlátokat, az integráció mértékét és a képességfejlesztést szisztematikusan összehangolják. A cikk a nemzeti politikai ellenőrzés és a multinacionális földi légvédelem operatív hatékonysága közötti feszültséget vizsgálja. Elemezi, hogy az érzékelők, a parancsnokság és irányítás, valamint a kiképzés és a gyakorlatok terén megvalósuló szelektív és funkcionális integráció hogyan teszi lehetővé a katonai szempontból releváns lég- és rakétavédelmi képességek kialakítását anélkül, hogy teljesen feladnák a katonai erő alkalmazására vonatkozó nemzeti hatalmat.

KULCSSZAVAK: Lég- és rakétavédelem, Földi légvédelem, Multinacionális együttműködés, Képességfejlesztés, Magyar Honvédség

“War is nothing but a continuation of politics with the admixture of other means.”

(Carl von Clausewitz)

Introduction – Strategic environment and the role of Air and Missile Defence

The return of high-intensity conventional warfare in the wake of Russia's aggression against Ukraine makes it clear that militarily effective air defence is inseparably linked to political decision-making processes on integration, escalation, and sovereignty. Furthermore, it becomes obvious that the assumption that war was a thing of the past was based on a miscalculation. Security policy requirements as well as military priorities changed virtually overnight. Ground-Based Air Defence (GBAD) is vital for Ukraine's survival, both at the strategic level to protect the population and infrastructure, and on the battlefield to defend against helicopters, fighter jets and attacking missiles. The widespread use of drones further expands the scope of air defence and contributes to the renaissance of anti-aircraft guns, which, ironically, had already been considered obsolete by most concepts.¹

In this context, Russia's war has provided a multitude of detailed insights at tactical and operational levels in relation to Air and Missile Defence (AMD), which must be carefully examined and ultimately incorporated into the doctrines of European armed forces. It is at least as important as the fact that the war also provides overarching lessons for the further development of the AMD architecture in Europe.

Furthermore, Russia's war of aggression has generated a wealth of insights in the area of economic rationality in security policy, particularly with regard to the cost-effective and resource-efficient development of military capabilities. On the one hand, the warfare on both sides has underscored the importance of mass deployment of military assets in general, which is particularly relevant in the context of aerial threats, e.g. Unmanned Aerial Systems (UAS). On the other hand, the importance of combining different systems in AMD has become increasingly clear. Both adequate defence at all layers and the availability of systems must be ensured in a manner

¹ Fritz, Kleiber 2025, 1.

consistent with the threat. For example, it would be highly inefficient to respond to inexpensive drones with extremely costly air defence missiles.²

In light of these conditions in the global security environment, the structural challenges encountered by small and medium-sized armed forces become particularly significant. The development of AMD capabilities in medium-sized states is characterised by limited resources, limited operational depth and constrained sustainability. This results in fragmented approaches to capabilities and a reduced overall capacity for permanent, comprehensive air defence. Effectiveness in fulfilling AMD responsibilities therefore derives less from fully integrated efforts at the national level than from prioritised, selective contributions within overarching multinational structures.

Since AMD procurements usually create long-term commitments with limited national flexibility, they are also often subject to heightened political sensitivity. The benefits of such integrated defensive capabilities for contingency purposes are more difficult to communicate politically than those of forces that can be deployed immediately. To generate political acceptance, contributions to collective multinational AMD architectures may thus be more useful than ambitious national full-scale equipment programmes. This article examines how a small or medium-sized European state like Hungary can develop and integrate robust and credible AMD capabilities through multinational cooperation under realistic political and operational conditions.

Multinational integration and capability development in the political-military conundrum

Analysing multiple formats of multinational AMD capability development along the layers of interoperability, it can clearly be deduced that only integration-based arrangements enable the synchronisation of sensors, decision-making, and engagement under time-critical conditions, thereby generating effects that exceed the sum of national contributions. Coordinating formats alone will not be sufficient to reach an adequate level of resilience which is urgently needed to cope with today's high-intensity conflict scenarios. The goal for allied nations in Europe must therefore be to build up truly integrated Command and Control (C2) structures and shared situational awareness in the sphere of AMD.³

Therefore, European nations will have to cooperate deeper and better to establish an effective, integrated AMD architecture, since it would simply be too expensive for individual states to tackle this issue on their own. The starting point for this was established a considerable time ago, as European airspace has already been regarded as an operational whole for many years due to NATO's Integrated Air and Missile Defence System (NATINAMDS). This idea could even be implemented more

² Lawrence, Zandee, Gasper 2025, 2.

³ Passbach 2026 (forthcoming).

effectively through multinational cooperation from the conceptual stages of capability management than through the subsequent integration of already procured individual systems. From a purely military and operational superiority perspective, a shift from an interoperability paradigm towards a full integration paradigm in multinational AMD cooperation would be necessary. Invaluable force multiplying effects will be produced if the national contributions of sensors, effectors and C2 elements operate within a shared network.⁴

Even though multinational, resource-efficient military capability development appears to make a lot of sense from an economic point of view as well, particular integration-based cooperation formats face strong political constraints. The greater the degree of multinational integration, the more inevitable it becomes that it will encounter concerns about sovereignty and, as a result, imposed national caveats. Particularly complex questions concerning the legitimacy of using military force or political accountability for military engagements have long been matters of national discourse.

The dilemma is obvious: loose coordination within the field of AMD is insufficient, as only a certain level of integration results in an adequate level of operational performance. At the same time, political sensitivity grows with each level of integration. Integration-based cooperation frameworks make sense from a military perspective, but are challenging from a political standpoint. Military imperatives clash with political constraints at this point. Thus, to what extent is a selective or a functional integration possible in order to ensure an effective multinational AMD capability with the highest possible but still realistically achievable degree of integration?

In this context, selective integration can essentially mean that, deliberately, only certain elements or areas of a national capability are integrated into a multinational architecture, while others remain nationally autonomous. By functional integration, I refer to the integration of a capability along specific military functions – e.g. surveillance, C2, effects – regardless of organisational or national affiliation. At first glance, differentiation through selective and functional integration could therefore represent a pragmatic approach to capability development in Integrated Air and Missile Defence (IAMD) in Europe. Selective integration will thereby allow specific elements of a national AMD system to be embedded into a multinational, higher-level architecture without requiring complete structural or organisational convergence. Functional integration complements this approach by embedding national contributions into the overall architectural framework along clearly defined military functions, regardless of their national ties.

The distinction between these two concepts seems extremely theoretical, but will be helpful in the subsequent analytical consideration of this article. Moreover, both approaches emphasise that the procurement of modern weapon systems alone does not constitute full AMD capability, but rather that operational effectiveness can only

⁴ Lawrence, Zandee, Gasper 2025, 2-4.

be achieved through the coherent development of all dimensions of the DOTMLPFI⁵ methodology. Selective and functional integration can therefore be a way to achieve high operational performance through cooperation and task sharing without disproportionately curtailing national policy leeway or the economic efficiency of capability development.

Military requirements for multinational AMD capabilities

Having briefly described the main challenges and the analytical framework, it will be useful to dive somewhat deeper into the operational logic and the military requirements for multinational AMD capabilities. As the Russo-Ukrainian war demonstrates, the current spectrum of aerial threats is characterised by high dynamics, short warning times and increasing saturation effects. GBAD systems as an integral part of NATINAMDS must therefore not represent additional individual capabilities but must form a highly integrated system of systems whose military effectiveness arises synergistically from the seamless interaction of interconnected sensors, integrated C2 structures and synchronised effectors. From a purely military perspective, multinational initiatives are therefore less a question of political cooperation formats than of the operational feasibility of this AMD system logic.

The operational performance of AMD systems is based on their ability to generate a shared and robust Recognised Air Picture (RAP) to complete decision-making cycles within extremely short time frames, and to deploy effectors in a threat-appropriate manner. The entire process must be efficient and fast, because in missile defence, response times ranging from seconds to a few minutes between the launch of a Tactical Ballistic Missile (TBM) and its arrival at the target are the norm. For instance, a Russian “Iskander” missile from Kaliningrad can reach Berlin within approximately five minutes.⁶ This means that national decision-making and approval procedures can adversely influence the overall effectiveness of the system. At the same time, IAMD requires continuous 24/7 operation with a high level of personnel and technical sustainability. Multinational contributions to the overall system can therefore only meet these requirements for operations if they are integrated in an enduring, structural manner and not merely on an ad hoc basis.

Functional integration is crucial in this regard, as delays in data fusion, discontinuities between national C2 elements or parallel command structures have a direct impact on mission accomplishment. Loosely structured forms of cooperation that rely primarily on data sharing or coordinating national C2 systems remain insufficient for effective air defence, as they do not enable an integrated logic for decision-making and mission execution. Coordination of efforts is no substitute for integration, and the decisive added value only materialises beyond certain integration thresholds. These include at least a jointly generated RAP, partially integrated C2

⁵ DOTMLPFI: Doctrine, Organisation, Training, Material, Leadership, Personnel, Facilities, Interoperability.

⁶ Arnold, Arnold 2024, 12.

processes in the spirit of mission command, and operational linking of effectors, which allows them to be deployed according to military necessity rather than national assignment.

In other words, it becomes clear that full integration of all system components is not necessarily required. However, below certain minimum integration thresholds, multinational AMD remains structurally and operationally limited. Hence, these military requirements define accordingly the operational framework for the design of multinational IAMD architectures. The challenge now lies in integrating existing systems as effectively as possible whilst ensuring that future capability development steps are thought through in a multinational context from the outset.

Taking a step beyond the scope of AMD considerations, European allies will generally have to place increased emphasis on the concept of Multi-Domain Operations (MDO), namely the effective orchestration of military activities across all operating domains and environments.⁷ And a proper integration within the elements of AMD will be a prerequisite for the implementation of the MDO approach in a wider sense, across all domains and dimensions.

As we consider the implications for small and medium-sized armed forces, it is evident that a nationally integrated, full-spectrum AMD capability is unrealistic, if not impossible. This makes multinational dependencies an inevitable military reality if a nation wishes to protect itself against contemporary air threats. However, as outlined, pursuing an “all-or-nothing” integration approach is not the only option; a functional or selective integration along the previously described interoperability layers seems to be a viable alternative.

A viable solution offers a deliberate, tailored separation of political control and operational effectiveness. Following this approach allows national decision-making and sovereignty rights to be preserved, while military capabilities are integrated functionally in such a way that they can develop their full operational effectiveness within a multinational framework. More specifically, for AMD this means that a state retains the political decision-making authority over the employment of its effectors, while simultaneously integrating its sensors, C2 elements, and fire control procedures into a multinational AMD architecture. Through well-defined and delegated decision-making areas, like authorization thresholds or pre-set Rules of Engagement (ROE), political oversight is managed in advance and not eliminated; decisions are enabled instead of delayed. The outcome is that a high level of responsiveness and operational performance is maintained while national control is preserved. Small and medium-sized states benefit from this in terms of the desired economies of scale, minimisation of military and legal risks, and, perhaps most importantly, political acceptance.

⁷ NATO Allied Command Transformation 2023.

Political and institutional constraints on integrated cooperation

Despite its high degree of standardisation, NATO IAMD remains constrained by national engagement authority, political caveats, and persistent technological heterogeneity among allied systems. There are many examples that AMD systems in Europe cannot fully interoperate with each other for both connectivity reasons as well as conceptual, doctrinal and organisational reasons. At the technological level, some systems are unable to directly communicate with each other, sometimes even if products from the same defence company are procured by different nations, due to specific national security regulations. In addition to communication issues, the interceptors of launchers of GBAD systems cannot generally be exchanged with one another. Europe's already limited capabilities are therefore additionally compromised by Europe's inability to exploit the potential that is theoretically already available. This has so far been a missed opportunity.⁸

Any substantial investment in the production of weapons and ammunition requires genuine political courage and leadership. However, rhetorical persuasiveness is also essential to explain to a population accustomed to relative security and peace why such extensive investment into the defence sector is necessary, even though so many other public services urgently require funding at the same time.⁹

In the past, even though many European allies finally managed to publicly express the desire to coordinate their capability management efforts, most development steps were still taken on a national level. Why does multinational integration, also in IAMD, regularly encounter distinct political and institutional boundaries? As previously indicated, the reason for this is hardly a lack of military insight, but rather the inseparable link between necessary air defence measures and national sovereignty. Air defence directly affects national authority to use military force, particularly in one's own airspace. Decisions on target identification, the employment of lethal force as well as escalation thresholds are therefore considered core areas of national decision-making competence and are politically only delegable to a limited extent within a multinational constellation. This sovereignty-related sensitivity is amplified by divergent political conditions such as national threat perceptions, varying risk tolerances among political leaders, and also contrasting ideas on alliance solidarity. This conundrum means that degrees of military integration that seem sensible – not only in the area of AMD – are often acceptable only partially at political level. Because the multinational decision-making processes in NATO or the EU are historically and consistently designed for consensus and political control, the responsiveness that is urgently needed, particularly in the time-critical domain of AMD, tends to be lost.

In addition, industrial and procurement-related policy considerations further limit a purposive integrated capability development. National procurement programmes ensure industrial value added, technological sovereignty and political

⁸ Van Hooft, Boswinkel 2021, 80.

⁹ Bronk 2023.

control, while multinational dependencies are perceived as a potential risk or even a loss-making business for a domestic economy.

The German-led European Sky Shield Initiative (ESSI) can serve as a prominent example for diverging courses of action in industry and procurement policy. Ironically, ESSI was intended to harmonise efforts, to coordinate procurement of AMD capabilities in Europe, and to address the economic inefficiencies of the fragmented national system landscape by exploiting economies of scale and reducing duplication. Several European allies had sought to advance European defence-industrial autonomy by favouring domestically manufactured systems. This ambition was undercut by ESSI's inclusion of COTS and MOTS procurement options¹⁰ drawing on German, American, and partly Israeli products. France has been especially critical of the ESSI approach of choosing the US PATRIOT system and advocated for a focus on European-made systems instead – particularly with regard to the Franco-Italian SAMP/T system in order to achieve higher European defence-industrial sovereignty.¹¹

In parallel to ESSI, a Greek-Polish proposal for a European “air defence shield” emerged in May 2024. Critical voices saw this as a counterproposal and a renewed duplication of effort at the wrong time. However, the Greek-Polish initiative does not consider itself an alternative, but rather a political and strategic supplement – or even correction – to ESSI, expanding its strongly procurement- and system-centred approach to incorporate the fundamentally important European governance dimension. While ESSI creates short-term military effects through pragmatic capability pooling and technological harmonisation, the Greek-Polish initiative addresses the long-term issue of political control, institutional embedding, and strategic autonomy of European air defence. Should those initiatives be adequately streamlined, they will achieve the intended cumulative effect – and Europe's AMD will be on track to operate as an integrated whole.¹²

Both sovereignty-related and industrial policy considerations have a direct impact on IAMD architecture decisions, degrees of system interoperability, and the willingness of the respective nations to pursue functional integration. This often results in hybrid solutions that are suboptimal from a military perspective but feasible from a political standpoint. Naturally, these effects are particularly prevalent in asymmetrical dependency relationships between allies.

In IAMD, small and medium-sized states are more dependent on common sensory technology, joint C2 capabilities, and shared effectors than larger nations. This could result in a perceived “strategic subordination” in which national freedom of action is sacrificed in favour of collective capabilities and operational effectiveness. Even if this sort of dependence may be militarily justifiable and extremely useful, it still demands political explanation and legitimisation from the smaller partner's government.

¹⁰ COTS and MOTS describe products or weapon systems that are available on the market and can be used without further adaption or customisation.

¹¹ International Institute for Strategic Studies 2025, 38.

¹² Lawrence, Zandee, Gasper 2025, 4.

These observations at the political level serve to explain why measures that make sense from a military perspective are not automatically implemented. For capability development, this implies that multinational cooperation and integration are not ends in themselves, but rather instruments for the enhancement of military effectiveness, ideally sustainable and designed to generate a sufficient degree of resilience. AMD capabilities are inherently network-centric, they operationally relativise national borders through integration, and yet they remain politically highly visible and deterrence-relevant. This makes it particularly clear how tightly political acceptance and multinational military capability development are interwoven – and why integration, even within an alliance, must always remain selective and politically conditioned.

Capability development in multinational structures: concepts and governance logics

Close cooperation between NATO and the EU is indispensable for maintaining transatlantic security, especially in light of the complex and evolving threats facing both organisations, most notably following Russia's unprovoked invasion of Ukraine. While NATO remains a military alliance focused on deterrence and collective defence, and the EU has always been first and foremost a political and economic union, the two structures are increasingly complementing each other in their efforts to ensure security and strengthen resilience. Together, the two organisations have created a multi-layered framework for a robust Western response to hostile Russian actions and for the “decoupling” of the US from Europe. This includes the closer coordination of NATO and EU defence planning, rapid expansion of the European defence industry, faster modernisation, and joint procurement measures. Despite repeated calls for strategic autonomy of the EU, both organisations have learned to complement each other rather than to compete.¹³

In multinational structures, GBAD capability development is a particularly long-term, priority-driven process. High acquisition and life-cycle costs, technological complexity, and requirements for permanent readiness and rapid response times fundamentally limit the ability of individual European NATO or EU member states to maintain a complete spectrum of GBAD capabilities independently. Cross-border integration of sensors and interception systems will therefore generate significant synergies.¹⁴ It becomes obvious that multinational capability development for GBAD is less an integration decision than a strategic necessity.

NATO's Framework Nations Concept (FNC) and EU cooperation formats such as the Permanent Structured Cooperation (PESCO) – specifically for GBAD the ESSI – strengthen European defence capabilities while improving NATO's operational effectiveness. However, in the AMD context, they primarily serve as a steering and

¹³ Górka-Winter 2025, 1-3.

¹⁴ Van Hooft, Boswinkel 2021, 80.

coordination framework. They enable the coordination of national capability targets and readiness levels, as well as a distribution of tasks across different tactical layers. The purpose of this is not to aim for the complete integration of various national GBAD forces, but rather their functional integration into NATO's higher-level, networked air defence architecture (NATINAMDS).

From a historical perspective and consistent with the Alliance's organisational approach, NATO formats focus more on technical and procedural interoperability, while the EU initiatives emphasise organisational, logistical and industrial policy aspects. Consequently, ESSI primarily standardises GBAD technology, not necessarily AMD operations. Considered separately, EU formats serve as integration enablers, but are rarely catalysts for achieving a sufficient end state of integration.

In the preceding discussion of military requirements, it was explained that IAMD must always be considered holistically. The entire sequence of events, from the detection of a threat by radar or satellite to its engagement, must be perfectly linked in near real time via a C2 structure to the combat unit, i.e. fire control and effector. Hence, this sequence in IAMD follows a kill-chain logic in principle, but operates in practice as a distributed and adaptive "kill web", not as a linear process. This is the reason why not only in engagement operations, but also in capability development and doctrine establishment, fragmented approaches with stove-piped mentality lead to missed opportunities for operational superiority in IAMD. Europe must strive for synergy in IAMD, not for stovepipes. The aggregate capability should be at least as good as the addition of the individual components.¹⁵

Particularly in a multinational context, GBAD capability development must implicitly follow the DOTMLPFI logic. Personnel and training represent a key bottleneck in this regard as highly qualified operators and maintenance personnel must first be recruited and then trained for a considerable period of time while at the same time they can be replaced by multinational specialists only to a limited extent. Leadership and organisation are the decisive factors for integration. Effective IAMD requires interoperable fire control arrangements, coordinated decision-making and engagement authorisation processes as well as precisely defined responsibilities within multinational C2 structures. Interoperability should not be interpreted as a technical feature of an individual system but rather as an independent capability that only becomes effective through training, exercises, and standardised doctrines.

Without effective overarching governance instruments, multinational GBAD capability development is inherently characterised by asymmetric national contributions. Allies participate through selective integration according to their geographical location, economic resources, and levels of political ambition – such as through sensor technology, effectors, leadership roles or logistical support. In practical terms, multinational GBAD capability development seems therefore less a question of maximum integration than one of appropriately managing the functional integration of roles, dependencies and priorities within existing cooperation formats.

¹⁵ Brown 2024, 57.

Experience, for example in various PESCO projects, has shown that a purely bottom-up process based solely on European states' initiatives does not spontaneously produce a pattern of cooperation with which all priority shortfalls can be addressed.¹⁶ This leads to the conclusion that tight supranational governance is crucial to achieve a coherent IAMD posture.

Functional or selective integration as an enabling framework

The analysis above shows that the separation of political control and operational effectiveness represents one of the central dilemmas of AMD multinational capability development and that air defence missions directly affect national sovereignty, as they are time-sensitive and remain directly linked to the use of military force. Taking it one step further, it can also be deduced that, in order to achieve the best possible outcome, multinational GBAD capability development should primarily focus on ensuring operational effectiveness within the NATO IAMD architecture rather than striving for the complete structural integration of national forces. In the first step, the systematic establishment of functional connectivity along defined C2, sensor and effector interfaces is more important than the formal harmonisation of the full spectrum.

Shifting away from an “all-or-nothing” approach to integration offers a politically viable solution if functional and selective integration form the doctrinal framework for coherently integrating national GBAD contributions into NATO’s collective defence structures without giving up national operational sovereignty or political control. Considerable operational added value can be achieved through functional integration in sensor technology, leadership, training, and planning without completely giving up national control over their use. The ability to modularise capabilities permits specific multinational contributions to be embedded, while other elements remain intentionally national. For small and medium-sized states, this can pave the way for a flexible integration approach along functional lines and interoperability layers.

Some authors argue that breaking down the aerial threat into its constituent parts and grouping capabilities into parallel lines of integration effort – defined in terms of threat criteria such as range and altitude categories – would suit NATO’s needs better than a single approach to integrated, Alliance-level AMD capability development. Even though this might run counter to the original logic of integration, enabling a hybrid approach of this categorisation as well selective and functional integration might best balance the conflicting imperatives within and between European states.¹⁷ Specifically in the context of AMD, a selective and functionally differentiated approach offers substantial advantages: economies of scale in sensor technology and C2, reduction of redundancies, lower financial and operational risks, and a higher probability of implementation as part of the NATINAMDS. At the same time, selective integration allows focusing on core national contributions, such as specific effector

¹⁶ Biscop, Murillo 2024, 3.

¹⁷ Kaushal 2025, 49-51.

segments, specialised C2 functions or training capacities, without claiming complete system self-sufficiency. Consequently, consistent implementation of NATO standards is a fundamental prerequisite for seamless joint operations.

The essence for small and medium-sized states is therefore that selective and functional integration is the politically most viable path to achieving Alliance operations-relevant AMD capability. The key factor here is the clear separation between political control and operational integration – not as a contradiction, but as a conscious governance logic of multinational capability development. Systematically, selective and functional integration can be considered as a compromise between purely national capability provision and full-scale multinational integration. In the medium to long term, the focus must shift away from platform thinking towards sustainably developing capabilities: training, qualified personnel, leadership skills and permanent functional integration into NATO structures will become decisive factors for the effectiveness and resilience of modern GBAD.

The Ukrainian GBAD posture provides a very applicable and even swiftly implemented example, because some developers demonstrated clear foresight at an early stage. Already during the concept phase of the IRIS-T SLM system, it was obvious for the designers that close integration with the PATRIOT system is a sine qua non for later fielding the product. This facilitated high intercept rates for both systems in Ukraine because the sensor fusion works as a default and data can easily be shared between the two weapon systems. On that account, European NATO allies should pay early attention to the networking and integration of surveillance, C2 and communications capabilities.¹⁸ While NATO will remain the prime facilitator for force generation and operational deployments, European nations may need to approach capability development from a more autonomous than a mandatory transatlantic perspective. While the focus might thus shift towards national or multinational European procurement, the principles of selective and functional integration must nevertheless be respected.¹⁹

Hungarian Defence Forces – Operational AMD capabilities

Through the substantial and ambitious modernisation initiated by the Zrínyi National Defence and Armed Forces Development Programme,²⁰ the Hungarian Defence Forces (HDF) managed to replace the obsolete Soviet-era systems and establish an extremely modern and flexible suite of key system elements for medium-range GBAD operations. The Surface-to-Air Missile Operations Centre (SAMOC)²¹ is capable of coordinating and supporting the full process of Surface-Based Air Defence (SBAD)²² employment including the planning of combat activities and fire control functions for

¹⁸ Loss 2024, 6.

¹⁹ Witney 2023.

²⁰ Previously: Zrínyi 2026 Defence and Force Development Programme.

²¹ See: <https://intelligence.airbus.com/industries/defence/c2/air-c2/fortion-samoc/>

²² In addition to the land-related expression “GBAD”, the term “SBAD” includes naval surface-based air defence operations in the maritime domain.

IAMD or within a GBAD task force. By data link implementation in line with NATO standards and network-based communication facilities, SAMOC meets all criteria for rapid integration into NATINAMDS. The open architecture and highly flexible modular system design of NASAMS²³ also meets the integration requirements of modern, interoperable air defence contributions. With its flexible connectivity, NASAMS can seamlessly integrate into a networked NATINAMDS structure. It would even be capable of integrating into a multinational and mixed-system environment, even without SAMOC as the higher echelon system. In addition to the NASAMS Sentinel²⁴ radar, the HDF procured the Israeli ELM-2084²⁵ multi-mission radar as a longer-range sensor for the execution of Air C2 surveillance tasks.

The strategic impact of those procurement decisions will be considerable, and through these game-changing modernisation measures, Hungary now belongs to the group of NATO's most advanced GBAD nations. In the given system composition, SAMOC with its high level of integration capability will serve as the reliable C2 element for joint operations in a multi-service and multinational context and as the linkage element to NATINAMDS. The solution not only delivers comprehensive compatibility and interoperability with current weapon systems and C2 facilities but is also prepared for further developments and future standard messaging protocols. The ELM-2084 sensor provides flexibility in different acquisition modes and will therefore be capable of partly contributing to airspace surveillance for the upper layer. Since SAMOC has also proven its operational abilities in delivering C2 in Anti-TBM missions with a mix of connected weapon system elements, the HDF will even possess a limited potential to contribute to NATINAMDS within the upper tier. However, there are currently no Hungarian organic upper-layer effector capabilities.²⁶

As a medium-sized NATO member state, Hungary is neither a leading nation nor a security policy frontrunner, but it does have relevant, interoperable and state-of-the-art GBAD niche capabilities that are significant for alliance security policy, particularly in the area of IAMD. Whilst having taken the appropriate procurement decisions constitutes a prerequisite, only subsequent integration into multinational operational structures will enable their military impact to be fully unfolded. In other words, the critical hurdle for the HDF's contribution to NATINAMDS is not the current state of equipment modernisation, but rather its integration.

AMD Capability development for the Hungarian Defence Forces

The existing modern AMD weapon system elements are a very promising starting point and are serving as capability enablers. The remaining path to full capability

²³ See: <https://www.kongsberg.com/kda/what-we-do/defence-and-security/integrated-air-and-missile-defence/nasams-air-defence-system/>

²⁴ The AN/MPQ-64 Sentinel, produced by Raytheon, is an X-band electronically steered pulse-Doppler 3D radar used with SHORAD weapon systems.

²⁵ See: <https://www.iai.co.il/p/elm-2084-mm>

²⁶ Passbach 2024, 53-59.

development and multinational integration must now be pursued consistently along DOTMLPFI. Which capability development steps and which cooperation formats can be most suitable for a mid-sized state like Hungary, given its ongoing national capability development trajectory? Which way offers the highest “integration value” for a mid-sized state? Which measures deliver short-term “quick wins” and what are the appropriate long-term pathways?

Generally, it can be deduced that – evaluating Hungary and the HDF as our case study – small and medium-sized states should continue to build on the existing status quo of their capability developments. After thoroughly assessing which degree of integration is politically feasible, they should concentrate on establishing the preconditions for true functional integration of their AMD elements into the European IAMD posture and MDO capacities in the wider sense.

Procurement decisions to be taken in the sphere of AMD should be enhanced by EU-based formats such as PESCO and capability pooling via ESSI. The steps of functional integration should be pursued via NATO IAMD structures and pathways towards the best possible contribution for NATINAMDS. Based on the political feasibility, the decision to contribute selected national sensor, C2 and effector elements to the overarching multinational architecture should be taken. National authorisation thresholds for the use of military force should be specified and stipulated in the multinational ROE provisions. Hybrid cooperation strategies with a sequenced approach combining capability pooling, procedural integration, as well as functional and selective multinational embedment seem to offer a balanced pathway between operational effectiveness and political sensitivity for small and medium-sized states.

Turning to the implications for Hungary in more concrete terms, the recommended strategy here also involves a sensibly differentiated and sequenced combination of several cooperation formats for different purposes. For example, ESSI will be most valuable for the HDF when it is explicitly aligned with NATO IAMD C2 integration, rather than being treated as a standalone solution. For reducing or minimizing costs and system heterogeneity in the area of AMD, capability pooling via ESSI should be pursued. The possibilities offered by NATO IAMD should be used to strive for functional, operational, and organisational multinational integration of the national sensors and C2 elements. Selective integration of Hungarian GBAD units into multinational formations is important in the medium to long term in order to adequately address all areas of capability development. Finally, participation in selected PESCO projects can ensure future-proof solutions for new threats or integration requirements. Hungary’s strategic advantage does not consist in choosing between NATO or EU frameworks, but in combining and sequencing them to maximise the resulting operational performance.

To swiftly ensure the best degree of capability development both from a national, but also from an alliance perspective, extensive training efforts for the complex IAMD mission have to be conducted from the operator on the tactical level up to strategic level personnel. Cleaving to the maxim “Train as you fight!”, the understanding of

doctrines, concepts of operation, tactics and C2 procedures amongst the personnel is imperative for the successful execution of an IAMD mission.²⁷ The series of NATO exercise Ramstein Legacy as well as the biennial Joint Project Optic Windmill (JPOW) are cherished and valuable opportunities to improve the harmonisation and integration of multinational force and system elements and thereby the deterrence posture of the Alliance as a whole.²⁸

One perspective for the long-term pathways of Hungarian AMD capabilities is certainly further functional, selective, and structural embedding into multinational formations. In addition, consideration can also be directed toward areas that are currently not part of the HDF capability spectrum, such as entry into long-range air defence (LRAD) or an initial capability for TBM defence, in both cases ideally striving for European product solutions. Naturally, an adequate emphasis should then be placed on the interoperability requirements as well as the potential for the best possible integration into the alliance structures and capabilities of NATO and the EU.

Conclusion

The analysis in this article shows that capability development is the key category for shaping multinational GBAD. It is not individual systems, but their integration into doctrine, C2, training and operational procedures that determines operational performance. AMD is thus primarily an integration and organisational challenge and not solely a problem of procuring the right weapon system. Multinational cooperation is a precondition for credible AMD capabilities, but does not guarantee military effectiveness in itself. Without adequate functional integration across sensor technology, C2 and operational procedures, cooperation remains politically visible but is limited in military terms. Synergistic effects and operational added value only arise once the mere coordination stage has been exceeded. Particularly it is capabilities with high technological, organisational and workforce requirements, which follow this integration logic. Functional and selective integration offers a generally applicable development framework for resolving the thoroughly discussed dilemma between military necessities and political feasibility.

Hungary and the HDF served as an illustrative case study in this analysis, not as a unique strategic exception. The identified military parameters, the assumed political constraints, and potential integration decisions are assessed as characteristic for small and medium-sized European allied nations. Nevertheless, Hungary has a certain time-based advantage in AMD capability development thanks to the timely modernisation measures already implemented by the HDF.

The conclusions can be applied to a large extent to other small and medium-sized European countries. States with comparable conditions face similar dilemmas

²⁷ Pronk 2020, 84.

²⁸ Pronk 2023, 36.

between national sovereignty, limited resources, and military operational effectiveness. Ultimately, multinational AMD capability will not be achieved through political declarations, but through realistic, step-by-step and functionally focused integration of adequately developed national capabilities. For multinational mission management, the deliberate separation of political authority and operational integration is crucial where military necessity requires it. Only in this way can political acceptance and military performance be consistently combined and an appropriate deterrent effect achieved.

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