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Military Innovation and Capability Development in a Multinational Context
The Costs and Benefits of Multinational Cooperation

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Abstract

Military capability development is a highly complex process, and when capability development happens in a multinational context, the complexities increase significantly. Militaries around the world have innovated to manage these complexities and developed several models to deal with them. Each model offers different solutions and has different costs and benefits, but there is always a trade-off. The most relevant trade-off is between coordination and political costs on the one hand and economic and military benefits on the other. The paper discusses the multinational capability development models militaries innovated with, their costs and benefits, and how militaries can deal with these costs.

The Strategic Backdrop

Capability development is not only about procuring weapon systems. It is also about ensuring that a defense organization possesses all 'the wherewithal to

complete a task or produce an effect within a set of specified performance standards and environmental conditions' (Taliaferro et al., 2019, p.5). Accordingly, other than procuring equipment, personnel must be assigned to do the job and trained, organizations need to be established to provide a framework around equipment and people, appropriate facilities and infrastructure have to be created, interoperability with allies needs to be ensured, and the conceptual and doctrinal framework has to be developed to provide guidance. Thus, military capability development is a highly complex task, as the model in Figure 3.1 illustrates, often involving hundreds or even thousands of personnel from various backgrounds and institutional elements to generate.

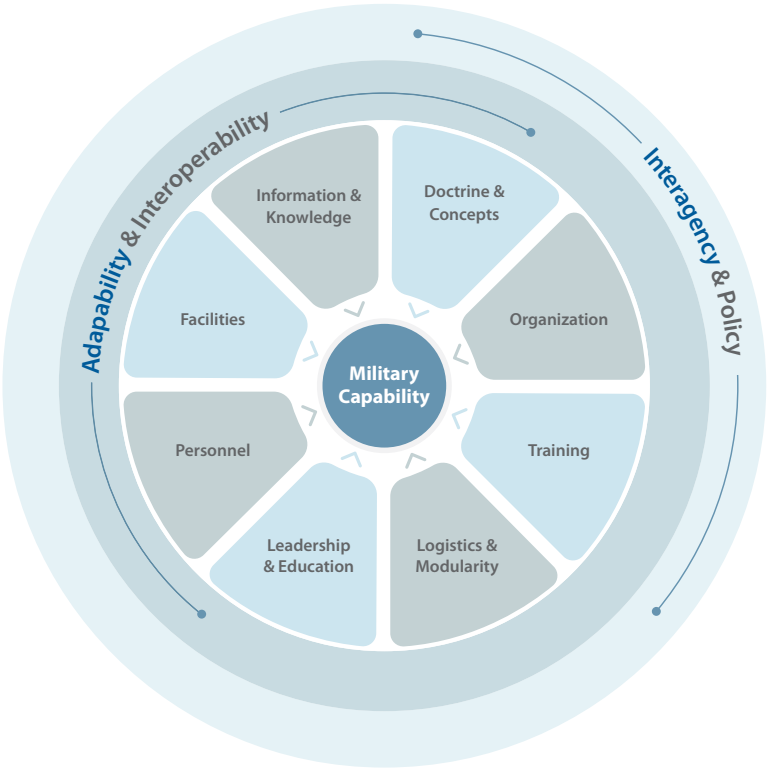

Figure 3.1: Defense Lines of Development (Adapted from UK MOD, 2007)

There is growing pressure on militaries to collaborate with allies and partners to achieve high-end capabilities, as often they lack the appropriate financial resources or specific expertise which might be necessary to achieve those

capabilities by themselves. This pressure is not a new phenomenon, and Michael Alexander and Timothy Garden (2001) already pointed out two decades ago that the 'arithmetic of defense policy' pushes militaries towards increasing multinational capability development. This arithmetic indicates that the costs of militaries grow much faster than their budgets. For instance, the personnel and running costs of militaries have been rising much faster than average inflation, and the costs of weapon systems show a steep increase with each new generation. Because of these reasons, militaries often opt for multinational projects hoping that collaboration can help overcome these difficulties.

Managing financial and military deficiencies through multinational cooperation, however, increases the complexity of the project disproportionally. The reason behind the higher complexity is that defense organizations from different countries with different organizational cultures, goals, structures, and processes must work together on multinational projects. Unsurprisingly, this higher complexity can cause problems for military and political leaders that they do not face when they rely entirely on national defense programs. For instance, more complexity increases coordination costs. Thus, multinational parties must invest significantly more time and effort to coordinate their pursuits compared to national capability development projects. This often results in cost overruns and delays (Hartley, 2019, pp.244-250). Furthermore, there are political costs that often stem from increased dependencies. For instance, when national or organizational interests diverge significantly, one or more nations might apply caveats and restrictions or even abandon the entire project, making the multinational project unviable. Despite these difficulties, militaries have innovated to make multinational capability development projects work, but the different approaches present different costs and benefits packages for decision-makers to consider.

Innovation in Multinational Capability Development

As Jan Fagerberg points out, there is a significant difference between invention and innovation. 'Invention is the first occurrence of an idea for a new product or process. Innovation is the first commercialization of the idea' (Fagerberg, 2018: 6). Accordingly, innovation often 'only' means that an organization applies an

already existing idea for a problem, process, product, etc., which was never applied in that particular setting before. It might sound relatively easy, but innovation is difficult and military organizations may struggle with implementing new ideas. In 2018, the U.S. Defense Innovation Board, led by former Google chief executive Eric Schmidt, highlighted that the Pentagon 'does not have an innovation problem; it has an innovation adoption problem' (Tucker, 2018). Militaries are cautious about new ideas as they have to deal with enormous uncertainties on the battlefield and in the strategic environment. Thus, militaries prefer stability and creating certainty from uncertainties through rigid hierarchical structures and standard operating procedures (SOPs). These characteristics of militaries produce stability and robustness, which help mitigate uncertainties but can be sources of resistance to change and innovation (Hasselbladh and Ydén, 2019). That is not to say that militaries cannot change and improve (Roberts, 2020), but significant changes and innovations happen mostly incrementally (Uttley et al., 2019), and quick changes occur in exceptional circumstances (Nemeth and Dew, 2020).

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The same is true concerning innovations in multinational capability development. For instance, the idea of creating a multinational European Air Transport Command (EATC) was born at the end of the 1990s (European Union, 1999) however the EATC was established only in 2010 and needed another five years to achieve its current format and capabilities. The EATC does not have its aircraft – the fleet under its command is based on national air bases and operated by national air forces – but it coordinates the national air transport and refueling capabilities of seven European countries and has operational control over a pooled fleet of 150 aircraft shared among participating nations to enhance effectiveness and efficiency (EATC, 2022).

> *The EATC 'merely' pooled existing national capabilities to generate economies of scale and higher efficiency in a multinational framework. The innovation implemented here was the application and modification of existing national solutions for planning, tasking, and controlling air assets into a multinational structure.*

Innovation is often associated with new technologies, but as the EATC example demonstrates, this is not necessarily the case. The EATC 'merely' pooled existing national capabilities to generate economies of scale and higher efficiency in a multinational framework. The innovation implemented here was the application and modification of existing national solutions for planning, tasking, and controlling air assets into a multinational structure. Innovation literature shows that, apart from technological innovation, defense organizations may implement innovation at the level of organization, logistics, process, or working models (Kahn, 2018). In line with this, the most relevant innovations in multinational military capability development are often not technological ones but rather related to process and organizational innovation. Such innovation attempts to manage extreme complexities and address the need for large-scale coordination are inherent characteristics of multinational military programs.

It is possible to differentiate between four types of multinational capability development models: *pooling of capabilities*, *sharing of capabilities*, *role and task sharing*, and *pooling through acquisition* (Csiki and Nemeth, 2012). In the case of *pooling of capabilities*, nationally owned capabilities are integrated into a multinational structure like the cited example of the EATC. *Sharing of capabilities* takes place when armed forces make some of their capabilities available in a multinational setting, but nations retain control over their capabilities during collaboration, and forces are not integrated into a multinational structure. Traditionally, these types of multinational projects include cooperation on training and education, improving interoperability between militaries, multinational maintenance projects, and concepts and doctrine development. *Role- and task-sharing* is when nations do not possess specific capabilities but provide support to each other to plug capability

gaps under multinational cooperation programs. In Europe, for example, air policing missions are conducted by allies over the Baltic states, Slovenia, and Iceland, as these smaller nations cannot afford to procure and maintain capabilities for such missions independently. In exchange, these countries have developed niche operational capabilities that benefit their allies in other areas (Christiansson, 2013). The British Royal Air Force also fulfills air policing duties in the Irish Flight Information Region to protect Ireland and the UK (Allison, 2022).

Pooling through acquisition has two sub-categories: *joint acquisition* and *co-development*. *Joint acquisition* happens when several armed forces decide to procure, maintain and operate a capability together. They do not have national control over this capability but use it through a different set of arrangements. For instance, sixteen NATO members together operate a fleet of fourteen Boeing E-3A Airborne Warning & Control System (AWACS) aircraft based at Geilenkirchen, Germany. These aircraft 'provide the Alliance [NATO] with air surveillance, command and control, battle space management and communications' capabilities (NATO, 2022a). Under the framework of Strategic Airlift Capability (SAC), a dozen NATO countries have procured and maintained a fleet of three C-17 Globemaster III transport aircraft operating from Pápa Air Base, Hungary (NSPA, 2022). Fifteen NATO Allies have also acquired the Allied Ground Surveillance (AGS) capability, which consists of five NATO RQ-4D "Phoenix" (modified Global Hawk) remotely piloted aircraft (RPA) and ground-based command and control (C2) stations that provide intelligence, surveillance and reconnaissance (ISR) to the alliance (NATO, 2022b).

Co-development is when two or more nations jointly develop and produce an asset. This can take different forms. For instance, in the case of the F-35, the United States is the lead developer and customer, while another eight contributing partner nations participate in the program. In Europe, however, the *juste retour* principle is often used, such as in the case of the co-development of the Eurofighter fighter aircraft and A400M transport aircraft. The *juste retour* principle ensures that participating nations produce proportionally the same program share as their contribution. As Andrew Moravcsik points out, '*juste retour* works like a cartel, in which the participants divide the market share between them' (Moravcsik, 1990, p.74). This is rarely an efficient solution as a

tremendous amount of coordination and negotiation are needed to distribute the different work phases proportionately, and there is no guarantee that those nations get production tasks that have the greatest expertise in them.

Costs and Benefits of Multinational Capability Development

Militaries and the defense industry have innovated significantly to produce diverse models of multinational capability development, but these models present different costs and benefits. Multinational defense cooperation typically happens when certain factors are aligned (Nemeth, 2022). Among others, partners usually turn to each other for developing defense capabilities in a multinational setting because they lack the necessary financial resources or expertise to achieve their capability goals. Thus, nations look for something in a multinational collaboration that they lack individually, and they hope that together with their partners, they will have enough resources and expertise to develop the desired capabilities. However, as Bastian Giegerich highlights, there is 'a complicated relationship between the costs and benefits of collaboration' because 'the more likely a certain method is to create significant benefits, the more likely it is to create significant costs' (Giegerich, 2010, pp.89-90) in other areas.

For instance, a multinational capability development project will likely benefit participating nations that combine resources to create an output for a military capability that would not otherwise be possible individually. At the same time, if costs are aggregated to include coordination and political costs, the capability development project may not necessarily prove less costly for individual nations. Costs may be paid in non-financial terms, such as by giving up certain aspects of national autonomy, tolerating higher dependency on partner supply chains, and accepting program delays due to extensive coordination requirements and partner negotiations on what is being co-developed.

Moreover, certain capability development models do not provide new capabilities. Although *pooling of capabilities, sharing of capabilities*, and *role- and task-sharing* may make existing capabilities more cost-effective and even make them operationally more effective, they do not automatically equate to the mitigation of capability shortfalls (Biscop and Coelmont, 2011, p.2). In contrast, the two types

of pooling through acquisition typically generate significant new capabilities but also establish substantial interdependencies with partners.

	Economic Benefits	Military Benefits	Coordination Costs	Political Costs
Pooling of Capabilities	Moderate	Moderate	High	Low
Sharing of Capabilities	Low	Low	Low	Low
Role- and Task-Sharing	Moderate to High	High	Moderate	Very High
Co-Development	Moderate to High	Moderate	Very High	Moderate
Joint Acquisition	Very High	Very High	Very High	Very High

Table 3.1: Benefits and Costs of Multinational Capability Development Models

Table 3.1 shows the relationship between certain costs and benefits regarding different types of multinational capability development models. 'Economic benefits' shows the positive financial impact compared to participating nations pursuing a national solution. 'Military benefits' indicate the level of military capability gains as a result of the multinational project, while 'coordination costs' reflects the intensity of negotiations and coordination necessary to make cooperation effective. Finally, 'political costs' refer to the risks that military and political leaders must accept about the national autonomy given up considering the expanded reliance and dependence on partners.

Sharing capabilities has the lowest costs and lowest benefits, as contributing to multinational training and improving interoperability generates value and is necessary but does not provide new capabilities *per se*. However, as the national capabilities are rarely integrated into multinational structures in this model, the political and coordination costs remain low. *The joint acquisition* provides the highest economic and military benefits, as, short of this option, many nations

may not be able to independently afford the capabilities that are procured and maintained collectively. However, the coordination and political costs of *joint acquisition* are high. *Role- and task-sharing* is relatively common among NATO allies, but in other regions, it tends to be an exception because it requires a very high level of trust between partners. In these scenarios, nations may rely entirely on allies and partners for military capability, which presents high political costs in exchange for the economic and military benefits they generate.

On balance, the *pooling of capabilities* and *co-development* offer the most beneficial returns. Although the economic and military benefits are moderate in the case of the *pooling of capabilities*, they offer increased efficiency, and political costs are comparatively lower. Nations typically reserve the strategic option to withdraw their capability contributions from these arrangements under certain circumstances, which is generally considered a less sensitive political commitment. However, the coordination costs here tend to be high because militaries must figure out how they can work together effectively and efficiently with capabilities that are pooled multinationally.

Determining the benefits of *co-development* is more complex. In this case, the alternative is procuring and maintaining a capability with commercial off-the-shelf solutions (COTS). The military benefits here are moderate, but the economic benefits are likely to include savings due to the economies of scale that multinational programs tend to offer. Keeping or developing national production capacities and expertise domestically can also have a significant impact on the wider economy (Hartley, 2019). However, the coordination costs tend to be very high, especially if modeled on principles such as *juste retour*. The *political costs* and interdependencies found in such multinational collaboration are moderate. Usually, the maintenance and operational effectiveness of nationally owned but co-developed capabilities are rarely in danger, but non-aligned export control policies of participating nations can create problems for exports of co-developed technologies.

Dealing with Coordination and Political Costs

Military capability development is a highly complex process, and when it occurs in a multinational context, the complexities increase significantly. Militaries

around the world have harnessed innovation to manage these complexities and developed various models to manage them. Each model offers different solutions and presents different costs and benefits, but there are always inherent trade-offs. The most relevant trade-offs tend to be found between coordination and political costs on the one hand and economic and military benefits on the other.

Three key lessons can be drawn from experiences of past collaborations to manage these costs in the best possible ways. First, nations that identify their national security goals to be aligned with highly trusted partners can limit the political costs of military collaboration and the interdependencies that necessarily entails. Accordingly, nations tend to initiate more defense collaborations among each other when this happens to be the case (Nemeth, 2022). This can significantly bring down political costs but does not guarantee success. Second, on a technical level, 'the most disruptive issue, however, seems to be the inability to harmonize requirements and timescales' (Giegerich, 2010, p.95). Thus, interoperability, standardization, and harmonization of requirements must be positioned at the forefront of multinational capability development programs from the beginning.

As Bastian Giegerich highlights, if armed forces choose to procure or generate national versions of a multinational capability project then 'it will also be virtually impossible to generate efficiency savings later on because varying national versions are likely to require separate training and servicing processes. They will also reduce interoperability when assets are deployed' (Giegerich, 2010, p.95). Finally, expanding interaction, such as with liaison officers, training, exchange, and assistance programs between militaries can help reduce political and coordination costs. Multinational military exercises are extremely powerful for improving interoperability, developing common doctrines, and establishing a common 'language' between military allies and partners (Frazier and Hutto, 2017).

A similar way of thinking between militaries can be generated through such interactions, helping advance how shared requirements and challenges can be met at a technical level and in building higher levels of trust. While political and coordination costs can be reduced by adopting such approaches for deeper cooperation and partnership-building, they will not disappear entirely. When militaries and political leaders decide on participation in multinational programs related to capability development, the costs and benefits of doing so need to be considered from broader perspectives.

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