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**6TH GENERATION FIGHTER  
JETS DEVELOPMENT:  
IMPLICATIONS FOR EUROPEAN  
AIR FORCES INTEROPERABILITY**

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## Introduction

Through a winding journey European industrial cooperation developed the 4th generation Eurofighter Typhoon fighter jet in the early 2000s (Heinrich, 2015). European countries, however, eventually missed an opportunity with the following generation, relying instead on the American-made F-35 Lightning II. Therefore, European states are now eager to make up for lost ground by developing a 6th generation fighter jet. Two parallel projects are underway. Firstly, France, Germany and Spain are jointly working on the Future Combat Air System (FCAS), a programme intended to develop a Next Generation Weapon System (NGWS) with a Next Generation Fighter (NGF) at its core. Second, Japan recently joined the UK and Italy in developing the Global Combat Air Programme (GCAP), a follow-up of the Tempest project similarly intended to deliver a 6th generation fighter.

While many similarities exist between the two projects, military and political-industrial factors, such as different operational requirements among the states involved, make their unification into a single programme highly unlikely. Carrying out two parallel projects entails, however, higher unit production costs and larger resources to be pooled for research and development (Schmitt, 2000), while they will also have to compete against each other in the global market. More importantly, this raises questions about the coordination of forces operating different systems. Accordingly, this Info Flash addresses the FCAS and the GCAP, along with limits to the development of a single programme. The ultimate goal is discussing the implications that these parallel efforts might have on European forces' interoperability.

## The Future Combat Air System (FCAS)

France and Germany launched the FCAS initiative in 2017, represented by Dassault and Airbus respectively, with Spain joining two years later (Airbus, 2023). Belgium eventually entered as an observer in June 2023 (Machi, 2023). The core idea behind the FCAS is one of a 'system of systems'. The FCAS involves a system centred on a combat aircraft, which is connected to and interoperable with manned as well as unmanned systems such as Unmanned Combat Aerial Vehicles (UCAVs), tanker and intelligence aircraft, and also largely rely on Artificial Intelligence (AI) (Maulny, 2019; Mölling, 2019).

While technical specifications have not yet been disclosed, it has emerged that the focus of the NGF is largely on connectivity and automation. The aircraft is expected to jointly operate with unmanned Remote Carriers (RC) and communicate with complementary assets in the air, ground, space and cyber domains through a combat cloud (Hemler, 2023b). The consortium behind the FCAS features Dassault (France), Airbus (Germany), Indra (Spain) and Eumet (France and Germany) as prime contractors (Hemler, 2023b), with the former taking the lead in the development of the NGF (Airbus, 2023). In December 2022, France, Germany and Spain awarded the prime contractors the contract for Demonstration Phase 1B which is currently underway (Airbus, 2022). While Phase 1A 'enabled the identification of key technologies and the launch of the demonstrators' developments', Phase 1B entails 'the continuation of flying demonstrators and required cutting-edge technologies development and maturation as well as project architectures consolidation' (Airbus, 2022). The FCAS ultimately aims at delivering a platform capable of replacing the Eurofighter Typhoon and the French Dassault Rafale by 2040 (Hemler, 2023b).

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The initiative is, however, not free from issues. First and foremost, France, Germany and Spain have different operational requirements. France aims to replace its Rafale multi-role fighters which can perform a variety of tasks, including air-to-air, ground attack, nuclear and interception roles, while also being capable of operating from aircraft carriers (Dossi & Masuhr, 2021; Defensebridge, 2023a). Conversely, the Typhoons that Germany and Spain aim to replace, despite being multi-role fighters, are mostly specialised in air-to-air and interception missions (Dossi & Masuhr, 2021; Defensebridge, 2023a). This makes the FCAS 'a complex balancing act' that requires a choice between 'multirole and specialized design philosophies' (Dossi & Masuhr, 2021, p. 2). Secondly, France, Germany and Spain feature different state-industry relations. Paris seeks to maintain control over strategic industrial sectors, while Berlin and Madrid push for higher autonomy at the European level (Dossi & Masuhr, 2021). Furthermore, Germany has stricter rules regarding exports and is often more reluctant to develop high-lethality weapon systems, especially UCAVs and other unmanned platforms (Bronk, 2021). This might eventually create problems, as the German Airbus is in charge of leading the development of RCs (Airbus, 2022).

### **The Global Combat Air Programme (GCAP)**

After considering options for a next-generation fighter since 2015, the UK presented a Tempest fighter mock-up in 2018 (Barrie & Giegerich, 2019). The Team Tempest consortium included BAE Systems, Rolls-Royce, Leonardo UK and MBDA UK, with BAE Systems leading the aircraft manufacturing (Barrie & Giegerich, 2019). Italy joined the initiative in 2019, while Sweden only signed a Memorandum of Understanding (MoU) for cooperation and remains reluctant to become a partner (Hemler, 2023a). The idea behind the Tempest resembled the FCAS's 'system of systems' with the fighter aircraft fitting in a capability network that includes manned and unmanned platforms, sensors and weapons (Bronk, 2020). The initiative aimed at delivering a 6th generation fighter by 2035 to replace the Eurofighter Typhoons operated by both Italy and the UK (Hemler, 2023a).

A major turning point occurred in 2022 as the Tempest initiative and the Japanese F-X merged under the GCAP (UK Ministry of Defence [UK MoD], 2022). Several factors affected the decision, including alignment of time frames, cost and risk reduction considerations, the possibility of research cooperation and confidential technical information sharing and export marketability enhancement (Hemler, 2023a; Kosuke, 2022). Shared tactical requirements also played a key role. The UK and Italy seek to replace their Typhoons, whereas Japan aims to replace its Mitsubishi F-2 fighters (Hemler, 2023a). The F-2s can also perform air-to-ground roles (Defensebridge, 2023b), unlike the Typhoons that are mostly specialised in air-to-air missions (Dossi & Masuhr, 2021). Nevertheless, London, Tokyo and Rome are looking to develop an aircraft capable of working alongside their F-35 Lightning II fighters (Peruzzi, 2022), which can perform air-to-ground roles (Royal Air Force, n.d.). Therefore, Japan and the UK ultimately aim to develop a multi-role stealth fighter capable of ensuring air superiority (Kosuke, 2022).

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The GCAP features BAE Systems (UK), Leonardo (Italy) and Mitsubishi Heavy Industries (Japan) as prime contractors (Hemler, 2023a; White, 2023). Set to enter development phase in 2025, cost-sharing arrangements have not been agreed yet (Kubo & Kelly, 2023). Hence, some issues might arise from the short timeframes available to reach an agreement. Furthermore, Bronk (2023) raises questions about the affordability and practicality of the GCAP, as the funds allocated so far by the UK and estimations of Japanese and Italian contributions indicate that it will be difficult to provide adequate financing for both development and procurement.

### **Limits on Undertaking a Single Effort**

The FCAS and the GCAP are similar in many regards. They both intend to deliver a European 6th generation fighter embedded in a broader capability network within similar time frames. Moreover, most states involved have already cooperated in the Eurofighter Typhoon development (Heinrich, 2015). Yet, they are unlikely to merge the two programmes; a first obstacle involves operational requirements as states have different needs, and agreeing on what roles the platform to develop should fulfil is no easy task. This has worked rather smoothly for the GCAP so far, but decisions on common requirements have slowed the FCAS development (Thomas, 2022). Therefore, envisioning a system that accommodates the operational needs of six different actors would be extremely difficult.

A second issue concerns the division of labour. Military capability development represents a sensitive issue and states seek an important role for domestic contractors involved. Featuring four partners, the Eurofighter Typhoon development has proved complex in this sense, with France leaving the project (Heinrich, 2015). Therefore, for six partners of this size to agree on work share arrangements would be even more challenging. They simply would not gain the share they aim for. The UK and France particularly seek a prominent role for their domestic firms and are less inclined to give up their leadership position (Barrie & Giegerich, 2019; Dossi & Masuhr, 2021). Defence industrial cooperation between the two has already proven difficult (Barrie & Giegerich, 2019). It is thus hard to envision their participation in a common project. For this to change states would have to adopt a strongly EU-centred focus, but this is highly unlikely considering the UK's and Japan's involvement.

### **Considerations for Air Forces Interoperability**

While obstacles have prevented states from merging the FCAS and the GCAP, the development of two parallel European projects bear consequences for interoperability. Among other dimensions, interoperability concerns the technical compatibility of equipment (Moon et al., 2008). This is highly relevant since the FCAS and the GCAP feature different contractors. Attempts to fill this gap are nevertheless underway. France, the UK and Italy are cooperating in the Future Cruise and Anti-Ship Weapon (FCAS/W) programme through MBDA (Vavasseur, 2023). MBDA is a European joint venture between BAE Systems, Airbus and Leonardo in the missile sector which participated in both the FCAS and the GCAP (MBDA, 2023).

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French President Emmanuel Macron and British Prime Minister Rishi Sunak recently issued a joint statement highlighting that the FCAS/W fits in the pursuit of commonalities in the respective air platforms (UK Government, 2023). MBDA's CEO Eric Beranger, however, declined to say if the FCAS and the GCAP will feature common weapon systems (Martin, 2023). Furthermore, Dossi and Masuhr (2021, p. 5) argue that technological and budgetary realities will possibly require actors to 'seek synergies at the subsystem level.' If this occurs, the FCAS and the GCAP will be sharing more compatible components.

Another relevant dimension of interoperability is information exchange and connectivity between systems (Moon *et al.*, 2008; Dufour, 2018). While next generation fighters will be connected to and exchange information with their capability network, it is not clear yet to what extent the FCAS and the GCAP will do so between each other. In a 2023 joint conference, Richard Berthon, Director of the GCAP, and Major General Jean-Luc Moritz, Head of SCAF, expressed the need for the two systems to operate together with a focus on connectivity (Robinson & Bridgewater, 2023). Macron and Sunak similarly put emphasis on inter-systems communication in their latest summit (UK Government, 2023). Political statements have thus been made on the necessity to ensure interconnectivity and information exchange between the combat clouds of the FCAS and the GCAP. However, whether this will actually be facilitated or enabled through their development is yet to be seen.

Meanwhile, the European Commission has launched the European Initiative for Collaborative Air Combat Standardisation (EICACS) in 2022 (Dassault Aviation, 2023). It consists of a study project that brings together the main European defence firms, including Dassault, Airbus, Indra and Leonardo (European Defence Fund, 2022), and aims at improving air forces' ability to perform collective missions in the framework of future air combat systems (Dassault Aviation, 2023). The initiative is expected to benefit both the FCAS and the GCAP (Charpentreau, 2023).

## **Concluding Remarks**

It is too early to draw definitive conclusions about the FCAS and the GCAP. While a merger between the programmes is highly unlikely, some potential exists for firms involved in the projects to cooperate on components development. The same limits that exist to a merger of the projects, however, also apply to their components. Partner states want their domestic firms to lead the development of what they consider as crucial sub-systems. Therefore, bringing together six states with significant defence industrial bases constitutes a complex effort. Economic factors have perhaps the potential to ease political-industrial constraints due to the benefits of developing systems jointly.

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Furthermore, officials at both the national and European level have repeatedly expressed the necessity of enhancing interoperability between the two programmes. This relates to both technical compatibility of equipment as well as information exchange and connectivity. The EU has also provided instruments to co-finance projects that prove beneficial to interoperability. Nevertheless, it remains to be seen whether the development stage will deliver mock-ups that, from a technical standpoint, effectively live up to the political statements made so far. Japan constitutes a significant share of the GCAP but, not being a member of neither NATO nor the EU, it has less stakes in enabling interoperability with the FCAS. The next important step is therefore the agreement on cost-sharing arrangements within the GCAP and the following division of labour between firms involved. This will likely provide us with relevant insights on the possible degree of interoperability between the two programmes.

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