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Germany's Role in NATO's Nuclear Sharing

The Purchasing Decision for the Tornado's Successor Aircraft

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Germany will need to replace its aging "Tornado" combat aircraft from 2025. To date, the federal government is considering purchasing F-18 aircraft from the United States or refitting Eurofighter planes. Buying state-of-the-art F-35 planes has been ruled out. Given Russia's deployment of new intermediate-range missiles on its Western territory, this decision should be reconsidered.

– NATO's nuclear weapons have the purpose of preventing war and preserving peace. As a carrier for US nuclear bombs, the Tornado's successor is essential for the credibility of Germany's contribution.

– The successor model must be able to work seamlessly and effectively with allied combat aircraft. By now, there are already seven European NATO members that have opted to buy the F-35.

– Germany must equip its pilots with the best-suited aircraft. The credibility of deterrence depends on the high likelihood of a successful mission and the permanent availability of the planes.

– For all these reasons, the federal government should include the F-35 fighter aircraft in its comprehensive analysis. It should then choose the aircraft that best fulfils the political-military criteria.

Germany's Defense Minister Annegret Kramp-Karrenbauer will decide in the coming weeks on the replacement for the country's ageing fleet of "Tornado" fighter planes. During a visit to Washington in September 2019, she stated publicly that any successor would have to ensure "seamless" continuity of the Tornado's capabilities. This refers to the plane's capabilities as a "dual-capable aircraft" (DCA): its dual role as a fighter plane for conventional warfare and as a carrier plane for a nuclear mission for NATO.

Russia's invasion of Ukraine in 2014 and its deployment of new nuclear-capable cruise missiles has led to a deterioration of the security situation in Europe. From NATO's point of view, it is crucial for Germany to make an appropriate and reliable contribution to the conventional and nuclear components of NATO's air forces. It therefore needs to provide a suitable successor to the Tornado in a timely manner.

So far, the federal government is exploring two options for replacing the Tornados: purchasing American F-18 fighter aircraft or refitting the Eurofighter as a dual-capable aircraft. There has been no consideration given to buying today's most modern fighter aircraft, the F-35. However, given the changes in the security environment, this approach is too narrow. F-35 aircraft should be included in the comparative review. This follows from the analysis of the requirements of nuclear sharing and nuclear risk sharing within NATO, as this study shows.

THE STRATEGIC FRAMEWORK

Russia's violation of the INF Treaty and its deployment of the new 9M729/SSC-8 intermediate-range missiles in the Western part of its territory[1] have caused great concern within NATO. For the first time since 1991, Europe has come under threat from Russia by land-based, accurate, nuclear-capable cruise missiles.[2] In addition, their deployment has raised awareness among NATO allies that Europe has in fact been exposed to multiple nuclear threats from Russian air- and sea-based ballistic and cruise missiles for some time now.[3]

In July of 2019, NATO's defense ministers agreed on the principles and parameters of NATO's response. The alliance is devising a balanced package of defensive measures. There are no plans for deploying new land-based nuclear missiles in Europe. Instead, NATO is focusing on intelligence, surveillance and reconnaissance; the development of conventional capabilities; air and missile defense; exercises, and the upkeep of a safe, secure and effective nuclear deterrent.[4] It is determined to take all necessary steps to maintain the credibility and effectiveness of its deterrence.[5] At the same time, NATO affirmed its commitment to effective arms control. It also remains committed to a meaningful dialogue with Russia.

Russia's Strategy

Deploying the missiles is part of Russia's strategy[6] aimed at destabilizing the West from the inside and intimidating it from the outside. Russia's "hybrid" array of tools reaches from systematic disinformation to nuclear threats, flexibly tailored to the evolving situation in peacetime, crisis, and war.

Russia's superior military strength vis-a-vis regions like the Baltic states gives the Russian leadership an option to create military facts on the ground. It is possible that its conventional forces could execute a rapid, pre-emptive attack to achieve a limited landgrab before NATO would be able to react militarily. It is conceivable, too, that Russia could simultaneously threaten the use of deep conventional or nuclear strikes against European capitals and against civilian and military infrastructure of essential importance to deployment, reinforcement, and defense. Such a combined use of conventional and nuclear means could paralyze the European's resolve to defend themselves, make the United States stay out of a conflict that would be confined to Europe and force NATO to stand down for fear of nuclear escalation.[7] In that case, Moscow would have achieved a strategic success without a long war.[8]

NATO's Deterrence and Defense Posture

At the NATO summits in Warsaw in 2016 and Brussels in 2018, allies including Germany decided to sig-

1 According to US sources, Russia has so far deployed four battalions with a total of 64 systems in Kapustin Jar, Kamyšlov, Mosdok, and Šuja. In: Gutschker, Thomas: „Russland verfügt über mehr Raketen als bislang bekannt", Frankfurter Allgemeine Sonntagszeitung vom 10.2.1019; https://www.faz.net/aktuell/politik/ausland/russland-verfuegt-ueber-mehr-raketen-als-bislang-bekannt-16032894.html (accessed on January 29, 2020).

2 The last missile covered by the INF Treaty was dismantled in Ma1991.

3 These are mostly sea- and airbased Kalibr 3M14, Kh 55/55SM and Kh 101/102cruise missiles. All in all, Russia has around 1800 nuclear warheads for medium-range missiles, in: Brauss, Heinrich/Krause, Joachim: Was will Russland mit den vielen Mittelstreckenwaffen? In: SIRIUS 2019, 3(2), 154-166; https://www.degruyter.com/view/j/sirius.2019.3.issue-2/sirius-2019-2005/sirius-2019-2005.xml?format=INT (accessed on January 29, 2020).

4 See NATO – Press conference by NATO Secretary General Jens Stoltenberg following the meetings of NATO Defense Ministers on June 26 2019; https://www.nato.int/cps/en/natohq/opinions_167072.htm?selectedLocale=en (accessed on February 6, 2020).

5 NATO – Press point by NATO Secretary General Jens Stoltenberg on the INF Treaty, 2 August 2019, https://www.nato.int/cps/en/natohq/opinions_168183.htm?selectedLocale=en (accessed on January 29, 2020).

6 Moscow's "Strategy of Active Defense" was presented by General V. Gerasimov, Chief of the General Staff of the Armed Forces of Russia, in a lecture at the Combined Arms Academy for the Armed Forces of the Russian Federation in Moscow on March 2, 2019. In: Dave Johnson, "General Gerasimov on the Vectors of the Development of Military Strategy," NATO Defense College, March 30, 2019.

7 With a range of around 2300 km, the new Russian medium-range missiles can reach most of Europe but not the United States. This has brought back the old European fear of a decoupling of Europe's from America's security as it existed at the time of NATO's double-track decision in 1979. In: Brauß, Heinrich/Mölling, Christian: Europas Sicherheit ohne INF-Vertrag. Politische und strategische Handlungsoptionen für Deutschland und die NATO, Berlin: Deutsche Gesellschaft für Auswärtige Politik (DGAP Kompakt), Januar 2019; https://dgap.org/system/files/article_pdfs/2019-01-DGAPkompakt.pdf (accessed on January 29, 2020).

8 For the time being, this is a theoretical scenario. But such a situation could arise if the United States had massive numbers of troops tied down in the Far East in a future military conflict with China. From a Russian perspective, this could constitute a favorable opportunity in Europe where the risks might appear manageable.

nificantly strengthen NATO's deterrence and defense posture. This is primarily aimed at denying Moscow the option to quickly create a Fait Accompli by conventional means in a regional war on the eastern flank of NATO. Since 2014, the alliance has taken a multitude of far-reaching measures to that end.[9] Given the deployment of Russia's SSC-8, NATO must now further adapt its response in order to neutralize any threat posed by these intermediate-range missiles. Such defensive measures need to strengthen the credibility and coherence of NATO's posture in the eyes of the Russian strategists.

Four measures are therefore of particular importance: (1) NATO's rapid reaction forces must be further reinforced, and all the conditions must be established for quickly moving these forces to where they would be required. They must be able to rapidly come to the support of allies on NATO's flank, who would be exposed to a direct military threat by Russia in a crisis. This requires a huge effort, particularly on the part of the Europeans.[10] They should also (2) acquire far-reaching and accurate conventional cruise missiles capable of paralyzing Russia's ability to conduct war. (3) Most allies must massively improve their air and missile defense. Over the past 20 years, it was dramatically reduced because it appeared unnecessary for crisis response missions and because defense budgets were consistently reduced. However, defending against the Russian SSC-8 requires the ability to quickly detect, track, and intercept low-altitude cruise missiles after their launch.

The final issue (4) concerns combat aircraft with the ability to carry American nuclear bombs to their targets. Their operational readiness should be increased, and their visibility improved through exercises. The reason is that so-called tactical nuclear weapons[11] and Dual-Capable Aircraft (DCA) have become much more important with the deployment of the Russian SSC-8 and in view of NATO's planned response.

There has been no consideration given to buying today's most modern fighter aircraft, the F-35

„Tactical" Nuclear Weapons and Dual-Capable Aircraft

Governments that have nuclear weapons think and act in accordance with the logic of deterrence, be it in defense or offense: in defense, to prevent an aggression, inhabit coercion, deny an aggressor possible options for action, and safeguard their own freedom of action; in offense, to intimidate and coerce the defender, to discourage resistance, and deny him options for an effective defense. NATO's military posture is defensive in nature. The alliance has an array of conventional and nuclear capabilities as well as cyber means. These capabilities allow for a multitude of options. In a crisis or

9 Summarized in Brauß, Heinrich: NATO Beyond 70: Renewing a Culture of Readiness; International Centre for Defence and Security, Tallinn, November 2018, https://icds.ee/nato-beyond-70-renewing-a-culture-of-readiness (accessed on January 29, 2020).

10 The NATO Readiness Initiative 4-30 from 2018 has so far resulted in European allies providing 30 battalions, 30 combat aircraft squadrons and 30 war ships equipped to be operational at the deployment location within 30 days. It was also agreed that these forces should be further expanded to several rapidly operational brigades, combat aircraft groups, and maritime operational groups. For quick deployment across national borders, legal, logistical and infrastructural preparations must be made. Transport capacities, roads, railway lines, bridges, tunnels, ports, and airports suitable for the deployment of mechanized forces are needed. NATO and the EU are working together on this matter, and the European Commission is planning to co-finance the improvement of the infrastructure with several billion euros.

11 Some people still speak of tactical nuclear weapons when talking about missiles with a range of under 500 kilometers or about bombs that are carried toward their target by tactical combat aircraft. Others believe that the use of any kind of nuclear weapon would be of "strategic" importance because it would fundamentally change the nature of a conflict.

conflict, NATO would choose the action that would most likely be capable of preventing an adversary from committing an aggression, or that would successfully defend against an attack and end the conflict at the lowest possible level. If the Russian leadership considers military aggression, it must come to the conclusion that the success of such an aggression would be doubtful, that the disadvantages would outweigh the desired gains, and that in an extreme case, inacceptable damage would be inflicted on Russia itself.

NATO will remain a nuclear alliance as long as nuclear weapons exist

Apart from a small number of about 150 B61-12[12] aircraft bombs stocked under US supervision in several European countries, there are no US nuclear weapons in Europe today. Therefore, these bombs are the only nuclear deterrence option that the United States has in Europe in the framework of NATO.[13] B-61 bombs would be – once the US president has given his approval – carried toward their target by fighter planes and pilots provided by European allies.[14] They therefore constitute a joint capability of the United States and European countries which do not have any nuclear weapons of their own.[15]

Over the past years, the alliance's heads of state and government have repeatedly confirmed that NATO will remain a nuclear alliance as long as nuclear weapons exist.[16] The B-61/DCA capability has a multiple political and strategic function.[17] It is the manifest and concrete expression of the United States' extended nuclear deterrence, the real proof of America guaranteeing Europe's security through its own security, and deliberately assuming the risks associated with that decision. The fact that European allies provide DCA combat aircraft and bunkers, storage facilities, and technical infrastructure on their territory is in turn the expression of their willingness to share this particular risk. It is the sign of a deliberate sharing of burden and risk which strengthens the alliance's coherence and solidarity.

At the same time, this risk sharing is the Europeans' "entry ticket" for participating in the nuclear planning at NATO and, in the case of an exercise or a mission being planned, for being consulted. Non-nuclear allies have

12 The exact figure is kept secret. The B-61-12 is a precision-guided bomb with variable explosive force of 0,3/1,5/10 or 50 kT. In: Federation of American Scientist: Video Shows Earth-Penetrating Capability of B61-62 Nuclear Bomb, January 2016; https://fas.org/blogs/security/2016/01/b61-12_earth-penetration/ (accessed on January 29, 2020).

13 All the other so-called tactical nuclear weapons from the time of the Cold War were withdrawn from Europe in the 1990s and destroyed. The United States currently plans to counter the Russian nuclear threat against Europe with sea-based missiles carrying nuclear warheads. In: United States of America/Department of Defense: Nuclear Posture Review 2018, pp 54/55; https://www.energy.gov/nnsa/articles/nnsa-completes-first-production-unit-modified-warhead/ (accessed on January 29, 2020).

14 Belgium, Germany, Italy, the Netherlands, and Turkey. Whether this is still the case in Turkey today is unclear. Great Britain and Greece also host facilities which, however, have not been activated. The United States also have capabilities of their own in Europe. Under SNOWCAT (Support of Nuclear Operations with Conventional Air Tactics), other European nations including Greece, Poland, the Czech Republic and Turkey can contribute to nuclear missions by providing fighter planes to escort the bombers.

15 France and Britain have their own nuclear weapons under their national command.

16 Most recently during their meeting in London in December 2019. See NATO – London Declaration, December 4, 2019, Paragraph 6, in combination with NATO – Brussels Summit Declaration, July 11, 2018, Paragraph 33-36. In its White Book of 2016, Germany has committed itself in a similar manner: „As long as nuclear weapons can be an instrument in armed conflicts, the need for nuclear deterrence continues. The strategic nuclear capabilities of the alliance, especially those of the United States, are the ultimate guarantee for the security of its members. NATO continues to be a nuclear alliance. Germany remains involved in the alliance's nuclear policy and the related planning through nuclear sharing." In: Weißbuch 2016 – Zur Sicherheitspolitik und zur Zukunft der Bundeswehr, p. 65, https://www.bundesregierung.de/resource/blob/975292/736102/64781348c12e4a80948ab1bdf25cf057/weissbuch-zur-sicherheitspolitik-2016-download-bmvg-data.pdf?download=1 (accessed on January 29, 2020).

17 Mattelaer, Alexander: Articulating the logic of nuclear sharing; Egmont Royal Institute for International Relations, Security Policy Brief No. 116, October 2019, https://www.ies.be/files/SPB116.pdf (accessed on January 29, 2020).

a seat and a voice in NATO's Nuclear Planning Group[18] that has the political control over nuclear planning, exercises, and any possible mission. "Nuclear sharing" (NS) is crucial for trust among allies and the coherence of the alliance. It lifts the pressure on nations that feel particularly threatened by Russia's posture to develop their own nuclear capabilities. In that sense, NS also serves to limit nuclear proliferation in Europe.

The B-61/DCA capacity sends out the strategic message that Russia's territory will not remain a sanctuary if Russia attacks Europe with nuclear weapons. The ability to hit Russia's own territory in an armed conflict is meant to neutralize a Russian threat, deter Moscow from committing an aggression during a crisis, or help end an aggression under way. It offers an array of flexible options to demonstrate determination during a crisis and, at the same time, respond appropriately and proportionately: increase or lower the level of operational readiness; hold more exercises; relocate aircraft; schedule exercises to coincide with NATO's map exercises or in a joint scenario with conventional forces; demonstratively relocate troops to specific areas of alliance territory; or, finally, implement a measured, selective, and deliberately limited nuclear strike in order to quickly end a war. These actions would be accompanied by appropriate diplomatic and public messages to Moscow.[19]

For all these reasons, the B-61/DCA capability remains central to NATO's deterrence and defense posture.[20] It will therefore play an important role in NATO's response to the Russian intermediate-range missiles.

GERMANY'S ROLE IN NUCLEAR SHARING

Given its central location, its political weight, and its economic and military potential, Germany is regarded as a crucial European ally by the United States as well as by other European countries. Germany's security benefits from the arrangements of nuclear sharing (NS) to which Germany at the same time significantly contributes. Thus, Germany has a particular responsibility for safeguarding nuclear sharing which has a large part in the coherence and credibility of NATO's structure of deterrence and defense.

In no European country, the provision of nuclear means is popular with the wider public. Were Germany to withdraw from nuclear risk sharing, other Europeans could follow its example. There would be a real danger, then, of Washington refusing to carry the nuclear risk for Europe's security by itself. Particularly European nations on the alliance's borders that feel exposed to direct military threats are likely to see the abandonment of NS as a violation of alliance solidarity. They could be tempted to take unilateral measures, setting a dynamic in motion which could end up putting a lot of pressure on NATO's self-imposed limitations under the NATO-Russia Founding Act.[21]

The Tornado Succession

Germany should therefore maintain its contribution to NS and all its components in a credible and reliable way. To underpin this political responsibility, the federal government must choose the right successor for its Tornado aircraft. It should take its decision so that the new aircraft will be available from 2025, as that is the date when the Tornados should be taken out of service after more than 50 years. To continue using the more than 90 Tornado aircraft beyond that date would be unreasonably costly and carry serious technical risks. The DCA commitment vis-à-vis NATO could no longer be credibly fulfilled.

For the pending decision, the performance, availability for the conventional and nuclear task, and cost of the possible Tornado successors should all play a role.[22]

- The Eurofighter (EF) is essentially a fourth-generation fighter plane. It has been certified for a limited role in air to ground attack with air-to-surface weaponry. However, the EF would need to be refitted extensively and expensively for the DCA role. This would take time, too. For a nuclear mission, it would have to be accompanied by other combat aircraft, increasing the overall number of planes required. Certification would take a long time, meaning that the EF could not be ready to replace the Tornado on schedule. But the EF will for the next 30 years remain the backbone of the German Luftwaffe's flying combat fleet, particularly in the role of air defense. To further develop its usability and operational capability the Long-Term-Evolution (LTE) is necessary and appropriate.

- The F-18 E/F Super Hornet is a fourth-generation US aircraft. According to US statements, it may be possible to get it equipped for nuclear missions by 2025, but it would then also need to be certified for a nuclear role. For a nuclear mission, it would need to be accompanied by other aircraft (for

18 The Nuclear Planning Group has 28 defense ministers as members. France with its independent national nuclear doctrine does not take part.

19 NATO – Brussels Summit Declaration, July 11, 2018, Paragraph 35.

20 Mattelaer 2019.

21 With the NATO-Russia Founding Act of 1997, NATO unilaterally pledged to neither deploy nuclear weapons nor substantial combat forces permanently on the territory of what was then the new member states. In: Founding Act on Mutual Relations, Cooperation and Security between NATO and the Russian Federation, May 27, 1997; https://www.nato.int/cps/su/natohq/official_texts_25468.htm (accessed on January 29, 2020).

22 For details of the performance criteria of the possible Tornado successor, see Mölling, Christian/Brauss, Heinrich: The Tornado Complex, Conflicting Goals & Possible Solutions for the New German Combat Aircraft. DGAP Policy Brief 04, February 2020, https://dgap.org/de/forschung/publikationen/der-tornado-komplex (accesed on 12 February 2020).

instance the EA-18G) that have been optimized for electronic warfare. This increases the overall requirement for planes.

- The F-35A is also an American fighter plane, but a model of the fifth generation. It is the most modern combat aircraft currently available, designed to carry tactical nuclear weapons and certified in accordance with US requirements. Experts agree that it is the aircraft which currently best fulfils the military and technical requirements.

Germany's federal government has the responsibility to provide its pilots,with the best suited combat aircraft

Given Germany's necessary contribution to the reinforcement of NATO's deterrence and defense after the end of the INF treaty, the choice of the Tornado successor should be taken in view of the following political and military elements and criteria:

- **Strategic importance of the DCA mission**. The strategic importance of the DCA mission means that its dedicated instruments must have maximum credibility. For an opponent, defense against a DCA mission has the highest priority. It is therefore the most difficult and dangerous mission for pilots and their combat aircraft. Before starting any DCA mission, NATO would have an in-depth discussion. It would be approved only if it was considered the best possible option to end a war in Europe. It must be credible that such a mission can be relied on to be a success, otherwise the political message will fail. The DCA capacity needs to be permanently available in sufficient quantity and the best quality in order to effectively contribute to deterrence and the preservation of peace.

- **Essential military functions and capabilities**. The Tornado successor must have the capability to conduct conventional attacks and manned tactical reconnaissance missions, to suppress enemy air defense, and to execute DCA missions. Replacing the Tornados must not lead to a loss of capabilities. For the credibility of DCA missions, the aircraft and their crews must have the highest degree of ability to prevail and survive. Russian air defense is modern and very dense; it consists of high-performance radar, a multitude of other sensors, multiple air defense missiles, and a flying air defense with comprehensive capabilities for electronic warfare.[23] NATO's combat aircraft need to provide sufficient guarantees that they can win the expected high-intensity battle against such an opponent with sufficient probability, and that they can penetrate deeply enough into enemy airspace to steer a nuclear weapon to its target and then return. Only then will the option of such a mission decisively influence the opponent's risk evaluation and achieve the required deterrent effect.

- **Assured availability and future viability**. The successor of the Tornado should, if at all possible, be available from 2025. By then, it will also need to be certified for carrying B61-12 nuclear bombs. That is the precondition for a quick step-by-step decommissioning of the Tornados. There should be no temporary solution to bridge the gap until the deployment of the "Next Generation Fighter" (NGF). The NGF is intended to be part of the Future Combat Air System (FCAS) that Germany and France have agreed to develop together. But it will only become available from 2040 at the earliest. Today, it seems uncertain and even questionable whether FCAS/NGF would be available as a DCA within NATO for US bombs, and whether it would be certifiable. A bridging solution would therefore not be sufficiently viable.

- **Interoperability**. The successor of the Tornado must be able to work together smoothly and effectively with other allied aircraft. In this context, it is particularly important to note that seven European members of NATO have already decided to purchase F-35 aircraft, including all the other DCA nations.[24]

23 In the north, the Baltic and the Black Sea regions and more recently in Syria, Russia has installed multilayered systems of capabilities called „Anti-Access/Area Denial (A2AD) Capability." In a war, they could massively impair the deployment of NATO forces for reinforcing eastern allies. This is why allied air forces must be able to neutralize these A2AD "umbrellas."

24 Belgium, Denmark, Great Britain, Italy, the Netherlands, Norway, and Poland will purchase F-35. Finland and Spain have not decided yet.

Consequently, the F-35 will be the combat aircraft that will dominate the relevant NATO planning and procedures for the coming years. The Tornado successor needs to be able to fulfill the entirety of its tasks within a combined air operation together with F-35 aircraft. It must not have any capability deficits that might endanger allies in critical situations. There must be no doubt about interoperability with allies that are purchasing F-35, especially in an area as sensitive as the European contribution to NATO's nuclear deterrence. In addition, Germany must keep the promise that it will be able to lead a Multinational Air Group within NATO. It is obvious that the required interoperability will most surely be achieved with an identical type of combat aircraft.

- **Sufficient diversification**. According to the regulations of Germany's Military Air Strategy[25], the country's fleet of combat aircraft should consist of more than one type of aircraft to safeguard flexibility in the performance of missions. With the Tornado and the Eurofighter, this has so far been the case. The decision about the successor model of the Tornado should also respect this principle.

- **Cost efficiency**. The costs of purchase and maintenance over the coming decades of the different options for the Tornado succession must be in reasonable proportion to their capabilities in the conventional and the nuclear role. A combat plane that has all the capabilities that it will need today and in the foreseeable future for its conventional, but particularly for its DCA role, allows for smaller overall numbers than a plane that needs to be accompanied by other planes in order to be able to survive battle and accomplish the mission.

- **Comprehensive analysis**. The possible successors of the Tornado should be rated in a comprehensive analysis that takes the political-military criteria and the effects on NATO into account. In addition, the consequences for European integration and the European defense industrial base relevant to Germany's interests, its contribution to the development of modern European technology and to the Europeans' ability to act, need to be considered. This analysis should lead to a well-founded political decision that the federal government can explain to the German public as well as its allies.[26]

CONCLUSIONS

Germany's federal government has the responsibility to provide its pilots, which have to be able to fulfill a particularly dangerous combat mission, with the best suited combat aircraft. NATO must be able to rely on that. The political-military considerations and criteria lead to the conclusion that the federal government should revise its initial decision to only consider the F-18 and the Eurofighter. Before taking the final decision, the F-35 should be included in the comparative analysis and evaluation.

The result of such a comprehensive analysis could be a package of three essential measures[27]: first, choosing the aircraft that best fulfils the political-military criteria as a replacement for the DCA Tornados; second, implementing the long-term program to increase the combat capacity of the Eurofighter until at least 2040 and replacing the remaining Tornado aircraft; and third, undiminished investment in research and development for the FCAS/NGF.

25 Germany's military airforce strategy in principle recommends using two different combat aircraft in parallel. In: BMVg – Militärische Luftfahrtstrategie 2016, S. 17.

26 For a detailed analysis and summary of the main political, military, technological, industrial, and cost elements that should be taken into account for the political decision about the Tornado succession, see Mölling/Brauß 2020.

27 Mölling/Brauß 2020.

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