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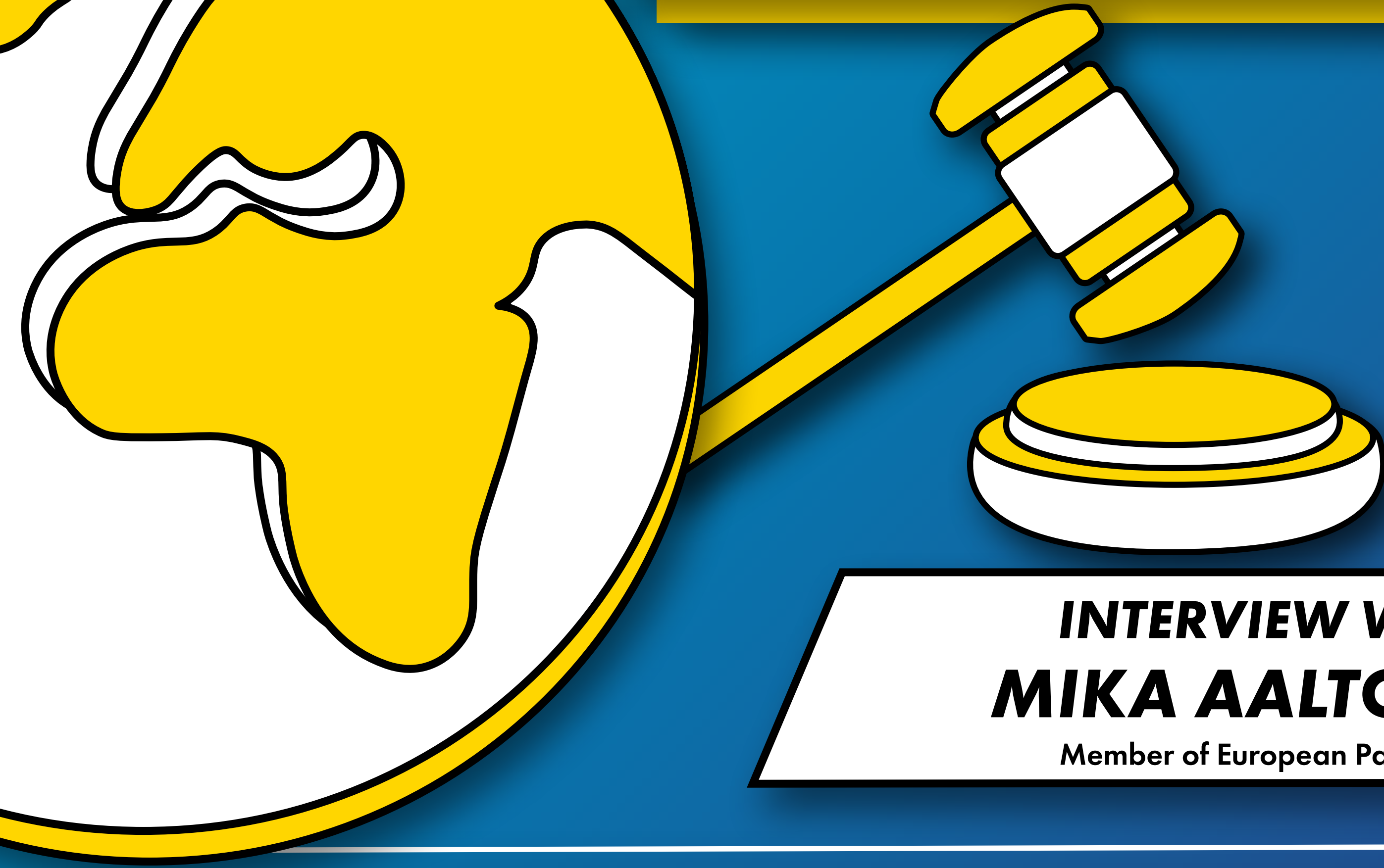
Between Power and Principles



INTERVIEW WITH MIKA AALTOLA

Member of European Parliament

The Link Between Migration and Terrorism

Fears that migration fuels terrorism have long shaped political debate, but how well do they hold up to evidence? Thomas Kurz examines the relationship between humanitarian and non-humanitarian migration and international terrorist incidents. His analysis of OECD countries shows that humanitarian migration has a small positive link to terrorism, while non-humanitarian migration shows no such effect. Kurz argues that conflating all migrants in security debates oversimplifies a far more complex reality.

The External Politics of the Israel-Hamas War

Behind the unrelenting violence in Gaza lies a wider battle of regional powers entrenching the conflict's deadlock. Gidi Brandes examines how states like Iran, the US, Qatar, and Saudi Arabia shape the war's trajectory through competing interests and alliances. The article maps the complex web of regional politics and proposes strategies to realign incentives, arguing that only coordinated external action can break the cycle of violence.

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Editorial

Theodor Himmel

Theodor Himmel is pursuing an advanced legal education as a Rechtsreferendar at the Regional Court of Baden-Baden. His expertise includes international arbitration and mediation, as evidenced by his Advanced LL.M. from Leiden University, where he focused on the EU and Singapore Mediation Conventions. As Chair of the EPIS Thinktank e.V., he leads international collaborations on foreign affairs and security policy, while also contributing to legal scholarship and policy advisory roles with government affairs.

Carl Johan Steninge-Otto

Carl holds an M.A. in International Affairs from the Hertie School, with a focus on international security. His primary interests lie in conflict studies, defence policy, and diplomacy. He is currently serving in the Danish army as part of the Officer Education Programme. Carl aims to contribute to the EPIS Catalogue by bringing together theoretical insight and practical military experience—an essential combination for advancing European defence ambitions.

Sarah Neuhauser

Sarah is currently pursuing a Master's degree in Multilateral Diplomacy, deepening her focus on international cooperation, peacebuilding, and global governance. With a background in business development, intercultural communication, and strategic planning, she brings a multifaceted perspective to the field. She is particularly passionate about respectful dialogue across cultures, thoughtful negotiation, and a leadership culture rooted in empathy and understanding.

Alvin Karl Bürck

Alvin Karl Bürck is pursuing an M.Sc. in International Political Economy at The London School of Economics and Political Science (UK). His research focuses on international political economy and geoeconomics. Currently, he serves as Postgraduate Student Academic Representative.

Power, Principles, and the Future Global Order

The post-Cold War rules-based order that a persisted for over thirty years has in many ways lost its most ardent backers. An investment in soft power globally, is shifting in favour of hard power, and it is becoming ever clearer that less deference is given to international law. This shift is embodied by a greater focus on the evolution of technological capabilities. This mix of the political, and the technological is the focus of this issue, the implicit question being to what extent power and principles dictate the future global order.

This issue of the EPIS Magazine explores these developments, politically, technologically. Thomas Kurz investigates the nuanced relationship between migration and terrorism, showing that while humanitarian migrants face greater vulnerability to radicalization due to socio-economic hardship, empirical evidence suggests only a minimal impact of migration on terrorist incidents overall. Gidi Brandes dissects the Israel-Hamas War as a strategic deadlock shaped by regional power dynamics, arguing that only by recalibrating the incentives of external actors like Iran, the US, Qatar, and Saudi Arabia can a sustainable ceasefire emerge in an increasingly multipolar Middle East. Belen Bringas explores how the U.S.–China military AI arms race—driven by autonomous weapon systems and strategic automation—is undermining global stability, and argues that without urgent international regulation, algorithmic deterrence could escalate future conflicts beyond human control. Endrit Kasumaj challenges the dominant narrative of an "AI arms race" and reframes global AI rivalry as an "innovation race," highlighting how cooperation, ethical standards, and strategic restraint—not zero-sum competition—will determine whether AI becomes a force for shared progress or destabilising risk. Martin Indjov warns that funding Europe's military rearmament by slashing social spending threatens to erode social cohesion, empower populism, and ultimately undermine the very security such policies aim to protect—arguing instead for a holistic strategy that balances defense modernization with strong social investment. Lenín Navas explores Europe's dangerous dependency on foreign-controlled critical raw materials, arguing that only coordinated investment, strategic partnerships, and supply chain resilience — from mining to manufacturing — can secure Europe's defense and energy future against geoeconomic threats. Lovely Bernardo looks at the global evolving doctrine of preemptive self-defence and eroding the legal foundations of the international order.

We are pleased to feature guest contributions from Ferdinand Wegener, and Erik Lewerenz and Heiko Radde, alongside interviews from famed French diplomat Didier le Bret, and Finnish MEP Mika Aaltola. We once again wish to thank our authors deeply for their expertise and their hard work, in bringing about the articles. Additionally, without the designer Cira Scherenberger, this issue would not have been possible. To all the readers, we also extend our gratitude – your interest in the work of the Magazine and the topics underline the continued engagement in the global community. We hope that this issue will provide you with an insight into the political trends and the technological evolutions, that will shape the future global order – and we hope that you enjoy this issue of the EPIS Magazine.

Theodor Himmel
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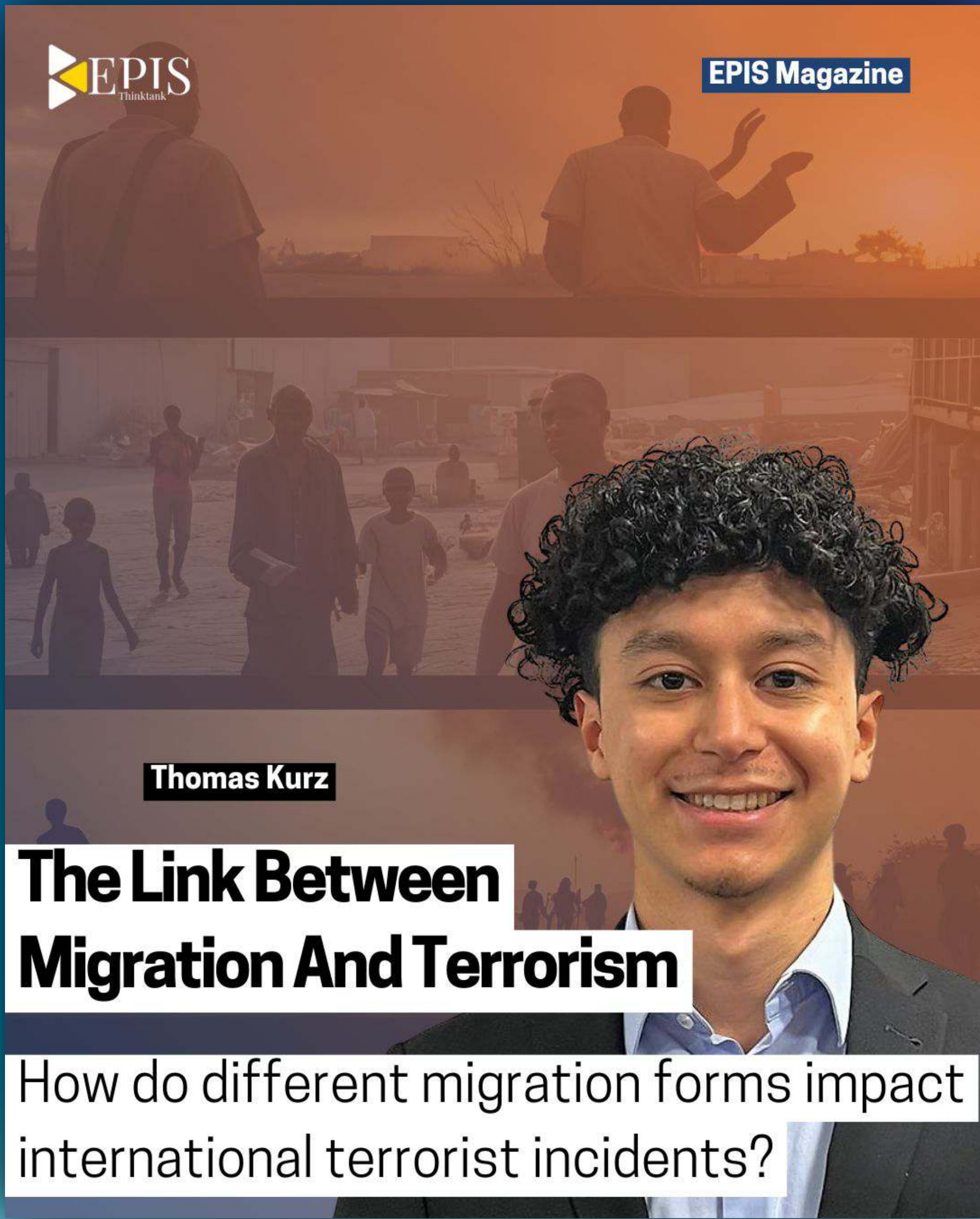

About the Article

Fears that migration fuels terrorism have long shaped political debate, but how well do they hold up to evidence? Thomas Kurz examines the relationship between humanitarian and non-humanitarian migration and international terrorist incidents. His analysis of OECD countries shows that humanitarian migration has a small positive link to terrorism, while non-humanitarian migration shows no such effect. Kurz argues that conflating all migrants in security debates oversimplifies a far more complex reality.

About the Author

Thomas Kurz studied Political Science and Public Administration at the University of Konstanz before he obtained a Master's degree in International Affairs at the Hertie School in Berlin. During his master's and especially in his exchange semester at Georgetown University in Washington, D.C., he specialized in International Security. His research focuses on the relationship between migration and terrorism. Furthermore, he is interested in transatlantic relations, especially in the political, economic, and security-related cooperation between Germany and the EU with the United States and Latin America.

1. Introduction

„Where were you during 9/11?"

This question often sparks vivid memories, with people recalling the exact time and place they learned of the terrorist attacks that forever altered the world. This question underscores the profound impact of 9/11 – not just on the United States, but globally – fueling a war on terror, and reshaping security, policies, and societal dynamics worldwide. The consequences were not limited to immediate violence; the attacks also intensified xenophobia and redefined how migration, security, and terrorism were discussed, particularly in Western countries.More than two decades later, Europe, and Germany in particular, faced a resurgence of terrorist violence. Although less deadly than the attacks of 9/11, a series of primarily Islamist attacks in 2024 shocked the public. Three major attacks in Solingen, Magdeburg, and Mannheim resulted in ten fatalities and nearly 220 injuries, reigniting debates about the link between migration and terrorism. (Parlamentsnachrichten Deutscher Bundestag, 2024; SWR Aktuell, 2024; tagesschau, 2024). The perpetrators were migrants, two of whom were individuals who already should have been deported. These tragic events not only intensified public discourse but also shaped the agenda for the German Federal Elections in February 2025, with migration and terrorism emerging as central issues (Forschungsgruppe Wahlen, 2025; tagesschau, 2025). In this complex context, migration is often viewed as a security risk in Germany, Europe, and beyond. While the fear of terrorism fuels these concerns, Western societies, including Germany, face pressing demographic challenges: aging populations and shrinking workforces. Migration is presented as a solution to address the labor shortage, with projections suggesting that without migration, Germany's workforce could shrink by up to 10% by 2040 (Kubis & Schneider, 2024). In the European Union, labor migration accounts for over 20% of inflows, with asylum-seekers constituting only 15%. Similar trends are seen across member states of the Organization for Economic Co-Operation and Development (OECD), where family migration also plays a significant role (Eurostat, 2022). Given these facts, the often populist call for reduced migration, especially as a response to security concerns, fails to account for the nuanced differences between different types of migration. While public debates and much of the existing literature tend to group all migrants together, distinguishing between humanitarian and non-humanitarian migration is crucial for an informed discussion. As this article will demonstrate, the lack of differentiation in these discussions has led to oversimplifications that overlook the distinct implications of different migration types on security.

2. What does the Literature say?

The scientific literature explores the relationship between migration and terrorism from various perspectives. Approximately ten key papers have attempted to answer the question of whether increased migration leads to a rise in terrorism, with the first notable contribution dating back to 2008. This indicates that the field is relatively new, largely driven by the 9/11 terrorist attacks in New York and Washington, DC. In 2022, Helbling and Meierrieks published a comprehensive review, summarizing essential contributions to the literature on the relationship between terrorism and migration. They emphasize the potential public policy implications of this ostensible relationship, such as stricter immigration laws under Trump in 2017 (Executive Order 13769 - Protecting the Nation From Foreign Terrorist Entry Into the United States) or electoral politics (e.g., German Federal Elections 2025). Furthermore, Helbling and Meierrieks (2022) identify three large N-studies examining the overall effect of migration on terrorism without distinguishing between humanitarian and non-humanitarian migration. Bove and Böhmelt (2016) aim to answer the question of whether immigration is associated with domestic and transnational terrorism. Their findings suggest that migrants stemming from terrorist-prone states moving to another country are indeed an important vehicle through which terrorism does diffuse. However, they also conclude that, in general, migrant inflows themselves tend to lead to a reduction in terrorist attacks. Dreher et al. (2020) investigate how a country's immigrant population – defined as the stock of people born abroad – affects the probability of a terrorist attack in the host country. They demonstrate that the probability of immigrants from a specific country of origin carrying out a terrorist attack in the host country increases as the number of foreigners from that country increases. However, they find that this "scale effect" does not differ from the impact that domestic populations have on domestic terror. Their study provides little evidence that terrorism is systematically imported from countries with large Muslim populations or from those with active terror networks. In another paper, Forrester et al. (2019) examine the relationship between immigration levels and terrorism. They could not find a relationship between immigration and terrorism in destination countries, regardless of whether it was measured by the number of attacks or the number of victims. Helbling and Meierrieks (2022) conclude that these findings "leave little evidence [...] in favor of the hypothesis that immigration unconditionally promotes terrorism in receiving countries" (Helbling & Meierrieks, 2022, p. 981). Focusing on the conditional effects of immigration on terrorism, Bove and Böhmelt (2016) and Dreher et al. (2020) acknowledge that the composition of migration inflow plays a significant role in the migration-terrorism relationship. While gender does not appear to be a crucial factor, both studies highlight that the skill level of migrants alters the effects, with high-skilled immigration tending to reduce the risk of terrorism. This may be attributable to the side effects of human capital, since high-skilled individuals are typically over-represented in migration flows (Bove & Böhmelt, 2016). Three large N-studies examine the relationship between "involuntary" migration (i.e., humanitarian migration) and terrorism. Choi and Salehyan (2013) and Milton et al. (2013) both identify a positive relationship between hosting refugees and terrorist activities in the hosting countries. These studies argue that poor conditions in refugee camps, as well as general mistreatment of refugees in host countries, contribute to higher levels of terrorist attacks. In contrast, Polo and Wucherpfennig (2022) argue that the rise in terrorist activities in refugee host countries is primarily due to increased attacks on refugees themselves – refugees as scapegoats – rather than refugees acting as "Trojan Horses" for terrorism. These findings are particularly apparent in developed countries. The aforementioned studies either focus on refugee migration or keep the term "migration" generic and do not specify whether they focus on humanitarian or non-humanitarian migration. Helbling and Meierrieks (2022) highlight three particularities that occur in refugee migration that could influence terrorism – features not found in other forms of migration. First, refugee migrants are less likely to self-select into migration. The opposite accounts for the groups of labor migrants, in which educated migrants are often overrepresented (Grogger & Hanson, 2011). This effect may also lead to refugees struggling more frequently with economic and social integration, which can increase their vulnerability to politico-economic hardship and discrimination (Helbling & Meierrieks, 2022). Second, refugees, by definition, typically come from countries affected by conflict and violence more often than other migrants (Echevarria & Gardeazabal, 2016). Third, refugees typically encounter less favorable living conditions in their host countries, which hinders their integration compared to non-humanitarian migrants (Walther et al., 2020).

Humanitarian Migration:
Movement of people forced to flee conflict, or disaster, seeking protection.

3. Different Forms of Migration

Migration is a global phenomenon. The International Organization for Migration (IOM) estimates that, in 2020, over 280 million people migrated internationally, with an additional 60 million people being displaced internally (International Organization for Migration, 2024). While these numbers seem significant, migrants represent only about four percent of the global population. Nevertheless, the estimated number of international migrants has steadily increased over the past five decades, tripling since 1970. It is important to mention that most examinations of the difference between migration and terrorism rely on official data on "regular" migrants (i.e., those who migrate through formal channels). Irregular (i.e., undocumented) migrants are excluded from the scope as they do not appear on official statistical data. Although this is a large caveat, there is currently no other way around.

In a recently published editorial, Scholten (2022) provides an introduction to migration studies, offering explanations of fundamental facts and trends in international migration. In chapter six, Talleraas (2022) gives a simple yet comprehensive definition of migration and migrants, describing them as "people who move or have moved" (Talleraas, 2022, p. 112). Nevertheless, she emphasizes that some people are labeled and governed as migrants while others self-identify as such. Building on Scholten's (2022) work, I have developed a framework to categorize different forms of migration. As shown in Figure 1, migration can be broadly divided into two categories: international and internal migration. International migrants are those who cross an international border during their journey, while internal migrants remain within a single country and do not cross state borders. Both categories can be further divided into forced and voluntary migration. This distinction is based on the drivers of migration and is not as rigid as the international-internal categorization. In practice, migration often involves "mixed flows" of forced and voluntary migrants as the drivers and experiences inherent in any migration journey exist along a spectrum rather than as a dichotomy (Erdal & Oeppen, 2018). Forced internal migrants are classified as Internally Displaced People (IDPs). IDPs are considered part of the group of humanitarian migrants; however, since they do not cross international borders, they represent a distinct group within the migration framework. In the context of international migration, forced migration includes refugees, asylum seekers, and individuals under subsidiary protection. These forms of migration can also be described as humanitarian migration. In contrast, non-humanitarian, or voluntary, migration includes labor migration, family migration, student or educational mobility/migration, and lifestyle migration (Scholten, 2022).

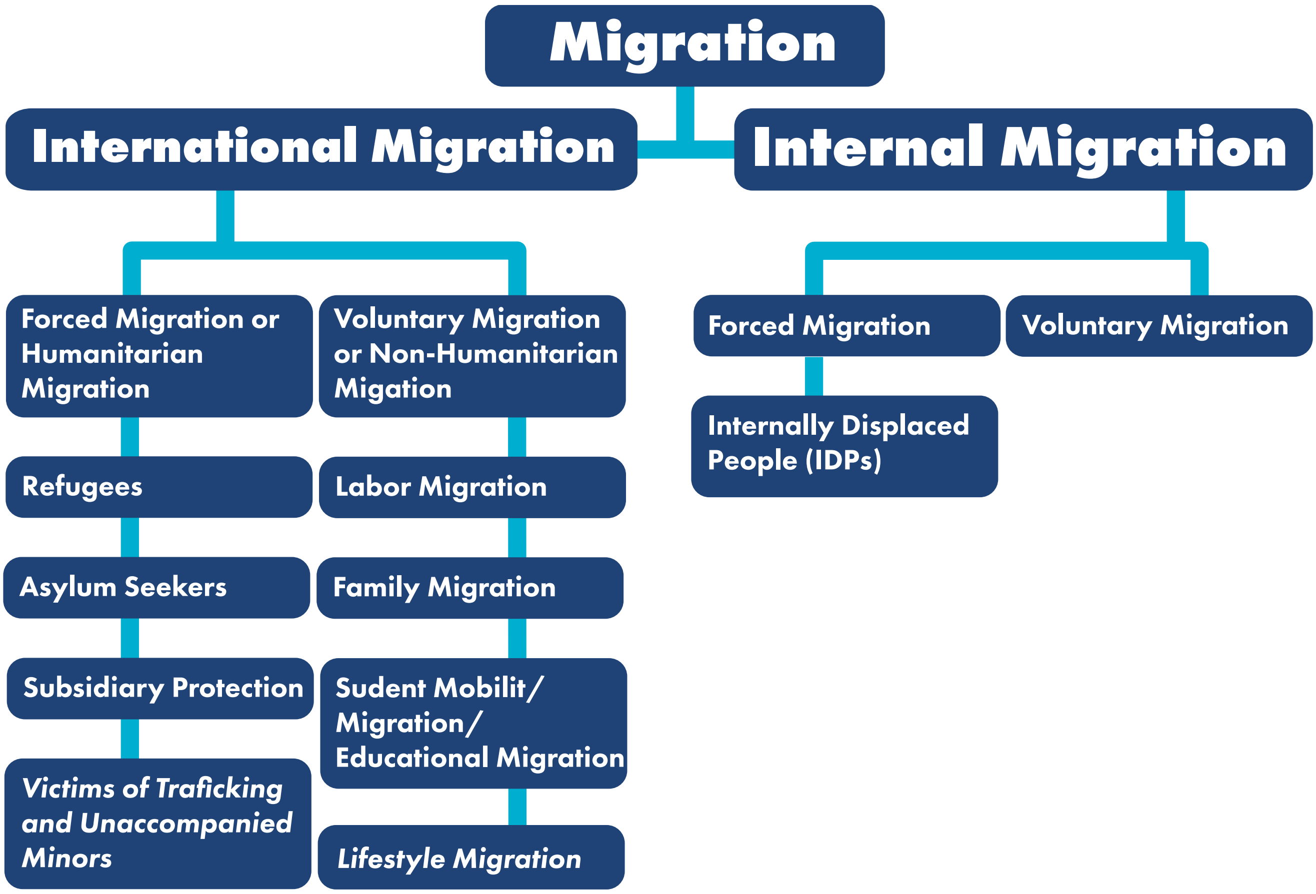

Figure 1: Self-Developed Framework for Migration based on Scholten (2022)

3.1 Differences in Humanitarian and Non-Humanitarian Migration

Humanitarian migration is loosely defined as "the movement of people who feel some-how forced to move" (Scholten, 2022, p. 151). This category is not highly selective, encompassing a variety of motivations for an individual to migrate. Research on humanitarian migration is historically grounded in the events of World War I and World War II. These wars significantly contributed to the establishment of International Humanitarian Law as it exists today. Nevertheless, the historical context also introduces a bias in contemporary analysis, as much of the literature on humanitarian migration tends to focus on the European asylum system and governance models in other "Western" receiving countries. In contrast, over 80% of the global refugees are hosted by developing countries (Talleraas et al., 2022). Humanitarian migration is characterized by the well-defined drivers of migration, and the legal status of humanitarian migrants is clearly outlined in international law. The 1951 Refugee Convention remains the primary source of these legal guidelines. Non-humanitarian migration includes voluntary forms of migration that differ fundamentally from forced migration. There is no central governing document, like the 1951 Refugee Convention, for these movements. Instead, voluntary migration is regulated by regional, sub-regional, dyadic, or national contracts.It is important to notice that there is often a blurred line between labor migration and other forms of migration. While refugees or family migrants may initially move for various reasons, they may later stay in a country for employment or income purposes. A current paradox exists in the distinction between various forms of migration, which are legally categorized based on factors like visa conditions. At the same time, public discourse and even academic research often treat migrants as a homogeneous group. This blurring of lines presents both opportunities and challenges. While humanitarian migrants could help address the labor shortages in Europe, the legal frameworks, often referred to as migration regimes, fail to adequately categorize them, thereby hindering the development of effective migration policies.

4. How Migrants become Terrorists

Several pathways have been identified in the literature through which migrants might become involved in terrorism. One prominent theory is the "Trojan Horse" theory, which is not typically supported in academic circles but remains a popular concern in public discourse. This theory suggests that terrorist operatives might infiltrate countries disguised as migrants, exploiting the migration process to enter a country undetected. Radicalization would occur outside the target country, and migrants serve as vehicles for terrorism. However, studies such as that by Polo and Wucherpfennig (2022) show little empirical support for this theory. The asylum process, which generally lacks the pre-entry screening required for other types of migration, could make it easier for individuals to enter countries and potentially carry out terrorist activities during lengthy asylum verification processes. While this may seem to support the Trojan Horse argument, more effective security measures in OECD countries have reduced this risk (Özbek, 2018). Another pathway to terrorism is through domestic radicalization, as seen in the "homegrown terrorist theory." This theory posits that migrants who have been in a host country for some time may become radicalized domestically, rather than as a result of their initial migration. Research also highlights how migrants are recruited and persuaded by terrorist organizations. Yayla (2021) outlines an eight-step recruitment process that terrorist groups use, including the identification of potential recruits, establishing contact, building rapport, and ultimately isolating the recruit from their prior social environments. This process is particularly effective when a recruit's social and economic circumstances make them vulnerable. Labor migrants and family migrants, who generally experience more stable environments due to employment and family integration, are less likely to

> **Labor migrants and family migrants are less likely to become radicalized**

become radicalized compared to refugees and asylum seekers, who often face social isolation. This difference in vulnerability is an important factor in understanding how humanitarian migrants may be more susceptible to radicalization and recruitment by terrorist organizations compared to non-humanitarian migrants. Theories related to individual vulnerability to radicalization emphasize factors such as age, social identity, and education. Younger individuals, particularly those without stable familial or social ties, may be more easily recruited due to identity struggles and lower self-esteem. Educational attainment also plays a role; higher levels of education tend to be associated with lower rates of radicalization, although individuals with specialized skills (e.g., in STEM fields) may be targeted for specific roles within terrorist organizations. Economic factors, including unemployment and poverty, are key drivers of radicalization. Refugees often experience higher levels of economic deprivation compared to non-humanitarian migrants, making them more vulnerable to recruitment by terrorist groups. Additionally, discrimination, lack of political representation, and social exclusion exacerbate feelings of alienation, increasing the likelihood of radicalization. Humanitarian migrants, by definition, often come from conflict zones and are exposed to higher levels of political violence, which further contributes to their vulnerability to radicalization. Overall, the literature outlines how various factors, both individual and external, contribute to the likelihood of migrants becoming involved in terrorism. Humanitarian migrants, due to social isolation, economic hardship, and political exclusion, face higher risks of radicalization compared to non-humanitarian migrants, who typically enjoy more stable social and economic conditions. Understanding these pathways is crucial for addressing the underlying causes of terrorism and improving migration and integration policies.

5. Empirical Evidence

To date, there is no empirical evidence regarding the question of whether there is a difference in effects between humanitarian and non-humanitarian migration on international terrorism, particularly in 38 OECD countries. I conducted an OLS and Fixed Effects regression to test the hypothesis that there is a difference in effects between humanitarian and non-humanitarian migration, with the former having a more positive effect than the latter. Fi. To do so, I used data from the Global Terrorism Dataset (GTD).

Methods explained:

Ordinary Least Squares (OLS) Regression

Ordinary Least Squares (OLS) regression is a widely used statistical technique that helps to analyze the relationship between two or more variables. It works by estimating how one variable (e.g., migration) influences another variable (e.g., terrorism) while controlling for the effects of other factors (such as GDP, population size, or unemployment rate). OLS regression can determine the direction (positive or negative), the magnitude, and the statistical significance of the relationship between the variables, helping to identify potential causal effects.

Fixed-Effects-Regression

Fixed-Effects regression is a more powerful method for analyzing relationships over time by observing the same subjects (e.g., countries or individuals) at multiple points. It controls for country- or time-specific factors, isolating the effect of key variables and reducing distortion from unobserved characteristics.

I regressed a count variable for terrorist incidents in OECD countries between 1970 and 2020 on the numbers of arriving humanitarian and non-humanitarian migrants to OECD countries in these years. The data is available at the OECD's International Migration Database. Furthermore, by matching the home countries of these organizations with the countries of origin of humanitarian and non-humanitarian migrants, I classify the migrants into two groups: those from countries with transnational terrorist organizations (TNT) and from countries without TNT. I replicate this approach, as outlined in Polo and Wucherpfennig (2022, p. 39). The table below presents the total number of migrants in the dataset, categorized by humanitarian and non-humanitarian migrants, as well as by migrants from TNT (transnational terrorism) countries and non-TNT countries (percentage of total in parentheses).

	Non-Humanitarian Migrants	Humanitarian Migrants	Total
TNT Migrants	A) 12,770,310 (10.17%)	C) 3,111,789 (2.48%)	15,882,099
Non- TNT Migrants	B) 98,019,226 (78.08%)	D) 11,629,460 (9.26%)	109,648,686
Total	110,789,536	14,741,249	125,530,785

Figure 2: Table about Migration Data

The results show that humanitarian migrations would need to increase by a factor of 21 for a 1% increase in terrorist activities. Having a look at a concrete example, according to the GTD, Germany experienced 3 (three) international terror attacks in 2018 while hosting 67,860 refugees from countries with international terrorist organizations. According to this (limited) model, to cause the number of terrorist attacks to increase from 3 (three) to 4 (four), i.e., one additional attack, the number of humanitarian migrants would need to increase to approximately 30.9 million. This is an increase of about 45.5 times the initial number of migrants.

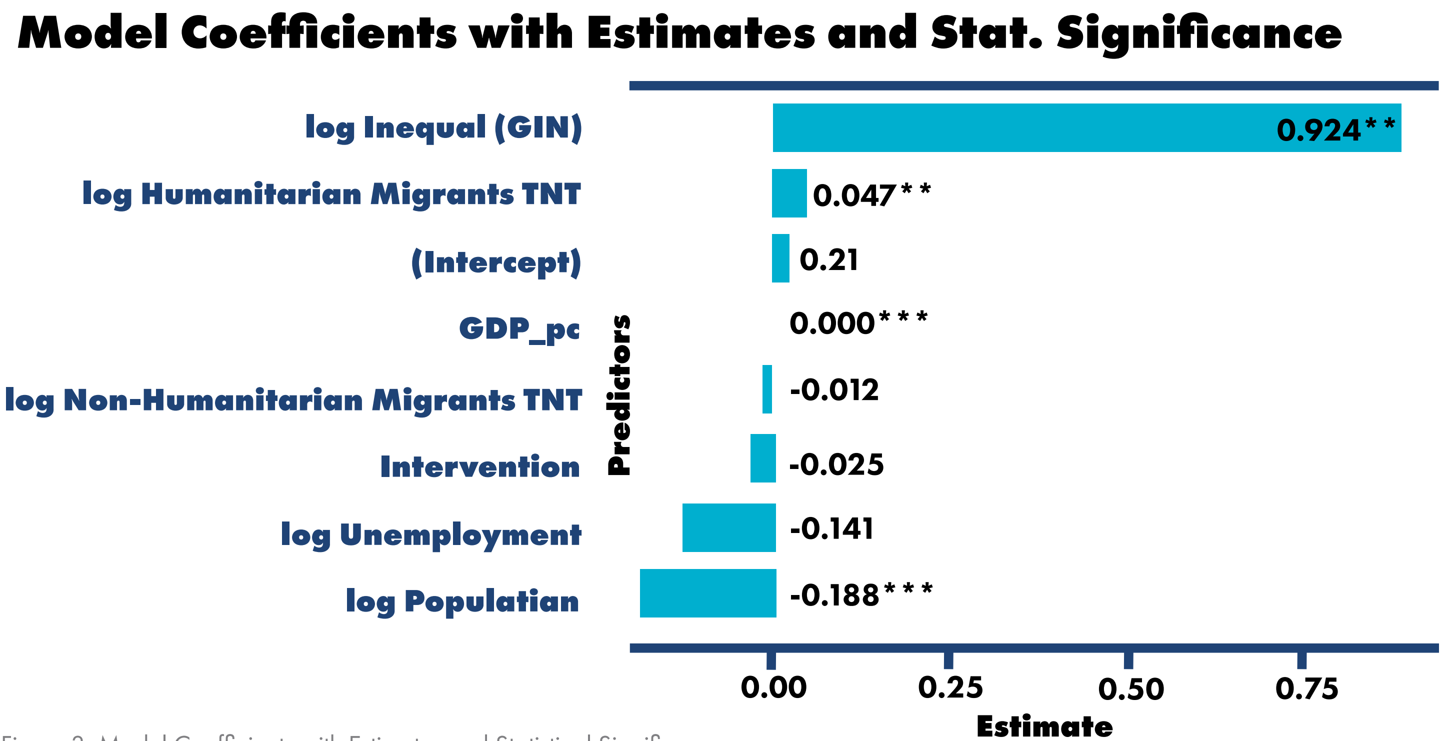

Figure 3: Model Coefficients with Estimates and Statistical Significance

In more technical terms, a 1% increase in non-humanitarian migrants is associated with a 0.012% decrease in international terrorist attacks in OECD countries, all else equal, although this effect is not statistically significant. In contrast, the estimate for humanitarian migration suggests that a 1% increase in humanitarian migrants is linked to a 0.047% increase in international terrorist attacks, statistically significant at the 5% level. Nonetheless, other models confirm the positive trend for humanitarian migration and the negative trend for non-humanitarian migration.

6. Conclusion & Outlook

In conclusion, the relationship between migration and terrorism is complex and multifaceted. This article has emphasized the critical distinction between humanitarian and non-humanitarian migration, highlighting that humanitarian migrants, due to their socio-economic vulnerabilities, are more susceptible to radicalization compared to labor or family migrants. While concerns about terrorism often dominate public discourse, the empirical evidence presented here shows that the effect of migration on terrorist activities is more nuanced. A significant increase in humanitarian migration would be required to cause a noticeable rise in terrorism, with even a large influx only resulting in small changes in terrorist incidents.

The findings underscore the importance of differentiating between migration types when discussing migration's impact on security. While the correlation between humanitarian migration and increased terrorism is evident, it is not deterministic. Further research, especially empirical studies, is needed for understanding the complexities of this relationship and shaping effective migration and security policies

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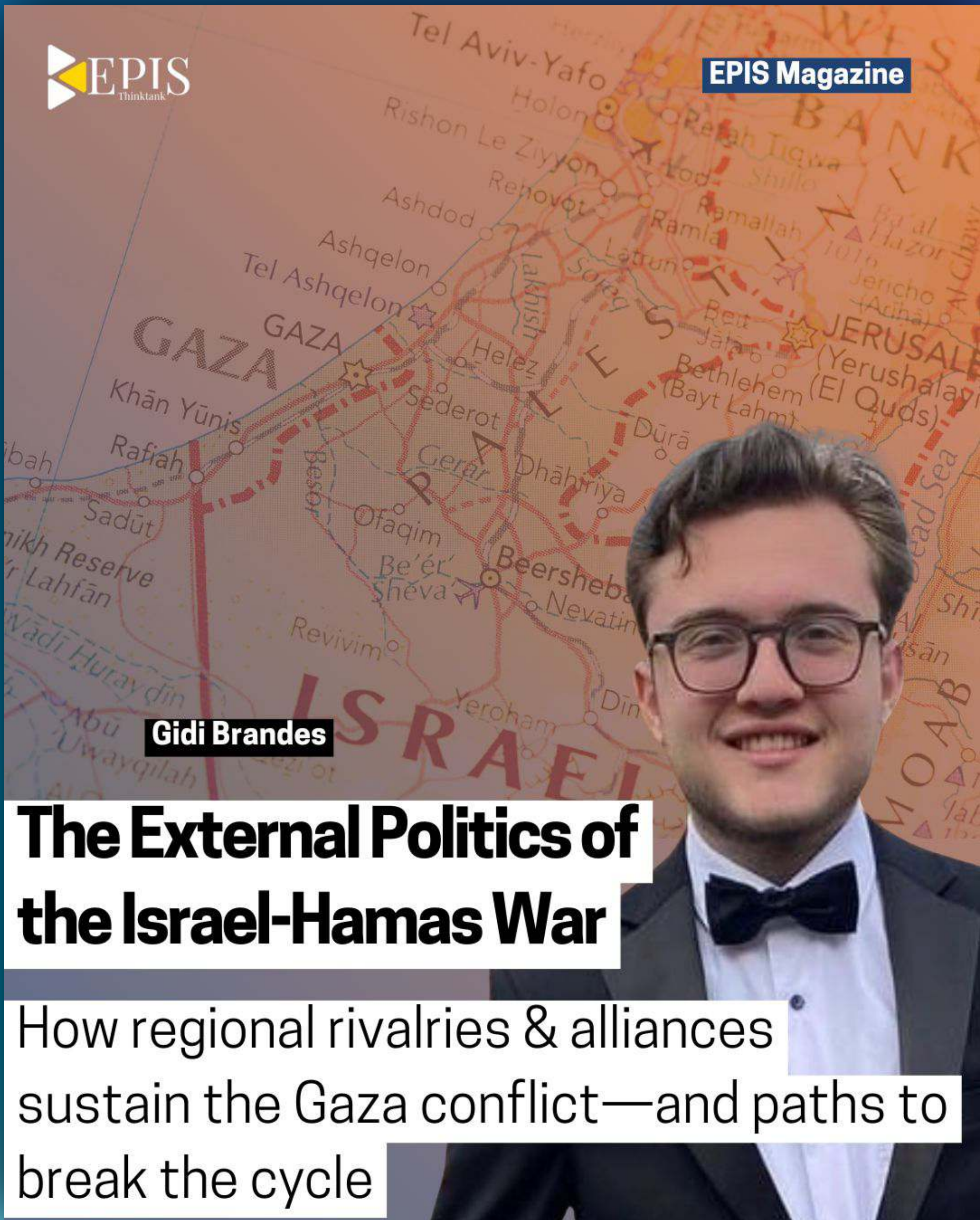

About the Article

Behind the unrelenting violence in Gaza lies a wider battle of regional powers entrenching the conflict's deadlock. Gidi Brandes examines how states like Iran, the US, Qatar, and Saudi Arabia shape the war's trajectory through competing interests and alliances. The article maps the complex web of regional politics and proposes strategies to realign incentives, arguing that only coordinated external action can break the cycle of violence.

About the Author

Gidi Brandes is pursuing a B.Sc. in Political Science at Leiden University (NL). His research focuses on great power competition and regional dynamics shaping global politics.

The

The Israel-Hamas War, reignited by Hamas's October 7, 2023, attack and Israel's intense response, is a strategic deadlock rooted in a complex Middle Eastern network. This essay argues that the conflict's persistence stems from both sides' inability to pursue compromise due to political, ideological, and operational constraints, with external actors, like Iran and the United States, shaping its trajectory through their strategic choices. Neither Hamas, driven by resistance and regional support, nor Israel, prioritizing deterrence under Netanyahu's hardline coalition, sees de-escalation as viable without risking legitimacy or security (Hamida & Jin, 2021). The war's regional impact, from disrupting Saudi-Israeli normalization to amplifying Iran's proxy influence, highlights its significance in a multipolar Middle East (Saikal, 2024; Krieg, 2024). This essay proposes four strategies to realign these actors' incentives and foster a stable ceasefire. By examining the strategic incentives of Israel and Hamas, the essay frames their deadlock as a self-reinforcing cycle where confrontation outweighs cooperation (Hamida & Jin, 2021). Hamas's attacks, like the October 7 assault killing 1,200 Israelis, sustain its resistance credentials, while Israel's airstrikes, claiming over thousands of Palestinian lives, reflect its security-driven stance (Byman, 2024). Bilateral ceasefire efforts, mediated by Qatar and Egypt, achieve temporary pauses but collapse due to external influences, such as Iran's support for Hamas and US backing for Israel (Saikal, 2024). By exploring the network of state actors (Iran, Qatar, Turkey, Egypt, US, EU, Saudi Arabia, and Jordan), the essay reveals how their relationships sustain the conflict (Krieg, 2024).

Proxy War:
Opposing powers support local actors to pursue their goals without direct confrontation.

1. Strategic Deadlock

The Israel-Hamas War's persistence reflects a strategic deadlock, where both Hamas and Israel view continued confrontation as more viable than compromise, locked in a cycle of mutual escalation. This section analyses the bilateral dynamics sustaining this equilibrium, the domestic incentives reinforcing it, and the reasons internal ceasefire efforts falter, highlighting the growing influence of external state actors. Strategic analysis highlights the war's intractability, showing that neither side can unilaterally shift to cooperation without facing greater costs (Hamida & Jin, 2021). For Hamas, confrontation—exemplified by the October 7, 2023, attack killing 1,200 Israelis—bolsters its legitimacy as a resistance movement, outweighing the risks of Israeli retaliation (Byman, 2024). Israel, conversely, prioritizes security and deterrence, viewing concessions as a signal of weakness that could embolden Hamas or other adversaries (Valbjorn et al, 2024). This deadlock, driven by conflicting incentives, ensures mutual escalation: Hamas's rocket attacks and Israel's airstrikes, which killed over ten thousands of Palestinians, reflect strategies where deviation (e.g., Hamas halting attacks, Israel offering concessions) undermines each side's immediate goals (Byman, 2024). The result is a self-reinforcing cycle of violence, with neither actor able to break free unilaterally. Domestic pressures entrench this situation. For Hamas, prioritizing resistance over governance aligns with its ideological commitment and public support in Gaza and the West Bank, where it gains credibility over the weakened Palestinian Authority (Hokayem, 2023). The October 7 attack, despite devastating consequences, temporarily boosted Hamas's popularity by disrupting Israel's normalization with Arab states (Valbjorn et al., 2024). In Israel, Prime Minister Netanyahu's coalition, reliant on far-right factions, faces public demand for robust security measures post-October 7, reinforcing hardline policies (Byman, 2024). Netanyahu's pre-2023 strategy of tolerating Hamas to undermine the Palestinian Authority further illustrates how domestic political survival shapes Israel's calculus, prioritizing short-term stability over long-term peace (Hokayem, 2023). These internal incentives—Hamas's resistance credentials and Israel's security-driven politics—lock both sides into confrontation. Bilateral ceasefire attempts, such as those following the 2008, 2012, and 2014 Gaza conflicts, consistently collapse due to mutual distrust and incompatible goals (Saikal, 2024). Hamas demands significant concessions, like lifting Gaza's blockade, which Israel rejects to maintain control, while Israel's insistence on demilitarization clashes with Hamas's survival strategy (Hamida & Jin, 2021). Mediation efforts, often led by Qatar and Egypt, achieve short-lived results, like the 2023 humanitarian pause, due to conflicting external interests (Hokayem, 2023). For instance, Qatar's financial support for Hamas and Iran's military backing strengthen Hamas's resolve, while U.S. military aid to Israel emboldens its hardline stance (Saikal, 2024). These external influences, reveal that the deadlock's roots extend beyond Gaza, requiring a regional recalibration to unlock.

2. External Actor Dynamics

> **The war's intractability stems from external states' strategic choices.**

The Israel-Hamas War's persistence as a strategic deadlock is not solely a product of bilateral dynamics between Israel and Hamas but is profoundly shaped by a network of external state actors whose strategic interests, rivalries, and alignments sustain the conflict's trajectory. This section maps key players—Iran, Qatar, Turkey, Egypt, the United States, the European Union, Saudi Arabia, and Jordan—analysing how their positions and interactions reinforce the strategic deadlock outlined earlier. By examining the web of state actors, illustrated through simple diagrams, this analysis reveals the war as a regional conflict within a multipolar Middle East, where state-driven dynamics complicate ceasefire efforts and perpetuate confrontation. The conflict's external actors form a complex web of influence, each with distinct roles. Iran bolsters Hamas through financial and military support, positioning it as a key component of the Axis of Resistance against Israel and US-aligned states (Celso, 2024). Qatar, leveraging its neutral broker status, mediates ceasefire talks while providing economic aid to Gaza, indirectly sustaining Hamas's governance (Valbjørn et al., 2024). Turkey adopts a pro-Palestinian stance, using rhetoric to enhance its regional influence, though economic constraints limit its direct involvement (Bardakçı, 2021). Egypt, controlling Gaza's Rafah border, mediates alongside Qatar but prioritizes domestic stability amid economic crises (Ahn, 2025). The United States, Israel's primary ally, provides military and diplomatic support, reinforcing Israel's hardline posture (Valbjørn et al., 2024). The European Union, despite significant aid to Palestinians, struggles with internal divisions, rendering its peacebuilding efforts ineffective (Akgül-Açıkmeșe & Özel, 2024). Saudi Arabia navigates a delicate balance, pursuing normalization with Israel while facing public backlash over Gaza's humanitarian crisis (Ahn, 2025). Jordan, with its large Palestinian population, supports a two-state solution but is constrained by internal unrest and its peace treaty with Israel (Samaan, 2012). These states, as actors in a regional web, collectively shape the conflict's dynamics. Each actor's strategic interests and interactions either perpetuate or complicate the deadlock. Iran's support for Hamas, including $100 million annually and missile technology, strengthens the group's military capacity, countering Israel and Saudi Arabia while escalating regional tensions (Celso, 2024). This aligns with Iran's broader rivalry with the US and Gulf states, particularly Saudi Arabia, which fears Iran's growing influence (Ahn, 2025). Qatar's dual role as mediator and Hamas funder enables temporary pauses, as seen in the 2023 humanitarian pause, but its support sustains Hamas's operational resilience, frustrating Israel's containment strategy (Valbjørn et al., 2024). Turkey's vocal pro-Palestinian stance, driven by domestic support for the Muslim Brotherhood, enhances its soft power but strains ties with Israel and Gulf states like the UAE, which view such rhetoric as destabilizing (Bardakçı, 2021). Egypt and Jordan, both US allies with peace treaties with Israel, prioritize border security and economic stability, mediating to prevent Gaza's collapse but avoiding direct confrontation with Israel due to domestic pressures (Samaan, 2012; Ahn, 2025). The US's unconditional support for Israel, including military aid, emboldens Israel's aggressive response but erodes its regional credibility, as Arab public opinion condemns perceived complicity (Valbjørn et al., 2024). The EU's fragmented approach, hampered by member states' divergent interests, limits its influence, with initiatives like the Middle East Quartet sidelined by US dominance (Akgül-Açıkmeșe & Özel, 2024). Saudi Arabia's normalization efforts, part of the Abraham Accords framework, are stalled by public outrage over Gaza, forcing a cautious stance to balance domestic legitimacy with strategic ties to the US and Israel (Ahn, 2025). These rivalries (e.g., Iran vs. Saudi Arabia, US vs. Iran) and cooperative dynamics (e.g., Qatar-Egypt mediation) create a web of relationships where incentives align against compromise, sustaining the deadlock.

3. Breaking the System

The Israel-Hamas War is sustained by a complex web of external state actors whose support perpetuates conflict. Qatar and Egypt's 2023 mediation attempts collapsed as states like Iran, the United States, and Saudi Arabia reinforced the status quo through their strategic alignments (Saikal, 2024). This section argues that disrupting this deadlock requires realigning the incentives of these external actors by strengthening or reconfiguring their support relationships. To do so, a qualitative analysis of diplomatic, economic, and military influence on Israel and Hamas was made. Together with four scenarios, this analysis illustrates pathways to de-escalate the conflict. Such changes show coordinated action can disrupt the deadlock.

Grey = Formal Alliance or Strong Cooperative Ties

Yellow = Partnerships, like Mediation or Economic Tie

Blue = Adversarial Relationships

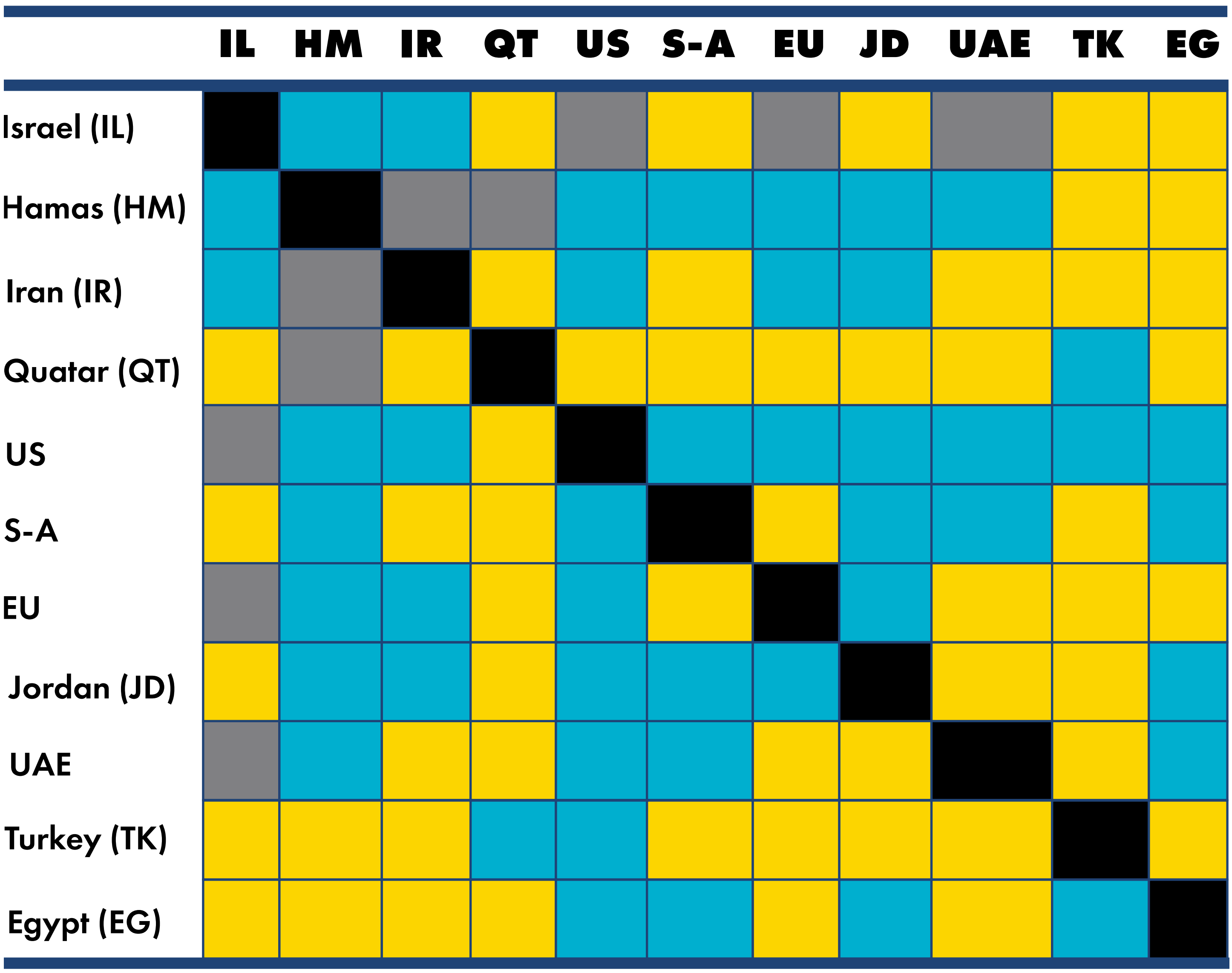

Figure 1: Table showing the Ties in the Middle East

Actor	Diplomatic Influence	Economic Influence	Military Influence
Iran	Backs Hamas via Axis of Resistance	Funds Hamas	Supplies Missiles
Quatar	Mediates Ceasefire Talks	Funds Gaza Aid	–
United States	Supports Israel Diplomacy	Limited Aid to Gaza	Military Aid to Israel
Saudi Arabia	Pursues Israel Normalization under condition of 2-state solution	Economic ties with Israel	–
EU	Fragmented Peace Efforts	Aid to Palestinians; Association Agreement with Israel	Individual member states trade arms with Israel
Jordan	Supports two-state solution	Limited trade with Israel; provides humanitarian aid to Gaza	–
UAE	Normalized ties with Israel (Abraham Accords)	Strong Economic ties with Israel	–
Turkey	Pro-Palestinian rhetoric, mediation attempts	Limited economic aid to Gaza	_
Egypt	Mediates ceasefire talks	Limited economic aid to Gaza; Trade with Israel	Border security operations; blockade of Rafah border

3.1. Shifting External Incentives

The war's intractability stems from external states' strategic choices. Iran's financial and logistical support for Hamas bolsters its resistance narrative, while the US's robust military aid to Israel entrenches its hardline policies, discouraging concessions (Saikal, 2024). Saudi Arabia's cautious normalization with Israel, driven by economic interests, and the EU's fragmented approach to the conflict further limit pressure for peace. Based on Table 1, we see that Egypt, Turkey, and Qatar, with zero adversarial ties in this web of state actors, are central players in mediation efforts for the ceasefire in Gaza. However, green ties also mean that states might have certain leverage over other states. For example, the leverage of the United States over Israel or Iran over Hamas. These relationships set the stage for exploring different scenarios by which we can recalibrate these ties through diplomacy, economic leverage, or sanctions, external actors can create conditions for a stable ceasefire, though broader coordination is essential for significant impact.

4.2. Scenarios for Recalibration

Scenario 1: US-Led Diplomatic Pressure

The U.S. strengthens support for Saudi Arabia and Egypt to empower the Palestinian Authority as a counterweight to Hamas, while reducing ties with Israel and withdrawing engagement with Hamas. This leverages the US's unique influence over Israel to push for a ceasefire and increased humanitarian aid, potentially stabilizing Gaza's governance (Byman, 2024). This may lead to a shift toward broader regional diplomacy. This could pressure Israel to moderate its policies and isolate Hamas, weakening its bargaining power. However, domestic political constraints in the US, particularly from pro-Israel constituencies, pose risks. Therefore, extensive US engagement with additional Arab states may be needed to significantly alter the region's structure.

Actor	Influence Shift	Outcome
Israel	US reduces diplomacy and military support	Pressured to moderate policies
Hamas	–	Isolated, weakened bargaining power
Saudi Arabia	US strengthens diplomatic and economic ties	Enhanced regional diplomatic role
Egypt	US strengthens diplomatic ties	Strengthened mediation influence
United States	Shifts focus to Saudi Arabia/Egypt ties	Gains leverage for ceasefire talks

Figure 2: Table showing scenario 1

Scenario 2: Gulf States' Economic Leverage

Saudi Arabia establishes a strong tie with Israel to incentivize progress toward a two-state solution, while withdrawing support from Hamas. This aligns with Gulf public sentiment supporting Palestine and counters Iran's regional influence, building on the Abraham Accords' framework (Ahn, 2025). The strengthened Saudi-Israel tie could shift Israel's calculus by tying economic benefits to political concessions, while Hamas's isolation reduces its leverage. Challenges include domestic Gulf resistance to normalization without tangible Palestinian gains and the need for broader Gulf coordination (e.g., with Qatar or even smaller Gulf states) to amplify pressure. These changes may require complementary state actions to disrupt the deadlock effectively.

Actor	Influence Shift	Outcome
Israel	Saudi Arabis establishes strong economic tie	Incentivized for two-state progress
Hamas	Saudi Arabia withdraws support	Isolated, reduced leverage
Saudi Arabia	Strengthens tie with Israel	Enhanced economic and diplomatic role
UAE	Coordinates with Saudi Arabia	Supports Gulf-led pressure
United States	Supports Abraham Accords Framework	Facilitates regional diplomacy

Figure 3: Table showing scenario 2

Scenario 3: Qatar-Turkey Mediation Axis

Qatar and Turkey enhance mediation by strengthening ties to Hamas, Israel, Egypt, and Jordan, leveraging Qatar's history of brokering humanitarian pauses, Turkey's pro-Palestinian stance, and Jordan's diplomatic efforts aiding border stability (Saikal, 2024; Bardakci, 2021; Samaan, 2012). Their initial ties (Table 1) reflect existing mediation roles, making it possible that changing or improving ties reinforce rather than transform their influence. Qatar and Turkey are positioned as a diplomatic hub, potentially coordinating ceasefire talks and stabilizing Gaza's borders through Egypt's cooperation. However, rivalry with Saudi Arabia and dependence on Hamas's compliance limit impact, as the stability of these regional relationships indicates. Broader alignment with other mediators like Egypt is crucial to shift the deadlock significantly, despite the robust qualitative potential of this axis.

Actor	Influence Shift	Outcome
Israel	Qatar and Turkey strengthen mediation ties	Engaged in ceasefire talks
Hamas	Qatar and Turkey enhance mediation support	Engages, but potentially non-compliant
Quatar	Strengthens ties with Hamas, Israel, Egypt, Jordan	Strengthened mediation hub
Turkey	Enhances mediation with Hamas, Israel, Egypt, Jordan	Bolstered pro-Palestinian diplomacy
Egypt	Strengthens ties with Qatar and Turkey	Enhanced mediation and border stability

Figure 4: Table showing scenario 3

Scenario 4: EU Coordinated Sanctions

Lastly, if the EU withdraws support from Israel, maximizes its sanctions on Hamas and strengthens ties with Qatar and Egypt to bolster mediation, the situation could shift slightly, reflecting reduced conflict engagement and enhanced diplomatic leverage (Akgül-Açıkmeşe & Özel, 2024). This isolates Israel and Hamas, pressuring negotiations through economic sanctions on settlement activities or Hamas's funding networks. The EU's normative power gains traction, but internal divisions and reliance on US alignment constrain effectiveness. While targeted sanctions can alter the dynamics, a more unified EU stance and additional state support are needed to maximize de-escalation.

Actor	Influence Shift	Outcome
Israel	EU withdraws support, imposes sanctions	Isolated, pressured to negotiate
Hamas	EU sanctions and targets funding	Isolated
EU	Strengthens ties with Qatar and Egypt	Enhanced normative and diplomatic role
Quatar	EU strengthens mediation supports	Strengthened mediation hub
Egypt	EU strengthens mediation support	Bolstered mediation influence

Figure 5: Table showing scenario 4

These scenarios demonstrate that realigning state support ties can challenge the Israel-Hamas deadlock, though the need for broader, coordinated efforts remains. By strategically enhancing key relationships, external actors can pave the way for regional peacebuilding, leveraging their collective influence to foster a sustainable resolution.

Scenario	Key Actors	Inflieunce	Outcome	Challange
(1) US Diplomacy	Israel, Hamas, Saudi Arabia, Egypt, US	US reduces Israel/Hamas support, strengthens Saudi/Egypt ties	Israel pressured, Hamas isolated, Saudi/Egypt mediation enhanced	US domestic pro-Israel constraints
(2) Gulf Leverage	Israel, Hamas, Saudi Arabia, UAE, US	Saudi strengthens Israel tie, cuts Hamas support, UAE coordinates	Israel incentivized, Hamas isolated, Gulf role enhanced	Gulf public resistance to normalization
(3) Quatar Turkey Axis	Israel, Hamas, Qatar, Turkey, Egypt	Qatar/Turkey strengthen mediation with Israel/Hamas/Egypt/Jordan	Israel/Hamas engaged, Qatar/Turkey mediation hubs	Saudi rivalry, Hamas non-compliance
(4) EU Sanctions	Israel, Hamas, EU, Qatar, Egypt	EU sanctions Israel/Hamas, strengthens Qatar/Egypt mediation	Israel/Hamas isolated, Qatar/Egypt mediation bolstered	EU disunity, US alignment needed

4. Conclusion

The Israel-Hamas War persists as a complex regional conflict, sustained by misaligned incentives among external state actors. While temporary ceasefires offer relief, the deadlock's roots demand a broader realignment to achieve lasting peace. By examining the web of state actors and their strategic interactions, this essay has highlighted how external support perpetuates confrontation. Table 5 outlines four strategies each offering a pathway to disrupt the stalemate. In the US-led diplomacy scenario, the United States shifts support from Israel to Saudi Arabia and Egypt, empowering the Palestinian Authority as a counterweight to Hamas (Byman, 2024). This could pressure Israel to moderate its policies and isolate Hamas, weakening its bargaining power and fostering ceasefire talks. However, domestic pro-Israel constituencies in the US may resist, necessitating broader engagement with Arab states to amplify diplomatic leverage. The Gulf leverage scenario sees Saudi Arabia strengthening economic ties with Israel, contingent on two-state solution progress, while withdrawing Hamas support (Ahn, 2025). Building on the Abraham Accords, this could incentivize Israel's concessions and reduce Hamas's regional clout, but Gulf public opposition to normalization without Palestinian gains poses a significant hurdle, requiring coordination with states like the UAE.

The Qatar-Turkey mediation axis leverages Qatar's history of brokering pauses and Turkey's pro-Palestinian stance to enhance ties with Hamas, Israel, Egypt, and Jordan (Saikal, 2024; Bardakçı, 2021). By positioning themselves as a diplomatic hub, they could coordinate ceasefire negotiations and stabilize Gaza's borders through Egypt's cooperation. Yet, rivalry with Saudi Arabia and Hamas's potential non-compliance could limit impact, emphasizing the need for alignment with other mediators. The EU sanctions scenario involves withdrawing support from Israel and Hamas while bolstering Qatar and Egypt's mediation roles (Akgül-Açıkmeşe & Özel, 2024). Sanctions on Israeli settlements or Hamas's funding networks could isolate both parties, pressuring negotiations, but EU internal divisions and reliance on US alignment may weaken effectiveness, requiring a unified stance.

These scenarios demonstrate that breaking the deadlock depends on realigning external incentives through diplomacy, economic tools, and mediation. While each scenario offers promise, challenges like regional rivalries and domestic constraints demand careful navigation. Only through collective action, where states coordinate to shift their roles, can the cycle of violence end, offering Gaza not just a ceasefire but a path to stability in a multipolar Middle East.

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About the Article

As artificial intelligence reshapes modern warfare, the race for military dominance between the U.S. and China risks tipping the world into instability. Belen Bringas explores how autonomous weapons systems and AI-enabled military strategies heighten the dangers of miscalculation, ethical violations, and unintended escalation. The article calls for urgent global governance to rein in the risks of militarised AI, and advocates for responsible innovation before machines decide the outcomes of future conflicts.

About the Author

Belen Bringas holds a B.A. in International Relations from Malmö University (SE). Her research focuses on AI governance, gender equality, peace, and security, with a focus on Latin America and the EU. Currently, she is a researcher for The Review of European and Transatlantic Affairs (RETA).

1. Introduction

Artificial intelligence and its application in defense have been developing rapidly, changing the global security landscape and adding new layers of complexity that could increase global insecurity and pose serious threats to international peace and stability. This essay argues that integrating AI into autonomous weapon systems (AWS) and military strategies by both the United States and China creates unpredictable risks and the potential escalation of conflicts. Unlike traditional military technologies, AI enables autonomy and can accelerate and enhance decision-making processes by processing large amounts of data and selecting useful information in ways humans cannot (Schraagen, 2024). The militarization of AI promises great potential, but the unintended consequences are even greater. To combat the significant risks created by the proliferation of military AI, it is necessary to establish global governance and rules that nations must follow. Principles of responsible AI must be integrated to prevent the potentially disastrous consequences of military AI. Protective frameworks and governance mechanisms are the best way to mitigate the risks posed by this technology (Garcia, 2023). The AI arms race is not just a technological competition; it is a destructive force that demands international governance to preserve global security and peace. Following this brief introduction, there will be an overview of the AI arms race between the US and China, focusing on their significant investments in military AI, particularly in AWS. The third part of this paper will explore the unpredictability and risks associated with the deployment of AWS and the potential for conflict escalation that could impact global security. Finally, I will discuss the need for global governance as a means to de-escalate the threat posed by AWS and the militarization of AI by both countries, while also advocating for the implementation of responsible AI principles to reduce the risk of global instability.

2. The AI Arms Race Between the U.S. and China

2.1. The United States

The military AI race for the United States began in 1983 when the American government invested one billion dollars in strategic computing (Haner & Garcia, 2019). In particular, autonomy has been a key component in the U.S. national security strategy since Directive 3000.09 from the Department of Defense (DoD) was announced in 2012. This directive was the very first to permit semi-autonomous systems to strike down targets that had previously been identified by human operators. It also allowed for fully autonomous weapons to choose and engage with targets after a senior-level authorization from the DoD (Haner & Garcia, 2019). Six years later, the U.S. National Defense Strategy put particular focus on AI development in defense, and in 2020, the National Defense Authorization Act (NDAA) cited AI exactly eleven times (Hunter et al., 2023). These events prompted the U.S. to intensify its efforts to advance artificial intelligence in defense. According to the Congressional Research Service, all the branches of the U.S. military are actively working to integrate AI into semi-autonomous and autonomous systems, including fighter jets, drones, land-based vehicles, and naval ships. The creation and establishment of the Joint Artificial Intelligence Center (JAIC) in 2018 was another milestone, intending to speed up the deployment of these AI technologies and increase its influence across the DoD for „joint force advantage." The JAIC took the lead to implement AI into all branches of the military, and as a result, the Army allocated $6.5 million for AI-related training, including simulations and virtual reality, according to the Department of Defense's 2019 budget report (Hunter et al., 2023). In 2021, $1.5 billion of the DoD budget was invested toward microelectronics and 5G infrastructure, which are key components to the advancement of AI technologies. Another $1.7 billion was put towards autonomous systems to improve their mobility and speed in both semi-autonomous and fully autonomous vehicles, but also to enhance human-machine collaboration. Furthermore, $800 million was dedicated to AI initiatives such as AI Pathfinders, the Joint Artificial Intelligence Center (JAIC), and Project Maven (Hunter et al., 2023). Some examples of autonomous weapon systems utilized by the U.S. can be found in the Air Force, which allocated $87 million in 2019 for AI-based wargaming and training. AI-powered autonomous piloting systems are being developed with the goal of independent aircraft operation and to even assume full control in missions. μZero, for example, was a program designed to fly a U-2 stealth aircraft, and it successfully did so in 2019. Similarly, the X47-B program, an autonomous piloting system, was meant to perform autonomous landings as well as aerial refueling, though later discontinued due to performance and funding issues. Despite shortcomings, the American Air Force and Navy continue to work together on AI-enabled weapons like the Long-Range Anti-Ship Missile (LRASM), which incorporates autonomous targeting capabilities (Hunter et al., 2023). The Navy and Marine Corps have also invested heavily in integrating AI for both training and combat purposes. Through the Navy's rapid prototype development program, a $49 million investment was made to add AI into combat systems, resulting in new submarine combat assets. The U.S. Navy has also researched AI-guided missile systems, which produced Tomahawk Anti-Ship Missiles (TASM) and LRASM stealth anti-ship cruise missiles. There is also Cognitive Lethal Autonomous Weapons Systems (CLAWS), which is a prototype submarine that is being developed with onboard AI authorized to detect, assess, and respond to threats autonomously using 12 torpedo tubes, which is expected to have a significant impact on marine warfare (Hunter et al., 2023).

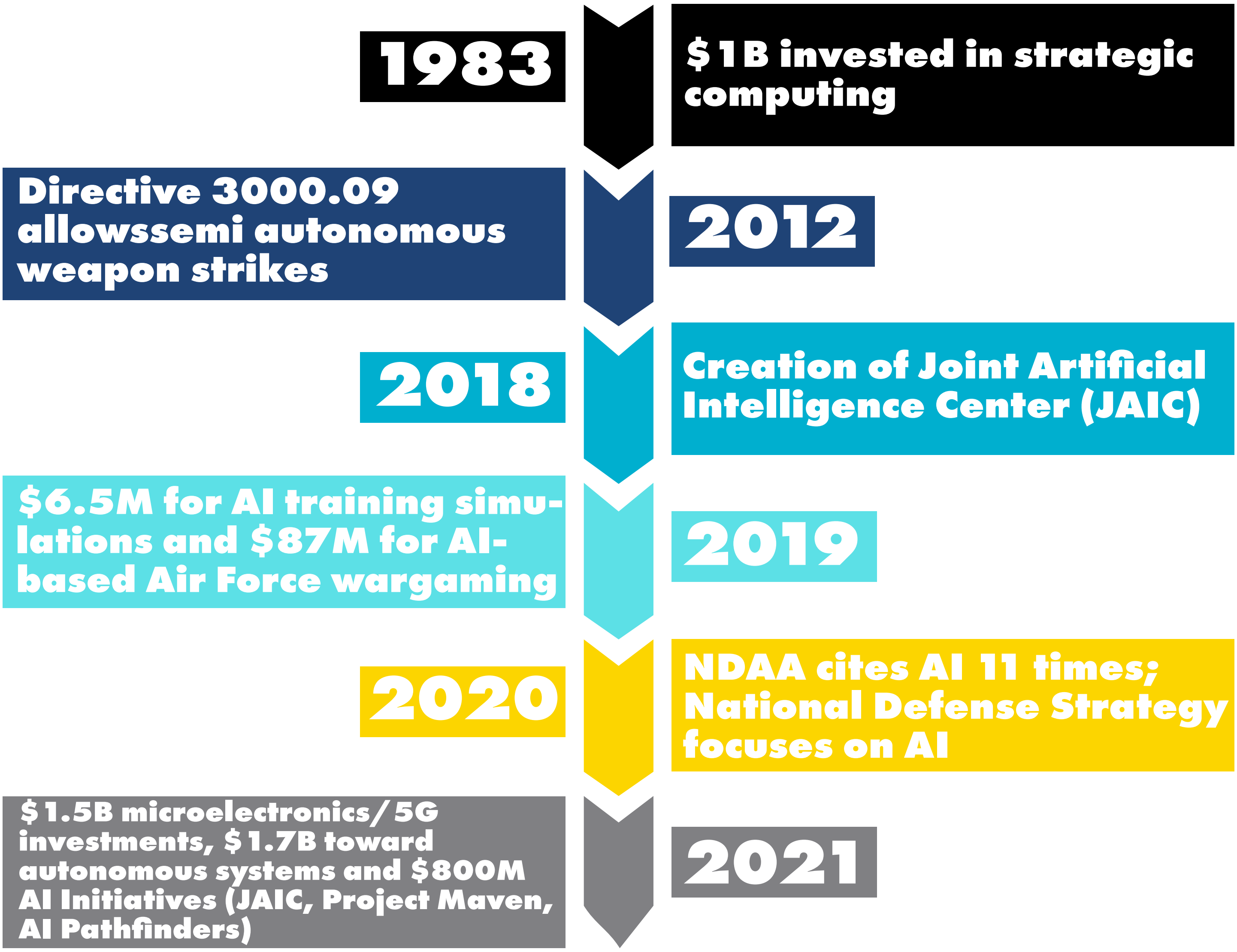

Figure 1: Timeline of Key AI Milestones in U.S. Military

2.2. China

China, on the other hand, has emerged as a solid competitor to the United States in the militarization of AI and the development of AWS. The Chinese State Council has stated its goal to become a world leader in artificial intelligence by 2030, with a particular focus on AI integration into its military. The competition with the United States appears to be a key factor in shaping its AI strategy (Hunter et al., 2023). China's Next Generation Artificial Intelligence Development Plan has also publicly declared its intention to utilize AWS on the battlefield. China also has a robust budget for weapon development, with an estimated annual budget of $250 billion. It is also heavily investing in civil-military fusions, which the Chinese State Council expects their AI industry to be worth $59 billion by 2025 and to reach $150 billion by 2030. Furthermore, between 2013 and 2018, China accounted for an estimated 60% of global funding for AI projects, which is double the amount that the U.S. invested in financing AI projects during the same period (Haner & Garcia, 2019). So far, it is known that China has been investing in and testing several unmanned vehicles and even working towards the development of missile technology integrated with AI. The Chinese government is advancing AI integration across diverse military platforms, which include the development of autonomous robots to increase weapon effectiveness and tactics to create new capabilities. These also include the „autonomous at rest" feature for data processing and decision support (Hunter et al., 2023). Similar to the United States, China seems to have avoided openly deploying weapon systems in its military that can fully operate without human involvement. In particular, to systems that are able to target, identify, and even fire on their own accord. However, just like the U.S., many of China's existing systems could be quickly adapted to function autonomously with just a few software adjustments (Hunter et al., 2023). China, much like the U.S., has developed its own set of autonomous vehicles for air, land, and sea. The Sharp Claw I/II, for example, are among the limited AI-powered technologies China has created to strengthen its ground troops. These are similar to drones but compact and tank-styled, which require very little human intervention, intending to be armored support units for ground operations. Regarding the Air Force, China has heavily invested in the development of unmanned aerial vehicles (UAVs), stealth aircraft, and cruise missiles with capabilities for automatic launching and targeting (Hunter et al., 2023). There has even been a public demonstration of the DF-ZF stealth craft, which can glide at hypersonic speeds and features automated missile systems. This craft was built specifically to bypass American defense systems, once again reflecting the Chinese ambition to compete against the U.S. militarily and technologically. More alarmingly, China is already exporting military drones to strategic allies in the Middle East. One example is Ziyan's Blowfish A3, which has been advertised to carry out complex combat tasks autonomously, such as precise timing detection, range-limited reconnaissance, and targeted strikes (Hunter et al., 2023).

United States	China
Autonomous piloting systems (μZero, X47-B)	Sharp Claw I/II autonomous ground vehicles
AI-enabled missiles (LRASM, Tomahawk)	UAVs and stealth aircraft with AI
Cognitive Lethal Autonomous Weapons System (CLAWS) submarine	DF-ZF hypersonic stealth craft with automated missiles
AI training and simulations	Exported autonomous drones (Blowfish A3)

Figure 2: Table showing the types of AI Military Systems

3. AWS' Unpredictability and Risks to Global Security

The discussions surrounding autonomous weapon systems are about the extent to which AI takes over; it is about the fear of humans no longer being in control of the actions of the AI. Imperfections in the system can occur due to biased data and flawed modeling assumptions (Schraagen, 2024). The result of these issues can be devastating, particularly when the human element in these systems is removed. The more autonomous a system becomes, the less human involvement is required. This often limits human input to the early stages of a mission, which can create a disconnect from the mission's outcome. The consequences may very likely violate international legal standards and even the ethical and moral principles we live by (Garcia, 2023). Trust is one of the first challenges around AWS and the general applications of AI in the military. AI systems need to be trustworthy for people to utilize them, and trust stems from appropriate development, testing, and validation methods in each stage of production. AI also needs to be explainable to be trusted by users. Explainability refers to "the capability of an AI agent to produce details or reasons to make its functioning clear or easy to understand" (Schraagen, 2024). However, many of the AI systems available today, such as deep neural networks, are complex to explain or comprehend, making it difficult for regulators and developers to understand and check the results produced by the system. On the other hand, there is the issue of biased data, and because AI relies on large amounts of data to work, it could produce unfair results. For example, AI might work well for a group of white men but poorly for a group of black women. The issue is, of course, that the world is in instant change and data can quickly become outdated, therefore making AI predictions less reliable. This phenomenon is also known as the distributional drift, which is exacerbated when AI is militarized, considering that the situations will be more complex, and there is only a limited amount of data available, which can exacerbate the problem of bias and discrimination. This is why it is even more important to ensure the quality of the data in the military and to strive for unbiased data. This is not only crucial from an ethical point of view but also affects performance, as a biased AI system will be ineffective in particular situations (Schraagen, 2024). The consequences of AI ethics failures can vary depending on the context. For example, in commercial facial recognition, such a failure might lead to racial bias, whereas in military computer vision systems, it could result in a misidentified target being attacked by a military force (Chapas, 2024). Returning to the topic of human control, there is an ongoing debate among scholars, organizations, and governments about autonomous weapon systems (AWS). For example, the US Department of Defense prefers the term "appropriate levels of human judgment" instead of "meaningful human control." They argue that "control" is too complex to clearly define and is not always required, unlike compliance with the laws of war, which is mandatory. In response, Human Rights Watch argues that "control" is a better term because it includes both mental judgment and physical action, which are necessary to prevent AWS from causing irreparable harm. It is also important to note that control over AWS decisions is usually shared among multiple people and occurs at different stages of the operation. Depending on the type of AWS, humans may only be able to intervene after the system is activated to stop it before it causes damage, although it is important to note that this is not always the case (Schraagen, 2024). Scholars have argued that the competition between great powers is a 'folly that must end' as it distracts and takes resources away from the actual important global issue that concerns society. Genuine security can be achieved by just one state; common good governance is the way forward for security. The idea of pushing towards a glo-

Autonomous Weapon Systems (AWS):
Weapons that can select and engage targets without human input.

bal common good is a way to combat the proliferation of military AI, which is making the world less safe. In fact, more militarization does not enhance protection but puts future generations in danger. We have seen this happen before with nuclear weapons, and the cycle repeats with AI-enabled weapons. The growing use of AI for military purposes increases the risk to global stability because the machine learning used by AI systems can behave unpredictably, as previously discussed. This raises the question of how global peace can be maintained when AI will be able to make choices between life and death that result in wars? (Garcia, 2023). While there is ongoing debate about the nature and extent of AI competition in the military, I argue that an AI arms race is already underway, with countries like the United States and China actively striving for dominance. The international balance of power (BOP) is significant when discussing this technological arms race and what it means for global stability. BOP refers to "how the distribution of economic and military power between states affects international relations." It implies that when states gain more power relative to others, they also enhance their ability to exert political, economic, and military influence. As a consequence, fluctuations in relative power between the US and China shape their capacity to assert influence internationally (Hunter et al., 2023). When discussing artificial intelligence in the military context, many researchers emphasize that AI can significantly impact not only their military strength but also a state's ability to project power at regional and global levels. In other words, AI will not only transform military strategies but also alter global power dynamics, and could even escalate rivalries among major powers, such as the US and China. The purpose is not for the AI system to be free of flaws or to even replace humans, but just powerful enough to give states that strategic edge compared to their adversaries (Hunter et al., 2023). One notable evidence in the already shifting world order disrupted by the introduction of AI into the military can be seen in the declining levels of global peace. According to the Global Peace Index, global peace levels have fallen by 2.5% since 2008, and military spending has soared; the budget on military AI alone is projected to reach $11.6 billion in 2025 (Garcia, 2023). The weaponization of AI is a looming threat to destabilize world peace and frameworks, and uncertainty grows over whether international laws can catch up to the rapid development of AI. Effective regulation is needed to ensure peace and the continuation of a stable global order.

AI systems need to be trustworthy for people to utilize them

4. The Need for Global Governance

Due to the fast development of AI, many agencies and organizations have been working towards creating a set of AI ethical principles and guidelines. In an analysis including 84 documents on AI principles, it was found that transparency, justice and fairness, non-maleficence, responsibility, and privacy were the most frequently mentioned. While some of these documents have been criticised for being too abstract to the point of being impractical, it is nevertheless a good starting point (Schraagen, 2024). Regarding AWS in particular, while there have been efforts to establish global regulatory frameworks, these have faced considerable obstacles. Some scholars argue that creating such frameworks is feasible if key actors were to initiate legal processes outside the UN Convention on Certain Conventional Weapons (CCW) (Bode et al., 2023).

In the case of China, its delegation has voiced concerns at the Group of Governmental Experts (GGE) meetings under the CCW. They expressed concern about the risks presented by AWS and advocated for an agreement prohibiting systems that can select targets without the possibility of human intervention. However, it is important to point out that their position is not only backed by ethical concerns but also by geopolitical ones. The Chinese government has expressed worry that technologically advanced nations might exploit AWS to dominate or provoke conflict. Despite their initial position against AWS, China has not implemented any domestic legislation to prohibit AWS, and there is little transparency regarding whether its military has considered such measures. In this aspect, China, much like the US, continues to develop unmanned systems for land, sea, and air operations, and continues to push towards automation, as previously discussed. It is clear that despite the call for regulation, the ongoing investments in AI technology in the military make it difficult to enforce a ban on AWS (Bode et al., 2023).

The United States has consistently argued against banning autonomous weapon systems, instead emphasizing their potential to enhance compliance with international humanitarian law. They argue that AWS can reduce civilian casualties through more precision and can improve battlefield oversight by commanders. The US appears to support rather than stigmatize innovation that aligns with the goals of the CCW and has outlined guidelines to ensure AWS functions according to its operators' intent. The US also openly opposes any legally binding regulations on AWS, compared to China, which, at the very least, has been open to regulations (Bode et al., 2023). There is no doubt that both countries are investing in weaponizing AI and perceive it as a strategic asset in the context of competition. While a global framework at this time seems unlikely, it is still the best course of action to maintain global stability and regulate military AI.

5. Conclusion

The integration of artificial intelligence into military strategies by the United States and China is intensifying global instability. As both nations continue to develop and deploy autonomous weapon systems, the risks of miscalculation, biased decision-making, and unintended conflict escalation grow. These systems reduce human oversight and rely on data-driven models that can be flawed, outdated, or biased, therefore raising serious ethical and legal concerns. The unpredictability of AI behavior makes it difficult to trust militarized AI systems and even more difficult to regulate these technologies. This arms race is not only about technological superiority but also poses a profound threat to international peace and security. To reduce the risks, international governance frameworks are urgently needed, and the promotion of responsible AI principles is the first step toward managing the military use of AI.

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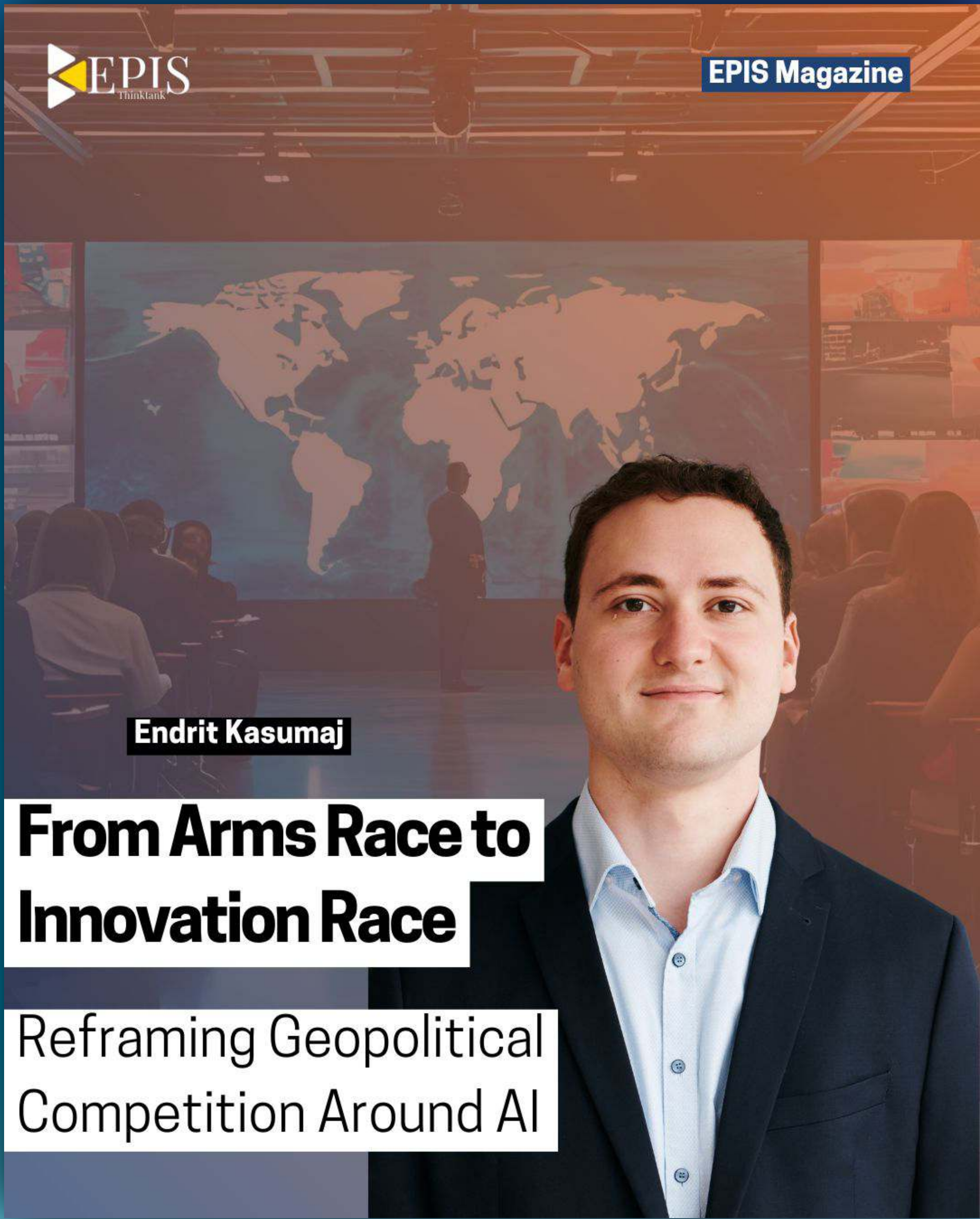

About the Article

As fears over militarised AI grow, are we trapped in the wrong narrative? Endrit Kasumaj builds on Belen Bringas' analysis of U.S.-China military AI rivalry by questioning whether an "arms race" lens truly captures the complexity of global AI competition. He proposes an alternative framing—an innovation race—driven not just by security imperatives but also by economic ambition, narrative construction, and transnational collaboration. The article urges a shift in mindset to prevent self-fulfilling spirals and foster safer, cooperative AI governance.

About the Author

Endrit is a Master's student in Public Policy and Administration at the London School of Economics, focusing on international relations and AI governance. Passionate about the intersection of technology and global politics, he is committed to shaping policy frameworks that address today's most pressing global challenges. Originally from Germany, Endrit brings a European perspective to his studies and is driven to make a meaningful impact on public policy and international affairs.

1. Introduction

Technological innovations have long been considered central to understanding geopolitical competition, giving rise to the concept of arms races. Especially since the 20th century, examples such as the naval rivalry between Britain and Germany or the nuclear arms race during the Cold War, the idea of an arms race has gained prominence (Mahnken et al., 2016). Artificial intelligence, as the latest general-purpose technology, has been touted as the newest technology that could revolutionise warfare through autonomous systems, cyber warfare and data-driven decision-making, causing speculations that the pursuit by the great powers to attain an edge in this area will spark a new arms race (Johnson, 2019). The previous article has argued in favour of the reality of an AI arms race, but to what extent does the concept of an arms race apply to the current global AI competition? This article will provide a conceptual examination and delve into the notions of arms races and modern AI, and to what extent it is useful to synthesise these two into the concept of an "AI arms race".

2. Conceptual Background

2.1 Definition and History of Arms Races and the Role of Technology

Although armed conflict between groups has existed since ancient times, the concept of an arms race can be traced to the 19th century and the industrialisation of weaponry. However, the term began to be used more widely around the turn of the 20th century when referring to the naval competition between Britain and Germany. With the outbreak of the Cold War and the proliferation of nuclear arms, scholarship on this topic surged, leading to theoretical innovation by scholars like Lewis Richardson or Samuel Huntington, with the latter defining an arms race as "progressive, competitive peacetime increases in armaments by two states or coalition of states. (Mahnken et al., 2016)" Glaser (2000), coming from an International Relations Realism perspective, divides the causes of arms races into external and internal. Regarding the first cause, rational state behaviour responds to threats or opportunities emanating from the international environment, leading to action-reaction dynamics causing states to bolster their armaments as a reaction to perceived threats from adversaries. Internal causes, on the other side, are those that are traced back to domestic factors such as bureaucratic politics, institutional drivers and economic interests, leading, for example, to a military-industrial complex which doesn't respond to any perceived threat. As was mentioned, the Cold War brought the concept of the arms race to the fore, with technological superiority being the main advantage the U.S. counted on in its rivalry against the Soviet Union which possessed the population numerical and resource advantage. As this conflict advanced, the U.S. bet on technological progress, aided by its dynamic and federally-funded research and development system which fused bottom-up innovation and top-down control, paid off. The Soviet Union gradually fell behind the U.S. until the 1980s, when it became clear that the Soviet Union would be unable to catch up, with many experts arguing that this realisation by state elites and citizens alike played a significant part in the collapse of the Soviet Union (Friedberg, 2006).

2.2 Artificial Intelligence Technology in Warfare

It is first useful to define Artificial Intelligence and its application to geopolitics and national security. Buchanan (2020) proposes the term "AI triad" to denote the three key components to explain modern AI systems: algorithms, data and computing power. Algorithms tell AI systems how to process information and can be divided into three main types which are supervised learning (learning from labelled data), unsupervised learning (finding patterns in unlabeled data) and reinforcement learning (learning via trial and error). Data is crucial in training machine learning systems but can also be detrimental to the system if it is biased or limited. Thus, larger and more representative datasets are crucial in ensuring that results are more solid and reliable. As AI systems grow more complex and encompass ever-growing datasets, computing power becomes instrumental in ensuring that this demand is satisfied. For example, OpenAI found that between 2012 and 2018, computing power required for major AI projects increased by a factor of 300.000. Thus, Buchanan summarises modern AI as "Machine learning systems use computing power to execute algorithms that learn from data" (Buchanan, 2020, p.3). One major way in which AI is applied to military technology is Automated Weapon Systems (AWS). Lethal Autonomous Weapons (LAWs) are autonomous weapons capable of identifying, targeting and engaging enemies without human control, which yields quicker decision-making and precision. These complex manoeuvres performed without human oversight by these systems have been enabled by rapid advancements in AI, which can be seen in virtual dogfights and deployments of autonomous drones and weaponised swarms (Ueno, 2023). While these advancements may enhance efficiency and reduce risk to soldiers, this delegation of lethal force to machines also bears the risk of potential errors, unaccountability and unintentional escalation. Furthermore, LAWs could potentially remove the political costs usually linked to troop deployment, thereby increasing the likelihood of leaders initiating conflicts. Moreover, AI is also innovating cyberwarfare by increasing the scale, speed and stealth of attacks on critical infrastructure (power grids, water supplies), by identifying vulnerabilities more efficiently and launching simultaneous and large-scale attacks (Chivvis and Kavanagh, 2024). Lastly, decision-making could also be outsourced to automated systems which may be able to process battlefield information and provide rapid insights, thus leading to reduced human intervention, potential errors and the loss of accountability.

2.3 Key National Players

The key states in the international system that primarily compete for superior AI capabilities are commonly associated with the United States, China and the European Union. The United States is considered the earliest developer of AI and stands out in areas such as talent, research, development, hardware and venture capital funding. Research and development spending by American software firms significantly outstrip those from their competitors abroad, thus producing cutting-edge research and innovation output. Moreover, the U.S. start-up system is renowned for attracting billions in capital and greatly contributing to America's competitive edge. In addition to the robust advancements in the private sector, the U.S. Defense Department has launched the "Joint AI Center" with which it seeks to coordinate AI initiatives and their application to the military and imposes comprehensive export controls that aim to limit the transfer of sensitive technology. China has been gradually narrowing the divide between itself and the U.S. by relying on its "military-civil fusion" which is a strategic policy designed to integrate civilian technological innovation with military applications. While China still trails the U.S. in terms of talent and research quality, its firms boast nearly twice as many high-performance supercomputers and have shown dramatic increases in R&D spending by software firms and rapid deployment of dual-use AI technologies. Moreover, in 2017, China's State Council launched the "New Generation Artificial Intelligence Development Plan" which seeks to invest in China's AI ecosystem and thereby evolve into the global leader in AI by 2030. In contrast to the previous two countries, the European Union lags in all measures of AI capabilities, such as talent, research, development and hardware, mostly due to its focus lying in creating a "human-centric" regulatory framework. This framework aims to set ethical standards and establish robust governance mechanisms for AI, such as the Ethical Guidelines for Trustworthy AI and the EU AI Act. Critics argue that while this approach seeks to foster transparency, accountability and digital sovereignty, it might also, as a byproduct, stifle innovation and thus undermine the EU's competitive edge. Furthermore, the national-focused investment landscape and regulatory caution hamper the development of strong R&D

Technopoles:
Hubs of concentrated innovation that serve as centers for technological advancement

funding and private-sector innovation that can be found in the U.S. and China (Carrozza et al., 2022).

3.Perspectives on the AI Arms Race

After having laid the groundwork for the proper discussion on an AI arms race, we now delve into the different perspectives concerning this very idea, more specifically the ascription of the concept of "arms race" to AI when describing the current state of global AI development. Far from a unanimous opinion about whether this novel idea is accurate, the current research landscape presents divergent perspectives. In this section, these will be presented and roughly categorised into the following concrete stances.

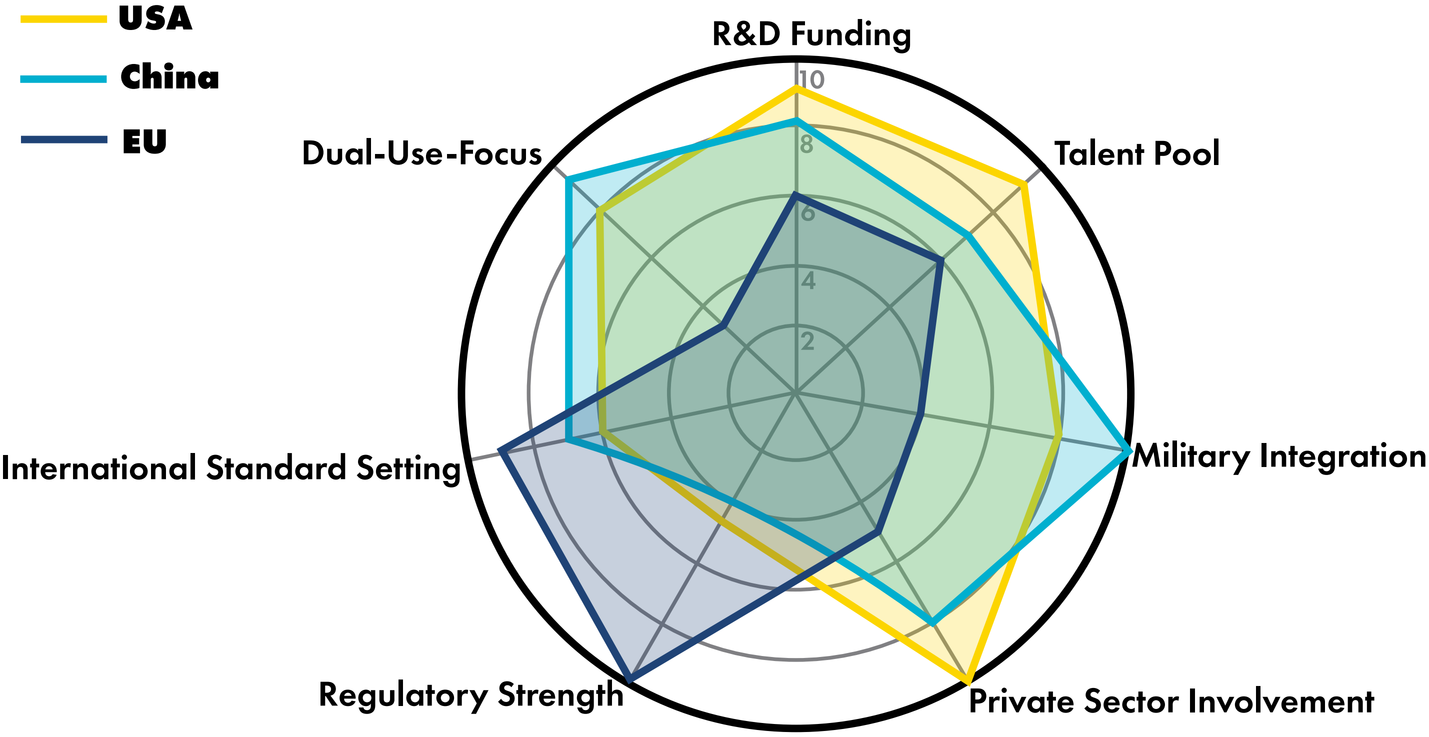

Figure 1: Strategic AI Capabilities of Major Powers Across Key Dimensions. Adapted from Carrozza et al. (2022).

3.1 Rejection of the "AI Arms Race" Narrative

One dominant stance that is critical of the framing of an "AI arms race" argues that AI is fundamentally different from traditional arms. Scharre (2021), for example, views AI first and foremost as a general-purpose technology without an inherent purpose to be deployed as a weapon, similar to electricity whose applications are multifaceted. He argues that AI lacks the "abnormal" increases in defence spending among at least two rival nations which is characteristic of the traditional arms races of the past. Instead, the real risk lies in the deployment of unsafe AI systems resulting from a security dilemma which leads to the gradual loss of human control in the face of ever-more potent AI. Likewise, Roff (2019) argues that the framing of an arms race is oversimplified, singling out the military aspect of AI development and disregarding the other crucial domains such as societal and economic. She views this framing as a diversion away from the urgent need to establish robust and ethical governance frameworks in order to reduce risk. Similarly, Diehl and Lambach (2022) contend that the terminology is flawed and echo Scharre's point that AI is not inherently a weapon, thus failing to meet the criteria of a traditional arms race. Rather, the idea of an "AI arms race" is largely seen as a product of media hype and political rhetoric which aims to promote increased investment into AI research under the pretext of national security. In this context, Asaro (2019) reinforces this particular critique by emphasising how media coverage creates sensationalism without addressing the nuances inherent in the debate. He regards this framing as overly simplistic and fails to account for the multifaceted nature of the geopolitics of AI. Cave and ÓhÉigeartaigh (2018) echo the grave danger the great powers can enter if they don't transform the framing from competition towards collaboration. Due to the nature of this AI arms race being constructed as narratives and framing, societies and states are able to shift this constructed framing and embrace a cooperative approach and therefore more effectively harness the benefits of AI while formulating global frameworks to mitigate the potential negative consequences thereof.

3.2 Affirmation of the "AI Arms Race" Narrative

The other dominant position within this debate regards the framing of the geopolitical dimension of AI as an arms race as meaningful. Among these, the eminent scholar Graham Allison (2020) argues that particularly the U.S.-China rivalry concerning AI resembles the nuclear arms race during the Cold War. He posits that the U.S. and China are in an unequivocal competition for AI dominance in the areas of economics, military and society. Due to the grand strides China has made on this front, Allison advocates for increased efforts to match China's capabilities. Geist (2016) reinforces the notion that an arms race is not only probable but is already taking place and is unstoppable. The author traces the militarisation of AI back to the Cold War during which the two rival superpowers began pursuing AI-related technologies to gain a strategic advantage. Thus, instead of relying on traditional diplomatic means, efforts should be made using Track II diplomacy to devise arms-control agreements. Lastly, the former CEO of Google Eric Schmidt (2022) echoes the the view that the U.S. and China are engaged in an AI rivalry with both powers whose ambition to gain technological dominance results in profound security implications. Specifically, Chinese dominance of global network platforms could create digital infrastructure which would enhance Chinese influence worldwide. For this reason, he advocates for a hybrid approach with selective decoupling in sensitive areas and simultaneous cooperation. Ding (2021) further shows the growing influence of China in international standard-setting organisations, specifically concerning emerging technology such as AI, which could enable China to "lead in the formulation of new systems of standard".

> **Lethal Autonomous Weapons (LAWs) capable of identifying, and engaging enemies without human control**

3.3 The AI Innovation Race

I am now going to weigh in and lay out what I think is the most accurate way of viewing this debate. To this end, I will consult the article "Arms Race or Innovation Race? Geopolitical AI Development" by Schmid et al. (2025). In it, they build on the aforementioned article by Diehl and Lambach and propose the term "AI innovation race" which aims to capture the multidimensional nature of global AI competition. More specifically, they propose four key features of this geopolitical innovation race which set it apart from a traditionally understood arms race. The first involves a departure from the notion characteristic of an arms race that competition is necessarily a negative- or zero-sum game. The authors argue instead that in AI innovation has the inherent potential of a positive-sum game, meaning that advancements in AI can result in benefits across the board.

Beyond Zero-Sum Competition

- Potential for Positive-Sum Outcomes
- AI Advancements can benefit multiple Actors
- Collaborative Innovation Potential

Technopoles: Innovation Hubs

- Regional Innovation Centers
- Integrated into global Network
- Simultaneously Competitive and Collaborative

Diverse Motivational Drivers

- Beyond Security Interests
- Economics, Prestige, and Innovation
- Varied National Strategies

Socially Constructed Narratives

- Framing Shapes Perception
- Narrative Impacts AI Development
- Ecolving Interpretative Frameworks

Figure 2: The Four Key Characteristics of the AI Innovation Race. Adapted from Schmid et al. (2025)

The Four Key Characteristics of the AI Innovation Race. Adapted from Schmid et al. (2025). Secondly, as opposed to a traditional arms race, which features state-military industrial complexes, the AI landscape features elements of domestic centres of innovation and transnational cooperation. The authors make use of the concept of "technopoles" by which regional innovation hubs are meant which are simultaneously concentrated but are integrated into a global web, thus exhibiting signs of both competition and collaboration. A third way in which the innovation race sets itself apart from an arms race concerns the different motivations driving AI development. While security interests dominate traditional arms races, economics and prestige are equally as important in the innovation race. This leads to different formulated interests behind AI development among the major players, with the U.S. emphasising the combination of national security with economic growth, China focusing on deepening economic integration and the EU setting global standards for regulation. Lastly, the authors highlight the socially constructed nature of AI (see Cave and ÓhÉigeartaigh) through which a certain arms race framing has emerged, thus going beyond mere technical capabilities. Although the authors convincingly point to the different nature of AI innovation from a traditional arms race which could potentially lead to fruitful cooperation, it is also pointed out that there exist strong pressures for national competition which could lead to the erosion of safety standards in the pursuit of the upper hand. This is where Armstrong et al. (2015) offer a helpful game-theoretical model of how such a trajectory could materialise. Their model outlines how the drive to gain an early advantage can lead to cutting safety standards, thus increasing the odds of harmful outcomes. Moreover, it highlights the potentially paradoxical trajectory of purely competitive AI development, in that these competitive pressures undermine the potential benefits brought about by rapid innovation. Therefore, both Schmidt et al. and Armstong et al. urge for a shift in consciousness from a purely competitive framing of AI development to a collaborative one which could adequately account for the harnessing of this breakthrough technology without letting it threaten the very foundations of global stability, ethical norms and social development.

4. Conclusion

In this review article, I analysed the notion of an "AI arms race" and its relevance to the geopolitical rivalry in AI development today. I concluded that the idea of an "arms race" does not serve as an adequate framework for understanding the complex nature of AI development. Alternatively, the idea of an "AI innovation race" provides this framing which encompasses this multifaceted nature, in that it accounts for the socially constructed nature of AI innovation narratives, the wide-ranging motivations behind national strategies, the existence of domestic innovation clusters along with transnational collaboration and the rejection of purely zero-sum outcomes. At the same time, the risk of unbridled competitive pressures making AI developers turn a blind eye to safety standards is nevertheless existent. The game-theoretical approach presented in this article, based on Schmidt et al. and Armstong et al., further points to the paradox of competitive forces and their undermining effect on fruitful and beneficial innovation. Therefore, increased international cooperation will be increasingly necessary in order to create internationally binding safety standards aimed at fostering AI development which mitigates risk while bringing out the benefits.Thus, by overcoming the arms race analogy and recognising the potential for a shared vision which benefits the global community, the great powers have the chance to adequately address the novel and paradigm-shifting challenge of AI. Ultimately, this critical reframing of the debate might greatly contribute to deciding the fate of this technology, specifically whether it will become the hitherto highest accomplishment of humanity or a risk factor for it.

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About the Article

Europe may be rearming for the future—but in doing so, is it dismantling the very fabric of its societies? Martin Indjov critiques the growing trend of slashing social benefits to fund rising defence budgets across the continent. Drawing on historical analogies and current policy proposals, he warns that sacrificing social cohesion for military spending risks fuelling inequality, weakening democratic resilience, and empowering populist backlash—undermining the very security such rearmament seeks to protect.

About the Author

Martin Indjov is a student of International Relations and Organisations at Leiden University with broad knowledge of the international political environment. His interests focus on economics and international relations in Europe and Eurasia. Passionate about improving people's lives, Martin is eager to join EPIS and contribute to its mission.

1. New realities

At around 5 a.m. local time the first explosions were reported all across Ukraine (Sheftalovich, 2022). Europe woke up to a new reality: war on the continent has re-emerged. What followed was in many ways unprecedented. Political leaders met in emergency meetings after emergency meetings to try and find an appropriate and unified response.On TV channels across Europe, numerous talk show specials aired, and military experts provided the public with their analysis. The topic of national defence turned from negligible to taking centre stage. Political leaders used that stage to emphasise the necessity of national defence and the subsequent need for large-scale investments and reforms within national militaries (Zandee, 2024). The details of such proposals differ. From those who think minor reforms will be sufficient, to those who envision a European army to defend all EU states among which most prominently French President Macron can be found (Bergmann, 2025). There is unanimous agreement that the military threat posed by Russia has been the greatest in recent memory (Jones, 2025). Therefore, to ensure national safety, reforms and investments are essential to guarantee the safety and well-being of citizens. This essay argues that while such proposals may very well be appropriate in light of recent global developments, they should under no circumstances be done in a way that undermines the foundation of our safety and prosperity.

2. National defence at a cost

Military reforms come at a cost. In this essay, I will lay out why contemporary military rearmament and the gutting of social benefit systems which occur to enable it will not create safety and security. The societal situation created by such policies will push people to the right-wing populists. But it does not have to be that way, there are ways to address our security needs while uplifting society. Why would large-scale military rearmament lead to the gutting of social benefits? The answer is an old economic concept which sees new-found popularity: Guns versus Butter. The concept was coined in the early to mid-20th century when the decision had to be made whether to prioritise the production of war materials or to spend the money on social needs (Mintz, 1989). As a consequence, the two were seen in direct conflict within a government's budget. An increase in spending for one leads to a decrease in spending for the other. Helpful for the content of this essay is the following graphic depicting spending trends on national defence with an assessment of future needed spending (Richter, 2025).

EU needs to Ramp Up Defense Spending to Deter Russia Alone

EU member states' defense spending as a percentage of GDP since 1995

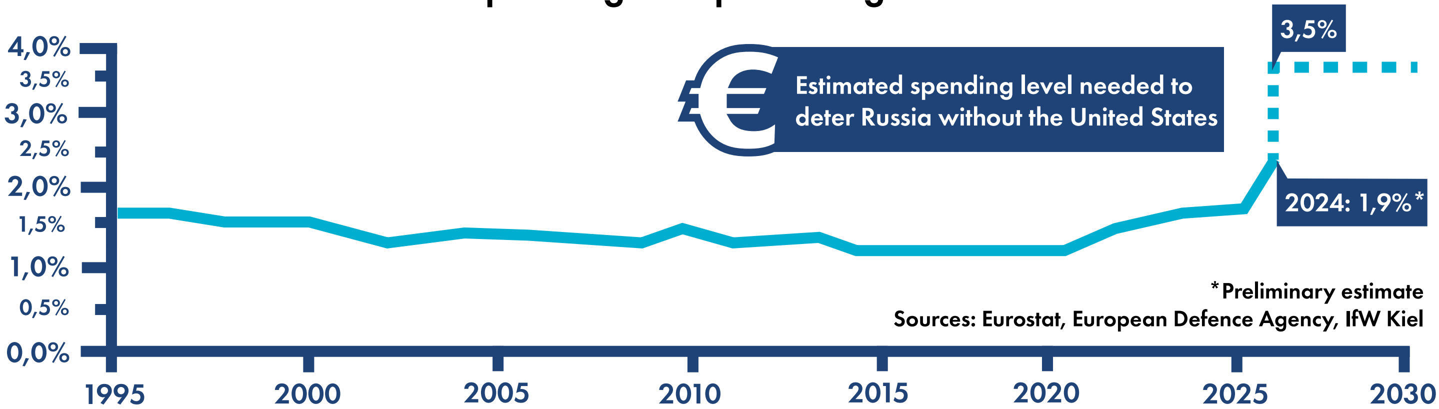

Figure 1: TEU member states' defence spending as percentage of GDP including estimated spending needed to deter Russia without the US. Source: Statista, https://www.statista.com/chart/34052/eu-defense-spending-as-a-share-of-gdp/

3. Proposed financing

In December 2024 NATO General Secretary Mark Rutte expressed what he deemed necessary to ensure Europe's safety. He suggested slashing spending on social benefits dramatically to save money that could then be spent on the military (Posaner & Griera, 2025). The logic in his argument is exactly that of the Guns versus Butter approach. Crucially he is not alone in thinking like this. Former Belgian Prime Minister Alexander de Croo said that it is "logical" to cut unemployment and other benefits in order to meet the (former) 2% NATO spending target (Carolan, 2024). Similar suggestions come from Labour Prime Minister Keir Starmer (Dickson & Bloom, 2025). While many are still in the "figuring it out" phase about how to raise military spending, like Emmanuel Macron who seems to favour cuts to social spending (Goury-Laffont et al., 2025). Others, like the Danish government or current Belgian Prime Minister De Wever, have already enacted such measures by eliminating a public holiday and reducing unemployment benefits respectively (Clapson, 2025; Wright, 2023). Why should this be a big issue? After all, the money has to come from somewhere right? Yes, Europe needs to rethink its approach to security. Russia, and to a smaller extent other authoritarian regimes, pose a digital but also increasingly physical threat to the safety and cohesion within European societies, and there is widespread agreement that this will cost a lot of money. But will shifting funds away from social benefits towards military expenditure help address these issues? No.

4. The consequences

In light of the post-Covid recession and inflation, the economic situation worsened dramatically for many citizens. In Germany, a country considered to be rich, 40% do not have any savings whatsoever (Fratzscher, 2017). And this is not a country-specific issue. Almost a third of EU households report that they are unable to cover unexpected financial expenses, and almost 10% of households are unable to warm their homes adequately (Directorate-General for Employment, Social Affairs and Inclusion, 2023). The details for financial distress that are discussed in the report by the Directorate-General are in the graphic below. Further according to an Ipsos poll, almost 50% of households "consider that there is a significant risk that they will find themselves in a precarious situation in the next few months" (Mercier, 2023). 62% of respondents have already had to restrict their travels, while 37% reported that they had a health problem for which they had to give up the treatment because it was too expensive (Mercier, 2023).

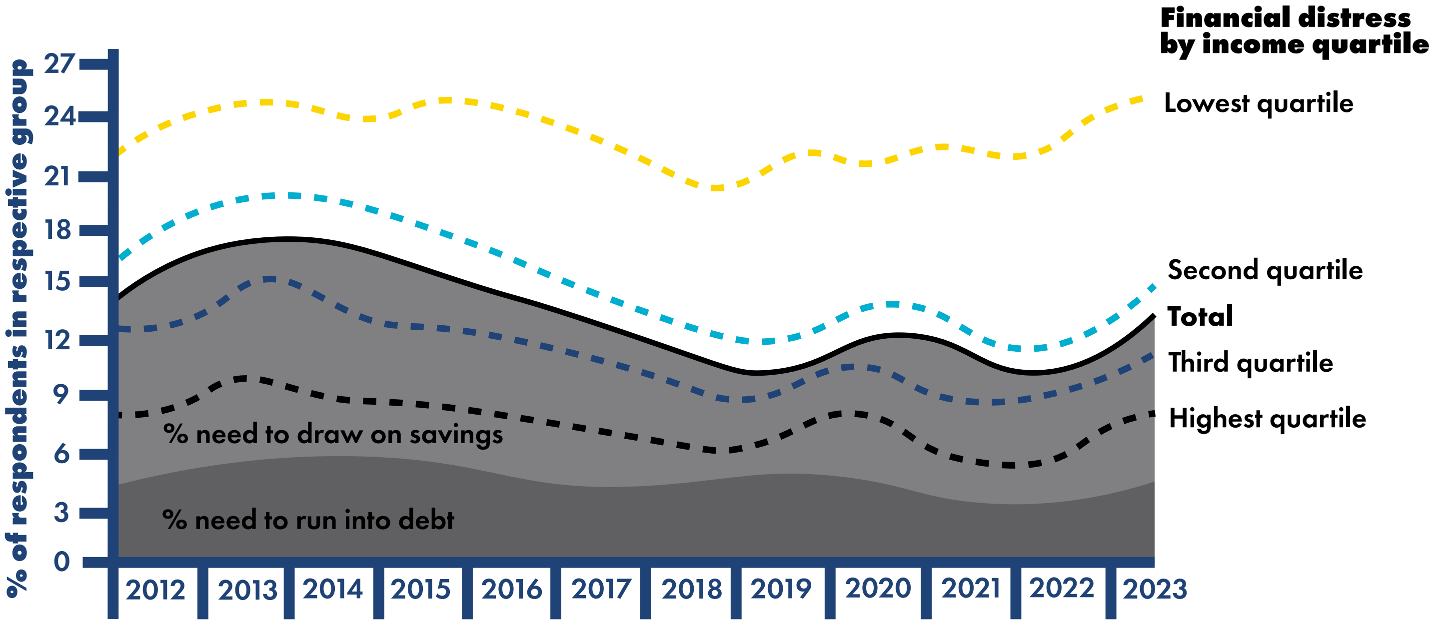

Figure 2:Reported financial distress by income quartile, 2012-2022, EU
Source: ESDE Review 2023, https://op.europa.eu/webpub/empl/esde-2023/chapters/chapter-1-4-1.html

These economic struggles translate quickly into social problems, as poorer people tend to be less engaged with society and also less attached to it. Someone who struggles financially will have fewer opportunities to meet with others, thereby they are more likely to feel isolated (Schulz, 2023). This makes them more susceptible to propaganda campaigns and more likely to adopt resentful opinions. Additionally, they become more desperate to find a way out of poverty, one of the ways in which this manifests is the increased likelihood to gamble (Grönroos et al., 2022). In the context of national defence, it means that they are less likely to stand up or even fight for their country, as they have practically nothing to fight for. This is a vulnerability that foreign actors like Russia know all too well how to exploit and use for their purposes. The consequences that these social benefit-cutting policies have will only fuel societal inequality and be counterproductive to the goal of national defence. It is not lost on people when the government burdens working-class people more and more through measures like increasing taxes or eliminating public holidays (Wright, 2023). As mentioned above people have real struggles and worries and how do governments plan to respond? By punishing and taking away from those that have next to nothing. At least that is what the proposed spending cuts will do. By cutting more strings of the net that are the social benefits, people who rely on it to barely make it to the next month will face struggles which are unworthy of a continent as rich as Europe. Cutting retirement benefits will not yield any positive results, it will merely lead to more elderly slipping into poverty in their last years (Schulz, 2023). Cutting unemployment benefits will not motivate people to start working. It will make people accept even the most disrespectful employment contracts from their employers with the worst conditions possible because they know that if they do not accept a much harsher punishment will wait for them; poverty, with no support structure to uplift them (Ernst, 2015). The only thing that people get is the occasional speech saying that they are not forgotten. But words do not pay the rent or the groceries. And while devastating cuts are taking place governments spend millions upon millions into the defence industry to acquire the newest fighter jet or the newest machine gun. The message that people receive from this is: You are not a priority to us. This makes people vulnerable to populists who will give them what they are missing: attention. They tell people to vote for them to pay it back to the government for mistreating them so badly and that once they are in power everything will be better. And many people believe them, they believe them because they want to, because they have nothing else left.

Guns vs. Butter:
the trade-off between a nation's investment in defence and civilian goods

5. What are the alternatives?

But it does not have to be this way. There are ways to address the present security needs without sacrificing social cohesion. One way of doing so is to be more active diplomatically. The most effective and lasting agreements are those that are just and fair. It becomes impossible to establish such agreements if dialogue is abandoned. However, it must be acknowledged that diplomacy will only get us so far. Increasing military spending may be adequate as there is a clear need for many European armies to modernise. This need for modernisation extends to many parts of our society and economy. However, only spending money on defence will not be very effective in the long run. To ensure stable national defence, societal cohesion must be ensured (Aall & Crocker, 2019). This is most effectively done by uplifting those at the bottom of our society to decrease income and wealth inequality. This can and must be done via a more active social policy approach, and there are many ways to achieve this. Many people are struggling with housing. A more active social state should take a more central role in constructing affordable housing and not just delegate this responsibility. Further, many people feel like their hard work is not paying off, and that's because it isn't. Taxes on work are comparatively high in many European states. Things must be changed if people should regain trust in the system and in the promise that hard work pays off. Changing taxing approaches to benefit working people while reducing the disparities that inheritance can create will ensure that people feel that they are part of one single society and not that there is a society for the common people and the super-rich. If people are given the tools to uplift themselves and those dear to them, they will stick together (Aall & Crocker, 2019). They will fight for the safety of the country and society because they have something to fight for. Instead of saving money where possible, governments should invest massively into the future, and to ensure lasting prosperity. Investments cost money, and that money must come from somewhere. Debt is historically seen as a bad thing for countries and many will argue that it leaves an unfair burden on the next generation. But these sentiments are misguided. Governments have been "indebted" for centuries, and yet they have progressed. History teaches us that debt is not necessarily holding us back, it can be used to propel progress and bring lasting prosperity (Bignon & Sicsic, 2020). Using debt as a means to finance investments has never been easier thanks to the ECB and its multinational mandate. If we stop investing in our society, in our future, and yes that includes our national defence, we will leave behind a much bigger burden, the burden of an outdated economy, a divided society which is incapable of defending our values and freedoms. There is a great threat looming over Europe. Hostile actors from the outside and within are posing a great digital and physical threat to our way of life. European leaders want to answer this by cutting social benefits to fund military rearmament. This is reckless as many citizens are already struggling and burdening them further risks tearing us apart. Disregarding the poorest in our society for the newest military technology will make them more vulnerable to populists and other outside actors who fill them with hate while promising them the world. We need to rethink our financial priorities and support those in need. And we have the tools to advance and modernise our defence, society, economy, and the European Union as a whole. After all, having the newest tanks is worthless if no one is willing to drive them. A society that uplifts each other, that trusts each other and that fights for each other will truly ensure lasting national security and well-being.

Social Cohesion: The strength of relationships and a sense of solidarity among members of a society

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About the Article

Europe's green and defence ambitions are built on a fragile foundation of foreign-controlled raw materials. Lenín Navas García investigates the EU's deep dependence on rivals like China for critical raw materials essential to both the energy transition and military production. The article assesses recent EU policies and warns that fragmented investment and limited financial tools risk leaving Europe exposed. Without bolder coordination and smarter partnerships, supply chain resilience will remain an elusive goal.

About the Author

Lenin is a Master's candidate in Peace and Conflict Studies with five years of experience working in global environments. He has conducted research on sustainability, security, and geoeconomics, and managed projects in conflict zones in Latin America. His interests include geoeconomics and international security, focusing on critical raw materials and the European defense industry.

1. Introduction

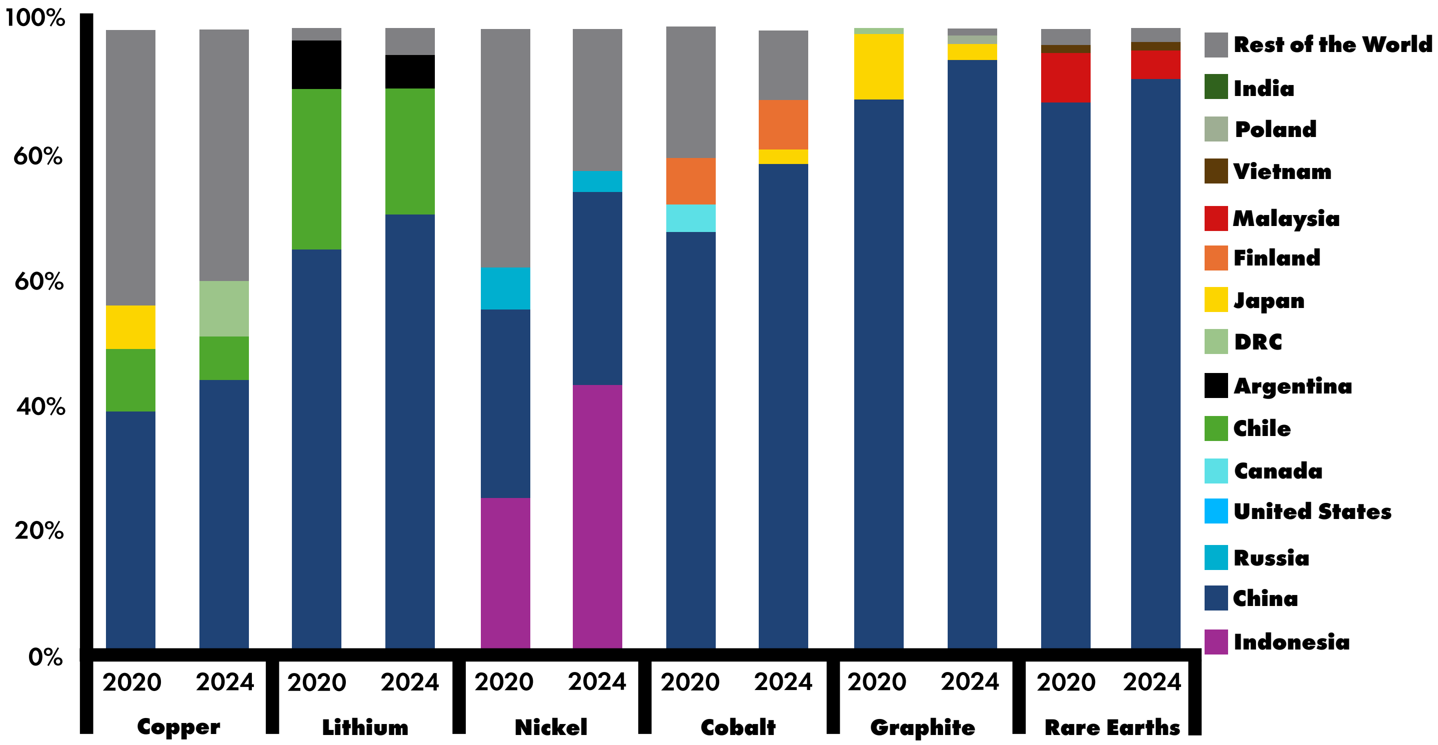
In September 2024, the European Union received a new wake-up call in the form of the Draghi Report (2024). This document, produced by the former Italian Prime Minister, analysed the EU's weaknesses in areas that affect its economic competitiveness and revealed the terrible truth that the EU must act soon if it wants to ensure its security and prosperity. Although the report drew attention to many sectors, one stands out because of its central importance to the European economy: the security of the critical raw materials (CRMs) supply chain. Therefore, this paper answers the question "how Europe can make its supply chain more resilient?"In order to answer that question, this essay analyses the EU's vulnerabilities in the supply of CRMs needed for energy transition technologies and the defence industry. It begins by summarising the current situation of these sectors, then looks at the measures the EU has taken to improve their resilience, and concludes by identifying three areas where more can be done: Financing, Foreign Investment and Risk Guarantees.

Critical Raw Materials:
minerals vital for high-tech industries, defence, and energy transition.

2. There is no security without CRMs

Since the beginning of the war in Ukraine, defence has been at the centre of European political debates. The war has highlighted the weaknesses of the EU defence industry, including an over-reliance on US equipment and a lack of manufacturing capacity for materials ranging from ammunition to strategic enablers (George et al., 2025). The EU and its member states are trying to reduce this dependency through new investment in the defence industry. In this sense, the "ReArm Europe/Readiness 2030" initiative (Clapp et al., 2025) and Germany's pledge to drastically increase its defence budget (Ford, 2025), are steps in the right direction to create a truly autonomous European Defence Technology Industrial Base (EDTIB).However, it is not enough to invest in new industrial capacity. Even if European countries solve major problems in creating this industrial base, such as the lack of coordination in procurement, that leads to market fragmentation and therefore hinders the possibility of economies of scale (Rensbergen, 2024), there is a major weakness in the base of the defence industry: the supply of CRMs. Raw materials such as aluminium, tungsten, nickel and gallium are used in the manufacture of military equipment, including weapons, sensors and communication systems. The problem here is that "Western states' potential adversaries have, in some cases, a near-monopoly on the supply of vital materials that (...) are used in current defence platforms" (Hackett et al., 2025, p. 2). For example, rare earth elements (REE) are used extensively in the manufacture of electronic systems that are central to the combat capabilities of the F-35 Lighting II, an aircraft purchased by many European countries. According to the US Department of Defence, more than 400 kilogrammes of REE are required to manufacture an F-35 Lighting II (Lopez, 2024). This use of REE can be found to a greater or lesser extent in virtually all modern war equipment that Europe needs. Currently, China accounts for 60% of REE extraction and 85% of processing capacity in the world, supplying 46.3% of European imports of these materials, while Russia is in second place with 28.4% (Eurostat, 2025). In other words: Western rivals can use Europe's dependence on rare earth supply to force political concessions, disrupt the supply chain and affect Europe's capacity to produce technologically advanced military equipment. This is not a fictional scenario, as China has already done so after the start of the trade war with the US, imposing export controls on 7 rare earths in response to the Trump administration's tariffs (Baskaran & Schwartz, 2025).

Share of refined material production by country



Notes: DRC = Democratic Republic of the Congo. Graphite is based on battery grade spherical and synthetic graphite. Rare earths are magnet rare earths only.

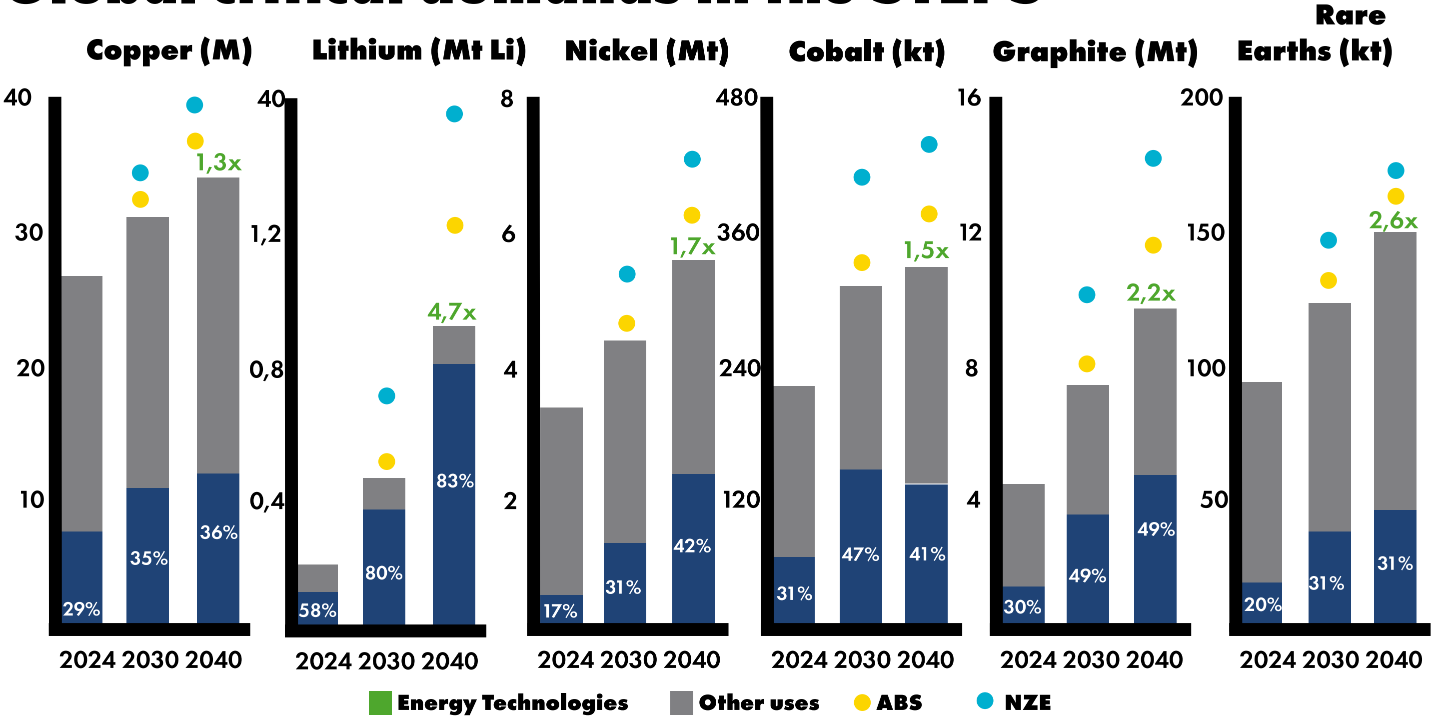
Figure 1: Table showing the Share of refined material production by country, Source: IEA, "Critical Materials Outlook 2025"

This vulnerability in the rare earth supply chain is present in almost all materials classified by NATO as critical for defence (NATO, 2024) and has its origins in the European model of raw materials procurement. Due to the environmental costs and risks associated with the mining of REEs, these activities have been relocated to third countries in recent decades. This model, in which mining has been concentrated in resource-rich countries, mostly in the Global South, and processing in countries such as China, has created a major vulnerability in the overall defence supply chain (Draghi, 2024, p. 50). This can be disrupted at any time by European rivals exploiting their geoeconomic advantage or simply by governance failures in resource-rich countries, such as the Democratic Republic of Congo (Rolley & Njini, 2025).

3. The material base of the energy transition

The dependence on external powers for the supply of CRMs is even greater in the case of energy transition technologies. Although large quantities of CRMs are required for military purposes, they only account for a small proportion of total European consumption. The EU could therefore protect itself, at least temporarily, against the risk of disruption to its supply chain by building up strategic stocks of the most important materials for the manufacture of core systems and weapons (Carrara et al., 2023, p. 189). However, for energy transition technologies such as EVs, photovoltaics and wind turbines, the use of CRMs is massive and unavoidable. The Stated Policies Scenario (STEPS) of the International Energy Agency (IEA) assumes a significant increase in demand for CRMs. This growth will be fuelled primarily by the increasing adoption of energy transition technologies whose production is highly dependent on these materials. Demand for cobalt and REE is expected to increase by 50-60% by 2040. Meanwhile lithium demand would surge fivefold, and even copper will experience a rise of at least 30% (IEA, 2025, p. 89). These figures could be even higher if countries take action to meet their emissions targets or do enough to reach net zero emissions by 2050.

Global critical demands in the STEPS



Notes: STEPS = Stated Policies Scenario; Mt = Million tonnes; kt = kilotonnes; APS = Announced Pledges Scenario; NZE =NetZero Emissions by 2025 Scenario
The figures for copper are based on refined copper (extending direct-use scrap). Those for rare earth elements are for magnet rare earth elements only.
Growth rates (in green) are between 2024 and 2025)

Figure2: Table showing the Share of refined material production by country, Source: IEA, "Critical Materials Outlook 2025"

In the case of the EU, the adoption of renewable energies and the electrification of the transport system is seen as a security issue. Especially after the Ukraine war disrupted the supply of cheap gas from Russia and caused an energy price shock (Jan Christoph Steckel et al., 2022, pp. 19–21). Therefore, creating clean, reliable and secure energy sources is a political priority set out in the revised Renewable Energy Directive (Renewable Energy Directive, 2023), which requires at least 42.5 % of the EU's energy consumption to come from renewable sources by 2030. This means that in order to achieve its goals, the EU must invest heavily in the production and mass procurement of solar panels, wind turbines, electric cars and lithium. Currently, the production of these technologies is heavily concentrated in China. This country dominates both the upstream (extraction, processing and refining) and downstream (manufacturing) segments of the global CRMs supply chain. This dominance has been built up in recent decades through a combination of incentives and direct investment (Carrara et al., 2023, p. 149). In a group of strategic energy-related minerals analysed by the IEA, "China is the dominant refiner for 19 of the 20 minerals analysed, holding an average market share of around 70%" (IEA, 2025, p. 8), while the country also accounts for 80% of global solar PV production capacity (Pacheco, 2024) and 75% and 75% of EV batteries (IEA, 2025, p. 53). These examples show how dependent Europe is on China for the energy transition. With the exception of the recycling of CRMs, the opportunities to establish an independent supply chain are limited. The development of production capacities for the energy transition would require expertise in the hands of Chinese companies. Once these factories are established, they would be dependent on CRMs processed in China and mined by Chinese companies in resource-rich countries. This creates a scenario where European policymakers need to act wisely to make supply chains resilient and the industry competitive vis-à-vis China.

4. European actions to achieve resilience

Faced with this clear diagnosis of the threats to the CRMs supply chain, European policymakers have launched a series of measures to strengthen resilience. The cornerstone of European policy in this context is the Critical Raw Materials Act (Critical Raw Materials Act, 2024). Under the Critical Raw Materials Act (CRMA), the EU stipulates that by 2030, at least 10% of CRMs consumed, 40% of CRMs processed and 25% of CRMs recycled must originate from the EU. In addition, no more than 65% of the supply of a material may originate from a single country outside the Union. These targets are intended to reduce dependence on China and strengthen the EU's control over its supply chain. In concrete terms, this initiative has resulted in two important measures. Firstly, the signing of "Strategic Partnerships" with resource-rich countries, particularly in Africa, to create the framework for accelerating European investment in the extraction and processing of CRMs. Secondly, the approval of 47 "Strategic Projects" in Europe under the CRMA, supported by the European institutions and Member States to obtain funding, with streamlined approval timelines of a maximum of 27 months for CRMs extraction projects and 15 months for other projects. Permitting in the EU can normally take up to 10 years (European Commission, 2025). These two aspects of the European strategy are important, but not sufficient. On the one hand, the strategic partnerships have not been as effective as Brussels expected. Some, such as the partnership with Norway and Serbia, have been useful for the development of projects related to CRM, but most of them have not produced concrete results after their signing, lacking effective coordination tools for new investments (Gherasim, 2024, pp. 20–25). The risks associated with investing in countries with low levels of governance, the low profitability and the lack of financial support and incentives from the EU drive private capital away from investing sufficiently (Karkare, 2025), leaving the market to Chinese companies supported by their government with subsidies and loans (Escobar et al., 2025, p. 6). On the other hand, the selected strategic projects will avoid the obstacle of lengthy approval periods for CRM-related permits. However, this in itself does not constitute a business case for investment in new projects. As the example of China shows, both upstream and downstream aspects must be taken into account when building CRM supply chains. Otherwise, Europe will have extracted and processed materials, but without a military or energy transition technologies industry that can utilise them. The result would be that the materials would go back to China and be used there for the production of electric cars, photovoltaic systems and batteries.

CRMs and the cost of producing all raw materials in Europe would make it a self-defeating policy

5. What to do? Europe's path to resilience

Given this scenario, there are two aspects of the European CRMs strategy that have the potential to greatly improve its effectiveness in building resilience in the supply chain. These are, firstly, the expansion and coordination of financial support for CRMs projects within and outside Europe, secondly, the creation of investment frameworks that encourage the participation of European private capital in extraction and processing projects in resource-rich countries.

5.1 Financial Support for European Companies

The first step would be to improve access to funding for European CRMs projects. Due to the institutional set-up of the EU, it lacks the financial power that countries like China and the United States can mobilise through fiscal policy and direct subsidies. Therefore, some Member States have taken responsibility for providing funding through instruments such as the €1 billion Made in Italy Fund (Fonte & Amante, 2023) and the €1.1 billion fund set up by Germany through its development bank KfW (Kowalcze, 2024). However, these types of uncoordinated efforts pale in comparison to the $387 billion provided for the energy transition through the US Inflation Reduction Act, which includes tax credits and loan guarantees (Lazenby, 2023). Therefore, if the EU wants to be competitive in the CRMs supply chain, it should start coordinating its financial capacity to offer concrete benefits to its companies. Tax credits and loans are a good start to support the Capital and Operational Expenditures of mining and processing companies. Also, "a joint funding scheme able to support those companies which are deploying projects in countries where there is no national support scheme" (Gherasim, 2024, p. 31) would complement national and European efforts. Finally, to reduce uncertainties in the industry due to price volatility or dumping attempts by rival countries, the EU could create contracts for difference (CFDs) that guarantee producers a minimum price and sales volume (Sørensen, 2024, p. 13). All these measures would require a more proactive involvement of the EU institutions and the use of its budget to fund them, as well as the integration of initiatives such as Global Gateway and the Team Europe approach.

5.2 Promotion of Overseas Investments

It is now clear that Europe "will never be entirely self-sufficient in supplying the critical raw materials it requires and will always rely on CRM imports" (Sørensen, 2024, p. 4). Although policies such as the CRMA can help to increase resilience, they will never achieve full autonomy as the geographical distribution of CRMs and the cost of producing all raw materials in Europe would make it a self-defeating policy. Furthermore, the current trend for resource-rich countries is to use them as a tool for industrialisation by restricting the export of raw materials forcing the creation of more complex processing operations within their borders (Gherasim, 2024, pp. 13–14). However, it is possible to de-risk the supply chain and increase the competitiveness of European industry through European investment in mining and processing projects in resource-rich countries.This strategy will follow the example of China, that, even if it cannot mine strategic raw materials directly on its territory, nevertheless has access to mining and processing abroad through direct investment in resource-rich countries as part of the Belt and Road Initiative (BRI). In this way, China invested 22 billion dollars in overseas metal and mining companies in 2023 alone (Wang, 2025), eclipsing Europe's national initiatives. To reverse this situation, Europe should focus on two areas. First, providing follow-up to the Strategic Partnerships for Critical Raw Materials, including dispute settlement procedures and concrete measures to facilitate and protect European investment in resource-rich countries. Second, international financial institutions should be utilised to provide risk insurance to European capital, as extractive industries are very long-term ventures that are vulnerable to disruption in countries with low levels of governance (Sørensen, 2024, pp. 11–12). Finally, and perhaps more crucially, we need to understand and recognise the objectives of resource-rich countries and their governments. Most of these countries are unwilling to revive extractivist dynamics that has not brought real social and economic improvement to their societies. Therefore, EU efforts should honour the word "partnership" and take an "ecosystem view" (Gherasim, 2024, p. 32) that offers benefits in other areas such as energy and transport infrastructure, sanitation and education for the population.

6. Conclusion

Achieving resilience in the CRMs supply chain is not an easy task. The geographical distribution of materials, the fierce competition of rival powers and the fragmented nature of the initiatives taken so far are all factors that hinder European objectives. However, as with many other challenges facing the continent, the key in this case lies in the coordination and mobilisation of resources at the European level. European efforts should focus on all parts of the supply chain simultaneously. Without the direct involvement of European companies in the extraction of critical raw materials in resource-rich countries, it is impossible to secure supply for processing facilities on the EU. If Europe does not create enough processing capacity, the mined materials will end up in China even if they are extracted by European businesses. And if there are not industries in energy transition technologies or defence that can absorb the supply of processed materials, we will not be able to create the demand that would make a business case for the huge investment that the CRMs sector needs.

Therefore, neglecting one part of the supply chain would threaten the efforts made in the other parts.

The good news is that Europe has the financial and technological resources to secure its supply chain. This can be achieved through financial incentives, investment guarantees and risk insurances that allow private capital to flow into the sector and create value for both Europe and resource-rich countries. However, without the political willingness to mobilise these resources, the result could be that the continent is left with a defence industry that can easily be disrupted by potential rivals, and an energy transition dependent on third countries.

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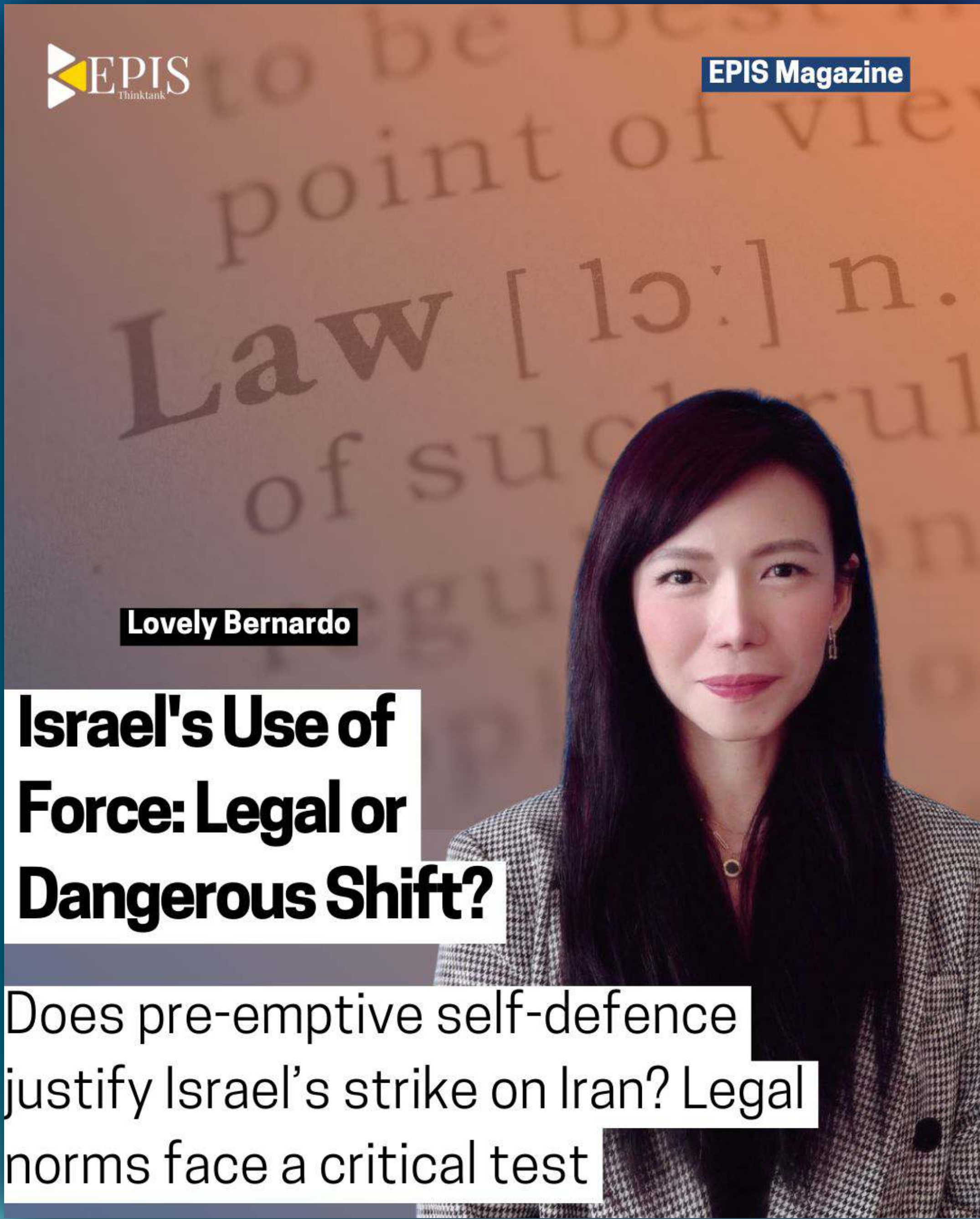

About the Article

Is Israel redrawing the boundaries of international law by force? This article examines Israel's justification of pre-emptive self-defence against Iran and argues it lacks legal basis under Article 51 of the UN Charter. Without evidence of an actual or imminent armed attack, such actions violate international law and risk eroding global legal norms, setting a dangerous precedent for future conflicts.

About the Author

Lovely Bernardo holds a Juris Doctor degree and is currently pursuing postgraduate studies in International Humanitarian and Human Rights Law. Formerly Division Chief in the Philippine Executive Department, she led policy initiatives on legal and governance issues. Her thesis explores how China's use of quantum sensing in the South China Sea constitutes strategic legal erosion, bypassing armed conflict yet undermining sovereignty and international law.

For decades, Israel has invariably asserted the legality of its actions, presenting itself to the world as operating within the bounds of international law. This stance is evident in its historical rhetoric, beginning with the 1967 Six-Day War against Egypt, Jordan, and Syria, when it launched a „pre-emptive self-defence" against these Arab nations. Similarly, in 1981, Israel conducted the Osirak Reactor strike bombing Iraq, perceiving Iraq's nuclear weapons program as a potential threat that needs to be prevented (Little, 2017)." In 2007, during Operation Orchard in Syria, Israel carried out an airstrike based on suspicions of a nuclear reactor, adhering to its policy of preventive strikes against adjudged existential threats (Mumino, 2023). Most recently, Israel attacked Iranian nuclear and military targets under Operation Rising Lion, once again invoking "pre-emptive self-defence" against Iran's alleged preparations for an imminent strike. While these actions may seem justified from national security standpoint, they raise a pressing question: can Israel's evolving interpretation of self-defence, particularly the concept of pre-emptive force, be harmonised with the established framework of international law?

What exactly is pre-emptive self-defence, and does it hold up under international law?

The Legal Framework of Self-defence

The United Nations (UN) Charter provides under its Article 2 (4) the prohibition of the use of force against the territorial integrity or political independence of any state. The two primary exceptions to this prohibition are:

- Authorization by the UN Security Council under Chapter VII, and
- The inherent right of self-defence, as outlined in Article 51, when an armed attack has occurred.

The purpose and intent of the law under this provision is to forbid both the use and the threat of force. While reprisals and retaliation were not explicitly mentioned in the Charter, the nature of Article 2(4) has been interpreted to ban such actions as illegal, and viewed them as counterproductive to the peaceful resolutions embedded within the UN framework (Bowett, 1972). Therefore, when a state

Israels History of Pre-Emptive Strikes

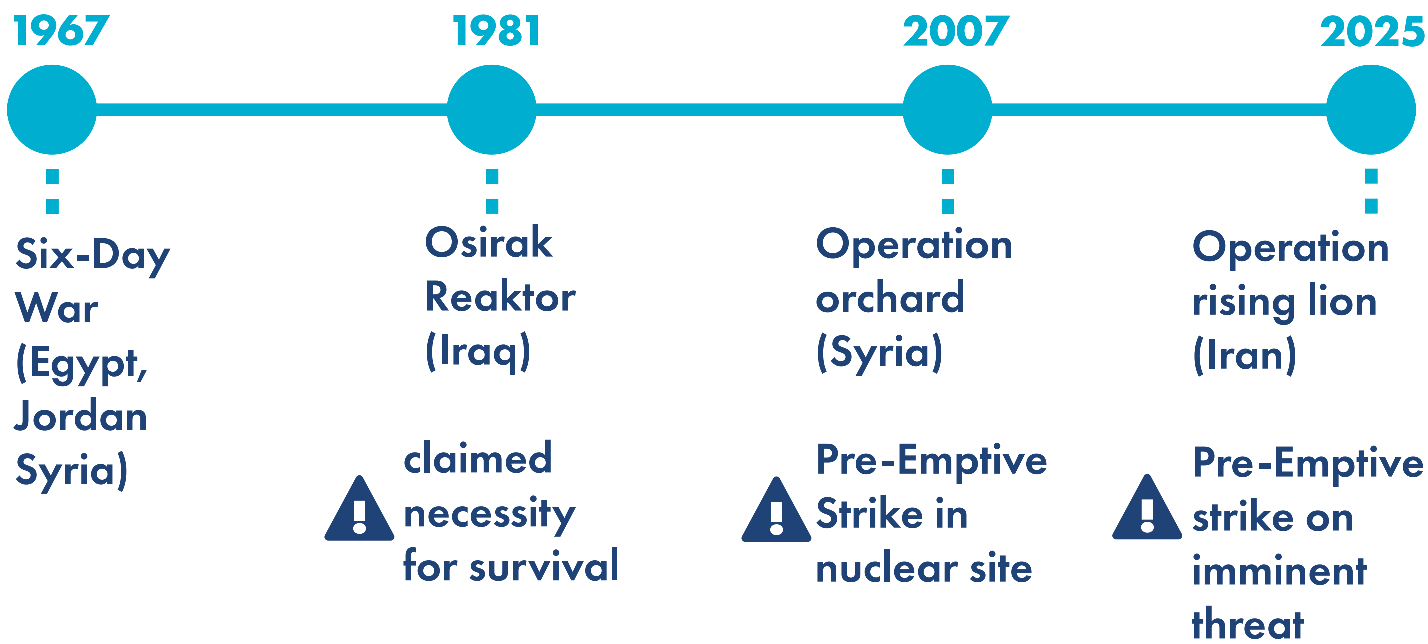

Figure 1: Israels History of Pre-Emptive Strikes

attacks another state outside any of the exceptions outlined in the Charter, it violates the territorial integrity or political independence of the state being attacked. Such actions run afoul international law, and undermine peace and security. The first exception is straightforward: authorisation from the UN Security Council would legitimise the use of force. However, this article does not intend to discuss that scenario. Instead, it will focus on the more contentious exception, which is, Article 51 of the UN Charter. Article 51 of the United Nations Charter recognises the inherent right of states to self-defence "if an armed attack occurs." Under this provision, a state is granted the ability to respond to aggression. However, this right is not unlimited and is not without exceptions. Actions taken in self-defence must adhere to the principles of necessity and proportionality; that is, defensive measures must be appropriate and limited to what is required to repel the attack and prevent further aggression (Gardam, 1993). Importantly, the International Court of Justice (ICJ) has repeatedly affirmed that the right to self-defence can only be invoked after an actual armed attack has occurred. The threshold for invoking Article 51 is intentionally high, excluding the use of force in anticipation of potential or speculative threats from its purview. What Israel has to prove is that there exist an armed attack against their state, and their attack on Iran is self-defence, and therefore would not constitute a use of force affecting the territorial integrity or political independence of Iran.

Pre-emptive self-defence:
Use of force before attack; lawful only if threat is imminent and clear.

What Is Publicly Known About the Israel-Iran Standoff?

Israel has been consistent in its claim that Iran poses an existential threat against them, focusing primarily on Iran's nuclear program, not to mention its support for militant proxy groups, and their hostile ideas about the Iranian leaders. The recent strike by Israel, was launched due to its assertion that Iran was preparing for an "imminent attack, against them (Israel Ministry of Foreign Affairs, 2025). They cited Iran's continued uranium enrichment linked to nuclear weapon (Schaer, 2025). They maintained the legality of their strike and argued that it was an act of "pre-emptive self-defence" intended to neutralise imminent danger. The claim was based on an intelligence report (Fabian, 2025), but no publicly disclosed conclusive evidence indicated that Iran had finalised plans for an attack at the time of the airstrike. On Iran's side, it maintained that its nuclear activities were for peaceful purposes, following the Non-Proliferation Treaty. However, Iran has reportedly been amassing uranium beyond the 60%, which is technically below weapons grade, but above the civilian energy needs (Presse, 2025), which fueled suspicions. Also, its continued support for regional proxy groups, further bolsters tensions. However, none of the activities individually amounted to a direct armed attack on Israel, but they undisputedly contributed to the rising conflict between the two states (Al Jazeera, 2025).

Israel's Legal Claim: Pre-Emptive or Anticipatory Self-defence

Israel argues that in certain extreme cases, the right of self-defence, as enunciated under Article 51 of the UN Charter, extends to pre-emptive or anticipatory self-defence. This means the use of force before an actual armed attack has taken place, but in anticipation of one that is imminent and unavoidable. Pre-emptive self-defence is a controversial concept within international law that aims to adapt traditional self-defence to modern threats that may not constitute conventional armed attacks. The use of military force is generally prohibited under international law, except in certain circumstances. One lawful justification for using force is self-defence, which traditionally requires an actual armed attack or an immediate threat that is considered equivalent to an armed attack (Bothe, 2003). The concept of pre-emptive self-defence suggests that a threat can be so immediate and overwhelming that a state should not be required to wait until an attack has started to take defensive action. This principle relies on the

Figure 2: When is Force Lawful under International Law

necessity and immediacy components that are part of the customary international law. The idea is rooted in the Caroline incident of 1837, a conflict between the U.S. and the British Empire (now Canada). It famously outlined the strict criteria for anticipatory (or pre-emptive) self-defence: the threat must be "instant, overwhelming, leaving no choice of means, and no moment for deliberation," and the response must be proportionate to the threat (Jennings, 1938). This became known as the Caroline Doctrine, a foundational principle in customary international law (Norman and Trachtman 2005). Critically, anticipatory (or pre-emptive) self-defence is distinct from preventive self-defence. The former concerns imminent threats; the latter involves speculative future dangers, which are not immediate or certain (Kasher, 2005). International law overwhelmingly rejects the latter as being unlawful.

Evaluating Israel's Justification

Assuming, for the sake of argument, that pre-emptive self-defence is valid, the key question becomes: Does Israel's justification satisfy its strict requirements?

Israel's assertion that its strike on Iran on June 13, 2025, was necessary to prevent an imminent attack. It cited Iran's nuclear program, missile development, and proxy activities through Hezbollah as constituting an existential and immediate danger that justified a pre-emptive strike. However, this concept is contentious when extended beyond immediate threats, such as when applied to perceived dangers where the threat is not yet fully evident.

Lack of Evidence of Imminence

For Israel's anticipatory self-defence argument to be valid, there must be a real, immediate, and overwhelming threat, following the Caroline Test. However, there is no conclusive evidence that Iran currently possesses nuclear weapons. U.S. Director of National Intelligence Gabbard publicly stated that Iran has not resumed nuclear weapons development, and that Supreme Leader Khamenei had not reversed the 2003 suspension of the program. And that Iran does not appear to have nuclear weapon yet (Pereira, 2025). In addition, Iran's proxy activities, while seemed to be destabilizing, do not amount to an armed attack directly attributable to the Iranian state. To reiterate, under international law, the threshold for an armed attack that would justify self-defence is high. The ICJ in Nicaragua v. U.S. (1986) emphasised that only "the most grave forms of the use of force" qualify. Similarly, in the Oil Platforms case (2003), the ICJ ruled that even repeated attacks on shipping did not justify a use of force in self-defence.

In summary, Israel's military action is predicated not on verifiable imminent harm but rather on strategic assumptions. Although Iran's nuclear program and its support for proxy groups remain significant concerns, they may not constitute an immediate threat of nuclear proliferation or direct military confrontation with Israel. Such mere conjectures amount to suspicion, lacking concrete evidence of an immediate and overwhelming threat that would necessitate the use of force without deliberation. The legal threshold remains unmet, and there is no tangible harm that would justify invoking the Caroline doctrine for pre-emptive or anticipatory self-defence. What Israel has is merely an assumption of danger, not a clear and certain threat that would legally allow an armed attack and would cost civilian lives.

Israel's strike lacks proof of imminence, failing the test for lawful self-defence.

Israel's Attack Fails the Tests of Necessity and Proportionality

Assuming arguendo that Israel's claim is lawful under pre-emptive self-defence, the use of force must nonetheless comply with two fundamental requirements: (1) necessity and (2) proportionality. These are not optional criteria but core principles under both customary international law and Article 51 of the UN Charter, which remain binding even when a state responds to an imminent threat.

Was Force the Last Resort (Necessity)?

The principle of necessity refers to the requirement that a certain action must be indispensable to achieve a specific, legitimate aim. It requires that military force be used only as a last resort, after all peaceful means have been exhausted (Akande, 2013). Even in cases of imminent threat, as Israel argues, it must show that no other measures, diplomatic, economic, or legal, could have averted the danger. In the case of the strike on Iranian facilities, there is no public record showing that Israel attempted to engage international bodies, such as the UN, sought mediation through third-party states, or issued a formal ultimatum to Iran. Moreover, U.S. and International Atomic Energy Agency (IAEA) assessments (as discussed) at the time indicated that Iran had not resumed nuclear weapons production, but only for the fact that there exist a higher amount of uranium collected, and that there was no clear evidence of a planned, immediate armed attack on Israel. These reports weaken the claim that the use of force was strictly necessary in these cases. If the threat was not truly imminent, then the justification for immediate and unilateral military action collapses.

Was the Force Used Excessive (Proportionality)?

Even if one accepts the argument that a strike was necessary, it must still be proportionate to the threat it poses. Proportionality requires that the use of force used must match the seriousness of the threat: the scale, duration, and intensity of the military action must commensurate with the aim pursued (Chainoglou, 2016). Under this standard, Israel's armed attacks targeting multiple Iranian nuclear and military facilities, which have reportedly caused damage beyond the intended military objectives, raise concerns. Moreover, targeting and killing scientists are prohibited under international humanitarian law. Scientists are regarded as civilians unless they are directly involved in hostilities, which cannot currently confirm and would require separate legal analysis.

If the threat was speculative or undeveloped, then the response, particularly a broad and sustained bombing campaign, could be seen as punitive rather than defensive. Additionally, any harm to civilians, civilian infrastructure, or regional stability must be weighed in the proportionality analysis. The strike triggered retaliatory threats, disrupted diplomatic talks, and provoked a wider regional escalation, suggesting that the attack may have been disproportionate to any real or imminent danger.

U.S. Strike on Iran, Masquerading as Collective Self-defence

Following the Israel's military operation, U.S. came into the picture and conducted its own airstrikes on Iranian nuclear facilities on June 22, 2025. These strikes, reportedly justified as acts of, again, self-defence and collective self-defence (Gill, 2025), or maybe a support for a strategic ally, representing a serious violation of international law. Not only did the U.S. act without a UN Security Council mandate, but it also invoked a distorted interpretation of collective self-defence that fails to meet the legal threshold under Article 51 of the UN Charter.

No Armed Attack, No Right to Collective Self-defence

Under Article 51 of the UN Charter, it also permits states to use force in collective self-defence only if an armed attack occurs against a member state. At the time of the U.S. strikes, Iran had not launched an armed attack against them. Without an actual attack, the legal trigger for self-defence was not met.

The U.S. strike on Iran was executed absent a Security Council resolution and without a clear, ongoing armed threat, violating Article 2(4) of the UN Charter, which prohibits the use of force against the territorial integrity or political independence of another state. Such actions, undertaken in support of a preventive war, are categorically unlawful. The U.S. may argue following the claim of Israel for an "imminent attack" would be outrageously flawed. International law does not permit one state to "borrow" the illegality of another's use of force. Instead, the International Law Commission's Articles on State Responsibility opined that states are prohibited from participating in or aiding internationally wrongful acts, including illegal uses of force (International Law Commission, 2001). By launching its own strikes, the U.S. did not merely assist; it directly committed a separate breach of international obligations.

Dangerous Precedent for the Future

If Israel's long-standing interpretation of pre-emptive self-defence were accepted, it would essentially transform Article 51 into a carte blanche for powerful states to launch pre-emptive strikes based not on actual attacks but on secret intelligence, perceived threats, and political assumptions. Worse, allowing the U.S. to frame its strike as lawful collective self-defence is dangerous. Permitting powerful states to launch attacks under vague or speculative threats, will legitimise a world where military might is right, and alliances become licenses for war. We have seen how Israel called for U.S. support publicly, we heard it, and the world was watching.

This would significantly undermine the prohibition on the use of force, destabilise the already fragile global legal order, and contravene international and customary law. As Professor Ben Saul warns:

"International law is only law if we demand that our allies, not only our adversaries, obey it. If we apply it selectively, we cannot expect others to respect it, or respect us" (Saul, 2025).

In reality, what Israel refers to as „pre-emptive self-defence" is actually preventive war, something that international law does not recognise as legitimate. Professor Marko Milanovic affirms:

"Even the broadest understanding of anticipatory self-defence was taken as correct, Israeli's use of force against Iran would be illegal" (Milanovic, 2025).

But this is not just a legal debate, this has human consequences. Allowing such actions to go unchallenged risks tearing at the fabric of the fundamental rules that restrain aggression between states. When one state redraws the rules of engagement, others will follow. And the world will inch closer to a future where missiles come before dialogue, and destruction precedes diplomacy. If international law is to retain its significance, states must not be allowed to expand the concept of self-defence into a justification for unilateral military action. While nuclear threats must indeed be treated with utmost seriousness and importance, international laws exist to be adhered to, not manipulated. Israel may be redrawing the boundaries of international law, but the world must decide whether it will stand by, as those lines are erased.

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About the Interview

Mika Aaltola explains how Russia's war in Ukraine transformed Finnish public opinion and pushed Finland into NATO. He argues that Finland's defense posture and trust-based society enable it to lead by example. For Europe to remain relevant, Aaltola urges stronger, more coordinated defense and renewed trust in institutions. Investing in security is not a threat to democracy but a foundation for it.

About the Interviewee

Mika Aaltola (b. 1969) is a Finnish political scientist and MEP, former Director of the Finnish Institute of International Affairs (FIIA). He earned a PhD from Tampere University and taught at Cambridge, Sciences Po, Johns Hopkins, Minnesota, and Tallinn. Aaltola has authored seven books on foreign policy, U.S. power, and democratic risks. A well-known expert on the Ukraine war, he rose to media prominence and ran for Finland's presidency in 2024.

About the Interviewer: Theodor Himmel

Theodor Himmel is pursuing an advanced legal education as a Rechtsreferendar at the Regional Court of Baden-Baden. His expertise includes international arbitration and mediation, as evidenced by his Advanced LL.M. from Leiden University, where he focused on the EU and Singapore Mediation Conventions. As Chair of the EPIS Thinktank e.V., he leads international collaborations on foreign affairs and security policy, while also contributing to legal scholarship and policy advisory roles with government affairs.

Theodor Himmel:
Mr. Aaltola, thank you very much for taking the time and for joining us in this interview for our magazine, EPIS Magazine for International and Foreign Affairs. We reached out to you since you are the Finnish MEP who is also concerned with security affairs and international affairs. Coming to that topic later, I first want to delve into your career — your path to becoming an MEP. You have studied, as one can see when searching for you, in various places—also in the U.S. and across Europe, at several universities. Why did you reach out to the world?

Mika Aaltola:
Well, it happened — you know, events, events, events. So, yes, I have been focusing on foreign affairs and international relations for 30 years. Different universities, different institutions. And then the war happened. Obviously, I had a constant presence in Finnish media. People were watching me, listening to me, and trusting my abilities. For example, Finnish NATO membership — it's really important to understand what is happening. And ultimately, if you are a very policy-oriented person and have a huge background, then this could be extremely relevant. The difference between policy relevance and politics is difficult to define. And people trusted me. I was the most popular expert in the studies in Finland in 2022. I was, just last month, among the top ten experts, even though I am already a politician. So, it wasn't really a big step. I was continuing on other platforms what I had done previously — focusing on expertise. I think in today's world, we place quite a lot of emphasis on personal experience.

Theodor Himmel:
What made you one of the top ten experts? Because you told the truth, or because you told people what they wanted to hear?

Mika Aaltola:
I think it was a combination. Events shape how a person is perceived. So I wasn't thinking about politics — I was thinking about explaining to people, in layperson's terms, what is actually happening. We are now in a situation where 1,300 kilometers of border separate Finland from a major large-scale war in its neighborhood. It was important to bring that information to the people — what it means, what consequences radiate from Ukraine because of the Russian war, and how those consequences affect the lives of people in Finland. So, I wanted to prepare and mobilize people so that they were ready for different eventualities — like Finnish NATO membership. We prepared both decision-makers and the public for the decisions that had to be made, according to my scenarios. That moment, when the Finnish nation started to arise and awaken, was combined with German guidance — understanding what was actually happening. There are different explanations for what happened when Finland decided to join NATO and sign the membership application. It was the people who decided it. What was less understood was the dynamics behind it. What happened with NATO was that public opinion shifted radically. There was a fundamental shift in Finnish perceptions of the world. The question then became: how can this be translated into a political process and into concrete policy decisions. People associated

me with expertise that was relevant to them. I recognized that this was a key moment. Of course, it required career planning. At that time, I was the director of the Finnish Institute for International Affairs, and I enjoyed my position. Politics, however, is a bit more unpredictable. You never know what will happen in politics. As a senior researcher back then, I had certain benefits — I could focus entirely on the issues I loved. But I thought hard about whether to enter politics, and I could clearly sense that there was a demand for my kind of politics. In life, you have to find the courage within yourself to take career jumps from time to time. That's what happened to me. But it wouldn't have been possible without popular support from the people.

Theodor Himmel:

I agree. The Russian attack on Ukraine was a life-changing moment — for some people, it meant finding a new direction. Later, I would like to discuss your role as a politician, but first, I want to focus on your role as the director of the Finnish Institute of International Affairs. What made you choose that path? In our think tank, there are many students who are deciding whether to pursue an academic career, a political career, or a career in the private sector. You have now done two of these three. Why did you start with an academic career?

Mika Aaltola:

It was a compelling choice. My father is a retired professor — apples don't fall far from the tree. I had an instinctive interest in academia and considered a postdoctoral career in academic life. It wasn't unfamiliar to me because of my family background. I actually enjoyed writing. When you finish a good sentence in a book or article, it feels satisfying. I suppose that's one of the aims in life — to feel happy. And there were many moments like that. I enjoyed the intellectual work, but I have always had this tendency to seek relevance. I didn't want my studies to be purely theoretical exercises — describing abstract phenomena in the world — but rather to have real-world impact. I wanted my work to be relevant for policy, to serve as policy advice. That's why my recommendation to anyone is: stay relevant. But the result of staying relevant is that it can also lead you to crossroads in your career. If you are relevant, doors and windows may open unexpectedly, and you have to make choices. If you don't stay relevant in an academic career, then the doors to politics likely won't open. I didn't plan it — it just happened. There is an element of serendipity in life. That's the fundamental explanation for things that you don't expect to happen.

Theodor Himmel:

Speaking of that relevancy and the moments when a chance opens a door in life — Finland, in the last two years, has become much more relevant in terms of security concerns from a NATO perspective, now being one of the latest NATO members. How has this changed the security landscape in Finland? I would imagine that it has changed very rapidly and on a fundamental basis. But in what specific aspects has this shift come into effect?

Strategic Deterrence:
The use of credible military capability to prevent aggression or conflict.

Mika Aaltola:

Well, I have studied quite a lot of classical works, and one that comes to mind is Carl von Clausewitz and his key work On War. One of the central insights from that book is this: If you are a nation located in a geopolitically crucial position — like Finland, which shares a long border with Russia and has a history of being a strategic defense power — then you need to have a „stick." You need defensive power. Finland has always invested in its defense, and now we have to further increase our defense expenditure in the future. If you have a „stick" and are in a strategically important position, then you will inevitably have friends and allies. That is a fundamental principle of geopolitics. So, the security landscape has, in some ways, become more unpredictable. At the same time, the global alliance system is facing an increasing lack of trust. Russia, for example, is currently negotiating what it sees as a „victory" in the war with Ukraine. That is why it remains crucial to stick to the basics: take care of yourself, build up your defenses, strengthen deterrence — and then you have less reason to worry.

Theodor Himmel:

You mentioned a lack of trust. That is something I wanted to follow up on. Whose trust is lacking, and how does this lack manifest itself?

Mika Aaltola:

Well, among the leaders of great powers, there is an increasing temptation to view the world through spheres of influence. For example, Taiwan is an issue for China, Ukraine is an issue for Russia, and Greenland and Canada seem to be issues for the United States. We are moving beyond a rules-based world order toward a power-based world order. And in such a world, power matters more than ever. We can also see how the European Union is doing its best — at an accelerated pace — to increase defense spending. Clearly, the world order is shifting rapidly. The lack of trust I referred to concerns key institutions that uphold the rule-based world order. There is also a divergence of interests between the U.S. and Europe. The old saying used to be: „Keep the U.S. in, the Germans down, and the Russians out." That equation doesn't work anymore, does it?

Theodor Himmel:

Well, we still have to keep the Russians out, right?

Mika Aaltola:

Yes, they are knocking heavily on our door. And the Germans are no longer „down," while the Americans are considering a partial withdrawal from Europe.

Theodor Himmel:

When you mentioned the lack of trust, you were referring to the world order, which is also secured by NATO. But do you also see a lack of trust in other institutions that embody this world order — such as the International Court of Justice (ICJ), the United Nations Security Council, or global trade agreements, which are meant to ensure that countries cooperate rather than conflict? For us to refer to

the world order, which is also being secured by NATO— you also see a lack of trust when it comes to other institutions that embody this world order, such as the International Court of Justice (ICJ), the United Nations Security Council, or trade agreements that are meant to ensure that countries cooperate rather than conflict.

Mika Aaltola:

Yes, exactly. Perhaps all of the institutions of the so-called rules-based world order are currently in a difficult situation. Many of the global institutions you mentioned are facing challenges, and there is open confrontation with them. Take the UN Security Council, for example. It is fundamentally based on the power dynamics that emerged after World War II, and we can see that power politics is deeply embedded in its structure. It is possible that the role of the Security Council will become even more significant in the future — especially as great powers increasingly make agreements based on their power positions rather than shared principles. In that sense, it could still function effectively. However, many of the institutions that were built during a more peaceful and stable era are now under significant pressure. That is why we have to be extremely cautious in safeguarding these institutions. From a European perspective, their existence is crucial. We have to safeguard NATO — especially the European link within NATO — while also hoping that the Americans will return to a more engaged role in the alliance, as they have done in the past. At the same time, we must protect the European Union, even as we see increasing hostility towards it from certain American actors. In the international media, there are even discussions about the potential use of nuclear weapons against European institutions. In such a world, we must invest in these institutions because they are part of the European way of life. Safeguarding these institutions is now more critical than ever to ensure that Europe maintains its relevance in the future global order. Europe must have a say in shaping its own fate and destiny.

> **Security is not the enemy of democracy—it is its foundation**

Theodor Himmel:
You mentioned safeguarding the European way of life. Earlier, you mentioned that Finland has to increase its military budget, as do other NATO member states. This is, I would say, about safeguarding the NATO alliance and the defense security mechanisms. But how does Finland participate in safeguarding the European way of life? Does it also contribute by increasing financial funds for the EU? Or what other ways are there to support the European way of life?

Mika Aaltola:
I think there are diverse approaches to this. Of course, there is the European Union and its institutions that need safeguarding — because the road ahead is going to be rough. There will be turbulence. When we talk about defense cooperation in Europe, even the European Commission is now focused on the defense of European nations. A new policy is emerging among European states, and interestingly, this also includes the UK. We have moved beyond Brexit very rapidly — largely due to the Russian threat and the active destabilization operations they are conducting in different parts of Europe. So, while this new European defense approach is based on cooperation between European nations, it is also coordinated by the European Commission and various institutions within the EU. It's not quite the federalist dream, but it can still be effective. The European Union spends about €300 billion per year on defense. However, this spending is inefficient. It is a redundant system — each state is essentially developing the same key military capabilities without real synergy between them. The challenge is to change that. Because €300 billion is a significant amount of money, and if we can reorganize how it is spent, we could actually build capabilities that allow the EU to project force outward — for example, in peacekeeping operations in Ukraine. Right now, we lack that capability. While there is significant defense power within Europe, it is not structured in a way that allows us to deploy it effectively beyond our borders. As mentioned what was done yesterday regarding defense and infrastructure spending in Germany: That was a dynamic decision. This will have consequences for the European approach to defense, and it will also affect Finland. At this moment, everything depends on those European countries that can act and have political systems that function in a relatively healthy and effective way.

Theodor Himmel:
In the last two questions, I want to focus on policies in Finland. You mentioned that in Germany, a new military funding deal was recently approved by Parliament — but it was not without discussion. A significant portion of the Parliament voted against it, and a large part of the German public voted against increased military spending.

How is the situation in Finland? Is the Finnish population unanimously in favor of increased military spending? Or is there also debate about alternative ways to secure Finnish independence — considering the threat from Russia and the lack of trust in NATO?

Mika Aaltola:

Well, Finland has always worked with Russia — historically speaking. And of course, our defense spending in the past was on a good level. In Finland, there is a deeply ingrained attitude that we face a threat from Russia. This is something fundamental to the very notion of the Republic of Finland. Again, referring to Clausewitz, I would say, a voice, and defense is a configuration of politics by other means. What is required is politics that is based on trust — you absolutely need to have trust within society. In the Nordic countries — not only in Finland — we have a high-trust society. And that is the foundation of everything. Some people always ask: These funds have to come from somewhere. So are they being taken away from education and social welfare programs? My response is usually to turn the question around. For decades, we were increasing budgets for education and social welfare while decreasing defense expenditure. Did that result in something good? Well, it resulted in stagnation — both politically and economically. So perhaps it is now time to invest in defense. And that investment could also become a catalyst for positive movement in our industrial policies. So I don't see this as something far removed from investing in the key foundational characteristics of any state. And if those foundations are in order, then I believe there will also be positive movement in other areas. This creates a sense of belonging — one that is meaningful both at the European level and at the national level. That is why I see security investment as key. Moreover, when people participate in building security, they also build trust within society. Right now, all democracies are in bad shape. We have to correct course. I see that this correction is now happening at the European level and also within many EU member states.

Theodor Himmel:

Looking particularly at Finland — we have seen a similar situation in history regarding the threat from Russia.
If we look back 85 years to the Winter War, when the Soviet Union attacked Finland — would you say that the situation today, with the threat from the East, is similar? Or how has it changed? Is Finland more prepared today? Or does Finland need a second Mannerheim?

Mika Aaltola:

I don't think there would be a need for a Mannerheim. What we need is the right attitude toward our eastern neighbor. What is required is a clear understanding of the present and pressing dangers posed by geopolitics. I know that most Finns understand this very clearly, and there are no major disagreements on this issue. If that attitude is made clear, then we are safe. Because this is happening on a European level, it is also important to be here in Brussels. I often recommend that people look at a map — if they can read a map. In certain strategic locations, it is crucial to invest in those who at least stay grounded in reality rather than in conspiracy theories. This is also where support is needed. That is why, when I write, I show maps — because maps are something that people can understand very clearly. We have an eye for strategic geography, and if you study the map, you will see that different security challenges require different security solutions — in the Nordics, in Eastern Europe, and in Southern Europe. There are different concerns in each of these regions. But if we take all of this into account, we can develop a defense and security package that is a win-win situation for many. And on top of that, there is the industrial policy — investing billions in industries can also create a positive economic environment.

Theodor Himmel:

All right. Thank you, Mr. Aaltola, for your time and for the interview.

About the Interview

Didier le Bret reflects on his career shaped by crises from post-Soviet transitions to the Haiti earthquake. He argues that France must combine credibility, sovereignty, and diplomacy to remain globally relevant. His call: Europe must engage the Global South and reclaim multilateralism to ensure lasting peace and equity.

About the Interviewee

Didier le Bret is a veteran French diplomat and crisis expert with over 30 years of experience in international affairs. He served in Eastern Europe, the UN, West Africa, and as Ambassador to Haiti during the 2010 earthquake. Former Director of France's Crisis Center and National Intelligence Coordinator, he bridges diplomacy, security, and humanitarian response. Today, he leads France's Diplomatic and Consular Academy.

Anass Bettaieb is an international relations specialist and External Relations & Partnerships Manager at the Andalus Committee. With academic roots in Paris and active engagement in global diplomacy, he represents the Committee at high-level forums such as the Paris Peace Forum. His work focuses on fostering dialogue between Africa, Europe, and the Global South, with a strong commitment to inclusive development and innovative diplomatic engagement.

About the Interviewers:

Andalus Committee

The Andalus Committee is the first youth-led think tank, with a global presence across all continents, to explore the emerging opportunities of the Global South and produce recommendations for world leaders

EPIS ThinkTank

EPIS Thinktank is an independent think tank, fully supported by its members. We focus on foreign and security policy through various formats.

Theodor Himmel, EPIS Chairman:
Monsieur le Bret, thank you very much for having us; the EPIS Think Tank for foreign affairs and security policy, and with me today is Anass, who can also say something about his think tank.

Anass, Andalus Committee:
Anass, from the Andalus Committee, a think tank specialised in the Global South.

Theodor Himmel, EPIS Chairman:
And together we came across you some time ago in some panels and met at dejeuners diplomatiques, and thus we thought that you, Monsieur le Bret, were an interesting person to talk to due to your career in diplomacy and security, and therefore we would like to start this interview by asking you to tell us a bit more about yourself.

Didier le Bret:
I started my diplomatic career in the early 1990s, a quite challenging historical period due to the Soviet Bloc falling apart, and I was basically a diplomat specialised in the former Soviet Union and eastern European countries. I speak Russian, even though I do not have that many opportunities to practice it nowadays. I spent almost 10 years back and forth between Paris and Russia (late 1980s/ beginning of the Perestroika until the end of the 1990s) and these 10 years were truly critical for many reasons, but mainly because that was the short window of democracy and openness that gave us the hope that a Russia might materialise. But, unfortunately, that was not the case. Thus, I spent 10 years truly dedicated to this evolution in the European continent. And then I started working on global issues in the French Mission to the United Nations. I was the Human Rights and Humanitarian Representative, and I was dealing mainly with all major international gatherings and summits. I was responsible for all of the human rights issues. I was also the focal point for France on mine action (fight against mines/landmines). These were newer issues that I started to deal with linked to the UN problematics and development. Upon my return to Paris, I began covering the field of aids and development, to then be posted in Dakar, where I served as Chief of the French Cooperation (early 2000s). I returned to Paris again and kept working in this field. In 2010, I was posted as a French Ambassador to Haiti, a critical period of my life as I was posted there three months before the earthquakes that took more than 200,000 lives in Haiti. I spent almost four years in Haiti, and then returned to Paris as I was appointed Director of the Crisis and Support Center of the French ministry of Foreign Affairs. I eventually switched from the local-national crisis section to the international crisis section. This made me deal concomitantly with security issues, since as you may know the Director of the Crisis Center is responsible for many security issues regarding French citizens overseas (at that time there were many French hostages throughout the world, mainly in Africa). Thus, I had to deal with various sensitive issues and getting familiar with the security dimension. Finally, I was asked to join President François Hollande for two years.

I eventually took a break from public service and worked for the private sector for 5 years, but ended up going back to the Ministry. I was asked to organise a French summit in Paris called Nouveau Pacte Financier Mondial that dealt mainly with questions on how to reduce the gap and aid those countries who wanted to speed up their ecological transition financially and how to gather the sufficient resources for that mission. I was also asked to contribute with a fresh vision and outlook to diplomatic training, and finally I was appointed Director of the new Diplomatic and Consular Academy.

Theodor Himmel, EPIS Chairman:
Why was the young M le Bret interested in joining diplomatic and foreign affairs?

Didier le Bret:
It was all a succession of chance and coincidences. 4 years before I started my diplomatic career I did not seriously envision becoming a diplomat because I was not familiar with the role of the diplomat. I leaned more towards journalism as I loved travelling (and as you see many diplomats have an overseas past of living abroad and understanding different cultures and environments). However, there is a common inclination for diplomacy and the diplomatic vision among many diplomats of being surrounded by a multicultural milieu; for instance, I was born in Paris but both of my parents were born in the former French colonies of Algeria and Indo-China or modern-day Vietnam. Thus, you inherit a sort of mindset that makes you curious about your history. I also began teaching at university, but after a year I realised that I would not have been able to spend the rest of my life in a classroom. There was something amazing that was happening in the former Soviet Union and I felt like a call, so I decided to teach the French language in the former Soviet Union. I was not a diplomat at the time but I spent two years doing this. I eventually met some diplomats and realized that maybe it was for me after all, as a diplomat is a sort of journalist with fewer readers but who understands the reality which surrounds him. It is about making suggestions and proposals and having a proactive rather than descriptive mindset. It is a versatile job.

Strategic Sovereignty:
a nation's ability to act independently in foreign policy and security decisions

Theodor Himmel, EPIS Chairman:
What experience shaped you the most in terms of how you assess your work and how you view your profession?

Didier le Bret:
Definitely the experience of getting through the earthquakes in Haiti because there you are facing life and death and everything that you do has a concrete impact on people's lives, who are truly relying on you from the very first decision you make. For instance, deciding whether to stay at the Embassy or moving since you have heard that after the earthquake, the risk of tsunami is extremely high. So you have two options: either you stay so you can take care of people who are injured and require assistance or you leave. I decided to risk it and stay, and to not lose the trust of the people you are supposed to take care of. It was somewhat having good faith in the outcome. I made sure from a very early stage that I made decisions that were helpful to rescue operations, as for instance was relying on a small team of people that were absolutely dedicated to the task. In these kinds of circumstances you understand truly who you are, as you cannot lie nor pretend to be someone you are not and you have to work alongside your own limits, qualities, capabilities and confidences. You have to be yourself, transparent and honest, and find the right way to ensure that everyone will follow you. Crisis management shapes you. I wanted to show my children that there were good reasons to fight and hope, and to not be pessimistic.

Anass, Andalus Committee:
You are now Director of the new Diplomatic and Consular Academy. Can you say a few words about this new institution and what its goal is or whether this is an institution reserved to French people?

Didier le Bret:

First of all, as all countries that have a diplomatic apparatus, we need to focus on training diplomats. This is the key mission of the academy. We have more than 100 professional courses annually for those who enter into the Ministry and for those who will be posted or appointed as First Ambassadors for consulates and other functions, in order to train them adequately. We also have language courses where we teach foreign languages; a fundamental base for being a good diplomat. 13 languages are taught in the Ministry. Every year we have 3000 people training diplomats out of a Ministry comprising 14000 people in Paris and overseas. And overall we have 8000 trainees per year, not only from the Ministry of Foreign Affairs but also people we accommodate from other ministries. A key element of the French Academy is to be the interface of the outside world and to have strong partnerships with other countries. Some young diplomats, before working in French embassies, are sent to foreign ministries for training. Partnership is very important. For example, considering the current geopolitical situation, it's clear that we must remain as close as possible to our friends and allies who are now facing significant Russian aggression — such as Ukraine, the Baltic states, Poland, and others that are in close proximity to Russia. Additionally, the cooperation between ministries — and possibly with the academy — is essential. And coming back to the idea of interacting with the outside world — the partnerships we referred to earlier — we, for instance, have a strong interest in seeing how the French academy can help us connect more deeply with countries that are particularly important to our diplomacy. These include countries of migration origin, the Middle East, parts of Africa, especially French-speaking Africa. These are countries with which we share a long — and sometimes difficult — history, but also a common language. We know each other well. Many individuals from those countries have studied in France. So when something happens in France, it resonates in those countries — and the reverse is also true. The academy could be a good way to explore how we might build, or rebuild, a certain level of mutual trust.

Theodor Himmel, EPIS Chairman:

To go a bit deeper into this model of training — you also have a background in the intelligence services and experience in that field. Is there a difference, or what is the difference, between training a diplomat and training someone for the intelligence services?

Didier le Bret:

These are quite different skill sets and training paths. But to a certain extent, you might imagine that when you're collecting information, you also need to handle that information — to prioritize it, interpret it. These are similar skills, whether you're in intelligence or diplomacy. However, the missions are quite different. For example, when you're asked to recruit someone — that's an entirely different mission. So yes, the missions are distinct. But it's important that people in defense, security, and diplomacy know each other, because at some point, they'll have to act collectively.

Anass, Andalus Committee:

You spoke about the necessity of rebuilding and the mission of the new academy. We are now living in a very different world—one shaped by new dynamics. My question concerns your views and perspectives, especially since you have dealt extensively with crises throughout your life. What is your vision for France today—this important country in Europe, and indeed, on the global stage? How do you see France's capacity to respond to and participate in resolving the various crises we face?

Didier le Bret:

Today, with the confirmation of President Trump following the January elections, there is a sense that France no longer holds the same influence it once did. It no longer appears to be a powerful country capable of resolving such crises. Perhaps we should consider what tools are at our disposal if we are to claim a role as a nation involved in global conflict resolution. As you know, the first requirement is sovereignty—being able to assess risks independently and make sound, well-founded proposals. For your diplomacy to be respected, you must be reliable and credible. And to be credible, you must be strong. We transitioned from a situation inherited from civil war to becoming a country that possesses nuclear weapons—though not a large arsenal, officially nine. We have been at the origin of 30 to 50 resolutions that were later cancelled, yet I believe we have been quite proactive in seeking solutions within the United Nations framework. We know how to wage war. Many countries have been involved in real conflicts and have acquired practical experience. In contrast, some nations maintain armies that have never set foot on a battlefield—that's the majority. What matters most, however, is reliability. You don't gain influence simply by following others—you must operate according to your own principles and capabilities. That's why, once France acquired nuclear weapons, we made the strategic decision to politely ask our American allies to withdraw from our territory. At that time, in the late 1960s, there were about 50,000 American troops stationed in France. To fully recover our sovereignty, we needed to possess nuclear deterrence and a strong, independent military. Consider the post–Second World War reality: France had virtually no army. And yet, today, we have the most powerful military in Europe. Furthermore, we are the second-largest weapons exporter in the world—after the United States and ahead of Russia. That tells you something about our industrial base: we have research, innovation, and a comprehensive defense sector. These are not marginal details; they are essential components of a credible diplomatic posture. Our current nuclear capability gives us the potential to destroy a significant portion of Russia's major cities if it ever came to that. We have a variety of delivery systems—land-based, air, and naval—that support this deterrence. This means that when we engage in diplomacy, it's understood that we do so with strength behind our words. To answer your question more directly: yes, this is a pivotal moment for France and for Europe. A French nuclear action would never be launched without the broader European context—it would inevitably involve the continent. That is why now is the right time for Europe to seriously reconsider the foundations of its own security. While a close alliance with the United States remains essential, we must also acknowledge that relying solely on that alliance is no longer sufficient in today's global environment. We must rebuild the parameters of our own sovereignty. Once Europe can make truly sovereign decisions, it will be in a better position to engage credibly with the rest of the world. Today, one of the fundamental problems in global affairs is the lack of balance and consistency. We allow some countries to act with impunity while holding others to different standards. What we need is greater autonomy among leaders—autonomy that enhances credibility on the international stage. That is the strategic direction we must take moving forward.

> **"Credibility comes from sovereignty—only then can diplomacy carry real weight."**

Theodor Himmel, EPIS Chairman:

Before we come to the final question, there's something important you would like to present regarding the Diplomatic Academy.

Didier le Bret:

Alongside our core mission, we aim to connect with key stakeholders and influential figures across multiple sectors. These include decision-makers and high-level professionals from business, politics, civil society, and journalism—individuals who are not only of interest to French diplomacy but who can also contribute meaningfully to its development. Our goal is twofold: to enrich our own understanding through dialogue with external actors, and to explore ways of working collaboratively, especially with sectors such as business, which often have different operating models. Just as importantly, we strive to deepen our self-knowledge—understanding how others perceive us and how we can improve the effectiveness of our diplomatic outreach. Each year, we select around 40 participants from these diverse sectors for a unique one-year program. Over the course of the year, they take part in approximately 10 seminars and meetings, offering them insight into the world of diplomacy, and more specifically, into how French diplomacy functions—its strategies, values, and global priorities. This program is intended for individuals who are at a mature stage in their careers—professionals with significant experience in fields such as international relations, academia, media, business, or civil society. They should have a demonstrated interest in global affairs and be open to engaging with the diplomatic world in a structured, reflective way. We will include further details about this initiative as an annex to our interview, as it may be particularly relevant to readers—especially those in the United States—who are exploring diplomatic and international career pathways. And just to add, we have a parallel initiative for younger participants as well.

Theodor Himmel, EPIS Chairman:

What has to be done? What has to be done for the economy, for the diplomatic future, for Europe?

Didier le Bret:

That's a huge question. I would say there are a few key things that must be done. First, we need to regain confidence in our collective capacity to strengthen the global security architecture. There is nothing more universal, legitimate, or efficient than the United Nations. We must trust what was built after the Second World War. That system declared that war is not a legitimate solution for state relations. Second, force must only be used under the mandate of the UN Security Council. That broad consensus is the best way to preserve life and maintain civilized, organized international relations. This idea was generally accepted—even if imperfect—until recently. On the European continent, despite the recent war in Ukraine, we've had almost 70 to 80 years of relative peace. That success must be remembered, especially for younger generations, to push back against a return to empire-driven thinking—where power dictates everything. That would be disastrous. We must rehabilitate multilateral thinking and show the younger generation that the UN system achieved real progress—especially in regulation and fighting inequality. The biggest causes of tension are not historical grievances but deep structural inequalities. Fighting inequality must remain a central mission for diplomats. Second, as I said earlier, we must regain credibility in how we assess global situations and propose solutions. When the Global South demands better financial governance and calls for reform of outdated institutions built after WWII, we must listen. We need to engage with emerging countries who are fully entitled to demand reform—especially of Bretton Woods institutions. France and Europe can lead these changes—whether in the UN Security Council or financial systems. Of course, these institutions were originally part of the U.S.-dominated global order—the Pax Americana. But now is Europe's moment to rebalance things and give rightful influence to those currently underrepresented. So, if I had to summarize: We should be obsessed 24/7 with creating a genuine, honest dialogue with the Global South—because of climate transition, financial inequality, demographics, and the new global balance. For all these reasons, we must act more decisively and cooperate.

About the Article

China air power is on the rise, with more and more of its aircraft lifting into the pacific skies each day. This puts big pressure on the next generation of US fighter and bomber aircraft. Can the F-47 and B-21 stealth planes stop the crimson tide?

About the Author

Ferdinand Wegener is the Co-Founder of EPIS and the current Head of Delegations. He studied law at the University of Cologne with a focus on European & International Law. He has led EPIS delegations to the Black Sea Security Forum in Odesa, the Paris Defence & Strategy Forum and the Munich Security Conference. His main topics of research are security policy and defense technology, with a specific interest in military aviation.

The picture that could be painted about the balance of power in the Pacific theatre for the US Armed Forces is a grim one. In 1991, during Operation Desert Storm, the US Air Force alone, not counting the Navy or Marine aviation, had about 4000 tactical aircraft (i.e. fighters, fighter-bombers and attack aircraft) available, of which 650 deployed to the Middle East for air raids against Iraqi targets. By 2025, only 1940 tactical aircraft remain in the USAF active inventory. The US Department of Defense (DoD) plans for the fiscal year 2025 calls for acquiring 91 tactical aircraft for the USAF, enough to equip a mid-sized nation with an entirely new air force. The same plans do however also entail retiring a grand total of 250 planes, further reducing the numbers. Between 2024 and 2028, 800 fighters are set to retire, while only 345 new ones join the fleet (Aldeghi, 2025a). And the year 2028 is awfully close to 2027, the earliest time experts predict a Chinese attack against Tiawan (Cancian, Cancian & Heginbotham, 2023). Other areas of a potential air war with China are not looking that good either, with the planes responsible for the information space over any aerial battlefield looking like museum pieces on the US side. The Airborne Warning and Control System (AWACS) planes are vital for situational awareness and increasing their respective fighter's radar and weapon range. The USAF only has 16 active E-3 Sentries in service, based on the ancient Boeing 707. The youngest one is 42 years old, and they are technologically behind, lacking an AESA (Active Electronically Scanned Array) radar. This would not be that bad, if their replacement, the E-7 Wedgetail, had now just been cancelled in a wave of cost cutting measures at the Pentagon (Rogoway, Trevithick, 2025). The 80 E-2D Hawkeyes of the US Navy are slated to fill the gap, but this is an imperfect solution as the Hawkeyes lack the E-3s range and are no match for China's growing fleet of about 60 AWACS aircraft, some of which are equipped with AESA radars. Relief for the US might come from an unlikely source, with General Atomics and Saab partnering up on the MQ-9B AWACS variant, called "Sky Guardian" (General Atomics, 2025). This system uses the MQ-9B STOL (Short take-off and landing) UAV (unmanned aerial vehicle) as a basis, iterating on the proven MQ-9 Reaper design, well known for its widespread use in the War against Terror. It can be launched by the US Marine's amphibious assault ships and the British carriers, increasing the number of launch platforms able to operate AWACS aircraft significantly (Newdick, Rogoway, 2025). If and how many might be procured is unknown, as the offering is brand new. If 42 years makes an aircraft old, the B-52 is borderline geriatric, with the youngest active airframe being 63 years "young". Old airframes not only have a limit in how far they can be upgraded, falling technologically behind, but they also require more and more maintenance, reducing readiness rates due to increasing structural fatigue.

Figure 1: Image of B52 at RIAT: "A B-52H landing at the RIAT airshow in the UK, the specific aircraft pictured was built in 1961, photograph by Ferdinand Wegener"

On the other hand, China is aggressively expanding its aerial capabilities. Their modernization of the aviation component of their military is planned to be completed by 2035. In 2025, Chinese Aviation consists of 1,300 semi modern combat jets, while all US military branches together came to 3,000 fighters. And that is without counting any allies in the region, which would assist the US in a conflict with the CCP. The gap of 1,700 means the Chinese need to build about 200 planes per year to reach parity with US numbers by 2035, when including the types retired by then. And they are actually right on schedule to meet that goal (Aldeghi, 2025b).

Formulating the problem in the words of the US DoD leadership, Pete Hegseth said on a podcast appearance a few weeks before becoming the current US Secretary of Defense that the way the bureaucratic and slow weapons procurement system works, the US is always a decade behind, fighting the last war. He contrasts this with China, which is building an army specifically dedicated to defeating the United States of America (Carroll, Trimble, 2025a).

Fighting an already lost battle?

So, is that it? Is the aerial might, the strongest part of the US military power, irreparably lost to the Chinese? Not so fast. A conflict in the Pacific would not only involve an aerial component but also large naval engagements and include most likely Japan, South Korea, Australia and many others entering the conflict on the side of the US. It would also include the unparalleled US military satellite intelligence gathering capacity. And existing US aircraft would have their capabilities greatly enhanced by new air-to-air missiles like the AIM-260 and AIM-174B entering service. Not to mention the upgrades to the F-22 and F-35, such as the proposed "Super F-22" with a new, more powerful AESA radar or the currently in production Block IV upgrade to the F-35 with engine and AESA radar improvements (Carroll, Trimble, 2025b). Getting even more exotic, Lockheed Martin CEO Jim Taiclet suggested a so-called "Ferrari"-version of the F-35, a 5+ Generation fighter with 80% of the capability of a 6th Gen fighter at 50 % of the cost, entailing new sensors, improved stealth coating and stealthy drop tanks, increasing the F-35 range by up to 600 miles (Hollings, 2025a).

But, besides all those points, the USAF has two stealthy aces up it sleeves that are definitely not designed for "the last war", and if they are supposed to be "a decade behind", then the US is undoubtedly living in the future. Those aces are the F-47 fighter and the B-21 bomber.

The F-47 - What we know, what we think we know, but don't & what we can assume

First things first: We don't know that much. We especially don't know as much about the F-47 as we think we know. So, what do we know?

Figure 2: Image of F47 "Rendering of the F-47, as envisioned by an artist"

The F-47 is the product of the US Air Force Next Generation Air Dominance (NGAD) program, started after a concept study in 2014. The F-47 is, according to President Trump and USAF statements made in the unveiling press conference on March 21st, 2025, the world's first 6th Generation fighter jet. If that is still true in light of the Chinese J-36 is as much up for debate as the actual features that define a so-called 6th Generation fighter. Therefore, all this really tells us is that the F-47 will be very advanced, beyond the capabilities of 5th Gen fighters like the F-35 and F-22, and that it will likely have the features most associated with the evolving definition of the 6th Gen moniker, chief among them all-aspect stealth. According to President Trump, an experimental version of the plane has been flying for almost five years. This probably doesn't refer to a prototype F-47, but to technology demonstrators that paved the way for the F-47, akin to the Boeing Bird of Prey.

Figure 3: Image of Boeing Bird of Prey: "The Boeing Bird of Prey, now on display at the National Museum of the USAF in Dayton, Ohio"

Prototypes are hand-built versions close to the finalized aircraft, built to test the entire platform shortly before entering full scale production. On the other hand, technology demonstrators serve to test specific new aspects like radically new stealth designs or revolutionary airfoil layouts, without the goal of developing the demonstrator into a production aircraft. Rather, they are used as a steppingstone to be able to integrate the tested systems into upcoming production aircraft. From USAF and DoD budget sources, we know about $ 29 billion has been spent on the F-47 so far, with $ 9 billion going to the development of its new engines. Boeing's offer was chosen, beating out competitors like Lockheed Martin. Lockheed Martin had already dropped out of the soon-to-be-chosen but rumored to be cancelled F/A-XX competition, the US Navy's NGAD, probably leaving Lockheed Martin without a production contract for a 6th Gen fighter. Coupled with lower-than-expected sales of the F-35 because of current US foreign policy, Lockheed Martin's fighter branch might be looking at tough times ahead. Export of the F-47 was discussed right away by President Trump, alluding to an export version toned down by 10 %, available for purchase to certain key allies. This might seem like another jab by the Trump administration against its allies, buy only offering them a watered-down export version. But this isn't historically uncommon, just look at the export versions of the T-72 that the Soviets sent to Iraq. And it actually might be more forthcoming than prior US governments. The export of the F-47 would be a departure from the approach established by the US with the F-22 Raptor to not export its top air-dominance fighter. Key allies like Japan, Israel and Australia had shown strong interest in the F-22, but a 1998 act by Congress (HR 2266) forbade the US from ever selling the plane or its secret stealth technology.

Figure 4: Image of F-22 Raptor: "The F-22 Raptor was deemed so advanced that a congressional act was passed into law to prohibit its sale even to the closest US allies"

What we can assume about the F-47

Although the following facts may not always have been stated outright, we can assume most of them with a high degree of certainty, as the contextual information makes different interpretations quite unlikely.
New features of the F-47:

- Variable flow engines by Pratt and Whitney (XA-103) or General Electric (XA-102) which have not been chosen yet (Carroll, Trimble, 2025c). They offer a „speed over two" according to President Trump, meaning above Mach 2, faster than the F-35. Their main feature is enabling high fuel efficiency by having a third engine opening that increases airflow. Before this next generation, variable flow engines, a jet turbine could be either optimized for high speed or fuel efficiency, not both.

- Next generation stealth characteristics, with all-aspect stealth and resistance to broad band radars expected. All-aspect stealth means stealthiness from all angles of attack, be it from ground radar or airborne radar. This is achieved partially by a tailless design with no vertical stabilizers for ultimate stealth against low frequency, long wavelength radars (Carroll, Trimble, 2025c).

- Widely increased data networking and controlling capabilities, with the ability to task drone swarms and smart weapons and to communicate and transfer sensor data seamlessly between other platforms like other fighters, drones, ships and satellites.

- Autonomous flying with the pilots on board acting more like Weapon Systems Officers (WSO), who concentrate on managing long range weapons, target locks, radar and sensor data while the plane flies itself in most situations, decreasing pilot load and freeing him up to concentrate on other, new tasks like controlling aforementioned drone swarms. In former F-14 fighter pilot Ward Caroll's words, the F-47 "fired the pilots and kept the WSOs", while Aviation Week reporter Steve Trimble estimates that "the flying part of the aircraft will be almost completely autonomous" (Carroll, Trimble, 2025c).

We know that each F-47 will cost dozens of millions of dollars per plane. Former Air Force Secretary Frank Kendall III confirmed the cost of the F-47 as "three times that of a F-35" (Hollings, 2024). Depending on the F-35 variant, with the USAF A model as the most likely basis, and the exact batch referenced, this leaves us with estimates ranging from $ 200 to $ 300 million per plane. Because of the high cost and low initial production numbers, the F-47 will work together with Collaborative Combat Aircraft (CCA), an unmanned aerial combat vehicle that will work as a wingman to the F-47, carrying extra weapons, extending the sensor range and being somewhat expendable. The CCA will cost about $ 30 million per drone, with at least two CCAs flying alongside each F-47 (Aldeghi, 2025c). This is also a sign that the USAF has shelved the concept of a light fighter as a cheap alternative to the F-47 for now. We can also assume that the F-47 will be compatible with most upcoming, long-range US air-to-air missiles like the AIM-260 JATM, as they are vital for its air dominance role in the pacific. According to USAF General David Allvin, X-plane demonstrators specific to the F-47 programs have been flying since 2019 (Binkov, 2025a). We can therefore expect an accelerated timeline for the program, enabling a pre-production prototype to take flight by 2028, before the end of the Trump Presidency (Aldeghi, 2025d). The first jets may roll off the production line by 2032. This might still put the program behind the timeline of the Chinese J-36, a presumed 6th Gen stealth fighter, as the first J-36 prototype seems to have taken flight in December of 2024 (Wegener, 2025b).

Figure 5: Image of Chengdu J-36: "The Chengdu J-36 observed on one of its purposefully poorly hidden test flights"

Back from the dead, NGAD was revived. It seemed like the program was close to cancellation, with no recent progress reported and the program ranking lower and lower on the USAF priority list by the month. Secretary of the Air Force Frank Kendall had ordered a halt to the NGAD program in March of 2024 over concerns of the plane being overpriced (3 times the price on an F-35 per plane). The Chinese J-36 fighter reveal might have put NGAD pack on the radar. NGAD now has survived despite a prior shift within the Air Force to instead focus on the NGAS program, a next generation stealthy tanker aircraft, which is supposed to replace or more likely augment the existing fleet for Boeing KC-135 tankers. These tankers were supposed to be more survivable in a modern peer to peer war, especially when facing long range PLAAF anti-air missiles like the PL-15, designed for the purpose of taking out American high value aerial assets. With a stealthier tanker platform, refueling was envisioned to take place closer to the combat area, enabling the fighters to carry less of their own fuel, therefore becoming lighter, smaller and cheaper. This concept was tested in war gaming simulations and must have been found to be less attractive than the NGAD approach, even though the service is still pushing for a stealthy next generation tanker plane that is more suited for the Pacific theatre, although at a now reduced pace. NGAD was originally intended to replace the F-22 in service, but after the cost of the NGAD per plane and the operational need for as many stealth planes as possible against China became evident and a fix for the F-22's integrated helmets was implemented, the NGAD is now slated to only augment the existing fleet of F-22s.

Artist's renderings and their (in)significance

But what about the artist's renderings? Don't we know much more about the F-47 from those? As the name suggests, artist renderings are just that: an artistic impression of what a graphic designer thinks the plane will look like. This might mean that they were shown early, simplified models of the plane or that they have just had the aircraft or its features described to them and they used their creativity to fill in the blanks and create an image. This most definitely does not mean that they had access to a top-secret prototype (if one were to exist) or the accompanying schematics. So, to a high degree, they are as in the dark about the F-47 as we are.

Figure 6: Artists rendering of F47: "Another artist's rendering of the F-47"

So, we can conclude that the real F-47 will certainly look different than the renderings. This is a given because a flying, to scale prototype for the F-47 most likely doesn't exist yet and a pre-production or production version is not even close to reality. There will be deviations between current information and whatever will be produced down the line. That begs the question: if the rendering doesn't show what the F-47 will look like, is it worthless? No, because it does show an aircraft that will at least bear some of the main features that the actual F-47 would incorporate.

Firstly, the rendering does show a fighter sized and shaped aircraft, unlike rumors of the F-47 being more of a bomber sized plane optimized only for stealth, range and payload or even being a specialized version of the upcoming B-21 Raider bomber, rebuilt for an air-to-air loadout and fitted with a radar. The renders also show a single wheel configuration for the front landing gear, suggesting an aircraft lighter than the new, massive Chinese stealth plane (J-36), rumored to be about 25 tons empty, 40 tons fully loaded, and more in the ballpark of the F-35 (about 14 tons empty, 30 tons fully loaded) (Binkov, 2025a). Furthermore, the artist's impression has canards (the small triangle shaped forewings forward of the main wing), a feature that an artist would have specifically been told about. Canards are quite unusual for US stealth designs. Canards on production stealth aircraft are currently only found on Chinese designs like the J-20. Canards do offer more maneuverability, but their shape also introduces reflective surfaces to the design. One might think that this new US approach signals that the F-47 compromises some stealth feature for more maneuverability. But quite the opposite might be true. By using canards as extra control surfaces, the F-47 probably gains the ability to eliminate any vertical stabilizers. Removing the vertical tail entirely increases the stealthiness of the design by a lot, in sum most likely much more than having to add canards to the design to balance out the loss of vertical control surfaces. Canards were found on the 1997 McDonnell Douglas X-36, which was a stealthy 28 % scale prototype that was built for remote piloting. Importantly, this design was also entirely tailless, using the canards, coupled with thrust vectoring to achieve the desired flight characteristics without vertical stabilizers. With McDonnel Douglas merging with Boeing in the same year, the X-36 may give us at least a little glimpse of what to expect of the F-47, although it must be said that stealth technology has changed a lot in the almost 30 years since then (Stewart, 2024).

Figure 7: Image of X-36: "The X-36 Tailless Fighter Agility Research Aircraft, a 28% scale test aircraft, in flight, now part of the exhibit at the National Museum of the USAF in Dayton, Ohio"

The tailless design enables better stealth especially against Chinese low frequency, long wavelength radars. Such radars are best suited to detect incoming stealth aircraft. Although, at this point it must be stressed that spotting and targeting a stealth plane are not the same thing. These low frequency radars can spot the approximate position of a plane but mostly cannot achieve a target grade lock, meaning they cannot guide anti-air-missiles to the exact location of the intruder. Modern Chinese air defenses combine a low frequency radar for spotting with a high frequency radar for targeting, but sharing information between them is technologically difficult and increases the overall complexity greatly. And even this complex design might not be enough to even spot the new, tailless and therefore extra stealthy F-47.

An aviation expert's insight into the F-47

Concerning the characteristics of the new US planes, I interviewed Prof. Dr. Dieter Wegener[1], an aeronautical engineer who did his PhD thesis on the secondary flow phenomena in aero engines. He has worked as research scientist at the DLR, the German Aerospace Center, lovingly called "German NASA" by Prof. Wegener. During his stay at DLR, he conducted experimental and theoretical work, including numerical 3D-calculations with the supercomputer Cray-1[2].

[1] The Interview was conducted on the 12th of June 2025; EPIS and the author thank Prof. Wegener for his time and expertise. Prof. Wegener on LinkedIn: https://www.linkedin.com/in/prof-dr-ing-dieter-wegener-672502259/

[2] Prof. Wegener is not only an aviation expert, but, maybe just as important, also the author's father.

Figure 8: "A picture of a variant of the Cray-1 supercomputer in use at the University Corporation for Atmospheric Research (UCAR) in Boulder, Colorado"

Firstly, we discussed the engines of the F-47, The variable flow engines of the F-47 present both an enormous engineering challenge to master and a tremendous achievement in engine design, if successful, according to Prof. Wegener. The introduction of a variable flow engine on a production aircraft would be a US quantum leap far surpassing Chinese engine technology in his view. This is echoed by Chinese struggles to develop suitable engines for their current and future aircraft fleet, resorting to using copies of imported Russian designs instead of domestic designs, having to compromise on reduced thrust output of indigenous engines or even using an unusual three engine layout on its new J-36 prototype. Concerning the switch from the resident stealth fighter expert Lockheed Martin (F-35 A, B, C and F-22) to first time stealth fighter manufacturer Boeing, Prof. Wegener judges this as a smart strategic move to foster competition. Unlike countries like China and Russia, who rely almost entirely on single, specialized design bureaus for specific aircraft types like Chengdu for all Chinese and Sukhoi for all Russian stealth fighters, the US had a different approach. Even after the consolidation phase of aircraft manufacturers into fewer, bigger conglomerates following the end of the Cold War, the US made sure to keep at least two companies in competitions in each sector of interest. By keeping at least two big aviation companies as direct competitors in any project for the following decades, the US acquisition policy ensured a steady pressure to innovate and a true contest of ideas between design bureaus to take place. This not only ensured a plurality of different approaches to the same challenge that could be iterated upon, but also made strategic decisions possible, such as choosing between a proven but less advanced or a more experimental but revolutionary aircraft proposal.

However, this strategy does require the US to keep both competitors in the market and thus also necessitates switching winners from time to time, just to keep both companies invested in the sector. Therefore, a switch from Lockheed to Boeing could be less about the aircraft design itself and more about having two companies in the US capable of designing cutting-edge stealth fighters. This could be happening with the switch from Lockheed Martin to Boeing for the next US stealth fighter manufacturer, Prof. Wegener surmises.

What is missing?

The artist's rendering and our assumptions do leave out a lot of detail. We know the F-47 will be stealthy, but we have no idea how stealthy. Will it have the radar cross section of a F-35 or a B-2? Or a new level of stealth, far beyond anything flying today? How big will the tradeoff between stealth and maneuverability be? What radar and other sensors will the F-47 carry? Does it have a crew of one or two? Is manning entirely optional? Will it be able to launch a wide variety of anti-ship and anti-surface weapons in addition to the air-to-air loadout or be truly optimized only for its air dominance role? How big is the aircraft really? How efficient will the engines be and what is the range? Will it be powered by one or two of those new engines? All these and many more fundamental questions remain unanswered. All we know is that the leap in all of its characteristics is presumed to be large and the systems will therefore be the state of the art in all areas, although what that means in real world numbers is also unknown.

Where are the missing jets between F-35 and F-47?

What happened to the numbers between F-35 and F-47? The public hasn't heard much of the X-plane numbers after the X-35 was chosen to become the F-35, but in reality, the number of X-planes already goes up to X-66, at least as far as they are declassified.

Figure 9: Image of X-35: "The X-35B prototype on display at the National Air and Space Museum, Virginia, photograph by Ferdinand Wegener"

The X-designations are not only used by the USAF but also by NASA and DARPA, and not only fixed wing planes get X-numbers, just like not all aviation prototypes are assigned X-designations (see Boeing Bird of Prey). The designation X-47 was but already in use for three separate prototypes, the A, B and C, two being naval based UCAVs and the other being a manned bomber design. None of those are the basis for the F-47. But Donald Trump is 47th president of United States of America, so you do the math. Also, the F-47 might be a reference to the venerable P-47 Thunderbolt, one of the most successful fighter-bombers of WW2. Back then, fighters were designated "P" for "Pursuit", which only changed into the "F" for "Fighter" after the end of the war, leaving the F-47 designation ripe for the taking. Although sharing its multirole ability for air-to-air and air-to-ground engagements, the P-47 and F-47 really share nothing beyond that, with the large P-47 and its roaring 18-cylinder-engine being quite the opposite of stealthy. This also explains why the P-47 went on to lend its nickname to the A-10 Thunderbolt II, a legendary ground attack aircraft much more suited as a spiritual, modern-day successor of the P-47 Thunderbolt.

Revealing the B-21 without repeating the B-2's mistakes

The roll-out of the B-21 was carefully scripted, done under the cover of darkness and with views restricted to certain angles. Only chosen personnel were allowed to attend, and everyone's phones were collected to eliminate unwanted photos. All official photographs were heavily policed, and every photo had to be approved, with only specific zoom settings allowed. These are direct lessons learned from the B-2 unveiling in 1988, when the first plane was rolled out to similar fanfare. The audience was similarly allowed to only view the B-2 from the front, but the B-2 was rolled out of the hangar and during daylight hours, without closing the airspace above the ceremony. A clever reporter from Aviation Week saw an opportunity, rented a Cessna and gave the world the first clear shots of the B-2 from above, revealing the futuristic angular stealth airframe design to the public (Carroll, Benitez, 2022). Someone certainly got fired for that oversight, and that seems to have done the trick, since no similar mistakes occurred with the B-21.

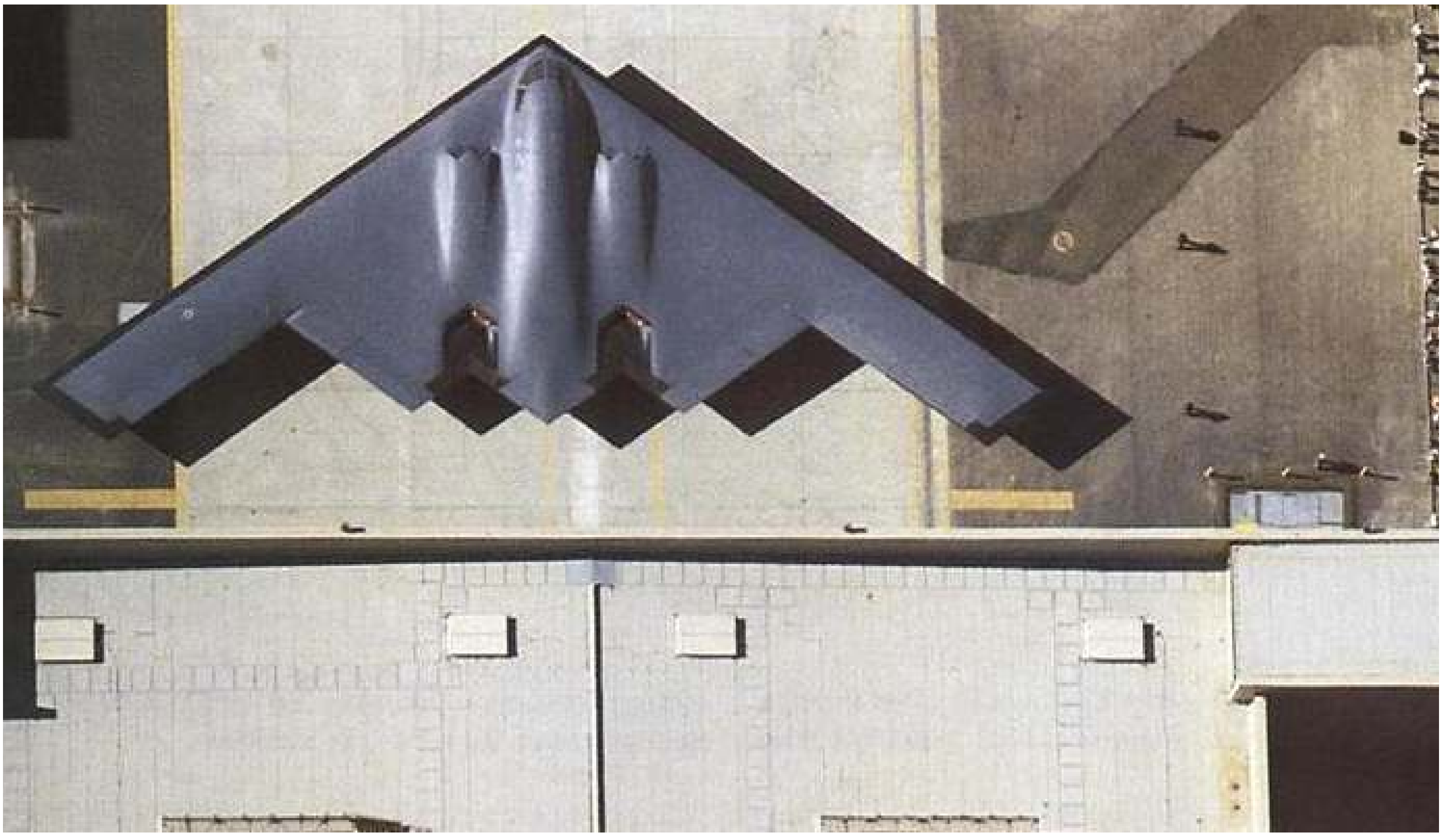

Figure 10: Image of 10 B-2 Overhead: "The B-2 Spirit was unveiled to the public on a sunny day and rolled out all the way from its hangar, leading to this aerial photograph being taken by a quick-thinking Aviation Week reporter and revealing the B-2 stealthy edges to the public"

Evolution instead of Revolution

The B-21, the USAF chosen new stealth bomber, went down a completely different route from the radical design approach of the F-47 from the onset. The B-21 is built by Northrop Grumman, the proven name in the small world of stealth bomber designers. The B-21 is, by all accounts, not a revolutionary, but an evolutionary aircraft (Wegener, 2025a & Aldeghi, 2025e). Instead of moving away from its spiritual successor, the B-2 Spirit, the B-21 Raider seems to take what makes the B-2 great and improves on every aspect of it. Where the B-2 is exceedingly stealthy, the B-21 is borderline invisible to radar. Where the B-2 has the range to strike almost any target on earth, the B-21 achieves that same range with a smaller, more efficient airframe.

Figure 11: Image of B-2 Spirit in flight: "The B-2 Spirit is seen as the spiritual predecessor of the B-21 Raider"

Some have dubbed the B-21 the "B-2.1", a reference to the B-21 just being a slightly improved B-2 (Aldeghi, 2025e) [3]. But, that is not even close to true. While not an aviation revolution that the B-2 was and the F-47 aims to become, the B-21 is still a substantial evolution of an entirely new plane, based upon the sound design ideas of the B-2, far from a mere "upgrade".

Northrop Grumman executives Steve Sullivan and Kathy Warden describe the B-21's stealth coating as a big improvement over the B-2, with overall significantly increased survivability and aerodynamic performance over the predecessor (Binkov, 2022).

The biggest improvement over the B-2 seems minor at first. Not only is the effectiveness of the RAM (radar absorbing material) coating increased, but also its durability. According to USAF generals and NG execs, this results in a higher cycle aircraft, meaning it can fly every day, unlike the B-2 which needs extensive maintenance for its radar absorbing material coating after every sortie (Binkov, 2022).

Figure 12: Image of B-21 Raider in hangar: "The B-21 evolves the concept of the B-2, taking the essence of what made the B-2 great and improving on every aspect of it"

[3] Aldeghi is not agreeing but only referencing the B-2.1 comment to highlight a viewpoint critical of the B-21.

The B-2 also needs specialized hangars and a huge logistics train to support, something the B-21 will move away from, as this does not only introduce extra complexity and cost but also makes the B-2's supply chain more vulnerable to attack and reduces the number of airfields it can be based on (Aldeghi, 2025e). The B-2 was a shoot-for-the-moon project with climate-controlled hangars and only technologically feasible by integrating not one, but multiple unproven, experimental scientific advancements (Binkov, 2022). This risky approach achieved a remarkable aircraft far ahead of its time and any adversary's capability, being unmatched even today (i.e. see: Iran's former nuclear sites). But it also led to an incredibly complex machine, with only 21 Spirits ever built at a price point of about $ 2 billion per plane. And that is billion with a b. That is not what the B-21 aims to be. The B-21 integrates cutting-edge but proven improvements in stealth, fuel efficiency and combat capabilities into a single, high cycle, high combat readiness aircraft. Instead of building less than two dozen, the USAF aims to procure at least 100 B-21s (Lopez, 2022), with former Air Force Secretary Frank Kendall III proclaiming that number could rise as high as 145 B-21s (Binkov, 2022). The B-21 is also scheduled to "only" cost $ 550 million in 2010 dollars, meaning a maximum of $ 778 million in 2024, adjusting for inflation (Hollings, 2024). The B-21 seems to currently be on target to meet or even undercut that cost figure, a presumed first for any government acquisition.

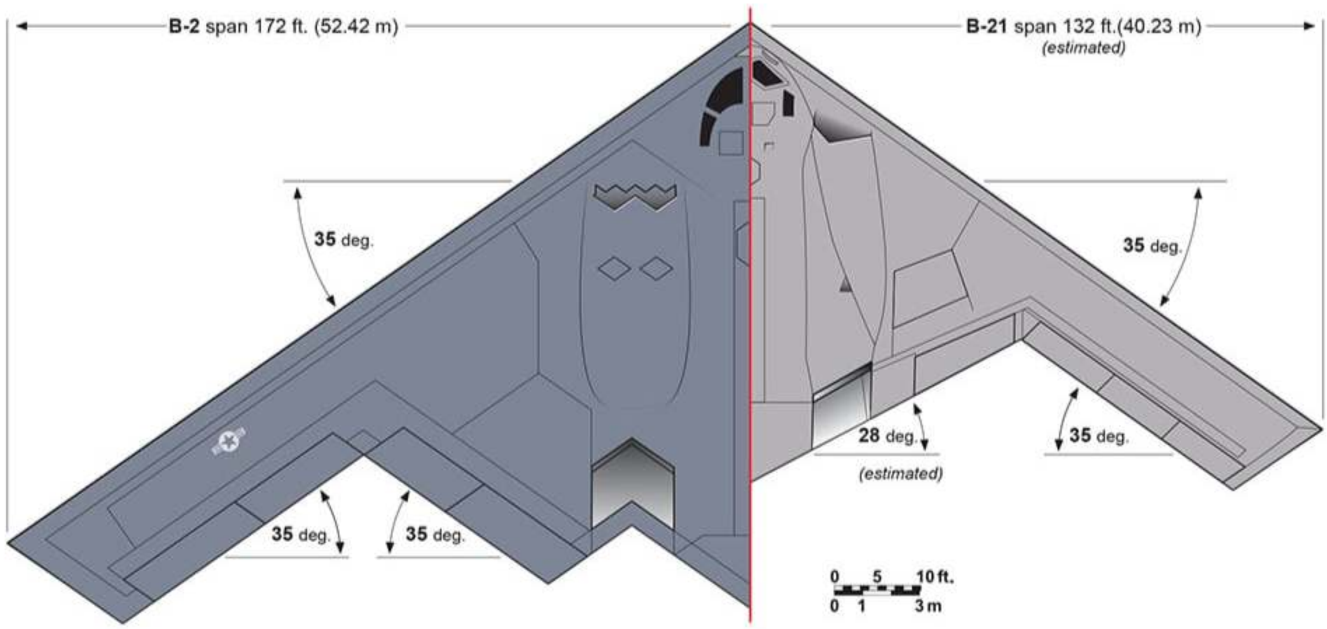

Figure 13: Image of B2 B21 side by side: "A side by side comparison of the B-2 and B-21 bombers"

According to Prof. Wegener, the B-21 Raider's design is innovative when compared to the B-2 Spirit, incorporating a reduction of airframe length and wing span by 23 % which results in overall surface area that is not 23 %, but roughly 40 % smaller than that of the B-2, offering a greatly reduced radar cross section (RCS), even before accounting for all the expected improvements in stealth technology such as better radar absorbing material (RAM) or airframe geometry. The designs reduced surface area in conjunction with a similar range and speed to the B-2 also showcases US technological progress. Via the minimization of the airframe and therefore reduced drag and need for power for generating lift, increased fuel efficiency and range can be achieved. This is vital for the Pacific theatre. Prof. Wegener noted a significant change in the design of the control surfaces of the B-21 compared to the B-2. The B-21 adds an additional flap on the outer wing but omits those on the inner wing, exemplifying an advancement in flight control systems and software, whereby more stable and maneuverable flight characteristics of the B-21 can be achieved with less overall control surfaces than on the B-2, reducing weight and hydraulic system complexity with increased software capabilities. Comparing the overall layouts, the expert took note of similar angles of attack for the wings of the B-2 and B-21, which imply similar designed cruised speeds. The engine intakes and outlets on the B-21 have significantly improved stealth features, almost blending with the wing of the B-21, while still being quite pronounced on the B-2, and, again unlike the B-2, omitting any sharp angles or corners, presenting only one continuous, smooth surface. This in turn, further diminishes radar returns. Contrasting the newest American designs with the latest Chinese Chengdu J-36 stealth jet, Prof. Wegener noted the less stealthy engine inlet and outlet shapes, being more akin to the B-2's angled design and less like the B-21 smooth air intakes. This suggests stealth characteristics lagging a generation behind the US designs. Other experts asserted that the cabin and fuselage are also much more blended into the wing on the B-21 than on the B-2, which, in conjunction with the intakes hidden into the wing, invites comparisons with the Northrop "Tacit Blue" stealth technology demonstrator (Binkov, 2022).

Figure 14: Image of Tacit Blue: "The advancements in stealth technology made with the Tacit Blue can still be observed in the lineage of the B-2 and B-21, as the setup and angle of the cockpit windows is a clear evolution of the Tacit Blue's design"

Prof. Wegener notes that the fuselage body of the B-21 has been substantially thickened and widened to allow for enough internal volume for all sub systems and weapon bays, leading to a bulkier design with the hull bulging out of the straight lines of the flying wing shape, another deviation from the B-2's pure flying wing heritage.

Roles, Replacement and Requirements

Former Secretary of Defense Llyod Austin said during the unveiling that the B-21 would be able to deter or defeat threats anywhere in the word, while "even the most advanced air defenses in service around the world would struggle to detect the B-21" (Lloyd, 2022).

This is not only a reference to state-of-the-art stealth characteristics, but also extraordinary range. The B-21 is estimated to at least match the range of the B-2 at 9600 km unrefueled, with only about half the fuel carried (Binkov, 2022). It achieves this in part by using less engines than the B-2, said to be powered by only 2 engines instead of the B-2's four (Binkov, 2022 & Carroll, Benitez, 2022). This not only increases fuel efficiency, but also saves weight, complexity and allows for smaller air intakes and a smaller overall airframe, beneficially maximizing the aircraft's stealth characteristics. The engine used is likely a modified version of the F-35's F135 powerplant (Carroll, Benitez, 2022). This engine is a proven design with all the early kinks ironed out and with an established supply chain and maintenance cycle. It is therefore another example of the B-21 design's philosophy of using only a few truly new systems to ensure program success and prevent cost overruns. Interestingly, the B-21 is scheduled to replace the B-2 and B-1B in service, but not the venerable B-52, the oldest of the three bomber types in US service. The "unretireable" B-52 will probably fill the role of long-range cruise missile delivery platform with its large payload as far away from contested airspace as possible, while the B-21 will be tasked with the high-risk missions into enemy territory, dropping free-fall bombs and bunker busters in addition to stand-off munitions. Another fascinating novelty about the B-21 is the fact that Australia has expressed serious interest in buying the B-21 for itself (Carroll, Benitez, 2022). That would mark a first for the nation and add Australia to the very short list of the world's strategic bomber operators. Only the US (B-52, B-1B, B-2), Russia (Tu-95, Tu-22M3, Tu-160) and China (H-6) currently have such fleets in active service. Adding the B-21 into its inventory would also make Australia only the second NATO country to presently have the capability for strategic bombardments. How many B-21s Australia would want to buy, if their budget could afford such an expensive stealth plane and its upkeep and if the US would even sell them to Australia is unclear at the moment, but with the AUKUS deal and the US trying to arm its allies against China, the chances for an Australian B-21 sporting a kangaroo or koala bear as nose art are less than zero. Make sure to write this down, as Australia becoming the operator of a strategic bomber fleet will surely be a popular aviation nerd trivia question.

Raiding the Red Scourge – The B-21 playbook

So, how will the B-21 get through the sophisticated network of Chinese SAM (Surface-to-Air Missile) sites and air patrols? Some of these systems, like the HQ-9, are now even battle-tested in the air war between India and Pakistan and fared favorably, at least according to first estimates and the loss of at least one Indian Rafale, one Mig-29 and one Su-30MKI.

Before answering that question, there is a question asked far more often. Why spend hundreds of millions of dollars per bomber and then risk such a high value manned asset in a strike mission, when one could just use cruise missiles instead? That would indeed be a neat solution, it is impractical for multiple reasons though. Firstly, the US cruise missile inventory might be the largest in the world at about 10,000 but it is still not enough for the thousands of military targets that would need to be struck in a war with China. But cheaper air-dropped munitions like the precision strike JDAM family of bombs are available in sufficient numbers (Binkov, 2025b). Secondly, some targets need bunker busting bombs, and those are too heavy for cruise missiles to carry. Operation Midnight Hammer, the US strikes on bunkers hiding Iran's nuclear weapons program, has recently demonstrated the need and strength of such a capability. If Iran's nuclear sites, buried under mountains, can be hit, so can the most hardened Chinese command bunkers. By necessity, bunker busters must be heavy to have the structural integrity and build up the kinetic force needed to punch through meters of earth, rock or concrete. The now famous GBU-57, used against Iran, weighs in at 30,000 lbs. or 14 tons. The B-2 can carry two, the B-21 probably has the requirement to carry at least one (Binkov, 2025b).

Figure 15: Image of B-21 Artist render: „An artist's rendering of a B-21 Raider in flight"

Some targets, like the J-20 production sites at Chengdu, the submarine construction sites in Wuhan or Beijing itself are also too far inland for some cruise missiles to hit. Less of a concern to the planning of an attack route against China is the stated max range of the B-21. An asset like the B-21 would certainly be air-refueled at least once in a given mission, extending its range into the theoretically infinite and making its approach vector highly unpredictable. B-2 bombers have flown 30 hours non-stop mission from mainland US to Yemen and back to hit Houthi targets in the Golf of Aden. For these reasons, the B-21 is still very relevant against China, even with a vast anti-air missile array. The US could use its large number of military satellites to map out the location of Chinese SAM-sites and air-defense radars, planning routes with the least amount of coverage, such as gaps near the Chinese shoreline. Alternatively, the B-21 could overfly less well defended areas such as taking a detour through North Korean airspace with its much less capable air defense or routes from mainland US over the sparsely populated and even less defended Russian tundra, approaching China from the North unexpectedly (Binkov, 2025b).

China's view of the B-21: Keeping your enemies closer

Taking a page right out of Sun Tzu's "The Art of War", let's take a look at what the enemy is thinking. The B-21 has been closely watched and studied by our CCP adversaries.

The People's Liberation Army Airforce (PLAAF) research institute stated in a report that the B-21 will be too costly and not produced in significant numbers to have a strategic impact. It also mentions that „Some country could achieve a breakthrough in strategic technology someday that could offset America's B-21 stealth" (Hollings, 2025b). Hidden behind this crude criticism is timid confession: The report includes an unwanted indirect acknowledgement that the B-21 bomber does pose a threat to Chinese targets, especially when mass-produced and that its stealth is hard to counter for the Chinese military with its current air-defense systems.

When we think about the Chinese PLAAF today, we think of modern stealth jets like the J-20 being produced in high numbers, a sheer never-ending number of newly spotted prototypes like the J-36 and J-50, and of the large arsenal of long-range air to air missiles like the PL-15.

Figure 16: Image of J-20: "The Chengdu J-20 is China's first stealth fighter, first flying in 2011 and has already entered large scale production, with almost 100 being built each year"

Only looking at the decreasing numbers of jets in the US arsenal or plummeting readiness is just half of the picture. From China's point of view, the good side. But it is an inherent strength of the Western systems to allow criticism and a pluralism of opinions. It does, however, lead us to the risk of thinking the gras is always greener on the other side, when your neighbor has erected a tall fence around his yard and holds a gun to the head of anyone who dares to speak about how he cuts his gras poorly or what an unreliable sprinkler system he is using. This situation of suppression of dissenting opinions, the inability to criticize and a lack of agency within the officer corps persists in most dictatorships and has a significant impact on military effectiveness, staying hidden until war exposes it quickly and with brutal consequences. Examples can be found everywhere in history, from the deficiencies within the Soviet army that have continued into "modern" Russia and helped the extreme miscalculation for the plan to invade Ukraine, to the abysmal combat record of the Arab armies against Israel and against each other, to, in China's case, the Sino-Vietnamese war in 1979, among other military failures.

When we think of China's aerial forces, we must not only thing of the J-20 and the newest AESA radars. We must also think of the large fleet of about 340 geriatric J-7 and J-8 aircraft, still based on the vintage Mig-21. We can't forget the low flight hours per Chinese pilot. They are climbing higher but are still overstated compared to US training hours. Chinese pilots, just like their Army and Navy brethren, spend an estimated 30 % of their total training time in propaganda classes and ideological indoctrination lessons. This is vital to a dictatorship that wants to have a strong military while averting a military coup, but it also reduces time for real combat training significantly.

Figure 17: Image of J-7: "The Chengdu J-7 with the fitting NATO reporting name "fishcan" first flew in 1965 and, apart from China, is still in service with airpower giants like Bangladesh, North Korea and Zimbabwe"

So, if we think about what Chinese challenges the F-47 and B-21 might face in the future, we must not forget what challenges China itself faces.

Conclusion and findings

The F-47 and the B-21 are two planes with very different design approaches that complement each other very well. The F-47, if successful in all its goals, will be a revolutionary step forward in fighter aircraft design. The B-21, on the other hand, is shaping up to be safe, on budget and on time choice that will improve over its predecessor in every important metric, be it stealth, readiness, logistics or the simple but vital stat of number built. As they say: Quantity has a quality of its own.

Does that answer our question? Will these two jets alone be enough to stem the crimson tide? The question answers itself with the addition of the word "alone". War is and always has been a highly complex, multifactorial affair. There are allies to consider. There is a Navy and a Marine Corps and an Army next to the Air Force. And, modern war is more about logistics than ever before, especially in the Pacific. Can airbases be supplied and defended from attack? Can the planes stationed there be rearmed and refueled in time? Even if the two planes were as good or better than discussed, that wouldn't matter if the production numbers were slashed and only very few were built (although the B-2 is quite an impressive example to the contrary). And next to those 6th Gen planes, there will be a far larger flock of 5th and 4th Gen aircraft in the sky, at least for the foreseeable future. Not to mention ever evolving aerial weaponry like the AIM-260 or AIM-174B, which by itself could make an impact as big or bigger on the battlefield than the platform that launches them.

Additionally, to again and very loosely reference a lesson from the "Art of War" by the great master strategist Sun Tzu, it does take two to tango. As classified und publicly unknown the details of the new US planes and their battle plans are, the details on the Chinese side are even more obscure. The J-36 might outperform the F-47. Or it might lack behind in performance but be so widely mass-produced that it still shifts the air war in China's favor. There is a myriad of other known unknowns, both on the US and the Chinese side of the fog of war.

Figure 18: Image of B-21 during test flight: "A B-21 prototype photographed during a test flight in 2024"

Therefore, giving a conclusive answer to the question this essay poses in its headline is impossible. But you probably knew that before you started reading it. And if you didn´t, I at least got you read it. The impact of the F-47 and B-21 in the Pacific will have to be assessed and re-assessed over and over again, as their success depends on too many factors for an easy, one and done conclusion. What we can say is that they follow different but sound design approaches and promise to be cutting-edge machines at the top of their respective class, giving the US both the most capable fighter and bomber in the World.

Epilogue: Nickname suggestions

The B-21 will be the Raider, which, sadly, is quite a bland name for an aircraft that cool. Then again, with deep infiltration air raids against China as its mission, the stealthy Raider gets straight to the point, with its payload and its name. A nickname for the F-47 has not been chosen yet. Going with the usual USAF convention of naming fighter jets after birds of prey (F-22 Raptor, F-15 Eagle, F-16 Falcon), may I suggest naming the F-47 „Sparrowhawk". The Sparrowhawk is native to China and therefore a nod to the intended hunting grounds for both birds of prey, the feathered and the metal kind. More importantly, the sparrow was also one of the so called „Four pests", targeted in a 1958 propaganda campaign by the Chinese Communist Party (CCP). This campaign, aiming to remedy prior central planning failures in agriculture induced by Mao, entailed the extermination of almost every sparrow in China, seen as a capitalist representative eating the collective harvest, causing a severe ecological imbalance when, like a biblical plague, the locust population exploded because all their natural predators had been decimated. This, among other man- or rather Mao-made reasons, led to the Great Chinese Famine, killing an estimated 55 million. An American fighter jet, alluding to one of the CCP's biggest failures, would indeed be poetic.

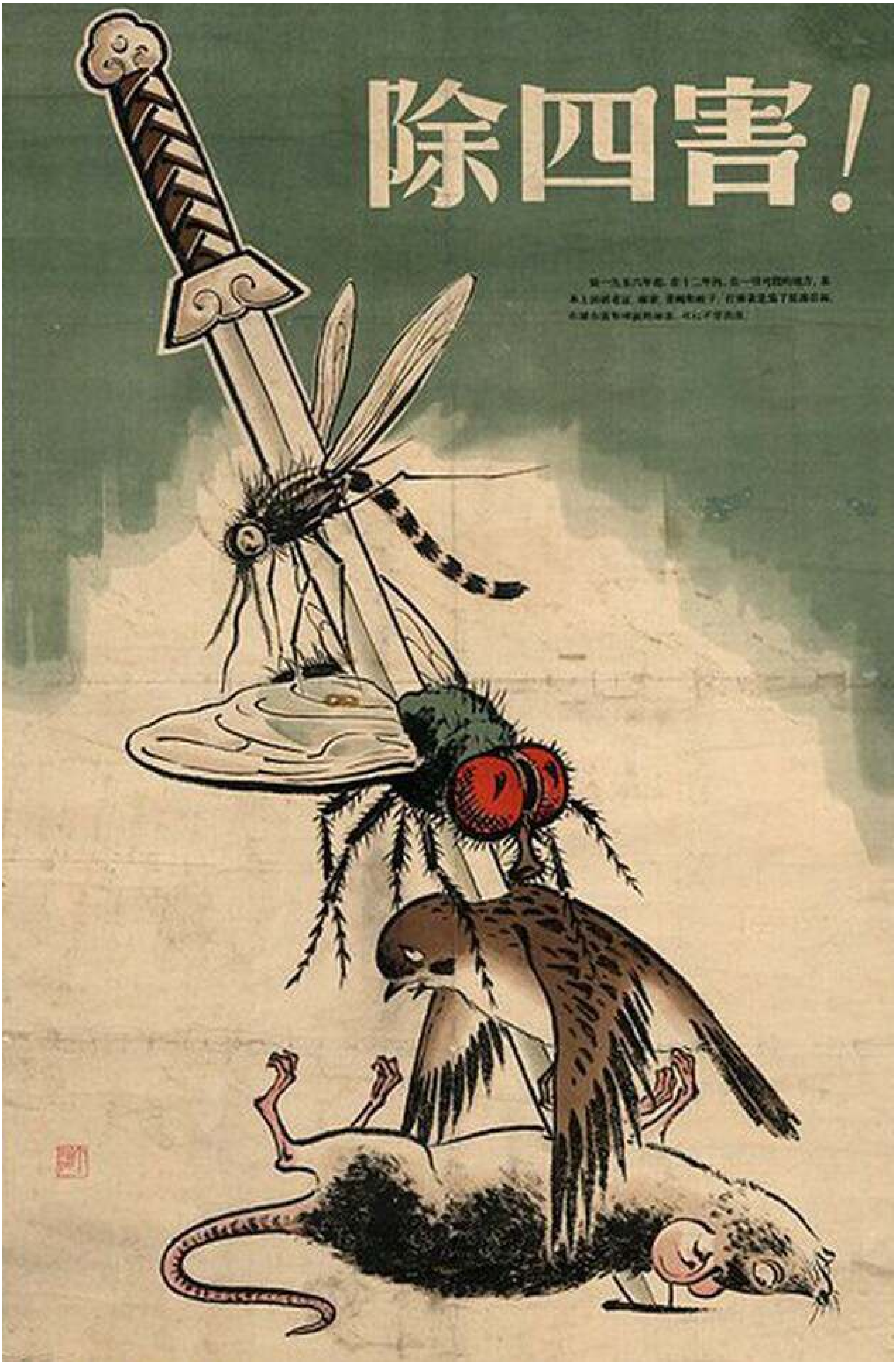

Figure 19: Image of the four Pests: "Chinese poster reading "Exterminate the Four Pests" from 1958, picturing the sparrow, rat, fly and mosquito"

For those readers who have not been overloaded with aviation information yet, I will recommend my article "The Untold Story of Operation Spider Web: How an Old-fashioned Aviation Museum Led to Cutting-edge AI That Made Putin's Pearl Harbor Possible" on my coincidental trips to Odesa during Operation Spiderweb and to the Strategic Aviation Museum in Poltava on a previous visit to Ukraine[4].

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About the Article

As satellites become linchpins of modern life and targets in geopolitical conflict, the security of space infrastructure is increasingly under threat. Erik Lewerenz and Heiko Radde examine the growing vulnerabilities in satellite communications and call for urgent adoption of post-quantum cryptography. Drawing on real-world case studies and in-orbit tests, they showcase how new cryptographic standards can future-proof satellites before quantum computers render today's defences obsolete.

About the Author

Heiko Radde is an Embedded Software Engineer at Berlin Space Technologies, where he designs, implements, and tests firmware for satellite systems. He specializes in bare-metal C and C++ programming and contributes to all stages of development across various device subsystems. With a focus on innovative space missions, he has worked on projects like the AFR satellite, integrating advanced technologies such as post-quantum cryptography into aerospace platforms.

Erik Lewerenz works at Berlin Space Technologies GmbH, and has previous experience with aerospace, having worked at the German Aerospace Center. In March 2025 he graduated with a Master's in Computational Science, from the Technical University of Braunschweig.

The usage of satellites is deeply ingrained within our modern life. Be it in communication solutions like satellite TV, navigation applications like GPS or earth observation for accurate weather predictions - all these services would not exist or be severely degraded without a fleet of operational satellites. At the same time, as shown in figure 1, our use of and reliance on space based systems is accelerating: While the United Nations Office for Outer Space Affairs (UNOOSA) reported around 150 yearly new satellites between 1960 and 2012, that number exploded to 2588 in 2023! [Out24] This increased reliance on satellite based services increases the need for strong cyber security as well. Currently these systems are out of scope of most adversaries - terrestrial targets are often still easier or more valuable. But this is starting to change, both in the domain of hybrid warfare as well as with commercial hackers like ransomware groups. Militaries the world over deem satellites as valid targets, even commercial constellations like Viasat in the hours before the Russian invasion of Ukraine in February 2022. As the value generated by these commercial constellations increases we're certain to see an increased interest by non governmental players in pursuit of monetary gains as well. [Erw25] [FT22] [Pee22]

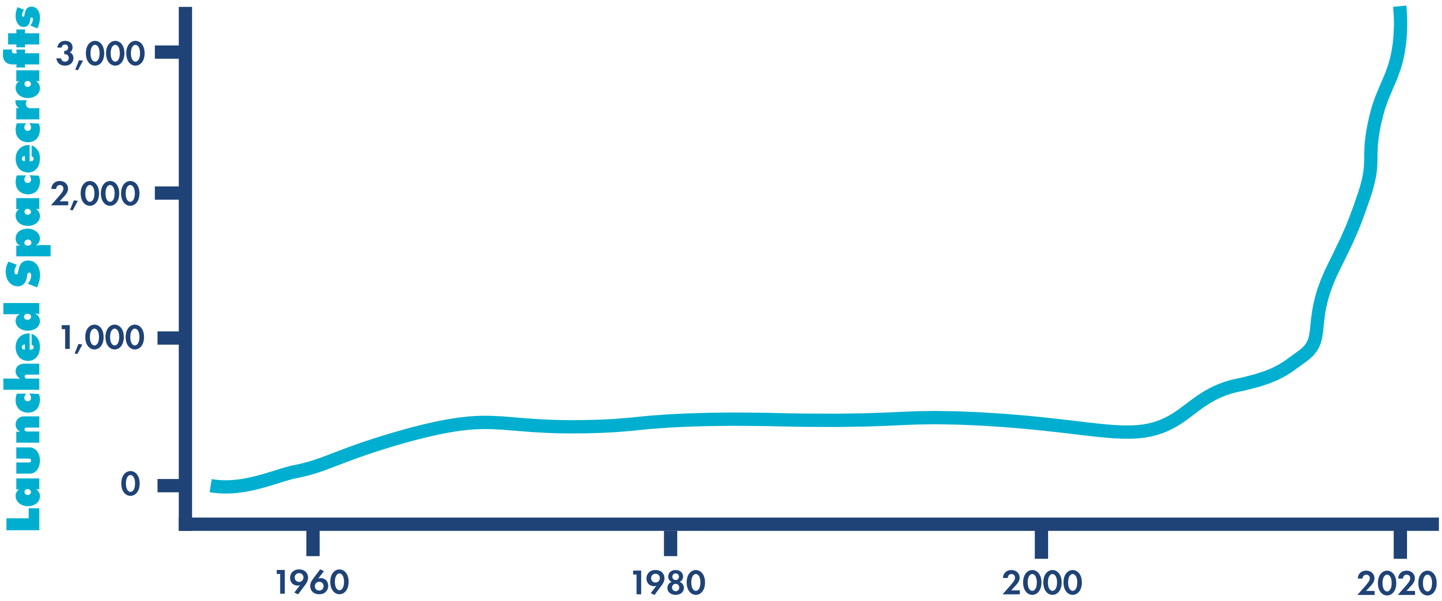


Figure 1: Number of launched satellites per year since 1957 [Out25]

1. Current state of satellite security

The level of cyber security on satellites is not uniform, it varies widely from mission to mission. While military and surveillance satellites, as well as spacecrafts for human spaceflight and other large institutional (scientific) satellites have used security-by-design principles for the longest time, this has often not been the case for smaller or commercial satellites. The whole topic of cyber security for spaceborne systems has not received interest of the industry or scientific community for a long time. This is starting to change now and the first scientific studies paint a worrying picture: For their 2023 IEEE paper [Joh+23] Johannes Willbold et al. conducted a survey of companies, academic institutions, and government as well as international institutions that are involved within the satellite development cycles[1]. In it only 53% of respondents stated that any defences against unauthorised access by third parties exist on their satellites. But even halve of those took the position that the secrecy of the satellite commands is suffi- cient security. Only the other halve implemented proper cryptography based access control

[1] The study focusses on the security deployed on the satellite systems themselves. It doesn't cover the security of the ground based equipment, which is in general handled like any other digital (server) equipment by the operators.

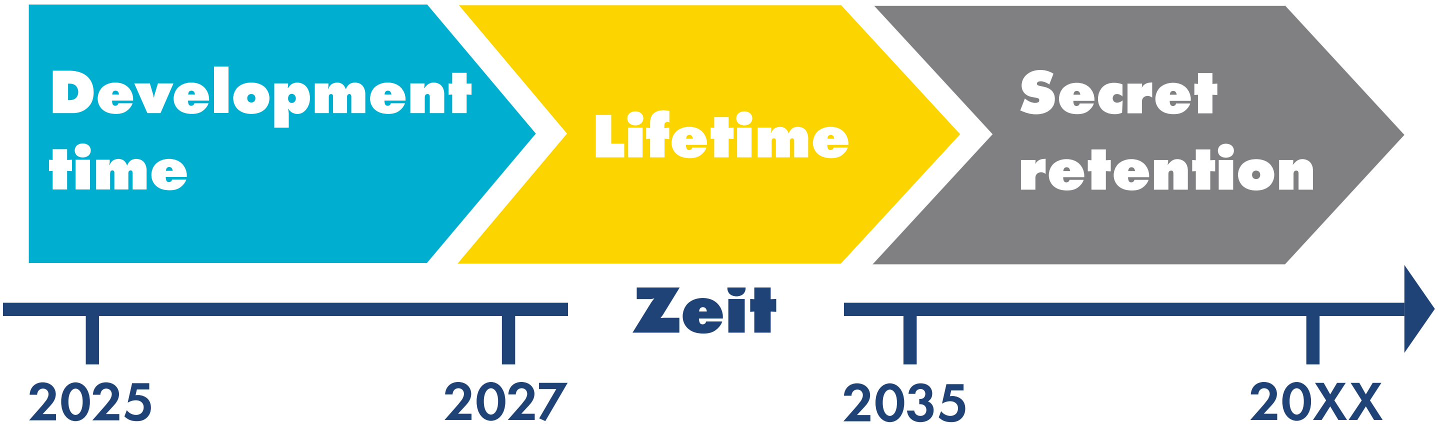


Figure 2: Development and life cycle of satellite system

on their systems. This shows the prevalence of security-by-obscurity in the industry. This is a fallacy: the protocols and commands used are often standardised and thus public knowledge. Access to powerful groundstations isn't a barrier either - radios and antennas capable of commu- nicating with satellites in low-earth-orbit (LEOS) are available for less than 2000 . [PM22]

In general all available research points in the same direction: while the ground segments are better secured because they're handled like any other server-based infrastructure, we've been lucky in regards to the space segment. Even then some attacks are happening: be it satellite TV signal hijacking for propaganda reasons or the destruction of satellite internet terminals on the eve of the Russian invasion of Ukraine in 2022, and others. [PM22] [Poi24] But terrestrial targets are often still easier to access by hackers and the importance of spaceborne systems has reached a critical state only within the last 15 years, thus haven't been in the public eye for much time yet. In addition any attack on this critical infrastructure will be investigated with intense scrutiny, increasing the risk for non state level threat actors. Still, the trend is clear: the number of cybersecurity incidents related to space systems is steadily increasing. The mindset of security-by-obscurity has affected the various standardis- ation authorities within the space domain as well. Organisations like MITRE have only indicated the importance of cybersecurity for space systems but so far have not provided guidance or standards for this domain. [Fal18] The same applies to the most common communication protocol standards. Here the Council of the Consultative Committee for Space Data Systems (CCSDS) has only added security layers as optional part of the protocols in 2015. [CCS22] It also recommends not using key exchange mechanisms, which are standard practice for any secured terrestrial application. Instead CCSDS is recommending static pre-shared keys, again citing the difficult ac- cess to satellites as reason. [CCS11] But the more data is encrypted using the same key, the higher the probability for an attacker to deduce the key out of the data he listened to. [KG16] Berlin Space Technologies has long been aware of these threats and falla- cies, and thus deploys transport security (encryption and authentication) as well as a key exchange mechanism on all their platforms since their second project. These are standardised and widely used cryptographic algorithms, also used e.g. for securing internet traffic. Here we've been at the forefront for systems of newspace companies, e.g. deploying key exchange mechanisms in- stead of static keys earlier than most of the industry. Additional second-layer defence mechanisms like access control levels are in the works for platforms destined to be used on satellite-as-a-service (SaaS) projects. But all these security mechanisms rely on the confidence in the key ex- change mechanism. Here a fundamental threat is now appearing for the whole cyber security domain: Quantum computers. Traditional key exchange algo- rithms are asymmetric cryptographic schemes that rely on the impracticality of reversing ab mod p = c when large prime numbers are used. But the quantum computers in development today will be able to solve loga c efficiently for large prime numbers, as soon as the early 2030s. [Sic25] This poses a pressing problem for the satellite industry: as shown in figure 2, if a system starts development today and is launched 2 years later, then one has to expect the availability of a usable quantum computer within its lifetime (average 7 years). But even after its demise, its data might need to remain secure; attackers that recorded data in the past shouldn't be able to decode it later for some time. Thus we have to deploy post-quantum-secure cryptography on our systems today, even without guidance by the space standardisation authorities like CCSDS.

2. Communication in the space environment

Spacecrafts are in essence embedded systems: They have limited processing power, limited storage sizes[2] and don't provide direct (physical) user access. Thus their software has to be highly optimised and can only offer a fraction of the processing speed of modern office computers. A few more special circumstances have to be observed when designing any communication related procedure or feature for spacecrafts:

KEM:
A triple of algorithms (KeyGen, Encaps, Decaps)

Asymmetric Channels Communication between spacecrafts and their ground- station(s) is done via radio. Typically the telecommand[3] channel is slower by several orders of magnitude than the telemetry channel.

Intermittent Connectivity Typically a spacecraft can only communicate with a groundstation via radio signals when they are within line of sight. In the[4] popular (polar) low earch orbit (LEO) each of these connections (passes) will only last a few minutes. A few passes will happen in shorter succession every halve day.

Propagation Delay Spacecrafts in LEO are between 200km and 3000km (most around 500km - 800km) , while those on geostationary orbit are 35.768km distance above the ground. When the spacecraft is not di- rectly overhead then the distance between it and the groundstation will be even larger. Communicating over these large distances, combined with the data conversions between radio signals and digital results in a higher propagation delay than typical terrestrial applications.

Remote Location Spacecrafts are by their very nature remote and inac- cessible to direct manual manipulation. With physical access being impossible care has to be given to prevent loss of access (e.g. because of data corruption loss of the crypto key).

Noisy Signals The relative low power radio signals are susceptible to signal noise over the long distances between groundstation and spacecraft, resulting in data corruption or loss. Other radio sources, terrestrial (cities, mobile phones, etc) or spaceborne (e.g. nearby satellites or solar storms) will lead to varying error rates within the signal.

3. Cryptography Basics

To construct the current and future cryptosystems employed by BST we make use of several so-called cryptographic primitives. One can think of them as the building blocks out of which we construct a secure system.

3.1. Block Ciphers

Block Ciphers are pseudorandom functions . A Block Cipher consists of two functions Encrypt and decrypt. Each of these Messages receives a shared secret key K and the (encrypted) message as inputs. A Block Cipher is defined by the following basic equation [5]

Decrypt (Encrypt (m, K), K) = m.

BST uses the Advanced Encryption Standard (AES) with

[2] Higher processing power and larger storage are directly linked to power higher require- ments. This in turn would require larger batteries and solar cells, increasing the costs to launch the system.

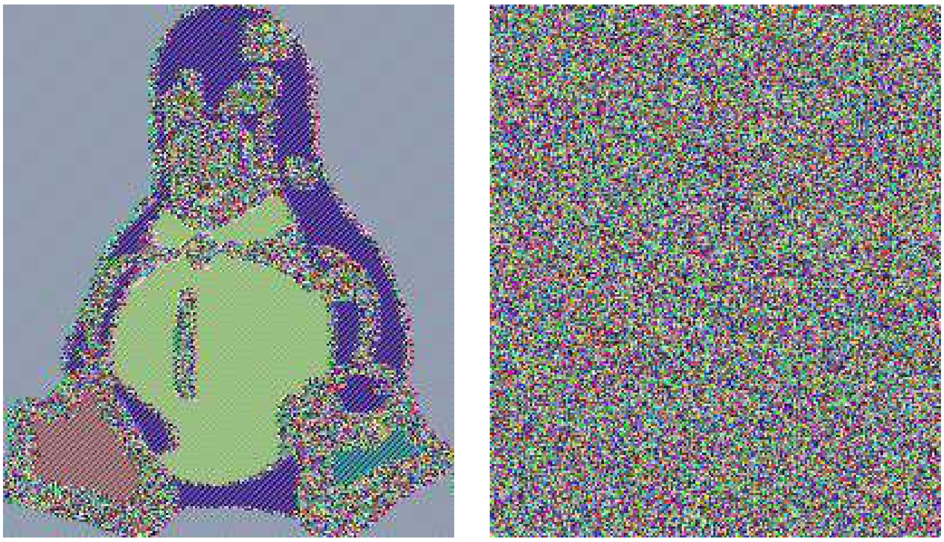
[3] Uplink from groundstation to the spacecraft

[4] Downlink from spacecraft to the groundstation

[5] Pseudorandom: deterministic but nearly impossible to predict without knowing the input parameters

a key size of 256bit to encrypt all communication. Usually Block Ciphers are rather simple func- tions and thus very efficient. More and more they are implemented in hard- ware instead of software. Since Block Ciphers encrypt a fixed size message into a fixed size ciphertext it is rather insecure to encrypt a message piece by piece. This approach is called Electronic Code Book (ECB). Instead one relates the different blocks to one another. BST uses the Galois Counter Mode (GCM) See figure 3 for a comparison of the two modes.

(a) ECB



(b) GCM

Figure 3: Identical image encrypted using the ECB and GCM modes

3.2 Diffie Hellman Key Exchange

To ensure both parties have the same secret key one can either distribute the keys pre mission through a secure channel. or perform a cryptographic key exchange via an unsecured channel. The drawback of the first approach is that a compromised of the system is non recoverable. Furthermore keeping keys around for a long time increases the likelihood of them being broken.cA solution to these problems is the Diffie Hellman Key Exchange. Both parties openly share information and generate a key using these open and their (distinct) secret information. There are several approaches to imple- ment Diffie Hellman. One can either use finite arithmetic using prime num- bers or points on elliptic curves. BST first used prime numbers but is now switching over to elliptic curves due to the better performance and higher se- curity they offer. The figure 4 displays the steps involved in a Diffie Hellman Key Exchange.

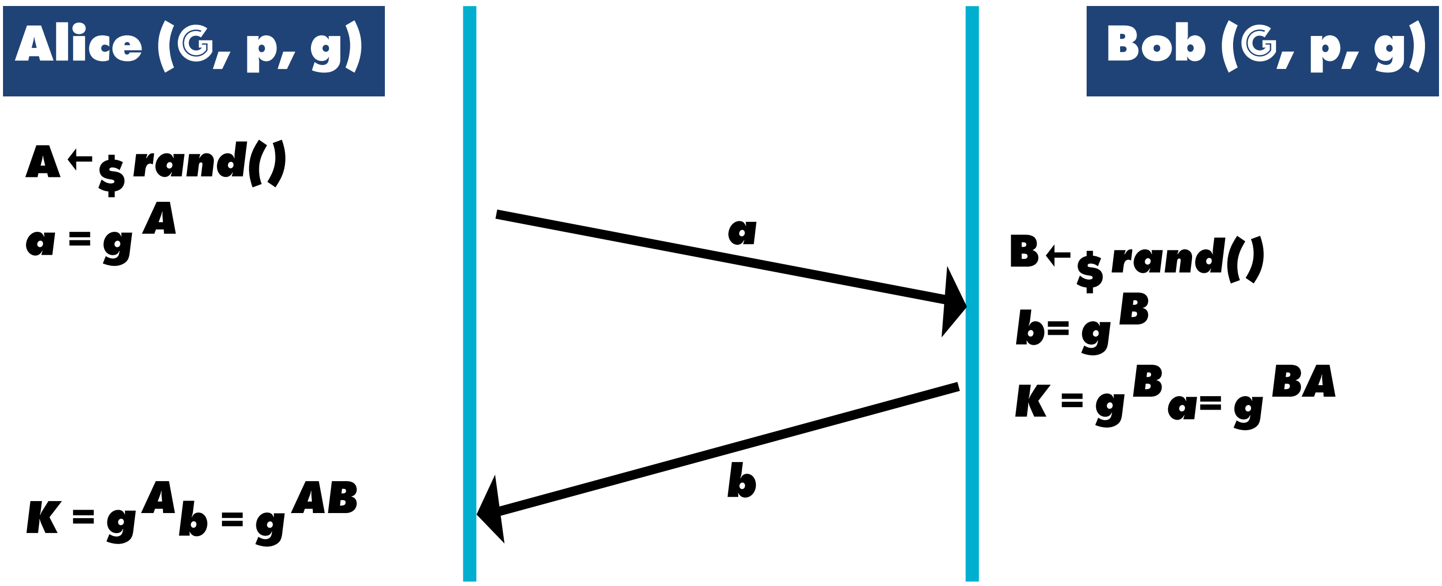


Figure 4: Diffie Hellman Key Exchange between Bob and Alice

3.3. Hash Functions

Hash functions are pseudorandom functions that take any input and output a fixed length of pseudorandom noise. In BSTs architecture they are used mostly for deriving a secret key out of raw material. Most modern Hash functions fall in one of two categories.

- Merkle-Damg˚ard Construction: The input message is split into blocks of a fixed length. A pseudorandom function is applied iteratively to each block. The final value is calculated using a truncation function.

- Sponge Construction: The input message is again split into blocks of a fixed length. During each iteration a state vector internal to the hash function, the sponge, is permuted according to the absorbed data. Finally a fixed size of data is squeezed from the internal state.

BST uses Hashing Algorithms of both types. Namely the SHA-2 and SHA-3 families of hashing algorithms standardised by NIST.

4. How Quantum Computers Attack Cryptography

Two Algorithms have so far been identified for quantum computers that threaten (BSTs) current cryptography. As of time of writing no quantum computer has been constructed that can efficiently run these algorithms. Nonetheless we can already estimate how exactly cryptographic primitives may be attacked and design future cryptographic systems accordingly.

4.1. Grovers Iteration

First described by the American Mathematician Lov K. Grover in 1996 [Gro96] this algorithm can be used to speed up non structured search by a factor of $\sqrt{N}$. Essentially a non structured search is brute forcing finding a key. Imagine there are 1024 possible keys. If we just try each possible key at a time we would expect to find the correct key after around 500 steps. Using grovers iteration we would expect to find the key after around 25 steps; figure 5 illustrates this scale.

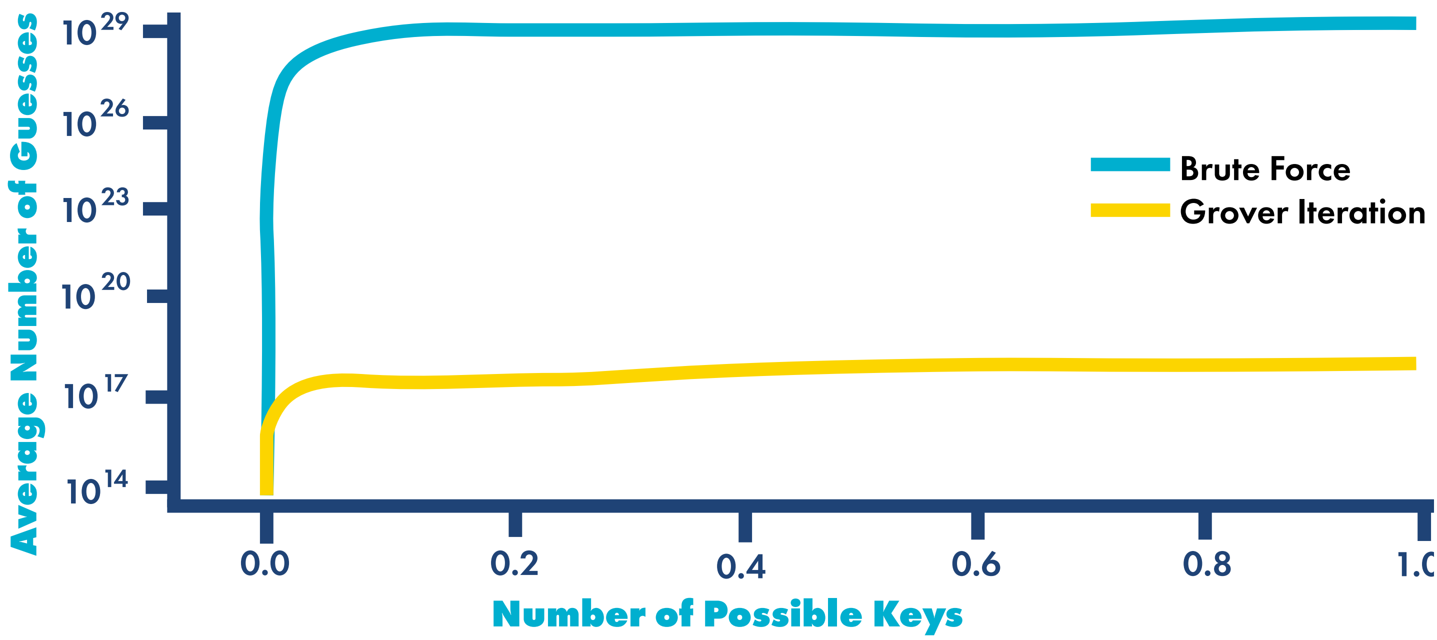


Figure 5: Speedup of Grover Iteration vs Brute Force

4.2. Shors Algorithm

Shors Algorithm was first published by American Mathematician Peter W. Shor in 1994 [Sho94]. It can be used to break the Hard Logarithm Problem associated with the Diffie Hellman Key Exchange. Shors Algorithm provides a significant speed-up compared to the currently fasted known factorization algorithm (Field Number Sieve), as indicated in figure 6.

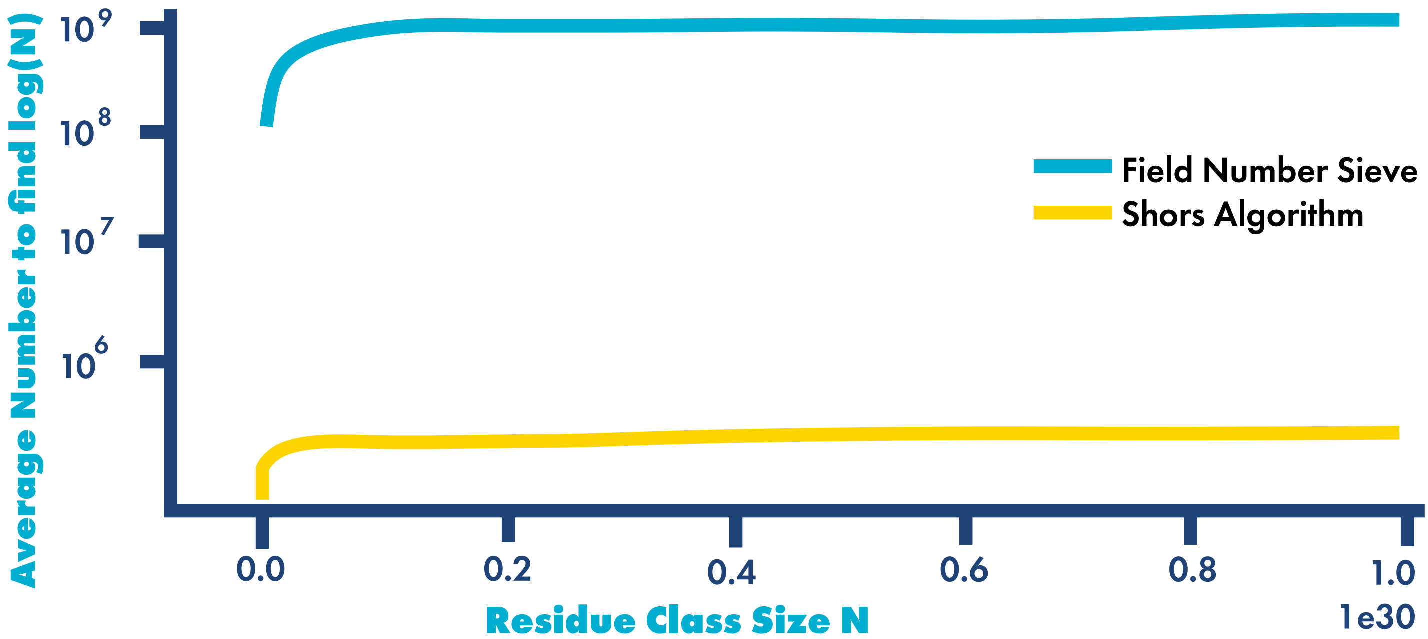


Figure 6: Field Number Sieve vs Shors Algorithm

4.3. What Now?

Grovers Algorithm can be used to attack Hashing Algorithms as well as Block Ciphers. However since the speed-up is "only" $\sqrt{N}$, doubling the key size aswell as retiring short hashes is actually enough to combat the risk. Shors algorithm in turn presents a much bigger challenge for modern cryptography. Virtually all key exchanges and digital signature schemes in use today rely on elliptic curves. The speed up accomplished by using Shors Algorithm is enough to completely obliterate any security. See table 4.3 for an overview of the consequences a quantum computer would have for BSTs cryptography.

Algorithm	Type	Purpose	Impact of CRQC Longer
AES	Symmetric	Encryption	Keys needed Larger
SHA-2	Symmetric	Hashing	Output needed
RSA	Asymmetric	Digital Signature	No longer secure
Diffie-Hellmann	Asymmetric	Key Establishment	No longer secure

5. Quantum Proofing BST Satellites

5.1. Key Encapsulation Mechanisms (KEM)

In 2017 NIST started a competition to find a replacement for elliptic curves which is quantum proof. It was decided to use a new kind of cryptographic primitive for key exchange purposes. A Key Encapsulation Mechanism is a special type of Asymmetric Scheme (or Public Key Scheme). A KEM is a triple of algorithms KEM = (KeyGen, Encaps, Decaps), satisfying

- The key-generation algorithm receives as input a security parameter s and outputs a public key pk and a secret key sk They are both assumed to be pseudorandom.
- The Encapsulation algorithm receives as input the public key pk and outputs the ciphertext c and the shared secret shs which are assumed to be pseudorandom.

- the Decapsulation algorithm receives as input the ciphertext c and the secret key sk and returns the shared secret shs.

Several underlying mathematical problems have been studied to build such KEMs. As of 2025 two flavours of KEMs are available and (about to be) standardised by NIST.

5.1.1. Code Based Schemes

First introduced in the 1970s these schemes are well studied. They are as- sumed to be very secure however have not been used before due to the large sizes of their keys. The Hamming Quasi Cyclic KEM submitted to NIST has been chosen as one of the winners of the NIST PQC competition and is going to be standardised next year.

5.2.2. Lattice Based Schemes

Based on so-called hard lattice problems. Lattice Based Schemes are of great interest due to their comparatively small key sizes. The Israeli Regev showed in 2024 that given they are secure against classical computers they are also secure against quantum computers [Reg24]. Note however that they are not yet well studied.

Spacecrafts are in essence embedded systems

5.2. The Hybrid Approach

Since Elliptic Curve Cryptography can no longer be considered secure once a Quantum Computer goes online we should no longer rely on it as a sole means of encryption. However, against classical adversaries Elliptic Curves remain a robust and well proven cryptographic scheme. This is in contrast to Post Quantum Cryptography which is still a young field of research. Thus there is not a lot of experience with these technologies and there is a considerable risk that Quantum Schemes will be broken after all (maybe even by classical computers). When designing a cryptosystem for use today we should of course take this into account. Therefore we decided to follow the approach outlined by Barbosa et al. [Bar+24], called X-Wing. The idea is to combine both classical and post quantum cryptography in such a way that if either is broken the other retains its full security.

5.3. Authenticated Key Exchange

Consider again the Elliptic Curve Diffie Hellmann outlined in figure 4. We imagine an attacker Eve who can intercept and alter messages sent between Bob and Alice. Eve can intercept the message A· G sent by Alice and instead send E1 · G. Bob now computes K1 = B· E1 · G and sends B· G back to Alice. Eve again intercepts the message and instead sends E2 ·G to Alice. Now Alice computes K2 = A · E2 · G. Essentially both Alice and Bob have unwittingly completed a key exchange with Eve who is in possession of both K1 and K2. This is problematic because Eve is now able to decrypt all messages sent from either Bob or Alice and reencrypt them. Bob and Alice meanwhile are unaware that their communication is compromised.
Currently BST solves this problem by signing messages using RSA. The security of RSA is also compromised by a future Quantum Computer as it is based on the Log Hardness assumption as well. There are several PQC signature schemes available and standardised for use by NIST. All of them are Lattice Based and require large amounts of data to be transmitted, a problem for the limited bandwidth available to spacecrafts (see section 2). We chose a different approach which was suggested by the authors of the original Kyber paper [Bos+18]. Instead of using signature schemes we use static keys for both Alice and Bob and a session key to authenticate both parties implicitly. We combine three KEMs to construct the Triple KEM key exchange protocol. Both Alice and Bob generate a static public/private keypair. The public keys are shared pre mission. Whenever required (ideally for every session) Alice generates a session key pair and shares the public key with Bob. Bob encapsulates both Alice's static key and the session key, while Alice encapsulates Bob's public key. The entire key exchange can be accomplished with just two messages. Alice sends Bob's encapsulated static key and the session key. Bob then decapsulates his static key and encapsulates both Alice's static key and the

session key. He then sends both these encapsulated keys to Alice who de- capsulates them. In the end both parties have the same set of three shared secrets which they can combine into a master shared secret. See figure 7 for an overview of this[Bos+18].

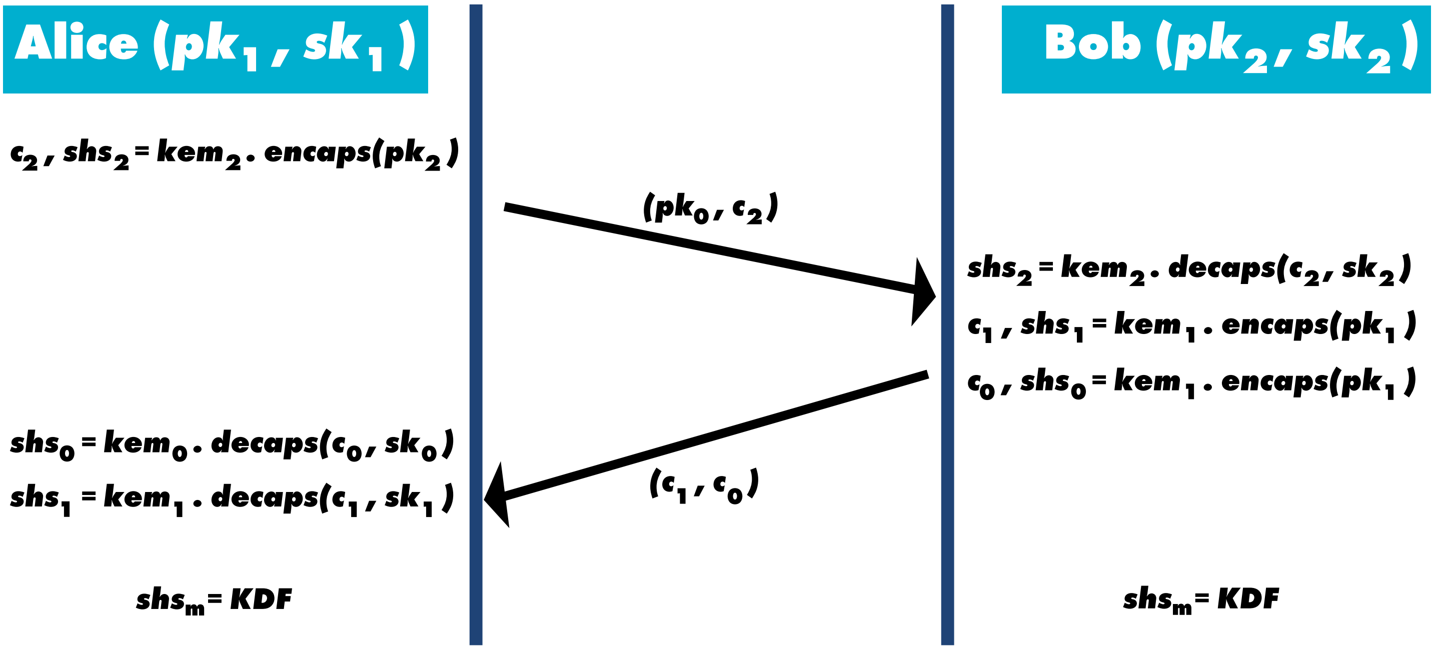


Figure 7: Triple KEM Key Exchange

For the key derivation we need a robust KEM combiner (similar to X- Wing).[Bar+24][GHP18] It is necessary to include the ciphertexts into the Key Derivation Function (KDF) to prevent chosen ciphertext attacks. We follow a similar approach to the X-Wing construction where we do not include the entire ciphertext into the KDF but only the Elliptic Curve Part. This reduces the stack size during key derivation. Without this optimisation key derivation might fail due to the low performance of satellite CPUs.

6. Testing in space

6.1. BST Triple KEM and AFR Satellite Test

The AFR (ABA First Runner) is an earth observation satellite build by BST and Azista BST Aerospace (ABA). It's owned and operated by ABA, but BST is able to access it in order to test new software and procedures in orbit. A basic firmware containing the Triple KEM protocol was uploaded to an in orbit demonstrator board on the AFR satellite. The triple KEM key exchange has been verified between ground and satellite software in April 2025. The uplinking and downlinking of data was conducted via the German

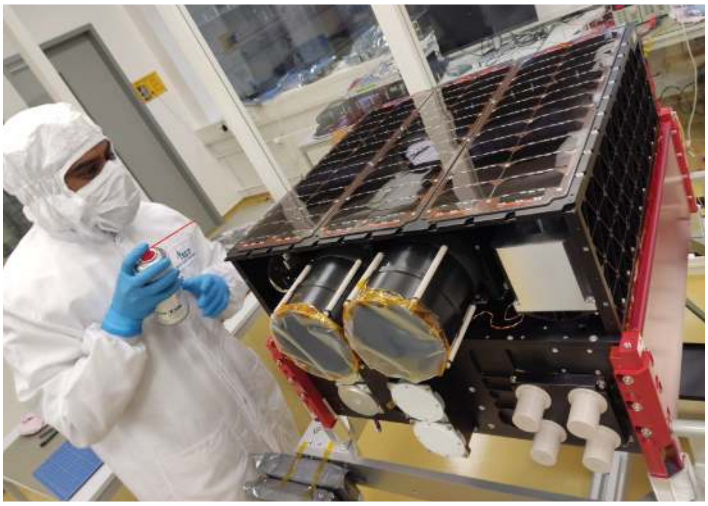


Figure 8: The AFR satellite dur- ing final assembly at BST

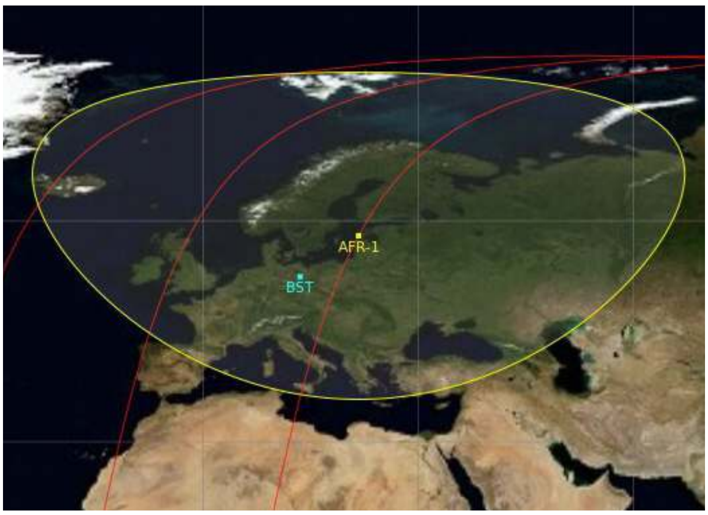


Figure 9: Orbit of the AFR satel- lite during a pass over the BST groundstation

Aerospace Center (DLR) groundstation in Neustrelitz using S-Band. AFR makes two to three passes over Neustrelitz every twelve hours. Each pass is between seven to eleven minutes long with 90 minutes between each one.

There are several code based algorithms available. See table 6.1 for sizes in bytes of the cryptographic data that needs to be stored and transmitted.

Algorithm	Hardness	Public Key	SecretKey	Cypher
ML-KEM768 [Sta24]	Lattice	1184	2400	1088
HQC-192 [al20]	Code	4522	4586	8978
BIKE-L3	Code	24659	3602	40973
Classic McEliece6960119 [al22]	Code	1047319	13948	194
ECDH (classical)	DLog	32	32	–

We chose HQC-192 and ML-KEM768 for our implementation. We tested triple KEM with three X-Wing Hybrid KEMs built from Curve25519 [Ber06] and ML-KEM768. We also verified the protocol using HQC-192 using a wired connection. The structure of the Triple KEM implementation and the necessary commands can be seen in figure 7.

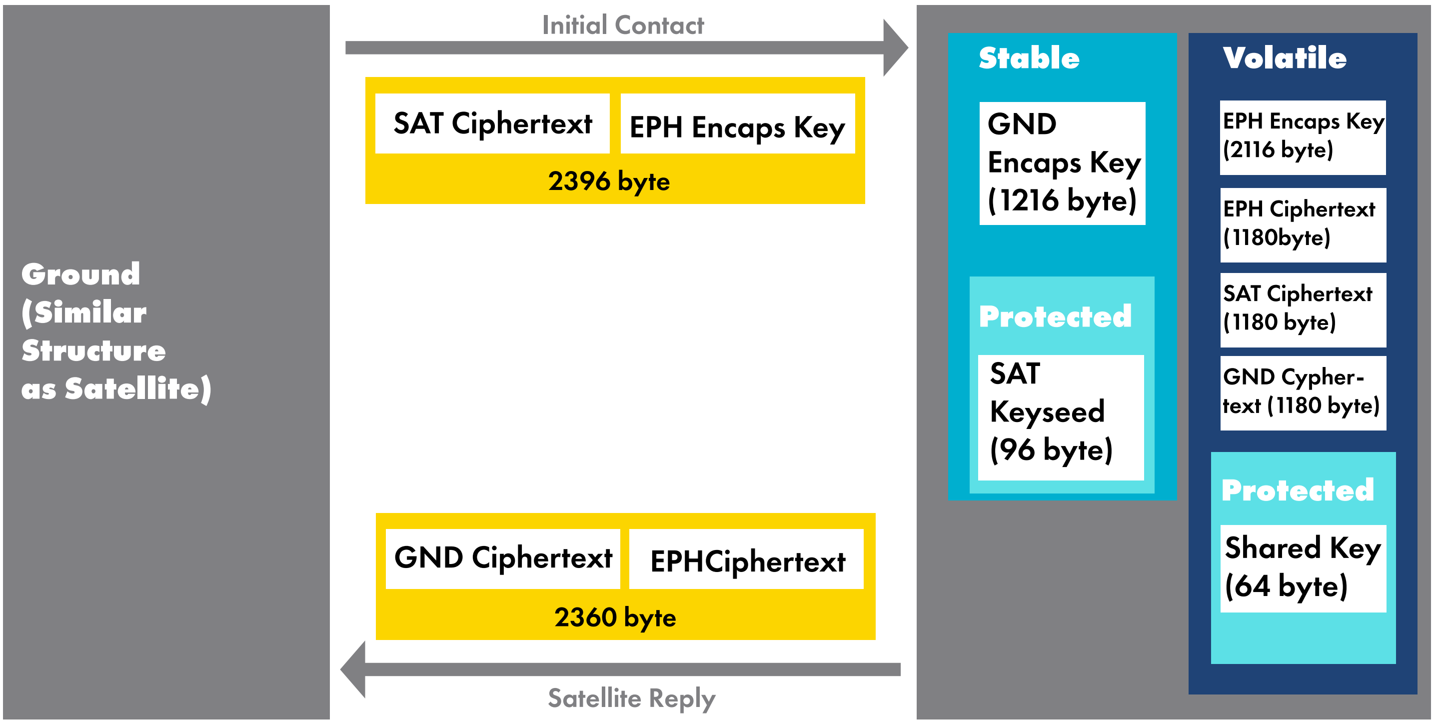


Figure 10: BST tailored Triple KEM showing commands and their sizes as well as the hierarchy of data in satellite firmware

The computation time of the cryptographic operations on the satellite was lower than the round trip time of communication with the satellite (< 500ms).

6.2. Conclusions and Future Developments

Since BSTs satellite computers are not performance bound regarding post quantum cryptography it was decided to migrate the system to session keys. This means everytime we contact the satellite new keys are generated auto- matically. This provides greater protection in case keys are leaked and makes it harder to compromise keys in the first place. In addition to that we are developing a system which allows us to define access level rights. Intuitively certain commands (e.g. controlling the satellite propulsion or writing into the memory) should only be allowed to be run by privileged users (i.e. the owners of the satellite) while other commands (e.g. using the payload, requesting satellite telemetry) can also be executed by third parties who use the satellite as a service. We designed our software in such a way that it is easy to switch around the PQC algorithms in use. This cryptoagile approach allows us to respond quickly and seamlessly in case a weakness were discovered in one of the PQC algorithms. Lastly, one might wonder why we even bother with post quantum cryp- tography if there is a secure key exchange mechanism using Quantum Key Distribution (which does not require a quantum computer). The problem with this approach is that it is not very reliable. It requires many attempts until it succeeds. Furthermore it requires specialised hardware which is not even commercially available (and won't be for the forseeable future). PQC algorithms run on standard hardware and are very reliable. As our test proves it can be deployed right now.

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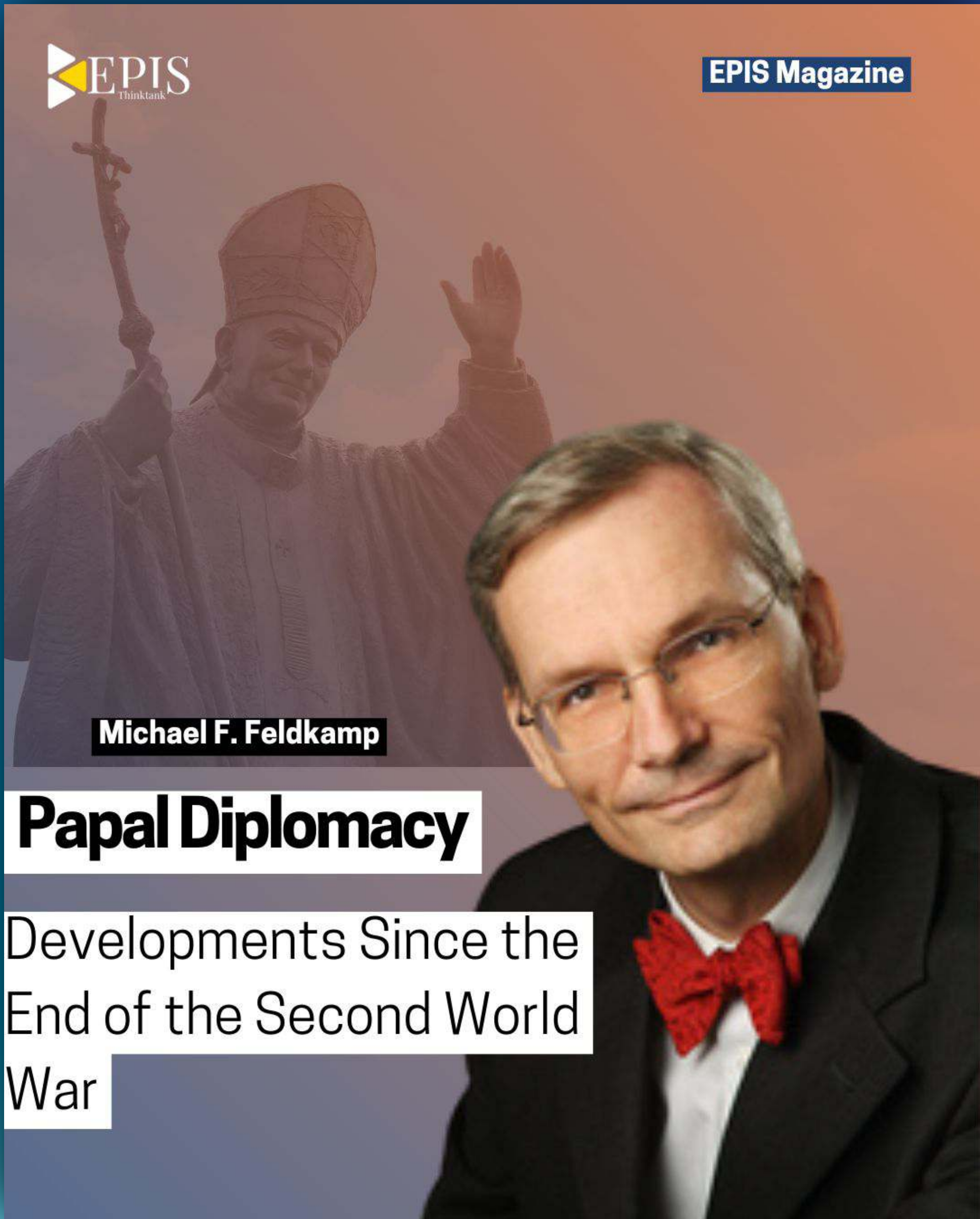

About the Article

Since World War II, the Holy See has used its moral authority to engage actively in reconstruction, diplomacy, and the promotion of human rights. Pope Pius XII expanded international relations, especially with newly independent states. Vatican Ostpolitik gained momentum from the 1970s, particularly under John Paul II. Papal diplomacy does not pursue power interests but advocates for values such as religious freedom and human dignity worldwide.

About the Author

Michael F. Feldkamp (* 1962) is a German historian and long-standing parliamentary scholar at the German Bundestag. With a PhD in church and diplomatic history, he has authored over 40 books and numerous articles—major works include studies on papal diplomacy, the Bundestag's history, and Pope Pius XII's role during World War II. Feldkamp was honored as Commander in the Order of St. Gregory the Great in 2021.

Historical Development

After the moral, political, and economic destruction of Germany and many other European countries following the Second World War, the Catholic Church—and specifically the Papacy under Pope Pius XII (1939–1958)—was regarded worldwide as one of the few recognized authorities. The Papacy had no proprietary economic interests; it viewed itself as a neutral, supranational actor. Thanks to the Lateran Treaties of 1929, it was financially independent but its currency was tied to the Italian state. This allowed the Holy See to maintain its sovereignty even during the German occupation of Italy. Politically, the Holy See aligned its political interests with the duties and self-understanding of the Pope as the religious head. On this basis, Pius XII was actively involved in the reconstruction of democratic Western Europe. In addition, he used the early years after the Second World War to establish new diplomatic relations with China (1946), Egypt (1947), Lebanon (1947), India (1948), Indonesia (1950), the Philippines (1951), Pakistan (1952), Japan (1952), Syria (1953), and Iran (1953). These were, until then, countries considered by the Holy See as mission territories under the papal Congregation for the Propagation of the Faith ("de Propaganda Fide"). Since the 1960s, direct diplomatic relations were established with most independent African states: Senegal in 1961; Burundi and Zaire in 1963; Rwanda in 1964; Zambia and Kenya in 1965; Malawi, Uganda, and Cameroon in 1966; Lesotho, the Central African Republic, and Gabon in 1967; Tanzania in 1968; Ethiopia and Mauritius in 1969; Dahomey and Niger in 1971; and Algeria, Tunisia, Sudan, and Ivory Coast in 1972. By 1972, there were five apostolic delegations and 24 nunciatures on the African continent. Except for Burundi, Rwanda, and Zaire, the Pope appointed pro-nuncios everywhere—i.e., the Holy See waived the precedence of its diplomatic representative within each country's diplomatic corps. The establishments reflect the Vatican's growing interest in maintaining diplomatic relations even with countries that have only Catholic minorities.

Moreover, the Holy See maintains representations as a "permanent observer" or "participant" in many international organizations, primarily:

- United Nations (UN) in New York
- United Nations Office and specialized agencies in Geneva
- International Atomic Energy Agency in Vienna
- UN Food and Agriculture Organization (FAO) in Rome
- UN Educational, Scientific and Cultural Organization (UNESCO) in Paris
- European Union in Brussels
- International Institute for the Unification of Private Law in the Vatican
- International Committee of Military Medicine in Tervuren
- International Union of Official Tourism Organizations (IUOTO)
- International Geographical Union

The Holy See has never sought full membership in these organizations. As an observer, it has always participated in political deliberation but has not been part of decision-making and is not accountable for the resulting decisions. This was an expression of its neutrality as a Christian head of state and religious leader. In matters of faith, unlike power politics, compromise is not possible—especially when ethical or moral questions are at stake.

The Papal Ostpolitik – The Pope as a "Global Player"

Since 1973, the Holy See participated with keen interest in the preliminary negotiations for the CSCE ("Conference on Security and Cooperation in Europe") in Helsinki. From 1975 to 1980, the CSCE constituted the core of a multilateral East-West détente policy in Europe. The participation of Archbishop Agostino Casaroli, the later papal Secretary of State under Pope John Paul II (1978–2005), initially caused astonishment and incomprehension among some diplomats. In doing so, the Vatican intended to use its chances just like the other participating states of the West to advance the policy of détente. The Vatican succeeded in ensuring that the free exercise of religion could be included in the treaty text. Furthermore, Casaroli established unofficial contacts with top politicians of the Eastern Bloc states on the sidelines of the conference, thereby creating the basis for numerous encounters with Eastern European heads of government. Not infrequently, this served to reach an understanding on a "modus vivendi" without truly resolving the problems. But the Holy See became the guardian of the intellectual and moral values in the European culture shaped by Christian values and was significantly involved in the "human dimension" of the future policy of détente. An unmistakable signal effect and decisive turning point in the Ostpolitik of the Popes came from the unexpected election of the Archbishop of Krakow, Karol Wojtyła, as Pope on October 16, 1978 — an event that was received with ambivalent feelings not only by the communist rulers in Poland. This Pope knew the ecclesiastical and religious circumstances in Eastern Europe from his own experience. It was to be expected that his Ostpolitik would not be made from behind a desk. In 1979, he visited his homeland Poland for the first time as Pope John Paul II. The Slav on the papal throne had sworn the spiritual unity of a Christian West and East Europe as his very own mission. The contribution of John Paul II to the dissolution of the Soviet Union and thus to the East-West conflict cannot truly be measured as long as this epoch has not been left to historians through the opening of the relevant archives. But through his visits, he ventured a significant building of bridges toward the East. Since 1989, negotiations with the Holy See have been conducted with all former Eastern Bloc states, including Russia and Ukraine. The trigger was Gorbachev's visit to the Pope on December 1, 1989. Within two years, all episcopal sees that had remained vacant during communist rule — from Lithuania to Bulgaria and from Belarus to Siberia — could be filled, which undoubtedly posed the highest ecclesiastical-political demands on Vatican diplomacy. The Vatican's Ostpolitik did not end with the elimination of the communist dictatorship, but only entered a new phase.

Readjustment since the Second Vatican Council

The Holy See's diverse diplomatic relations only developed into their present form at the end of the 1960s, that is, after the Second Vatican Council. Papal diplomacy no longer maintains contact solely with Catholic states, as it did in the past; nor is it limited to dealing exclusively with Catholic affairs. Even during the two World Wars, the Curia did not withdraw from its responsibility for humanity. Its universal ("catholic") mission was increasingly recognized. Not without reason did states with barely any Catholic population seek to exchange diplomats with the Vatican for historical reasons. Conversely, countries with large Catholic populations — such as Mexico or the United Kingdom — for historical reasons maintain either no or only limited diplomatic contact. Often, they wish to avoid an elevation in the status of the Catholic Church. Papal diplomacy in the Middle Ages and early modern period was heavily shaped by papal envoys and nuncios, and only since the 20th century increasingly by the popes themselves and their collaborators in the Curia. This is due on the one hand to the greater expansion of the centralized curial administrative apparatus. On the other hand, the world has become much "smaller" in light of

> **A model of Church:**
> **State relations based on formal agreements (concordats) ensuring cooperation.**

media and new means of communication such as telephone, fax, and now the internet. The ability to react quickly to events in the world makes our times fast-moving and often forces political actors to respond immediately. John Paul II was the first pope to fully take advantage of rapid means of transportation for his pastoral journeys to all continents — more so than any pope before him. His at times spectacular travels are an expression of the desire to be present throughout the world. This presence cannot be replaced by television and other broadcast technologies. Conversely, these stays, declared as "pilgrimages," do not replace the diplomatic contacts of a papal nuncio. It remains the nuncio's task to maintain sympathy or at least respect for the Catholic Church among the respective governments, to foster close contact with the bishops, the clergy, and the faithful, and to select suitable candidates for upcoming episcopal appointments. None of this can be carried out by a centralized papal administration in the Vatican; it makes a permanent papal representative indispensable in the ongoing tension between Church and state, as well as between the local Church and the papacy. Into the 20th century, the popes have built one of the densest diplomatic networks in the world. After the United States of America and the Federal Republic of Germany, the Vatican today maintains the largest number of official diplomatic missions. In contrast to the papal system of legations in the Middle Ages, however, today it is no longer about expanding the worldly power of the popes. Rather, it is Church-related matters that the nuncios represent in individual countries — both among the local bishops' conferences and in relation to the respective governments.

Those who guarantee human rights also guarantee religious freedom.

Models of Church–State Relations

Four different models by which relations between Church and state are maintained across the world and beyond religious boundaries were recently distinguished by Nikola Eterović (The Quiet Power: The Diplomacy of the Holy See, 2023). The model of a state church, which we are familiar with especially from the Protestant countries of northern Europe — for example, Finland and, until a few years ago, Denmark.

- The "symphonic model" is ideally predominant in the Orthodox Church, and particularly in the Russian Orthodox Church. Its characteristic is the close connection between Church and state authority — as can be seen especially in the Russian Orthodox Church and whose origins lie already in the early Christian or even ancient Church (cf. Caesaropapism).

- The third model is characterized by a strict separation between Church and state, such as in France, where we can observe a radical form of laïcité: "The Republic guarantees freedom of conscience; it guarantees the free exercise of religion within the framework of public order," as stated in the French law on the separation of Church and state of December 5, 1905.

- The fourth model is, also from the Holy See's perspective, the "concordatory model." Here too, the separation of Church and state is a prerequisite. But both sides are open to shaping their cooperation, which is guaranteed in treaties (concordats). In this sense, the Holy See also understands its own position: that the Catholic Church must not be a privileged Church.

Whoever guarantees human rights also guarantees religious freedom

Cardinal Secretary of State Giovanni Battista Montini, the future Paul VI, once described the goal of international papal diplomacy as follows: "If secular diplomacy strives to unite the world by preferring reason to the use of force and by encouraging individual states to develop within a harmonious community of an ever-expanding international organization, then it finds in ecclesiastical diplomacy almost a model [...] because of the ideals from which ecclesiastical diplomacy proceeds and toward which it strives, namely the worldwide, universal community of all people." With the retreat of the Church from public life due to modern ideologies — and even more so through the totalitarian states of the 20th century — the humanitarian mission came increasingly into focus for papal diplomacy. Regardless of religion or denomination, papal diplomats have advocated for human and fundamental rights in all countries and international organizations. The core idea is self-evident: a state that guarantees human and fundamental rights also guarantees religious freedom and the free exercise of religion. That the commitment to a humanely shaped future also includes a political dimension is demonstrated by the engagement of the popes and their diplomats in those countries where human rights and civil liberties are trampled upon.

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2025 signals tension in the East, as defence budgets in the Asia-Pacific region are rising to record levels. China's defence budget increased by 7.2% over 2024's budget, Japan's by 9.4%, and others following not far behind. Why does it look like states are preparing for war despite claims to seek peace? One explanation lies in the desire to deter threats and ensure national security - paradoxically fuelling insecurity. This is known as the "security dilemma".

How More Security Can Increase Insecurity

To understand the security dilemma first requires acknowledging anarchy in the international system. The international system, the space in which states interact with one another, is not governed by a higher power that can enforce its will. The system is characterized by state sovereignty, whereby states are free to act as they wish. As such, the international system is said to be anarchical in nature, where each state prioritises its own interests and security. In this system, it is up to the state to guarantee its security, meaning it will increase military capabilities as it sees necessary to protect itself and its citizens. Thus arises the security dilemma! A militarily weak state faces greater risk from opportunistic neighbors. To deter other states from attacking, a state may strengthen its military to become a more difficult target. Yet, a state's military buildup may be perceived as offensive preparation rather than defensive, thus incentivizing other states to increase their own military capabilities to deter stronger states.

What Is The Best Defence?

The security dilemma manifests itself in two ways: offensive and defensive buildup. States may increase their offensive military capabilities to deter others from attacking. A defining characteristic of war is reciprocity. If state A attacks state B, state A must concern itself with the potential retaliatory damage state B can inflict. As such, an increase in state B's offensive capabilities may serve as a deterrent against potential attack by state A. Offensive development can also signal escalation or the desire to use military capabilities aggressively in the future, exacerbating the security dilemma. Defensive buildup is also a manifestation of the security dilemma. If state A attacks state B, state A must concern itself with the feasibility of overcoming state B's defences. State B can develop its defences to make it more difficult and costly for an aggressor to succeed, increasing state B's security and solving its security dilemma. Defensive buildup does not necessarily signal aggressive intent, thus easing the security dilemma. However, both offensive and defensive buildup can exacerbate the security dilemma because they signal the desire to be prepared for conflict.

The Future of East-Asian Security

he security dilemma can partially explain defence budget increases in the APAC region, as states seek to deter others. Though paradoxical, increases in defence budgets signal a desire to guarantee territorial security in uncertain times. Even so, the security dilemma is only a piece of this very complex puzzle that goes beyond the region and extends into global security politics.

Further Reading Recommendation

Liff, A. P., & Ikenberry, J. (2014). Racing toward tragedy? China's rise, military competition in the Asia Pacific, and the security dilemma. International Security, 39(2), 52-91. https://www.jstor.org/stable/24480583


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