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Systemic Inertia: A Comprehensive Analysis of Structural, Legal, and Cultural Impediments to Agile Software Acquisition within the German Defense Procurement System

June 2026

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Prepared for the Naval Postgraduate School, Monterey, CA 93943.

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ABSTRACT

This thesis examines why agile software acquisition remains difficult within the German defense procurement system and argues that these difficulties result from the interaction of structural, legal, and cultural constraints rather than from any single rule or institution. Using structured document analysis and a comparative assessment of German procurement reforms and U.S. defense acquisition practices, it evaluates both the sources of systemic inertia and the transferability of selected U.S. mechanisms to Germany. The findings show that recent reforms, including acceleration measures and the 2024 PBN framework, improved procedural speed but did not overcome deeper barriers to agile software acquisition. These barriers include fragmented software governance, hardware-oriented process logic, limited specialized capacity, and an oversight model that still prioritizes ex ante control. The thesis concludes that Germany should treat software acquisition as a distinct procurement problem. It recommends consolidating software governance within BAaINBw and clarifying a software-specific path under PBN, making agile practice more tangible through an internal software playbook and pilot projects, and using rapid and IT-specific routes more deliberately for software-intensive procurement.



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LIST OF ACRONYMS AND ABBREVIATIONS

AAF	Adaptive Acquisition Framework
ASA	Assistant Secretary of the Army
ASN	Assistant Secretary of the Navy
BAAINBw	<i>Bundesamt für Ausrüstung, Informationstechnik und Nutzung der Bundeswehr</i> [Federal Office of Bundeswehr Equipment, Information Technology, and In-Service Support]
BMVg	<i>Bundesministerium der Verteidigung</i> [Federal Ministry of Defence]
BwBBG	<i>Bundeswehr Beschaffungsbeschleunigungsgesetz</i> [Bundeswehr Procurement Acceleration Act]
CPM	customer product management
DIB	Defense Innovation Board
DoD	U.S. Department of Defense
DoDI	Department of Defense Instruction
GAO	Government Accountability Office
IPP	integrated planning process
IPT	integrated project team
JCIDS	Joint Capabilities Integration and Development System
MDA	milestone decision authority
MTA	middle tier of acquisition
MVP	minimum viable product
OUSD(A&S)	Office of the Under Secretary of Defense for Acquisition and Sustainment
PBN	<i>Projektbezogene Bedarfsdeckung und Nutzung</i> [Project-Based Procurement and In-Service Use]
PPBE	planning, programming, budgeting, and execution
RAA	rapid acquisition authority
SWAP	software acquisition and practices
SWP	software acquisition pathway



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DISCLOSURES

During the research and writing process, generative AI tools were used to support brainstorming, translation, outlining, grammatical editing, and improving the coherence of the argumentation. The author reviewed and revised all AI-assisted output and retains full responsibility for the content, analysis, and conclusions.



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I. INTRODUCTION

The modernization of defense forces depends on efficient acquisition processes capable of handling complex weapon systems and software solutions. In recent decades, military capabilities have become increasingly software-intensive and interdependent, requiring rapid integration of cutting-edge technologies and continuous adaptation to evolving operational requirements. German defense procurement, however, is widely recognized for its slow and bureaucratic nature, operating according to traditional sequential processes that were designed for a different era of defense technology. The growing complexity and software intensity of modern military capabilities demand agile and adaptive acquisition methods to keep pace with technological innovation and operational needs.

This fundamental mismatch between the pace of technological change and the rigidity of existing procurement structures creates substantial challenges for the Bundeswehr's modernization efforts. *Bundesamt für Ausrüstung, Informationstechnik und Nutzung der Bundeswehr* [The Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support] (BAAINBw), as the central procurement authority, faces particular difficulties in implementing flexible, iterative development approaches—commonly known as agile methods—that have become standard in civilian software development and are increasingly adopted by other nations' defense departments.

A. PURPOSE OF RESEARCH

The purpose of this study is to examine the legal, cultural, and structural obstacles that consistently prevent the implementation of agile software acquisition in the German defense procurement system. The study aims to suggest ways to enhance the efficacy of German defense procurement to better match acquisition procedures with the requirements of contemporary, software-defined combat by identifying challenges and analyzing lessons from global experiences, especially those of the U.S.

More precisely, this study examines how institutional cultures, organizational structures, and legal frameworks interact to produce systemic inertia inside the BAAINBw. In order to determine what tactics have been used, why they have had little success, and



which institutional or procedural reforms have failed, the study looks at previous reform initiatives in Germany. Additionally, this study contrasts the German strategy with the U.S. Department of Defense's (DoD) Adaptive Acquisition Framework, focusing on how the U.S. has reorganized its procurement procedures to support quick prototyping, iterative software development, and ongoing user feedback. The goal is to determine which aspects of the American strategy could be modified, used, or adapted to the organizational, legal, and cultural framework of Germany. The ultimate goal of this study is to offer evidence-based suggestions that can direct the BAAINBw toward more effective and responsive acquisition processes for software-intensive defense capabilities.

B. PROBLEM STATEMENT

Current research and policy analysis characterize Germany's defense procurement system, focused on BAAINBw, as sluggish, excessively procedural, and hindered by fragmentation and capacity constraints (Kiel Institute, 2024). Analysts emphasize that intricate regulations, numerous approval tiers, and a scarcity of specialized personnel hinder the prompt realization of political objectives into operational capabilities (Rombach, 2025). Notwithstanding numerous reform initiatives, the system persists in prioritizing legal defensibility and adherence to formal processes, thereby limiting flexibility and responsiveness. In this context, BAAINBw has faced challenges in establishing agile software acquisition as a standard practice, despite the widespread recognition of the necessity for more iterative, software-centric methodologies (Paulus, 2025).

C. RESEARCH QUESTIONS

These three questions guide the thesis:

1. What are legal, organizational, and cultural barriers the BAAINBw faces when it comes to agile software acquisition?
2. What strategies has Germany employed in the past to overcome these barriers? How effective have these strategies been?



3. What lessons can the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support apply based on its understanding of the U.S. experience in agile software development?

D. SCOPE AND LIMITATIONS

As acquisition in German defense procurement has a wide range, it is essential to define what is and is not included in this study. With a focus on the BAAINBw as the primary procurement authority, this study particularly examines the obstacles to agile software acquisition in the German defense procurement system. The study looks at three types of barriers: legal (regulatory frameworks, parliamentary supervision, contractual requirements), cultural (risk aversion, institutional norms, skill gaps), and structural (organizational fragmentation, decision-making processes, staffing). The temporal span includes reform efforts commencing circa 2010; the analysis focuses on initiatives that directly alter defense procurement governance and legal structures for the acquisition of equipment and information technology, specifically the proposals of the Weise Commission, the reorganization that established BAAINBw, the Bundeswehr Procurement Acceleration Act, and the PBN regulation.

To find transferable lessons, the study compares the Software Acquisition Pathway and Adaptive Acquisition Framework of the U.S. Department of Defense. Nevertheless, the study does not provide a thorough review of all defense acquisition programs or attempt to measure the precise financial impact of delays on specific projects.

This study does not contain primary data gathering through surveys or interviews with BAAINBw employees or other stakeholders. It is restricted to document analysis, comparison analysis, and theoretical analysis. As a result, the conclusions are based on data from published reports, official guidelines, scholarly studies, and policy assessments; nevertheless, they do not take into account current viewpoints or informal organizational dynamics. Additionally, the analysis is restricted to the German federal defense procurement system and does not thoroughly analyze procurement procedures used by other European countries or at the service level (Army, Navy, Air Force). Despite being instructive, the U.S. parallel should be understood cautiously because of the contrasts in institutional histories,



parliamentary structures, and legal systems. Furthermore, this research represents the level of knowledge as of late 2024 and early 2025. As a result, several mentioned processes may be subject to change due to the quick speed of defense procurement reform. The analysis does not aim to deliver an exhaustive history of all Bundeswehr reforms but focuses on software related acquisition. Lastly, this study does not cover all technical facets of software development or Cybersecurity integration into procurement procedures, nor does it offer comprehensive cost-benefit evaluations of suggested improvements.

E. RESEARCH METHODOLOGIES

The comparative study is based on a theoretical and empirical comparison along with an organized document analysis. It entails methodically analyzing the body of research on defense procurement in Germany and the U.S., as well as government regulations and official reports, to pinpoint its advantages and disadvantages. Case studies of acquisition projects that highlight each system's effectiveness, responsiveness, and agility are used to supplement the analysis. To identify strategies to enhance Germany's defense procurement system, especially in implementing agile software acquisition techniques, the comparative framework outlined in this project will look at processes like requirements development, budgeting, program management, and oversight.

F. SUMMARY

The main objective of this thesis is to comprehend the reasons behind the German defense procurement system's difficulties implementing agile software acquisition and to create workable suggestions for removing these obstacles. Three analytical techniques will be used: The formal structure of the German procurement system is revealed through document analysis; a comparison with the U.S. DoD reveals how other countries have dealt with comparable issues; the persistence and interaction of these barriers will then be explained theoretically. A thorough evaluation of the obstacles and evidence-based suggestions for the BAaINBw to enable more prompt defense software purchase are anticipated results.



II. LITERATURE REVIEW

This chapter provides a structured review of the relevant literature that informs about barriers to agile software acquisition in the German defense procurement system. It is organized thematically to build a logical foundation for addressing the research questions.

The examination begins with an analysis of the German defense procurement system. The Kiel Institute (2024) presents an empirical examination of procurement capacity and timelines, emphasizing significant discrepancies between orders made and capabilities ultimately provided. Rombach (2025) provides a critical evaluation of procedural and legal impediments that result in protracted and inefficient acquisition processes.

The conceptual and practical underpinnings of agile software acquisition are primarily derived from international literature and best practices, notably highlighting the U.S. Department of Defense's Software Acquisition Pathway as delineated in DoDI 5000.87, which articulates the fundamental distinctions between agile methodologies and conventional, sequential approaches. Novak (2023) consolidates these practices to elucidate fundamental agile principles in the context of defense acquisition.

Finally, we consider comparative and reform-oriented literature that addresses how defense organizations in different national contexts have attempted to adopt agile methods, what obstacles they have faced, and what lessons have emerged (Calabria, 2022).

In conclusion, the research gap that this study addresses is identified—namely, the lack of comprehensive analysis that integrates structural, legal, and cultural dimensions specifically in the context of agile software acquisition within German defense procurement.



A. GERMAN DEFENSE PROCUREMENT AND SYSTEMIC CHALLENGES

The German defense procurement system has been the subject of considerable research and policy analysis. Wolff et al. (2024) conduct an empirical examination of Germany's defense procurement capabilities and timelines, observing that "Germany's massive disarmament in the last decades and the current procurement speed, [...] Germany will not attain 2004 levels of armament for about 100 years" (p. 2). Their study analyzes concrete procurement timelines, addressing instances where schedule delays and production limitations significantly exceed initial projections, and underscores a continual disparity between procurement intentions (orders placed) and the actual delivery of capabilities (items received and operationalized).

Academic research on the German procurement framework has examined the institutional structure and human capital dimensions. Rodler (2013) analyzed the Customer Product Management (CPM) guidelines and documented that "[m]any of the CPM's specified deliverables, like formulating needs, writing requirements and conducting analysis, are created and managed by military personnel that are assigned to support the acquisition management [and] are not always familiar with the common systems engineering and acquisition methodologies and tools" (p. 4). This research identifies knowledge gaps within BAaINBw as a structural challenge in the acquisition process.

The Federal Ministry of Defense (BMVg) has published acquisition guidance reflecting the institutional framework. The Projektbezogene Bedarfsdeckung und Nutzung (PBN) regulation (A-1500/3, effective May 23, 2024) represents the current acquisition framework. The regulation establishes three procurement pathways and emphasizes speed as highest priority, with defined timelines for the analysis phase (maximum six months) and final decision-making (ten to fifteen working days depending on project category). The framework mandates preference for market-available solutions and establishes Integrated Project Teams (IPT) with defined user involvement structures.

Policy analysis from the CDU/CSU parliamentary faction (2025) provides a critical assessment of the German procurement system's current status. It is characterized



as at the limit of its performance (“nach wie vor an seiner Leistungsgrenze,” p. 4). The analysis identifies continuing structural challenges including low thresholds for direct procurement (€5,000), extended timelines for the realization phase not covered by PBN reforms, standardization gaps in digital systems, and issues in the personnel rotation within the BAABINBw that challenges continuity. The CDU/CSU report notes that legal flexibilities introduced in the 2022 Beschaffungsbeschleunigungsgesetz are insufficiently used and observes that the law itself expires at the end of 2026, which leaves uncertainty for long-term procurement planning.

Paulus (2025) focuses on software procurement, noting that “there is no single entity in the Bundeswehr that has overall responsibility for procuring and managing software; instead, responsibility is distributed among many different entities.” The research emphasizes fragmentation in software governance and identifies gaps in oversight of software supply chain risks, including vendor security practices and third-party dependencies. This fragmentation is said to create significant vulnerabilities for military digital capabilities.

Policy analysis by Rombach (2025) describes the German procurement process as “slow and cumbersome” and identifies specific procedural obstacles including the necessity for the approval from Bundestag Budget Committee at €25 million thresholds and lengthy legal appeals processes (“Nachprüfungsverfahren”). The analysis documents that the possibility to enter legal discussions “incentivize defense manufacturers to threaten entering into years-long appeals with the aim of forming a consortium with the winning bidder” creates delays in fulfilling war-fighter needs.

When taken as a whole, this literature describes a procurement system with several institutional levels, distinct regulatory frameworks (CPM in the past, PBN in the present), personnel knowledge gaps, dispersed responsibilities—particularly severe in software governance—and numerous legal oversight and approval points.

B. AGILE SOFTWARE ACQUISITION: CONCEPTUAL FOUNDATIONS

The main hurdle facing modern defense acquisition is the disconnect between the nature of software and the traditional procurement systems that were built for hardware.



While hardware typically follows a straightforward life cycle with a clear endpoint, software is much more fluid, evolving continuously and without a defined conclusion. This key difference is crucial for grasping agile acquisition methods and why they are essential for today's defense organizations.

To start, it is important to acknowledge that software is fundamentally different from hardware. McQuade et al. (2019) highlighted this in their Software Acquisition and Practices (SWAP) study, noting that one of the three core themes reshaping defense acquisition is that "Software is different than hardware (and not all software is the same)" (p. 2). Hardware can be developed, procured, and maintained in a linear way, while software represents an ongoing capability that needs constant support and enhancement throughout its life cycle.

Software development, on the other hand, is a continuous process. This is because it is far easier to improve software than to improve hardware. Rewritten software code can easily be downloaded, whereas improved mechanical parts must be designed, manufactured and shipped to a location where they can be installed by skilled technicians. (Bush, 2024, p. 7)

This difference has significant consequences for acquisition strategies. Traditional waterfall methods treat software like hardware, assuming that all requirements can be clearly defined before development kicks off. This creates rigidity that goes against the very nature of software. McQuade et al. (2019) points out that laws and regulations that enforce a sequential, hardware-focused approach "weaken our national security and expose our nation to risk" (p. 1) by hindering rapid deployment and ongoing improvement.

Traditional waterfall methods lay out software development as a series of distinct phases: requirements, design, implementation, verification, and maintenance. Each phase is wrapped up, validated, and set before moving on to the next. Kara et al. (2024) describe the waterfall model as progressing "through each stage of development once," (p. 1) based on the idea that each stage can be completed independently.

The major issue with this approach is that it doesn't hold up in the real world of software development. Olagbemi et al. (2009) highlight the fallout: "In the Department



of Defense (DoD), the typical outcome of a software acquisition program has been massive cost escalation, slipping planned delivery dates and making major cuts in the planned software functionality to guarantee program success” (p. 188). The core problem lies in the belief that requirements can be clearly defined and remain unchanged. However, military operational needs shift as threats evolve, technology progresses, and real-world experiences create new demands. The waterfall model lacks a way to adapt to these changes; it forces managers to either freeze requirements (turning a blind eye to reality) or deal with delays and budget overruns.

Olagbemiro et al. (2009) pinpoint “requirements instability” as a key issue: “In software development, requirements instability has a profound impact on a program’s schedule and drives up costs” (p. 189). The common practice of locking in requirements before development “does not work and is not representational of the DoD doctrine to support the flexible development and rapid delivery of products to meet the warfighters needs in an ever-changing environment” (p. 190).

Agile methodologies turn the traditional waterfall approach on its head by focusing on iterative development cycles, ongoing user feedback, and gradual delivery. According to Kara et al. (2024), agile is all about creating “ the project via iterations and sprints, with the intention of changing or replacing parts of it as the project evolves” (p. 1). Instead of following a linear path, agile breaks work into short cycles where teams can design, develop, test, and showcase functional increments.

The main idea here is to manage changing requirements through constant engagement with stakeholders. Rather than locking in requirements, agile sees them as evolving elements that get refined through repeated cycles. Bush (2024) highlights this in the context of the Software Acquisition Pathway (SWP) established in U.S. defense acquisition, stating that SWP “encourages more agile acquisition by shifting from prescriptive, monolithic requirements to high-level needs statements that can be modified in response to changes in user needs” (p. 7). This transition—from strict requirements to flexible needs statements—marks a significant shift that allows for ongoing refinement.



The concept of the Minimum Viable Product (MVP) puts Agile’s iterative philosophy into practice in a tangible way. DoDI 5000.87 describes an MVP as “an early version of the software to deliver or field basic capabilities to users to evaluate and provide feedback on” (p. 22). The insights gained from MVPs are crucial for shaping the scope, requirements, and design. Importantly, the MVP is not just a bare-bones final product; it’s a launchpad for learning and improvement.

Novick (2024) offers a broader definition: “a prototype that provides the program office with enough information to determine that the acquisition is worthwhile as soon as possible in the product development process. It may or may not be a fielded” (p. 99). The MVP embodies a key agile principle: learning by doing. Instead of getting bogged down in extensive requirements analysis, a MVP quickly puts functional features into the hands of users. Their feedback—like unexpected use cases and the gaps between what was assumed and what’s actually needed—shapes the next development phase. This approach fosters proactive risk management: fixing misunderstandings with a low-fidelity prototype is much more cost-effective than dealing with the fallout of a fully developed system.

McQuade et al. (2019) highlight that “Speed and cycle time are the most important metrics for managing software” (p. 1). The swift delivery of capabilities takes priority; costs and timelines are controlled through clear scope definitions, and specifications can be adjusted based on user input.

This strategic focus reflects both competitive and operational realities. On the tech front, software capabilities are advancing at a breakneck pace; requirements set in the first year might be outdated by the fifth. On the operational side, military needs are constantly evolving. Bush (2024) showcases tangible outcomes through agile practices: the Next Generation Squad Weapon was fielded in about three years—saving nearly 18 months compared to standard timelines; the M10 Booker achieved “low-rate initial production in just four years,” (p. 8) as opposed to the usual “six to 10 years on the major capability acquisition pathway” (p. 8).



C. COMPARATIVE AND REFORM-ORIENTED LITERATURE

The U.S. DoD has made some significant changes to its acquisition system to better handle software-intensive defense capabilities. The Adaptive Acquisition Framework (AAF), which was set up through DoDI 5000.02, gives program managers the flexibility to choose from various pathways, including the Software Acquisition Pathway (SWP), Middle Tier of Acquisition (MTA), and Urgent Capability Acquisition (Bush, 2024). The SWP combines Agile Software Development, DevSecOps, and Lean Practices, pushing programs to prove their capability viability within just one year (Howard et al., 2025).

The results of these reforms speak for themselves. Bush (2024) notes that the Next Generation Squad Weapon was fielded in three years using the MTA—saving a whopping 18 months—while the M10 Booker reached initial production in four years, which is a significant improvement compared to the usual six to ten-year timeline.

The core issue lies in the mismatch between traditional acquisition timelines and the fast-paced nature of modern software development. The Government Accountability Office (GAO) (2004) found that successful programs utilized evolutionary development environments, disciplined processes, and meaningful metrics. On the flip side, programs that missed these marks—like the F/A-22, Space-Based Infrared System, and Comanche—saw cost overruns of 88–231% and schedule delays of 104–120% (Government Accountability Office [GAO], 2004). The GAO (2004) estimated that the DoD was spending around \$8 billion each year just to fix software quality issues—40% of the \$21 billion software budget for fiscal year 2003.

Novick (2024) points out the differences between software and hardware acquisition, highlighting that software needs iterative prototyping and MVP, while hardware typically follows a more linear process. By applying agile principles through Urgent Capability Acquisition, the High Mobility Decontamination System was able to deliver its capabilities in just nine months, and the Negatively Pressurized Conex system was deployed in an impressive 95 days (Novick, 2024).



The German defense procurement system functions within various institutional frameworks. According to Rodler (2013), the Customer Product Management (CPM) guidelines set forth deliverables that are often crafted by military personnel who may not be well-versed in systems engineering methodologies. The central procurement authority, BAAINBw, oversees around 1,700 active projects (Bundestag, 2017).

Recent reforms have significantly boosted capacity. The Grosswald Institute (2025) highlights that approvals for large-scale projects jumped from 55 in 2023 to 97 in 2024—a remarkable 77% increase. As noted by Henckel (2022), BAAINBw has revamped its strategy to focus on market-ready products that can deliver 80% of the required capability quickly, rather than waiting for the perfect 100% solution. This includes involving end users in the specifications, forming commissions with troop representatives and commercial experts, and broadening framework contracts.

However, these reforms have had a limited structural impact. The Grosswald Institute (2025) points out that even with €58 billion in procurement approvals (including €20 billion from special defense funding) in 2024, there are still significant capability gaps in areas like ammunition, maintenance, and personnel. This paradox—where increased funding doesn’t lead to improved capabilities—suggests that there are structural issues that go beyond just budgetary reforms.

A key structural difference is in how organizations are integrated. The U.S. system keeps the Joint Capabilities Integration and Development System (JCIDS) requirements separate from the Planning, Programming, Budgeting, and Execution (PPBE) processes, which fosters accountability but can lead to misalignment. In contrast, the German system combines these through the Integrated Planning Process (IPP), which allows for better coordination but also makes it susceptible to siloed decision-making.

Decision-making structures vary quite a bit. In the U.S. Air Force, they use a centralized Milestone Decision Authority (MDA) that requires formal approvals at key decision points. On the other hand, Germany’s approach leans towards a decentralized model, where project managers have more say. This setup allows for greater flexibility but can lead to inconsistent oversight (Air Force Institute of Technology, 2015).



Both systems are grappling with contracting issues. Traditional procurement contracts focus on a set scope, schedule, and cost, while agile methodologies are designed to adapt to changing requirements. The Air Force Institute of Technology (2015) points out that this fundamental mismatch is a significant hurdle.

The U.S. has made agile practices a requirement across the department. A memorandum from March 2025, titled “Directing Modern Software Acquisition to Maximize Lethality,” mandates the use of Software Procurement (SWP) for all software components and encourages the use of Commercial Solutions Openings and Other Transaction Authority (Howard et al., 2025). Howard et al. (2025) reports that, in presenting the 2025 software acquisition reform, the Department of Defense cited prior experience with more than 500 CSO-based Other Transactions, 88 percent of which went to nontraditional defense contractors..

Germany’s approach reflects its unique context. The 2022 Beschaffungsbeschleunigungsgesetz introduced simpler procedures and raised thresholds (Henckel, 2022), while the upcoming BAaINBw 2026 restructuring is being described as “disruptive.” However, the Grosswald Institute (2025) stresses that simply increasing spending won’t fix “structural weaknesses”—both financial and organizational reforms are necessary.

Both systems face significant institutional challenges. The Air Force Institute of Technology (2015) notes that for agile practices to take hold, cultural and organizational shifts are essential, including training, process re-engineering, and changes to contracting. Training is a key hurdle, as resistance within organizations can slow the shift from traditional sequential processes to more iterative ones.

The U.S. tackles this issue with a focused approach: they require training at the Defense Acquisition University and have clear agile policies in place. On the other hand, Germany’s reforms are mostly about changing laws and procedures, focusing on timelines and thresholds, but they lack the same strong institutional push for changing methodologies.



D. IDENTIFIED RESEARCH GAP

The literature reviewed here sheds light on the contrasting experiences of the U.S. and Germany in adopting agile software acquisition. Bush (2024) clarifies that the Department of Defense's Adaptive Acquisition Framework established a specialized Software Acquisition Pathway aimed at expediting the delivery of software capabilities via iterative development and ongoing user feedback. Howard et al. (2025) elucidates that a 2025 Department of Defense memorandum designates the Software Acquisition Pathway as the favored approach for software development procurements, with a specific objective to reduce bureaucratic obstacles and expedite software delivery.

According to Henckel (2022), the 2022 Bundeswehr Procurement Acceleration Act (Bundeswehr-Beschaffungsbeschleunigungsgesetz) implemented streamlined procedures and elevated thresholds aimed at reducing procurement durations for defense equipment. The subsequent PBN framework prioritizes expediency, a preference for commercially available solutions, and organized user engagement through IPTs, indicating a transition towards more time-sensitive and user-centric procurement processes (Bundesministerium der Verteidigung [BMVg], 2024).

However, a notable gap emerges in the literature: even with increased procurement efforts and resources, Germany's reforms haven't led to a corresponding boost in capability delivery. The Grosswald Institute (2025) notes that approvals for large-scale projects nearly doubled from 2023 to 2024, yet there are still considerable shortfalls in areas like ammunition, maintenance, and personnel. This puzzling situation—where more resources and authority don't equate to better outcomes—remains largely unaddressed in the current comparative studies.

The core issue is the lack of a comprehensive analysis that looks at the structural, legal, and cultural barriers to agile software acquisition within the German defense procurement landscape. While some individual obstacles have been identified—such as knowledge gaps among acquisition staff (Rodler, 2013), disjointed software governance (Paulus, 2025), protracted approval processes (Rombach, 2025), and institutional resistance to change (Air Force Institute of Technology, 2015)—the existing literature



fails to systematically explore how these barriers interact and specifically hinder the implementation of agile methodologies.

The existing literature doesn't really clarify which specific institutional mechanisms, decision-making structures, or contractual practices from the U.S. system could be adapted to tackle certain constraints in the German context. It overlooks the significant differences in legal frameworks, parliamentary systems, and organizational traditions. While the literature outlines what each system has, it falls short of systematically exploring how specific mechanisms could be transferred to overcome the identified challenges.

This study aims to fill that gap by providing a comprehensive analysis of the structural, legal, and cultural barriers to agile software acquisition within BAaINBw. It looks at how these barriers interact to create systemic inertia and identifies evidence-based adaptations of U.S. mechanisms that could help make German defense software acquisition more responsive.



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III. BACKGROUND

This chapter offers the essential context to comprehend the challenges associated with agile software acquisition in the German defense procurement system. This analysis initially outlines the historical evolution of defense procurement in Germany and the U.S., illustrating how both systems were influenced by hardware-centric assumptions. It subsequently contrasts their institutional frameworks to elucidate the distribution of authority, responsibility, and decision-making. Ultimately, it analyzes the existing regulatory frameworks in both nations to underscore the distinctions between the U.S. software-centric acquisition model and Germany's more sequential procurement approach. Collectively, these components delineate the institutional and legal framework for the subsequent comparative analysis.

A. HISTORICAL CONTEXT

Military capabilities have seen a significant shift in their technical makeup. The GAO (2004) highlighted this change vividly: The software content in aircraft jumped from about 10% in the early 1960s with the F-4 fighter to a staggering 80% in the F/A-22. Nowadays, software is responsible for crucial functions, ranging from flight control to weapons targeting. This shift from hardware-focused systems to software-heavy ones has created a disconnect between acquisition processes that were built for physical manufacturing and the unique demands of software development.

The impact of this disconnect became clear in major U.S. acquisition programs. Take the F-22 modernization program, for instance; it showcased the issue perfectly. The traditional sequential acquisition processes, which were tailored for hardware development with set specifications, fell short for software-intensive systems where requirements changed throughout the development phase. As a result, schedule delays and cost overruns piled up, especially when defects were found late in the development cycle, making them costly to fix (Defense Intelligence Agency, 2018).

The U.S. DoD started to recognize this challenge in the early 2000s. The Software Acquisition and Practices (SWAP) study pointed out the fundamental mismatches



between the traditional waterfall acquisition model and software development (Government Accountability Office, 2004). Initial efforts focused on promoting iterative development and ongoing user involvement, but these changes remained tactical, operating within the existing regulatory frameworks that were originally designed for hardware acquisition.

The shift in institutional practices really picked up speed with the launch of the Software Acquisition Pathway (SWP) through DoDI 5000.87 back in October 2020. This new pathway made a clear distinction between software acquisition and the traditional hardware-focused processes, emphasizing agile development principles, aiming for MVP delivery within a year, and allowing for ongoing improvements based on user feedback. At the same time, the revision of DoDI 5000.02 introduced the Adaptive Acquisition Framework, which included various pathways designed for different types of capabilities (DoD, 2022).

These changes have shown real, measurable success. By 2025, the Software Acquisition Pathway had become the go-to standard for all DoD software development programs, with clear evidence of shorter acquisition timelines and a broader involvement of nontraditional defense contractors (Secretary of Defense, 2025). The commitment to this new approach was clear: software acquisition was no longer just a part of traditional procurement; it had evolved into a completely distinct category that required its own processes, authorities, and contractual methods.

Germany faced similar procurement hurdles after the Weise Commission report in 2010, which pointed out significant bureaucratic inefficiencies and a lack of clear responsibilities within the Bundeswehr's acquisition system (Strukturkommission der Bundeswehr, 2010). The reforms that followed—especially the 2022 Beschaffungsbeschleunigungsgesetz and the 2024 PBN regulation—aimed to speed up decision-making processes and focus on solutions readily available in the market (BMVg, 2024).

However, these German reforms took a fundamentally different approach. While they tackled the need for quicker and more flexible procedures, they didn't recognize



software acquisition as a separate category that would require unique methodologies. The PBN framework pushed for swift decision-making and market-driven solutions but didn't explicitly mention agile development principles or the concept of MVP. As a result, the acquisition system continued to be organized around a sequential planning and delivery model, even with the legislative push to speed up individual steps.

B. INSTITUTIONAL STRUCTURE

This section initially analyzes the U.S. procurement system to establish a comparative baseline, highlighting its distinct organizational logic and acquisition pathways in contrast to the German model, thereby explaining the institutional conditions influencing agile software acquisition.

1. The U.S. Procurement System

The U.S. DoD has a structured acquisition system that separates policy development from program execution. The Office of the Under Secretary of Defense for Acquisition and Sustainment (OUSD(A&S)) is responsible for setting acquisition policies, creating frameworks, and overseeing defense procurement throughout the entire Department (DoD, 2022). DoD (2022) outlines the decision-making processes, approval authorities, and compliance requirements that apply to all acquisition programs, no matter the service or type of commodity involved.

At the service level, organizations like the Army Acquisition Executive (ASA), Navy Acquisition Executive (ASN), and Air Force Acquisition Executive (ASC) carry out acquisition programs specific to their branches while following the policies set by DoD. Each service has its own acquisition authority and decision-making power for programs that fall within certain limits and policy guidelines. These service acquisition organizations have dedicated teams, including program managers, contracting officers, systems engineers, and technical specialists, all organized by their specific commodity or capability area (DoD, 2022).



This setup leads to several parallel execution centers that operate under a unified policy framework. Decision-making authority is spread across the different service levels, allowing for quick decisions at the program level while ensuring consistency across the department through centralized policies.

2. The German Procurement System

The German acquisition system is primarily focused on the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw), which was set up in 2013 to serve as the main procurement authority for the Bundeswehr. BAAINBw operates under the umbrella of the Federal Ministry of Defense (BMVg).

This office is divided into eight directorates based on different commodities: Combat Systems (K), Air Systems (L), Sea Systems (S), Land Support Systems (U), Information Technology (I), IT Support and Services (G), Complex Services and Purchasing (E), and Central Affairs (ZA) (Bundeswehr, 2026). Each directorate is responsible for managing the entire acquisition life-cycle within its specific area, which includes defining requirements, selecting suppliers, managing contracts, and providing in-service support.

Project management is handled by dedicated project offices that focus on technical execution, system integration, and ensuring a smooth operational transition. A centralized Project Management Office offers shared expertise and standardized processes that all directorates can utilize. The Federal Ministry of Defense outlines and regulates acquisition procedures through frameworks like the PBN regulation, which sets the timelines, approval requirements, and parliamentary oversight thresholds (BMVg, 2024).

C. REGULATORY SITUATION

The institutional differences are manifested in the regulatory frameworks that oversee acquisitions in each nation. This section examines the U.S. regulatory model first, as it demonstrates how software-specific acquisition rules can be integrated into procurement policy.



1. The U.S. Regulations

The Adaptive Acquisition Framework (AAF), which was created with DoDI 5000.02, governs defense acquisition in the United States. It divides procurement into multiple pathways so that acquisition procedures can be customized to the nature, risk, and urgency of the capability being acquired (DoD, 2022). The AAF includes six pathways and clearly distinguishes software acquisition as a distinct category instead of treating software as a component of conventional hardware procurement (DoD, 2022).

To facilitate the timely acquisition of custom software capabilities developed for the armed forces, the U.S. DoD established the Software Acquisition Pathway in DoDI 5000.87 for software-intensive capabilities (DoD, 2020). Because they surpass traditional cost thresholds, programs utilizing this pathway are typically exempt from the traditional Joint Capabilities Integration and Development System and are not considered major defense acquisition programs (DoD, 2020). Rather, the regulatory model is based on quick and iterative delivery: programs must show operational viability within a year of the initial obligation of funds, and they must provide new capability to operations at least once a year after that. Where feasible, more frequent releases are encouraged (DoD, 2020). The U.S. framework therefore embeds agile principles directly into acquisition regulation.

According to the DoD (2020), programs must employ iterative techniques like agile or lean development, DevSecOps practices, human-centered design, continuous user engagement, automated testing when practical, and life cycle strategies for cybersecurity, intellectual property, and supportability. The pathway is structurally separated into two phases: planning and execution. To begin execution, capability needs statement, user agreement, acquisition strategy, test strategy, and cost estimate are needed (DoD, 2020).

2. The German Regulations

By contrast, the current German regulatory situation is centered on the 2024 regulation PBN (BMVg, 2024). Its stated objective is to provide the Bundeswehr with the equipment required for mission fulfillment as quickly as possible while observing statutory requirements (BMVg, 2024). The regulation recognizes three procurement



variants—EinkaufBw, Komplexe Dienstleistungen, and PBN—and defines the regular PBN procedure as the default model (BMVg, 2024).

The German regular procedure remains organized in sequential phases of analysis, realization, and use, carried out through Integrated Project Teams (BMVg, 2024). It emphasizes time as the guiding factor, prioritizes market-available products, strengthens user involvement in defining functional requirements and specifications, and provides special procedures for IT services, development solutions, and urgent operational needs (BMVg, 2024). Even so, the system remains strongly document- and approval-driven: the analysis phase is generally limited to six months, selection decisions are to be taken within ten to fifteen working days, and contracts with a volume of 25 million euros or more must be submitted to the Bundestag Budget Committee before signature (BMVg, 2024).

3. The Contrast

Germany continues to govern software procurement predominantly within a comprehensive project-procurement framework that emphasizes time, commercially available products, and sequential phases of analysis, implementation, and utilization, rather than instituting a separate, software-specific acquisition system (BMVg, 2024). In contrast, the U.S. DoD has established a specialized Software Acquisition Pathway that categorizes software as a distinct acquisition category, incorporating specific mandates for iterative development, ongoing user engagement, and regular delivery of functional increments (DoD, 2020). The broader Adaptive Acquisition Framework enhances this differentiation by providing various pathways customized for distinct capability types, including software-intensive programs, rather than depending on a singular predominant process logic (DoD, 2022).

This differentiation is also evident in contemporary German reform discussions. The CDU/CSU parliamentary group contends that rapidly evolving software and cyber environments necessitate iterative adaptation and should not be regulated by the same inflexible, linear procedural logic as more static procurement sectors (CDU/CSU-Fraktion im Deutschen Bundestag, 2025).



D. SUMMARY

This chapter demonstrates that historical development, institutional design, and regulatory framework are crucial for comprehending the challenges of agile software acquisition in Germany. Historical analyses reveal that both the U.S. and Germany initially developed procurement systems based on hardware-centric acquisition principles, despite military capabilities becoming progressively software-defined and reliant on ongoing adaptation rather than singular delivery (GAO, 2004). The Strukturkommission's recommendations and subsequent ministry guidance in the German context emphasize that legacy processes and governance frameworks were established for substantial, hardware-intensive projects rather than for the ongoing development of software capabilities (Strukturkommission der Bundeswehr, 2010). Recent PBN guidance recognizes that modern capabilities are significantly influenced by software and digital interdependencies (BMVg, 2024).

The institutional comparison also highlights a notable disparity in organizational design between the two systems. In Germany, the procurement authority for significant projects is centralized within BAANBw, under the supervision of the BMVg, establishing a highly centralized framework for managing acquisition processes and oversight (Deutscher Bundestag, 2017). In the U.S., acquisition policy is primarily established by the DoD, whereas program execution is delegated to service-specific acquisition organizations operating within a unified policy framework (DoD, 2022).

Notably, the regulatory comparison indicates that the United States has implemented a software-specific procurement framework. DoD guidance delineates the Software Acquisition Pathway as a specific route that explicitly supports iterative development, ongoing user engagement, and accelerated delivery cycles within the overarching Adaptive Acquisition Framework (DoD, 2020). In contrast, the German PBN framework—despite recent acceleration reforms—still organizes projects into sequential, document-driven phases of analysis, realization, and utilization, and has yet to establish a comparable software-specific acquisition regime (BMVg, 2024).



Collectively, these findings indicate that obstacles to agile software acquisition in Germany do not arise from a singular legal regulation or a discrete organizational deficiency. Instead, they stem from the interplay of historically developed procurement frameworks, centralized institutional configurations, and a regulatory environment that has expedited processes without fundamentally transforming them for the development and maintenance of software-intensive defense capabilities (BMVg, 2024).



IV. COMPREHENSIVE ANALYSIS

This chapter utilizes a comparative institutional framework to elucidate the challenges of agile software acquisition in Germany, building upon the historical, institutional, and regulatory context established in the preceding chapter. It examines the interplay of organizational structure, legal limitations, and professional culture prior to assessing which aspects of the U.S. model may be applicable to the German context.

A. ANALYTICAL FRAMEWORK AND CHAPTER LOGIC

This chapter employs a comparative institutional framework to examine German defense procurement, considering acquisition failure because of interrelated structural, legal, and cultural constraints within the broader procurement system. Rodler (2013) emphasizes structural and human capital constraints by demonstrating that essential CPM deliverables are frequently generated by individuals lacking adequate systems engineering and acquisition expertise. Paulus (2025) highlights the fragmentation of governance and accountability in software procurement, indicating dispersed ownership and deficiencies in oversight regarding software supply-chain risks. Rombach (2025) emphasizes procedural and legal impediments, including Budget Committee thresholds and protracted review processes, as primary factors contributing to delays.

This chapter advances through three analytical stages: it initially identifies the core constraints within the German system, subsequently analyzes how the U.S. has tackled analogous issues in its acquisition framework. Ultimately it evaluates which U.S. mechanisms can be feasibly adapted to Germany's legal and political context.

The fundamental claim is that Germany's procurement challenges in software-intensive capability development are systemic rather than coincidental. While recent reforms, like the 2024 PBN framework, have accelerated some procedural stages and placed an emphasis on time, market-available products, and integrated project teams, the system is still primarily structured around a sequential, hardware-centered acquisition logic that is only partially suited to iterative software development (BMVg, 2024). The analytical value of the U.S. is to identify functionally equivalent solutions for persistent



issues, such as fragmented governance, rigid requirement definition, and weak feedback integration in software acquisition.

From a theoretical standpoint, this comparative institutional lens views German defense procurement as a path-dependent system where historically developed structures, practices, and role conceptions produce self-reinforcing patterns that make fundamental change expensive and politically challenging (Strukturkommission der Bundeswehr, 2010). According to the Strukturkommission der Bundeswehr (2010), the Bundeswehr's organizational structure is excessively complicated, characterized by overlapping duties, divided responsibilities between military and civilian branches, and a lack of clear accountability, which encourages actors to replicate established procedures rather than try out novel arrangements. The “entire ecosystem of procurement with its responsibilities, structures, and processes” has remained largely unchanged even after the *Zeitenwende*, according to recent political evaluations of the procurement system. This suggests that reform initiatives have so far reinforced rather than broken established patterns (CDU/CSU–Fraktion im Deutschen Bundestag, 2025).

The observation of bureaucratic risk aversion and blame avoidance in the German context serves as a second building block. The Weise Commission specifically emphasized “Verantwortungsdiffusion” in the BMVg, contending that ambiguous and overlapping responsibilities make targeted steering challenging and fostering a culture in which highly qualified employees impede one another in unsuccessful structures (Strukturkommission der Bundeswehr, 2010). According to more recent analyses of Bundeswehr procurement, it is frequently safer for individual officials to escalate decisions, demand additional documentation, and adhere rigidly to established processes than to take ownership of innovative approaches that could expose them to concentrated blame if outcomes are contested. These analyses also highlight overburdened procedures, dense legal and parliamentary controls, and a tendency to prioritize formal compliance over timely capability delivery (CDU/CSU–Fraktion im Deutschen Bundestag, 2025).



B. STRUCTURAL, LEGAL, AND CULTURAL CHALLENGES IN THE GERMAN PROCUREMENT SYSTEM

The subsequent analysis demonstrates that the obstacles to agile software acquisition in Germany are interrelated rather than distinct. This initial subsection analyzes how fragmented responsibilities and centralized approval mechanisms generate bottlenecks that impede decision-making and diminish flexibility.

1. Structural Fragmentation and Centralized Bottlenecks

A principal paradox within the German system is its pronounced centralization in organizational structure, juxtaposed with a fragmentation of functional responsibilities. BAaINBw serves as the principal procurement authority and oversees an extensive portfolio of projects; however, the responsibilities for software, planning, user input, IT governance, budgeting, and operational implementation are dispersed among various stakeholders, resulting in coordination challenges and hindering cohesive decision-making (Deutscher Bundestag, 2017). Paulus (2025) emphasizes this fragmentation in software governance, indicating that no singular entity assumes comprehensive responsibility for the procurement and management of software, and that the oversight of software supply-chain risks is distributed among multiple organizations.

The Weise Commission has emphasized that the Bundeswehr's overall organizational structure is analytically pertinent to procurement governance and contributes to fragmentation (Strukturkommission der Bundeswehr, 2010). The existing PBN framework aims to address these issues by designating formal project leadership roles and creating IPTs, thus clarifying user participation (BMVg, 2024). Nonetheless, these teams remain integrated within a framework characterized by numerous supervisory interfaces and delineated responsibilities among BAaINBw, planning authorities, user organizations, and ministerial oversight entities, resulting in many decisions and approvals being subjected to identical institutional bottlenecks. Rombach (2025) contends that this concentration of authority leads to procedural bottlenecks, whereas Paulus (2025) demonstrates that, within the software sector, distributed responsibility intensifies delays instead of promoting agility.



2. Procedural and Legal Rigidity

The revised PBN process necessitates comprehensive documentation, systematic option analysis, economic justification, risk assessment, and formal selection determinations. Significant projects are contingent upon external approval criteria, including the Bundestag Budget Committee threshold exceeding 25 million euros, thereby introducing an additional decision-making layer to the process (BMVg, 2024). Rombach (2025) observes that procurement disputes and legal review processes can exacerbate delays in execution, especially when unsuccessful bidders strategically employ appeal mechanisms in high-value defense contracts.

PBN represents a legitimate acceleration initiative in formal design, constraining the analysis phase to a maximum of six months and projecting selection decisions within ten to fifteen working days, contingent upon the project category (BMVg, 2024). Nonetheless, these expedited front-end timelines do not eliminate subsequent inflexibility in aspects such as contracting, parliamentary approval, compliance review, testing, and realization, indicating that advancements in initial procedural speed do not inherently result in agile delivery throughout the entire project life cycle. The CDU/CSU parliamentary group emphasizes that, despite acceleration measures, prolonged realization timelines and structural impediments persist in obstructing timely capability delivery (CDU/CSU-Fraktion im Deutschen Bundestag, 2025).

3. Hardware Legacy in a Software-Intensive Environment

Conventional defense acquisition systems were initially designed based on relatively stable, hardware-oriented capability assumptions and linear, sequential life-cycle models. McQuade et al. (2019), DoD (2020), and Novak (2023) all underscore that traditional processes were tailored for ships, vehicles, and aircraft components, where early specification, rigid requirements, and stringent stage-gate control were viewed as advantages rather than limitations. This hardware-focused logic conflicts with software-centric capability development, characterized by greater uncertainty, evolving requirements, and value generated through ongoing iteration rather than singular delivery.



The existing PBN regulation delineates distinct pathways for market-ready products, IT services within cluster logic, development solutions, and urgent requirements, emphasizing expediency and the utilization of off-the-shelf solutions when feasible (BMVg, 2024). Nonetheless, PBN lacks a software-specific acquisition philosophy akin to the U.S. Software Acquisition Pathway outlined in DoDI 5000.87, which prioritizes human-centered design, ongoing user feedback, agile and DevSecOps methodologies, and swift, iterative releases as fundamental principles rather than anomalies. Concepts like MVP delivery, time-boxed increments, and structured iterative capability growth are still peripheral in German regulation. Recent reforms recognize the necessity for speed and market accessibility but predominantly adhere to a hardware-centric acquisition logic that is only partially congruent with the realities of software-driven defense capabilities.

Figure 1 illustrates how software-related decisions are dispersed across planning, ministerial steering, procurement execution, and budgetary oversight, creating repeated handoffs and a hardware-centric bottleneck at the center of the process.

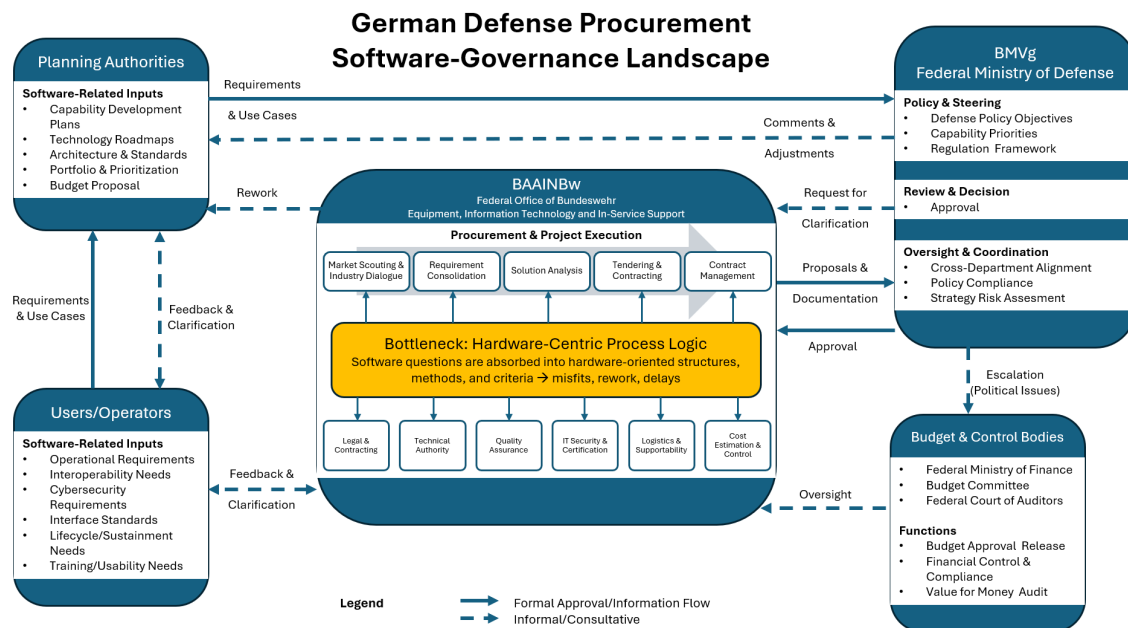


Figure 1. German Defense Procurement Software-Government Landscape

4. Workforce, Skills, and Risk Culture

Organizational capacity constitutes another critical constraint. Rodler (2013) demonstrates that significant acquisition deliverables within the previous CPM framework were frequently generated or overseen by individuals lacking extensive systems-engineering and acquisition proficiency, suggesting that process quality is contingent not solely on formal regulations but also in the depth of expertise within the organization. The Weise Commission underscored the necessity for a more professional administrative culture, enhanced governance, and clearer management frameworks, contending that procedural reform without personnel reform is improbable to yield enduring change. Paulus (2025) asserts that no singular Bundeswehr entity possesses complete responsibility for software procurement and management, resulting in fragmented authority and undermining the development of a cohesive software-oriented professional community within the procurement system. In this context, institutional risk aversion is justified: when accountability is ambiguous, individuals are more inclined to safeguard themselves through procedural adherence, documentation, and escalation rather than through adaptive experimentation (Strukturkommission der Bundeswehr, 2010). The disparity in expertise in systems engineering and acquisition exacerbates this issue, as numerous critical deliverables are generated by individuals lacking comprehensive methodological training (Rodler, 2013).

5. Oversight, Accountability, and Speed Trade-Offs

The German system encounters a continual tension between democratic oversight and operational efficiency. Oversight mechanisms fulfill valid constitutional and fiscal objectives in a defense sector marked by substantial expenditure, strategic sensitivity, and corruption risks; however, they may prolong decision-making processes and promote risk-averse behavior in both industry and administration (Rombach, 2025). The Weise Commission emphasized this tension by illustrating how intricate layers of control and dispersed responsibilities promote defensive, procedure-oriented behavior instead of proactive problem-solving (Strukturkommission der Bundeswehr, 2010).



The parliamentary threshold of 25 million euros is particularly important as considerable procurement activities are typically finalized by the time projects arrive at the Budget Committee, making delays or renegotiations at this juncture incur significant opportunity costs (BMVg, 2024). This does not suggest the elimination of oversight; instead, it indicates that the existing system is predominantly dependent on ex ante control and multiple layers of approval, rather than ex post performance evaluation and differentiated pathway selection, which is less suited to iterative software delivery where controlled adaptation is standard rather than exceptional (BMVg, 2024). Conversely, the U.S. Adaptive Acquisition Framework demonstrates how strong accountability can be upheld via pathway-specific milestones, customized evidence requirements, and appropriate decision structures (DoD, 2022). The outcome is a continual trade-off between efficiency and accountability that Germany has yet to resolve institutionally.

6. Cultural Barriers to Agile Software Acquisition

The Bundeswehr procurement system operates within an administrative risk culture that profoundly affects behavior in uncertain situations, transcending formal structures and legal frameworks. German public administration prioritizes legal correctness, equitable treatment, and ex post accountability over fostering experimentation or organizational learning. This establishes motivation for stringent adherence to regulations and the avoidance of evident errors. The Weise Commission (2010) has already identified the ministry and procurement structures as exhibiting “overstretched” complexity, fragmented responsibilities, and insufficient “learning and adaptive capacity.” The commission observed that highly qualified employees are impeded by structures “that are not conducive to success” (Weise Commission, 2010, pp. 30–36, 88–90). In such an environment, career incentives favor error-avoidance and audit-proof documentation, while the pursuit of expedited capabilities through risk-taking appears unreasonable to individual officials.

A significant disparity exists at the military-civilian interface that influences this risk culture. Civilian procurement organizations and the BAaINBw are chiefly assessed on legality, fiscal management, and the defensibility of their procedures in judicial and



audit contexts, whereas operational users encounter capability deficiencies and are more amenable to provisional solutions and gradual enhancements. Rodler’s analysis of the CPM framework (Rodler, 2013, pp. 52–58) indicates that numerous fundamental acquisition documents are authored by military personnel with insufficient acquisition expertise, while civilian specialists oversee procedural accuracy, thereby sustaining misunderstandings between the two groups. Consequently, instead of being regarded as a standard and beneficial aspect of iterative learning, user-driven requirement modifications stemming from operational experience are often perceived as “scope creep” or a failure in planning.

These cultural norms directly impede agile practices. Preliminary experimentation, MVPs, and iterative reprioritization of requirements are regarded as essential mechanisms for value creation within agile methodologies and the U.S. Software Acquisition Pathway (McQuade et al., 2019). The inclination towards comprehensive ex ante analysis and extensive, fully delineated projects is accentuated in the German context, where operational failures—even those involving intentionally minimal or experimental capabilities—are penalized more harshly than prolonged planning or contracting. The MVP logic presented in U.S. guidance conflicts with a German risk culture that prioritizes delivering the initially approved, “complete” solution over learning through incremental releases and imposes stricter penalties for field errors than for process delays.

C. GERMAN REFORM STRATEGIES AND THEIR EFFECTIVENESS SINCE 2010

This section assesses the efficacy of German reform initiatives since 2010 based on explicit criteria. Prior to evaluating individual reforms, it is essential to delineate the reform context, the intended objectives, and the criteria employed to determine whether a measure enhanced agility, speed, and accountability in procurement.

1. Reform Context and Effectiveness Criteria

Since 2010, German defense procurement has undergone numerous reform initiatives addressing analogous issues: excessive organizational complexity, ambiguous



accountability, protracted decision-making, and procurement processes that do not provide necessary capabilities punctually (Strukturkommission der Bundeswehr, 2010). The Zeitenwende following Russia's comprehensive invasion of Ukraine in 2022 introduced a heightened urgency, correlating procurement efficacy directly with Germany's capacity to reestablish deterrence credibility within a five-to-eight-year timeframe (CDU/CSU-Fraktion im Deutschen Bundestag, 2025). In this context, the efficacy of reform strategies should not be evaluated merely by the speed of formal processes or the quantity and scale of sanctioned projects; instead, it must be assessed based on whether reforms diminish structural fragmentation, elucidate accountability, and significantly enhance the prompt provision of capabilities, especially in software-intensive domains where conventional, hardware-centric methods are insufficient (BMVg, 2024).

2. The Weise Commission (2010)

The 2010 report by the Weise Commission initiated the current reform cycle, advocating for a comprehensive overhaul of Bundeswehr leadership and organization, a significant reduction in hierarchical levels, and a clear consolidation of responsibilities to address "Verantwortungsdiffusion" and alleviate structurally overloaded decision-making processes (Strukturkommission der Bundeswehr, 2010). The Commission advised transforming the current procurement offices into a consolidated agency focused on best practices, equipped with professional project management, centralized risk management, and a more cohesive IT governance framework (Strukturkommission der Bundeswehr, 2010). The recommendations formulated a reform agenda that merged the structural consolidation of procurement functions with demands for a more professional administrative culture and enhanced guidance; however, they did not address the integration of software-specific capabilities and agile development practices into the acquisition system.

3. Creation and Early Years of the Federal Office of Bundeswehr Equipment, Information Technology, and In-Service Support

The creation of the BAAINBw in 2012–2013 aimed to implement the Commission's recommendations through institutional reform by centralizing procurement authority and establishing a unified interface among the armed forces, the ministry, and industry



(Bundestag, 2017). BAAINBw was assigned the responsibility of overseeing an extensive project portfolio across various directorates, encompassing combat systems, platforms, IT, and services, thereby centralizing operational procurement efforts that had previously been dispersed among multiple organizations (Bundestag, 2017). Subsequent analyses reveal that the establishment of BAAINBw did not entirely rectify the structural issues identified in 2010: critical IT and software responsibilities continued to be fragmented among BAAINBw, planning authorities, user organizations, and distinct IT governance bodies, and a singular entity with comprehensive responsibility for software procurement and management remains absent (Paulus, 2025). The amalgamation of formal centralization and enduring functional fragmentation results in BAAINBw frequently functioning as a bottleneck within an otherwise static governance framework, rather than as a fully empowered, software-centric procurement agency.

4. The Bundeswehr Procurement Acceleration Act and Related Measures (2022–2023)

The Bundeswehr Procurement Acceleration Act of 2022 was the inaugural significant legislative reaction to the *Zeitenwende*, designed to streamline procurement law within the defense sector, elevate thresholds, and implement special procedures for urgent acquisitions under time constraints (CDU/CSU Fraktion im Deutschen Bundestag, 2025). The legislation aimed to expedite procurement processes by simplifying justification criteria for comprehensive contracts, permitting greater flexibility in negotiated procedures, and alleviating certain documentation obligations in high-value defense tenders (CDU/CSU-Fraktion im Deutschen Bundestag, 2025). In 2023, an internal acceleration package was introduced alongside legal modifications, which encompassed the Zimmer decree on procurement acceleration and a directive from the Chief of Defence that enhanced the responsibilities of service inspectors in validating functional requirements and performance specifications, aiming to minimize late requirement alterations and reinforce user-side accountability (CDU/CSU-Fraktion im Deutschen Bundestag, 2025). However, the government's own reports indicate that only a minority of the instruments provided by the acceleration act have been utilized thus far, that the majority of acceleration effects arise from a limited range of measures, and that the law is time-restricted until the end of 2026,



which limits its long-term influence on procurement practices (CDU/CSU-Fraktion im Deutschen Bundestag, 2025).

5. Projektbezogene Bedarfsdeckung und Nutzung

The 2024 regulation on PBN constitutes the most comprehensive effort to reform internal procurement processes, superseding the former Customer Product Management guidelines and instituting a uniform framework for project-based procurement (BMVg, 2024). PBN delineates three procurement variants, with the standard PBN procedure established as the default pathway, structuring acquisition into successive phases of analysis, realization, and utilization, executed by Integrated Project Teams under the auspices of BAAINBw (BMVg, 2024). The framework explicitly seeks to expedite procurement by constraining the analysis phase to six months, imposing stringent deadlines for selection decisions, prioritizing commercially available products, and enhancing user engagement in delineating functional requirements and specifications, including obligatory approval of requirements by service inspectors (BMVg, 2024). Simultaneously, parliamentary oversight is maintained via the 25-million-euro threshold and comprehensive documentation mandates, while software continues to be governed within a wider project-procurement framework rather than through a separate, software-specific acquisition system, thereby allowing the fundamental hardware-centric and document-driven procedural structure to largely endure (CDU/CSU-Fraktion im Deutschen Bundestag, 2025).

6. Why Reforms Have Not Overcome Systemic Inertia

Taken together, these reform efforts reveal a consistent pattern: they address procedural duration and formal acceleration more directly than the structural and cultural drivers of systemic inertia. The Weise Commission initiated significant organizational transformations; however, its recommendation for a more agile, software-capable procurement governance framework has been only partially implemented, resulting in a fragmented responsibility for software and a continued dilution of accountability across institutional boundaries (Strukturkommission der Bundeswehr, 2010). The establishment of BAAINBw centralized numerous procurement functions without instituting a cohesive software governance framework, resulting in a lack of practical agility despite formal



centralization (Paulus, 2025). Efforts to expedite legislation since 2022, such as the Bundeswehr Procurement Acceleration Act, the Zimmer decree, and the PBN framework, have resulted in higher approval rates and reduced initial processing times in certain domains; however, they have not fundamentally altered the sequential, hardware-centric logic of procurement or the risk-averse oversight culture that influences behavior within the system (CDU/CSU-Fraktion im Deutschen Bundestag, 2025). For agile software acquisition, this means that Germany still lacks a distinct software-specific acquisition regime; software continues to be regulated within a sequential, project-based procurement framework (BMVg, 2024).

Figure 2 traces the main reform phases of German defense procurement since 2010. It illustrates how the Weise Commission initiated a broader reform debate, how BAAINBw became the central procurement authority, how the acceleration reforms of 2022/23 sought to shorten procedures, and how PBN in 2024 established the current framework. The figure therefore captures both continuity and change: procurement was sped up, but the system remained only partially suited to agile software acquisition.

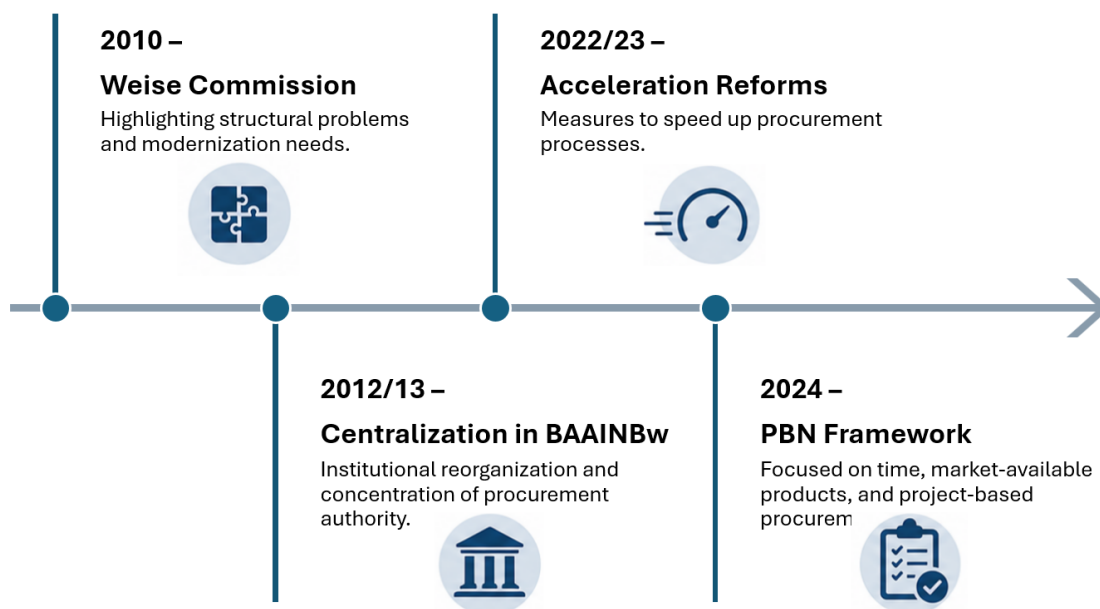


Figure 2. Timeline of German Procurement Reforms (2010–2024)

D. HOW THE U.S. SYSTEM ADDRESSED COMPARABLE CHALLENGES

This section analyzes how the U.S. tackled similar acquisition challenges via distinct approaches and more flexible governance. It begins with the principle of dedicated acquisition pathways as the structural basis of the U.S. model.

1. Dedicated Acquisition Pathways instead of One Dominant Logic

The most significant U.S. response was to abandon a one-size-fits-all acquisition architecture. Under the Adaptive Acquisition Framework, the DoD acknowledges that major capability programs, software programs, urgent acquisitions, and middle-tier efforts differ in pace, uncertainty, and governance requirements, so they shouldn't all be forced through the same procedural logic (Bush, 2024). This is significant because it transforms flexibility from an ad hoc exception to a formal design principle of the acquisition system. The U.S. system creates a more differentiated framework where governance, evidence requirements, and oversight mechanisms can be more closely aligned to the type of capability being acquired, but it also lessens the pressure to treat all projects as variations of the same bureaucratic template (Calabria, 2022).

2. Software Acquisition Pathway as a Software-Specific Answer

DoDI 5000.87 clearly treats software as a separate acquisition category and emphasizes agile development, DevSecOps practices, continuous delivery, and early delivery of a MVP that can be evaluated by users, with capability viability to be demonstrated within a year (Bush, 2024). In conceptual terms, the pathway shifts acquisition from fixed, prescriptive requirement packages to higher-level needs statements that can be improved through iterative development and user interaction (Bush, 2024). This is significant because the U.S. system no longer attempts to fit software into a hardware-centered model; rather, it acknowledges that software programs need different control rhythms, different proof of progress, and a different definition of “maturity” during execution (McQuade et al., 2019). The Pentagon memorandum from March 2025 reinforced this reasoning by directing the use of the Software Acquisition Pathway for software development procurements throughout the department (Howard et al., 2025).



3. Rapid and Flexible Authorities for Urgent or Emerging Needs

In addition to the software pathway, the Adaptive Acquisition Framework offers options like Middle Tier of Acquisition and Urgent Capability Acquisition, which are intended to shorten timelines and allow for a quicker transition from problem identification to usable capability (Bush, 2024). These mechanisms are important because they institutionalize urgency rather than relying on improvisation. The practical impact can be significant. Rapid acquisition approaches allowed some U.S. systems to reach deployment or production far faster than under conventional timelines. Examples include fielding in months rather than years in urgent contexts (Novick, 2024). Germany's PBN contains a "Sofortinitiative" route and other acceleration elements, but the U.S. model is more comprehensive because urgency is integrated into a wider range of acquisition pathways rather than being a narrow exception.

4. More Adaptive Requirements and User Feedback Integration

Another strength of the U.S. reforms is how they link acquisition to operational learning. The software pathway uses iterative delivery and MVPs to get working increments into users' hands early, allowing feedback to shape subsequent development cycles instead of assuming that all key requirements can be fixed reliably at the outset (Bush, 2024). This directly addresses one of the oldest issues in software acquisition: requirements instability, which should be managed through structured adaptation rather than suppressed by strict front-end specification (Olagbemiro et al., 2009). By requiring future users to be more involved and by employing integrated teams, Germany's PBN does increase user participation in comparison to previous models. However, user input is still primarily embedded in the creation and management of functional requirements and performance descriptions, rather than in a software-native cycle of repeated operational feedback on delivered increments (BMVg, 2024). In this way, German reform has increased participation without fully institutionalizing iterative learning.

5. Governance through Milestones and Pathway Choice

The U.S. system did not eliminate governance; rather, it redesigned it. Rather than primarily depending on dense uniform procedure, it governs more through pathway



choice, milestone authorities, and fit-for-purpose decision structures that vary by program characteristics and acquisition type (Bush, 2024). This means that control is maintained, but it is exercised through differentiated architecture as opposed to a single dominant process model. The U.S. experience indicates a different conclusion: accountability can be maintained if decision rights, review points, and escalation mechanisms are customized to pathway logic and capability type rather than being imposed uniformly across fundamentally different procurement problems (Howard et al., 2025). This point is especially pertinent for Germany because reform debates frequently frame agility and control as opposites.

E. TRANSFERABILITY TO GERMANY: OPPORTUNITIES AND CONSTRAINTS

The transferability assessment differentiates between practices that Germany could feasibly implement within its existing institutional framework and those that would necessitate more profound structural changes. This distinction is crucial as not all effective U.S. reforms can be directly implemented in the German defense procurement system without modification.

1. What is Transferable in Principle

Numerous U.S. lessons seem transferable in principle as they pertain to organizational design rather than constitutional modification. The existing PBN framework prioritizes speed, commercially available solutions, user engagement, and varied procurement options, indicating that Germany could establish a software-specific pathway within or parallel to PBN while maintaining parliamentary oversight and fundamental public procurement standards (BMVg, 2024). Simultaneously, Paulus (2025) contends that software governance within the Bundeswehr is fragmented due to the absence of a singular entity responsible for the comprehensive procurement and management of software. Henckel's analysis of BAABW's reform trajectory indicates an increased emphasis on commercially available solutions, an "80 percent" capability rationale, enhanced user engagement, and a wider application of framework and option contracts. This suggests that the primary objective is not the adoption of entirely foreign



concepts, but rather the refinement of reforms that Germany has already initiated (Henckel, 2022).

2. What is Only Conditionally Transferable

Other U.S. mechanisms are conditionally transferable as they depend on more extensive institutional ecosystems. In the U.S., adaptable contracting strategies, swift shifts between acquisition methods, and the heightened utilization of alternative procurement tools are ingrained in a developed culture of pathway-based management (Howard et al., 2025). Germany may incorporate aspects of this model; however, significant modifications in staffing, legal interpretation, risk management, and training would still be necessary for effective implementation (Air Force Institute of Technology, 2015). Simultaneously, endeavors to enhance the flexibility of requirements management will continue to be limited by the current procurement. These constraints are exacerbated by parliamentary approval and information mandates that further restrict administrative flexibility (Rombach, 2025). Fundamentally, they embody a public administration culture that prioritizes *ex ante* justification and legal defensibility (Strukturkommission der Bundeswehr, 2010).

3. What is Difficult to Transfer

A direct replication of that model is improbable due to Germany's parliamentary budgetary culture, constitutional traditions, and administrative legal framework. The elements encompass the expanded executive latitude in U.S. defense acquisition, the scale and expertise of the American acquisition workforce, and the established doctrinal context regarding pathway differentiation and delegated milestone authorities (Howard et al., 2025). An extensively decentralized agile model lacking prior capacity-building may indeed exacerbate incoherence rather than mitigate it (Paulus, 2025). In conclusion, the primary transferable lesson from the U.S. is not the replication of institutional structures, but rather the alignment of governance with the specific type of capability. Transferring solutions that necessitate a robust preexisting software acquisition community is also difficult.



F. TRANSITION OPTIONS FOR GERMANY: SHORT-, MEDIUM-, AND LONG-TERM

Prior to differentiating between partial and limited transferability, it is beneficial to ascertain the reforms that Germany could feasibly integrate within its existing framework. This subsection examines U.S. practices that are transferable in principle, as they address functional issues also found in the German procurement system.

1. Short-Term Options

Instead of awaiting a complete legislative revision, Germany could implement a software-specific sub-track within the current PBN framework via administrative regulation (BMVg, 2024). Within this framework, software-related criteria could be delineated more precisely, iterative delivery could be underscored more explicitly, and modular contracting, option structures, and preliminary operational testing of functional increments could be incorporated without diverging from the overarching German system of documentation and oversight (BMVg, 2024). A secondary short-term strategy would involve systematically utilizing the current expedited routes and market-oriented solutions to address urgent digital capability deficiencies, rather than regarding them as extraordinary measures (BMVg, 2024). Existing mechanisms under PBN, such as development pathways, IT-service cluster logic, streamlined processes for low-value requirements, and the Sofortinitiative, could enhance their efficacy for software-intensive projects if aligned with a more robust focus on modular, updatable capability delivery and well-defined software governance responsibilities (Paulus, 2025).

2. Medium-Term Options

In the medium term, Germany should implement a formal software acquisition framework, or a similarly effective institutional mechanism, that distinctly separates software-intensive procurement from conventional hardware processes in aspects such as requirement specification, delivery timelines, user feedback, contract formulation, and post-deployment updates (Bush, 2024). This would not necessitate an exact duplication of the U.S. Software Acquisition Pathway. The primary objective should be to adapt its foundational logic to the German procurement context and integrate it within the current



PBN framework. A subsequent medium-term reform initiative would involve restructuring governance to incorporate more specific milestone and escalation frameworks, thereby aligning oversight more closely with project type and execution risk (Bush, 2024). While PBN already encompasses decision points, project categories, and established timelines, these components could be refined into a more flexible governance framework wherein various project types are assigned distinct approval mechanisms, customized review frequencies, and predetermined transition protocols in response to changes in key assumptions during implementation.

3. Long-Term Options

For Germany to establish software agility as the standard rather than the anomaly, it must implement more extensive institutional reforms. This reform necessitates the cultivation of a workforce with enhanced software-acquisition proficiency, the establishment of robust software-governance capabilities, and the minimization of redundant interfaces between planning and procurement entities (Paulus, 2025). Simultaneously, it would necessitate a cultural transformation from procedural safeguarding to managed adaptation and enhanced outcome accountability (Strukturkommission der Bundeswehr, 2010). Long-term change must address the political aspect of oversight, as the institutionalization of agile software delivery at scale is challenging when significant procurement governance is linked to uniform thresholds and multiple ex ante approvals. This constraint is exacerbated by the dynamics of approval and review that persistently hinder practical adaptation (Rombach, 2025).

G. ASSESSMENT OF FEASIBILITY AND IMPLEMENTATION HORIZON

This section assesses the viable reform alternatives identified in the prior analysis and differentiates between measures that can be executed in the short, medium, or long term. The objective is not merely to enumerate reforms, but to evaluate what can feasibly be accomplished within Germany's legal, administrative, and political limitations.



1. Feasibility Criteria and Levels of Action

The legal feasibility in Germany is more accurately characterized as uneven rather than binary. Certain reforms may be executed via secondary regulation or administrative reinterpretation within the current framework. Conversely, some may necessitate legislative amendments, wider political consensus, or a more significant recalibration of executive autonomy and parliamentary oversight (Rombach, 2025). These profound constraints also mirror enduring structural patterns within the German defense administration (Strukturkommission der Bundeswehr, 2010).

This thesis evaluates feasibility in three dimensions: legal, administrative, and political. Legal feasibility denotes the degree to which a reform alternative can be executed within the prevailing constitutional and fiscal structure via secondary regulation, administrative guidance, or reinterpretation of existing procurement regulations. Consequently, it does not presume modifications to the Basic Law, the Federal Budgetary Regulations, or essential parliamentary oversight mechanisms, including the 25-million-euro threshold. Administrative feasibility pertains to the organizational, staffing, and skill modifications necessary within BAAINBw and the broader defense administration. Reforms that seem feasible in theory may encounter practical challenges due to fragmented responsibilities, personnel shortages, and insufficient software-acquisition expertise (Rodler, 2013). Political feasibility pertains to the anticipated level of opposition from significant veto players and oversight entities, particularly the Bundestag, the Budget Committee, the Bundesrechnungshof, and prominent industry stakeholders (CDU/CSU-Fraktion im Deutschen Bundestag, 2025). The feasibility ratings in the matrix distill these three dimensions into a streamlined High/Medium/Low evaluation and an initial implementation timeline.

The options delineated in the subsequent matrices function at varying levels of action. Certain reforms necessitate parliamentary decisions or primary legislative amendments, whereas others pertain to regulatory modifications at the BMVg or agency-level alterations within BAAINBw. This distinction is significant because system-level reforms typically promise greater impact but often encounter more substantial political



constraints, whereas the BMVg and BAAINBw possess greater immediate flexibility within the existing legal framework (BMVg, 2024).

2. System-Level Reform Options

Table 1 summarizes key system-level reform options that operate at the level of parliamentary oversight and core procurement regulation, indicating which structural problems they address, their primary focus of action, and their assessed feasibility and implementation horizon.

Table 1. Feasibility and Implementation at the System-Level

Reform Option	Problem addressed	Primary level of action	Feasibility	Implementation horizon
Recalibrating parliamentary oversight thresholds	Dense ex ante parliamentary control and lengthy review processes slow major projects and reinforce risk-averse behaviour in BAAINBw.	Parliament (Budget Committee, legislation)	Low – Political	Long-term
Reforming the primary procurement framework (PBN and BwBBG)	Core processes remain sequential and hardware-centric, and acceleration instruments are underused or time-limited.	BMVg primary regulation and Parliament	Medium	Medium-term
Establishing a software-specific acquisition regime in German regulation	No dedicated regime addresses the specific life cycle, governance, and agility needs of software-intensive capabilities.	BMVg primary regulation (e.g., PBN)	Medium	Medium- to Long-term

Amending the 25-million-euro threshold and associated parliamentary oversight mechanisms primarily tackles the issue that extensive ex ante control and protracted Budget Committee procedures result in sluggish, cumbersome procurement processes and promote risk-averse decision-making in substantial projects, particularly those reliant on software (Rombach, 2025). Legally and administratively, modifying thresholds or implementing more nuanced oversight models would be uncomplicated once enacted;

however, political viability is limited due to the direct implications for the Bundestag's established authority over defense expenditure, which can readily be portrayed as a diminution of parliamentary control (CDU/CSU-Fraktion im Deutschen Bundestag, 2025). This option is classified as a long-term, politically constrained lever rather than a short-term solution for facilitating agile software acquisition.

The reform of the primary procurement framework involves the enhancement of the PBN regulation and the revision or extension of the Bundeswehr Procurement Acceleration Act, addressing the ongoing sequential, hardware-oriented process logic and the restricted practical application of existing acceleration instruments (BMVg, 2024). The PBN regulation may be modified at the BMVg level to enhance phases, decision-making processes, and alternatives, while a revised acceleration law would expand upon an existing framework that has thus far been implemented only partially and is presently constrained until the end of 2026 (CDU/CSU-Fraktion im Deutschen Bundestag, 2025). The feasibility of these reforms is evaluated as medium, given that they necessitate a coordinated effort between the BMVg and Parliament, yet do not require constitutional amendments, with an implementation horizon in the medium term.

Implementing a software-specific acquisition framework in German regulation—such as a specialized software track within PBN—addresses the lack of a regulatory structure. It accommodates the unique life cycle, governance, and agility requirements of software-intensive capabilities (McQuade et al., 2019). This option is moderately feasible legally, as it can be executed via modifications to PBN or supplementary BMVg guidance, leveraging the recognized distinctions between software and hardware, without amending the Basic Law or fundamental budgetary stipulations (Bush, 2024). Administratively, it necessitates significant adaptation: delineating responsibilities in a context where software governance is presently disjointed and developing the requisite skills and contractual frameworks for iterative delivery and ongoing updates, rendering this a medium- to long-term undertaking (Paulus, 2025).



3. Agency-Level Reform Options for Federal Office of Bundeswehr Equipment, Information Technology, and In-Service Support and Federal Ministry of Defence

Table 2 highlights agency-level reform options that BAAINBw and the BMVg can implement within the existing legal framework to address software-specific shortcomings in governance, processes, and skills.

Table 2. Feasibility and Implementation at the Agency-Level

Option	Problem addressed	Primary level of action	Feasibility	Implementation horizon
Consolidating software governance within BAAINBw	Software responsibilities and risk oversight are fragmented across multiple entities, with no single owner for software procurement and life cycle management.	BAAINBw	High	Short- to medium-term
Developing an internal agile software playbook under PBN	PBN offers procedural flexibility, but acquisition staff lack methodological guidance and experience in applying agile and iterative practices in defense projects.	BAAINBw / BMVg (internal guidance)	High	Short-term
Strengthening software acquisition skills and continuity in key roles	Knowledge gaps in systems/ software engineering and high personnel rotation undermine continuity and professionalism in complex procurement programs	BAAINBw / BMVg (personnel and training policy)	High	Medium-term
Clarifying use of rapid and IT-specific paths for software projects	Acceleration instruments such as the BwBBG tools, PBN Sofortinitiative, and IT-specific procedures are available on paper but applied only selectively in practice.	BAAINBw / BMVg (internal criteria and processes)	Medium-High	Short-term

Consolidating software governance within BAAINBw directly tackles the existing fragmentation of responsibilities, wherein no singular entity possesses comprehensive



accountability for software procurement and life cycle management, resulting in deficiencies in oversight and risk management (Paulus, 2025). As this is mainly an internal organizational decision, BAAINBw can create a specialized software governance function or coordinating entity within the current structure, rendering this a highly viable option in legal and political contexts with a short- to medium-term implementation timeline.

Creating an internal agile software playbook within PBN addresses the identified deficiency in methodological proficiency among acquisition personnel, who are anticipated to generate intricate deliverables without a solid foundation in systems engineering and contemporary software methodologies (Rodler, 2013). A playbook issued by BAAINBw and the BMVg could offer explicit direction on structuring iterative delivery, MVPs, user feedback loops, and agile-compatible contracts within the current PBN procedures, which is legally sound and administratively feasible through internal guidance and training initiatives.

Enhancing software acquisition expertise and ensuring continuity in critical positions addresses two interconnected challenges: deficiencies in technical and methodological proficiency and elevated personnel turnover that jeopardizes continuity in intricate programs (Rodler, 2013). By establishing targeted training pathways for software-intensive acquisition roles and modifying rotation practices in critical positions, BAAINBw and the BMVg can rectify deficiencies recognized by political actors as hindering procurement performance, rendering this a highly viable medium-term reform lever (CDU/CSU-Fraktion im Deutschen Bundestag, 2025).

The clarification of rapid and IT-specific methodologies for software projects aims to bridge the disparity between the formal availability of acceleration tools—such as BwBBG instruments, the PBN Sofortinitiative, and IT-specific protocols—and their comparatively restricted implementation in practice (CDU/CSU-Fraktion im Deutschen Bundestag, 2025). Under the existing legal framework, BAAINBw and the BMVg may establish internal criteria delineating the circumstances under which software-intensive projects must consistently utilize these pathways, bolstered by training and oversight,



rendering this a medium-high feasibility option with a short-term implementation timeline.

H. CHAPTER CONCLUSION

The comparative analysis indicates that Germany's challenges in executing agile software acquisition stem not from a singular institutional deficiency, but from the interplay of multiple interdependent constraints. This encompasses centralized bottlenecks within the procurement. They also encompass disjointed accountability for software governance and management (Paulus, 2025). Moreover, stringent legal-procedural regulations and ongoing delays in approval processes consistently diminish execution flexibility (Rombach, 2025). These patterns are fundamentally maintained by an administrative and oversight culture that predominantly depends on ex ante control and procedural defensibility (Strukturkommission der Bundeswehr, 2010).

The primary lesson from the U.S. case is not literal institutional imitation, but rather the establishment of governance suitable for software. The primary focus is on establishing dedicated pathways, implementing more flexible milestone structures, facilitating earlier and continuous user feedback, and expediting processes for urgent needs, all within a framework that adheres to German constitutional, fiscal, and political standards (Howard et al., 2025). The current PBN framework provides initial foundations for this approach; however, it has yet to classify software as a separate procurement category with its own delivery, feedback, and adaptation logic.

From that viewpoint, the trajectory ahead is evolutionary, yet it is not peripheral. Germany does not require a complete adoption of the U.S. model; however, it must acknowledge software acquisition as a unique procurement challenge necessitating distinct institutional management.



V. CONCLUSION AND RECOMMENDATIONS

This concluding chapter encapsulates the principal findings of the thesis and translates them into actionable recommendations for German defense procurement. It consolidates the structural, legal, and cultural arguments articulated in the preceding chapters and identifies the reforms most likely to facilitate more agile software acquisition within the current German framework.

A. THE LEGAL, ORGANIZATIONAL, AND CULTURAL BARRIERS THE FEDERAL OFFICE OF BUNDESWEHR EQUIPMENT, INFORMATION TECHNOLOGY, AND IN-SERVICE SUPPORT FACES WHEN IT COMES TO AGILE SOFTWARE ACQUISITION

The acquisition of agile software within the German defense procurement framework is hindered by a combination of structural fragmentation and central bottlenecks at BAAINBw. Planning, requirements, budgeting, procurement, and in-service support are distributed among various stakeholders, while BAAINBw oversees an extensive project portfolio lacking a dedicated software governance function, particularly for software-intensive capabilities. This results in extended coordination chains, ambiguous ownership of software decisions, and a propensity to regard software as a subsequent addition to hardware initiatives, which contradicts the continuous and integrative essence of contemporary defense software.

Legal and procedural regulations perpetuate this structural inertia by entrenching procurement within sequential processes, extensive documentation, and rigorous ex ante oversight, including the 25-million-euro threshold and comprehensive review options that introduce delays and favor front-loaded specifications (Rombach, 2025). Cultural elements exacerbate these limitations: under stringent legal and audit oversight, coupled with dispersed accountability and career motivations that penalize apparent failure, officials logically eschew risk and associate evolving requirements with inadequate planning rather than with standard software progression (Strukturkommission der Bundeswehr, 2010). Consequently, despite the existence of reforms such as the acceleration law and PBN's Sofortinitiative, agile methodologies like MVPs and iterative



user feedback are still atypical in German defense software procurement (CDU/CSU-Fraktion im Deutschen Bundestag, 2025).

B. STRATEGIES AND THEIR EFFECTIVENESS GERMANY EMPLOYED TO OVERCOME THESE BARRIERS

Since 2010, Germany has implemented various reform strategies to rectify identified deficiencies in defense procurement, such as organizational complexity, ambiguous accountability, and protracted decision-making. The Weise Commission (2010) advocated for a more streamlined Bundeswehr, enhanced leadership frameworks, and a unified procurement entity to mitigate “Verantwortungsdiffusion” and alleviate congested decision-making processes. The establishment of BAAINBw in 2012–2013, the Bundeswehr Procurement Acceleration Act of 2022, and the 2024 PBN regulation all aimed, through various means, to optimize processes, elevate thresholds, and emphasize expediency and commercially available solutions, particularly in response to the Zeitenwende imperative to reestablish deterrence within a five-to-eight-year timeframe.

These strategies have yielded quantifiable impacts on throughput and formal process design yet have not fundamentally transformed the conditions for agile software acquisition. BAAINBw has emerged as the principal procurement authority, overseeing a comprehensive portfolio and mitigating organizational fragmentation. Reforms have led to a significant rise in the quantity and magnitude of sanctioned major projects, with large-scale approvals nearly doubling from 2023 to 2024. PBN has condensed the analysis phase, streamlined decision timelines, and formalized Integrated Project Teams along with enhanced user engagement, whereas the acceleration act has established legal avenues for simplified procedures and expedited processes in specific instances.

The efficacy of these reforms in addressing systemic inertia is concurrently constrained, particularly regarding software-intensive capabilities. BAAINBw’s establishment did not resolve the functional fragmentation in software governance, and no singular entity possesses comprehensive responsibility for software procurement and management. The acceleration act is temporally constrained, and only a small fraction of its instruments is utilized in practice, whereas PBN persists in integrating software within



a more extensive, sequential, and hardware-centric project framework instead of instituting a specialized software acquisition regime. Consequently, reforms have enhanced capacity and established new formal instruments; however, they have not yet addressed the structural, legal, and cultural impediments that hinder the integration of agile software acquisition into the German defense procurement system.

C. LESSONS LEARNED BASED ON U.S. EXPERIENCE IN AGILE SOFTWARE DEVELOPMENT

The U.S. experience with agile software acquisition demonstrates that institutionalizing software-specific pathways, iterative delivery, and differentiated governance can significantly accelerate capability delivery without abandoning oversight. The Adaptive Acquisition Framework, and especially the Software Acquisition Pathway, embeds agile and DevSecOps practices in a dedicated route that uses minimum viable products, frequent releases, and early user feedback to manage requirements instability rather than suppress it. Rapid and urgent authorities further show how urgency can be built into acquisition architecture itself, enabling some systems to be fielded in months rather than years when supported by appropriate legal instruments, training, and metrics.

For Germany, several elements of this approach are functionally relevant and, in principle, transferable because they are organizational rather than constitutional in nature. These include more adaptive governance for software-intensive capabilities, a differentiated pathway logic instead of a single dominant process model, and the creation of a software-specific route within or alongside PBN that formalizes iterative learning and user feedback beyond the initial requirements phase. At the same time, other U.S. practices—such as frequent pathway switching, flexible contracting at scale, and extensive use of alternative procurement instruments—are only conditionally transferable because they depend on a broader ecosystem of legal authorities, acquisition workforce capacity, and a long-standing culture of pathway-based management that Germany currently lacks.

Finally, some aspects of the U.S. model are difficult to transplant directly due to structural differences in parliamentary budget culture, constitutional traditions, and



administrative law. The greater executive room for maneuver, the size and specialization of the U.S. acquisition workforce, and the deeply ingrained doctrinal environment around delegated milestone authorities cannot be replicated quickly, and a strongly decentralized agile model without prior capacity-building could exacerbate fragmentation rather than reduce it (Paulus, 2025). The most robust lesson for Germany is therefore not to copy U.S. institutional forms, but to adopt the underlying principle of differentiated, software-aware governance matched to capability type, and to develop a stronger software acquisition community as a prerequisite for more ambitious agile reforms.

D. RECOMMENDATIONS

The following recommendations, derived from the comparative analysis, outline measures to enhance German defense procurement. They are intended to be actionable, institutionally anchored, and consistent with the overarching goal of mitigating systemic inertia in software-intensive procurement.

1. Consolidate Software Governance within Federal Office of Bundeswehr Equipment, Information Technology, and In-Service Support and Clarify a Software-Specific Path under Project-Based Procurement and In-Service Use

Considering the existing fragmentation of software responsibilities and the lack of a singular entity with comprehensive accountability for software-intensive capabilities, BAAINBw might contemplate consolidating software governance into a distinctly identifiable function or coordinating body. This function would not supplant current line organizations; rather, it would serve as a central resource for software architecture guidance, risk management, and the elucidation of PBN options for software projects, thereby clarifying ownership and assisting program teams in navigating available flexibility with greater consistency.

BAAINBw and the BMVg could collaboratively investigate the potential for a software-specific track within the current PBN framework, specifically by establishing criteria for classifying a project as software-intensive and delineating a customized sequence of steps and decision points for these instances. This does not necessitate an immediate revamp of the entire procurement system; rather, it could commence with



internal directives and pilot initiatives, indicating that software is regarded as a unique capability type and fostering a more predictable environment for teams aiming to implement iterative and agile methodologies within the existing legal framework.

2. Make Agile Practice under Project-Based Procurement and In-Service Use Tangible through an Internal Software Playbook and Pilots

Considering that PBN and the Bundeswehr Procurement Acceleration Act offer procedural flexibility and specialized pathways for IT and development solutions, BAAINBw and the BMVg could enhance this by creating an internal “agile software playbook” that illustrates, in practical terms, how software-intensive projects can leverage these options. This playbook may delineate standard frameworks for developing MVPs, iterative releases, and user feedback during the PBN phases, incorporating sample documentation and contract provisions that adhere to German procurement law while being more congruent with the ongoing nature of software development.

To prevent overengineering the concept, this playbook could initially be implemented in a limited number of pilot projects that already demonstrate a robust software emphasis and for which PBN’s development and urgent-need protocols are especially pertinent. Insights from these pilots—identifying effective strategies, pinpointing documentation or approval bottlenecks, and assessing user reactions to incremental delivery—could subsequently guide precise enhancements of the guidance, allowing BAAINBw teams to utilize existing instruments with greater confidence and consistency, rather than resorting to “hacking the system” for each new software initiative.

3. Use Rapid and Information Technology–Specific Routes More Deliberately for Software-Intensive Projects

BAAINBw and the BMVg could delineate the circumstances under which software-intensive projects should consistently employ BwBBG tools, the PBN Sofortinitiative, and IT-specific procedures, building on the existing but selectively utilized acceleration instruments. Instead of regarding these routes as exceptional alternatives, internal criteria could establish standard trigger conditions—such as the



necessity for time-sensitive digital capabilities, the technical feasibility of a MVP, or the adaptability of market-available solutions through iterative processes—and convert them into explicit decision-making tools for project teams.

To render this guidance actionable, these criteria should be supplemented with succinct training modules and fundamental monitoring of the frequency and impact of rapid and IT-specific pathways utilized in software-intensive programs. The objective is not to compel all projects into an expedited process, but to facilitate teams in identifying when these tools are suitable and to implement them confidently, thus transforming formal legal flexibilities into practical facilitators of accelerated, iterative software delivery within the current German procurement framework.

E. AREAS FOR FURTHER RESEARCH

This thesis frequently addresses personnel and competency issues but does not consider the human-capital dimension as a separate area of analysis. This constitutes a significant limitation, as Rodler identifies inadequate technical qualifications for complex acquisition tasks as a structural deficiency of the procurement system (Rodler, 2013). Simultaneously, recent political evaluations have underscored apprehensions regarding insufficient continuity and specialization within the procurement workforce (CDU/CSU-Fraktion im Deutschen Bundestag, 2025). A systematic analysis of personnel structures, qualification profiles, and career trajectories would thus constitute a significant direction for future research. A subsequent study could examine how specialized software-acquisition positions, tailored training programs, and modified rotation patterns may affect the systemic inertia identified in this thesis. It could further investigate the organizational incentives necessary for agile methodologies to evolve from a mere option to a viable and sustainable career trajectory within the procurement system.



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