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Conceptualizations and boundaries of EU digital sovereignty

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ABSTRACT

Digital sovereignty has attracted much attention in recent years, particularly within European Union (EU) political discourse and across multiple academic disciplines. Motivated by growing concerns of digital dependencies, digital sovereignty is proposed as a solution to issues relating to digital autonomy, yet its meaning and realization remain contested. Building on an initial review of boundaries and extending it through a targeted follow-up review, this study explores digital sovereignty conceptualizations in academic literature and relates them to five recurring boundaries: technological capabilities, infrastructure control, member state tensions, public-private sector dynamics, and regulatory overreach. The definitional review identifies four conceptual approaches: digital sovereignty as political claim-making, as control over the digital, as capability, and as individual digital self-determination. The results show that digital sovereignty is conceptually diverse and practically constrained, and that progress toward digital sovereignty depends on which understanding is assumed. The study contributes to research on digital sovereignty by clarifying the definitional landscape and showing how different understandings of digital sovereignty foreground different constraints.

1. Introduction

With the rise of digitalization and digital transformation, digital sovereignty has become a central aspect of European Union (EU) discourse as a response to growing concerns surrounding dependencies, control, and resilience within the digital realm. This discourse and the underlying tensions can be understood as part of the broader conversation surrounding digital sustainability, wherein digitalization brings both solutions and new societal challenges (Veit and Thatcher, 2023).

Indeed, the notion of digital sovereignty has received increasing attention in recent years. Traditionally originating from the legitimacy of a state to control its territory (Couture and Toupin, 2019; Floridi, 2020), a modern extension of the sovereignty terminology factors in the importance of digital technologies. Here, concerns surrounding control and ownership in the digital realm are framed by growing concerns of digital dependencies. This is particularly evident within the EU, where over 80% of digital services, infrastructure, and technologies are supplied by non-EU providers (Knafo, 2025). These dependencies are further reinforced by rising geopolitical factors, wherein tensions between the United States (US) and China, as well as Russia's war on Ukraine, or the COVID pandemic are only a select few examples exposing European digital vulnerabilities (European Commission, 2025a).

Resulting from these concerns, there is an increased call for European digital sovereignty, which has become a central topic within the EU's digital policy agenda (European Commission, 2021, 2025a). The sentiment is reflected in regulations such as the Digital Markets Act (DMA), the Digital Services Act (DSA), as well as recent initiatives such as Gaia-X (Gaia-X, 2025) and the Sovereign Open Source Foundation Model initiative (Soofi, 2026). These efforts to strengthen European digital sovereignty also include EURO-3C, a recently announced €75 million project aiming to develop a federated telco-edge-cloud infrastructure (European Commission, 2026). This exemplifies the EU's growing efforts to reduce digital dependencies and strengthen its capacity to shape digital infrastructures, platforms, and data flows.

Despite the widespread use of digital sovereignty in academic and political discourse, the term remains conceptually ambiguous (Barrinha and Christou, 2022). At the same time, growing interest in digital sovereignty as a policy objective raises the practical question of what constraints and tensions shape its pursuit. We refer to such recurring constraints and tensions as boundaries to digital sovereignty, insofar as they limit or complicate the realization of digital sovereignty goals. In this, it becomes difficult to assess political initiatives that act in pursuit of digital sovereignty. To our knowledge, these boundaries have not previously been systematically synthesized across the interdisciplinary academic literature that makes up our current knowledge base on digital

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sovereignty. An initial scoping review was therefore conducted examining precisely these boundaries (hereafter: the boundary review), which were then organized into overarching recurring themes, collectively forming the boundary framework (Macpherson and Veit, in press).

Upon reviewing academic sources for this boundary review, it became apparent that references to digital sovereignty did not necessarily imply a shared understanding of the term. This may well be due to the nature of the sovereignty terminology, which encompasses legal, technological, geopolitical, and political dimensions. While prior literature frequently engages with the emergence of the digital sovereignty term (e.g., Floridi, 2020), related terms frequently overlap, leading to uncertainty on the subject matter (Aguerre and Bonina, 2024; Barrinha and Christou, 2022). This conceptual fragmentation raises an important question regarding the previously developed boundary framework, namely, whether different underlying understandings of digital sovereignty are associated with different boundaries. The present study therefore extends the boundary review by adding a targeted follow-up review of how digital sovereignty is conceptualized in academic literature (hereafter: the definitional review) and relates these conceptualizations to the previously identified boundaries.

Therefore, this review is guided by the following research questions:

(1) *What boundaries does academic literature identify as constraining the pursuit of EU digital sovereignty?*
(2) *How is digital sovereignty conceptualized in academic literature within the EU context?*

Accordingly, this study specifically examines digital sovereignty through an academic lens. This perspective is analytically distinct from research examining how EU institutions themselves articulate digital sovereignty in policy and legal documents. For example, Anand et al. (2026) analyze EU legal documents to identify motivations and goals associated with digital sovereignty. In contrast, our study examines boundaries to the pursuit of digital sovereignty identified in academic literature and how digital sovereignty is conceptualized within this literature. This academic perspective is important for establishing conceptual and analytical clarity and providing a foundation for cumulative research on digital sovereignty.

This study makes several contributions:

- First, we consolidate constraints and tensions shaping the EU's pursuit of digital sovereignty, which were previously fragmented across interdisciplinary academic outlets, thereby providing a systematic structure for understanding what limits and complicates EU digital sovereignty.
- Second, we provide a conceptual differentiation of common interpretations of digital sovereignty across a fragmented academic literature base. This provides greater conceptual clarity and facilitates comparison across studies that invoke digital sovereignty in different ways.
- Third, by relating the boundaries and conceptualizations, we show how different understandings imply different criteria for assessing digital sovereignty progress. We find that addressing a boundary under one understanding may leave other sovereignty goals unresolved, leading to contrasting assessments of the same initiative.

The remainder of this article is structured as follows: Section 2 describes the theoretical foundations of digital sovereignty, beginning with a short historical overview of the sovereignty term, then transitioning into contemporary work on digital sovereignty. Section 3 details the review methodology, first by revisiting the initial boundary review and then outlining the second definitional review. The results of both reviews are then presented and discussed in Sections 4 and 5, respectively, and we conclude the article in Section 6.

2. Theoretical foundation

In classical political thought, one of the earliest conceptualizations of sovereignty was established by Bodin in 1576, wherein it is conceived as the supreme, absolute, perpetual, and limitless power over citizens and the commonwealth (Bodin, 1576, as cited in Merriam, 2001, p. 7). The idea of sovereignty was reinterpreted by Rousseau in the 18th century by locating it in the people, as opposed to an absolute ruler (Rousseau, 1762, as cited in Merriam, 2001, pp. 17–18). These two examples of the historical understanding of sovereignty illustrate the nature of the concept, in that it is malleable and adaptable to the political environment in which it is articulated. At their core, however, both Bodin and Rousseau directly tie sovereignty to ultimate legitimate authority.

In modern political discourse, the idea of national sovereignty has emerged to characterize the power of a state over its territory (Couture and Toupin, 2019; Floridi, 2020). In light of the complexities of the digital age, where digital infrastructures and data flows transcend territorial boundaries, a conceptualization of sovereignty centered on absolute power over a territory and its people may no longer adequately capture contemporary manifestations of authority and control (Couture and Toupin, 2019). Instead, the concept is increasingly extended to include the digital realm, giving rise to the notion of digital sovereignty (Floridi, 2020).

While countries such as China and Russia have been advocating to restrict and control access of their citizens to the internet in the name of *internet, cyber*, or *information* sovereignty since the 1990s (Jansen et al., 2023; Thumfart, 2022), discourse surrounding digital sovereignty concepts in European countries has emerged more reactively, particularly in response to geopolitical tensions and technological dependencies.

The exposure of US-American digital espionage by Edward Snowden in 2013 served as a catalyst for an erosion of trust in foreign digital platforms and led to calls for stronger regulation to ensure the security of EU citizens' and institutions' personal data and digital autonomy (Barrinha and Christou, 2022; Couture and Toupin, 2019; European Parliament, 2014). These developments laid the groundwork for the General Data Protection Regulation (GDPR), which was passed in 2016 and entered into force in 2018 (Farrand and Carrapico, 2022; European Parliament and Council of the European Union, 2016). The successful implementation of the GDPR positioned the EU as a normative power in the digital realm, influencing data protection standards worldwide, though this did not significantly improve its global standing in terms of digital economic competitiveness (Thumfart, 2022).

The discourse surrounding digital sovereignty in the EU further increased when Ursula von der Leyen was elected president of the European Commission in 2019 (European External Action Service, 2019). Von der Leyen explicitly made the pursuit of sovereignty in crucial areas of technology a priority for the European Union, promising the creation of the Digital Services Act as well as investments into artificial intelligence to facilitate Europe's digital transformation (von der Leyen, 2019). The COVID-19 pandemic further exposed the extent to which Europe relies on foreign digital service providers. This strengthened the existing sentiment that the EU must reduce its dependencies (Barrinha and Christou, 2022; European Commission, 2021).

Next to regulatory initiatives such as the GDPR, the DSA, or the AI Act, the EU has also launched projects to build up technological independence with the stated goal of achieving digital sovereignty. One example of this is the Gaia-X project, which aimed to develop a European alternative to the private US-based cloud ecosystems that currently dominate the market (Baur, 2025; Blancato, 2024).

A key component of EU plans for the digital future is the ambition to strengthen digital sovereignty, a notion that is still gaining traction. The European Commission's 2025 report on the *State of the Digital Decade* (European Commission, 2025a) reaffirms the importance of digital sovereignty for the digital future of the EU by detailing the current state of digital sovereignty initiatives and progress, as well as highlighting key challenges (European Commission, 2025a).

Despite the extensive political discourse on digital sovereignty, the precise understanding of the term remains unclear (e.g., Grohmann and Costa Barbosa, 2026; Kaloudis, 2021). Within academic discourse, multiple overlapping terms are used to describe this notion of sovereignty in the digital. The most prominent terms are *digital* sovereignty, *technological*, or *tech*, sovereignty, and *data* sovereignty. AI sovereignty, which is concerned with facets of digital sovereignty relating to resources that are necessary to develop and deploy AI, falls under the umbrella of digital sovereignty and is closely linked to data sovereignty, as access to training data is an essential component of developing sovereign AI solutions (Mügge, 2024). While there are other expressions of sovereignty involved in this discourse, notably cyber sovereignty and internet sovereignty, these are not typically used in conjunction with the EU's understanding of the term. Instead, they are used to describe alternative digital governance approaches from China and Russia (Budnitsky and Jia, 2018; Gao, 2022).

3. Methodology

This study follows a sequential review design, building on a previously conducted scoping review of academic literature discussing the boundaries of digital sovereignty within the context of the EU (Macpherson and Veit, in press). Consistent with the research questions, both reviews focus on academic literature concerning digital sovereignty in the EU context. During the analysis of the boundary review corpus, it became apparent that the reviewed literature did not necessarily share the same understanding digital sovereignty. This heterogeneity motivated the definitional review, a targeted second review examining conceptualizations of digital sovereignty. After analyzing the corpus identified in the definitional review, the conceptualizations identified were applied to the boundary corpus to examine the relation between these two analytical dimensions. The process of our literature review can be found in Fig. 1.

3.1. The boundary review

The boundary review addressed our first research question by examining which recurring constraints, tensions, and limitations academic literature identifies as shaping the pursuit of EU digital sovereignty. It was designed as a scoping literature review, as digital sovereignty is an emerging and interdisciplinary concept with unsettled meanings. As such, it was guided by established scoping review procedures and PRISMA-ScR principles to ensure clarity and transparency throughout the review process (Arksey and O'Malley, 2005; Levac et al., 2010; Paré et al., 2015; Tricco et al., 2018). No review protocol was registered prior to conducting the review.

To identify relevant literature, the databases EBSCOHost, ProQuest, and Web of Science were searched, followed by a backwards citation search. First, we conducted exploratory searches within EBSCOHost and ProQuest with a broad search string, which can be found in Table 1. These databases were selected to capture a variety of interdisciplinary research relevant to digital policy, information systems, political science, and governance, while highly technical or engineering-focused outlets were not included in line with the focus of the review.

The exploratory searches produced large amounts of conceptually unrelated material (total $n_{EBSCOHost} = 1654$, $n_{ProQuest} = 3754$), which led to substantial conceptual drift. Nevertheless, the EBSCOHost and ProQuest results were screened at the title and abstract levels and relevant

Table 1
Boundary review: inclusion and exclusion criteria and keywords.

Search String (EBSCOHost and ProQuest)	
((AB(data OR information OR techno OR digital OR network OR algorithmic) OR TI(data OR information OR techno* OR digital OR network OR algorithmic) OR SU(data OR information OR techno* OR digital OR network OR algorithmic)) AND (AB sovereignty OR TI sovereignty OR SU sovereignty)) AND RV Y*	
Inclusion	Exclusion
1. Peer-reviewed journal articles 2. Published between 2013 and 2025 3. English-language publications 4. Explicit engagement with digital or technological sovereignty 5. Situated within an EU context (EU institutions, EU policy initiatives, EU governance) 6. Discussion of boundaries (tensions, limits, constraints) shaping the realization of digital or technological sovereignty	1. No engagement with digital or technological sovereignty 2. No substantive discussions of boundaries 3. Primarily technical or engineering-focus 4. Published in a journal with a Journal Impact Factor below 5 as a relevance filter

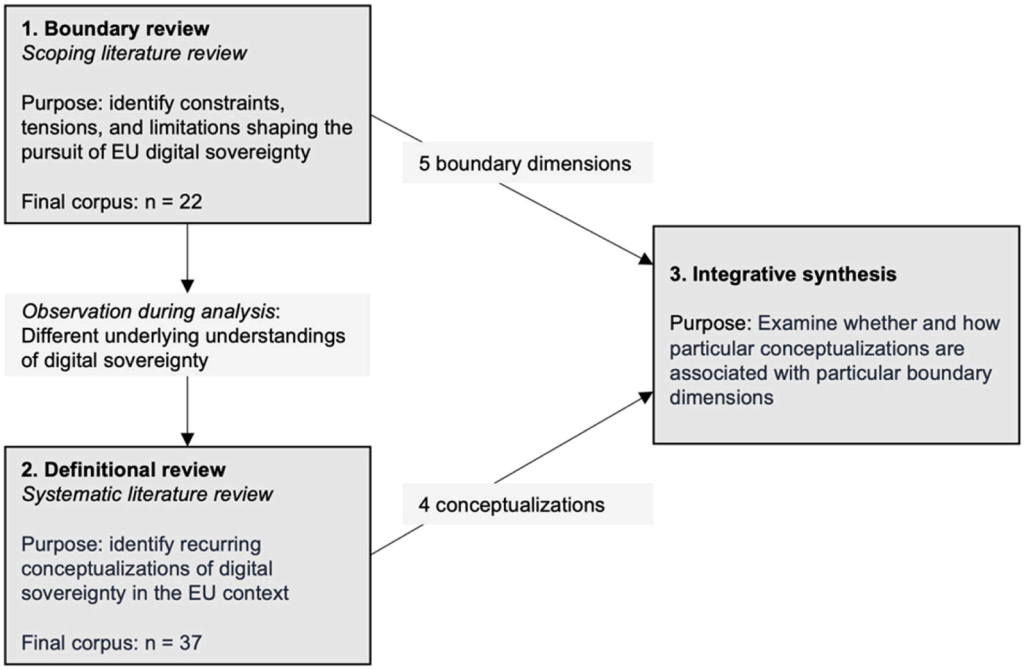


Fig. 1. The literature review process.

papers were retained. Based on the relevant literature identified in the exploratory phase and as the analytical focus of the review became clear, the search strategy was refined to focus on the terms most aligned with the review objective, namely digital and technological sovereignty. The final search in Web of Science was therefore conducted on the 30th of July 2025, returning 148 records. All identified records were screened by a single reviewer. Then, titles, keywords, and abstracts were assessed against the inclusion and exclusion criteria, which are shown in Table 1. This screening resulted in 65 papers being retained for a more detailed abstract assessment, of which 40 papers were included in the full-text screening. This process resulted in the final boundary corpus of 22 papers, which can be found in Table A1. An overview of the search and selection process is provided in Fig. 2.

Next, we charted relevant information of all papers within the boundary corpus. During this stage, we recorded notes and passages and compared the papers iteratively, identifying constraining factors discussed. Concepts were retained when they were distinct from other categories and were found across multiple papers.

Consistent with PRISMA-ScR guidelines for scoping reviews, no formal critical appraisal of individual sources of evidence was conducted (Arksey and O'Malley, 2005; Levac et al., 2010; Tricco et al., 2018). The review aimed to map recurring boundaries discussed in the literature rather than assess the strength of evidence of effects. However, we applied source-selection criteria, intended to support the credibility and relevance of the literature sample, especially given the large number of records retrieved in the exploratory stage. Specifically, we restricted our search to peer-reviewed publications and consistently applied a Journal Impact Factor threshold of 5, which served as a pragmatic journal-level relevance filter. These criteria were intended to focus our review on established academic outlets while preserving the exploratory nature of a scoping review. This approach is consistent with scoping review guidelines, which allow for relevance-based source selection (Arksey and O'Malley, 2005; Levac et al., 2010), and with recent guidance that credibility safeguards should be aligned with the purpose of the review (Hahn, 2026).

This process resulted in five inductive boundary categories, which were organized into overarching themes to create a more cohesive structure: practical implementation boundaries and institutional boundaries. The concept matrix, representing our final conceptual structure, was then populated by marking papers with a supporting entry from the data extraction table (Webster and Watson, 2002). Papers could also map multiple boundaries where applicable. The final concept matrix structure can be found in Table A1.

3.2. The definitional review

The definitional review extends the boundary review by conducting a targeted systematic literature review, addressing our second research question by examining how digital sovereignty is conceptualized in academic literature within the EU context. To ensure structured and transparent reporting of the identification, screening, selection, and synthesis, relevant PRISMA 2020 recommendations were used (Page et al., 2021). The definitional review was not registered, and no formal review protocol was prepared prior to conducting the review.

The search scope was broadened to include data sovereignty as a core search term in addition to the previously used terms of digital and technological sovereignty. Papers were included when they made a substantive contribution to the understanding or definition of digital sovereignty within an EU context. Therefore, eligibility criteria differed between the two reviews. Where the boundary review required a focus on the constraints of digital sovereignty, the definitional review required a focus on its conceptualization.

The search was conducted in the databases Scopus and Web of Science. In contrast to the more exploratory boundary review, the definitional review followed a more targeted approach based on clearly specified terms used in academic digital sovereignty literature. Scopus and Web of Science were selected due to their broad multidisciplinary coverage of relevant subject areas. The decision not to repeat the previously used EBSCOHost and ProQuest search was a pragmatic choice to concentrate the follow-up search on these two multidisciplinary citation databases, which offer overlapping but non-identical journal coverage (Mongeon and Paul-Hus, 2016). We restricted the search results to only include English-language publications and the document types article and review. The search combined the core sovereignty constructs with an EU anchor, which was applied to the titles, abstracts, and keywords. The full database-specific search strings can be found in Table 2. The final searches in both Scopus and Web of Science were conducted on the 4th of March 2026. These searches yielded a total of 431 results. An

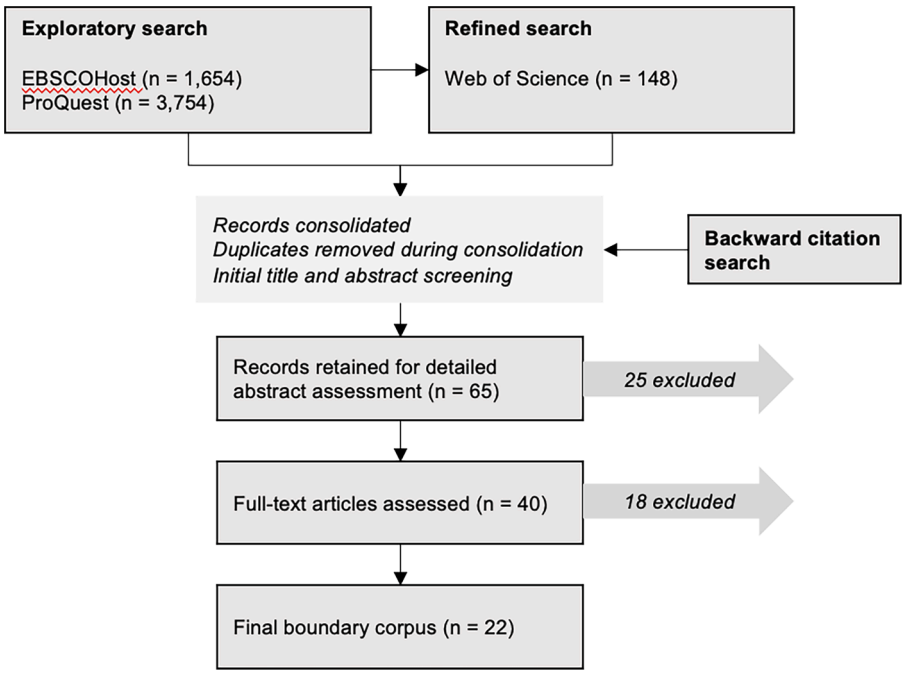


Fig. 2. The boundary review.

Table 2
Definitional review: search strings.

Database	Search string	Filters	Records retrieved
Scopus	TITLE-ABS-KEY ("digital sovereignty" OR "technological sovereignty" OR "data sovereignty") AND TITLE-ABS-KEY (EU OR "European Union" OR Europe OR European)	Document type: article, review Language: English	238
Web of Science	TS=("digital sovereignty" OR "technological sovereignty" OR "data sovereignty") AND TS=(EU OR "European Union" OR Europe OR European)	Document type: article, review Language: English	193

overview of the search and selection process is provided in Fig. 3.

The retrieved articles from both databases were merged into a single dataset. A single reviewer conducted both title, abstract and full-text screenings. After deduplication, 262 unique records remained for further screening. Next, we performed a manual screening based on the titles and abstracts to determine concept centrality and scope fit, resulting in 86 records being retained for the full-text screening. This full-text screening was conducted in accordance with the criteria summarized in Table 3, after which 37 records remained, which formed the basis of the definitional review.

After screening, the papers were entered into an Excel-based table for data extraction. For each paper, we recorded relevant information, passages and notes. For the relevant excerpts, we included both explicit definitions and broader conceptual passages, as many papers did not provide explicit definitions. Data extraction was conducted by a single reviewer.

The analysis proceeded at the level of these excerpts. Here, we compared the extracted passages for recurring definitional patterns. The resulting concept-centric clusters were then iteratively refined across all excerpts to ensure that distinct understandings were captured (Webster and Watson, 2002). As the review objective looked to identify recurring understandings of digital sovereignty, a concept-centric synthesis was appropriate. We then assigned each paper within the definitional corpus one understanding of digital sovereignty to organize the corpus according to each paper's central conceptual emphasis. If an explicit definition was provided, we followed this understanding. If not, we followed the paper's broader argument to determine the primary understanding. This classification does not imply that a paper exclusively

Table 3
Definitional review: inclusion and exclusion criteria.

	Inclusion	Exclusion
Title and Abstract Screening	1. Use of digital, technological, or data sovereignty as a central concept 2.Clear link to the EU or European context	1. Digital, technological, or data sovereignty is used as a buzzword or in passing 2. Clearly outside of the EU or European context 3. Clearly narrow or sector-specific application of sovereignty without broader engagement with the conceptual understanding of digital sovereignty 4. Publication type was not suitable for review (e.g., commentaries, forum introductions, commentaries, etc.)
Full Text Screening	1. Contributes to the main focus of the review by conceptualizing and defining sovereignty in the digital domain 2. Sovereignty remains central in full text	1. Sovereignty is not a main theme 2. Narrow or sector-specific application of sovereignty without broader engagement with the conceptual understanding of digital sovereignty

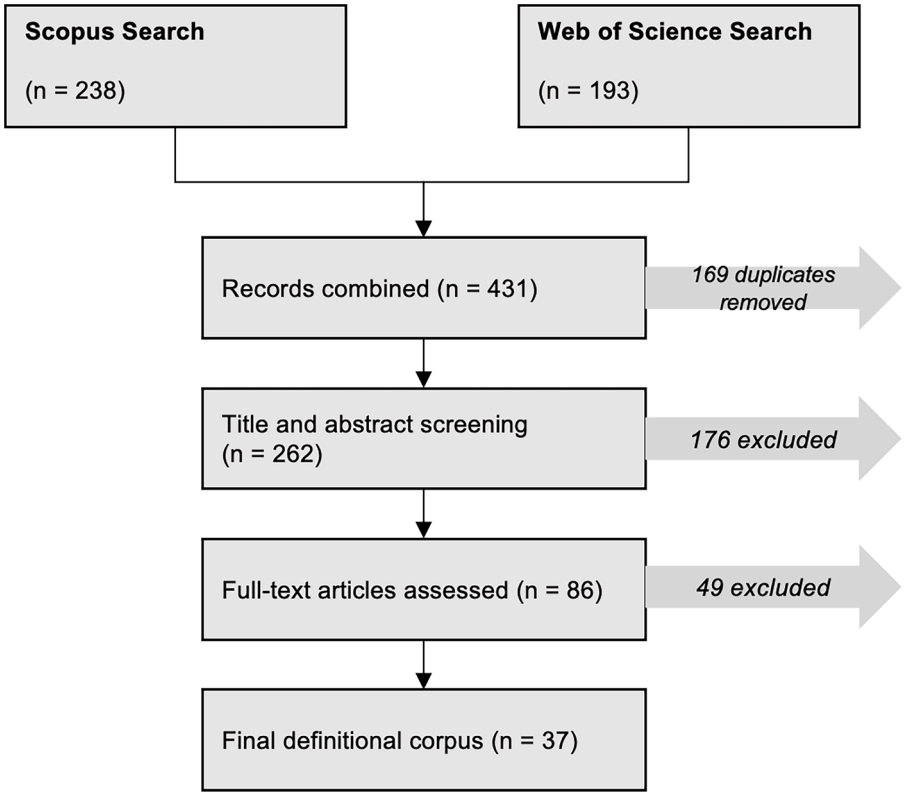


Fig. 3. The definitional review.

draws on one conceptualization.

Similarly to the boundary review, no formal article-level appraisal was conducted for the definitional corpus. Given the nature of the definitional review's study design, in that the focus was conceptual and interdisciplinary, sample credibility was supported through explicit inclusion and exclusion criteria, as seen in Table 3. Additionally, the search was restricted to peer-reviewed academic articles and reviews.

This process resulted in four conceptualizations: digital sovereignty as political claim-making, digital sovereignty as control over the digital, digital sovereignty as capability, and digital sovereignty as individual digital self-determination. The full concept matrix for the second review can be found in Table A2.

3.3. Integrative synthesis

The final step of our study integrated the two review stages to examine how the different conceptualizations of digital sovereignty relate to the identified boundaries. Together, the two corpora contained 55 unique records, overlapping in four papers.

Due to differences in the analytical purpose, the conceptual coding differed between the two stages. In the definitional review, the four conceptualizations were developed inductively from extracted definitions and other relevant passages. In the process of the integrative synthesis, these established conceptualization categories were then applied deductively to the boundary corpus to examine how these appeared in papers discussing boundaries. This deductive application was non-exclusive, allowing multiple conceptualizations to be retained where relevant.

For each of the 22 papers in the boundary corpus, we analyzed relevant excerpts and the paper's broader argument to determine its understanding of digital sovereignty. The four identified understandings of digital sovereignty were treated as non-exclusive categories, as papers discussing boundaries often did not clearly define digital sovereignty, instead drawing from multiple conceptualizations in line with their argument. Consequently, multiple understandings could be coded into a single paper in the boundary corpus. The resulting integrative concept matrix therefore indicates which definitional families the boundary corpus draws upon as well as which boundary dimension each paper addresses. This concept matrix can be found in Table A3.

4. Results

The results are structured as follows: First, we revisit the boundary dimensions from the boundary review. Next, we present the identified conceptualizations of digital sovereignty from the definitional review corpus. Finally, we link the definitional conceptualizations of digital sovereignty to the boundary dimensions.

4.1. Boundaries to the pursuit of EU digital sovereignty

Following our guiding research question, the boundary review inductively synthesized insights from academic sources across several disciplinary lenses. In this, the review mapped how the boundaries are framed in the literature.

Table A1 depicts the resulting concept matrix and shows which concepts were identified in the selected sources. The analysis revealed five recurring boundary concepts that constrain the EU's goal to achieve digital sovereignty. These concepts are grouped into two overarching dimensions. The first dimension, practical implementation boundaries, includes technological capabilities and infrastructure control. The second dimension focuses on institutional boundaries and includes member state tensions, public-private sector dynamics, and regulatory overreach. A summary of these boundaries can be found in Table 4. In the following, we revisit these boundaries before relating them to the conceptualizations identified in the definitional review.

Table 4
Boundaries to the pursuit of digital sovereignty.

Boundary	Description
Technological capabilities	Limited R&D, production capacity and human capital increase reliance on external actors.
Infrastructure control	Ownership and governance of critical infrastructure remain concentrated on foreign providers.
Member-state tensions	Diverging preferences and unequal capacities constrain EU coordination.
Public-private dynamics	Private ownership, diverging incentives and power asymmetries complicate public control
Regulatory overreach	Restrictive regulation may weaken innovation and international competitiveness.

4.1.1. Practical implementation boundaries

The notion of digital sovereignty as it is envisioned by the EU is frequently constrained by the realities of technological and infrastructural dependencies. Here, the concept of digital sovereignty is challenged by the concrete limitations of availability and access to digital technologies and infrastructures.

Technological capabilities are a central practical implementation boundary. Within this boundary dimension, it is central that the EU's ability to develop core digital technologies and components on the continent is maintained. Although European providers in key segments such as 5 G components design their technology in-house, key stages of production, including semiconductor manufacturing, often take place outside of the EU (Da Ponte et al., 2023). Similar capability gaps are observed in the cloud sector, where the EU struggles to match the scale of research and development investments made by incumbent global providers (Baur, 2025; Blancato, 2024; Calcara, 2026; Rone, 2024). The literature also shows shortages and uneven distributions of specialized digital human capital, which further constrain the development and maintenance of domestic capabilities (Da Ponte et al., 2023). In combination, these factors increase the need for partnerships with non-EU actors, reinforcing external dependencies (Rone, 2024). The EU's digital sovereignty ambitions thereby remain tied to infrastructures and technologies owned by external actors.

Another practical limitation is infrastructure control, that is, the question of who owns and governs central digital infrastructures. Where the previous category addresses the EU's ability to increase digital resilience by creating and adopting digital technologies, this boundary dimension centers on the ownership and governance of both the physical and digital infrastructures required to operate them. In cloud services, for example, the European market is dominated by US-based providers Amazon Web Services, Microsoft Azure, and Google Cloud, making up 72% of the European market, while the market share of European cloud providers has declined despite revenue growth (Calcara, 2026). At the same time, the three dominant providers continue to expand their European data center presence, furthering the EU's infrastructure dependencies (Blancato, 2024). Similar asymmetries exist in other critical infrastructures. Submarine cables, for instance, are increasingly owned by private-sector actors, giving non-European firms growing influence over international digital communication networks (Ganz et al., 2024). Gaia-X is often discussed in the literature as an attempt to counter such dependencies, yet the case also reveals the difficulty of pursuing autonomy while relying on incumbent infrastructures. With the goal of reducing dependencies on foreign cloud providers, the initiative faced criticism due to close collaboration with precisely those foreign cloud providers it was seeking independence from, which some argue undermines its goal of digital sovereignty (Baur, 2025; Blancato, 2024). Hence, across the literature, infrastructure control emerges as a boundary as the EU seeks greater digital independence in an environment where critical infrastructures remain largely owned or governed by external private actors.

4.1.2. Institutional boundaries

Beyond these practical implementation constraints, the literature shows boundaries that are more related to the institutional context. Unlike the practical boundaries, these institutional issues address the underlying power relations that determine the success in achieving digital sovereignty goals. Disagreements between member states and the EU institution, public-private sector dynamics, and the risk of isolating the European digital market via regulatory overreach directly affect the ability to effectively enable digital sovereignty.

The first institutional boundary lies in member state tensions. The EU is a union of member states, which often do not share the exact same values. The ambiguously defined and interpreted concept of digital sovereignty raises the question of whether it should be approached from a national or a supranational perspective (Floridi, 2020). Here, disagreements emerge across EU member states. Germany and France are often cited as early adopters of digital sovereignty and more supportive of a supranational EU-level approach, while countries such as Sweden, Poland, and the Netherlands tend to oppose the concept or prefer alternative terminology, such as strategic or technological autonomy, which aligns more closely with their vision of digital governance (Calcara, 2026; Falkner et al., 2024; Rone, 2024). Smaller or more technologically dependent European member states that are less able to develop their own digital infrastructures and technological solutions may also be more willing to trust foreign digital providers (Blancato and Carr, 2024). Across the reviewed studies, member state tensions therefore emerge as a boundary because the EU's digital sovereignty agenda is constrained by diverging preferences and uneven capacities within the Union.

The next institutional boundary focuses on public-private sector dynamics. As many of the technologies and infrastructures that the EU relies on are owned and governed by private actors, often based outside of the EU, digital sovereignty is shaped by an inherent tension as private actors prioritize their own interests, which frequently diverge from public actors' interests (Baur, 2025; Floridi, 2020). This is particularly visible in areas such as submarine cables and cloud services, where private ownership and governance complicate efforts to exercise public control in a way that facilitates digital sovereignty (Ganz et al., 2024). More broadly, the reviewed literature suggests that the environment in which digital sovereignty initiatives take place are shaped largely by private firms whose strategic interests do not necessarily align with public objectives, which cannot be entirely remedied by stronger regulations. Public-private sector dynamics therefore emerge as a recurring boundary because the EU's digital sovereignty depends not only on regulatory capacity and power, but also on its ability to shape and negotiate with private power.

A final institutional boundary concerns regulatory overreach, that is, the risk that the EU's pursuit of digital sovereignty through regulatory measures may lead to unintended protectionism. The EU's global leadership in regulation is often seen as a primary contributor to the establishment of digital sovereignty (Thumfart, 2022). At the same time, regulatory measures to increase influence over digital environments in the name of digital sovereignty may lead to protectionism, consequently creating an isolated European market (Barrinha and Christou, 2022). Several studies note that stronger regulations can hinder domestic innovation and international collaboration, which simultaneously hinders economic growth and international competitiveness and creates stronger dependencies on foreign providers who are able to develop technologies under less restrictive regulatory conditions (Blancato, 2024; Calderaro and Blumfelde, 2022; Rossi, 2024). In this sense, the EU's push to become a regulatory superpower could reinforce dependencies, thus decreasing digital sovereignty advancements. The risk of regulatory overreach therefore emerges as a boundary to digital sovereignty insofar as a pursuit primarily through rule-making and regulatory power may constrain rather than strengthen the EU's ability to realize its digital ambitions.

4.2. Conceptualizations of digital sovereignty

Upon reviewing the literature on digital sovereignty, we uncovered several recurring understandings of digital sovereignty. In this section, we categorize the papers identified in our definitional review based on their main understanding of digital sovereignty. The complete concept matrix for the definitional review can be found in Table A2. The categories presented here represent recurring conceptualizations, meaning that they are not mutually exclusive definitions. Control and capability-oriented understandings concern the authority and capacity to achieve digital sovereignty, while political claim-making refers to how digital sovereignty is invoked and individual self-determination focuses on agency at the individual level. Table 5 provides an overview of the identified conceptualizations of digital sovereignty.

4.2.1. Digital sovereignty as political claim-making

A recurring understanding of digital sovereignty found in the literature was the notion of the term as a political claim-making. This was the most frequent primary interpretation of the concept, observed in 15 of the 37 papers in the definitional corpus. Here, the term was understood as a vague, high-level concept, which did not directly represent a specific ideal and was instead used as a narrative to further political goals without committing too heavily to specific digital sovereignty actions (Broeders et al., 2023; Turobov et al., 2026). In this understanding, digital sovereignty was often viewed as performative rhetoric that is not being implemented in practice (Adler-Nissen and Eggeling, 2024; Barrinha and Christou, 2022; Björk et al., 2025; Falkner et al., 2024). One possible explanation for this use of digital sovereignty is that contradictory concepts such as open markets and stronger regulations may be unified through conceptual unclarity (Turobov et al., 2026), leaving space for actors with differing and sometimes competing interests to interpret the idea in a way which is most suitable to them. For example, in the Gaia-X project, the initial goal was to reduce external dependencies on foreign cloud providers and the subsequent collaboration with those providers attracted criticism. In order to re-align with the stated goal, digital sovereignty was then reinterpreted as compliance with European rules (Baur, 2025).

4.2.2. Digital sovereignty as control over the digital

Another understanding of digital sovereignty which was present throughout the definitional corpus was the idea that digital sovereignty largely centers on control over the digital. The central theme within this understanding is that being digitally sovereign depends on the legitimate authority to make decisions over digital resources (Hulkó et al., 2025; Roberts et al., 2021).

Included here are concepts such as infrastructure control, which relates to the governance of hardware and networks (Hulkó et al., 2025), and data control, which centers on data collection, processing, mobility, and management (Daliparthi et al., 2025; Hulkó et al., 2025). Regulatory control refers to exercising authority through binding legal obligations and regulatory supervision (Donnelly et al., 2024).

Following this conceptualization, digital sovereignty can therefore be achieved even when ownership is not, provided authority and

Table 5
Conceptualizations of digital sovereignty.

Conceptualization	Description
Political claim-making	Digital sovereignty functions as an ambiguous narrative through which actors advance strategic objectives.
Control over the digital	Digital sovereignty refers to the authority over how critical elements of the digital are owned, governed, accessed, and used,
Capability	Digital sovereignty requires sufficient technological and economic capacity to act independently in the digital.
Individual self-determination	Digital sovereignty refers to individuals' ability to exercise meaningful agency within the digital.

governance are obtained (Donnelly et al., 2024; Roberts et al., 2021).

4.2.3. Digital sovereignty as capability

The next recurring understanding of digital sovereignty followed a framing centered on capabilities, competitiveness, and technological leadership. Here, capabilities refer to the knowledge, skills, and productive capacity needed to develop and use technologies (Caravella et al., 2024; Crespi et al., 2021). The intended consequence of strengthening these capabilities is reducing dependencies and heightening resilience (Crespi et al., 2021).

Actors adopting this view of digital sovereignty focus on the idea of a country or, in the case of the EU, a union of countries, being able to develop technological capacities which reduce vulnerability to external dependencies. However, this does not necessarily require producing all technologies domestically. Instead, digital sovereignty can also be achieved through access to externally developed technologies through reliable partnerships (Crespi et al., 2021). This conceptualization of digital sovereignty therefore focuses on the ability to understand and evaluate technologies while maintaining independent action and decision-making, without necessarily pursuing maximum autarky (Kaloudis, 2022).

4.2.4. Digital sovereignty as individual digital self-determination

Contrary to the three previously detailed understandings of digital sovereignty, this final aspect focuses on digital self-determination at an individual level (Bokolo, 2025). In this understanding, privacy and freedom play a central role in conceptualizing digital sovereignty, with a strong emphasis placed on citizen rights and protection (Braun and Hummel, 2025; Coletti et al., 2025). Here, the terminology of data sovereignty is also often mentioned in terms of sovereignty related to individual data privacy (Calzada et al., 2025). Within the European context, this conceptualization of digital sovereignty is understood to further European values at the individual citizen level (Keerthiraj and Misra, 2026).

4.3. Linking conceptualizations and boundaries

The two preceding sections show that the literature differs both in how it defines digital sovereignty and which boundaries it emphasizes in terms of the realization of digital sovereignty. To bring these findings together, the papers from the boundary review were revisited and analyzed in relation to their implicit or explicit understanding of digital sovereignty. Table A3 shows the synthesized concept matrix. A visualization of the co-occurrence of conceptualizations and boundaries within the boundary corpus can be found in Table 6.

Although there is no clear one-to-one relationship between the boundaries and the conceptualizations, the practical implementation boundaries were mostly connected to understandings of digital sovereignty as control and as capability. In these studies, sovereignty is primarily framed in relation to the reduction of dependencies, the strengthening of domestic European capacities, and control over critical technologies and infrastructures (e.g., Blancato, 2024; Ganz et al., 2024; Jansen et al., 2023). Technological capabilities were associated primarily with control (n = 7), capability (n = 6) and political claim-making (n = 5). This indicates that limitations in technological capabilities are discussed from the perspective of deficits in productive capacity as well as difficulties in the EU's ability to exercise control and translate political ambitions into action. The infrastructure control boundary was most frequently related to the control-oriented understanding (n = 7), but also to political claim-making (n = 4), capability (n = 2), and individual digital self-determination (n = 1). Within the reviewed papers, this boundary was therefore primarily framed in terms of ownership and governance.

In contrast, the institutional boundaries are conceptually more heterogenous. Among papers in the boundary corpus addressing member state tensions, control-oriented understandings were addressed most frequently (n = 7), followed by capability (n = 6), political claim-making (n = 4), and individual digital self-determination (n = 2). Here, differences in national positions within the member states were discussed in light of difficulties exercising collective European control and developing shared technological capabilities. Tensions between member states were also reflected in understanding digital sovereignty as political claim-making, exemplifying disagreements within the Union regarding a shared meaning of digital sovereignty.

Within the boundary corpus, public-private sector dynamics were most often associated with control-oriented understandings of digital sovereignty (n = 4), followed by political claim-making (n = 3), while capability and self-determination were each identified once. The papers in this category primarily examined the importance of who governs the critical infrastructures and technologies (e.g., Baur, 2025; Falkner et al., 2024). Political claim-making was also present where stated European ambitions to strengthen digital sovereignty contrasted with the reality of cooperation with foreign private providers.

Papers in the regulatory overreach boundary category were more evenly distributed among the conceptualizations. Political claim-making, control, and capability were each identified in two papers. Here, papers discussed the boundary of a possible regulatory overreach from the perspective of a discrepancy between political sovereignty claims and the practical effects, as an attempt of exercising regulatory control, or as a potential constraint on European innovation and technological capabilities.

While digital sovereignty as discourse is the most common understanding of digital sovereignty in the definitional corpus, followed by control and self-determination, and then capability, the boundary corpus shows a slightly different distribution. Here, the most frequently used understanding is that of control, while political claim-making and capability appear less often. By contrast, self-determination conceptualizations appear only rarely within the boundary corpus, although it was more prominent in the definitional corpus.

Overall, the findings show that the emphasis of the boundaries varies across conceptualizations of digital sovereignty. While control- and capability-oriented understandings serve as the environment for practical implementation constraints, institutional boundaries are distributed across different conceptualizations. In contrast, digital sovereignty as individual digital self-determination plays a limited role in the boundary corpus. As such, the boundary corpus mainly discusses constraints at the level of EU institutions, member states, and technological systems.

Table 6
Digital sovereignty conceptualizations and boundary dimensions identified within the boundary corpus.

	Political claim-making	Control	Capability	Individual digital self-determination
Technological capabilities	5	7	6	0
Infrastructure control	4	7	2	1
Member-state tensions	4	7	6	2
Public-private dynamics	3	4	1	1
Regulatory overreach	2	2	2	0

Note: Values show the number of boundary-corpus papers coded to each conceptualization. Categories are non-exclusive and papers may appear in multiple cells.

5. Discussion

In the following section, we discuss and interpret the previously identified findings, namely that digital sovereignty is both conceptually

diverse and practically constrained. First, we discuss what the identified boundaries reveal about the limits of the EU's digital sovereignty agenda, and then consider what the definitional variation reveals about the concept of digital sovereignty. Finally, we discuss our contributions to research, policy, and practice and the limitations of our study.

5.1. Boundaries and the limits of EU digital sovereignty

The boundaries identified in the boundary review point to recurring tensions within the EU's pursuit of digital sovereignty. At the level of practical implementation, the findings suggest that digital sovereignty ambitions remain closely tied to technological and infrastructural dependencies, which the EU cannot easily overcome. Producing European alternatives often requires international cooperation with foreign vendors, while shortages in skills and infrastructure continue to constrain the development of more autonomous digital capabilities.

The findings also suggest that regulation is a paradoxical element of digital sovereignty. While regulation can allow the EU to exert influence in domains that it does not otherwise directly control, regulation alone does not solve underlying capability gaps. Here, the literature points to risks of market fragmentation, reduced innovation, and tensions with open digital markets. For instance, approaches such as compliance by design may reconcile European rules with continuing reliance on non-EU providers, though their effectiveness of this has not yet been proven (Baur, 2025).

The current debate surrounding the Digital Omnibus further addresses the problem of complicated regulation, wherein the European Commission offers a proposal which could reduce compliance costs and strengthen competitiveness while maintaining regulatory objectives (European Commission, 2025b). However, the European Data Protection Board and European Data Protection have raised concerns that the proposed narrowing of the definition of personal data may adversely affect data protection (European Data Protection Board and European Data Protection Supervisor, 2026). This response to the regulatory overreach boundary could therefore weaken individuals' control over their personal data, which is counterproductive to digital sovereignty from the perspective of individual digital self-determination.

Open source software also illustrates this interaction. While the availability of open source software solutions does improve access to technologies, maintaining the security of such software still requires funding and sustained development work (Tridgell, 2025). Using a capability-oriented understanding, investing in this work does improve the practical ability to access digital technologies, thus improving digital sovereignty. From a control-oriented understanding, however, governments may seek greater influence over the software in the name of improved digital sovereignty. Where this takes the form of restrictions that obstruct international open collaboration, regulatory overreach may weaken precisely those capabilities that digital sovereignty initiatives seek to strengthen. Germany's Sovereign Tech Fund provides a concrete example of a response to the technological capabilities boundary, supporting the maintenance of shared open digital infrastructure (Tridgell, 2025).

Additionally, fragmented ownership structures shape digital sovereignty. Private actors own many central digital technologies and their interests may not align with digital sovereignty goals (Baur, 2025). Reducing dependencies on a provider may thereby conflict with that provider's interest to maintain its market position. Increasing digital sovereignty therefore takes place in an environment where the private actors involved have limited incentives to reduce such dependencies. EU member states also differ strongly in their preferences and capabilities. The EU's pursuit of digital sovereignty is thereby negotiated across a variety of levels and actor constellations.

The findings therefore indicate enduring tensions between autonomy and dependencies, openness and control, and supranational ambition and national interests. They also suggest that responses to one boundary may remain constrained by another, such as in the cases of Gaia-X and open source software.

5.2. Definitional variation of digital sovereignty

Thinking back to the term's roots, sovereignty has always been reinterpreted to fit the context and political purposes of those who invoke it. It is therefore unsurprising that the modern conceptualization of sovereignty in the digital realm remains unresolved and shaped by the interests of those who interpret it. As the review has shown, the literature does not converge on a single understanding of digital sovereignty, instead revealing four main conceptualizations, each of which foregrounds different priorities, actors, and objects of digital sovereignty.

This variation impacts how digital sovereignty can be pursued in practice. On the one hand, it complicates the concrete implementation of digital sovereignty, as the concept remains unclear. For example, how digital sovereignty should be achieved, and when it can be said to have been realized, are questions that remain largely open.

At the same time, this openness may be politically useful in more institutional contexts, as it allows different actors to interpret and mobilize digital sovereignty in ways that align with their own interests. This is exemplified in the case of Gaia-X, where digital sovereignty was understood as compliance with European rules in order to accommodate competing political and commercial interests (Baur, 2025). In this, the conceptual variation of digital sovereignty functions as a conceptual limitation and a source of political adaptability.

Apart from the definitional ambiguity, the observed variation in conceptualizations also shapes the ways that problems are recognized as being central to digital sovereignty. For example, where a control-oriented understanding focuses on boundary dimensions of ownership and governance, an individual digital self-determination-oriented understanding is more concerned with individual rights and autonomy. Therefore, the implicit or explicit definition of digital sovereignty helps explain which boundaries are given the most attention. Consequently, the same initiative may be assessed differently depending on the underlying understanding of digital sovereignty. Improving access and ownership to cloud capacity as is proposed in Gaia-X may satisfy digital sovereignty from a control perspective, while a capability-oriented perspective would consider whether actors have the skills and capacity to develop and use relevant technologies, for example through reliable partnerships (Baur, 2025; Crespi et al., 2021). In order to assess an initiative, it is therefore necessary to first establish which form of digital sovereignty is to be addressed.

This is particularly relevant in an EU context, where many different member states, institutional levels and private actors are brought together. In this setting, conceptual openness becomes an opportunity to justify many different initiatives, such as industrial policy, citizen rights protection, market regulation, or cybersecurity under one shared label. This plurality also helps explain why different strands of the literature emphasize different boundaries.

Another noteworthy finding is that, while the definitional corpus on the role of individual digital self-determination is represented at similar levels to the other dimensions, it remains marginal in the boundary corpus. Within the selected boundary corpus, constraints were therefore more commonly examined at a broader level than in terms of individual autonomy or rights. However, differences in search dates and terms may contribute to this pattern, so this does not generalize the entire literature. Still, the contrast raises the question of whether initiatives that strengthen EU digital sovereignty also increase individuals' ability to exercise meaningful digital control. As the papers discussing this specific understanding are all comparatively recent, this may become more prominent in future debates.

5.3. Contributions to research, policy, and practice

This study offers several contributions to research on digital sovereignty. First, we clarify the core concept by distinguishing four recurring

approaches to the understanding of the concept. Here, we differentiate between the ideas of digital sovereignty as political claim-making, as control over the digital, as digital capability, and as the idea of digital self-determination. Although these understandings are not always strictly applied throughout the literature, our overview provides a more structured basis for comparing studies using the term digital sovereignty.

Next, we add to our previously established boundary framework by relating it to the aforementioned definitional variation. Here, we were able to observe that the practical implementation boundaries are most closely associated with control- and capability-oriented understandings of digital sovereignty, while the institutional boundaries are more conceptually heterogenous. This adds to the boundary framework in that the focus on specific constraints to the pursuit of digital sovereignty partly depends on the underlying and oftentimes implicit understanding of digital sovereignty. Additionally, our study helps explain the fragmentation of the current literature base by showing that the different approaches to digital sovereignty evaluate the EU's current digital sovereignty agenda according to different implicit criteria. For example, while more capability-oriented understandings value the capacities to develop and maintain digital infrastructure and technology, individual rights and user autonomy play a larger role when taking an individual self-determination approach to digital sovereignty.

For policy and practice, our findings suggest that while it may be politically beneficial to refer to an ambiguously defined digital sovereignty term, the actual implementation of digital sovereignty would strongly benefit from a better clarification of the aspects that are to be addressed. The findings also suggest that regulatory ambition alone is compensate for the technological capability gaps that sustain dependencies. Hence, digital sovereignty strategies must align regulatory initiatives with investments, for example, and address trade-offs, such as the tension between open markets and control, autonomy and interdependencies, EU-level coordination and national preferences, and competitiveness and rights protection.

5.4. Limitations

The study has several limitations. First, our focus on academic literature meant that we did not directly include policy documents and reports. The findings consequently map academic interpretations rather than providing a comprehensive account of how EU institutions articulate digital sovereignty. Next, focusing on English language publications may have introduced bias, particularly as the EU is a multilingual institution spanning national borders. Our database and keyword choices may also have excluded adjacent terminology, such as strategic autonomy, meaning that this review primarily encompasses literature using the core digital or technological sovereignty framing. Screening and charting were also conducted by a single reviewer, which may introduce selection bias and interpretive bias despite traceability and transparency measures. Finally, we chose to analyze only publications focusing on the EU, limiting our ability to contextualize the boundaries in an interconnected global digital order.

6. Conclusion

This study set out to examine the EU boundaries of digital sovereignty. Motivated by increasing political and academic discourse on the term, coupled with growing concerns of dependencies on non-EU actors, this review contributed to the clarification and boundary exploration of digital sovereignty. Building on an initial review of boundaries and extending it through a targeted follow-up review on definitional approaches, this study drew on a wide variety of academic literature and explored the questions:

(1) *What boundaries does academic literature identify as constraining the pursuit of EU digital sovereignty?*
(2) *How is digital sovereignty conceptualized in academic literature within the EU context?*

The findings show that digital sovereignty is not yet treated as a uniform concept. Within these understandings, different actors and priorities are considered, oftentimes implicitly, to be the most important factor in achieving digital sovereignty. At the same time, digital sovereignty is shaped by practical implementation boundaries and institutional boundaries. While there is not a clear one-to-one relationship between the boundaries and the definitions, the salience of the individual boundaries differs depending on the definition that is assumed.

By combining the definitional and the boundary layer, this study contributes to a more structured understanding of digital sovereignty. This is relevant for research and policy, as greater clarity is required in order to create meaningful digital sovereignty agendas and assess these theoretically. Future research could build on these limitations in several ways. To address the first limitation, an analysis of policy documents could be conducted to examine whether the four categories of definitional approaches identified in this study also appear in EU regulations and strategies. Next, empirical work, particularly qualitative studies with policymakers, firms active in digital sovereignty projects, and citizens, could investigate to what extent the academic understandings of digital sovereignty align with the practical use of the term. Finally, future work could also analyze how non-EU countries understand and how different cultures and digital sovereignty definitions shape the boundaries that they face.

CRediT authorship contribution statement

Laura Macpherson: Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Daniel J. Veit:** Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A1. Boundary concept matrix

Sources	Practical Implementation Boundaries		Institutional Boundaries		
	Technological Capabilities	Infrastructure Control	Member State Tensions	Public-Private Sector Dynamics	Regulatory Overreach
Ahokangas et al., 2023			X		
Barrinha and Christou, 2022					X
Baur, 2025	X	X		X	
Bharosa, 2022	X				
Blancato, 2024	X	X	X		X
Blancato and Carr, 2024		X	X		
Calcara, 2026	X		X		

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Calderaro and Blumfelde, 2022			X						
Carver, 2024				X					
Da Ponte et al., 2023	X								
Falkner et al., 2024						X			
Farrand and Carrapico, 2022				X					
Floridi, 2020				X		X			
Ganz et al., 2024	X		X			X			
Jansen et al., 2023	X		X						
Kaloudis, 2021				X					
Rone, 2024	X			X					
Rossi, 2024								X	
Santaniello, 2025	X		X						
Seidl and Schmitz, 2024	X					X			
Tan et al., 2023			X	X					
Tridgell, 2025			X					X	

Appendix A2. Definitional concept matrix

Sources	Political Claim-Making	Control Over the Digital	Capability	Individual Digital Self-Determination
Adler-Nissen and Eggeling, 2024	X			
Barrinha and Christou, 2022	X			
Björk et al., 2025	X			
Bodó et al., 2021				X
Bokolo, 2025				X
Braun and Hummel, 2025				X
Broeders et al., 2023	X			
Calzada et al., 2025				X
Caravella et al., 2021			X	
Coletti et al., 2025				X
Crespi et al., 2021			X	
Csernatoni, 2022	X			
Daliparthi et al., 2025		X		
Donnelly et al., 2024		X		
Saura García, 2024		X		
Grohmann and Costa Barbosa, 2026	X			
Gstrein, 2023				X
Gulyás, 2024			X	
Hulkó et al., 2025		X		
Kaloudis, 2021			X	
Kaloudis, 2022			X	
Keerthiraj and Misra, 2026				X
Lambach and Oppermann, 2023	X			
Lehuedé, 2024			X	
Liman and Weber, 2023		X		
Marcut, 2020	X			
Oliveira Martins et al., 2022		X		
Meijen, 2024	X			
Moghior, 2022	X			
Roberts et al., 2021		X		
Rogat, 2025	X			
Rossi, 2024			X	
Ryan et al., 2024		X		
Santaniello, 2025	X			
Šitera and Eberle, 2025	X			
Turobov et al., 2026	X			
Wenzelburger and König, 2025	X			

Appendix A3. Synthesized concept matrix

Sources	Review	Definitions Political Claim-Making	Control Over the Digital	Capability	Individual Digital Self-Determination	Boundaries Technological Capabilities	Infrastructure Control	Member State Tensions	Public-Private Sector Dynamics	Regulatory Overreach
Ahokangas et al., 2023	1			X				X		
Baur, 2025	1	X	X			X	X		X	
Bharosa, 2022	1		X	X		X				
Blancato, 2024	1		X	X		X	X	X		X
Blancato and Carr, 2024	1		X				X	X		

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Calcara, 2026	1	X	X	X		X		X					
Calderaro and Blumfelde, 2022	1	X		X			X						
Carver, 2024	1	X						X					
Da Ponte et al., 2023	1			X		X							
Falkner et al., 2024	1	X	X							X			
Farrand and Carrapico, 2022	1	X	X	X				X					
Floridi, 2020	1		X		X			X	X				
Ganz et al., 2024	1		X			X	X		X				
Jansen et al., 2023	1		X			X	X						
Rone, 2024	1	X	X	X		X		X					
Seidl and Schmitz, 2024	1	X		X		X			X				
Tan et al., 2023	1		X		X		X	X					
Tridgell, 2025	1	X	X				X				X		
Barrinha and Christou, 2022	1, 2	X									X		
Kaloudis, 2021	1, 2			X				X					
Rossi, 2024	1, 2			X							X		
Santaniello, 2025	1,2	X				X	X						
Adler-Nissen and Eggeling, 2024	2	X											
Björk et al., 2025	2	X											
Bodó et al., 2021	2				X								
Bokolo, 2025	2				X								
Braun and Hummel, 2025	2				X								
Broeders et al., 2023	2	X											
Calzada et al., 2025	2				X								
Caravella et al., 2021	2			X									
Coletti et al., 2025	2				X								
Crespi et al., 2021	2			X									
Csernatoni, 2022	2	X											
Daliparthi et al., 2025	2		X										
Donnelly et al., 2024	2		X										
Saura García, 2024	2		X										
Grohmann and Costa Barbosa, 2026	2	X											
Gstrein, 2023	2				X								
Gulyás, 2024	2			X									
Hulkó et al., 2025	2		X										
Kaloudis, 2022	2			X									
Keerthiraj and Misra, 2026	2				X								
Lambach and Oppermann, 2023	2	X											
Lehuedé, 2024	2			X									
Liman and Weber, 2023	2		X										
Marcut, 2020	2	X											
Oliveira Martins et al., 2022	2		X										
Meijen, 2024	2	X											
Moghior, 2022	2	X											
Roberts et al., 2021	2		X										
Rogat, 2025	2	X											
Ryan et al., 2024	2		X										

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Šitera and Eberle, 2025	2	X
Turobov et al., 2026	2	X
Wenzelburger and König, 2025	2	X

Data availability

Data will be made available on request.

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