TALLINN UNIVERSITY OF TECHNOLOGY
School of Information Technologies

Triin Tuulas 212066IVGM

A Systematic Literature Review of The Terms "Digital State", "Virtual State" and "E-State”

Master's thesis

Supervisor: Amirouche Moktefi
PhD - History and philosophy of science

Co- supervisor: Karin Oolu
PhD student

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Triin Tuulas 212066IVGM

Terminite “digiriik”, “virtuaalne riik” ja “e-riik” süstemaatiline kirjanduse ülevaade

Magistritöö

Juhendaja: Dr. Amirouche Moktefi

Kaasjuhendaja: Karin Oolu
Doktorant

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Author’s declaration of originality

I hereby certify that I am the sole author of this thesis. All the used materials, references to the literature and the work of others have been referred to. This thesis has not been presented for examination anywhere else.

Author: Triin Tuulas

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Abstract

The importance of the research questions addressed by the review is to bring clarity in the usage of the term of digital state, virtual state, and e-state in the method of systematic literature review.

Based on the results, the author offers a conclusion, does these terms have any substantial differences or can they be considered as synonyms? How have the terms evolved throughout history in the substantial, geographical or occurrence means? This systematic literature review examines how authors have conceptualized and defined these terms in their materials. Within the scope of this literature review and based on the materials where the concepts are defined, is it possible to formulate a common definition for these terms?

As input for the future studies in the discourse of the narrative of the phenomenon of the state in digital era, author compares the result with Chandran Kukathas interpretation of the state (Kukathas, 2014). His article "A Definition of the State" looks inside the State as an organism in-depth and with broader perspective than just the meaning of the government. Current author has a background hypothesis (that is not aimed to answer with this thesis but will give first particles of answer) that D.V.E. state currently has no unified meaning and has to be looked with a broader scope than just e-gov technology solution and process/ service optimization. This article has a summative explanation derived from different theories and interpretations, how the state is defined and how it differs from other institutions and social structures, therefore author of current thesis sees this article as a sensible benchmark for seeing digital/virtual/e-state broader than just e-government or e-service platform.

This review covers material from Primo search portal, which is described as a search portal, that enables to make a cross-database search in research databases, online catalogue ESTER and TalTech Library's Digital Collection (List of databases, 2024).

Chat GPT 3.5 is used for styling the text and translation of source materials to English from languages that are not English or Estonian. Atlas.it artificial intelligence tool (Atlasti.com, 2024) is used for additional coding of the sources (AI provided codes are marked separately).

This thesis is written in English and is 108 pages long, including 5 chapters, 7 figures and 8 tables.

Annotatsioon

“Terminite “digiriik”, “virtuaalne riik” ja “e-riik” süstemaatiline kirjanduse ülevaade”

Käesolevas uurimuses käsitletavate uurimisküsimuste tähtsus seisneb terminite digitaalne riik, virtuaalriik ja e-riik (D.V.E. riik) kasutamisse selguse toomises süstemaatilise kirjanduse ülevaate meetodil.

Tulemustele tuginedes jäteldab autor, kas neil terminitel on olulisi erinevusi või kas neid võib pidada sünonüümideks? Kuidas on nende terminite tähendus ajaloos muutunud vastu geograafilisi ja ajaloolist aspekti? See süstemaatiline kirjanduse ülevaade uurib, kuidas autorid on oma materjalides neid termineid mõtestanud ja defineerinud. Selle kirjanduse ülevaate raames selgub, kas materjalide põhjal, kus mõisted on defineeritud, on võimalik formuleerida ühine tähendus nende terminite jaoks?

Sisendiks tulevaste uuringute jaoks, mis käsitlevad digitaalajastu riigi fenomeni, võrdleb autor oma tulemust Chandran Kukathase riigi tõlgendusega (Kukathas, 2014). Tema artikkel "Riigi definitsioon" vaatleb põhjalikult riiki kui organismi ja laiemalt kui ainult valitsuse tähendus. Praegusel autoril on taustahüpotees (mis pole selle väitekirjaga vastamiseks suunatud, kuid annab esimesed vastuseosakesed), et D.V.E. riiki tuleb vaadata laiemas ulatuses kui ainult e-valitsuse tehnoloogilise lahenduse ja protsessi/teenuste optimeerimise tasandil. Kukathase artikkel pakub kokkuvõtvat selgitust erinevatest teooriatest ja tõlgendustest, kuidas riik on määratletud ja kuidas see erineb teistest institutsioonidest ja sotsiaalsetest struktuuridest, seega näeb käesoleva väitekirja autor seda artiklit mõistliku võrdlusobjektina digitaalse/virtuaalse/e-riigi laiemaks mõistmiseks kui ainult e-valitsuse või e-teenuste platvormi.

See ülevaade hõlmab materjale Primo otsinguportaalist (List of databases, 2024), mida on kirjeldatud kui otsinguportaal, mis võimaldab teha ristandmebaaside otsinguid teadusandmebaasides, veebikataloogis ESTER ja TalTechi raamatukogu digitaalkogus.

Chat GPT 3.5 (OpenAI, 2024) on kasutatud teksti stiilimiseks ja lähteallikate tõlkimiseks inglise keelde muukeeltest, mis pole inglise ega eesti keel. Lisaks on kasutatud Atlas.it tehisintellekti tööriista (Atlasti.com, 2024) allikate täiendavaks kodeerimiseks (AI-ga antud koodid on eraldi märgitud).

Lõputöö on kirjutatud inglise keeles ning sisaldab teksti 108 leheküljel, 5 peatükki, 7 joonist, 8 tabelit.

List of abbreviations and terms

BITA	a discipline of business - IT alignment
IT	information technology
EA	enterprise architecture
DEG	digital era governance
D.V.E.	digital state, virtual state and/or e-state

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1. Introduction

This thesis aims to address the essential research questions concerning the terminology and conceptual understanding of digital state, virtual state, and e-state (D.V.E.) through a systematic literature review. Despite the increasing prevalence of these terms in scholarly discourse and policy discussions, there remains a lack of systematic reviews elucidating their usage and meaning. While there is a plethora of terms in use additional to D.V.E. (including digital/ information/ datafied/ virtual etc. society, digital/ virtual/ electronic/ e- government, digital/ virtual/ e-nation or country, digital agency and so on), which have been employed to describe digitally transformed phenomena of state (as an environment where we live and participate), society, nation, public service or government, this study focuses exclusively, is for the beginning of future studies, only on the aforementioned three terms- digital, virtual and e-state. Such selection is chosen for the purpose of creating clarity inside the term "state" by its direct usage. Current thesis does not include the interpretation review (although justified in the future studies) for terms like "e-government" in the means, how is this term used in literature- just as electronic government service or broader. Current research scope selection is mostly chosen to have an optimal scope of research material for master's thesis and with the aim not to disperse the topic.

Through an exhaustive examination of relevant literature, this research endeavours to ascertain:

- how are D.V.E. interpreted (or if applicable then defined) throughout history and geography? Can they be considered as synonyms or not?
- whether a unified definition can be formulated for these terms, thereby fostering greater clarity and coherence in their usage. The contemporary discourse surrounding digitally transformed environments abounds with additional various terms such as e-government, e- governance, digital society, information society, digital nation, virtual country, and datafied society, among others. However, ambiguity often shrouds the precise meanings of these terms, leading to confusion and inconsistency

in interpretation. For example, here are some examples of different interpretations for “digital state”:

a) “The digital state is a digital society where the use of digital channels is an integral part of people's everyday life” (Ministry of Economic Affairs and Communication , 2024). State and society are not synonyms, yet Estonian official source is defining the term like this.

b) „As to what is supposed to be resilient, this thesis focuses on the state’s DG (digital government), including its digital systems and infrastructures, and the functions it performs. Throughout the thesis and in the title, the author also refers to this understanding of the state’s DG as the “e-state” or “digital state” “. (Skierka-Canton I. , 2023). State and government are not synonyms although in everyday speech it is used as a turn of phrase.

c) “Atlas intends to create the first Digital State in the history of humankind. Borderless in nature, people from all over the world will be able to “apply for citizenship” and partake in the democratic governance of this State. The goal is to showcase to the world that transnational governance is needed to solve global issues & make the world equitable and start to implement it through the creation of a digital state.” (Atlas, 2024). This example shows one possibility of re-defining the meaning of state and how would a digital environment change the common requirements of defining the traditional state.

Considering the foregoing, this systematic literature review aims to discern the predominant usage of these terms and elucidate any substantive differences or potential synonymies. By scrutinizing how authors conceptualize and define these terms, this study offers insights into their possible nuanced meanings and proposes possible unified interpretation for their consistent usage in future studies. As in the discourse of the narrative of the phenomenon of the state in digital era author compares the result with Chandran Kukathas interpretation of the state (Kukathas, 2014). His article “A Definition of the State” looks inside the State as an organism in-depth and with broader perspective than just the meaning of the government. Current author has a background hypothesis (that is not aimed to answer with this thesis but will give first particles of answer) that D.V.E. state must be looked with a broader scope than just e-gov technology solution and process/ service optimization. This article has a

summative explanation derived from different theories and interpretations, how the state is defined and how it differs from other institutions and social structures, therefore author of current thesis sees this article as a sensible benchmark for seeing digital/virtual/e-state broader than just e-government or e-service platform.

Current research's results are useful calibrators for the visionaries and developers (policy makers and implementors) for enhancing the performance and management of digital transformation of their state. By commonly understanding the term, it focuses and thus also secures the path of development of science and its speed in the field of these terms, if the researched object (question "what") is clearly identified and framed. By establishing a collective understanding of these terms, this study facilitates more informed decision-making and enhances the efficacy of digital initiatives. Moreover, it underscores the importance of clear communication and contextual explanation in fostering acceptance and facilitating change management amidst digital transformation efforts. (Hiatt, 2006).

In conclusion, this thesis serves as a valuable resource for researchers seeking to develop comprehensive theoretical frameworks for digital, virtual, or e-state phenomena. Through its rigorous analysis and synthesis of existing literature, this study contributes to the ongoing discourse on digital governance and lays the groundwork for future research endeavours in this burgeoning field.

1.1 Importance of semantics in IT development

The focal point of this thesis lies in elucidating and reducing the ambiguity surrounding terminologies pertinent to IT advancements, which play a pivotal role in the digital transformation metamorphosis of entities such as the state.

By digital transformation, this research interprets a chain of changes implementing new information technology tools and environments to replace physical manual processes that have originated (as for mainstream usage) from the private sector and spread across various sectors, with one of the initiators (among other reasons (Porter & Heppelmann, 2014) (Mergela, Edelmann, & Haug, 2019)) as being the adaptation and response to customer/ user expectations (Andal-Ancion, Cartwright, & Yip, 2003).

We inhabit an era where virtual reality, alongside physical existence, exerts an increasingly substantial influence on everyday life. Examples such as social media and personalized digitalized information underscore this shift, necessitating careful consideration of data usage in compliance with overarching data[1] protection regulations. Consequently, service providers are compelled to scrutinize the underlying motivations for data utilization, thereby elucidating the overarching rationale behind their solutions. It becomes imperative to delineate the fundamental objectives and its' conceptual architecture, roadmap, affected stakeholders, business regulations, additional need for integrations and their architecture, performance metrics, and other fundamental aspects underlying IT development initiatives. Additionally, a comprehensive assessment of the long-term and short-term implications of such solutions, along with their impact on adjacent stakeholders and boundaries, is warranted. Such complex mechanisms need a natural language between business i.e. policy makers and information technology sector to minimize misinterpretation.

Within the context of this thesis, pertinent inquiries arise concerning the emergence of novel forms of statehood in contemporary societies. Are we witnessing the construction of an entirely new paradigm of governance or existence, encompassing realms such as e-government or specific public services, or is there a broader, more encompassing vision taking shape? Furthermore, as we navigate towards a digitally driven society, the delineation of the state's role in this phenomenon becomes paramount. Does the management of the public sector-defined state persist in this digital landscape, or is there a discernible shift towards the dominance of private sector entities? Moreover, the imperative to ensure the resilience of the state, not only in its physical manifestation but also in its digital/virtual counterpart, warrants careful consideration. Are we experiencing a substantial redefinition of the state's role in the digital era, or is it a mere extension of its traditional functions?

These questions bear significant relevance, particularly in the context of horizontal transformation initiatives unfolding in modern developmental spheres. It becomes imperative for these regions to align on a shared understanding and interpretation of the

[1] With data arises the necessity of contextualizing the substance of data and its usage purpose. Author is referring here for the principle of the need of data usage, i.e. why is data used for and to what does it contribute to. For example, data is needed for a service, yet service itself is component of a larger technological entity, organism.

concepts and objectives driving such transformations. With this review, it is possible that we witness characteristics, dimensions/layers that encompassed with digitalization and can have future discourse whether digitalization has created a new method of state provision or has digitalization created new attributes for the state. Future researchers can dispute whether digitalization has changed the framework and its elements and essence of the state or has digital transformation created something that we cannot be recon as a state anymore. For these future scientific discussions, it is needed to have a systematic literature review to consolidate the so-far understandings of the used terms. Conceptualize the mid-point interpretation for current time-period, and conduct further research based on evidence-based infomercial.

1.2 Practical objectives

The objective of this literature review is to elucidate the distinctions and potential synonymity among the terms digital state, virtual state, and e-state. The inquiry seeks to determine whether these terms can be interchangeably utilized or if they represent distinct phenomena, each requiring nuanced consideration within specific contexts. The erroneous application of these terms may engender biased interpretations and expectations in IT development initiatives and roadmaps which creates delays and inappropriate use of resources.

If definitions of terms are registered with this review, current investigation endeavours to offer a synthesized, analysis-based definition for these concepts, thereby furnishing a foundational framework for their subsequent usage and analysis. While existing research elucidates how these terms are utilized, it does not delve into the rationale behind their usage. This aspect constitutes a significant avenue for future research.

As a result of this research, clarity emerges regarding the preferred term for usage, whether they can be deemed as synonymous, based on a thorough examination of prevalent explanations, established popularity or usage habits, and contextual appropriateness. Such clarity provides invaluable insights for shaping the discourse surrounding digitally transformed states, potentially serving as a foundational element for future theoretical

frameworks in this domain. It can be used as input to future ground theory of a state in a digital era.

2. Background

In this chapter, the author conveys the framing of the research problem, which has led to the author's need to conduct a systematic literature review analysis to address the research questions.

2.1 A Thesis Exploration: Enhancing Understanding and Articulation of Digital, Virtual, and E-States

Simply put, the overarching research hypothesis of this master's thesis is that the concepts of digital state, virtual state, and e-state have not been adequately covered by theory and widely articulated in society (broader view than single state) to establish a unified understanding of what a digital state, virtual state, or e-state entails for the countries. This is despite the fact that these terms are sometimes even stereotypically used in certain countries' contexts (for example Estonia (Sierzputowska, 2020), Kazakhstan (Kassen, 2019), or the US state of Minnesota (Misa, 2013)).

It is risky to assume that people universally understand the purposes these terms encompass and in which context it is more appropriate to refer to the state, society, service provision, or government. Without understanding the meaning of terms uniformly, there is a risk of misunderstandings arising, which prolong various applicable processes and thereby create inefficiency. When discussing the term "state," we are likely all interested in its meaning on a personal level. As part of the organism that is the state, citizens have the right to understand this entity in which they play a role. So called “ordinary people” (citizens and non-citizens) who consider the state an entity to which they belong or are connected to, should be aware of the rules, rights, upcoming changes, visions, and practical technological developments in that entity’s environment. This foster understanding and transparency in the partnership between the state and its citizens.

2.2 Evolution and Semantics: Exploring the Definition and Perception of Digital States

It can be argued that even if the definition of a traditional state has been defined in various ways throughout history it will continue to be defined in the future. It evolves. Therefore, it may be questioned whether defining a digital state, virtual state, or e-state is justified or possible today, given that David Hume, who lived in the 18th century, interpreted by Kukathas in his article "A Definition of the State" (Kukathas, 2014) believed that the state, like all institutions, is “an evolutionary product”. He defines the state as a political entity consisting of people living within a certain territory and sharing common cultural, historical, or political characteristics. His approach emphasizes the role of the state in safeguarding citizens' freedoms and rights and acknowledging diversity. Yet he recognizes that the meaning of the state and the concept of the state transforms over time, and the same can be assumed for D.V.E.- it is in constant metamorphosis.

State can be observed from different standpoints, but regardless of the different standpoint, they all follow a certain uniting phenomenon which distinguishes each from another and therefore enables to acknowledge the state as some kind of community or behavioural unity with its distinguishable root-level working mechanism and its architecture, such as defined and acknowledged horizontal characteristics (territory), vertical attributes (ethnic groups) or matrix relations (religion). D.V.E. states also transform in different standpoints- we have e-government solutions, virtual reality environments to replace phenomenas from physical world and so on.

State can be taken as political organism with certain political order, structure and apparatus behind it and its hierarchy (such as democratic, autocratic, parliamentary etc. with its functions, rights and constraint and their regulations). Political states have created tools that help to run the system electronically. States can be considered with metaphorical approach, which tends to characterize cross- territorial entities yet they are not considered as nations or societies in everyday level. They encompass culture (homogeneity or on contrast multiplicity of it in a territory, language states), economic systems (capitalist, socialist states), geography (inward-looking states, island states, mountainous states, coastal states), but they have a common element that unites the state or distinguish it from else.

For monitoring and leading the general development of society, it is important to re-cap the progress of the so-far development of the state and articulate the current meaning and phenomenon of these terms at certain stages of development. Without a collective understanding and the ability to create a universally understood context around a term, it is risky to assume a single interpretation for these keywords in the context of future-oriented perspectives for their respective fields. If even two readers have different understandings of what a digital/ virtual/ e- state entails, their perception of future directions or visions will also differ and that can create bias between results and expectations.

To illustrate this thought author found by chance an example of possible bias of contextualizing the meaning behind a term. Official document "Estonian's Digital Agenda 2030" (Ministry of Economic Affairs and Communication, 2021) English version is naming its first sub-objective as "Digital Government" and at the same document's Estonian version this objective is titled "Digiriik" (direct translation to English: digital state). Therefore, is Estonia aiming towards more developed government or a state, which can have a broader meaning as articulated above, than just government?

The importance of semantics, or the study of meaning, in information and communication technology is consistently significant (Orozco, 2012). In the context of communication, which implies interaction and information/ data exchange, a shared language and understanding are essential. This includes not only coding languages but also a general principled, enterprise level architectural understanding of what is being developed or how different data models in information systems and between information systems are terminologically and substantially related, dependant or preclusive. Regarding the example in the paragraph above, there is a stark difference whether a digital government or a digital state is being built.

As demonstrated in the introductory chapter of this document, the terms under investigation are used, next to translation bias, with substantially varying meanings, indicating that the meaning of terminology has not been universally articulated and adopted at the societal level, leading people to use and interpret the content of terms according to acquired knowledge, which may come from various sources where the terms have been used. Although this systematic literature review does not focus solely on Estonia but covers all countries where

materials about or related to the state have been published, the need for this research has primarily arisen from Estonian language and media usage practices.

2.3 A Holistic Perspective: Navigating the Complexity of Digital Transformation in Governance

While different new and enhanced e-governance technologies are developed every day, there is a need for business and IT architectural view (for example like Estonia has had (Vaher, 2020)) to align all developments and plans into a bigger scope or program. With horizontal national development plans (The World Bank, 2023) there are countries that focus on digitalizing industries (example Finland) or state apparatus (example Estonia). In Estonia the leading ICT role is carried out by Ministry of Economic Affairs and Communications with the high-level and broad-scoped agenda (Ministry of Economic Affairs and Communication, 2021) yet each Government ministry has their own parallel sectoral development plan for carrying out digital transformation in its domain (example: the idea of digital nomad[2] visa by Ministry of Interior Affairs (Ministry of Interior Affairs, 2024); Digitization of Cultural Heritage by Ministry of Culture (Ministry of Culture, 2024). Therefore, digital state is not only focusing on direct e-government development, because cultural heritage or travel regulations as such are part of identity and borderlessness and has more holistic scope of interest than just government.

> - Estonian culture is easily available digitally all over the world, stored for the future and actively (again) in use. The Estonian language is alive and developing in the digital space." (Ministry of Economic Affairs and Communication, 2021)

States and their administrative bodies underscore disparate objectives influenced by their developmental maturity levels (for example see Cultural Heritage Digitization[3] mentioned

[2] "Someone who does not have a permanent office or home and works from different countries, towns, or buildings using the internet: 1) A freelance translator from Rome, she became a digital nomad five years ago and has now lived and worked on four continents. 2) He is a digital nomad who spreads his business around different coffee shops." (Cambridge Advanced Learner's Dictionary & Thesaurus)
[3] To convert or express an analog form in a digital format. (Gartner, 2024)

above vs proactive government services[4] by Ministry of Economic Affairs and Communication). However, notwithstanding these differences, they collectively endeavour towards a common goal, constructing a foundation crucial for national progress. Digital transformation processes are unfolding across various domains within aspiring societies, encompassing the digitalization of industries, social frameworks, governmental structures, and procedural frameworks. Amidst this digitization journey, it is imperative to comprehend the underlying aspirations and objectives beyond mere efficiency gains or service enhancements. Digital transformation fundamentally alters the perspective of interactions between providers, recipients, and the medium of interaction.

Transformation entails a commencing point and an anticipated (continuous) outcome along the trajectory. As outlined by Lucidcharts (Lucidchart, 2024) digital maturity emerges as the ultimate objective of transformation—an adeptness to continuously adapt and respond to emerging technologies, equipped with the knowledge and tools to evaluate requirements, and respond accordingly. Digital transformation and maturity constitute ongoing processes entailing continuous goal setting and refinement. Transformation, as defined by the Cambridge Business English Dictionary is "the process of changing completely the character or appearance of something in order to improve it" (Cambridge University Press & Assessment, 2023).

To grasp the contextual nuances of digital, virtual, or e-states, alignment of strategic business (transformation) goals with IT strategies, tactics, and deliverables becomes paramount. Notably, the risk of confusion and misinterpretation of objectives and terminologies necessitates the harmonization of plans and semantics. This concern is echoed by Pilleriin Lillemets in her thesis "e-Estonia – A Digital Government in Digital Transformation"[5]

[4] In this example, process is more digitally transformed and can be named as digitalization, which is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business. (Gartner, 2024). These two examples represent the difference of the level of digital transformation maturity curve (stated by author).

[5] "Even though it is not necessary per se to define what digital transformation in the policy documents is, in the current context of Estonia, it would be useful. Digital transformation, new technologies, AI, not to mention e-Estonia, are buzzwords more than definitions. However, the Estonian government is in a situation where the definition determines direction and ambition, and the official documents leave it unclear whether the these are rightfully understood. Examining the policy documents reveals the inconsistency around the Estonian translation of "digital transformation" on a practical policy level. This inconsistency evidently creates confusion among the interviewees, who are themselves high-level officials responsible for different aspects of the public sector digital transformation. Interviewees such as Sikkut, Ilves, and Vainik acknowledge that an unclear definition is not necessarily problematic as such. However, it becomes a hindering factor when there is an assumption that the term is commonly understood." (Lillemets, 2023)

(Lillemets, 2023) and also similar concerns were pointed out with. Meijer and Bekker found out from their e-government systematic literature review that “in the analysis of the 116 papers on e-government we found that there was a bias towards (1) explaining e-government (rather than understanding social constructions), (2) analyzing holistic systems (rather than the behavior, attitudes and cognitions of individual actors) and (3) studying incremental rather than transformational change. This bias was, for all three dimensions, slightly stronger in the IS journals than in the PA journals. At the same time, it should be put forward that our results only take into account the recent period between 2011 and 2013.” (Meijer & Bekkers, 2015).

Thus, it prompts the question of how these aforementioned facets are categorized. To steer, administer, and thereby govern the trajectory of technological and organizational evolution, a profound understanding of the essence of change and the substance of transformation is indispensable. Failure to establish a consensus and collective understanding of transformational vocabulary poses a substantial risk of diverging trajectories, leading to inefficient resource utilization and confusion in developmental endeavours and expectation management. Emphasizing the significance of aligned plans and semantics Stratu-Strelet, Gil-Gómez, Guerola-Navarro and Oltra-Badenes stated in their article: “Examining the extensive e-government literature, Malodia (Malodia, Dhir, & Mishra, 2021) identified three significant research gaps. Firstly, e-government literature is divided into studies focused on information systems and public administration, which fail to integrate knowledge from both areas. Consequently, the literature lacks methodology and theoretical rigor (Abu-Shanab & Harb, 2019), as both viewpoints - information systems and public administration - are critical for the effective implementation of e-government (Khan, Krishnan, & Dhir, 2021) as part of the presented e-state model. Secondly, the literature has mainly focused on assessing citizens' perceptions of e-government services, dedicating less attention to studying citizens' needs and expectations from e-government services (Weerakkody, El-Haddadeh, Sivarajah, Omar, & Molnar, 2019). Thirdly, the existing literature has not conceptualized e-government according to the multidimensional and multi-level framework suggested by recent studies” (Khanra & Rojers, 2019) (Stratu-Strelet, Gil-Gómez, Guerola-Navarro, & Oltra-Badenes, 2023).

2.4 Navigating Business-IT Alignment in the Era of Digital Transformation

Underlining the intrinsic and direct correlation between term definitions and IT development outcomes underscores the importance of commencing with business owner initiatives—a need, a problem, a strategy for resolution, and a goal delineating the desired state/status upon resolution. Often touted in the media as the construction of a digital state, at its core, technology augments physical phenomenology. Information technology (IT) tools are selected to enhance both experience and essence. Each IT development harbours an originating idea and use case, necessitating clearly defined objectives to eradicate ambiguity (Ashworth, Boyne, & Entwistle, 2010).

In 1993, Henderson and Venkatraman (Venkatraman & Henderson, 1993) formulated first principles of business – IT alignment topic, and from that day on a new domain of governance process started developing. Authors (Zhang, Chen, & Luo, 2018) have created a summarizing visualization of business- IT alignment (BITA) matrix based on different BITA models that exist. This matrix was created as a result of analysing different BITA models that have been created throughout the past and which are used as etalon for business objectives vs IT strategies, solutions and implementation roadmaps. Such models are also basis for national digitalization strategies that are the principal source task for enterprise architecture (EA) and its frameworks. Figure 1 proves the vast number of different models that interact differently between businesses strategy and IT delivery.

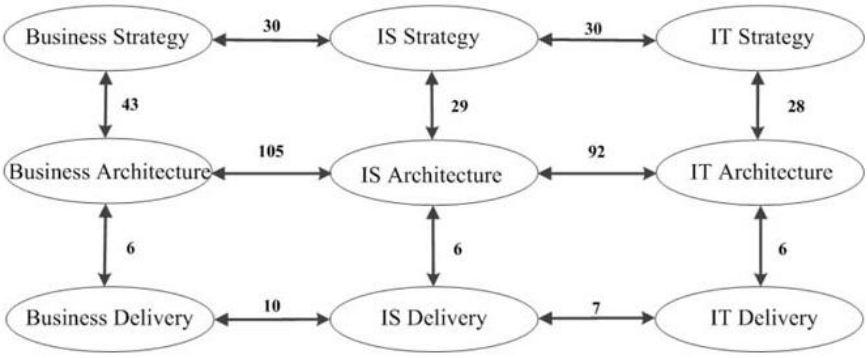

Figure 1 BITA domains relating to EA.

Based on their (Zhang, Chen, & Luo, 2018) article and their visualized research result in Figure 1, there is a possibility that national or horizontal digitalization strategies that aspire towards digital transformation and digital state, can have different capacity and strength of

connections and correct interpretation between understanding the aim or big picture of digitalization or development roadmaps and actual granulated delivery outcomes. If there is misunderstanding in some of these stages presented in Figure 1, there will be deviations in progress.

Another reason, why it is important to align objectives and their meaning is to be able to understand the expectations and context (Institute of Estonian Language, 2024) of goals. Definition of context and the ability to understand it both by business side and IT is also relevant regarding the phenomenon of difference in professional terminology and vocabulary. Common definition and the need for common definition and the purpose of common definition of digital transformation (Rojas- Segura, Faith-Vargas, & Martinez-Villavicencio, 2023, vol 17, n.3) that reflectively illustrates current research pursuit to find out the current most common definition of widely used term digital, virtual or e-state. What is being built and developed (from business side as well as IT side) and does the business owner interpret the context the same as technology strategist, architect, and deliverer. The end user of the development, the citizen, should also be familiar with the term. As Mergela stated in her article 2019, individuals cannot be forgotten in the analysis of e-government and public administration technology reforms. "…/ However, what is missing according to the authors is an understanding the social constructions, the behaviour, attitudes and cognitions of individual actors or transformational change. They clearly state that research should consider "explaining how individuals transform government./…/ This includes the notion that IT is not the means to support change, rather, processes, people, policies, and especially leadership need to be fundamentally changed to accomplish digital transformation in the public sector." (Mergela, Edelmann, & Haug, 2019).

2.5 Media and its impact to societal level in digital transformation era

Message and communication are curated and leaded. Therefore, while in current mapping there are 5 578 articles (Figure 2, 07.04.2024) with mentioning digital or e-state in Estonian media, possible misinformation is easily spread (in Estonia virtual state as a term is least used and due to www.dea.digar.ee lack of functionality it is impossible to search 2-word search) mostly[6] in the context of marketing, hype and branding (e.g. Estonia is known as a

[6] Author got acquainted with the term usage of about 300+ articles on the basis of a random sample

leading digital state, nation, country, society etc.; success stories and problematic topics but not going into details of describing the essence and core of what is e-state or digital state).

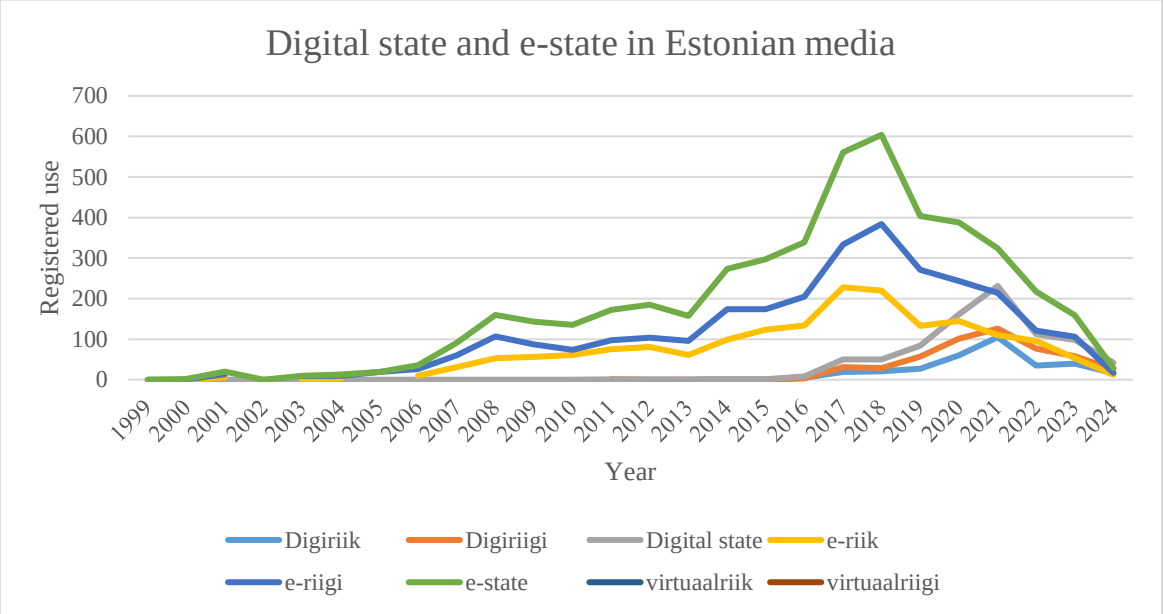

Figure 2 Term search result report

To test ourselves with the thought of a state as a broader package of commonly known four or five traditional elements: people, territory, government, sovereignty, and recognition in digital, virtual or e- condition, it is welcome to justify the need for the review how authors around the globe have subjected the terms. The boundaries between the physical and virtual are increasingly blurring. The development and implementation of digital services and solutions for better governance and everyday life necessities are outcomes of transformation, but in a societal level which is heading towards a datafied society (Masso, 2020) does the digital state possess the same roles as defined in modern physical state. Are reviewed authors talking about a broader scope of the state or are they focusing on a more conservative and traditional view.

The widespread use of various technologies in our daily lives is changing our environment, worldview, expectations, identities, relationships, culture (Levin & Mamlok, 2021), sense of security, consumption, services[7], food and health, general rules, and norms, and somewhat even religious traditions (Rebecca Kern, 2013), etc.

[7] "We must, on one hand, be able to put our personal data and data embodying intellectual property, national security intelligence, and so on, under careful protection, while on the other hand, we must enable the free

Where is our country, nation, and society heading on this journey of computerization? To what extent have the boundaries between the physical and virtual state and society become blurred today? Historically, there have been states, physical entities, connecting people for centuries, but now we have begun expanding the physical state into digital or even virtual form. For that reason, for example, Estonia has made steps to prepare the population for possible digital skillset gaps through knowhow but also via aspiration to provide the tools and environments in native language, which is also unimaginably important aspect of cultural and self-determination/ continuity. “The need to address the broader digital literacy of the population continues. There is less and less need to "bring" people to the Internet. Instead, it must be ensured that they have up-to-date skills to deal with digital solutions usefully and safely. By 2030, all Estonian adults should be regular internet users. This provides an opportunity to ensure their sufficient capacity, including the corresponding base level of awareness, so that they can use the services after the development leaps of the digital country more and more. /…/The best possible services need good Estonian language technology base, so that both domestic and global service providers can make their services as convenient as possible for the members of the Estonian digital society. This means increasing investments in basic language technology solutions.” (Ministry of Economic Affairs and Communication, 2021).

2.6 E-Governance Evolution: From Systematic Review to Digital Transformation Perspectives

Regarding the possible path, authors (Bindu, Prem Sankar, & Satheesh Kumar, 2019) have conducted a systematic literature review of e-governance. They did not analyse the meaning of state yet provided their result on how e-governance maturity curve i.e. transformation line

flow of medical, industrial, traffic and other most useful, non-personal, anonymous data to see no borders, repeat, no borders. The regime we must build is one for D.F.F.T., Data Free Flow with Trust-- non-personal data, needless to say.” (Abe, 2019)

is heading (see Figure 3 E-governance roadmap for the future).

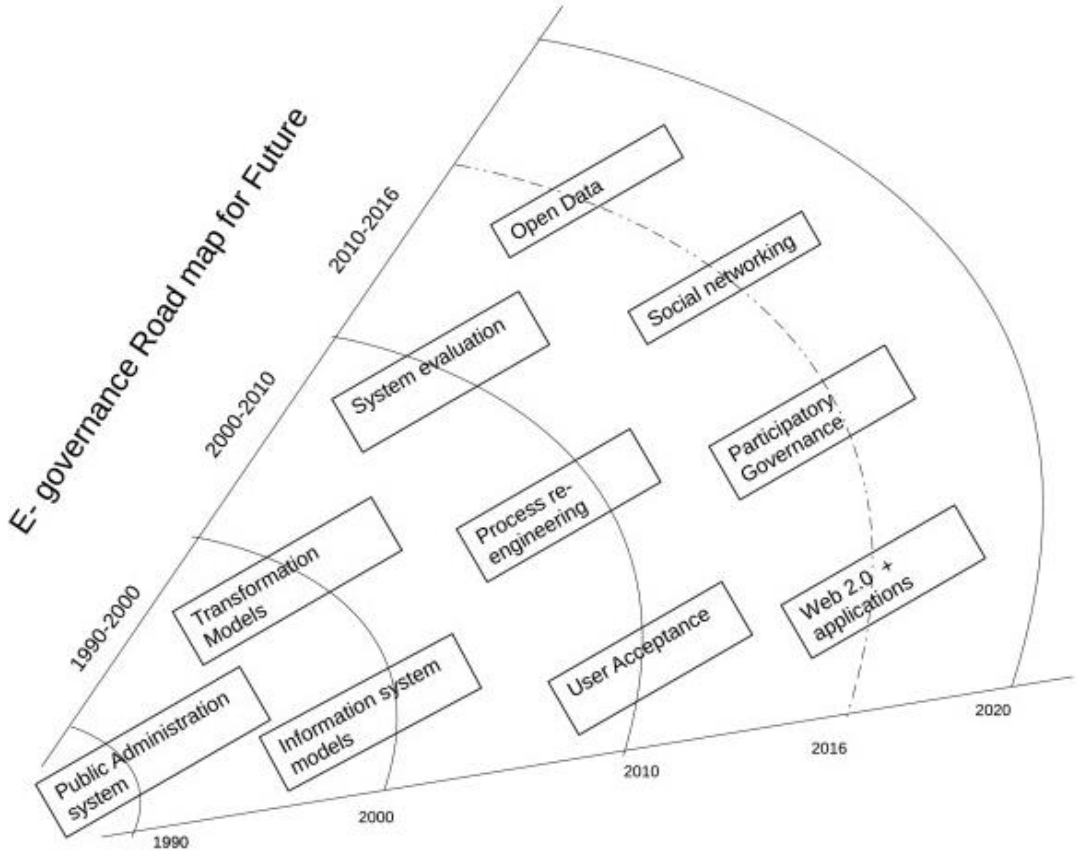

Figure 3 E-governance roadmap for the future.

The development of technologies and human understanding of the world around them, where many phenomena that were previously known only in physical form now exist additionally, or only, in virtual or digital form, has changed and continues to change our environment, where we live, our country, land, people, identity, society, and civilization.

Before Meta Verse or virtual worlds inside it, there was Jane Fountain (Fountain, Building the virtual state. Information Technology and Institutional Change, 2001), who is considered as one of the pioneers of opening the virtualisation topic in the context of digital transformation yet with a level of knowledge corresponding to the development of technology. Fountain sees the virtual state as from integral perspective of the state. Virtual intersects with traditional governance structures.

Next to Fountain there are some additional perspectives. Another pioneer, Lawrence Lessig, and his distinct reality idea proofs that there are authors, who think that state can exist not

only physically. “Whenever anyone is in cyberspace, she is also here, in real space. Whenever one is subject to the norms of a cyberspace community, one is also living within a com mu n i ty in real space. You are always in both places if you are there, and the norms of both places apply. The problem for law is to work out how the norms of the two communities are to apply given that the subject to whom they apply may be in both places at once.” (Lessig, 2006). Kostakis supplements Lessig idea by stating that additional to physical experiences in our everyday lives, both positive and negative characteristics, virtual versions of these experiences have evolved to virtual sphere (Kostakis, 2011). For some people virtual experience is as a live as physical one and online gaming companies are continuing to merge virtual and physical spheres.

To supplement Lessig and Kostakis’s idea of being in both places, there is similar phenomenon provided by the angle of death by Mariusz Fras: “„Information technologies have contributed to significant changes in economy, law, and society itself, whose essential part is currently formed by the so-called digital generation (digital natives). Contemporary services on the internet enable their users to actively create new digital content. As a result, such users produce, use, and record vast amounts of data. Therefore, the question becomes relevant about the future of such content and the right to dispose of them in the event of “digital death,” that is death of an Internet user. (Fras M. , 2021). Such narrative can be seen both as a way of distinct vision of D.V.E state or also just as integral part of state from the perspective of digital archiving and retention.

A broader perspective is also seen as (Kempeneer & Heylen, 2023) state in their article the need to conceptualise the objective of transformation from a broader perspective than just technology and involve organizational, political, and cultural actors. “Therefore, Fountain argues that the “Virtual State” needs to be built, to accommodate the internet, but also other technology. Now that the uptake of data-driven decision making and AI is on the rise, we continue to witness the building of the “Virtual State”. However, this construction process, involving processes and politics of institutional change, still remains as troublesome as described in Fountains 2001 book ((Kuziemski & Misuraca, 2020); (Vydra & Klievink, 2019). For instance, (Goh & Arenas, 2020) refer to a McKinsey report showing 80% of government's digital transformation efforts failing to achieve expected results. Almost two decades after the publication of Jane Fountain's (2001) seminal book ‘Building the Virtual State’, one might wonder why governments have yet to succeed in doing do” (Kempeneer

& Heylen, 2023). Answering to Fountain and Kempeneer and Heylen, there might be a possibility that failure of transformation has realized due to semantic and business alignment reasons. One possibility for assumptions is also the learning curve and adjustment of digital era. As Mihajlov (cross-reference) is cited in Kosorukov's article, society is in a young digital age therefore adjustments in e-governance are made and digital governance model is being created (Kosorukov, 2017) in the age of cloud computing, big data, and social media It aims to integrate organizational cultures influenced by external digital spheres into government operations. Drawing from early internet ideologies such as anarchism and cyber-utopianism, as well as principles advocating for open data and digital citizens' rights, the digital governance model serves as a foundation for practical recommendations in public administration and governmental decision-making within an increasingly intricate digital landscape.

With emerging virtual reality inevitably, it changes how people interact among themselves, with nature, and in how they recognize their own self-conceptions. Among the many qualities of cyberspace, it involves a degree of unpredictability. Artificial intelligence, for example, stipulates new modes of action, and as result, reshapes humans' experience (Yampolskiy, 2020). In addition, because living in a digital environment is a relatively new phenomenon, the history of our new cyber habitat is concise. For that reason, digital society's current state Information is often called "digital feudalism," (Jensen, 2020) as estimated similar to the corresponding state of the early medieval period expressing by this belief in the approaching era of Digital Enlightenment (Helbing, 2019). (Levin & Mamlok, 2021). Therefore, it is crucially important to record the current interpretation of virtual, digital and e-state for the future researchers.

3. Research method

3.1 Methodological Selection

The choice of methodology for this study is imperative due to the existence of various terms that may lead to inaccuracies in interpretation and contextualization within academic discourse. The primary objective of this thesis is to comprehensively grasp the contextual nuances of terms commonly perceived as synonymous in everyday language: digital state, e-state, and virtual state.

The research inquiries to be addressed in this thesis are as follows:

- How are the terms "digital state," "virtual state," and "e-state" construed and contextualized within academic literature?
- Can these terms be considered interchangeable based on their application?
- How does these interpretation contrast with C. Kukathas's definition of a state (Kukathas, 2014)?

For this study, a systematic literature review approach has been adopted, as advocated by Kitchenham (Kitchenham, 2004)), to gain an in-depth semantic understanding of these terms. This methodological choice aims to produce evidence-based outcomes that can subsequently contribute to the development of a ground theory of D.V.E. state, as proposed by Okoli (Okoli, 2015) and authors who interpret D.V.E as a distinct realm from the physical state, or to supplement the theory of state with the nuances derived from digital transformation to enrich the integral realm of state. Kukathas is chosen as suitable neutral benchmark between these two perspectives of state- integral view and distinct view, due its open and adoptive interpretation of state and its evolutionary essence to provide a broader input for the future studies of D.V.E. state nature and its possible distinguishment from physical state.

A systematic literature review serves several purposes for policy makers and ICT strategists next to researchers, including the elucidation of existing knowledge, identification of research gaps, refinement of research questions, and formulation of hypothesis. By

conducting such a review, this study aims to establish a robust foundation of understanding and identify pivotal concepts essential for possible grounded theory development, particularly concerning the evolving landscape of political and societal entities in the digital realm.

Grounded theory, as described by Charmaz and Okoli (Okoli, 2015) (Charmaz, 2014), is a qualitative research methodology that entails iterative data collection, analysis, and theory development rooted in empirical evidence. By beginning with a systematic literature review, researchers can gain insights into existing theories and empirical findings, which subsequently inform the design of data collection methods for grounded theory development.

In summary, the systematic literature review conducted in this study provides a foundational basis for grounded theory development, which is essential for advancing understanding in domains where clear theoretical frameworks may be lacking. Amidst the plethora of qualitative methodologies available to researchers, selecting the appropriate approach, as emphasized by (Kraus, et al., 2022) is crucial for ensuring methodological rigor and scholarly contribution.

3.2 Data sources and search strategy

Search keywords that were implemented were: “digital state”, “virtual state”, “e-state”. They were searched individually and also with supporting keyword like government, polity, country, and society. Search was conducted in English search keyword. Each search result was checked if it included the term in actual document. Each document is checked by search function if it included a research term (if yes, it is considered as analysable source) and if it provides a direct and clear definition about the term from the author. If the document uses the term but does not actually define it, the document is listed accordingly.

The initial phase of this study involved defining the research topic and formulating research questions. Subsequently, data were gathered through the TalTech Primo search portal (List of databases, 2024). This platform is characterized as a comprehensive search portal

facilitating cross-database exploration across research databases, the online catalogue ESTER, and the TalTech Library's Digital Collection (Search Portal Primo, 2024).

The selection of this search portal was based on its capability to aggregate international materials from various individual library databases, including Estonian public university thesis pertinent to the research criteria. This thesis does not include as research object paid sources (materials, which are accessible via purchase). If Primo provides access to paid article, the author considers alternative ways via Google Search engine to find free versions of current material, due to the personal knowledge of the author, that there is such possibility existing in practice. This increases the number of research objects and mitigates the deviation of results.

In addition to the Primo search portal, the author consulted the Google search engine, Estonian policy documents from Ministries' and agencies' websites, the Estonian National Digital Archive Digar, Estonian Digar Articles (National Library of Estonia, 2024) (National Library of Estonia, 2024), to supplement background and theoretical content. However, it is important to note that while these additional sources contributed to contextual understanding, they are beyond the purview of the review's primary data sources.

During the analysis phase, the author scrutinized the contextual usage of the term under study. This entailed identifying and elucidating potential shifts in the term's meaning and content over time, as well as examining geographical or geopolitical variations that might influence its interpretation. The investigation also aimed to discern any disparities in the term's connotations across different regions. Consequently, the research framework incorporates a structured approach, as delineated in Table 1 „Structure and scope of term mapping" to guide the exploration and categorization of data.

Table 1 Structure and scope of term mapping

• Conceptual interpretation of the term • Components of the state	• History of the term • Evolution of the term over time
• Usage of the term in a geographical context	• Sources with and without definition of the term

This review meticulously examines, categorizes, and scrutinizes the outcomes derived from the utilization of the term 'state' in comparison to its conventional portrayal as a physical entity. The overarching objective of this investigation is to elucidate the nuanced disparities, both qualitative and quantitative, in the conceptualization of a physical state as delineated by Kukathas (Kukathas, 2014), juxtaposed against the constructs of digital, virtual, or e-states. Furthermore, this study endeavours to discern the temporal evolution and geographic variances in these disparities, thereby shedding light on the dynamic nature of the contemporary discourse surrounding statehood in the digital era.

As A. Schwartz stated in his collaborative article “a „good" framework article should offer a clear guideline (indicating possible problems that can be examined within the stated framework), consist of a parsimonious set of elements, and have a clearly defined boundary. On the other hand, a helpful review article should advance the field as a result of consolidating prior research, identify and propose testable hypothesis, and focus on simplifying past results. We also found that both framework and review articles can be characterized according to their stated objective, comprehensiveness, relationship to research boundaries, temporal focus, and content focus.” (Schwartz, Mehta, Johnson, & Chin, 2007).

3.3 Study selection

In conducting the study selection process within Primo, all identified sources containing the terms "digital state," "virtual state," and "e-state" were queried, with a focus on their conceptualization within the context of the state as a political organism or societal element. Notably, instances where the term "state" pertained to physics, such as in reference to rotors or various waves (e.g., electromagnetic waves), were deliberately excluded from the search results due to their unrelated nature to the current literature review focus.

Data collection through Primo commenced in the third quarter of 2023 and underwent validation in the first quarter of 2024. The temporal scope of this data collection extended from the inception of records until the conclusion of 2023. Importantly, no restrictions based on geography or language were imposed during the mapping process.

Subsequent analysis revealed that certain titles were excluded from further examination due to the following reasons:

A) Technical limitations hindered translation efforts, primarily arising from file formats that posed challenges for translation. Documents not in English or Estonian underwent translation using tools such as Google Translate or Chat GPT translator.

B) Accessibility barriers presented obstacles to accessing certain materials for the purposes of this research. In cases where Primo sources were inaccessible due to restricted access (e.g., requiring payment or lack of access through TalTech University), PDF format articles were sought and accessed through alternative means such as Google search. Nevertheless, materials that remained inaccessible despite these efforts were omitted from the review.

While Kitchenham (Kitchenham, 2004) underscores the importance of quality assessment in primary studies as a component of systematic literature review methodology, it is pertinent to note that such assessment was deemed infeasible in the current research context. This is attributed to the absence of primary studies addressing the specific research topic under review, thereby necessitating the omission of this stage from the review process.

3.4 Study quality assessment

To ensure methodological rigor and effective data extraction, all search results pertinent to this research were meticulously recorded and imported into an Excel spreadsheet. Subsequently, the results were systematically categorized based on the focus of the current review. Meta-analysis in a traditional manner was not concluded due to the explorative characteristic of the review. Sensitivity analysis was also conducted in authors interpretational way since current research, conducted by one person, would not give an objective equivalent in a numeric value for adjectives. Results were then employed to delineate the fundamental characteristics of the examined terms and to identify and address potential biases.

The collated data were meticulously processed within MS Excel, with concise summaries and tabular representations formulated for inclusion in the appendices of this thesis. To enhance the reliability of our interpretations, the imported search results underwent coding by the author and were further validated through the utilization of the Atlas.it artificial intelligence tool. This AI tool, designed to aid in qualitative analysis, facilitated the extraction of keyword classification codes from the text, thereby offering an additional layer of validation. Codes suggested by the artificial intelligence tool were distinctly marked for reference.

Furthermore, the Primo search portal provided keywords associated with the retrieved articles, which were meticulously inventoried to identify overlaps and assess their relevance to the current review. These keywords were subsequently utilized as additional codes and systematically organized into overarching categories to streamline analysis and interpretation.

3.5 Data extraction

Data extraction form had four stages. At first preliminary form was set that included the following values presented in Table 2. All search results were filled with values and sorted according to value types.

Table 2 Preliminary set of codes for data extraction form

Value type	***Meaning***
Term	Virtual state, digital state, or e-state (etc. if needed based on the outcome of the review)
Has definition	Yes/no
Year	Year of publication
Title	In the language that Primo provides
Author(s)	
Document type	A book, an article, a review, thesis, dissertation, report, conference proceeding etc.
Region	According to the one that the source is about. If no location is mentioned, then N/A

Identificatory	URL, DOI
Source	Parent-location of source (a journal, a book etc.)
Description/ copy from the text, where term is used	Provided by Primo + authors additional comments and text extracts providing additional insights for the term.

Secular stage involved preliminary keywords/ codes for the search results that interpreted the authors interest of term definition:

Keyword	Keyword meaning
IT architecture	Term is used in the context of e- governance technologies architecture. Roles, hierarchy, chain of command and responsibilities
Digital society	Mentions research term as digital society or is using the term as a component in digital society
Statehood/ resiliency	Source, where focus is on statehood and resilience. Term is used in the context of associating the term with digital/virtual/e- statehood and its resilience. Broader than just public e-service, and connected with digital/virtual/e- self-determination
Self-determination	Term is used in the context where digital/virtual/e- state is considered as a solution for self-determination or that it is a solution that expands also to digital/virtual/e version of self-determination.
Territory	Term is used in the context of virtual/digital/e- territory or cyber space. Or document is talking about territorial topics.
Citizenship	Term is used in the context of virtual/digital/e- citizenship or possibility to solve citizenship impossibilities with digital/virtual/e- version of citizenship if needed. Or document is talking about citizenship.
Identity, community	Term is used in the context of virtual/digital/e- identity or phenomenon of digital/virtual/e-version of community or possibility to solve communal topics as alternative to physical and traditional manner, with digital/virtual/e- version of identity/ community if needed. Or document is talking about identity/community.

Cultural impact	Term is used in the context of virtual/digital/e- phenomenon which influences society in cultural domains. Or document is talking about cultural impact topics.
Societal impact	Term is used in the context of virtual/digital/e- phenomenon which influences societal domains. Or document is talking about societal impact topics.
Cyber security	Term is used in the context of virtual/digital/e- phenomenon which affect cyber security and wellbeing. Or document is talking about cyber security topics.
Mis-/dis-information/ information warfare/trust	Term is used in the context of virtual/digital/e- phenomenon which affect trust by mis-/disinformation or information warfare. Or document is talking about these topics.
Social media	Term is used in the context of social media. Or document is talking about social media.
Data protection	Term is used in the context of virtual/digital/e- phenomenon which affect data protection. Or document is talking about this topic.
Public service	Term is used in the context of public service. Or document is talking about public service.
Private sector	Term is used in the context of private sector. Or document is talking about private sector.
Social service	Term is used in the context of social service. Or document is talking about social service.
Environment/ space	Term is used in the context of describing the technical solution environment to implement digital/ virtual/ e-state. Or document is talking about this topic.
X- road	Term is used in the context of describing the digital/ virtual/ e-state together with x-road solution. Or document is talking about x-road topic.
IT infrastructure	Term is used in the context of describing the digital/ virtual/ e-state together with overall technical IT infrastructure topic. Or document is talking about the topic.

Requirements	Document is about the need to change the technical requirements to implement virtual/digital/e-state. Or the document is talking about the requirements overall manner.
E- government	Term is used in the context of describing the digital/ virtual/ e-state together or as e-government. Or document is talking about the topic.
State apparatus	Term is used in the context of describing the digital/ virtual/ e-state together or as a tool for state apparatus. Or document is talking about the topic.
E- governance	Term is used in the context of describing the digital/ virtual/ e-state together or as a e-governance. Or document is talking about the topic.
Phenomenology	Document is talking about the term in the means of philosophical angle as what the term existentially is or affects.
Culture/human	Term is used in the context of virtual/digital/e- phenomenon which affect(s). Or document is talking about cultural or human-perspective topics. This article is not merely focusing on state apparatus and more on human.
Holistic topics	This article is covering the term in a broader spectrum than just public sector or e-government. For example, it involves self-determination or questions whether digital/virtual/e-state territory escalades to cyber territory or cultural inherit or etc.
History	Document is talking about the history of terms.
Customer need, regional and social diversity	Term is used in the context of describing the digital/ virtual/ e-state together or as solution to provide solution for customer need and accessibility regardless of location or social characteristics. Or document is talking about the topic.
Transformation	Document is talking about transformation of state and/or its services.
Technological readiness	Document is talking about the technological requirements that are needed for digital/ virtual/ e-state and/or its services.
Semantics	Document is focusing about the meaning of term or covering a broader scope where terms are sub-elements of that broader scope.
Justice	Document is focusing on the juridical topics that relate to terms.
Education	Document is focusing on the educational topics that relate to terms.

Industry, transport	Document is focusing on the industry and/or transport segment transformation topics that relate to terms.
Health care	Document is focusing on the e- health and/ or overall health topics that relate to terms.
Change of business rules	Term is used in the context of describing the digital/ virtual/ e-state together with the description or enabler of transformation of business rules that come together with digital/ virtual/ e-state. Or document is talking about the topic.
Image, brand	Document is mentioning the term, but just as a term without a deeper meaning than just a state known or being famous for as a digital/ virtual/ e-state.
Change of process, substance	Term is used in the context of describing the digital/ virtual/ e-state together with the description or enabler of transformation of business/technological processes that come together with digital/ virtual/ e-state (human task is replaced with technology which needs different business and IT architecture as before). Or document is talking about the topic.

List of preliminary codes were later enriched with following AI provided codes that are presented in table 3.

Table 3 AI enriched value types

Hyperconnectivity	Terms are used in the context of terms providing the enablers for interoperability, event-based services, and data-exchange.
Corporate influence	Document is focusing on the corporate interest and how/if virtual/digital/e-state is affected by it.
Proactive service delivery	Document is talking about proactive service delivery or that virtual/ digital/e-state is the enabler of these services.
Efficiency	Document is mentioning the terms as phenomenon that creates efficiency.
Technological advancement	Document is mentioning the terms as phenomenon that creates and expects technological advancement to witness the existence of terms.

Globalization	Document is mentioning the terms as phenomenon that creates globalization.
Activism	Document is mentioning the terms as phenomenon that enables activism that is not possible in physical form of state.
Government initiative	Document is mentioning the terms as phenomenon that creates and expects government initiative to witness the existence of terms.
Policy making	Document is mentioning the terms as phenomenon that creates and expects policy making or changes the field to witness the existence of terms.

Search results are imported to MS Excel, coded by author's interpretation, and additionally supplemented with the Atlas.it artificial intelligence tool meant for helping qualitative analysis to process text to get AI-s interpreted keyword classification codes. Artificial intelligence tool was onboarded for the purpose to evaluate authors data synthesis and point out the differences between sources investigated. AI provided keywords were added to the code list.

4. Result

Search results of the terms, described in the "Data source and search strategy" section can be described as follows. Overall Primo Search Portal detected 1 790 search results to the keywords listed below (a – q), and from the list, 214 sources were qualified and analysed.

Majority (1 790 – 214 = 1 576) of the search result sources, which Primo provided, were manually excluded from the final analyse list as unqualified for the research. Such need for disqualification came from the search result bias provided by the search portal. Excluded were the sources, which do not belong to current topic, i.e. they were mainly about physics or chemistry - related issues (most commonly about different waves, molecular states, and rotors). Another reason for decreasing the final list was of because the terms "virtual", "state", e-state" were used in other means (virtual as "virtually no reason" or state as "in current state" with accompanying word "digital" mentioned somewhere in the rest of the text which has no direct relation to the term "state" or with the overall topic). E-state was often presented as a search result bias as well, when Primo suggested "estate" or was the hyphen misleading Primo in cases such as "Goose state", which was not meant as e-state context yet provided as a search result. With current search result there lies the possibility that current portal, or some other search engine does not recognise the actual content and therefore there might be a possibility of not noticing all adequate sources for systematic literature review.

From the final analyse list (214 sources) extra 35 were not covered at all or covered just plainly from the result abstract that Primo provided due to the fact that the source was not available nor via Primo nor via Google (example (Kamolov & Smagina, 2019), (Stone, 2000)) or were available only via purchase (this is not the chosen method for current thesis). To maximize the reliability of research and mitigate the risk that all relevant sources are included, a search with additional keywords was performed.

The list of search results, from which irrelevant sources mentioned above and duplications, have not been excluded yet, is as:

a) Virtual state summary: 356 sources as whole robust result, 50 (14%) applicable for the topic and review

b) "Virtual state" government- 96 sources

c) "Virtual state" society – 231 sources

d) "Virtual state" polity – 3 sources

e) "Virtual state" country – 26 sources

f) Digital state summary: 480 sources as whole robust result, 125 (26%) applicable for the topic and review

g) "Digital state" – 204 sources

h) "Digital state" country – 29 sources

i) "Digital state" government – 160 sources

j) “Digital state” society- 85 sources

k) "Digital state" polity – 2 sources

l) e-state summary: 954 sources as whole robust result, 43 (5%) applicable for the topic and review

m) "e-state" – 320 sources

n) "e-state" polity – 2 sources

o) "e-state" government – 130 sources

p) “e-state” society- 455 sources

q) "e-state" country – 47 sources

“Virtual state” as an individual search keyword was not used due to there (in Primo) was no predefined focused search topic for social or e-gov science field and the results, 1 746, included from preliminary inventory significant number of physics related sources. Therefore for “virtual state” the author used additional supporting keywords to narrow the target object result list.

There were four sources, where multiple terms were used as synonyms as shown in Table 4.

Table 4 Sources which use overlapping terms.

Term	Year	Title	Author	Type

digital state and e-state	2020	Estonian Way to the Digital State: Determinants of the Development of the Republic of Estonia.	K. Sierzputowska	Article
digital state and virtual state	2006	Digital Era Governance (IT Corporations, the State and E-government)	Patrick Dunleavy, Helen Margetts, Simon Bastow and Jane Tinkle	Book
e-state and virtual state	2023	e-Estonia – A Digital Government in Digital Transformation	Pilleriin Lillemets	Master's thesis
digital state and e-state	2020	Going paperless: main challenges in EDRMS implementation. Case of Georgia	Teona Gelashvili	Master's thesis

The search results were queried regardless of language, as all sources which were not in English or Estonian, were translated into English using Google Translate or ChatGPT. Texts were retained in their original language and translated directly to English to minimize any loss of meaning that could happen if the author could have translated the text to Estonian and then to English.

The division of the researched objects is depicted in Figure 4. Surprisingly, the results reveal that while search results of Primo's robust search were fairly balanced in terms of magnitudes by individual keyword. Digital state has the highest hit-rate in the means of topic counterpart, but e-state has the highest number of preliminary robust results. Virtual and e-state associate most with society and digital state with government. After conducting a substantive thematic alignment check, it can be inferred that the terms virtual and e-state are more used in different means in the English-speaking discourse than "digital state". “Virtually” or “virtual” is very commonly used term in another context and it has confused the search portal. Additionally, the hyphen in the search term likely poses challenges to the search portal, resulting in only 5% of all e-state materials ultimately aligning with the scope of this research.

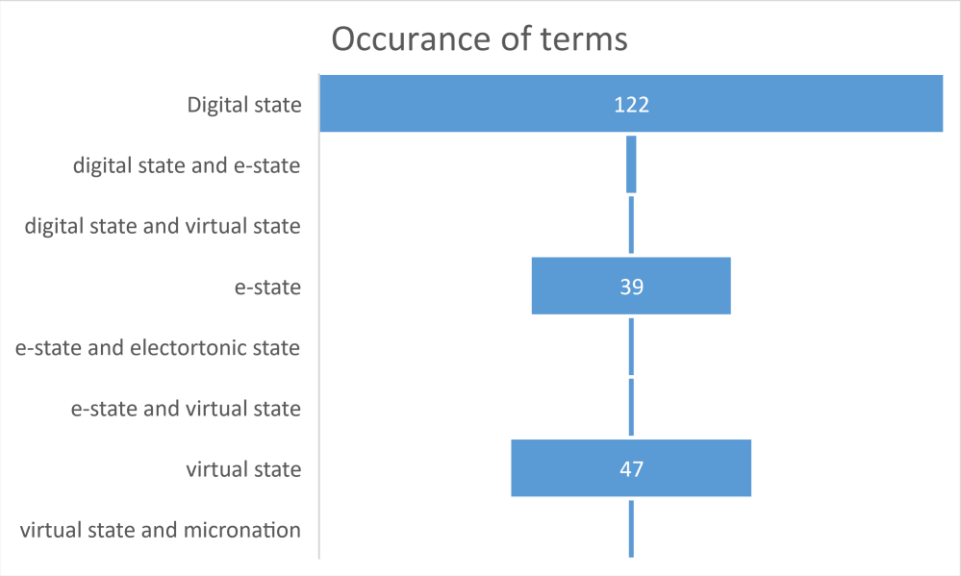

Figure 4 Occurrence of terms.

Based on the present meta-analysis, it can be argued that of the three terms examined, "digital state" is the most frequently utilized within academic literature. Since this research did not separately and specifically analyse the concept of e-government or the terms related to the digital or information society, it can be presumed that these terms are also commonly used alongside and interchangeably with the subject of this study. It is recommended that similar systematic literature review should be conducted for e-government to understand in which context is e-government used in which volume is it used as e-state, or digital state.

4.1 History and substantial evolution of the term

The analysis of the history of terms yielded an interesting result, suggesting that the concept of the "virtual state" is understood more broadly in the context of statehood, community, sovereignty and identity, than merely as a synonym for "e-government" or a model of an internetizied statemechanism or organization, as initially introduced by Jane Fountaine in her seminal work "Building the Virtual State: Information Technology and Institutional Change" (Fountain, Building the virtual state. Information Technology and Institutional Change, 2001). In this context, I highlight the Russian author, Viktor A. Osipov, who in his article (Osipov, 2020) brings out that the occurrence of the term "virtual state" started already

as early as the beginning of the 20th[8] century or even before that. Osipov defines, as shown in Figure 5, the virtual state as so-called fictional states such as Poyais (The British Museum, 2024) or Fredonia (Wikipedia, 2024).

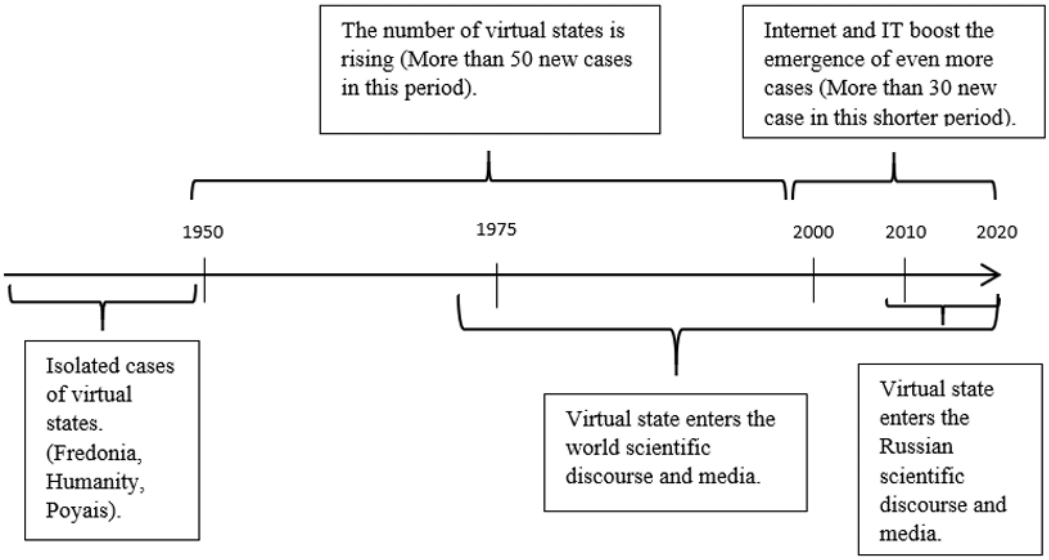

Figure 5 Viktor A. Osipov's personal research for the history of virtual states.

The inclusion of such phenomena in the virtual state may raise questions about whether the virtual state can be seen as fictional, parallel-dimensional or fake, which in turn is/might be opposing the pursuit of one of the main focal themes of e-services and data-driven management, namely trust and reliability. Regardless of later possibility, current author does not consider wrong the idea of Osipov associating the current assimilation of virtual state with the fictional state from the past if these past states were also agreed phenomenas in some groups. It can also be identified with the structure that exists in the cyber environment.

Moving further from Osipov's interpretation, the attention of the author of this study was also drawn to the overall earliest dated source, employing one of the three terms under investigation. In 1986, Fararo and Skvoretz published an article titled "E-State Structuralism: A Theoretical Method" (Fararo & Skvoretz, 1986), Remarkably, albeit not consciously foreseeing internetization and globalization, they occasionally, perhaps even accidentally, define the essence[9] of the e-state or at least its robust core. This definition, approached from

[8] According to the author's data, Poyais emerged in 1820, and Fedonia has carried different territory names, but its first mention is also between 1803-1826. Material regarding Humanity mentioned by Osipov could not be found.
[9] Opinion of current theses author

the perspective of sociology rather than IT, conceptualizes the e-state as a state predicted due to its data-based nature and networking (using animals as an example). In the current thesis' author's estimation, this definition is at least worthy of consideration or further research, aligning well with the treatment of contemporary data-driven, behaviourally informed information societies. Hence, despite Fararo and Skvoretz not directly discussing information technology in their work but rather focusing on sociology through governance, structuralism, social behaviour, and interaction alongside a spectrum of mathematics (models and relationships), all of which, viewed as keywords, may have simply been ahead of their time in the context of the non-existent academic treatment of the D.V.E. state at that time. Future researchers could more precisely validate whether their created theory can be regarded as the ground theory to the e-state.

Ten years later, in 1996, a highly cited work titled "The Rise of the Virtual State" (Rosecrance, The Rise of the Virtual State, 1996), emerged, defining the virtual state as "the virtual state—a state increasingly based on intangibles and brainpower," describing the transformation of the meaning of state territory through the context of economic prospects and activity. Whereas previously, the success and wealth of a state were based on goods produced within the country and entrepreneurial activity within country's therein, Rosecrance depicts the new virtual state as one where goods and services no longer necessarily need to be produced and provided within the same territory, but production and provision can occur in economically advantageous regions, such as developing countries, like Asia at that time. Rosecrance introduces globalization, and a few years later, Jerry Everard establishes a connection between the Internet and the sharing of cultures among nations and states in his book "Virtual states" (Everard, 2000). Everard discusses the early stages of Internet proliferation (around the turn of the millennium), focusing on online information and connectivity, yet refrains from explicitly defining the term "virtual state." He predicts the expansion of the internet and its impact on information dissemination and cultural exchange, noting limitations in information flow to regions lacking national internet networks. All other sources in year 2000 talk about the same perspectives as Everard and Rosecrance, but from the erection of Fountain's (Fountain, Building the virtual state. Information Technology and Institutional Change, 2001) interpretation of virtual states and its direct links with state apparatus (agencies as she calls them) that are becoming connected

to the internet, a new perspective of virtualisation was born- virtualisation of public service domain and e-governance.

With following years, the academic domain grew and so grew the number of publications. Purpose of this paragraph is not to list and introduce each registered source, therefore the author of current thesis focuses on the most influential or original ones. As presented in the Figure 6 graph, Usage of terms throughout years, in the early stages of terms' usage, virtual

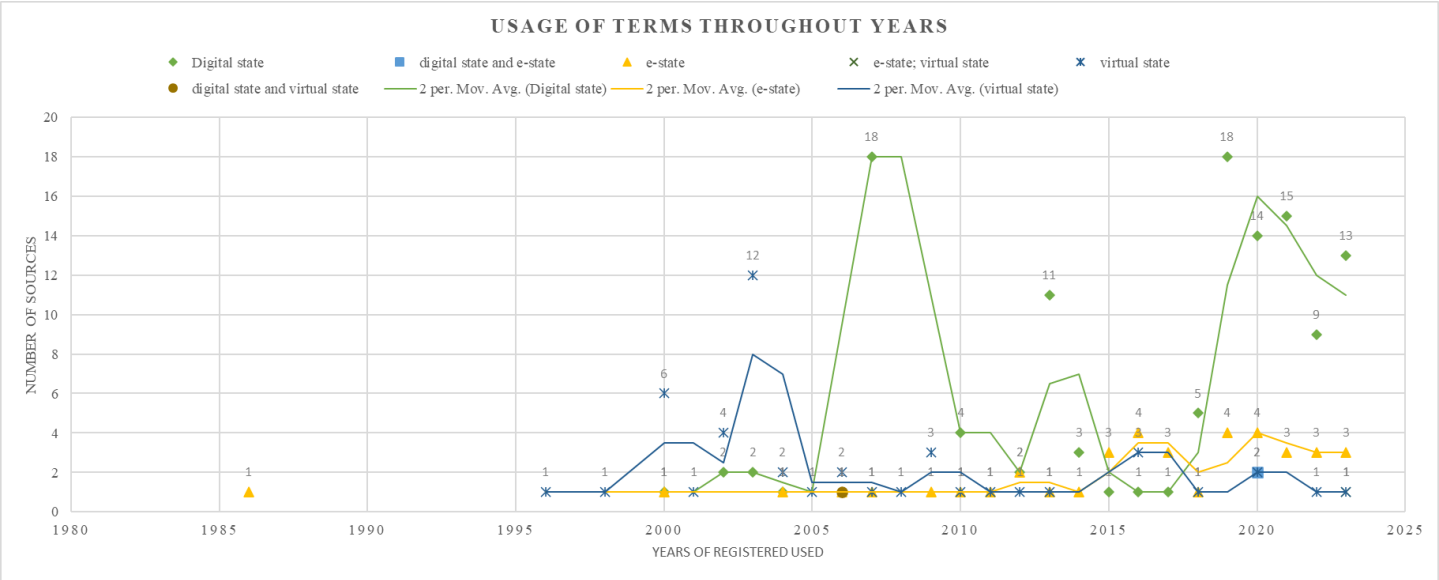

Figure 6 Usage of terms throughout years.

state was more used largely due to Jane Fountain's effort and her influence to future studies, but even though Primo provided as one source the review of the original material, one original notation belongs to Paul Frissen (Frissen & Emery, 1999), who emphasises on the essential change of the role of politics and administration through technology[10].

However, while e-governance began to gain prominence in the late 1990s and early 2000s as governments worldwide started embracing digital technologies to improve their service

[10] „Page 270 /.../The virtual state is a tragic problem, particularly for politics. On the one hand, this is the consequence of the political ambition to dominate. Policy and control can be made more finely meshed. But achieving that ambition strengthens bureaucracy and technocracy, and politics is displaced into new arenas. However, this displacement of politics, through technological and administrative developments, is also at the same time a fundamental change of shape. The image of politics as a social decision-centre splinters in the fragmentation of post modernisation; displacement is one manifestation. There is some political reflection going on about this, but the suggested strategies would test the skills even of Baron von Miinchhausen. Even if one wanted to pull oneself out of the mire by one's own hair, the head on which the hair is growing has vanished. /…/Of no greater help is the futile romanticism of communitarism. It is superfluous because the forming of communities, certainly in a virtual form, no longer requires a political centre, and it is dangerous

delivery, citizen engagement, and administrative efficiency. The late 1990s saw the emergence of initiatives such as the United States' Electronic Government Act of 2002 (U.S. Department of Justice, 2002) and the European Union's eEurope Action Plan (Eurpoean Commission, 2001), which aimed to promote the use of ICT in government operations. These initiatives helped popularize the topic and laid the groundwork for further research and development in the field. Around 2005 arises the usage of term "digital state" and in 2006, Dunleavy, Margetts, Bastow and Tinkle, while digitization (Gartner, 2024) was taking bigger effect in the transformation curve, introduced the need for broader view to e-governance and "state"- there is a need for digital era governance (DEG) because the change will be substantial and starts with the organisational culture change.

It seems that around 2015 until 2017 (look at Figure 6) there has been more peaceful period in publications, yet this has been the time when e-state has risen. Overall, while the years 2015-2017 may have been relatively quiet in terms of academic publications in certain areas of ICT, they likely represented a period of consolidation, implementation, and refinement of existing technologies and concepts, including digitalisation of state apparatus and society. It can be seen from the Primo research results that over time, virtual state as a term is not so much in use anymore and it is more replaced with digital state and even e- state. Although not in current literature review focus, it can be assumed that different D.V.E. state related terms are also in use (for example e-gov, e- services, e- government, digital society etc.).

The number of publications rise significantly from around 2017. In author's personal perspective it can be due to overall societal developments in ICT domain. Modern regions and societal communities began to use digital solutions daily and technology has merged to everyday lives. Approximately between 2015 – 2020 ICT sector witnessed significant developments across various fronts. The rollout of 5G networks gained momentum,

because it tries to combat the loss of political primacy through a strategy of moralisation, forgetting that the loss of primacy in the first place is largely owing to the shortcomings of the grand narrative.
Page 271 /…/ Politics will have to accept the virtual state. It is an inevitable consequence of both modernisation and post modernisation. Furthermore, it corresponds to the nature of social developments. In the economy, in organisations and in culture, we can see a comparable pattern of fragmentation. The modern contract society is an archipelago, and its culture is staccato in character. The modern has become postmodern. Page 271 /…/ The virtual state is a metaphor for the complex and contingent connections between politics, administration, and technology in the 'postmodern condition'. Postmodernism as a theoretical orientation attempts to describe these connections and employs a vocabulary which tries not to be totalising or metaphysical. That is why fragmentation, connectivity and contingency were given such a prominent place in my description of politics and administration in cyberspace and my proposals for a postmodern theory of administration and politics.

promising faster speeds enhanced connectivity and IoT applications. Artificial Intelligence continued its integration into diverse industries, powering applications ranging from virtual assistants to predictive analytics. Such developments woke the imagination of visionaries and virtual realities started to secure the rear. Blockchain technology saw increased adoption beyond cryptocurrencies, with potential applications in finance, supply chain management, and healthcare. The Internet of Things (IoT) ecosystem expanded, with a proliferation of connected devices driving innovation in areas like smart homes and cities and industrial automation. Heightened cybersecurity concerns prompted regulatory efforts to protect consumer data and privacy. Cloud computing remained dominant, enabling scalable and flexible computing solutions.

A symbolic effect or even possible catalyst from the implementation of ICT technologies in ordinary people's everyday lives had Covid-19 pandemic. While in 2019 Covid-19 pandemic emerged and brought new ways of working into organizational culture, it also created a need to interpretation in current review topics- altogether ten different sources listed in Table 5. This enhanced the accessibility of services, "customer" needs and change of impersonal communication, which also demanded focus on contact-free delivery, issues of trust that are parallelly emerging with mis- and dis-information growth, and bended the so far need for borders as of physical territorial requirement to implement different activities. Importance of distance was decreasing and the addiction to technological solutions grew- e-services, digital communities and also different existential phenomenas, which were assumably boosted by mental health issues that raised with isolation periods, like virtual worlds (Gliboff, 2023) (Malaby, 2010) and death in the Internet (Fras M. , 2021)were there to stay.

Table 5 Covid- related sources

Title	**Author**
Exploring digital transforming challenges in rural areas of South Africa through a systematic review of empirical studies	(Aruleba & Jere, 2022)
COVID-19 pandemic. New challenge for constitutional relations	(Lungu, 2020)
Social aspects of the COVID-19 pandemic in the education system	(Mukhametzyanov & Popova, 2021)

Connecting the dots: Kerala's use of digital technology during the COVID-19 response	(Ummer, Kerry, Diwakar, & Chakra, 2021)
COVID-19 pandemic as a trigger for the acceleration of the cybernetic revolution, transition from e-government to e-state, and change in social relations	(Grinina, Grininb, & Korotayevc, 2022)
Emerging cyber threats in Estonian public sector during and after COVID-19	(Ruut, 2023)
Flight, freeze, fight	(Zherebetska, 2022)
Digitisation of Ukraine in Terms of Public Electronic Services' Distribution	(Danyliuk, Dmytryshyn, & Goran, 2021)
Deliberative democracy in the time of crisis: participatory instruments at the local level and their limitations (some remarks)	(Sokalska & Edyta, 2021)
Improvising an E-state: The Struggle for Cash Transfer Digitalization in Mozambique	(Castel-Branco, 2021)

Digital transformation initiatives have accelerated, driven by changing consumer behaviours and competitive pressures, while discussions around data ethics and responsible artificial intelligence shaped public debates and industry/policy makers' practices. Edge computing emerged as a complementary paradigm to cloud computing, enabling real-time analytics and low-latency applications. Overall, the period was characterized by innovation, expansion, and transformation across various segments of the ICT sector, and this meant also bigger number of publications and broader spectre of angles to discuss and analyse the paradigm of digital transformation of the state and its effect to political and national state(hood) as it is substantially touched by Tomlinson in his concerns emerged with social media and artificial intelligence as new political dynamics, such as online activism and crowdfunding for legal challenges, underscores the evolving landscape of administrative justice have born and where the state must align with new technological tools[11] (Tomlinson, 2019).

[11] „/…/The alternative is to try to understand an increasingly digitalised state by seeking to awkwardly fit developments into possibly outdated frameworks, something that would risk making those who do so pedlars of an increasingly irrelevant nostalgia. Where necessary, we should be willing to reconceptualise and even abandon conventional models of understanding and devise new models so that we can better explain the changing administrative justice system. Moreover, at least for the foreseeable future, humans will still be operating digital systems, and they will certainly be designing them. Technologists have no special authority to make claims about institutional design beyond purely technological solutions. Technology is best conceived as a new material that has been discovered, which is to be added to the existing materials used in

From the period of 2017 – 2023 one symbolic article that gives value to current review is focusing on the theoretical structuralism of e-state is "The structure of the e-state and public administration at the digital age" (Barkov, Sokolov, & Kiselev, 2021), which debates if e-state is an integral part of e-democracy and electronic state is a system which is at the same time a bigger part of a system of a higher order and therefore an electronic state will be carried out in coordination with the development of larger-scale ideas and theories, which also correlates with current research understanding that building a digital state needs an objective and BITA alignment. What in interesting to note based on Table 8 (on page 97), is the increase of publications from 2019. From so far (1986 – 2018), the average publications per year is ca 5,5 and from 2019, average increases to 18,4 per following years. Overall, the surge in academic publications on the digital state, virtual state, or e-state reflects the increasing relevance and complexity of ICT in shaping modern governance systems and underscores the interdisciplinary nature of research in this field, drawing from areas such as public administration, political science, information systems, and sociology, as seen from the literature review. From BITA alignment perspective it is obvious that implementation has raised discussions interdisciplinarily and with the maturement of e-governance and virtual societies' science domain, need for scientific approaches witnessed in the society, are relevant to the day.

The need of alignment and big picture is discussed by (Kempeneer & Heylen, 2023) in their intriguing article "Virtual state, where are you? A literature review, framework, and agenda for failed digital transformation" which title concludes the problem. Authors state that regardless of technological evolution and large investments in technology, a virtual state that Jane Fountain described more than two decades ago, is still lacking.

As conclusion for historical retrospective of the evolution of the terms it can be said that the essence of virtual/ digital/ e- as electronical state has evolved together with the technological development and the literacy of meaning, possibilities and also threats behind new

building systems. We should understand it as a means for advancing the functions of the state, not as some sort of transcendental change. In this sense, the digitalisation of administrative justice is similar to the expanding use of contracted-out services in the 1980s – it is a new method, not a new end. The use of digital technology may bring about or represent changing politics and the form of technology-enabled decision-making may itself have certain consequences, but technology is no more than one tool in a state's toolbox (and it is certainly not a tool with magical properties which can somehow circumvent questions of politics)." (Tomlinson, 2019)

technological capabilities. The evolution of meaning of terms started with literal awareness of the national network of the Internet as such and has come to the point where it is hard to distinguish the technology from human. In this point it is difficult not to highlight the it is difficult not to highlight authors (Osipov, Fararo and Skvoretz) with an "outside the box" vision, who, in the opinion of the author of this work, as visionaries, successfully frame the country's parallel form of existence with their bold narratives.

4.2 Usage of the term in a geographical context

Each search result source is coded by regions of the topic. If source is not focusing on a specific region or is not mentioning it at all, the source is marked accordingly (as N/A). From 214 sources 31 were not focusing on a specific region, these had universal scope. Others were divided between countires as presented in the Figure 7.

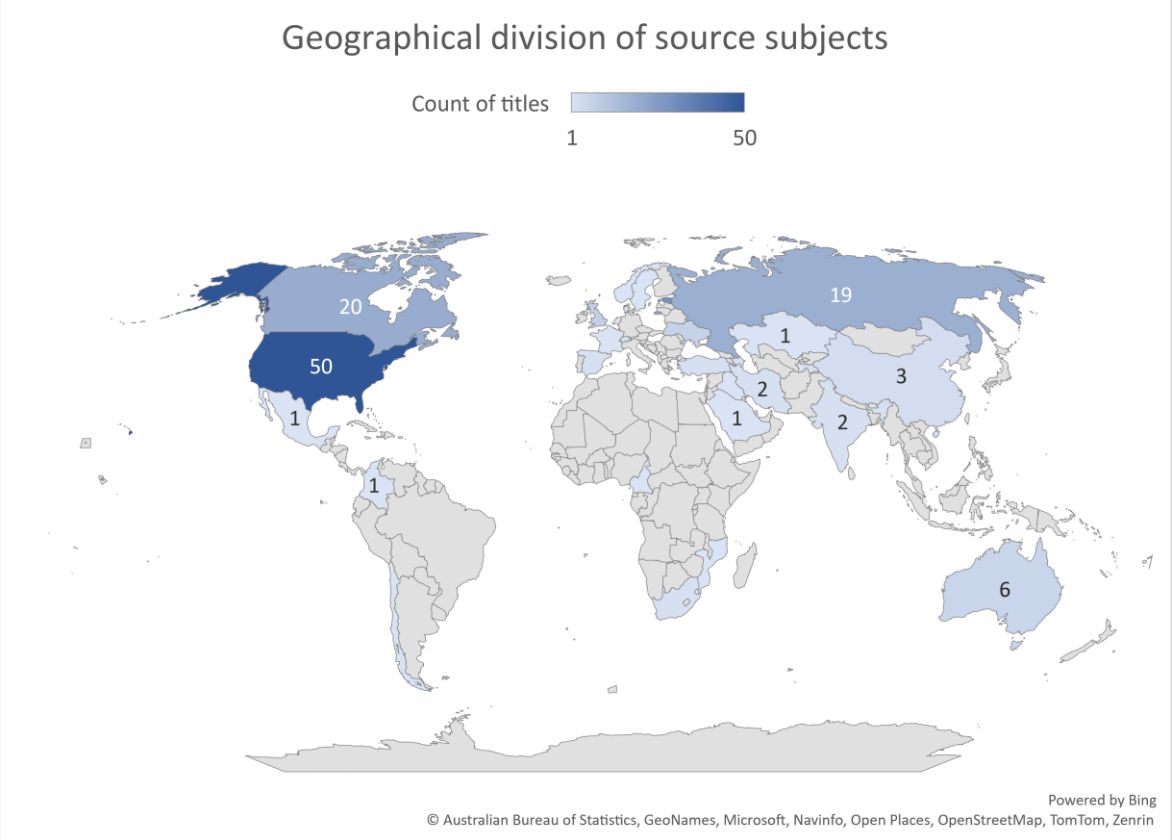

Figure 7 Subject countries.

Additionally, there were seven sources with mentioning of regional detail level, which is technically impossible to merge into Figure 7. Therefore, these regions are listed in Table 6.

Region-level subject	
Africa	2
Arab states	1
Latin- America	2
Europe	1
Middle- East	1

Table 6 Region-level subject

Based on Figure 7 and Table 8 (Table 8 on page 97) and Table 6, it can be seen, that publication velocity throughout years is relatively stable in regionless publications. Most fruitful states according to being as subject/discussed states to publications are USA, Estonia, Canada, Russia, Ukraine. Even though based on Primo's findings, Canada is in the list, but current author would not consider its position fair, due to the fact that Primo has provided separately book paragraphs of "Digital state at the leading edge" (Borins, et al., 2007), which discuss about the research topic. Yet, regarding to the Country-level digital competitiveness rankings worldwide as of 2022 (Statista, 2022) for example Canada is in top 10 countries in digital competitiveness, (IMD, 2023) and based on e-government development index (United Nations, 2022) on place 32. Therefore, it is highly developed state with digital solutions, where are assumably practices to study and learn by others- there must be other alternative keywords more used than digital, virtual or e-state, or the is the material more granulated based on topic and there is not enough desire to observe and analyse the bigger scope and cross-domain view to acknowledge, what does it all add up to.

From geographical perspective it is also interesting that publications originate from these specific countries and other European or Asian counties which are also present in different e-development indexes, are not presented in current review. Therefore, it can be concluded that in these countries and regions are using other keywords to associate digital, virtual or e-state phenomena. This rises the interest of multiplexity of the ICT terms regarding state/ e-governance, information or digital society that can be predicted is the case, because why then don't we see in the geographical list Netherlands, Singapore, Iceland and other countries best practices, success stories and analyses of learning curves, countries who also put a generous effort into digitalising/ virtualising their surroundings and experiences. Author of

this thesis suggests future researchers to analyse top indexes' countries from the digital/ virtual / e-state perspective, if they consider the transformation that they have achieved as a format of distinct state or from integral perspective.

4.3 Components of the * state

Current research conducted a coding process, where each source material term use-case was individually assessed by its content and context, how does the source comply with the topic. In what context was the term used. Author categorised the usage with each source and as a validation round, Atlas.ti was used to offer artificial intelligence perspective for the codes. Codes were assigned to each source based on the topic. Author finds that AI provided valuable perspective for the review that created legitimate diversification.

In the context of selecting the list of keyword clusters and their sub-codes, the author of this research attempted to cover the main and most significant elements that could be relevant in reconciling manual tradition with technology, aiming for a digitally transformed outcome that would represent a hybrid (i.e. integral) or new version (i.e. distinct) of the state. To provide evidence to that we are discussing about a digitally transforming state, it is crucial to map out a general list of state elements (which are by common knowledge: population, territory, sovereignty, and government). Reflecting the digital transformation, the author employed the key elements of the BITA model - policy shaping, strategy, architecture, implementation. Additionally, commonly used terms as codes were added which we use in everyday language, such as digital society, e-government, e-governance.

To reflect the essence of transformation, the focus is on the content itself, namely, better meeting customer needs, proactivity, and national initiatives in areas such as economics, industry, and medicine. Transitioning to the national level, e-state often involves discussions on the efficiency of the public sector, streamlining state apparatus, and making services more citizen-centric. Placing the focus on service improvement cannot be achieved without changing processes and sometimes even business rules/legal regulations, which in turn shifts the focus to IT, its architecture (and hopefully compliance with national initiatives and goals), infrastructure, technological environment, and technological readiness, as well as the need to be technologically advanced. Technology goes hand in hand with cybersecurity,

maximizing big data while ensuring data protection, and nowadays, also with social media and dis-/misinformation. Primarily through social media but also through national citizen engagement platforms, attention can be drawn towards community self-definition, activism, which in some cases manifests as pursuits of resilience or sovereignty of the state or community. In today's technological society, the private sector plays a significant role, where it is essential to discuss corporate influence and the influence of the private sector in the technology sector alongside the manual government apparatus. This brief list of the used codes and their reasons, in the author's view, is a comprehensive list to understand, in today's context, how terms such as 'digital', 'virtual', 'electronic' state are understood.

The keyword clusters, divided independently of terms, are listed according to their frequency of occurrence in descending order in Table 7 Cross-terms codes in descending order. The results reflected in the table demonstrate a clear distinction between the upper and lower parts of the table. A boundary is observed between themes beyond the fourth domain, revealing less popular perspectives, including the private sector and economy, citizenship, identity and community, cybersecurity and information integrity, education, law, and healthcare.

However regardless of the distinction between Table 7 upper and lower segregation, there is a tender substantial difference between digital, e-, and virtual state also.

Table 7 Cross-terms codes in descending order

Context of digital state	Context of virtual state	Context of e-state	cross-terms context	Cluster	Code	Cross-terms	e-state	Virtual state	Digital state
26	7	12	43	Government and Governance:	State apparatus	77	23	12	45
					Public service	72	16	13	45
					e- government	45	18	4	24
					Policy making	43	10	9	26
					e- governance	34	15	3	18
					Social service	30	9	4	17
					Government initiative	29	5	5	21
					Statehood/ resiliency	15	1	5	9
24	6	10	39	Service Delivery and Efficiency:	Change of process, substance	62	15	11	39
					Customer need, regional and social diversity	49	15	5	30

					Change of business rules	41	6	7	29
					Efficiency	33	11	6	18
					Proactive service delivery	10	3	2	6
21	6	8	33	Societal and Cultural Impact:	Transformation	74	19	12	47
					Holistic topics	40	9	6	27
					Societal impact	38	8	4	27
					Semantics	35	11	5	21
					Phenomenology	27	6	5	17
					History	25	8	7	12
					Cultural impact	13	2	3	8
					Culture/human	12	1	3	8
17	6	11	32	Digital Society and Technological Advancement:	Image, brand	53	25	9	26
					Technological advancement	50	15	9	29
					Technological readiness	49	12	9	30
					IT infrastructure	35	15	5	17
					Requirements	32	8	9	17
					IT architecture	31	10	3	21
					Digital society	28	10	6	14
					Hyperconnectivity	17	6	1	10
					Globalization	15	5	6	5
					x- road	11	7	1	4
14	5	6	24	Private partner and economy	Private sector	33	10	5	18
					Industry, transport, economics	23	4	4	15
					Corporate influence	17	4	6	8
13	5	6	22	Citizenship, Identity, and Community:	Environment/ space	53	14	9	31
					Identity, community	30	10	5	15
					Territory	15	3	5	7
					Citizenship	15	5	3	7
					Self-determination	13	1	3	9
					Activism	8	1	3	4
9	3	3	14	Cybersecurity and Information Integrity:	Cyber security	18	3	2	13
					Mis-/dis-information/ information warfare/trust	17	3	5	9
					Data protection	15	3	0	7
					Social media	6	1	0	5
10	2	2	14	Education, Justice, and Health Care:	Justice	19	3	1	15
					Education	11	2	3	6
					Health care	11	2	1	8

This research proofs that digital state and e-state can be more seen as synonyms (as following the colour pattern provided by MS Excel with Conditional formatting tool) based on Table

7 source codes. These two terms are having bigger similarity in occurrence pattern than virtual state. All three terms, considering the query of sources which have defined the terms in their texts, definitions address the integration of digital technologies into governance, they vary in their emphasis on specific aspects such as traditional state structures, citizen engagement, self-governance, and the broader implications of digitalization on sovereignty and geopolitics, yet they all have their own differences.

E-state definition (list of sources available in appendix section) focuses more on the utilization of information and communication technologies (ICTs) to facilitate self-governance and self-organization among citizens. It emphasizes reducing reliance on traditional government and bureaucratic institutions and transforming the relationship between citizens, businesses, and government authorities. The key components include the implementation of e-government practices to improve efficiency, transparency, and accessibility. Additionally, it mentions the potential use of socio-technical self-regulating systems (SSSs) to revolutionize governance structures.

Digital state definitions (list of sources available in appendix section) emphasize the integration of electronic technologies and platforms into traditional state structures and functions, focusing on enhancing governmental processes, service delivery, and societal interaction. It highlights key components such as cybersecurity, e-government, smart cities, and digital skills. The emphasis is on leveraging technology to optimize state functions, enhance citizen engagement, and foster socio-economic development. It also underscores the creation of digital ecosystems and the redefinition of the state-individual relationship. Only digital state term has association with Metaverse in its sources (Gliboff, 2023) (Malaby, 2010).

It can be derived from the knowledge that virtual state as a term is not so much used anymore in academic sources (author has personal assumption that it is more used in mainstream, popular science web contents in the context of virtual worlds, (uni)verses), but the seldom sources that still get published have a different scope than two previous ones. Virtual state is more correlated with private sector and corporate transformation and bigger picture. Virtual state is also less used concerning e-government, e-governance, and pro-active alteration customer (in this case citizen) needs. Unlike the previous definitions, this one (list of sources available in appendix section) introduces the concept of a "virtual state," which

transcends traditional territorial boundaries. It emphasizes the integration of information and communication technologies into state structures and processes, focusing on enhanced information sharing, collaboration, and innovation. Key attributes include alignment with the semantic web (Web 3.0), shifts in economic and geopolitical dynamics, and the exploration of digitalization's potential to reshape governance models and public diplomacy strategies. It also challenges conventional notions of sovereignty, security, and political primacy by highlighting the emergence of intangible services, knowledge-based economies, and interconnected networks. Current author suggest using virtual state as a unified term to cover state and its elements and their related topics. E-state and digital state could be considered as elements of virtual state.

The narrative of government and governance was most frequently used across all three terms, particularly within the context of the state apparatus and public services. Additionally, other terms frequently mentioned alongside included changes in business processes and improvements in solutions provided to end-users. The journey towards a digital state is facilitated through transformations that impact the social and cultural spheres of the state. Equally important are the conditions for becoming a “digital” state, technological readiness, and the necessary plan and scope, to became technologically advanced.

Based on the literature review, it can be inferred that approximately 25% of all articles discuss digital, virtual, and e-government at the level of mere image and brand, mostly without delving deeply into the topic of digital governance but rather mentioning a specific country as a success story or example of a digital state for context creation, assuming a common understanding of what a digital state entail.

4.4 Review result comparation with Chandran Kukathas “Definition of the state”

To present the complex mechanism of the state, Chandran Kukathas has covered the nuances of state essence. He states that despite the diversity of political forms, the state remains the most significant type of human collectivity in the world today. The state is a form of political association among various human associations, but it is not the only political association; others include townships, counties, and international organizations. As seen from current

literature review, virtual state involves also a complex network of digital interactions and governance mechanisms throughout different and similar levels in cyber sphere.

Like the historical emergence of the state due to changing political landscapes, the virtual state arises from technological advancements and societal (derived from economic globalisation, internetification) shifts towards digital era governance.

Defining the state is challenging due to its historical evolution, diverse interpretations, variations in size and power among entities claiming statehood, and the need to deploy contentious normative concepts like legitimacy. Philosophers throughout history have and still are discussing about the substance of the state.

Defining the digital era state is also challenging due to its rapid technological evolution, diverse interpretations in broad masses, variations in governance models, and the need to consider novel concepts like for example digital citizenship, virtual reality, virtual cultural heritage preservation, virtual self-determination, trust and data sovereignty.

Kukathas emphasised in his article these main statements:

- The state does not subsume all other forms of association. The digital era state does not replace traditional political associations but intersects with them, creating new governance paradigms (Stevens, 2022).
- The state is a unique political association that possesses independent political authority and territorial attachments. The digital era state, similarly, is a unique political entity in the virtual realm, possessing independent authority and territorial connections in the online space (Gliboff, 2023).
- The state has its own interests, separate from those it governs. The digital era state has its own interests, such as corporate technology and its vendor lock, which distinct it from traditional state interests. In virtual environment, digital activism, social media and dis-/misinformation also have its own interests that are separate from the ones who govern (Sajjadi, 2016), (Monroe, 2011).
- The state, though of human construction, is not fully under human control. The digital state, while shaped by human actions, is influenced by technological forces beyond complete human control (Chenou & Valenzuela, 2021), (Kempeneer & Heylen, 2023).
- The state does not necessarily serve the deepest interests of all individuals or groups.

- The digital era state's role in securing people's interests involves complex considerations of privacy, digital rights, and cybersecurity ((Danyliuk, Dmytryshyn, & Goran, 2021), (Azarova , Tkachuk , & Nikiforova, 2019) (Denisenko, 2021).
- The state is a modern construct originating in early modern Europe but replicated globally. Similarly, the digital state is a modern construct born out of the digital revolution, with its origins in the rise of digital technologies and replicated across digital platforms worldwide. (Rosecrance, The Rise of the Virtual State, 1996), (Everard, 2000) (Bellamy, 2003).
- The state is an institution for both exercising and being subject to power. The digital era state is an institution for both enabling and regulating digital interactions and data flows. Digital power is a phenomenon that needs deeper future discussions. (Uwuchukwu, 2022) (Stevens, 2022).
- The state is an abstraction existing through relations among people. The virtual state is an abstract concept reflecting the interconnectedness of digital or virtual systems and their impact on society (Fras M. , 2021), (Gliboff, 2023).
- The state is a political community but not synonymous with a nation or people, and it does not subsume society. Likewise, the digital era state is a community in the digital realm, not necessarily synonymous with any specific national or ethnic group, and it operates within the digital society without entirely encompassing it (Sajjadi, 2016), (Stevens, 2022) (Ibrahimova, 2020).
- Government typically expresses the state's agency but is not synonymous with it, and states can exist without governments. Similarly, in the digital realm, digital governments may express the agency of the digital state but aren't the entirety of it, and digital states can exist without traditional governmental structures (Osipov V. S., 2020).

5. Summary

Based on the findings of the current systematic literature review, it is evident that the concepts of virtual, digital, and e-states can be understood with slight nuances. Based on interpretations, the author suggest to consider virtual state as the frame where digital and e-state exist as last mentioned ones have slightly narrower scope than virtual state.

The methodology of the research has proven its worth by being literally the only one of a kind from all the sources detected from Primo search portal. So far there are no comparable articles that investigated these terms in such context. There were valuable findings from the review, such as (Everard, 2000) (Fararo & Skvoretz, 1986) (Gliboff, 2023) (Stevens, 2022) (Ibrahimova, 2020) who deserve bigger attention from future researchers regarding their original narratives.

In this regard, the methodology has indeed demonstrated its effectiveness as delicate nuances emerged from the results, delineating differences in the meaning and historical context of the terms. The author acknowledges that a systematic analysis of literature alone may not fully suffice for a comprehensive interpretation of digital, virtual, and e-states, as the analysed sources consistently feature terms such as e-government, e-governance, and digital/information society. Therefore, it is necessary to examine the extent to which these mentioned terms differ in meaning within the context of this research. This, in turn, raises the question of how to apply the knowledge gained from this research in practice. In the author's opinion, it is essential to conduct an alternative systematic literature analysis focusing on terms such as e-government, e-governance with the accompany of the terms digital and e-state and then synthesize the results to understand whether the consolidation of terms is possible based on the two analyses or whether they maintain their distinct nuances and are not synonymous. Virtual state term is more related to broader scope and therefore more suitable with the architecture and structural perspective of the organism of state or society. The comparison of digital or information society or currently more attractive virtual worlds and distinct approach like authors, such as Lessig or cyber activists and philosophers such as Richard Barbrook (Malmgren, 2020) would be acute.

Nevertheless, clarity in terminology is welcomed to minimize misunderstandings. There is an interesting contradiction between digital state and virtual state use cases. Even though it can be seen in previous paragraph, that term virtual state has slightly different meaning than digital state, digital state is yet associated with Metaverse- i.e. articles that use term digital state, mention Metaverse, which can be interpreted as an ecosystem in the context of digital state but has a broader substance than just state. But when reading materials about Metaverse, these sources tend to use virtual country or virtual world or reality and not digital or e-state. Therefore, it is more crucial to combine studies with e-government and society level discourse, to understand in a zero-ground level how big is the circle of different perspectives of states that is used as terms. And also, to educate people in this transformational era about new vocabulary that has emerged to our spectre- for instance, let us not talk about digital state as a synonym of digital society or e-government as a synonym of e-state.

As looking for the future, it seems that based on the analysed literature, we are in the phase where we try to identify and understand the possible changes[12] that digital transformation and digital era may bring. We map the possible affect to politics (Stevens, 2022) and regulations (Tomlinson, 2019) and our beliefs (O'Neil, 2016) and culture (Annus, 2022). Gliboff (Gliboff, 2023) points out in his article that there might be different state perspectives as triggers that lead the digitalisation of the state- for example geographical. We are talking about digital preservation and not only as for cultural heritage but for as for example Tuvalu being the first digital nation in Metaverse. This is an existential phenomenon and will open new paths for metamorphosis of state just as Rosencrance (Rosecrance, The Rise of the Virtual State, 1996) or Everard (Everard, 2000) were introducing cross-border production as a new form of state existence that lead to phenomenon that we now know as globalization

[12] "How will a state administration be able to conclude public contracts to work on these technological bricks? As for social networks, the regulation of metaverses will be a key issue for public authorities. In its annual report published in 2022, the French Conseil d'Etat (State Council) stresses, on one hand, the need to regulate and, on the other hand, the need to anticipate the rise of more in-depth forms of virtual universes, such as metaverses. The metaverse also raises sensitive issues regarding the ability of a state's public authorities to intervene regarding territoriality rules (state borders, delimitation of a geographical and functional perimeter). How can we transpose rules existing in the "real" world to this new area? This would bring practical questions in terms of implementation if we assume that the metaverse is the continuity of the real world. Would it be necessary to imagine the acquisition by public institutions of lands inside a metaverse? With what currency? How can we identify the users of these virtual universes?" (CANO, 2023). The regulation enforced by public authorities will be all the more important if public institutions intend to invest in the metaverse and offer public services via this new medium.

or global economy. With the across the border production and consumption it can be compared to across the border existence in virtual reality.

As mentioned in the results of this research, Fararo's and Skvoretz's "E-State Structuralism: A Theoretical Method" may be considered as a theoretical fixture of electronical state. It combines mathematics, prediction, data analysis as the core of e-state. If we continue with the idea that suits well to current datafied era we can see the reflection of their method in practice in our everyday lives. Cyber and physical spaces interpenetrate as reported by Barry Wellman (Wellman, 2008) and create a new, a different, way of being as Levin and Mamlok found out in their systematic research "It reconceptualizes how people consider their transition into the digitized world that change conceptions of who people are and how they engage with ourselves and others." (Levin & Mamlok, 2021). In current times, while possessing the vast amount of data that has been created in virtual realm, there can also be mathematical prediction virtual simulators (Frissen P. , 1999), like Mason RebeLand that calculate the scenarios in societal scale (Cioffi-Revilla & Rouleau, 2010). These, at time utopian concepts, are here in present state and not in the future. They seem to be acting and existing independently[13] from state. Therefore, how can we define the meaning and position of the state in such environments.

"We are all neighbours now. There are more phones than there are human beings and close to half of humankind has access to the internet. In our cities, we rub shoulders with strangers from every country, culture, and faith. The world is not a global village but a global city, a virtual cosmopolis"; these are the opening words of a quite recent book by Professor Timothy Garton Ash (Ash, 2017), which suit well to visualise the change in essence of our era where technology creates bridges to change.

[13] "It is essential to understand one key thing. One virtual world can never be a metaverse. With the metaverse, we are talking about the interconnection of several virtual worlds, if not all at once. The metaverse is much more than the internet, blockchain, or other technology. It is a virtual universe where everyone can interact with other people, sharing data and values without permission. In essence, you can think of it as a digital version of the world as we know it today. There are continents, countries, cities, villages, and regions. Each is autonomous, but each contributes toward the bigger picture. Moreover, users can dive deeper by purchasing land plots, building out experiences for other players, and monetizing those experiences. There is no predetermined gameplay or narrative. Instead, it's a world where players decide and create what they wish to see." (DappRadar, 2024)

Appendix 1

6.1 List of authors, who define virtual state.

	Title	Author
1	The Semantic Web and Networked Governance: Promise and Challenges. Related Titles: Lecture Notes in Computer Science	(Fountain, The Semantic Web and Networked Governance: Promise and Challenges. Related Titles: Lecture Notes in Computer Science, 2006)
2	International security and the virtual state: states and firms in world politics	(Rosecrance, International security and the virtual state: states and firms in world politics, 2002)
3	Future Studies of Virtual State Formation in Iran and Its Effect on the Promotion of Global Peace Index (the Outlook of 1404)	(Sajjadi, 2016)
4	NSK	(Monroe, 2011)
5	Building the virtual state: Information technology and institutional change	(Fountain, Building the virtual state. Information Technology and Institutional Change, 2001)
6	The Virtual State: Transforming American Government?	(Fountain, The Virtual State: Transforming American Government?, 2001)
7	Mediated public diplomacy of the Islamic state in Iraq and Syria: The synergistic use of terrorism, social media, and branding	(Melki & Jabado, 2016)
8	The Rise of the Virtual State	(Rosecrance, The Rise of the Virtual State, 1996)
9	Digital Era Governance (IT Corporations, the State and E-government)	(Dunleavy, Margetts, Bastow, & Tinkle, 2006)
10	Politics, governance, and technology: A postmodern narrative on the virtual state (Virtuele Staat, Politiek, Bestuur, Technologie)	(Stevens, 2022)
11	Virtual State: Scoping Review of Russian Political and Social Sciences	(Osipov, 2020)
12	Bringing e-democracy back in: Why it matters for future research on e-governance: Jane Fountain's building the virtual state	(Chadwick, 2003)
13	Virtual states: the Internet and the boundaries of the nation-state	(Everard, 2000)
14	Implementing Central Bank Digital Currency (Cbdc) Into the National Monetary System: The Case of Estonia	(Moor, 2022)

6.2 List of authors, who define digital state.

	Title	Author
1	Modern Trends in The Formation of Architectural Environment of Public Administration Digitalization	(Pudovkina, Ivanova, & Khazova, 2021)
2	Digitalising the State Data Centres and the Power of Exchange	(Maguire & Winthereik, 2021)
3	Theoretical And Legal Aspects of The Digital State And E-Government	(Kasimov, 2020)
4	Building digital state: Understanding two decades of evolution in Kazakh e-government project	(Kassen, 2019)
5	Digitalization and automation of the agricultural sector	(Evdokimova, 2021)
6	Government Responses to Digital Workforce Shortages: A Study of the U.S., Germany, Japan, and China. Related Titles: Lecture Notes in Computer Science	(Li, 2023)
7	Information Processes for the Formation of a Digital State in the Republic of Tajikistan	(Badriddinovich, 2019)
8	The structure of the e-state and public administration at the digital age	(Barkov, Sokolov, & Kiselev, 2021)
9	Connecting the dots: Kerala's use of digital technology during the COVID-19 response	(Ummer, Kerry, Diwakar, & Chakra, 2021)
10	A Post-Soviet Eco-Digital Nation? Metonymic Processes of Nation-Building and Estonia's High-Tech Dreams in the 2010s	(Annus, 2022)
11	Digital Transformation in France: Legal Innovations	(Talapina, 2019)
12	Waterproofing Statehood: Strengthening Claims for Continued Statehood for Sinking States Using "E-Governance"	(Gliboff, 2023)
13	The Idea of the Digital State in the Face of the Russian Cultural Tradition of Understanding of Sense of the Government	(Aleksandrov, 2020)
14	Digital Era Governance (IT Corporations, the State and E-government)	(Dunleavy, Margetts, Bastow, & Tinkle, 2006)
15	Internet voting in Estonia 2005–2019: Evidence from eleven elections	(Ehin, Solvak, Willemson, & Vinkel, 2022)
16	Public administration risks in the migration sphere in the context of digital transformation	(Ledeneva & Rakhmonov, 2020-12)
17	Digitisation of Ukraine in Terms of Public Electronic Services' Distribution	(Danyliuk, Dmytryshyn, & Goran, 2021)

18	Estonian E-Residency and Conceptions of Platform-Based State-Individual Relationship	(Tammpuu, Masso, Ibrahimi, & Abaku, 2022)
19	Evolution of institutions for new industrial policy implementation	(Romanova, 2019)
20	e-Government Lessons from South Africa 2001-2011: Institutions, State of Progress and Measurement	(Cloete, 2012)
21	Diia. Digital state' and E-Government Practices as Anti-Corruption Tools in Ukraine	(Marysyuk, Tomchuk, Denysovskyi, Geletska, & Khutornyi, 2021)
22	The Future of the (Digital) State	(Casini, 2023)
23	E-democracy in the context of the information society: prospects, challenges, and opportunities	(Storozhenko, Ignatenko, Yaroshovets, Antypenko, & Vlasenko, 2023)
24	"Securing Digital Government: Towards Governance	(Skierka-Canton I. , 2023)
25	Mechanisms for E-state Resilience"	(Khaimovich, Ramzaev, & Chumak, 2018)

6.3 List of authors, who define e-state.

	Title	**Author**
1	E-State: Realistic or Utopian?	(Aham-Anyanwu & Li, 2020)
2	E-government Implementation in Spain, France, and Russia: Efficiency and Trust Level	(Boldyreva, Gorbunova, Grigoreva, Ovchinnikova, & Mantulenko, 2019)
3	E-state building: legal approaches	(Markulynets, 2021)
4	E-government: E-state within a state	(Khan H. U., 2012)
5	Exploring the links between democracy and digital transformation in developing Latin America countries: Building a democracy consolidation theory	(Stratu-Strelet, Gil-Gómez, Guerola-Navarro, & Oltra-Badenes, 2023)
6	COVID-19 pandemic as a trigger for the acceleration of the cybernetic revolution, transition from e-government to e-state, and change in social relations	(Grinina, Grininb, & Korotayevc, 2022)
7	Estonian e-Government Central Components Modernisation Study	(Raidmaa, 2016)
8	Paperless Management as a Foundation for the Application of e-Governance in Local Governments	(Pappel, 2014)
9	Increasing the Use of ASAN Signature in the eGovernment Services in Azerbaijan	(Mahyaddinova, 2023)
10	E-State Practices in Turkey: Evaluation of Governmental Web Sites	(Turan & Bayram, 2009)
11	E-State Structuralism: A Theoretical Method	(Fararo & Skvoretz, 1986)

12	Role of e-states in providing of informational security	(Ibrahimova, 2020)

Appendix 2 Compete list of Primo sources

Term	Year	Title	Has definition	Author	Source
Digital state	2021	Modern trends in the formation of architectural environment of public administration digitalization	Yes	O. E. Pudovkina, E. V. Ivanova, D. L. Khazova	European Proceedings of Social and Behavioural Sciences EpSBS
digital state	2019	Digital state spaces: state rescaling and advanced digitalization	No	Schou, J.; Hjelholt, M.	Territory, politics, governance, 2019-10, Vol.7 (4), p.438-454
digital state	2023	Public opinion effects of digital state repression: How internet outages shape government evaluation in Africa	N/A	Strauch, R.	Journal of information technology & politics, 2023-11, p.1-14
digital state	2021	Digitalising the State Data Centres and the Power of Exchange	yes	Maguire, J.; Winthereik, B.R.	Ethnos, 2021-05, Vol.86 (3), p.530-551
digital state	2022	Introduction: Digitizing Borders, Cities, and Landscapes	No	Poster, W. R.	Information & culture, 2022-03, Vol.57 (2), p.111-122
digital state	2020	Theoretical and legal aspects of the digital state and e-government	Yes	Kasimov, T.	Правовое государство: теория и практика, 2020-04, Vol.16 (4-1), p.122-130
digital state	2002	Technology states	N/A	Borja, R. R.	Education Week, 2002-03, Vol.21 (25), p.17

digital state	2021	Habeas data, habemus algorithms: Algorithmic intervention in public interest decision-making in colombia	Yes	Chenou, Jean-Marie; Valenzuela, Laura Estefanía Rodríguez	Revista de direito, estado e telecomunicações, 2021-10, Vol.13 (2), p.56-77
digital state	2019	Building digital state: Understanding two decades of evolution in Kazakh e-government project	Yes	Kassen, M.	Online information review, 2019-04, Vol.43 (2), p.301-323
digital state	2015	Digital State: The Story of Minnesota's Computing Industry	No	November, J.	The Journal of American History, 2015, Vol.101 (4), p.1316-1317
digital state	2000	E-town, USA	N/A	Appleton, Elaine	Inc. (Boston, Mass.), 2000-01, Vol.22 (13), p.56
digital state	2003	Progress towards developing national geological databases	No	Nicholson, S. W.; Stoeser, D. B.; Wilson, F. H.; Grosz, A. E.; Piper, D. Z.; Ludington, S. D.; Anonymous	Abstracts with programs - Geological Society of America, 2003-11, Vol.35 (6), p.364
digital state	2019	A functional framework	No	Tomlinson, Joe	Justice in the Digital State, 2019, p.1-18
digital state	2019	Crowdfunding and the changing dynamics of public interest judicial review	No	Tomlinson, Joe	Justice in the Digital State, 2019, p.19-36
digital state	2019	The tribunals gamble	No	Tomlinson, Joe	Justice in the Digital State, 2019, p.37-62
digital state	2019	How digital administrative justice is made	No	Tomlinson, Joe	Justice in the Digital State, 2019, p.63-88
digital state	2021	Digitalization and automation of the agricultural sector	Yes	Evdokimova, Y.	IOP Conference Series: Earth and Environmental Science, 2021-03, Vol.723 (3), p.32002, Article 032002
digital state	2019	Justice in the Digital State: Assessing the Next Revolution in Administrative Justice	No	Tomlinson, Joe	

digital state	2010	Digital state 2.0	No	Toner, G.; Pal, L. A; Prince, M. J. P.; Glen T.; Leslie. A.	Policy, 2010, p.177-206
digital state	2007	Making Political Connections: IT and Legislative Life	No	Borins, S.; Kernaghan, K.; Brown, D.; Bontis,; Thompson, F.	Digital State at the Leading Edge, 2007, p.224
digital state	2007	Citizen Relationship Management in Canadian Cities: Starting to Dial 311	No	Borins, S.; Kernaghan, K.; Brown, D.; Bontis,; Thompson, F.	Digital State at the Leading Edge, 2007, p.137
digital state	2007	E-Consultation: Technology at the Interface between Civil Society and Government	No	Borins, S.; Kernaghan, K.; Brown, D.; Bontis,; Thompson, F.	Digital State at the Leading Edge, 2007, p.253
digital state	2007	Complete Evolution or Revolution?: E-Government in the United States	No	Borins, S.; Kernaghan, K.; Brown, D.; Bontis,; Thompson, F.	Digital State at the Leading Edge, 2007, p.302
digital state	2007	Conceptual framework	No	Borins, S.; Kernaghan, K.; Brown, D.; Bontis,; Thompson, F.	Digital State at the Leading Edge, 2007, p.14

digital state	2007	What Keeps a CIO Awake at Night?: Evidence from the Ontario Government	No	Borins, S.; Kernaghan, K.; Brown, D.; Bontis,; Thompson, F.	Digital State at the Leading Edge, 2007, p.69
digital state	2007	Don’t Try This at Home: Lessons from England	No	Borins, S.; Kernaghan, K.; Brown, D.; Bontis,; Thompson, F.	Digital State at the Leading Edge, 2007, p.325
Digital state	2007	Mining the Nation’s Intellectual Capital: Knowledge Management in Government	No	Borins, S.; Kernaghan, K.; Brown, D.; Bontis,; Thompson, F.	Digital State at the Leading Edge, 2007, p.155
digital state	2007	Digital Leadership: The Human Face of IT	No	Borins, S.; Kernaghan, K.; Brown, D.; Bontis,; Thompson, F.	Digital State at the Leading Edge, 2007, p.277
digital state	2007	Beyond Bubble Gum and Goodwill: Integrating Service Delivery	No	Borins, S.; Kernaghan, K.; Brown, D.; Bontis,; Thompson, F.	Digital State at the Leading Edge, 2007, p.102
digital state	2007	Is IT Transforming Government?: Evidence and Lessons from Canada	No	Borins, S.; Kernaghan, K.; Brown, D.; Bontis,; Thompson, F.	Digital State at the Leading Edge, 2007, p.355

digital state	2007	The Government of Canada: Government On-Line and Citizen-Centred Service	No	Borins, S.; Kernaghan, K.; Brown, D.; Bontis,; Thompson, F.	Digital State at the Leading Edge, 2007, p.37
digital state	2023	Government Responses to Digital Workforce Shortages: A Study of the U.S., Germany, Japan, and China. Related Titles: Lecture Notes in Computer Science	Yes	Li, Ziyang	Cross-Cultural Design, 2023, Vol.14022, p.254-267
digital state	2002	Privacy and the digital state: Balancing public information and personal privacy	No	Durrett, B	
digital state	2004	Michigan top digital state	N/A		State legislatures, 2004-10, Vol.30 (9), p.11
digital state	2014	On Remembering a Post-Digital Future	No	Charlton, J.	A peer-reviewed journal about, 2014-06, Vol.3 (1), p.144-155
digital state	2020	COVID-19 pandemic. New challenge for constitutional relations	No	Evgeniya V. L.	Pravoprimenenie, 2020-10, Vol.4 (3), p.69-75
digital state	2022	Exploring digital transforming challenges in rural areas of South Africa through a systematic review of empirical studies	No	Aruleba, Kehinde ; Jere, Nobert	Scientific African, 2022-07, Vol.16, p.e01190, Article e01190
digital state	2020	Health digital state and Smart EHR systems	No	Serbanati, L.D.	Informatics in medicine unlocked, 2020, Vol.21, p.100494, Article 100494
Digital state	2003	Privacy and the digital state: Balancing public information and personal privacy	N/A	Bennett, CJ	Governance, 2003, Vol.16 (3), p.459-462
Digital state	2021	The Appropriated Body: Biometrics Regime, The Digital State and Healthcare in Contemporary India	No	Mishra, R.K.	Global policy, 2021-07, Vol.12 (S6), p.55-64

digital state	2019	On Leveraging the Potential of Open Data to Enhance Transparency and Accountability - A Case Study from Ukraine	No	Popelyshyn, O.; Tsap, V.; Pappel, I.; Draheim, D.	2019 Sixth International Conference on eDemocracy & eGovernment (ICEDEG), 2019, p.25-30
digital state	2018	A Survey on Customer Satisfaction in National Electronic ID User Support	N/A	Muldme, A.; Pappel, I.; Lauk, M.; Draheim, D.	2018 5th International Conference on eDemocracy and eGovernment, ICEDEG 2018, 2018, p.31-37
digital state	2020	Centering the Law in the Digital State	No	Cobbe, J.; Lee, M. S. A.; Janssen, H.; Singh, J.	Computer (Long Beach, Calif.), 2020-10, Vol.53 (10), p.47-58, Article 9206415
digital state	2019	Information Processes for the Formation of a Digital State in the Republic of Tajikistan	Yes	Badriddinovich, C. J.	Informaciâ i Innovacii, 2019-12, Vol.14 (3-4), p.19-25
Digital state	2019	Private Partnership as a Global Trend of Digital Government	No	Sidorenko, E.L.; Khisamova, Z.I. Mantulenko, V.	SHS Web of Conferences, 2019, Vol.71, p.1004
digital state	2021	The structure of the e-state and public administration at the digital age	Yes and no	Barkov, A.; Sokolov, A.; Kiselev, A.; Contributor Mostafa, A.M.M.; Malushko, E.Yu ; Deryugina, T.V. ; Cindori, S. ; Mokhov, A.A.	SHS Web of Conferences, 2021, Vol.109, p.1008

Digital state	2021	Social aspects of the COVID-19 pandemic in the education system	No	Mukhametzyanov, I.Sh Popova, O.	SHS Web of Conferences, 2021, Vol.101, p.3006
digital state	2020	Business model of regional institutional design of digital state entrepreneurship: management aspect	No	Golovina, A.N.; Levchenko, R.Y.. Contributor Tkachenko, I.	SHS Web of Conferences, 2020, Vol.89, p.7003
digital state	2020	Yellow Brick Road to Digital State	No	Osipov, V. S.	TSifrovoe pravo (Moscow, Russia), 2020-08, Vol.1 (2), p.28-40
digital state	2020	“Ask for More Time”: Big Data Chronopolitics in the Australian Welfare Bureaucracy	No	Whelan, Andrew	Critical sociology, 2020-09, Vol.46 (6), p.867-880, Article 0896920519866004
digital state	2021	Connecting the dots: Kerala’s use of digital technology during the COVID-19 response	Yes	Ummer, O.; Scott, K.; Mohan, D.; Chakraborty, A.; LeFevre, A. E.	BMJ global health, 2021-07, Vol.6 (Suppl 5), p.e005355, Article e005355
digital state	2007	Digital state at the leading edge	No	Homburg, V.	International Review of Administrative Sciences, 2007, Vol.73 (4), p.650-652
Digital state	2019	Hacking the Cis-tem: Transgender Citizens and the Early Digital State	No	Hicks, M.	IEEE annals of the history of computing, 2019, Vol.41 (1), p.20-33
digital state	2017	Transitioning From Paper to Digital: State Statutory and Regulatory Frameworks for Health Information Technology	No	Schmit, C.; Sunshine, G.; Pepin, D.; Ramanathan, T.; Menon, A.; Penn, M.	Public health reports (1974), 2017-09, Vol.132 (5), p.585-592

digital state	2022	A Post-Soviet Eco-Digital Nation? Metonymic Processes of Nation-Building and Estonia’s High-Tech Dreams in the 2010s	Yes	Annus, Et.	East European politics and societies, 2022-05, Vol.36 (2), p.399-422
digital state	2013	Digital State: The Story of Minnesota's Computing Industry	No	Misa, T.J.	
digital state	2018	Digital Constitution: Fundamental Rights and Freedoms of an Individual in a Totally Informational Society	No	Shakhrai, S. M.	Herald of the Russian Academy of Sciences, 2018-11, Vol.88 (6), p.441-447
digital state	2019	Digital Transformation in France: Legal Innovations	Yes	Talapina, E.	Law. Journal of the Higher School of Economics, 2019-12 (4), p.164-184
digital state	2007	Digital State at the Leading Edge	No	Roberge, I.	Canadian Journal of Political Science, 2007, Vol.40 (3), p.792-793
digital state	2022	Flight, freeze, fight	No	Zherebetska, Nastichka	Adweek (2003), 2022-04, Vol.63 (7), p.22-32
digital state	2023	Waterproofing statehood: strengthening claims for continued statehood for sinking states using "e-governance"	Yes	Gliboff, J.	Columbia law review, 2023-10, Vol.123 (6), p.1747-1793
digital state	2020	The Idea of the Digital State in the Face of the Russian Cultural Tradition of Understanding of Sense of the Government	Yes	Aleksandrov, V. B.	Upravlencheskoe konsul′tirovanie, 2020-03 (2), p.16-21
digital state	2021	Trust as a Factor in the Legitimization of the Law in the Digital State	no	Denisenko, V. V.	Teoretičeskaâ i prikladnaâ ûrisprudenciâ, 2021-10 (3), p.25-29
digital state	2010	Book Review: Sandford Borins, Kenneth Kernaghan, David Brown, Nick Bontis, Perri 6, and Fred Thompson Digital State at the Leading Edge Toronto,	no	Ho, Alfred Tat-Kei	The American Review of Public Administration, 2010, Vol.40 (4), p.482-485

digital state	2014	Live digital, remember digital: State of the art and research challenges	No	Díaz López, Daniel ; Dólera Tormo, Ginés ; Gómez Mármol, Félix ; Alcaraz Calero, Jose M. ; Martínez Pérez, Gregorio	Computers & electrical engineering, 2014-01, Vol.40 (1), p.109-120
digital state	2022	Building 100 percent digital state and local governments	No		The American city & county, 2022-10
digital state	2023	Digital ecosystem model of the agro-industrial complex	No	Korobeinikov, D. A.	Вестник университета, 2023-03, Vol.1 (1), p.83-91
digital state	2021	The Idea of Administrative Law and the Expansion of the Administrative State	No	Sossin, Lorne Miller, Gerald J. ; Lindquist, Evert A. ; Hildreth, W. Bartley	Handbook of Public Administration, 2021, p.40-54
digital state	2019	Theoretical, Institutional and Ethical Basis for Implementing Modern Industrial Policy. Part II	No	Romanova, Olga Aleksandrovna; Alena Olegovna Ponomareva	Ekonomika regiona, 2019-12, Vol.15 (4), p.1036-1049
digital state	2022	Internet voting in Estonia 2005–2019: Evidence from eleven elections	Yes	Ehin, Piret ; Solvak, Mihkel ; Willemson, Jan ; Vinkel, Priit	Government information quarterly, 2022-10, Vol.39 (4), p.101718, Article 101718

digital state	2020	Assessment of Russian citizens' attitude to the processes of public services digitalization	No	Kosarin,S. P.; I. V. Milkina	E-management (Moscow, Russia), 2020-02, Vol.2 (4), p.51-63
digital state	2021	Digital breakthrough: will public administration be smart enough in a digital state and how smart are the elite and citizens	No	Vasilenko, L. A.	Cifrovaâ sociologiâ, 2021-10, Vol.4 (3), p.6-15
digital state	2020	Public administration risks in the migration sphere in the context of digital transformation	Yes	Ledeneva, V. Yu.; A. Kh. Rakhmonov	Управление, 2020-12, Vol.8 (4), p.51-59
digital state	2021	Digitisation of Ukraine in Terms of Public Electronic Services' Distribution	Yes	Danyliuk, Mariia ; Marta Dmytryshyn ; Tetyana Goran	Naukovì gorizonti (Online), 2021-12, Vol.24 (7), p.90-99
digital state	2019	Public management and administration in the context of protecting its information space	No	Azarova A.O.; L.M. Tkachuk ; L.O. Nikiforova ; A.A. Shiyan ; O.M. Khoshaba	Вісник Житомирського державного технологічного університету: Серія: економіка, управління та адміністрування, 2019-06, Vol.2 (88), p.149-155
digital state	2022	Estonian e-residency and conceptions of platform-based state-individual relationship	Yes	Tammpuu, Piia ; Masso, Anu ; Ibrahimi, Mergime ; Abaku, Tam	Trames (Tallinn), 2022-01, Vol.26 (1), p.3-21
digital state	2016	Digital State: The Story of Minnesota's Computing Industry. By Thomas J. Misa	No	Saylor, Thomas	The Oral History Review, 2016-09, Vol.43 (2), p.479-480
digital state	2021	Succession of Digital Goods. A Comparative Legal Study	No	Fras, Mariusz	Review of European and Comparative Law (Online), 2021-01, Vol.47 (4), p.67-81
digital state	2010	Digital State at the Leading Edge	No	Ho, Alfred Tat-Kei	American Review of Public Administration, 2010, Vol.40 (4), p.482-485

digital state	2007	Digital state at the leading edge Seotud pealkirjad: The Institute of Public Administration of Canada series in public management and governance	No	Borins, Sandford F	Digital state at the leading edge, 2007, p.x-x
digital state	2007	Digital state at the leading edge. IPAC series on public management and governance	N/A	Roy, Jeffrey ; Perri Six ; Thompson, Fred	Canadian Public Administration, 2007-09, Vol.50 (3), p.450-453
digital state	2018	El registro civil e identificación en la región y el mundo "Civil registration and identification in the region and the world"	No	Ortega de la Torre, Felix	Revista de Derecho Electoral, 2018 (25), p.175-197
digital state	2020	Managing the Rise of the Digital State: Implementation of Digital Education by Local Government	No	Cahlikova, Tereza; Pirmin Bundi	Yearbook of Swiss administrative sciences, 2020-09, Vol.11 (1)
digital state	2020	What Drives Online Transparency Practices at the Local Level? Evidence from 2222 Municipalities in Switzerland	No	Mabillard, Vincent; Nicolas Keuffer	Yearbook of Swiss administrative sciences, 2020-10, Vol.11 (1)
Digital state	2013	Philadelphia Story: Wartime Origins of Minnesota Computing	No	Misa, Thomas J	Digital State, 2013, p.17
digital state	2013	St. Paul Start-up: Engineering Research Associates Builds a Pioneering Computer	No	Misa, Thomas J	Digital State, 2013, p.45
digital state	2013	Corporate Computing: Univac Creates a High-Tech Minnesota Industry	No	Misa, Thomas J	Digital State, 2013, p.71
digital state	2013	First Computer: Honeywell, Partnerships, and the Politics of Patents	No	Misa, Thomas J	Digital State, 2013, p.135
digital state	2013	Big Blue: Manufacturing and Innovation at IBM Rochester	No	Misa, Thomas J	Digital State, 2013, p.163
digital state	2013	High-Technology Innovation: Medical Devices and Beyond	No	Misa, Thomas J	Digital State, 2013, p.219

digital state	2013	APPENDIX: Employment in Minnesota Computing, 1980–2011	No	Misa, Thomas J	Digital State, 2013, p.233
digital state	2013	Innovation Machine: Control Data's Supercomputers, Services, and Social Vision	No	Misa, Thomas J	Digital State, 2013, p.99
digital state	2013	Introduction: minnesota goes high-tech	No	Misa, Thomas J	Digital State, 2013, p.1
digital state	2013	Industrial Dynamics: Minnesota Embraces the Information Economy	No	Misa, Thomas J	Digital State, 2013, p.189
Digital state	2012	Monitor 2011 – The Digital State of Affairs in Norwegian Schools	No	Egeberg, Gunstein ; Björk Gudmundsdottir, Greta ; Hatlevik, Ove Edvard ; Ottestad, Geir ; Skaug, Jørund Høie ; Tømte, Karoline	Nordic journal of digital literacy, 2012-03, Vol.7 (1), p.73-77
digital state	2023	China's digital transformation: Data-empowered state capitalism and social governmentality	No	Wang, Wayne Wei	The African journal of information and communication (Online), 2023-06, Vol.2023 (31), p.1-13
digital state	2007	Introduction	No	SANDFORD, BORINS	Digital State at the Leading Edge, 2007, p.3
digital state	2019	User-centered design as a practice for digital governments : A case study of the process of applying for a work permit at the Swedish Migration	No	Granlund, Isabelle	

digital state	2019	Evolution of institutions for new industrial policy implementation	Yes	Romanova O.A.	Управленец, 2019-07, Vol.10 (3), p.14-24
digital state	2019	Digital social networks in the focus of public governance	N/A-	Kamolov, Sergei ; Smagina, Aleksandra	Economic and Social Development: Book of Proceedings, 2019, p.640-645
digital state	2010	The Second Life of Institutions: Social Poetics in a Digital State	No	Malaby, Thomas M.	Anthropological quarterly, 2010-04, Vol.83 (2), p.355-371
digital state	2014	Getting the Aloha State up to speed	N/A	Farmer, Liz	Governing (Washington, D.C.), 2014-08, Vol.27 (11), p.11
Digital state	2020	Justice in the Digital State: Assessing the Next Revolution in Administrative Justice by joetomlinson	No	Adler, Michael	Journal of Law and Society, 2020-03, Vol.47 (1), p.170-174
digital state	2012	E-Government Lessons from South Africa 2001-2011: Institutions, State of Progress and Measurement	Yes	Fanie Cloete	The African journal of information and communication (Online), 2012-12 (12)
digital state	2021	Diia. Digital state' and E-Government Practices as Anti-Corruption Tools in Ukraine	Yes	Marysyuk, Kostyantyn B. ; Tomchuk, Inna O. ; Denysovskyi, Mykhailo D. ; Geletska, Iryna O. ; Khutornyi, Bohdan V.	WSEAS TRANSACTIONS ON ENVIRONMENT AND DEVELOPMENT, 2021-08, Vol.17, p.885-897
digital state	2021	Deliberative democracy in the time of crisis: participatory instruments at the local level and their limitations (some remarks)	No	Sokalska, Edyta	Journal of Modern Science, 2021-01, Vol.45 (2), p.153-168

digital state	2022	Analysis of Domestic and Foreign Experience in Project Management in the Implementation of the E-Government Concept.	No	Kulkaev Grigory Alexandrovich; Mozaleva Natalya Igorevna; Leontyev Dmitry Nikolaevich	
digital state	2023	Content and significance of the profession of IT lawyer	No	Ya. Mazur ; T. Mikhailina	Науковий вісник Ужгородського національного університету. Серія Право, 2023-06, Vol.1 (76)
Digital state	2023	The Future of the (Digital) State	Yes and no	Casini, Lorenzo	BioLaw Journal, 2023 (3), p.241-273
digital state	2023	Digital transformation challenges to the tax security of the state in russia and other brics countries	No	Ponomareva, Karina	BRICS law journal, 2023-01, Vol.10 (4), p.142-161
digital state	2023	E-democracy in the context of the information society: prospects, challenges and opportunities	Yes	Storozhenko, L., Ignatenko, O., Yaroshovets, T., Antypenko, I., & Vlasenko, V	
digital state	2007	Digital state at the leading edge	No	Borins, Sandford ; Kernaghan, Kenneth ; Brown, David ; Bontis, Nick ; 6, Perri ; Thompson,	Canadian public administration, 2007, Vol.50 (3), p.450-453

				Fred ; Roy, Jeffrey	
digital state	2023	Securing Digital Government: Towards Governance Mechanisms for E-state Resilience	Yes	Isabel Skierka-Canton	
digital state	2023	E-Government and Digital Divide: A Case Study of Azerbaijan's ICT Landscape	No	Lala Sadigova	
digital state	2023	Emerging cyber threats in Estonian public sector during and after COVID-19	No	Oliver Kristopher Ruut	
digital state	2022	How does the use of technology in innovative public services influence the way we relate to the world around us? A case study on the use of artificial intelligence in Labour Market services	No	Steffen Dean Turnbull	
digital state	2023	Digital transformation for implementing an e-cabinet: the case of djibouti	No	Stephen Damilola Bejide	
digital state	2018	E-residency as a nation branding case	No	Kimmo, Margarita ; Pappel, Ingrid ; Draheim, Dirk	ACM International Conference Proceeding Series, 2018, p.419-428
digital state	2019	Open government in new digital states: Which libraries for which citizens?	No	Peña-López, Ismael	BiD (Barcelona, Spain), 2019-12 (43)
digital state	2018	Data modelling to analyze how the cities in the volga region correspondent to the digital state format	Yes	Khaimovich, I. N. ; Ramzaev, V. M. ; Chumak, V. G.	CEUR Workshop Proceedings, 2018, Vol.2212, p.46-55
digital state	2020	Interview with Prime Minister Jüri Ratas of Estonia Rejali, Saman	N/A	Rejali, Saman	International review of the Red Cross (2005), 2020-04, Vol.102 (913), p.e1-e6, Article 181638312000034

digital state and e-state	2020	Estonian Way to the Digital State: Determinants of the Development of the Republic of Estonia.	No	SIERZPUTOWSKA, K.	
digital state and e-state	2020	Going paperless: main challenges in edrms implementation. Case of georgia	No	Teona Gelashvili	
digital state and virtual state	2006	Digital Era Governance (IT Corporations, the State and E-government)	Yes and no	Patrick Dunleavy, Helen Margetts, Simon Bastow and Jane Tinkle	
digital state is irrelevant in digital society	2019	Fundamental rights in the digital society - derechos fundamentales en la sociedad digital	No	Author(s): Germán M. Teruel Lozano	Source: Revista Chilena de Derecho , 2019 Enero - Abril, Vol. 46, No. 1 (2019 Enero - Abril), pp. 301-316
e-state	2006	Moving into the Digital Age: A Conceptual Model for a Publications Repository	N/A	Martin, Kristin E.	Internet reference services quarterly, 2006-09, Vol.11 (2), p.27-47
e-state	2007	Moving Beyond Politics as Usual?: Online Campaigning	No	Borins, Sandford ; Kernaghan, Kenneth ; Brown, David ; Bontis, Nick ; Thompson, Fred	Digital State at the Leading Edge, 2007, p.183

e-state	2020	Event-Centric Microservices for E-states. Related Titles: Lecture Notes in Computer Science	N/A	Tourgaidis, Dimitrios ; Karakasidis, Alexandros	EGOVIS, 2020, Vol.12394, p.78-88
e-state	2016	Estonian e-Residency: Benefits, Risk and Lessons Learned. Related Titles: Lecture Notes in Computer Science	N/A	Kotka, Taavi ; del Castillo, Carlos Ivan Vargas Alvarez ; Korjus, Kaspar	EGOVIS, 2016, Vol.9831, p.3-15
e-state	2019	Jätkusuutliku identiteedihalduse strateegia kavandamine kogemustega e-riigis. Designing an Effective Long-Term Identity Management Strategy for a Mature e-State	N/A	Lips, Silvia. Contributor Draheim, Dirk (supervisor). Pappel Ingrid (supervisor)	
e-state	2020	E-State: Realistic or Utopian?	Yes	Nnanyelugo McAnthony Aham-Anyanwu, Honglei Li	International Journal of Public Administration in the Digital Age · April 2017 4(2):56-76
e-state	2015	Privacy 2.0: Surveillance in the digital state	N/A	Cole, David	The Nation (New York, N.Y.), 2015-04, Vol.300 (14), p.218-221
e-state	2019	E-government Implementation in Spain, France and Russia: Efficiency and Trust Level	Yes	Boldyreva, E.P. ; Gorbunova, N.V. ; Grigoreva, T.Yu ; Ovchinnikova, E.V. ; Mantulenko, V.	SHS Web of Conferences 62, 11005 (2019) Problems of Enterprise Development: Theory and Practice 2018

e-state	2000	In the digital state, connections count	N/A	STONE, PETER H	National journal (1975), 2000-07, Vol.32 (27), p.2172
e-state	2012	E-government: E-state within a state	Yes	Khan, Hameed Ullah	Journal of Theoretical and Applied Information Technology, 2012, Vol.41 (2), p.207-213
e-state	2023	Exploring the links between democracy and digital transformation in developing Latin America countries: Building a democracy consolidation theory	Yes	Doina Stratu-Strelet a, Hermenegildo Gil-Gómez b, Raúl Oltra-Badenes c, Vicente Guerola-Navarro c	Technological Forecasting and Social Change Volume 195, October 2023, 122742
e-state	2022	COVID-19 pandemic as a trigger for the acceleration of the cybernetic revolution, transition from e-government to e-state, and change in social relations	Yes	Leonid Grinina, Anton Grininb, Andrey Korotayevc,*	
e-state	2016	Estonian e-Government Central Components Modernisation Study	Yes	Kärt Raidmaa	
e-state	2014	Paperless Management as a Foundation for the Application of e-Governance in Local Governments	Yes	Ingrid Pappel	
e-state	2017	E-Palestine: Digital State Empowerment as Grounded Development Opportunity. E-Palestiina: digitaalse riigi mõjuvõimu maandatud arengu võimalus	No	Maria Inês da Silva Boski	

e-state	2018	Challenges of implementing iranian eid in the public sector and citizens' awareness of it	No	Alireza Azari	
E-state	2022	Understanding the Complexity of the two Advanced E-Government Integration Models - Vertical versus Horizontal Integration	No	Emmanuel Isiedo Uwuchukwu	
e-state	2017	State integrated informatization program in poland: single-entrypoint portal and trans-boundary concept	No	Iaroslav Denysenko	
e-state	2016	Improving Knowledge Transfer Processes of e-Governance Competence Example of Estonia	No	Kedi Välba	
e-state	2016	Trust towards services of e-government	No	Mõtlik, Anna	
e-state	2015	E-Residency – Attracting Foreign Entrepreneurs to Open Businesses in Estonia	No	Terje Tampere	
e-state	2023	Increasing the Use of ASAN Signature in the egovernment Services in Azerbaijan	Yes e-government =e-state	Urfan Mahyaddinova	
e-state	2019	The impact of digitalization of the economy on welfare in developed and developing countries	No	Zverevaa A. A., Belyaevab, Zh. S., Sohagb, K.	Regional Economics. - 2019. - T. 15, issue. 4. - pp. 1050-1062
e-state	2013	Behind the slogan of “e-State”: Digital stratification in Estonia	No	Contributor: Muschert, Glenn W. ; Ragnedda, Massimo	Is Part Of: The Digital Divide, p.213-226
e-state	2022	Transformacja Estonii po rozpadzie Związku Radzieckiego. Determinanty historyczne i analiza porównawcza skutków	No	Kaczmarek, Krzysztof	Acta politica polonica, 2022, Vol.54 (54), p.5-15

e-state	2021	Türkiye’de Kamu Yönetimi ve İşletme Eğitiminde Bilişim ve Diğer Teknolojiler: Literatür, Tarihsel Gelişim, Dersler ve Sorunlar	No	ÖZGÜR, Hüseyin ; ÇİÇEK, Saynur	Pamukkale Üniversitesi İşletme Araştırmaları Dergisi, 2021-06, Vol.8 (1), p.1-26
e-state	2010	Managing IT in Florida: Consequences and Aftermath of the Bush Era	No	Graham, Judith ; Kelly, Alison ; Shea, Christopher M ; Garson, G. David; Garson, G. David ; Shea, Christopher M	Handbook of Public Information Systems, 2010, p.167-186
e-state	2021	Improvising an E-state: The Struggle for Cash Transfer Digitalization in Mozambique	No	Castel-Branco, Ruth	Development and change, 2021-07, Vol.52 (4), p.756-779
e-state	2009	E-State Practices in Turkey: Evaluation of Governmental Web Sites	Yes	Turan, Feryal ; Bayram, Ozlem	Electronic journal of academic and special librarianship, 2009-07, Vol.10 (2)
e-state	1986	E-state structuralism: a theoretical method	Yes	Fararo, Thomas J. ; Skvoretz, John	American sociological review, 1986-10, Vol.51 (5), p.591-602
e-state	2011	Conception and activity directions for training and science centre supporting development of Estonian e-state technologies	No	Pappel, Ingrid ; Pappel, Ingmar ; Saarmann, Monika	ACM International Conference Proceeding Series, 2011, p.219-224

e-state	2019	Electronic Government and the Information Systems Perspective: 8th International Conference, EGOVIS 2019, Linz, Austria, August 26-29, 2019, Proceedings.	No	Kő, Andrea ; Francesconi, Enrico ; Anderst-Kotsis, Gabriele ; Tjoa, A. Min ; Khalil, Ismail; ő, Andrea ; Francesconi, Enrico ; Tjoa, A Min ; Anderst-Kotsis, Gabriele	
e-state	2017	Technological Capacity in the Public Sector: the Case of Estonia	No	Lember, V., Kattel, R., Tõnurist, P.	IIPP Working Paper Series, 2017-03.
e-state	2004	Measuring the performance of electronic government services	No	Steyaert, Joan C.	Information & management, 2004-01, Vol.41 (3), p.369-375
e-state	2023	Debating E-voting throughout Europe: constitutional structures, parties' concepts and Europeans' perceptions	No	Borucki, Isabelle ; Hartleb, Florian	Frontiers in political science, 2023-05, Vol.5, Article 982558
e-state	2015	Legal Impediments in the EU to New Technologies in the Example of E-Residency	No	Tanel, Kerikmäe ; Sandra, Särav	Baltic journal of law & politics, 2015-12, Vol.8 (2), p.71-90
e-state	2020	Role of e-states in providing of informational security	Yes-overview of definitions	Ibrahimova, Aytakin	Law Review of Kyiv University of Law, 2020-04 (1), p.401-406
e-state	2020	The Blank Slate E-State:Estonian Information Society and the Politics of Novelty in the 1990s	No	Velmet, Aro	

e-state	2012	Behind the curtains of e-state: Determinants of online sexual harassment among Estonian children	No	Soo, Kadri ; Ainsaar, Mare ; Kalmus, Veronika	Studies of transition states and societies, 2012-11, Vol.4 (2), p.35-48
e-state and electortonic state	2021	E-state building: legal approaches	Yes, but not as a whole.	Markulynets, A. A.	Науковий вісник Ужгородського національного університету. Серія Право, 2021-11, Vol.66, p.56-59
e-state; virtual state	2023	E-Estonia – A Digital Government in Digital Transformation	No	Pilleriin Lillemets	
virtual state	2008	Public Information Technology and E-Governance: Managing the Virtual State	No	Pandey, Sanjay K.	Public Management Review: SYMPOSIUM: PUBLIC SERVICES INNOVATION, Guest Editor: Victor Bekkers, 2008-01, Vol.10 (1), p.151-153
virtual state	2020	Virtual state-making	No	Author: Dean, Mitchell ; Villadsen, Kaspar	Is Part Of: State Phobia and Civil Society, 2020, p.105-120
virtual state	2012	Towards a smart State? Inter-agency collaboration, information integration, and beyond	N/A	Gil-Garcia, J. Ramon	Information polity, 2012-12, Vol.17 (3-4), p.269-280
virtual state	2013	Electronic Regimes: Democracy and Geopolitical Strategies in Digital Networks	N/A	Santaniello, Mauro ; Amoretti, Francesco	Policy and internet, 2013-12, Vol.5 (4), p.370-386
virtual state	2006	The Semantic Web and Networked Governance: Promise and Challenges. Related Titles: Lecture Notes in Computer Science	Yes	Fountain, Jane E.	International Semantic Web Conference, 2006, Vol.4273, p.997-998

virtual state	2002	Building the Virtual State: Information Technology and Institutional Change	N/A	Hoetker, Glenn	Academy of Management review, 2002, Vol.27 (4), p.619-622
virtual state	2002	International security and the virtual state: states and firms in world politics	Yes	Rosecrance, Richard	Review of international studies, 2002-07, Vol.28 (3), p.443-455
virtual state	2016	Future Studies of Virtual State Formation in Iran and Its Effect on the Promotion of Global Peace Index (the Outlook of 1404)	Yes	Sajjadi, Mandana	Journal of politics and law (Toronto), 2016-03, Vol.9 (2), p.200
virtual state	2016	Polity Instability Model Featuring Reconstruction after State Failure	No	Contributor Voinea, Camelia Florela	Political Attitudes, 2016, p.263-267
virtual state	2011	Nsk	Yes and no	Monroe, Alexei	Radical history review, 2011-01, Vol.2011 (109), p.162-171
virtual state	2001	Building the virtual state: Information technology and institutional change	Yes	Fountain, Jane E.	
virtual state	2003	Building the virtual state: Information technology and institutional change	N/A	Bennett, CJ	Governance, 2003, Vol.16 (3), p.459-462
virtual state	2001	The virtual state: transforming american government?	Yes	Fountain, Jane E.	National civic review, 2001-09, Vol.90 (3), p.241-252
virtual state	2003	Building the Virtual State: Information Technology and Institutional Change	N/A	Feldman, Maryann	Journal of Policy Analysis and Management, 2003, Vol.22 (2), p.324-326
virtual state	2016	Mediated public diplomacy of the Islamic state in Iraq and Syria: The synergistic use of terrorism, social media and branding	Yes	Melki, Jad ; Jabado, May	Media and communication (Lisboa), 2016-04, Vol.4 (2A), p.92-103
virtual state	2023	Virtual state, where are you? A literature review, framework and agenda for failed digital transformation	No	Kempeneer, Shirley ; Heylen, F.	Big data & society, 2023-01, Vol.10 (1), p.205395172311605, Article 20539517231160528

virtual state	2018	‘Welcome to the virtual state’: Estonian e-residency and the digitalised state as a commodity	N/A	Tammpuu, Piia ; Masso, Anu Contributor Bolin, Göran ; Miazhevich, Galina	European journal of cultural studies, 2018-10, Vol.21 (5), p.543-560
virtual state	2009	Paradise lost?	N/A	Gaia, Vince	New scientist (1971), 2009-05, Vol.202 (2707), p.37
virtual state	2000	From `Real' to `Virtual' States?: Integration of the World Economy and its Effects on Government Activity	N/A	Bernauer, T.; Achini, C.	European journal of international relations, 2000-06, Vol.6 (2), p.223-276
virtual state	2003	Building the virtual state: Information technology and institutional change	N/A	Bretschneider, S	Public Administration Review, 2003, Vol.63 (6), p.738-741
virtual state	2000	The Rise of the Virtual State: Wealth and Power in the Coming Century	No	Russett, Bruce	Political Science Quarterly, 2000, Vol.115 (2), p.300-302
virtual state	1996	The Rise of the Virtual State	Yes	Rosecrance, Richard	Foreign Affairs, 1996-07, Vol.75 (4), p.45-61
virtual state	2004	Building the virtual state - Book Review	Yes and no	Fountain, Jane E.	IEEE Technology & Society Magazine, 2004, Vol.23 (4), p.65-66
virtual state	2002	Building the virtual state: Information technology and institutional change	N/A	Dawes, SS	Journal of public administration research and theory, 2002, Vol.12 (4), p.627-631
virtual state	2010	Trajectories of Education in the Arab World: Legacies and Challenges. Related Titles: Routledge Advances in Middle East and Islamic Studies	No	Osama Abi-Mershed; Contributor Abi-Mershed, Osama	
virtual state	2007	Public information technology and e-governance: Managing the virtual state	No	Rocheleau, Bruce	Public administration review, 2007, Vol.67 (3), p.584-588

virtual state	2002	Politics, governance and technology: A postmodern narrative on the virtual state (Virtuele Staat, Politiek, Bestuur, Technologie)	Yes	Stevens, C	Public Administration, 2002, Vol.80 (1), p.223-224
virtual state	2003	Post-logo: works cited	No	Bellamy, Craig	M/C journal, 2003-06, Vol.6 (3)
virtual state	2000	Culture and the Other on the Internet	No	Everard, Jerry	VIRTUAL STATES, 2000, p.75-86
virtual state	2000	Hungry, thirsty and wired	No	Everard, Jerry	VIRTUAL STATES, 2000, p.45-61
virtual state	2009	Trajectories of Education in the Arab World	No	Brewer Dominic J. ; Charles A. Goldman	
virtual state	2000	Virtual states	No	Everard, Jerry	
virtual state	1998	Science, technology and the state in Singapore: An overview, evaluation and comparison	N/A	Low, Linda	Journal of the Asia Pacific economy, 1998-01, Vol.3 (2), p.183-206
virtual state	2003	Neoinstitutionalism and E-government: Beyond Jane Fountain : Jane Fountain's building the virtual state	No	YANG, Kaifeng	Social science computer review, 2003, Vol.21 (4), p.432-442
virtual state	2003	Bringing e-democracy back in: Why it matters for future research on e-governance : Jane Fountain's building the virtual state	Yes	CHADWICK, Andrew	Social science computer review, 2003, Vol.21 (4), p.443-455
virtual state	2003	The need for government-wide information capacity : Jane Fountain's building the virtual state	N/A	MULLEN, Patrick R	Social science computer review, 2003, Vol.21 (4), p.456-463
virtual state	2003	Shadow theories in Fountain's theory of technology enactment : Jane Fountain's building the virtual state	N/A	GRAFTON, Carl	Social science computer review, 2003, Vol.21 (4), p.411-416
virtual state	2003	Technological teleology and the theory of technology enactment: The case of the International	N/A	GARSON, G. DAVID	Social science computer review, 2003, Vol.21 (4), p.425-431

		Trade Data System : Jane Fountain's building the virtual state			
virtual state	2006	Securing the Virtual State: Recent Developments in Privacy and Security	No	Garson, G. David	Social science computer review, 2006-11, Vol.24 (4), p.489-496
virtual state	2005	Moving towards the virtual state: integrating services and service channels for citizen-centred delivery	N/A	Kernaghan, Kenneth	International review of administrative sciences, 2005-03, Vol.71 (1), p.119-131
virtual state	2003	Building the Virtual State... Or Not?: A Critical Appraisal	N/A	Norris, Donald F.	Social science computer review, 2003-11, Vol.21 (4), p.417-424
virtual state	2003	Symposium on the Theory of Technology Enactment in Jane Fountain's (2001)Building the Virtual State: An Introduction	N/A	Garson, G. David	Social science computer review, 2003-11, Vol.21 (4), p.409-410
virtual state	2009	Power Points: The Virtual State and Its Discontents	N/A	Losh, Elizabeth	Virtualpolitik, 2009
virtual state	2003	Debate about the virtual state	No	Thibault, JF	
virtual state	2000	Virtual states: the Internet and the boundaries of the nation-state	Yes	Everard, Jerry	
virtual state	2004	Continuation of symposium on Jane Fountain's building the virtual state: Innovation in innovation? The technology enactment framework	N/A	Danziger, J N	Social science computer review, 2004-04, Vol.22 (1), p.100-110
virtual state	2022	Implementing central bank digital currency (cbdc) into the national monetary system: the case of estonia	Yes	Moor, Kristel	

virtual state and micron ation	2020	Virtual State: Scoping Review of Russian Political and Social Sciences	Yes	Osipov, Victor A.	Vestnik Rossijskogo universiteta družby narodov. Seriâ: Gosudarstvennoe i municipal′noe upravlenie (Online), 2020-12, Vol.7 (4), p.371-378

Table 8 Sources publisher per year per Country/ region

Country		1986	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Country
N/A	30	1	1		1		1	1		1	1	1		1			1		2					3	7	2	2	4	N/A
South Africa	2																1										1		South Africa
Africa	2																				1							1	Africa
Cameron	1				1																								Cameron
Mozambique	1																									1			Mozambique
Turkey	2													1												1			Turkey
Arab states	1													1															Arab states
Iran	2																				1		1						Iran
Iraq	1																				1								Iraq
Middle- East	1														1														Middle- East
Palestine	1																					1							Palestine
Kingdom of Saudi Arabia	1																1												Kingdom of Saudi Arabia
Australia	6				4								1												1				Australia
Maldives	1													1															Maldives
China	3																	1										2	China
Singapore	1			1																									Singapore
Hong Kong	1						1																						Hong Kong
India	2																									2			India
Russia	19																						2	3	6	4	1	3	Russia
Kazakhstan	1																							1					Kazakhstan
Azerbaijan	2																											2	Azerbaijan
Tajikistan	1																							1					Tajikistan
Canada	20							1				16			2											1			Canada
USA	50				2	2	4	12	4		3	2			3			11	1	2	1	1			2				USA
Chile	1																							1					Chile
Latin- America	2																						1					1	Latin- America
Mexico	1																										1		Mexico
Colombia	1																									1			Colombia
Denmark	2																							1		1			Denmark
Estonia	27															1		1	1	2	4	1	3	1	2		7	4	Estonia
Europe	1																									1			Europe
France	1																							1					France
Norway	1																1												Norway
Poland	2																					1				1			Poland
Slovenia	1															1													Slovenia
Spain	2																							2					Spain
Sweden	1																							1					Sweden
Switzerland	1																								1				Switzerland
UK	8											1												6	1				UK
Ukraine	7																							2		3	1	1	Ukraine
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