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TECHNOLOGICAL DIPLOMACY AND THE INTERNATIONAL POSITIONING OF SMALL STATES: THE CASE OF DENMARK

E. S. Leonov

MGIMO University,
76 Prospekt Vernadskogo, Moscow, 119454, Russia

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This article examines Denmark's digital development trajectory and the strategic role of technological diplomacy in elevating 'small states' on the global stage, with Denmark as a prime case study. The introduction of technological diplomacy into Danish foreign policy documents is contextualised against the backdrop of accelerating political and economic digitalisation, alongside the transformative impact of cutting-edge technologies — including big data analytics, artificial intelligence, and neural networks — on the global economy and international relations. Denmark pioneered the appointment of a Technology Ambassador, the world's first, to bolster the country's presence at key multilateral tech fora, draw investment, and pave the way for Danish firms in global markets. The country also led in crafting an industry-specific methodological framework by embedding technology agendas into core foreign policy strategies. Denmark's digital leadership stems from historical foundations, seamless integration of digital tools into domestic governance and economy via phased, comprehensive sector reforms (notably e-government), widespread upskilling in digital competencies, and robust network infrastructure development. The nation now stands poised for the next leap — 'smart government' — fueled by AI, metaverses, blockchain, and VR across public administration and business.

Keywords:
technological diplomacy, technological ambassador, e-government, smart government, information technology, artificial intelligence, metaverses, Denmark

Introduction

Accelerating technological change and the need for state institutions to adapt to new economic realities have contributed to the emergence of technology diplomacy (tech diplomacy or Techplomacy) as an established phenomenon in international relations. The relevance of this concept is driven by the influence

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of artificial intelligence (AI) technologies, neural networks, and various big data analysis algorithms on the global economy and international political processes; the establishment of social networks and other digital resources as primary communication channels; the emergence of cryptocurrency as an important element of the global financial architecture; major investments in the metaverse market for building virtual trading platforms and the gaming industry; as well as the emergence of new cybersecurity risks.

A new paradigm of public-private interaction in the international sphere is taking shape against the backdrop of the growing importance of private actors in international relations as key drivers of innovation. The market capitalisation of IT companies often exceeds the GDP of individual countries, placing them among the top 50 global entities by economic size.[1] For example, Apple's market value, which surpassed the $3 trillion mark in 2023, exceeds the GDP of all but six of the largest economies in the world[2], necessitating changes in approaches to assessing the global balance of power. Private actors are accumulating not only economic but also political resources[3], which has highlighted the need for structural changes and institutional transformations in state-business interaction [1].

Integrating the technology agenda into the foreign policy track opens a window of opportunity for so-called *small states*, strengthens their role in the new global technological order, and contributes to the formation of polycentrism in international relations. Rapid societal digitalisation offers them a unique opportunity to both contribute to and benefit from the changing landscape and global technological competition.

The purpose of this article is to examine the origins of the concept of technology diplomacy using the example of a pioneer on this track — Denmark — as well as to analyse the initiatives of the Danish government regarding the digitalisation of domestic political and socio-economic processes in the country, which laid the technological foundation for its leadership. The author sets research tasks to analyse the specifics of the Danish model of technology diplomacy, study the historical cause-and-effect relationships within Denmark's digital transformation, assess the current state of digitalisation of Denmark's public sector and business, review promising initiatives for integrating advanced technologies, and identify risks of slowing down Denmark's digitalisation.

[1] Chowdhary, M., Diasso, S. 2022, Taxing Big Tech: Policy options for developing countries, *State of Big Tech*, URL: https://projects.itforchange.net/state-of-big-tech/taxing-big-tech-policy-options-for-developing-countries/ (accessed 01.06.2025).

[2] Sinha, V. 2023, Apple's market cap is now higher than France, Italy's economy; might soon beat India's GDP, *Hindustan Times*, URL: https://www.hindustantimes.com/business/apples-marketcap-is-now-higher-than-france-italys-economy-might-soon-beat-indias-gdp-101702743469102.html (accessed 01.06.2025).

[3] Bank, M., Duffy, F., Leyendecker, V., Silva, M. 2021, The lobby network — Big Tech's web of influence in the EU, *Corporate Europe Observatory*, URL: https://corporateeurope.org/en/2021/08/ lobby-network-big-techs-web-influence-eu (accessed 01.06.2025).

The methodology includes methods of systematic description, historical-chronological analysis, and the case-study principle. Additionally, a comparative analysis of Denmark with another 'small state' (Sweden) is conducted to highlight the specifics of the Danish model of technology diplomacy and to lend greater objectivity to the work.

The relevance of the study stems from the currently limited body of scientific research on Denmark's technological development. Most of it is devoted to analysing individual industries, sectors, and clusters, which does not contribute to a systemic understanding of cause-and-effect relationships, patterns, and the chronology of development. In particular, a number of works form a highly fragmented theoretical base for Denmark's innovative development: they are devoted mainly to digital transformation in municipal governance, digitalisation of the entrepreneurial sector, building e-government, technology integration in medicine, and the introduction of AI in Denmark's defence sector. Besides contributing to a comprehensive vision of technological evolution problems, the work can fill research gaps regarding the introduction of AI, metaverse, and blockchain technologies by Denmark's public sector and business, which seems extremely relevant in the context of a number of countries transitioning to the stage of establishing 'smart governments'. Finally, there is a significant research gap regarding Russian authors' examination of the concept of "technology diplomacy" and its role in the development of 'small states', given the changing global balance of power in international relations. This work aims to help fill this gap.

Denmark as a flagship of the new diplomacy format

The first example of technology diplomacy was Denmark's appointment in 2017 of a Tech Ambassador to the San Francisco Bay Area, home to Silicon Valley, one of the world's most advanced innovation ecosystems and a global centre for major technology companies.

At the initial stage, the Danish Ambassador's mandate included establishing cooperation with technology companies in the Bay Area to attract investment to the Danish economy and facilitate the international expansion of Danish firms, as well as engaging with international organisations and government bodies on a range of global technological issues and challenges. This initiative subsequently triggered a wave of similar appointments by other countries, which recognised the potential of this instrument for adapting foreign policy institutions to contemporary technological ecosystems. Today, approximately 20 countries have adopted the practice of appointing tech diplomats.[1]

Over time, the functionality of tech ambassadors has expanded; they now oversee issues ranging from developing a unified national technological position abroad to representing the state at key multilateral platforms and forming

[1] Australia, Austria, UK, Germany, Denmark, Israel, Kazakhstan, Canada, Lithuania, Malta, Netherlands, Portugal, Slovenia, Finland, France, Czech Republic, Switzerland, Estonia, Japan, etc.

alliances and partnerships. The Danish Tech Ambassador's areas of competence include topics such as cybersecurity, combating disinformation, deepfakes, and terrorism on the Internet, digital taxation, online privacy protection, AI technology implementation, and data ethics, among others.[1] A separate block is related to regulatory activities. For example, one of the key tasks of the Danish Tech Ambassador is active participation in the process of institutionalising norms of international law within their competence. Legislative initiatives are a traditional tool for ensuring the integration of 'small states' into international economic and political structures [2].

Furthermore, due to increased operational load and responsibility, tech ambassadors today typically have permanent offices with supporting staff or other flexible forms of representation (e. g., teams consisting of narrow specialists to solve specific tasks). Denmark, which places special emphasis on technology diplomacy in its foreign economic activities, operates several permanent offices (in San Francisco and Copenhagen).[2]

Unlike the area of responsibility of traditional diplomatic representation, the tech ambassador's area of responsibility extends beyond national borders and regions (including consular districts). While maintaining a nominal physical presence in Silicon Valley and Copenhagen, the Danish Tech Ambassador is endowed with a global mandate to represent Denmark's interests at international platforms and fora. This approach seems most optimal for small states as it avoids maintaining a large staff in foreign missions of various levels and purposes (embassies, consulates general, trade missions, etc.).

Another important innovation of the instrument of appointing tech ambassadors as a marker of the global digitalisation of international relations (digital international relations) [3] has been the democratisation of diplomatic protocol, requiring the development of new competencies and skills when interacting with the technology business.[3] Former Danish Tech Ambassador Casper Klynge noted this development, humorously sketching a modern portrait of a diplomat that does not necessarily involve wearing a suit and tie.[4] This same approach is manifested in building modern forms of communication, such as social networks and video hosting sites, to convey non-clichéd information to target audiences.

The skills and competencies of a tech ambassador are directly related to experience in business, government, or academic environments with a special focus on technology. Depending on the state's tasks, a candidate with the necessary

[1] The TechPlomacy Approach, 2025, *Office of Denmark's Tech Ambassador*, URL: https:// techamb. um.dk/the-techplomacy-approach (accessed 01.06.2025).

[2] Ibid.

[3] Zonova, T.V. 2019, New in diplomacy: from "Twiplomacy" to "TechPlomacy", *Russian International Affairs Council*, URL: https://russiancouncil.ru/analytics-and-comments/ analytics/novoe-v-diplomatii-ot-tviplomasi-k-tekhplomasi/ (accessed 01.06.2025).

[4] Office of Denmark's Tech Ambassador, 2025, *Facebook (Meta activity is recognized as extremist and banned in the Russian Federation)*, URL: https://www.facebook.com/ DKTechAmb/ (дата обращения: 01.06.2025).

background is selected. In the Danish case, the current Tech Ambassador, Mette Mølgaard, worked at the World Economic Forum in Geneva (2017—2020) before her appointment, where she oversaw the mobilisation of technology companies, governments, and civil society to jointly remove barriers hindering the responsible scaling of new technologies to solve society's biggest problems.[1]

To build a comprehensive technological ecosystem, Denmark became one of the first countries to develop a corresponding methodological framework for the sector by integrating tech diplomacy into its foreign policy strategy documents. At the initial stages, the model of 'stitching' new provisions into an existing, time-tested legislative framework appeared to the Danish Government to be a more flexible and less resource-intensive approach than developing a separate standalone document. The goals and objectives of the TechPlomacy initiative were first included in Denmark's Foreign and Security Policy Strategy for 2017—2018, which specifically notes that the government makes digitalisation and technological development a strategic priority of Denmark's foreign policy. TechPlomacy aims to strengthen the 'Danish voice' in the international technology environment and establish partnerships between Danish and international actors. The document also promoted the thesis of the need for closer international cooperation in regulating the development and use of new technologies[2]. Denmark's visionary proposal for developing a legal framework in the IT field has been implemented at the EU level since 2024.

In 2021, a separate Danish tech diplomacy strategy was developed (Strategy for Denmark's Tech Diplomacy 2021—2023), calling on Denmark to take a leading role in shaping global technology governance by promoting three principles: responsibility, democracy, and security. The strategy expresses scepticism about the situation where technologies are a central component of struggle and strategic competition between state actors (e. g., the US and China), as well as a weapon of authoritarian regimes for digital surveillance, control, oppression, and censorship. The strategy promotes Denmark's readiness to act as a 'saviour' of democratic principles through its leadership in the technology sector.[3]

A clear distinction should be made between the functions and tasks of the Tech Ambassador (and his/her offices) and the Innovation Centre of Denmark, of which there are 7 as of 2025 (Munich, Bangalore, Shanghai, Seoul, Tel Aviv, Silicon Valley, and Boston). The innovation centres, operating under the umbrella of the Ministry of Foreign Affairs and the Ministry of Higher Education and Science of Denmark, provide advisory functions, working pragmatically 'in the

[1] Meet the Ambassador, 2025, *Tech Ambassador*, URL: https://techamb.um.dk/team/meet-the-ambassador (accessed 01.06.2025).

[2] Udenrigs- og sikkerhedspolitisk strategi for 2017—2018, 2018, *Regeringen*, URL: https://regeringen.dk/aktuelt/tidligere-publikationer/udenrigs-og-sikkerhedspolitisk-strategi-for-2017-2018/ (accessed 01.06.2025).

[3] Strategy for Denmark's tech diplomacy 2021—2023, 2023, *Ministry of foreign affairs of Denmark*, URL: https://techamb.um.dk/impact/tech-diplomatic-results (accessed 01.06.2025).

field' with Danish startups, small and medium-sized enterprises, corporations, research centres, and other intermediary organisations, providing them access to relevant knowledge centres through their branches. The Tech Ambassador, as an autonomous unit, performs broader intermediary activities in terms of advocating values, representing Denmark's interests in the global technology industry, and influencing international technology policy.

Although strictly speaking, Denmark's innovation centres are not an integral part of Danish technology diplomacy, broadly speaking, they play a significant role in strengthening the country's technological authority internationally and allowing it to remain at the forefront of development.

To identify the specifics of the Danish model of technology diplomacy, it seems appropriate to conduct a comparative analysis with another "small" country also ranking high globally in digitalisation leadership (Sweden). Unlike Denmark, where the Tech Ambassador acts as an independent structure, in Sweden, the corresponding function is performed by the Ambassador for International Cyber and Digital Affairs[1] within the Security Department of the Swedish Ministry for Foreign Affairs. The agency's website specifically notes that the Ambassador contributes to Sweden's policy development on cyber issues exclusively in close cooperation with responsible groups in other government agencies. This is because digitalisation in Sweden falls under the shared responsibility of various departments. Furthermore, unlike his Danish counterpart, the Swedish Ambassador for International Cyber and Digital Affairs does not have overseas offices, which limits his ability to work 'in the field'. Thus, it can be argued that the Danish government not only pays significant attention to digitalisation issues (as in the Swedish case) but defines technologies as a cross-cutting priority of its foreign and security policy, endowing the Tech Ambassador with a wide range of powers and instruments.

Sweden's Foreign and Security Policy Strategy regarding cyber and digital issues sets more modest goals (compared to Denmark). It concerns enhancing the country's security and prosperity while considering a consolidated position with EU and NATO partners. Nevertheless, the strategic documents of both countries note the importance of strengthening international role and influence through the competitive advantages of technologies developed by local companies. Thus, despite differences in approaches and instruments for implementing technology diplomacy, both Denmark and Sweden view their digitalisation achievements as a unique factor for positioning small states on the international stage.

Historical prerequisites for Denmark's digital transformation

It seems inappropriate to consider Denmark's technology diplomacy without analysing the conditions for the development of the country's innovative leadership, which allowed it to demonstrate its ambitions to participate in

[1] The position was established in 2023.

the international technology agenda. Denmark's right to be called one of the pioneers in technological and information development is explained by historical prerequisites and a phased, comprehensive reform of the sector initiated as early as the 1990s. A supporting factor was the already existing centralised database of Danish residents (the CPR register or personal identification number), created in 1968 [4]. In line with trends observed in several industrialised countries, large centralised government databases and archives using mainframes[1] replaced punch cards[2] in Denmark during the 1960s and 1970s [5]. Furthermore, during the 1950s—1970s, the first steps were taken towards the implementation of standardised, centralised systems in Denmark's public administration, particularly in the areas of wages and taxation. It was the effective digitalisation of data and systematisation of information that became a condition for Denmark's subsequent recognition as the most digital economy and society in the EU.

Another important historical factor of Danish leadership was economic clustering, a unified approach to which was developed in Denmark as early as the late 1980s — early 1990s. At this stage, promising network structures in the country were identified, as well as mechanisms for generating and transferring knowledge and technology at both national and regional levels. By 1992, Denmark was ranked among the world leaders in economic clustering [6]. According to several researchers, clustering represents a successful concept demonstrating its practical effectiveness, including in matters of innovation policy [7].

Since the 1980s, Denmark has also paid attention to electronic commerce — in particular, recommendations were developed to enter the top five countries in this field — and to the introduction of electronic payments via the Dankort product (a universal debit card used by the vast majority of services for the adult population).

At later stages, the methodological gap regarding clearly formulated goals, objectives, and directions for digitalisation was filled. Starting with the Info-Society 2000 initiative (adopted in 1994), which outlined the initial vision of the Danish information society, the process of implementing Denmark's digital strategies began (1994—2000, 2001—2004, 2004—2006, 2007—2010, etc.). Of particular note is the report "Digital Denmark: Conversion to the Network Society" (1999), prepared by the Ministry of Research and Information Technology, which timely and accurately described for the first time the goals of forming the world's first digital government, as well as the digitalisation of the state system and civil society as a whole. The document outlined the development directions for the Danish public sector for the next 20 years and the creation of a full-fledged network society, embodying a departure from autonomous

[1] A mainframe is a powerful, fault-tolerant computer designed to process huge volumes of data and solve critical tasks for large organizations.

[2] A punch card is an information carrier made of thin cardboard, on which data is represented in the form of holes arranged in specific positions.

information systems. Specifically, it was planned that no later than 2003, the Danish public administration should provide the best and most efficient public services in Northern Europe through digital administration.

The theoretical basis was promptly supported by practical steps: by 2001, Denmark had become one of the first EU countries to start implementing an "e-government" project aimed at delivering public services electronically [8]. By 2010, Denmark had developed a range of public digital portals providing reliable, verified information, transactional services, and access to personal data, including healthcare (Sundhed.dk), taxation (Skat.dk), business services (Virk.dk), and citizen services (Borger.dk).[1]

Furthermore, the foundations of a new image of cultural, educational, research, and other forms of diplomacy were being laid, expressed in democratizing citizen access to them by supporting events with interactive Internet services. This initiative aimed to create a single portal serving as a unified entry point for Denmark's citizens, designed to facilitate political debate, public consultations, and the dissemination of information to the population.

A crucial direction that laid the foundation for Denmark's modern technological profile was business support [9]. The government encouraged the introduction of new business models adapted to digital technologies [10] and provided a wide range of support for small and medium-sized businesses to prepare them for digital transformation. Gradually, an effective system for financing digitalisation projects was formed through a combination of government support instruments (budgetary financing, tax deductions) and attracting private investment. Additionally, administrative barriers were minimised, and the business registration process was simplified [11]. For instance, between 2001 and 2010, the level of administrative barriers was reduced by nearly 25 %. From a foreign policy perspective, Denmark's IT policy documents and reports from the late 1990s and early 2000s reflected the political reality of small states due to their limited power element in foreign policy and the need to replace it with "soft" instruments. In particular, they consistently contain calls to be "first," a "pioneer," or "one of the best" (Danish: "foregangsland"), reflecting Denmark's aspirations to be a participant in the "global race" and increased international competition for leadership in the innovative sector as an alternative to being outside the decision-making framework in the military-political dimension. To some extent, this paradigm resembles the actions of the German government after the collapse of the bipolar system of international relations to position itself as a 'humanitarian power'. In the Danish case, digital technologies became a competitive advantage and a niche strategy for entering the international arena. Denmark's ambitions

[1] Nielsen, M., Dhaou, B. 2023, Case studies on digital transformation of social security administration and services: Case study Denmark, *UNU Collections*, URL: http://collections.unu.edu/eserv/UNU:9179/case-study-digital-transformation-SSAS-DENMARK.pdf (accessed 01.06.2025).

were regularly manifested in its readiness to actively participate in international forums on digitalisation at platforms such as the UN, ITU, UNESCO, OECD, G20, and others.

Current state of digitalisation of Denmark's public Sector and business

According to most ranking methodologies, Denmark demonstrates leadership in the implementation of online services at all levels of government and data infrastructure projects [12]. For instance, Denmark ranks second after South Korea in the list of countries with the highest level of digital government and public sector, according to the OECD Digital Government Index 2023.[1] The pinnacle of the Danish government's achievements was also the UN's recognition in 2024, for the fourth consecutive time, of Denmark's digital public sector as the best in the world.[2] This indicator has important political significance, as the digital transformation of public administration is currently a global trend.

Furthermore, Denmark ranked third in the IMD World Digital Competitiveness Ranking 2024, which demonstrates the country's ability to adapt to digital changes (development of new technologies and infrastructure, training of a skilled workforce, degree of IT integration in various economic sectors, existence of a regulatory framework, etc.).[3] The index indicates that Denmark offers an environment in which companies can operate efficiently and scale rapidly, thereby strengthening the government's negotiating position in technology diplomacy. Notably, Denmark outperformed leading global economies such as the United States, China, Germany, and Japan in the ranking, several of which are actively competing for global technological leadership.

Another important indicator until 2022 was the Digital Economy and Society Index (DESI), which has been incorporated into the State of the Digital Decade Reports since 2023. This index tracked the digital performance and competitiveness of European Union member states across four dimensions: human capital, connectivity, integration of digital technology, and digital public services. Traditionally, Denmark ranked among the top three performers, with its main competition typically coming from other Nordic countries, namely Sweden and Finland [13].

[1] Denmark has the second most digital public sector globally, 2025, *Ministry of foreign affairs of Denmark*, URL: https://investindk.com/insights/denmark-has-the-second-most-digital-public-sector-globally (accessed 01.06.2025).

[2] Denmark Tops UN E-Government Survey, 2025, *The Agency for Digital Government*, URL: https://en.digst.dk/news/news-archive/2024/oktober/denmark-tops-un-e-government-survey/ (accessed 01.06.2025).

[3] The 2024 IMD World Digital Competitiveness Ranking (WDCR), 2025, IMD, URL: https://www.imd.org/centers/wcc/world-competitiveness-center/rankings/world-digital-competitiveness-ranking/ (accessed 01.06.2025).

The individuality of Denmark's digital profile is manifested in the successful creation of a model with a single point of access to all government services and the obligation for all citizens to use the digital channel to access public services. Denmark was one of the first in the world to complete the stage of a full transition from providing services through disparate local government websites to a single circuit for citizen engagement within so-called participatory platforms, i. e., internet applications linking citizens and decision-makers [14].

Among the digital solutions that have become hallmarks of Denmark's digital infrastructure is MitID, a digital identification system covering 96.6 % of the Danish population over the age of 15. It enables residents and businesses to authenticate themselves electronically across public and private digital services, sign documents, and access online banking, healthcare, taxation, and other digital platforms.[1]

Denmark's developed electronic identification infrastructure by the start of the COVID-19 pandemic allowed the country to become a leader in the speed of implementing passports (or other verification documents) for those vaccinated against coronavirus (COVID-19 Passport), which facilitated safe, free movement of citizens around the world. Furthermore, when announcing the next wave of vaccination registration, the Danish government avoided website crashes and other problems faced by the US, Asia, and Europe. The Danish authorities skillfully organised a virtual waiting room that guaranteed citizens fair and equal access to services. This, in turn, provided Denmark with significant competitive advantages within the framework of so-called vaccine diplomacy.[2] Denmark's 2022 National Strategy for Digitalisation specifically notes the key merit of the country's digital services in their ability to cope with serious crises like COVID-19.[3]

In the fight against the coronavirus, Denmark demonstrated a more advanced level of technological readiness, for example, in comparison with Germany, which implemented mobile tracking applications for quarantine monitoring and epidemiological surveillance at a later stage, partly due to limited prior experience, the absence of a systematic approach, and heightened privacy concerns [15].

Another major initiative, covering 94 % of the population of Denmark, is Digital Post, a core component of the country's cross-governmental digital service infrastructure that enables public authorities to communicate securely with citizens and businesses in digital form. Messages delivered through Digital Post have mandatory legal force in Denmark and include, for example, hospital

[1] Get started with MitID, 2025, *MitID*, URL: https://www.mitid.dk/en-gb/get-started-with-mitid/ (accessed 01.06.2025).

[2] How Denmark became a global leader in digital government, 2025, *Queue-it*, URL: https://queueit.com/blog/government-digital-transformation-denmark/ (accessed 01.06.2025).

[3] National Strategy for Digitalisation, 2025, *Ministry of Finance*, URL: https://en.digst.dk/media/mndfou2j/national-strategy-for-digitalisation-together-in-the-digital-development.pdf (accessed 01.06.2025).

communications, information on student grants, updates on housing benefits, daycare placement notifications, and correspondence from the Central Customs and Tax Administration (SKAT).[1]

During the COVID-19 pandemic, Digital Post was effectively used by the Danish government to announce updated rules and restrictions, inform citizens about payments, vaccines, and public health policies.[2]

Also noteworthy is the banking solution NemKonto, an account that citizens of Denmark aged over 18 and businesses are required to register with the government. This system significantly reduces administrative costs by standardising recipient account details and centralising the disbursement of public payments, including unemployment benefits, grants, and tax-related payments.

Furthermore, there are many other applications and platforms (including cross-platform) that collectively form Denmark's unique technological profile (e. g., Borger.dk — a unified centre for public services; the Danish Driving Licence App — digital driver's license;[2] the Danish Health Insurance Card App — a digital version of the plastic health insurance card;[4] the Single Digital Gateway Regulation (SDGR) — online access to information, administrative procedures, and assistance services for EU residents and businesses;[5] and others). Most of these services are overseen by the Danish Agency for Digital Government.

A significant boon for business is the Danish Government's support for an open database of potential business partners — this greatly facilitates the interaction mechanism between the private sector [16].

According to the Danish government, the multi-layered digitalisation system, stitching through the entire state administration system, business, and civil society, saves €296 million per year and reduces data processing time by 30 %, rightfully earning it the title of one of the most efficient in the world.[6]

The Danish government's digital approaches with a planning horizon until 2026 are concentrated in Denmark's 2022 National Strategy for Digitalisation, presenting 9 directions: strengthening cyber and information security; providing seamless and user-friendly digital services connecting the public and private sectors; automating digital tools to increase public sector efficiency; stimulating economic growth by supporting small and medium-sized enterprises (SMEs)

[1] Digital Post, 2025, The Agency for Digital Government, URL: https://en.digst.dk/systems/digital-post/ (accessed 01.06.2025).

[2] How Denmark became a global leader in digital government, 2025, *Queue-it*, URL: https://queueit.com/blog/government-digital-transformation-denmark (accessed 01.06.2025).

[2] Driving Licence App, 2025, *The Agency for Digital Government*, URL: https://en.digst.dk/systems/driving-licence-app/ (accessed 01.06.2025).

[4] Health Insurance Card App, 2025, *The Agency for Digital Government*, URL: https://en.digst.dk/systems/health-insurance-card-app/ (accessed 01.06.2025).

[5] Single Digital Gateway Regulation, 2025, *The Agency for Digital Government*, URL: https://en.digst.dk/systems/single-digital-gateway-regulation/ (accessed 01.06.2025).

[6] Denmark is at the top in several studies when it comes to digitization, 2025, *eBoks*, URL: https://blog.e-boks.com/denmark-is-at-the-top-in-several-studies-when-it-comes-to-digitization (accessed 01.06.2025).

in their digital transformation; modernizing healthcare services with digital solutions; accelerating the green transition with digital solutions; promoting ethical principles for using digital technologies and data; positioning Denmark at the center of international digitalisation; and equipping citizens with the skills and competencies needed for the digital age.[1]

The final major component of the Strategy, namely the promotion of citizens' digital skills, should be regarded as foundational. The Danish breakthrough was made possible solely by instilling digital competencies in Danes, including improving computer literacy and equalising access to electronic services (in 2020, 71 % of Danes had digital skills, of which almost 50 % had skills above basic [17]), as well as organising regular professional development for public sector employees in using ICT.

In this paradigm, the education system, focused on increasing the number of students enrolled in STEM programmes (science, technology, engineering, and mathematics), occupies a special place. It provides Danish employers with personnel possessing the required digital skills. The list of priority training areas was formalised in 2018 by the relevant document — the Danish Technology Pact, which united the efforts of the government, private business, educational and research institutions, and NGOs.

Another important factor is network infrastructure and connection quality. Denmark is a global leader in citizen access to the Internet (about 95 % of households are connected to networks with very high capacity (VHCN)[2]). The country has one of the highest 5G mobile broadband coverage rates in Europe (98 % of settlements) [18]. High-speed internet is a fundamental condition for Copenhagen's annual inclusion in the top 10 smartest cities in the world, according to the Smart City Index.[3] In terms of connectivity quality, Denmark scored 100 out of a possible 100 points according to the Euler Hermes Digitalisation Index (EDI) from 2020 [19].

Artificial intelligence, metaverse, and blockchain technologies

The document "A Strategic Approach to Artificial Intelligence," published by the Danish Ministry of Digital Government in 2025, clearly defines two priority goals: Danish companies must be competitive in the global market, and Denmark's public sector must become a world leader in the use of AI.[4]

[1] National Strategy for Digitalisation, 2025, *Ministry of Finance*, URL: https://en.digst.dk/media/mndfou2j/national-strategy-for-digitalisation-together-in-the-digital-development.pdf (accessed 01.06.2025).

[2] Denmark Country Commercial Guide, 2025, *Official Website of the International Trade Administration*, URL: https://www.trade.gov/country-commercial-guides/denmark-digital-economy (accessed 01.06.2025).

[3] Smart City Index, 2025, *IMD*, URL: https://www.imd.org/smart-city-observatory/home/rankings/ (accessed 01.06.2025).

[4] Strategic Approach to Artificial Intelligence, 2025, *The Ministry of Digital Affairs*, URL: https://www.english.digmin.dk/Media/638719220318136690/Stategic%20Approach%20to%20Artificial%20Intelligence.pdf (accessed 01.06.2025).

Analysis of statistical indicators and specific projects demonstrates that Denmark is successfully moving towards achieving these targets. According to the "Digital Development in Denmark 2025" report, 28 % of Danish companies used AI for various purposes in 2024, exactly twice the European average (14 %). According to Eurostat, Denmark tops the first cluster of countries (leaders) based on AI usage percentage values. A trend is noted of a widening gap between AI adoption leaders and countries with low AI adoption, which only strengthens Denmark's role in the international innovation dimension [20].

Although in most cases this involves products from foreign developers, Denmark is actively pursuing its own projects for technological autonomy and competitiveness in the global economy. For example, in 2024, the Danish Centre for AI Innovation, in collaboration with the Novo Nordisk Foundation and NVIDIA, announced an AI supercomputer named Gefion, opening new possibilities in quantum computing, clean energy, and biotechnology. This is an example of a successful public-private partnership. In practical terms, at the first stage, AI should support Danish pharmaceutical companies (e. g., Novo Nordisk) and 'green' projects in accelerating innovation and, consequently, increasing the competitiveness of Danish products on the global market. Later, it is planned to provide Gefion's advanced capabilities to a wider audience of enterprises and public institutions.[1] This event received significant media support as Denmark entered the elite club of countries participating in developing an intelligent system based on its own territory and for the benefit of its own business. Furthermore, Denmark is a co-owner of the LUMI (Large Unified Modern Infrastructure) supercomputer in Finland [21].

Developing its own supercomputers is part of the Danish programme to ensure digital sovereignty in the face of geopolitical turbulence and the unpredictability of some partners (primarily the US).[2] The formation of national infrastructure reflects the ambition of a 'small country' to enter the select community of great powers with a full spectrum of digital sovereignty (currently the US, China, and Russia).

There is great potential for integrating AI into Danish smart city initiatives to enhance sustainability, efficiency, and the quality of life for citizens. As noted earlier, Denmark positions itself as an industry leader: Copenhagen traditionally ranks among the most developed smart cities globally. Against the backdrop of risks such as a shortage of qualified personnel and intensifying international competition for AI resources, the Danish government promotes the principle of joint efforts to create common AI standards, invest in education and training,

[1] Denmark's first AI supercomputer is now operational, 2025, *Novo Nordisk Foundation*, URL: https://novonordiskfonden.dk/en/news/denmarks-first-ai-supercomputer-is-now-operational/ (accessed 01.06.2025).

[2] Ministerial Visit to SDU Highlights Digital Sovereignty and Danish Cloud Infrastructure, 2025, *University of Southern Denmark*, URL: https://www.sdu.dk/en/om-sdu/institutter-centre/imada_matematik_og_datalogi/nyt_fra_imada/digitaliseringsminister (accessed 20.12.2025).

and align AI strategies with international partners [22]. A number of Western academic schools call this approach "Smart City Diplomacy," and it seems to be considered an integral part of the broader concept of technology diplomacy. Building international connections between smart cities is another effort by the Danish government to establish itself as a global player in the technology field.

In the area of public service, Denmark continues to implement successive reforms. At present, it is at the stage of piloting and testing experimental initiatives aimed at integrating AI-based chatbots of various formats, including applications for social security benefits and the provision of consultations on government-related matters. There are also projects involving the deployment of service robots to perform tasks within local government authorities. In addition, the public sector employs supervised machine learning and robotic process automation. To accelerate the adoption of artificial intelligence in the public sector, the government, in cooperation with Danish local authorities and regions, established the Digital Taskforce for Artificial Intelligence. Furthermore, Denmark is gradually moving towards the most advanced technological stage of the present era by exploring the integration of the metaverse for organising interactions between citizens and public employees in virtual environments.

These transformational processes indicate an emerging transition of Denmark's public administration system and society from e-government towards the concept of "S-Government" (Smart Government), which implies the use of innovative technologies to better understand citizens' needs and expectations (communities, voters, etc.), accurately assess situations, and respond in a timely and effective manner. The only factor posing a conditional barrier to Denmark's full transition to S-Government is the absence of a national super-application, analogous to the Chinese messenger WeChat or the Russian MAX [23].

The use of AI and VR technologies is also being recorded in individual sectors of Denmark's socio-economic life, with fragmented scientific publications by Danish authors on integration experiences (e. g., in healthcare — a VR project for treating social anxiety disorder, the use of AI in screening examinations, and emergency phone calls to patients [24]).

Beyond the civilian sector, AI technologies are considered promising by the Danish government for the defence and security sector, allowing the country to strengthen its role internationally (including as a NATO member) due to its limited power capabilities. Broadly, the main goal is the significant technological acceleration of the Danish Armed Forces so they remain an important and relevant partner for allies, as outlined in the report "Danish Security and Defence towards 2035". In more detail, the main challenge is the transition from the unsystematic collection of large volumes of raw data using radars and sensors, which the Danish Armed Forces are already actively doing, to the integration of a full-fledged AI system as part of developing a more powerful digital backbone for processing growing volumes of information and sharing it across platforms, units, and domains [25].

Achieving these goals will require significant work on formulating a strategic vision (formulating a Danish strategy for defence AI); more precisely defining AI both operationally and in terms of support functions; testing, training, and evaluating AI performance; and training future defence AI specialists. In the latter case, changes to existing programmes and the development of new ones within Danish military education are needed [25]. Even today, Denmark is experiencing a shortage of technical translators and data science experts to develop comprehensive digital thinking in the industry [26].

The presence of a developed digital infrastructure and high internet penetration, which determines digital literacy and receptiveness to innovation, attracts significant investment (including external — especially from the US) into the Danish metaverse and cryptocurrency market. The industry's volume is expected to reach $2 billion by 2030 (as of 2025, it was $382 million). Danish companies demonstrate particular openness to integrating metaverse technologies with various goals (e. g., creating virtual trading platforms, immersive educational environments, and interactive entertainment platforms).[1] The distinctive face of the Danish metaverse market is shaped by the country's thriving gaming industry, which requires the ability to adapt to constantly changing customer preferences, such as for immersive digital experiences (including AR/VR). Finally, several research centres specialising in the metaverse operate in the country: the University of Southern Denmark's SDU Metaverse Lab and the Technical University of Denmark (DTU).[2]

Denmark's metaverse market is closely linked to the accelerated implementation of blockchain technology, as the latter provides a decentralised infrastructure, security, and transparency for metaverse applications. Furthermore, via blockchain, the Danish government shows a keen interest in potentially building a virtual economy. This seems logical given the successful examples of other small states (e. g., Caribbean nations and Bermuda), gradually taking leadership in developing new digital diplomacy practices in the financial segment.

The Danish government realises that the above projects will not be able to demonstrate efficiency and scale to the level of national digital transformation without adequate access to the latest scientific knowledge and international experience. In this regard, an initiative is currently being developed to create an interdisciplinary centre for research and consultation on the use of AI in society — a single point of access to knowledge. It would bring together leading universities and research centres.

A serious obstacle on this path could be the trend emerging in Denmark in recent years of a sharp decline in the ability to attract and retain digital technology

[1] Metaverse — Denmark. Market Insights, 2025, *Statista*, URL: https://www.statista.com/outlook/amo/metaverse/denmark?currency=USD#revenueGrowth_399245 (accessed 01.06.2025).

[2] Explore the Metaverse in Denmark, 2025, *Ministry of Foreign Affairs of Denmark*, URL: https://investindk.com/set-up-a-business/metaverse (accessed 01.06.2025).

specialists. In turn, staff shortages play a decisive role in reducing the scale of innovation stimulation, which could negatively affect the competitiveness of Danish companies. For example, in 2023, about 2,400 IT specialists arrived in Denmark, and over 1,850 left the country (i.e., net inflow was only 550 people compared to 1,200 in 2022).[1] Thus, the groundwork made by the Danish government on the digitalisation track in previous years may not be sufficient to maintain innovative excellence and use it as a competitive advantage on the world stage. In the coming years, Denmark faces an urgent need to rethink approaches to shaping its attractiveness for global digital talent from around the world.

Conclusion

Denmark, having rapidly established a robust institutional and infrastructural foundation for state digitalisation, has secured a significant lead that will be challenging for competitors to match. Primarily, this concerns the deployment of basic infrastructure (digital identities, signatures, etc.), general infrastructure (national portals, communication platforms), the introduction of standardisation, and maintaining a high level of internet penetration among the population [27]. The commitment to short cycles for adopting updated digitalisation strategies (every four years) reflects Denmark's intention to maintain its leading global position. This ambition is further evidenced by its gradual transition towards the integration of AI, the metaverse, blockchain, and AR/VR technologies across both the civilian sector and the defence industry. The distinctiveness of the Danish case lies in its long-term, consistent, and systematic state policy of digital transformation, initiated as early as the 1960s.

These competitive advantages, in turn, predetermined Denmark's readiness to take responsibility for shaping global digitalisation standards, technology integration, and ensuring international information security, which today is increasingly encompassed by technology diplomacy. In practical terms, this is manifested in the appointment of a Tech Ambassador, the establishment of permanent offices supporting their activities, and the development of methodology (adjusting conceptual documents, developing an independent technology diplomacy strategy, etc.). Denmark became the first country in the world to define technology and digitalisation as a cross-cutting priority of its foreign and security policy. The Danish government views technologies as a conductor for strengthening international influence in the absence of a power element in foreign policy. In particular, Denmark is making efforts to ensure digital sovereignty, which would open the door for it to enter the elite club of countries possessing a full spectrum of national digital infrastructure.

[1] Denmark Faces Significant Decline in Ability to Attract and Retain Digital Talent, 2025, *Digital Hub Denmark*, URL: https://www.digitalhubdenmark.dk/post/denmark-faces-significant-decline-in-ability-to-attract-and-retain-digital-talent (accessed 20.12.2025).

At the same time, statistical data point to a concerning trend of IT specialist outflow from Denmark, which the government recognises as a potential threat to maintaining its competitive advantages on the international stage in the medium term.

References

1. Remili, K. D., Bouzourine, N., Hartani, R., Belouchrani, A. 2025, Tech diplomacy and Critical Technologies: Case of the LEO satellite internet, *Telecommunications Policy*, vol. 49, № 4, EDN: RHVVJA, https://doi.org/10.1016/j.telpol.2025.102947

2. Navasardyan, A. 2014, Features of the Diplomacy of Small Countries (Machiavellianism as a Prototype of the Diplomacy of Small States. The Correlation of the Diplomacy of Small States with Their Potential), *21st Century*, № 4, p. 5—11 (in Russ.).

3. Tsvetkova, N. A., Sytnik, A. N., Grishanina, T. A. 2022, Digital diplomacy and digital international relations: Challenges and new advantages, *Vestnik of Saint Petersburg University. International Relations*, vol. 15, № 2, p. 174—196, https://doi.org/10.21638/spbu06.2022.204

4. Barseghyan, A. 2022, Leading Countries in E-Government Development: What can We Learn From Them?, *Amberd bulletin*, № 5, p. 49—56, https://doi.org/10.52174/2579-2989_2022.5-49

5. Totonchi, A., Ahlan, A.R., Mohadis, H.M. 2025, E-Government Between Developed and Developing Countries: Key Perspectives from Denmark and Iraq, *Jurnal Ilmu Komputer dan Informasi*, vol. 18, № 1, p. 77—93, EDN: SKYXAA, https://jiki.cs.ui.ac.id/index.php/jiki/article/view/1316, https://doi.org/10.21609/jiki.v18i1.1316

6. Tischenko, A. N. 2010, Theory and practice of organizing clusters: international experience, *Problems of Economics (Kharkiv)*, № 2, c. 9—15, EDN: NTPTEC (in Russ.).

7. Trushkina, N., Shiposha, V. 2021, Clustering Of The National Economy As An Effective Tool For The Sustainable Development Of European Countries, *Three Seas Economic Journal*, № 2 (4), EDN: KVIOZF, https://doi.org/10.30525/2661-5150/2021-4-1

8. Falch, M., Henten, A. 2000, Digital Denmark: from information society to network society, *Telecommunications Policy*, vol. 24, № 5, EDN: DYUXQL, https://doi.org/10.1016/S0308-5961(00)00028-8

9. Kholodnaya, E. V. 2020, On the digital transformation of public administration in Denmark, *Bulletin of the Saratov State Military Academy*, № 4, p. 230—234, EDN: XBNRFQ, https://doi.org/10.24411/2227-7315-2020-10121

10. Grinderslev, O. J., Kramp, P. L., Kronborg, A. F., Pedersen, J. 2017, Financial cycles: what are they and what do they look like in Denmark?, *Danmarks Nationalbank, working paper*, № 117.

11. Telkhigova, M. Sh. 2011, Danish business structure features, *Transport business of Russia*, № 4, p. 36—38, EDN: QIPPRD

12. Andersen, K. N., Lee, J., Kim, S. 2024, MetaVerse+ in South Korea and Denmark: Snapshots from Two Leading Digital Nations, *Proceedings of the 25th Annual International Conference on Digital Government Research*, p. 827—831, https://doi.org/10.1145/3657054.3657149

13. Melnichuk, M. V. 2019, International experience in a digital economy development in the European Union countries, *Modern Science: Current Issues of Theory and Practice. Series: Economics and Law*, № 6, p. 97—103, EDN: XDDSSR (in Russ.).

14. Calista, D., Melitski, J. 2007, e-Government and E-governance: Converging Constructs of Public Sector Information and Communications Technologies, *Public Administration Quarterly*, vol. 31, № 1/2, p. 87—120.

15. Leonov, E. S. 2019, New trends in the development of digital diplomacy in the context of COVID-19, *International life*, № 1, p. 20—27, EDN: MOIUDW

16. Polyakova, O. E., Lavrova, E. V. 2024, Digital trasformation in state and municipal management: international experience, *Management Accounting*, № 9, p. 141—147 (in Russ.), EDN: QQPEAG

17. Kholodnaya, E. V. 2019, Digitalization in Denmark: the experience of a leader in implementing the "electronic government" project, in: *Problems and Challenges of the Digital Society: Trends in the Development of Legal Regulation of Digital Transformations. A Collection of Scientific Papers Based on the Proceedings of the First International Scientific and Practical Conference*, p. 165—167, EDN: AXKWLO

18. Anishchenko, A. I., Sokolovsky, V. S. 2024, Digital transformation of public administration in Denmark: success factors, *Electronic library of BSU*.

19. Tashenova, L., Mamrayeva, D., Kulzhambekova, B. 2024, Digital transformation of the economy: the experience of Estonia and Denmark, *Bulletin of the Kazakh University of Economics, Finance and International Trade*, № 3, p. 186—195 (in Russ.), EDN: JTKWZO, https://doi.org/10.52260/2304-7216.2024.3(56).20

20. Stan, M., Ciobotea, M., Voda, A. M., Badea, D. L. 2025, Artificial Intelligence Landscape in the European Union. A Comparative Study, *Proceedings of the International Conference on Business Excellence*, vol. 19, № 1, p. 3432—3445, EDN: BMNPDV, https://doi.org/10.2478/picbe-2025-0262

21. Frolov, A. V., Lysunets, M. V. 2022, Relevant aspects of the digital transformation of the economy of the european region, *Bulletin of the Moscow University Named S U Vitte Series 1 Economics and Management*, № 1, p. 61—71, https://doi.org/10.21777/2587-554x-2022-1-61-71

22. Okonta, E. D., Rahimian, F., Agu, N. L. 2025, Emerging Policies for Ethical and Effective AI Implementation in Smart Cities, *Lecture Notes in Civil Engineering*, № 591 LNCE, p. 702—712, https://doi.org/10.1007/978-981-96-4051-5_68

23. Lemke, F., Taveter, K., Erlenheim, R., Pappel, I., Draheim, D., Janssen, M. 2020, Stage Models for Moving from E-Government to Smart Government, in: Chugunov, A., Trutnev, D., Khodachek, I., Misnikov, Y. (eds.), *Electronic Governance and Open Society: Challenges in Eurasia — 6th International Conference*, p. 152—164, https://doi.org/10.1007/978-3-030-39296-3_12

24. Ørskov, P. T., Lichtenstein, M. B., Ernst, M. T., Fasterholdt, I., Matthiesen, A. F., Scirea, M., Bouchard, S., Andersen, T. E. 2022, Cognitive behavioral therapy with adaptive virtual reality exposure vs. cognitive behavioral therapy with in vivo exposure in the treatment of social anxiety disorder: A study protocol for a randomized controlled trial, *Frontiers in Psychiatry*, № 13, p. 1—12, EDN: LZZOCI, https://doi.org/10.3389/fpsyt.2022.991755

25. Graae, A. 2024, Servers Before Tanks? Defence AI in Denmark, *The Very Long Game*, p. 173—194, https://doi.org/10.1007/978-3-031-58649-1_8

26. Bollmann, A., Jacobsen, K. 2023, Militær dataoversættelse og digital transformation. Erfaringer fra Ukraine og fokusområder for det da nske forsvar. DJØF forlag and Center for Militære Studier, *Københavns Universitet*.

27. Nielsen, M. M., Jordanoski, Z. 2023, Digital Transformation, Governance, and Coordination in Times of Crisis: An Analysis of Australia, Denmark, and the Republic of Korea, *Digital Government: Research and Practicv*, vol. 4, № 4, p. 1—20, EDN: ATEYYQ, https://doi.org/10.1145/3604569

The author

Dr **Egor S. Leonov**, Associate Professor, Department of Diplomacy, MGIMO University, Russia.

https://orcid.org/0009-0008-5801-3070

E-mail: e.leonov@inno.mgimo.ru