

Executive summary

Artificial Intelligence (AI) is developing fast and the benefits of adopting AI are widely recognized. AI applications can contribute to better public services, e.g. by improving citizen-government interaction, enabling smarter analytical capabilities or improving efficiency across public-sector domains and supporting democratic processes. The use of AI systems can bring benefits across all key public-sector activities. Through early adoption of AI, the public sector can be the first mover in adopting AI that is secure, trustworthy and sustainable. Public procurement is one of the key measures that have a strong potential to facilitate AI adoption and help stimulate demand and offer trustworthy and secure AI technologies in Europe.

AI applications can contribute to better public services for example by improving citizen-government interaction, enabling smarter analytical capabilities, delivering shorter feedback loops or improving efficiency. However, the available evidence suggests that there is still considerable untapped potential for the uptake and public procurement of AI. Therefore, one of the focus areas for the European Commission is to develop and support European actions to accelerate the process of AI uptake and strategic, sustainable and ethical public procurement of AI systems by the public sector in the EU and thus maximise the impact and benefits of human-centric and trustworthy AI.

Against this background, DG CNECT commissioned a study on how best to support public procurement of AI systems in the European Union and help to transform public procurement processes themselves. The main purpose and objective of the commissioned study are to support the European Commission with evidence and operational recommendations on how public procurement of AI systems can be facilitated.

The study includes the State of play/scoping report (presented in chapter 1), the Assessment of the key sectors (presented in chapter 2), Consultation and assessment of the results of the consultation of stakeholders (presented in chapter 3) and the Assessment of policy options and recommendations (presented in chapter 4).

Chapter 1: State of play/ Scoping report

The study opens with a scoping section, which aims to identify the state of play on the uptake and public procurement of AI technologies by the public sector in the EU and to select four priority key sectors that are most ready for large-scale deployment of AI technologies. This is achieved by analysing available literature, evidence, and data and is presented through four main sections. The first section (State of play of the public procurement of AI) provides an overview of the political and legislative initiatives on AI at the European level as well as a focus on the AI strategies put in place at the national level throughout the EU. The second section (Challenges and benefits in public procurement of AI) identifies the main challenges and benefits faced by Member States' governments when considering the public procurement of AI technologies. The third section (Economic analysis) analyses the economic potential of further investments in AI based on existing quantitative data on public procurement, market trends and maturity of AI technologies. Finally, the selection of the four key sectors that are most ready for large-scale deployment of AI technologies is provided in the fourth and final section and is based on the information gathered and analysis conducted throughout the three other sections of the scoping activities.

More specifically, the final selection of the sectors is based on three research questions, further detailed in the methodological note, on identifying (1) the main gaps and obstacles that hinder public procurement and uptake of AI, as well as (2) the benefits and added value that can be generated by a wider uptake and procurement of AI systems in the EU and the main sectors/areas, and (3) AI technologies with high economic potential (e.g. technological readiness, high growth performance) where accelerated public procurement could bring the highest EU added value. The approach taken to tackle the research questions consists of four main steps. Firstly, providing a

state of play focused on public procurement by mapping and analysing, both qualitatively and quantitatively, national initiatives on AI. Secondly, conducting a challenges and benefits analysis in public procurement by analysing and mapping identified challenges and benefits for the public procurement of AI and complementing it with findings of the private sector. Thirdly, performing an economic analysis by quantitatively mapping current investments in AI projects and future national projections as well as analysing innovation indicators in selected economic sectors and market indicators of AI typologies. Lastly, selecting the four priority areas based on the above steps and triangulating the findings based on the specific criteria of identified trends in governmental initiatives, projects, and the market, maturity of AI technologies, and the economic potential of the sectors that will create European added value for the public procurement of AI.

The scoping concludes that the four key sectors that are most ready for the large-scale deployment of AI are: health, mobility, e-Government and education. This is based on the findings of the qualitative and quantitative analyses of governmental AI initiatives and the economic analysis. The former provides, on the one hand, an overview of governments' priority policy areas for the adoption of AI, and on the other hand, the current state of play of adopted AI policy areas and technologies. The economic analysis evaluates the digital maturity levels of sectors by looking at the following indicators: AI adoption levels, digital intensity, and R&D intensity of different sectors. Along the same line, the economic potential of AI technologies was also assessed based on four key indicators: market growth, adoption rates, labour productivity impact, and employment generation.

Chapter 2: Qualitative and quantitative analysis of key sectors

This chapter analyses the dynamics of the adoption and use of Artificial Intelligence (AI) in four key public sectors in the European Union: eGovernment, mobility, healthcare and education. Leading the way in terms of AI maturity, these central sectors are already undergoing significant change as a result of the introduction of this paradigm-changing technology. Using the insights from these policy areas, acquired through a multi-method research design, this chapter aims to increase the understanding of the uptake of AI by public organisations. This is paramount if the European Union is to reach its goal of becoming a global leader in the field of AI and other policy goals such as the twin-transition.

In eGovernment and general public services, AI's potential to considerably improve operational efficiency, and public services and allow more open government has seen many administrations begin to fund, develop and use AI solutions. In addition to a burgeoning GovTech space, chatbots and virtual assistants are now commonplace in many member states at both the national and regional levels. While much of the innovation thus far has focused mostly on upgrading established governmental practices, a continued investment could see AI radically redesign existing vertical and hierarchical-oriented administrative structures for the benefit of everyone. This is contingent on well-informed public sector actors with expertise in AI adoption and the mitigation of risks such as a lack of trust and understanding of the technology and its effects.

In the mobility and transport sector, one of the most profoundly affected by the COVID-19 pandemic, AI is perhaps the most pervasive in the public consciousness. AI has the potential to greatly increase efficiency and safety as well as transform everyday transportation with autonomous vehicles (AV) and smart traffic systems. The sector has a considerable political imperative for governments given the centrality of transport in everyday life and the fight against climate change but a lack of harmonized rules across Europe and siloed focus on data and regulation has meant that the majority of innovation and use of AI has taken place in the private sector. With a proven economic track record from the success of the AV market and the environmental benefits of improved transport systems and urban space, mobility will continue to be at the forefront of AI development provided concerns around safety remain central.

In the health sector, government-funded research of AI is still the dominant paradigm of public sector support although the use of AI solutions in healthcare system management and frontline applications is growing. AI has myriad potential uses in the health sector at every step in the value chain from R&D in the field of pharmaceuticals to managing hospitals and healthcare systems and delivering care to the patients themselves. Harnessing AI in health will assist governments in tackling the long-term structural problems of ageing populations and protect against rising costs, especially through automating administrative tasks, currently a common focus area for AI health policy. As with other sectors, effective implementation will increase the quality and accessibility of healthcare though it is vital to guarantee thorough security and protection of data and that the human side of the provision of healthcare is not lost.

Finally, in education, AI has emerged as both a subject of learning and an instrument to improve its delivery. AIEd and EdTech promise to transform education through student-facing AI, enhancing teaching and improving the operation of education systems. However, AI use cases in education are not yet widespread as a result of a lack of tried and tested solutions and reticence from educators to adopt the technology. Nevertheless, the current focus of most public policy throughout Europe focuses on educating citizens on the use and potential of AI. Not limited to technical higher education, the key link between employment and education has seen many governments invest in teaching programmes on AI from early years to adult learning.

Chapter 3: Consultation of stakeholders, analytical and comparative report

This chapter presents a comparative analysis of stakeholder consultations undertaken as part of this study. The consultations included four sectoral workshops, dedicated to exploring the challenges and measures in the uptake of AI by the public sector in the health, e-government, mobility/transport and education sectors, and an online survey, dedicated to assessing the challenges and recommendations in the uptake of AI in the public sector.

The stakeholder consultations undertaken as part of this study show that the main challenges in the uptake of AI centres on the procurement process, data, AI technology and organisation.

The most significant procurement process challenges are related to burdensome administrative requirements, lack of clarity from the public sector regarding their needs/demands, an emphasis on price/cost-savings over service quality and non-financial benefits, unclear regulatory requirements, and the complexity of writing technical specifications.

The most significant data challenges are related to unsatisfactory sharing of data across organisational boundaries, insufficient access to large volumes of high-quality data, lack of data to understand where AI is needed/ best suited, underdeveloped data governance, and lack of clear "data ownership/ data sovereignty".

The most significant AI technology challenges are lack of transparency in AI systems' decision support/making processes, difficulty to inspect and assess an AI solution before their actual deployment, the potential for biases/discrimination within the systems, difficulty in establishing liability and responsibility for the AI system, lack of limited regulatory spaces ("sandboxes") for experimenting with AI solutions and monitoring their impacts, and high requirements for the explainability of AI solutions.

The most significant organisational challenges are a lack of human resources for managing the system, lack of political support, lack of understanding of the capabilities/benefits of AI solutions, lack of human resources for procuring the system, system complexity and lack of single-entry point, and lack of system interoperability.

The comparative analysis shows that these challenges are not significantly different across the sectors. These challenges were raised and discussed by participants in all the

workshops, irrespective of the sector. In addition, the differences between the sectors in the online survey were minor and cannot be considered significant.

Chapter 4: Policy recommendations on the uptake of AI in the public sector

This chapter explores the recommendations to increase the uptake and public procurement of AI. It includes the results from the policy workshop dedicated to identifying and exploring policy solutions and recommendations for the uptake of AI in the public sector, and an online survey, dedicated to assessing recommendations for the uptake of AI in the public sector.

The chapter also provides a comparative assessment of the recommendations. It provides an assessment of the most important recommendations on a scale of low/medium/high based on the criteria of Effectiveness (the extent to which recommendations achieve their goals and the level of benefits they provide), Feasibility (the extent to which recommendations can be implemented and whether they have significant limits), Efficiency (the extent to which recommendations provide value for money and if they require significant resources), and EU added value (the extent to which recommendations provide benefits at a European level and the Single Market and which level of implementation, European or Member State, is the most appropriate, keeping in mind the principle of subsidiarity).

The chapter triangulates the recommendations from the policy workshop and the online survey to arrive at the combined ranking. The recommendations are:

1. Increase funding and resources for AI in the public sector.
2. Reduce bias within AI and data sources.
3. Encourage coordination of AI procurement strategies.
4. Increase clarity and harmonization around cross-border data flows.
5. Promote alignment between industry and public sector expectations.
6. Establish a clear AI regulatory framework.
7. Promote the integration of new AI technologies and services into existing systems in education, health and transport.
8. Promote interoperability, open data and data sharing.
9. Build trust in AI solutions through transparency and accountability.
10. Harmonize EU regulations to promote human-centric and trustworthy AI-enabled public services.
11. Focus on long-term implementation in the use of AI in the public sector.
12. Develop dedicated AI-enabled solutions based on co-creation approaches.
13. Create a European marketplace for GovTech solutions in support of public sector digital transformation.
14. Strengthen the role of the EU Artificial Intelligence Observatory.
15. Promote the development of sustainable AI.

The report concludes with a brief discussion of each recommendation, noting the current EU initiatives and the potential policy actions that the European Commission can take to address them.