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A BLUEPRINT FOR GREECE'S AI TRANSFORMATION

HIGH-LEVEL ADVISORY COMMITTEE ON ARTIFICIAL INTELLIGENCE

Credits

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Abbreviations

AI

Artificial Intelligence

HPC

High Performance Computing

EuroHPC

European High-Performance Computing

STEM

Science, Technology, Engineering, and Mathematics

NeurIPS 2019

(Conference on) Neural Information Processing Systems

MVA

Mathématiques, Vision, Apprentissage

CIFRE

Conventions Industrielles de Formation par la Recherche

LLMs

Large Language Models

ELLIS

European Laboratory for Learning and Intelligent Systems

EOSC

European Open Science Cloud

NOADs

National Open Access Desks

IT

Information Technology

HITL

Human In The Loop

NATO

North Atlantic Treaty Organization

KPIs

Key Performance Indicators

SMART

Specific, Measurable, Achievable, Relevant, and Time-bound

DSAR

Data Subject Access Requests

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01

1. Introduction

The field of Artificial Intelligence (AI) has recently seen breakthrough advances, enabling computational technology to engage with many kinds of information — from speech to images to natural language to molecular structures— at a capacity that would have seemed unlikely a couple of decades earlier. This progress suggests vast opportunities for transforming all aspects of human activity, with positive impacts on society and the economy in numerous ways.

In response to these new opportunities, a high-level AI planning committee has been established by the Prime Minister to outline a national AI strategy that will allow Greece to leverage this enormous potential to the benefit of the Greek nation, its people, economy, and global standing. This strategy is of existential importance to Greece. In the context of a globalized economy and a fast-moving technological frontier, now that our econ-

omy is on the rebound, it has become urgent for Greece to be well-positioned to make the most of the economic and other opportunities presented by the deployment and development of AI technology. It has become equally urgent to anticipate and mitigate the risks associated with the use of this technology, including exacerbating inequalities, social fractures, and the erosion of democracy.



This report was developed by leveraging this committee's own expertise and perspective as well as those of various stakeholders in Greece and abroad. It introduces the principles and methodologies that are the foundation of our AI strategy as well as half a dozen flagship programs which offer large transformational potential for Greece in the AI space (chapters 1 and 2). In the remaining chapters, we describe our systematic approach, considering four domains in which a coordinated strategy can catalyze Greece's AI transformation: in the domains of Innovation and Entrepreneurship (Chapter 3), Education and Research (Chapter 4), Regulatory Framework (Chapter 5), and AI applications in the Public Sector (Chapter 6).

AI is not a new scientific field. Its roots can be traced back to the 1940s, with many applications in domains as diverse as healthcare, industrial automation, defense, and more. It also plays an essential role in the Internet economy, driving important applications such as web search, online advertising, online recommendations, sharing economy applications, ranking of content in online social networks, etc. At its heart, AI can be viewed as a combination of optimization and statistics, but it draws on many other theoretical and applied fields, including game theory, probability theory, information theory, mathematical logic, theory of computation, control theory, robotics, and more. As such, AI is well-developed and has already found applications that have transformed our lives. Yet there is new excitement

about AI's capabilities. At the heart of this excitement is AI's recently acquired ability to understand the content of data modalities that had previously been challenging for algorithms to extract content from, including images, speech, text, and even molecular structures. The vast improvements in algorithms that understand the content of these types of challenging data has emerged through a confluence of factors, which include innovations in hardware (namely Graphical Processing Units), algorithmic models (namely deep learning architectures such as transformer neural networks), and optimization methods, as well as a significant increase in computational resources and an abundance of data in digital form that can be used as training material for AI algorithms.

The newfound ability of AI algorithms to access the content of

intricate types of data unlocks capabilities that, as noted, were not available to AI before. For example, a traditional AI system would take as input a patient's record comprising a well-structured list of relevant pieces of information such as the patient's age, weight, blood pressure, symptoms, history, etc., and would make a diagnosis, treatment recommendation, or outcome prediction. Unstructured pieces of information such as clinical notes, medical images, speech, video, and other relevant signals would have been difficult to include in the algorithm's prediction, unless they were pre-processed by humans or algorithms to extract simple informational content from them, e.g. extracting the heart rate and a few other numbers out of an electrocardiogram.

With the advent of new AI capabilities, unstructured signals can be directly included in raw form, and deeper informational content can be extracted from them by the AI model as it makes its predictions. As such new opportunities suggest themselves in application domains where rich data is available or can be collected in the form of text, images, videos, speech, or other unstructured signals. These include fields as varied as healthcare, climate mitigation and management, defense, education, culture, public service provision, and more, and can unlock benefits for citizens and small businesses in addition to larger enterprises. See, e.g., Chapter AI and the State of this report for a systematic discussion of opportunities that this committee has identified for the application of AI in the public sector.

While all technological revolutions introduce new capabilities or make improvements to existing ones, the AI revolution is perhaps unique in that it also targets tasks formerly regarded as distinctly human endeavors, e.g. artistic creation. As such, besides its vast technological and economic potential, AI has the potential to significantly reshape labor markets, educational systems, and social interactions, including the democratic process. We thus need to be prepared to harness the opportunities offered by this technology, while anticipating and mitigating the risks associated with its use. Indeed, we should develop principles and associated regulations to make decisions that appropriately trade the benefits from the use of AI with its potential risks. Finally, the AI frontier is moving incredibly fast in the context of a globalized digital and industrial landscape. This makes it even more urgent for various stakeholders to prepare for the AI transition. This includes regulators, national and transnational, defining frameworks for the development and the deployment of AI technology; high-tech industry players, engaging in a fierce competition around developing AI technology and consolidating computational power, research talent, data, and funding; the broader industry, identifying opportunities to innovate using this technology in conjunction with public and proprietary data and domain expertise; the academic and broader scientific community, solidifying the foundations of, pushing the frontiers of, and developing frameworks for the safe and ethical use of AI technology; the general public, shaping the debate around the

proper use and development of AI technology and educating themselves to be part of the AI future; and governments and nations, planning the transition to the AI era to the benefit of their citizens, societies, economies, and natural environments.

Greece is a relative latecomer to the AI space, dominated by other nations in terms of technological innovation and deployment, market share, and human capital development. We therefore need a customized strategy that would identify and exploit Greece's competitive advantage, allowing it to punch above its weight, a strategy with "leapfrogging potential." Such a strategy could include a forward-looking, adaptable and transparent regulatory framework that embraces innovation, a vigorous investment in human capital and ecosystem building that would turn Greece into an innovation nation, and the identification and stimulation of innovation activity around verticals where Greece is in a unique position or in high need for innovation such as culture, shipping, tourism, agriculture, energy, climate mitigation and adaptation, and defense.

1.1 Mission and Vision

Priority areas to be served by the proposed national strategy to the benefit of the Greek nation, its people, economy, and global standing include:

- preparing citizens for the AI transition: introducing AI and its associated disciplines, including topics on the ethical use of AI, to the educational curriculum, starting at the primary level; introducing reskilling and upskilling programs for the general population; improving AI literacy and spreading its empowerment opportunities across the Greek population; strengthening Greece's AI innovation potential;
- improving public service efficiency for Greek citizens and people living in Greece: organizing smart infrastructures and citizen-friendly government services at the national and local levels;
- safeguarding and enhancing democracy: defending democratic values, facilitating informed public participation in democratic processes, and protecting the public sphere from disinformation and misinformation;
- promoting the quality of health care for all: bolstering the national health system with the capacities to provide better quality, data driven, and targeted health care, including the prediction

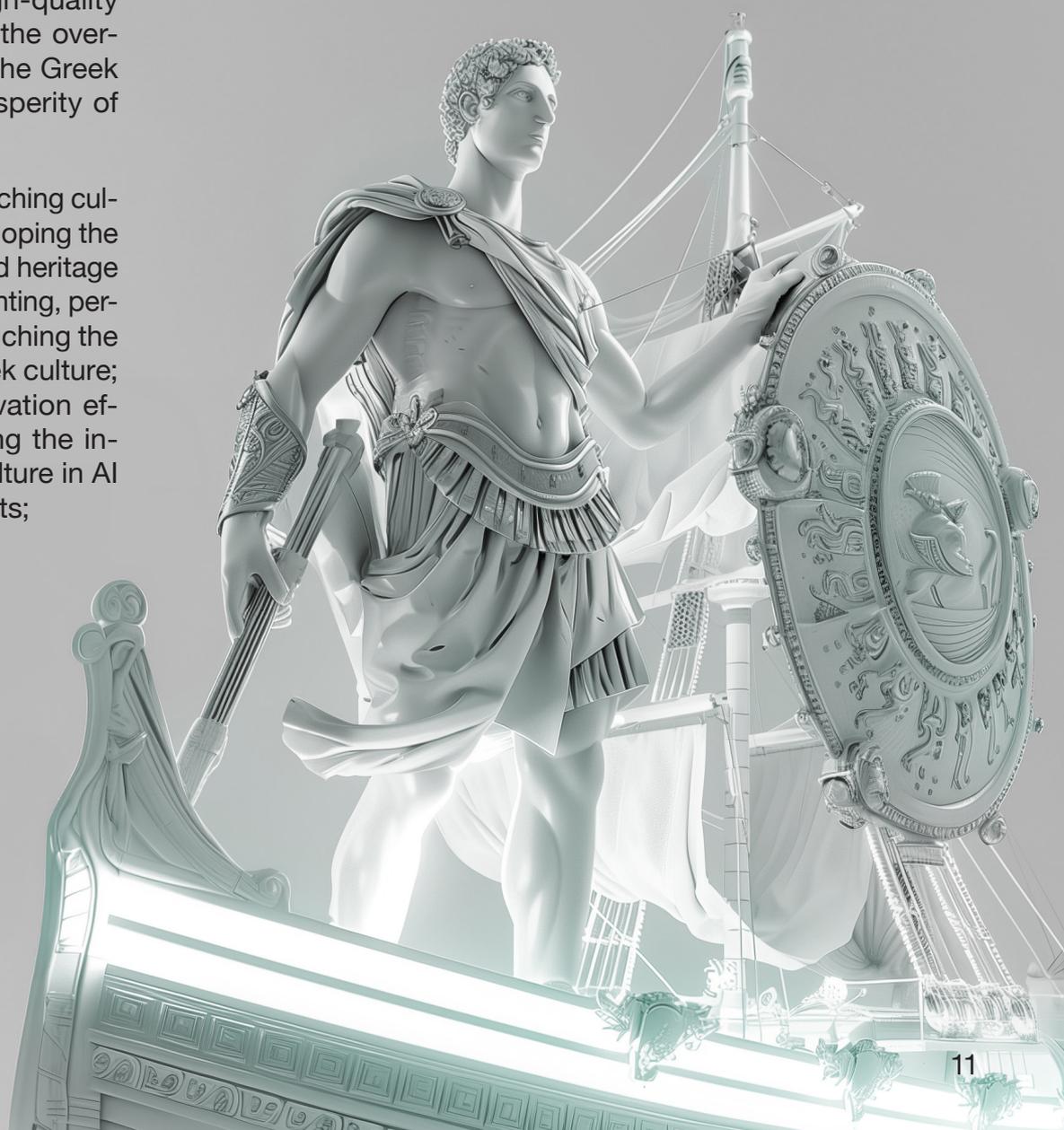
and management of chronic and rare diseases, while at the same time protecting the rights of patients;

- democratizing access to, and improving the quality of, education: enhancing the ability of children and young people to learn and develop new skills, improving opportunities available to children with learning disabilities and those from underprivileged backgrounds, and tailoring educational materials to individual interests and abilities of all students;
- turning Greece into an attractive global destination for AI and high-tech investment: developing the ecosystems that will create high-quality jobs and improve the overall productivity of the Greek economy and prosperity of the Greek people;
- preserving and enriching cultural heritage: developing the Greek language and heritage data space; augmenting, personalizing, and enriching the experience of Greek culture; enhancing preservation efforts and protecting the integrity of Greek culture in AI models and artifacts;

- climate mitigation and adaptation: equipping Greece with the capabilities to prepare for, prevent, mitigate, adapt to, and effectively manage the climate crisis and extreme natural disasters; harmonizing technological progress with environmental stewardship to diminish the ecological footprint of AI development and deployment;
- supporting national security: upgrading defense capabilities, including cyber-defense capabilities, and improved safeguarding of national borders.

ODYSSEUS

Travelling with warship



1.2 Guiding Principles

AI is at an explosive stage of growth, characterized by impressive technical capabilities that override long-held assumptions about technical barriers, and by new avenues for deploying this technology being vigorously explored. The AI field is far from set in stone; its capabilities are versatile and continuously evolving. In this context, a successful national AI strategy should be flexible and adaptable, grounded in principles and values that we want to promote. It is the view of this committee that the following principles should govern our national AI strategy:



ZEUS

God of thunder, king of the gods
on Mount Olympus

- **Respect for human dignity:** AI systems should be deployed in ways that respect the personal autonomy and fundamental rights of human beings, including personal freedom, equality, privacy, security, non-discrimination, and access to information. Measures should be taken to prevent AI systems from exploiting, degrading, or diminishing the self-determination of human beings.
- **Human Flourishing:** AI technology should enhance opportunities for individual human flourishing. That is, it should be recognized as a tool that assists and inspires people to lead better lives through the realization of their unique human capabilities, whether in the workplace, education, personal relations, the aesthetic domain, or in dealing with the state. AI technology should not be understood as a way to replace human endeavors for the sole purpose of reducing costs.
- **Pluralism:** Sound policy responses to the opportunities and challenges of AI must consider a diversity of normative considerations, such as human rights, economic prosperity, environmental protection, human safety, and national security, among others, and seek to resolve any potential friction among them. These normative considerations must also be grounded in diverse kinds of expertise, ranging from the scientific to the humanistic, especially given the need for relevant policies to be tailored to specific domains of application, e.g., health care, the judicial system, etc.
- **Participation:** Because AI technology will have a pervasive effect on all aspects of human life, it is vital that citizens have equal opportunities to participate in the AI society through access to relevant training, knowledge, technology, computational resources, datasets, etc. Such opportunities should exist in various domains, including basic AI-related research, the development of AI applications, and the use of AI in work and other contexts. It is also essential that the governance of AI should reflect the views of all stakeholders, including citizens. And although there is a risk that the misuse of AI technology can threaten democratic processes through misinformation, deep fakes, etc., it is also important to recognize the potential for AI tools to facilitate informed and engaged democratic deliberation and decision-making at scale.
- **Transparency:** Algorithms, data, and decision-making processes should be sufficiently accessible to stakeholders so that the operations of the AI systems are comprehensible, explicable, trustworthy, justifiable, and accountable. Transparency is vital for responsible decision making about the development and deployment of AI systems and the identification of risks and benefits that it requires.
- **Oversight:** Oversight mechanisms must be instituted to ensure that AI systems satisfy the values that must govern their operation, as mentioned above. Serious consideration must be given to tailoring appropriate forms of oversight, including human oversight, to the character of different AI systems and their domain of application, while weighing the distinctive risks and benefits associated with them.
- **Adaptability:** AI is a multifaceted and constantly evolving technology that demands a correspondingly nuanced and dynamic policy response, one that adapts to the new opportunities and challenges this technology presents over time, while respecting the need for a stable and predictable regulatory environment.
- **International multilateral cooperation:** Effective regulation of AI cannot be secured through any one state's efforts. It is thus important for the Greek State to participate in and contribute to international initiatives and learn from policy proposals pursued by other states, regional bodies, and international organizations. International collaboration within the European Union, the United Nations, and the Organization for Economic Cooperation and Development (OECD) is vitally important to ensure that AI is developed and deployed in ways that foster the common good of humanity as a whole.

1.3 Flagship Programs



The main body of this report provides the committee's detailed analysis and plan. We outline several domains where we have identified opportunities for applying AI to the benefit of Greece, including its citizens, economy, society, and the natural environment. We also propose a number of regulatory, infrastructural, educational, and investment innovations that would catalyze Greece's successful transition to the AI era.

However, in the context of a globalized technological, industrial, and economic landscape, and given Greece's present standing, it is our view that our country is in urgent need of implementing certain targeted and ambitious projects that would enable Greece to both join leading nations in AI and substantially benefit from its deployment. Recognizing that both are of existential importance to Greece, we recommend that the Greek

government rallies around the implementation of the flagship programs that are outlined below, and which are detailed in the main body of this report. These programs center around data, human capital development, ecosystem building, protecting and promoting Greek culture and heritage, and claiming a leadership role in identifying an appropriate framework for AI governance and ethics.

Flagship Program 1: Become a model nation in data collection and governance, AI readiness, and AI strategy.

The strongest present AI systems are developed by combining powerful computational infrastructure, algorithmic advances, and vast amounts of data. While AI systems with impressive horizontal capabilities are being developed by the top industry players, it is also recognized that domain-specific data can be utilized to customize these systems for increased performance in specific verticals, that is to increase their accuracy, insight and specialization in specific domains of interest, such as healthcare, culture, energy, the maritime industry, climate mitigation and management, defense, etc. Indeed, having access to proprietary data in a domain of interest can be used to derive a competitive advantage in that domain.

Within this context, we believe that Greece can increase its leapfrogging potential by becoming a model nation in how it approaches data collection, data governance, AI readiness, and AI strategy. For this purpose, we propose the creation of data governance and AI strategy coordination units within the Greek government. These entities would:

- catalog, consolidate and harmonize data assets across the public sector through a comprehensive mapping process;
- monitor, identify and prioritize high-value data capture opportunities;
- implement a transparent data governance policy, which respects privacy, copyright, and other regulation, as well as ethical principles, while at the same time fosters and facilitates access to the data;

- design AI-ready infrastructure and cultivate an AI-ready culture within the State;
- design safe AI experimentation spaces; and
- identify strategic priorities and synergies for AI efforts within the State.

By organizing and streamlining access to its data through a transparent data governance policy that promotes data accessibility, Greece can identify strategic opportunities for AI development and deployment, obtain a competitive advantage regionally and/or globally by leveraging high-quality data to train AI models, and attract AI talent, innovation, and investment around its data. Besides granting public access to datasets, as appropriate, this strategy would also promote open data policies, and the backing of open-source AI initiatives.

STRATEGIC OPPORTUNITIES FOR AI DEVELOPMENT

By promoting an AI-ready infrastructure and culture within the State, Greece can attract companies, researchers, and practitioners eager to experiment with and implement models in real-world settings, nurture a vibrant and cooperative atmosphere, and propel the progression of AI technologies in the region to the public's advantage. By establishing a regulatory environment that allows for the creation of AI regulatory sandboxes – i.e. controlled experimentation environments where innovative products and services can be developed and tested under regulatory supervision – and safe harbors – i.e. legal provisions that under specific conditions offer innovators protection from liability for testing AI systems in real-world settings – Greece can attract researchers and developers who are eager to push the frontier of AI technology while still maintaining oversight to ensure ethical and safety standards, and without introducing systemic risk.

Greece should take the lead in creating sandboxes and safe harbors around vertical industries where Greece has heightened needs or potential competitive advantages, e.g. maritime, climate, natural disasters and civil protection, green energy, migration and border control, and culture.

Flagship Program 2: Establish a world-class AI research and education institute.

Greece is in pressing need of the human capital that would allow the nation to leapfrog ahead in the development, deployment, and exporting of AI. Currently, Greece produces substantial scientific talent that is emigrating, especially after undergraduate studies, to pursue opportunities at universities and companies abroad. For Greece to be an equal partner in a globalized technological landscape, Greek talent should be offered opportunities for world-class innovation in the homeland. Meanwhile, for Greece to be a leading country in adopting and benefiting from AI, it needs to adapt its workforce to the new technology.

Within this context, we propose the establishment of an **AI Center of Excellence**, a new graduate school and research center, focusing on AI, which would pursue world-class research and provide world-class training.

The AI Center of Excellence would offer interdisciplinary, multi-disciplinary, and transdisciplinary programs, which would flexibly adapt to new developments. It would also house programs on AI ethics, philosophy, the social sciences, and executive education.

The Center could be established in collaboration with a renowned academic institution abroad, or, at any rate, aim to be a world-class institution. It would leverage the significant number of scientists in relevant fields in Greece and the large number of distinguished scientists in the Greek diaspora. It would also leverage Greece's special, historical relationship with the humanities and ethics, since bound to be called upon to address the significant changes that AI will bring to many areas of life.

The AI Center of Excellence would serve as the point of reference for the country's transition to the new era. It would provide world-class education to Greek and international graduate students, catalyze world-class research and innovation, train the workforce, advise the Greek government on the relevant national priorities, support the state in various related projects (e.g., teaching AI in schools), boost the entrepreneurial and innovation ecosystem, and play a significant role in general AI literacy among students, professionals, employees, and the population at large.

The AI Center of Excellence would be governed by special legislation that would ensure stability, continuity, independence, flexibility, and efficiency. It would operate on a substantial endowment and would also draw funding from public, European, industry, and philanthropic sources.



FOSTER A COMMUNITY OF LEARNERS AND PRACTITIONERS

Flagship Program 3: Develop a central AI education platform supporting teaching and learning, virtual collaboration, and hosting AI competitions.

Access to high-quality educational materials is not always a given and not always widespread. To bridge this gap and provide broader access to the new concepts and skills that are in high demand, we propose the supportive delivery of AI educational material through a central online platform. This platform should function as a shared virtual space where educational material could be developed by teams of AI experts from both academia and industry. Content creators should be invited to produce relevant material and be compensated based on their usage. The objective is to foster the creation of a dynamic and sustainable ecosystem for AI education, where contributions are rewarded, and continuous improvements are encouraged. The offerings should undergo a rigorous vetting process to maintain high standards of quality and educational value. To ensure equitability, the state should subsidize, perhaps by gaining support towards this goal from European sources, philanthropic organizations, and the private sector, access to the platform by

special groups of citizens (e.g. students). Educators could also pick and choose materials that are relevant to their instruction and audience, and individuals could follow self-directed studies to discover new areas of knowledge or seek learning support to improve learning gaps.

The same platform could host competitions and hackathons by providing a virtual collaboration space. These events can be structured around specific themes or challenges, encouraging participants to develop innovative solutions using AI and other technologies. The platform can facilitate the submission and evaluation of projects, provide access to relevant datasets and tools, and enable communication among teams and mentors. By hosting competitions and hackathons, the platform will foster a community of learners and practitioners, promote hands-on learning, and inspire creativity and innovation in the field of AI and beyond.

Finally, the same infrastructure can be used for professional, vocational, and continuing education.

Flagship Program 4: Foster the development of AI ecosystems around data, computation, and opportunities for investment, training, and mentoring.

Today, most cutting-edge AI models and impactful applications are being developed in the private sector. Countries that have succeeded in attracting such activity have done so through the formation of ecosystems consisting of different actors (human talent, corporate entities, research institutions, investors, etc.), information, relationships, and resources, all interacting to turn ideas into transformative impact at scale. Greece already has several ingredients in place to form a fledgling AI ecosystem, but its development can be nurtured and accelerated further through targeted interventions.

To begin with, Greece should compete in the European call to form an **AI Factory**¹ in the form of an AI startup accelerator, i.e. an ecosystem that fosters innovation, collaboration, and development in the field of AI,

that would also act as a hub for diffusing AI capabilities into the Greek private sector. With access to subsidized computing power for its members (including computing cycles from the soon-to-be-built Greek High-Performance Computing (HPC) facility “Daedalus”²), privileged access to pooled data sources, regulatory protection in the form of sandboxes and safe harbors, and desirable real estate, such an AI innovation hub can act as the nexus where researchers, students, investors and industry professionals can work together on cutting-edge projects in a few focused AI vertical areas where a Greek presence can bring a competitive advantage. The presence of such a hub signals a commitment to technological advancement, making the region more attractive to both domestic and international investors.

More generally, Greece should organize and showcase the incentives that it has already put in place for attracting talent and resources domestically and from abroad, including incentives provided to members of the Greek diaspora who are looking for opportunities to engage locally. Existing tax incentives, visa programs, and bespoke outreach to hyperscaler companies (that is, companies like Amazon, Google and Microsoft that deliver massive cloud computing services, globally) to establish Greek R&D centers are all efforts that can be better coordinated and showcased under an umbrella program to establish Greece as an “innovation destination” for the world’s best AI talent.

01. <https://digital-strategy.ec.europa.eu/en/policies/ai-factories>

02. <https://eurohpc-ju.europa.eu>

Flagship Program 5: Develop the Greek language and culture data space.

Data used to train the most powerful current AI models, such as ChatGPT and other language models, is drawn in large part from the Internet. This data is biased, i.e. statistically skewed, in all kinds of ways, including being dominated by the language and other artifacts of cultures that have a large footprint on the Internet, such as the U.S. and English-speaking countries. Using biased data to train AI models results in these models incorporating these biases, which tend to persist even when measures are taken to remove them.

In turn, using biased AI models has numerous negative implications. First, these models are likely to be inaccurate when their application domain is substantially different from the domain where their training data was sourced. For example, a clinical assistant AI tool trained on data from a western European population is likely to be less accurate in its predictions when used on

patients with a southeastern European background. Moreover, biased AI models may also replicate the biases contained in the data that they were trained when they make predictions or when they generate content, creating vicious cycles when AI-generated content is subsequently used to train other models. For example, a language model trained on content from the extremist press is likely to make inferences and generate text reflecting that viewpoint.

Of pertinence to Greece is that the performance of the most powerful commercial language models such as ChatGPT is significantly worse when processing or generating Greek text, compared to English. Moreover, the knowledge, culture and norms that are reflected in their predictions and generated content is dominated by non-Greek sources.

Within this context, Greece needs to foster the creation of models (large language models and other) that better incorporate the Greek language and the Greek culture. This is important

for the purpose of having more accurate models that interact with Greek citizens in the Greek language, and to facilitate these models' accumulation of authoritative Greek sources. Having AI models that incorporate the Greek language and Greek culture will contribute to their preservation in the predictions made by these models and the content they generate.

The creation of models that better incorporate Greek culture can be facilitated by curating high-quality data representing various aspects, artifacts, norms, and other knowledge related to Greek culture. Similarly, the creation of models that better incorporate the Greek language can be facilitated by curating high-quality content in Greek. This data can be used to fine-tune existing models or to train new models within an appropriate framework that licenses this data.

As such, we propose the creation of a “**Greek Data Space**,” which will both provide infrastructure for the collection, pooling, curation and sharing of high-quality data, representative of the Greek language and culture, and will provide the means to foster innovation and collaboration under a suitable governance structure, ensuring openness, participation, security, transparency and conformity to ethical and legal requirements, including intellectual property (IP) rights and licensing considerations. In turn, in addition to language and cultural preservation, models trained on this data and the applications they will enable could have profound economic and social benefits.

The collection of high-quality data and the articulation of its governance structure will benefit from Flagship Program 1, while the fostering of an innovation ecosystem around this data will benefit from Flagship Programs 2, 3 and 4.

A GLOBAL AI FORUM PROMOTING ETHICS, DEMOCRACY, AND SUSTAIN- ABILITY

Flagship Program 6: Launch a global AI ethics forum and a global AI observatory for the democratic process.

Due to the richness of her cultural and intellectual heritage, Greece should host a global forum for engaging with the ethics of AI, including the role of this technology in promoting human flourishing, enhancing liberal democracy, and supporting environmental sustainability. A **Global AI Forum** will act as an open global platform for building understanding and meaningful bridges between stakeholders, fostering mutual learning and providing the basis for international co-operation. Importantly, it will consider AI development within a moral framework that promotes the values of accountability, open-mindedness, and fairness. Encouraging a rich debate will be at the core of the forum in an inspiring cultural



setting, one in which some of the most important philosophical traditions (especially the Platonic-Aristotelian³ ones) originally emerged.

We distinguish at least three functions performed by this forum:

- a public educational function, promoting AI literacy through the development of courses, lectures, publications, podcasts, etc.;

- a convening function, providing a venue for an annual high-level international meeting on AI ethics and policy;
- a monitoring function, tracking the impact of AI technologies on the democratic process globally.

This forum will coordinate with the AI Center of Excellence, benefit from research at universities

and research centers throughout Greece, pursue international collaborations with relevant institutions worldwide, and capitalize on the generous support of the Greek academic diaspora.

03. <https://www.oxford-aiethics.ox.ac.uk>

A white paper from the event is available here J Ober and J Tasioulas, 'The Lyceum Project: AI Ethics with Aristotle' <https://papers.ssrn.com>

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02

2. Methodology

The Greek National AI Committee, formed in October 2023, has employed a collaborative methodology across four subcommittees: Innovation and Entrepreneurship, Education and Research, AI and Regulatory Framework, and AI and the State. The following consolidated methodology outlines the structured approach taken by the entire committee to achieve its objectives.



INIOHOS
The charioteer of Delphi

2.1 Coordination and Meetings

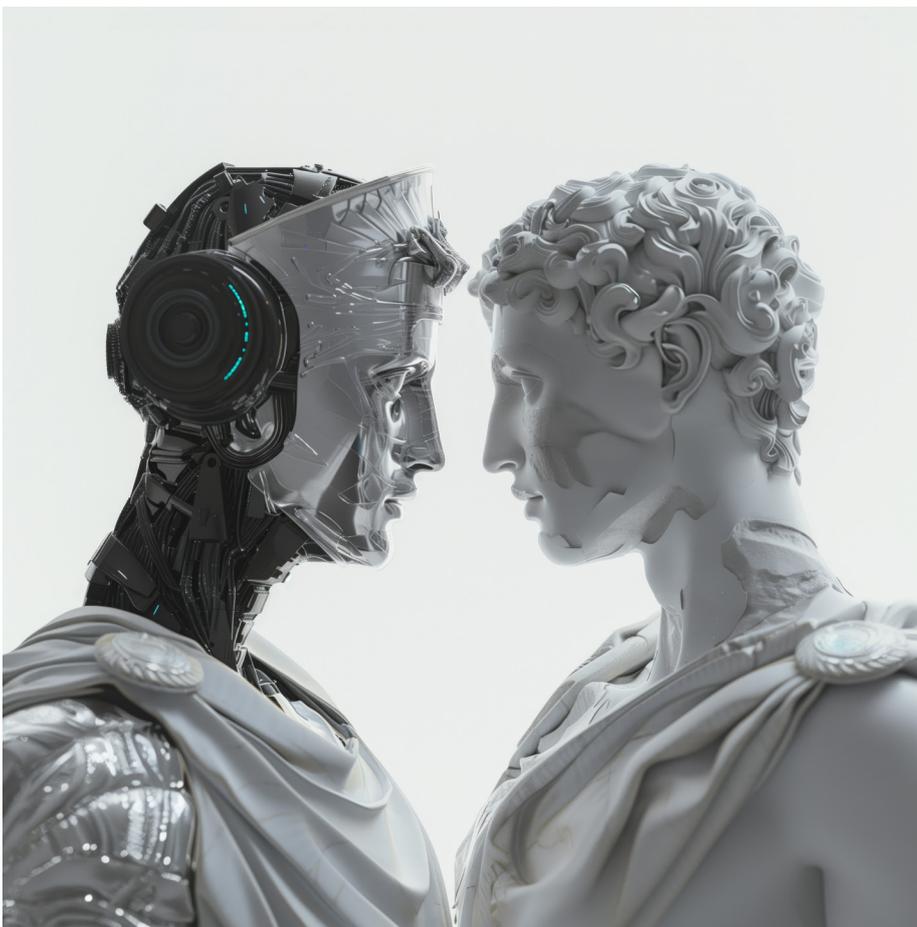
Since late October 2023, all sub-committees held weekly meetings to coordinate their activities, discuss progress, share findings, and ensure alignment with the overall objectives of the committee. These meetings have facilitated continuous communication and collaboration among the subcommittees, allowing the integration of insights and recommendations across different areas of focus.

2.2 Literature Review and Desk Research

The Committee conducted extensive literature reviews and desk research to gather information on best practices, global national strategies, and technological developments related to AI.

Several AI-related studies focused on Greece were reviewed, including by Google⁴, the National Center for Social Research (EKKE) and the “Demokritos”

National Center for Scientific Research (NCSR),⁵ and the Hellenic Federation of Enterprises (SEV). Additionally, several global reports and papers on the AI global ecosystem were examined, including those by the OECD⁶ and Accenture.⁷ These studies provided detailed analysis of the current global market conditions and future potential for Greece, ensuring that the Committee’s findings and recommendations align with international trends and standards, while also helping to benchmark the country’s potential investments against global best practices.



04. <https://implementconsultinggroup.com>

05. <https://www.researchgate.net>

06. <https://www2.oecd.org>

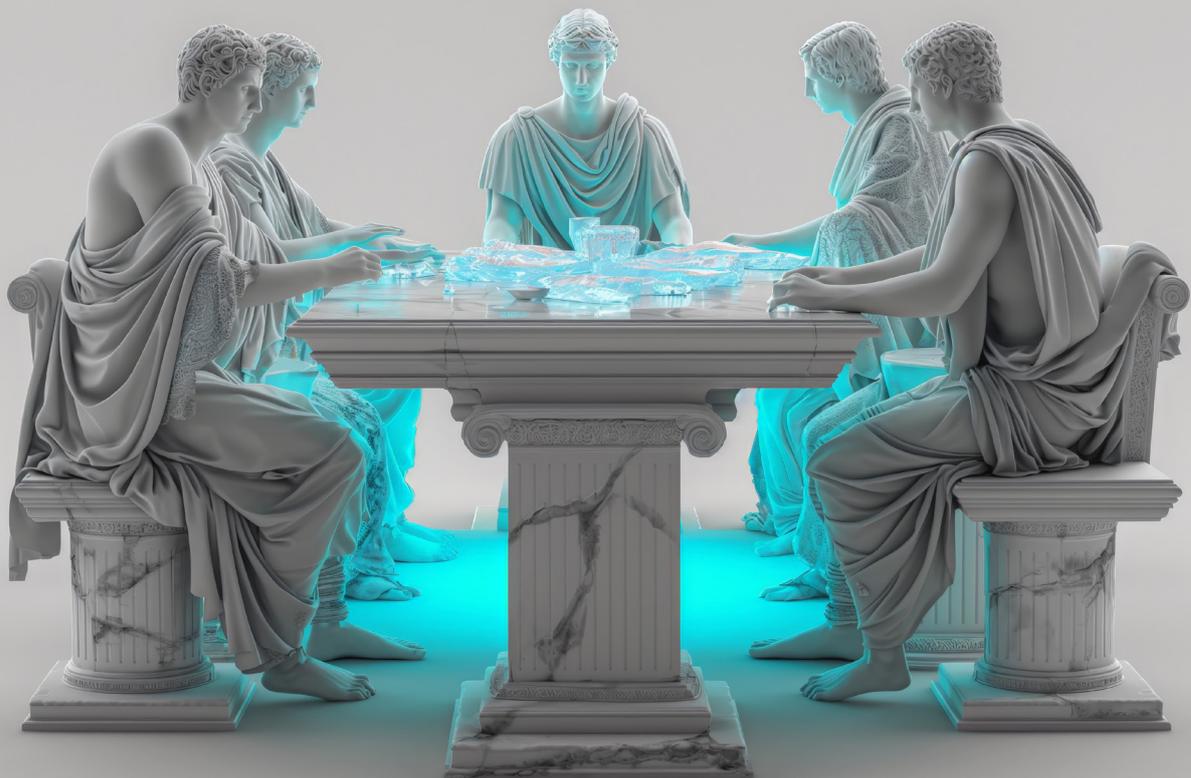
07. <https://www.accenture.com>

<https://www.accenture.com>

2.3 Stakeholder Engagement and Interviews

To gather diverse perspectives and in-depth insights, the Committee engaged in numerous interviews with stakeholders from various sectors. This included:

- 20+ government and state officials;
- 10+ researchers and stakeholders in education and research;
- executives from AI-focused enterprises, both in Greece and internationally to assess opportunities;
- 30+ founders of AI startups and representatives from the largest corporate entities in Greece;
- 15+ representatives from different sectors of the Greek government to understand the current state of AI adoption and data collection;
- 10+ international experts and government officials to gain insights on global best practices and their adaptation to the local ecosystems.



These efforts helped the Committee identify challenges, opportunities, and the maturity of AI integration in various sectors. Additionally, more than 20 meetings with government representatives from European countries were conducted to gather insights on current policies and initiatives related to AI focus areas.



2.4 Surveys and Focus Groups

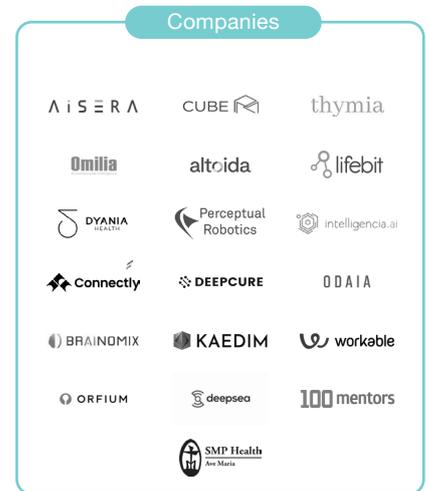
In the context of thoroughly analyzing the Greek AI ecosystem and tailoring the recommendations to Greece's specific needs, the Committee engaged with both the startup community and large enterprises in the country. A detailed survey was conducted of twenty-one (21) leading AI country-related startup companies (Greek-based operations

or international operations with Greek founders) to understand their challenges, opportunities, and needs. This survey provided valuable data on the country's entrepreneurial AI landscape. In addition, with the assistance of Endeavor Greece and SEV, we conducted two workshop sessions with representatives from leading large Greek cor-

porations across all major industries (Banking, Energy and Natural Resources, Telco, Retail, Manufacturing, Hospitality, Shipping, etc.). These sessions were designed to discuss AI adoption and diffusion within the corporate sector in Greece, and to capture its role in fostering innovation and development using AI.

Survey Overview - Respondents

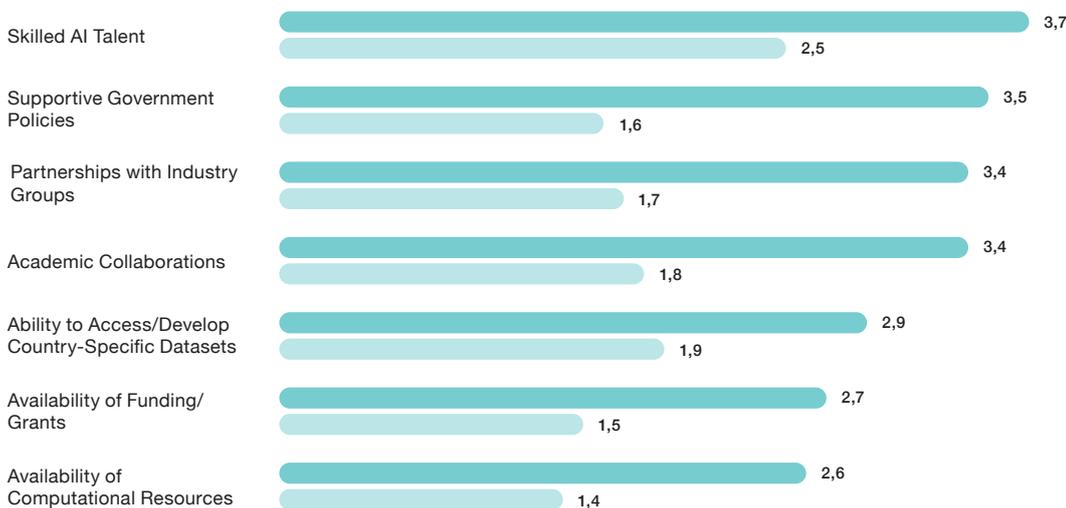
Total Respondents 21*



*Most respondents have a presence in diverse countries and regions.

Factors rating Internationally and in Greece

Average rankings of the key factors influencing the AI

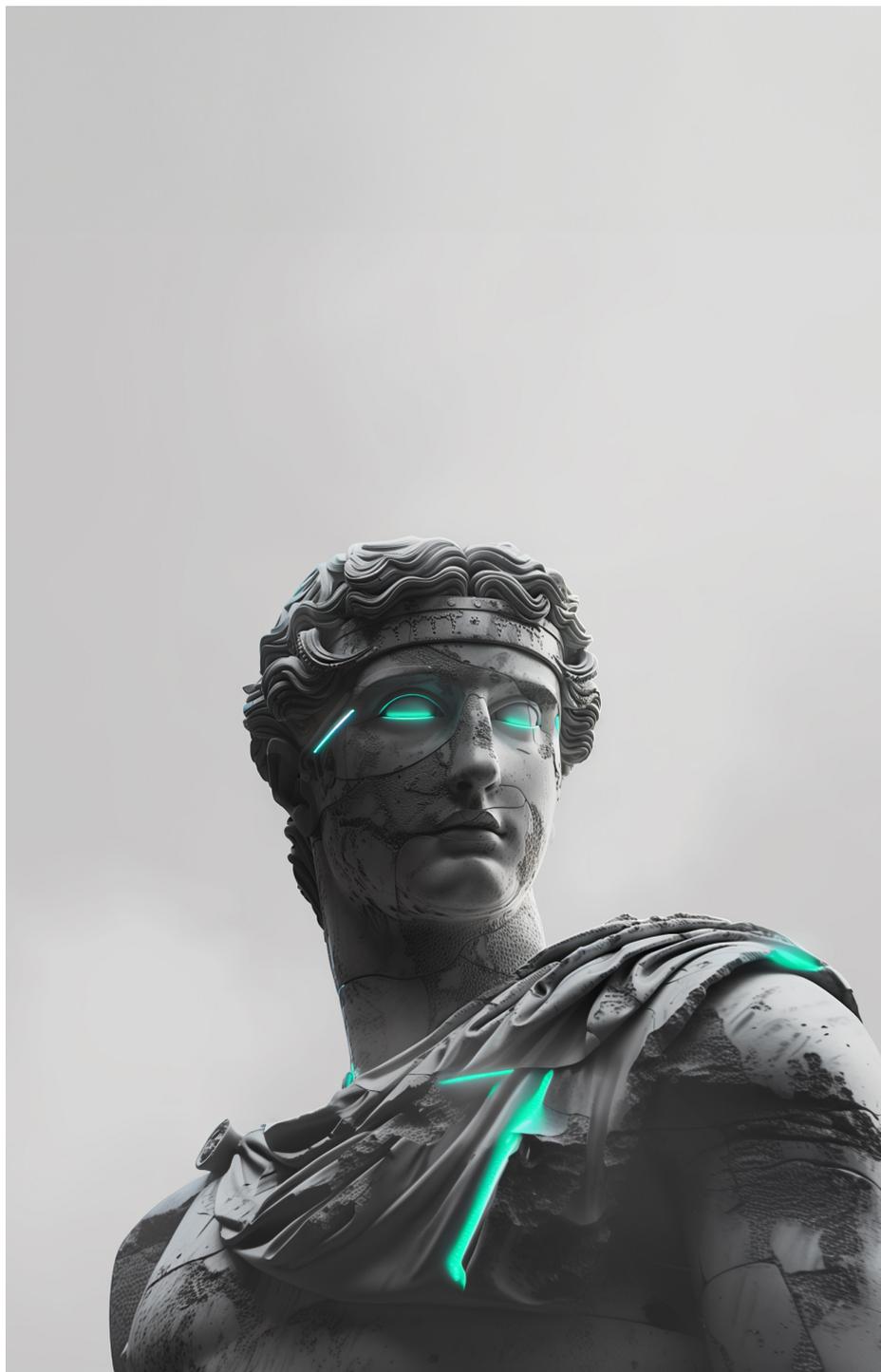


- Skilled AI Talent is considered more critical both globally and in Greece
- Global ranking is higher than Greece in all factors
- In Greece, the only factor achieving an average ranking is Skilled AI talent, while all other factors are rated below average.

● Internationally
● Greece

2.5 Synthesis of Findings and Recommendations

By considering data from these diverse sources, the Committee aimed to ensure that the recommendations with focus on areas where it would make the most sense for Greece to invest. The focus was cross verified against both the strategic priorities of the country and the insights gained from international benchmarks.



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03

3. Innovation and Entrepreneurship

3.1 Objective - Purpose



The flight of
ICARUS

The subcommittee on innovation and entrepreneurship was formed to examine the current state of AI diffusion in the Greek corporate and startup environments, identify areas of strength and opportunities for improvement, collect ideas and suggestions from corporate actors, and identify recommendations that can lead to:

- faster appropriation of AI capabilities across Greek corporate actors;
- identification of industry verticals or other subdomains where Greece can credibly develop a competitive advantage in attracting and promoting high added value corporate activity; and
- strengthening of the Greek innovation ecosystem across the board.

This chapter covers recommendations organized around building capabilities and ecosystems to take advantage of the revolution around AI.

3.2 High-impact recommendations

Proposal 3.1: Build a focused AI innovation brand for the nation of Greece and execute the plan to make the brand a reality.

Greece already possesses some of the elements that can make it an attractive destination for the creation of AI-focused innovation ecosystems. It has an attractive capital gains tax rate, a relatively low cost of living, an attractive quality of life, and one of the highest percentages of STEM⁸ graduates with a strong education. It also has locally based champions not all of which are widely known, such as:

- in technology, iconic Silicon Valley companies, such as Tesla⁹, Samsung¹⁰, and Meta¹¹, have world-class, albeit small, R&D facilities in Greece;
- in manufacturing, several leading global players, such as Titan Cement¹², Raycap¹³, Olympia Group¹⁴, already leverage digitization and AI to improve their product lines;
- in the maritime industry, companies such as Signal Group¹⁵ which has a 50%+ global market share for its AI shipping solutions;
- in data-intensive corporate functions, Greece has attracted data science centers of excellence, such as those set up by Pfizer¹⁶, Accenture, and others;
- several former startup technology companies valued at over \$1B (“unicorns”) when acquired or during their last investment round, such as BlueGround¹⁷, Beta CAE¹⁸, Viva Wallet¹⁹, and others.

In addition, Greece has a large diaspora (including many successful academics and business entrepreneurs in related fields) that strengthens the country’s international ties, with many in this community considering spending more professional time in Greece.

The country is also a top tourism destination, with the potential to leverage its quality of life and lower cost of living to attract digital nomads. Finally, given the cultural and historical heritage of Greece, including its globally recognized legacy as the cradle of democracy, Greece can play an important role in shaping the global debate on AI innovation that respects and upholds fundamental human rights and the democratic system.

All these elements are part of a story that has yet to be told. It is imperative that Greece can develop and communicate a consistent message about its potential as a “nation of innovation,” which is a priority that cuts across all our recommendations for capability and ecosystem building below. This needs attention at the highest level of governmental decision-making, with dedicated resources and corresponding responsibility, authority, and accountability, both for the brand-building component as well as for implementing the plan according to this report’s recommendations.

08. <https://gpseducation.oecd.org/>

09. <https://www.tesla.com>

10. <https://www.samsung.com>

11. <https://therecursive.com>

12. <https://www.titan-cement.com>

13. <https://www.raycap.com>

14. <https://www.groupolympia.com>

15. <https://www.thesignalgroup.com>

16. <https://centerfordigitalinnovation.pfizer.com>

17. <https://www.crunchbase.com>

18. <https://www.investopedia.com>

19. <https://www.crunchbase.com>

Proposal 3.2: Attract, regain, nurture, and sustain the critical mass of skilled human capital that will allow AI innovation ecosystems to develop.

Both in our interviews with large corporations and in our survey of startups, the availability of skilled human capital consistently came up as the most important factor for companies choosing where to invest in AI-related activities. Many of our detailed recommendations, both in the capabilities-building and the ecosystem-building sections below, focus on efforts to enhance Greece's supply of such human capital through a nexus of measures, incentives, and coordinated efforts with large companies abroad.

Proposal 3.3: With support from the EU, create an AI Factory in Greece to be an accelerator for AI startups in key vertical industries and an enabler of faster diffusion of AI capabilities into the Greek corporate ecosystem.

In the face of AI activity being dominated by US and Chinese companies, challenging the EU's digital sovereignty, that is its autonomy and leadership in the digital field, the European Commission has put out a call²⁰ for member states to create "AI Factories" around EU-funded high-performance computing (HPC) facilities to act as local innovation hubs for the development of AI-related technologies and corporate capabilities, including innovations to support the development of trustworthy AI. Countries' proposals must specify their purpose, goals, governance, data availability and access, and high-level operating principles.

Utilizing this report's recommendations, Greece should put together a proposal for an AI Factory. This would become a beacon that would both attract to Greece innovative AI startup activity happening in the diaspora and would accelerate the

development of local champions in selected vertical industries, such as healthcare, language and culture, and sustainability and energy (including climate adaptation-related opportunities), where Greece can have a competitive advantage. Furthermore, the AI Factory can act as a nexus for the collection of best practices and resources (content, programming, events, and the like) to accelerate the diffusion of AI capabilities into the existing Greek corporate ecosystem of Small and Medium-sized Enterprises (SMEs) and larger entities.

20. <https://digital-strategy.ec.europa.eu>

3.3 Building AI Capabilities in Greece

In this section and the next, we present recommendations that would allow Greece to build several relevant AI capabilities and ecosystems. Taken together, these actions would strengthen the brand of Greece as an innovation-friendly nation. We lay out our recommendations for capabilities building in this section, and our recommendations for ecosystem building in the next. Many studies point to the importance of core digital, data, and organizational capabilities for any organization to best leverage new technologies. Here, we discuss specific enablers that apply to Greece with respect to its ability to take advantage of data and AI advancements.

HEPHEASTUS

God of fire,
metallurgy, and crafts



3.3.1 Human talent development

Greek scientists and academics are already globally recognized for their AI contributions: notably, 11% of European AI researchers whose work was presented orally at NeurIPS 2019, the premier conference of the field with a highly selective 0.5% acceptance rate for oral presentations, were of Greek origin.²¹ Moreover, one of the best paper awards in that conference was given to a paper written by authors of Greek origin.

Meanwhile, availability of human capital with AI skills, both on the business and the technical side, was the most desirable factor that startup companies identified in our survey, in line with literature on AI adoption and innovation.²² Startup companies operating in multiple geographical domains (a development that tends to be the norm for AI-focused startups) select where to open offices largely based on

the availability of such talent and on their ability to attract and retain employees with strong business and technical skills.

Similarly, one of the biggest hurdles to large enterprises being able to adopt and disseminate AI applications quickly is a lack of skilled talent,²³ along with a resistance to technology-powered solutions, especially by older employees. Change management is a top determining factor for successful technology adoption, also indicating the importance of combining technical and business skills.²⁴

There are two essential ways to develop talent in this context. One is to import and retain expertise from abroad, and the other is to develop talent inside the country. What follows are a few proposals that would contribute towards these goals.

3.3.1.1 Attracting Talent

Proposal 3.4: Implement a Greek Tech Visa program to facilitate migration of qualified talent from non-EU countries.

Some of the most successful Greek companies in the invention, adaptation or promotion of AI-related applications pointed towards their ability to hire experts from outside Greece as a key factor for their success. In many cases, these companies relocated such experts to Greece; in other cases, the foreign experts worked together with Greek teams to transfer knowledge locally and expand the business globally. To facilitate the process of importing expertise on AI, we propose to accelerate the implementation of the recently enacted Greek Tech Visa program, as has been done in several other EU countries.²⁵

21. <https://greekanalyst.substack.com>

22. <https://www.oecd.org>

23. <https://www.oecd-ilibrary.org>

24. <https://www.oecd-ilibrary.org>

25. <https://nanoglobals.com>

Proposal 3.5: Simplify the process to qualify for expat-hiring tax incentives.

Greece has enacted stock option plans for employees with favorable tax treatment and other tax incentives²⁶ for professionals relocating to Greece, either temporarily or permanently. However, the process to qualify for these incentives is overly bureaucratic and time-consuming, and its outcome is not guaranteed. As a result, the perceived benefit is discounted by prospective applicants. Some ideas to ameliorate this include:

- creating a definitive and up-to-date web resource²⁷ on gov.gr that lists all relevant tax incentives for expatriates considering employment in Greece;
- providing simple self-service tools (tax benefit calculator, question-based qualification wizard, etc.) to allow individuals to calculate the impact of the tax incentive on their specific situation; and
- legislating for relevant service providers (tax and legal advisors, auditing firms, etc.) to have the authority to pre-qualify applicants for tax benefits for a fee, similar to the provisions of law 4864/21 about investment rebate qualification.²⁸

Lastly, consistent with our recommendations in the Defense section of Chapter AI and the State of this report, we propose that a military conscription service be adapted for highly skilled individuals, in order to cease being a disincentive for highly qualified talent to return to Greece following their academic studies abroad. We postpone further discussion of this point to the Defense section.

26. <https://www.enterprisegreece.gov.gr>

27. <https://www.welcometofrance.com>

28. <https://www.solcrowe.gr>

3.3.1.2 Developing talent in universities and the industry

Proposal 3.6: Expand opportunities for multiple forms of graduate and professional education, specialized training, and reskilling to provide the human capital for a rapidly evolving AI landscape.

The Greek education and training ecosystem can benefit from greater flexibility, specialization, competition, and differentiation that would allow it to adjust to a rapidly evolving AI-related technological and business environment.

Greek undergraduate institutions already export academic talent throughout the world, many becoming leading academics at the top universities of Europe and North America. A promising new development are recent efforts, adopted by ongoing legislation, to collaborate with universities abroad.

The Education and Research chapter of this report discusses the educational landscape and a broad range of proposed reforms. Here we place emphasis on degree programs that can be flexibly adapted to meet modern needs for skilled human capital, both on the technical and the business/management sides. In Silicon Valley and other successful tech ecosystems, such programs allow for a steady output of both business and technical talent who, in turn, are quickly absorbed by large companies and startups alike. Instead of losing many of the most promising university graduates to such programs abroad, Greek uni-

versities should be encouraged to establish such professional degree programs that leverage existing curricula and faculty exchange opportunities with leading institutions around the world. In addition, multi-disciplinary and joint degrees among Greek universities should be allowed and encouraged. The private sector can also be strengthened to support lifelong learning programs and the upskilling of the Greek workforce. The AI Centre of Excellence proposed as Flagship Program 2 of the Introduction chapter and detailed in the Education and Research chapter may act as a hub for such programs. Some ideas to evaluate further include:

- creation of a common national AI skills-focused Master's curriculum, such as the Mathématiques, Vision, Apprentissage (MVA) program in France, for top graduates of Greek universities;
- development of new - possibly joint - Master's degrees, or specializations in existing degree program, combining AI training with sector specific skills (e.g., AI and Healthcare, AI and Energy, AI and Business, etc.);
- emphasis on lifelong learning, with AI and Business focused executive education and other corporate programs to continuously upskill Greece's workforce, with incentives for companies to do so subject to quality standards;

- development of related lifelong learning certificates that satisfy quality standards to support workforce upskilling and facilitate the supply and demand of talent matching;
- closer collaborations with industry to specify requirements and obtain funding for "industrial post-doctorate" programs, along the example of Finland or the CIFRE program in France;
- integration of internship opportunities for academic credit within companies performing cutting-edge AI product-related work;
- creation of alternative avenues to upskilling and reskilling distinct from traditional post-graduate education, such as micro-degrees and professional certification.

3.3.2 Availability of data

Proposal 3.7: Open access to public datasets in areas where Greece has a competitive advantage. Provide incentives (e.g., competitions) to attract relevant companies to engage.

Data is the “new gold,” the most important raw material for AI applications, together with talent and computational resources. Availability of clean or otherwise privileged datasets, while ensuring privacy and safety, can thus be a powerful incentive for companies to invest in R&D resources. Greece can play a role here in two distinct ways: (i) geographical position-related datasets; or (ii) leapfrogging digitization-related datasets.

Category (i) comprises datasets related to Greece’s unique geographical position, such as civil protection datasets around climate change-induced phenomena (fires, floods, weather events, etc.), and also border control or defense-related datasets where Greece’s thousands of islands and distributed sensor network can produce data that is hard to replicated elsewhere in the world. Category (ii) pertains to areas where Greece’s digitization efforts need to improve significantly, e.g. the digitization of health records for the National Health System. This presents a leapfrogging opportunity that can be catalyzed by collecting and managing data in a way that is “AI-ready,” skipping over the need to ensure compatibility with legacy data collection and management systems, which would typically be associated with data fragmentation and would add friction to using this data in the development of AI systems.

The AI and the State chapter of this report discusses the AI readiness of Greece’s public sector in detail, including the availability of data that can be used to train AI models. Such data, in addition to being leveraged within the public sector for internal applications, can act as a powerful incentive to attract private company activity.

While the availability of datasets is fundamental, their usefulness for AI systems hinges on proper annotation, which is also vital. Annotation is the process of labeling data points with relevant information, making them interpretable and usable for training AI models. While this process is often costly and time-consuming, depending on the type and volume of data, the required level of detail, and the expertise of annotators, it is crucial because high-quality annotation typically leads to better performing and more reliable AI models, making it a worthwhile expense overall.

Consistent with creating an AI innovation brand, Greece should implement a highly visible effort to collect, annotate, and safely open access to data, at an unprecedented scale and with well-defined access rules. Accessibility to the data can include prerequisites for local R&D investment, or other public-good benefits piloted in Greece. We envision the potential for global competitions that would identify beneficial uses of public datasets, e.g., competitions on designing AI systems that predict, prevent, or mitigate climate-induced disasters.

3.3.3 Affordable access to computational resources

Proposal 3.8: Leverage the Daedalus supercomputer and other EU-funded HPC facilities, to offer lower-cost and more environmentally friendly AI computing resources to companies with local presence.

The cost of computing resources used to train AI models, especially LLMs for generative AI applications, is significant, as is the cost of using such models for inference or fine-tuning applications. Also costly is the potential environmental impact of today's high energy use associated with data/computation centers. Thus, it is not surprising that, when asked what countries can do to attract more startup activity around AI, our AI survey respondents listed "offering cheaper computing resources" as a top priority. Having realized the importance of both computing resource availability for AI and maintaining digital sovereignty, the EU has sponsored the creation, and expansion in some cases, of powerful high-performance computing (HPC) facilities to act as hubs that attract innovation around AI development by both research institutions and startups. Greece is well-positioned to become an attractive destination for such an HPC facility, for a variety of

reasons presented in the AI and the State chapter of this report, including, among others:

- high and rapidly increasing use of renewable sources for electricity generation;
- being in the process of building a supercomputer (Daedalus²⁹) with architecture that is AI-ready, and which could be enhanced further for heavy AI workloads;
- having a large network of AI-related startups with Greek founders who are looking for reasons to build or grow their presence in Greece.

Therefore, the timing is ripe to use the proposed AI Factory, discussed earlier in this section, to create governance and rules for easier/cheaper access to HPC resources, as well as for attracting and distributing credits in hyperscaler companies for cheaper cloud computation. The convergence of two mega-trends, sustainability and technological innovation makes this a unique moment to position the country as a top destination for sustainable computing.

The current rules around access to HPC resources, which are at least partially funded by the EU, are set up on a per-call basis, an example being the recent (March 2024) call³⁰ for generative AI-focused application development. We envision the establishment of a more flexible and predictable access model, e.g., subsidizing or matching credits to more applicants rather than providing free access to a small subset of applicants undergoing heavy vetting over long timeframes.

In addition to centrally administered HPC resources, startups can get cheaper access to hyperscaler company cloud credit, which currently requires separate applications to each hyperscaler company. Through our discussions with hyperscaler company representatives, we anticipate that such credit programs could be centrally managed in the AI Factory, serving as an additional incentive for selected companies to lower their cost of AI computation.

Finally, AI usage can be further stimulated by tax incentives that treat AI expenses as R&D expenses for enterprises.

29. <https://eurohpc-ju.europa.eu>

30. <https://eurohpc-ju.europa.eu>

3.3.4 Strengthening the Data and AI Capabilities of the Private Sector

Proposal 3.9: Provide National and Regional AI Services to support organizations in their journey toward AI maturity, paying attention to SMEs.

An organization's ability to absorb new technologies, whether this organization is a large enterprise, a small or medium-sized enterprise (SME), or a government entity, is critical for successful technology adoption and innovation. While not all organizations are the same – in particular, there are differences depending on their size, age, industry, and digital nativeness, i.e. whether they started their operations online or they are operating exclusively or mostly in the digital space, there are some common factors influencing their ability to absorb AI-related technologies. These include skills (ranging from technical to managerial, among others), data availability and quality, support and culture for experimentation, and other complementary assets (e.g., industry expertise, partnerships, market reach and channels, unique processes, etc.). Beyond building these capabilities, organizations face several challenges throughout their AI maturity journey: identifying use cases and assessing their return on investment (ROI) potential, scaling up AI Proofs of Concepts (POCs), identifying and selecting solutions providers, or managing organizational change.



As there is no one-size-fits-all and no “silver bullet” to overcome these challenges, organizations need to employ a portfolio of practices such as upskilling, awareness building for AI use cases, knowledge sharing of best practices and frameworks, access to relevant information (e.g., about data, algorithms, suppliers, talent, etc.), and support for experimentation.

To support organizations with AI adoption and innovation, public or private AI service providers can:

- provide national and regional “AI Concierge” services that can share information and support about data, talent hiring channels, training programs, cloud compute, AI solutions, service providers, best practices, regulatory guidance, etc.;
- provide platforms for sharing information about use cases and success stories; for example, countries such as Germany³¹ and Japan have developed maps of use cases for technologies like Internet-of-Things (IoT) to help firms share their experiences and learn from others;
- support experimentation through public challenges, private challenges, and hackathons; for example, AI Singapore has been organizing grand societal and industry challenges and coordinating AI challenges shared by the private sector;
- provide advisory services, such as “Chief AI Officer as a service for SMEs”, gap analysis of AI capabilities, or support with identification and prioritization of use cases;
- support networking and sharing of best practices; for example, France’s Cap Digital and Canada’s Vector Institute organize executive networking events, recruiting events, industry and research conferences.

31. <https://www.plattform-i40.de>

3.3.5 Government policy and regulation

Proposal 3.10: Implement the EU AI Act in Greece through local regulations that provide the most clarity, simplicity, and flexibility to companies choosing to operate locally.

The concerns around AI, and the EU's objective of becoming a global leader in regulating technology in general, have led to the ratification of the European AI Act³² in mid 2024. Like the enactment of the General Data Protection Regulation (GDPR) before it, the broad-sweeping and relatively generic directives provided by the AI Act will require each country to pass regulation to implement the Act. There is thus an opportunity for Greece to differentiate itself, consistent with our discussion in the Regulatory Framework chapter of this report, by placing itself on the more business-friendly end of the spectrum of local regulation, compared to taking a more stringent regulatory stance.

As a relatively small country within the EU, Greece cannot compete on the level of absolute financial incentives, such as availability of funding and market size, to attract innovative companies. However, there is an opportunity to use company- and innovation-friendly regulations as a competitive lever within what many consider to be an overall heavy-handed European technology regulatory environment.

The passing of the EU AI Act makes this effort very timely, as companies will have to grapple with the Act's implications and make decisions about where to deploy their resources. Much as when the RRF framework was passed, when Greece set itself apart by being first to submit its plan and therefore secure a larger share of the funds, there is an opportunity to carve out a welcoming niche for companies and researchers jumping into AI.

For example, the EU AI Act calls for the creation of "AI regulatory sandboxes." These are controlled experimentation and testing environments set up by competent authorities, which offer providers or prospective providers of AI systems the possibility to develop, train, validate and test, where appropriate in real-world conditions, an innovative AI system, for a limited time under regulatory supervision. Regulatory sandboxes should aim³³ to enhance legal certainty for innovators and the competent authorities' oversight and understanding of the opportunities, emerging risks and impacts of AI use, support the sharing of best practices, contribute to evidence-based regulatory learning, and facilitate and accelerate access to the Union market for AI systems. Greece should take the lead in creating and promoting specific sandboxes around vertical domains where Greece has heightened needs or potential competitive advantages, e.g. maritime, climate, natural disasters and civil protection, green energy, migration and border control, and culture.

32. <https://eur-lex.europa.eu>

33. <https://www.cambridge.org>

<https://documents1.worldbank.org>

<https://goingdigital.oecd.org>

Another opportunity for Greece, also called for in the EU AI Act, is the creation of explicit “safe harbor” regulations that indemnify companies meeting specific criteria for testing their systems in real world conditions, without participating in an AI regulatory sandbox. Indemnification criteria might be met when the target

application falls under common-good application designations, when informed consent of natural persons to participate in testing in real world conditions is pursued, when appropriate measures can be taken so that the decisions of the AI system can be reversed, or when additional safeguards have been put

in place to safeguard persons belonging to certain vulnerable groups.

In addition to the importance of Greece’s approach to the implementation of the EU AI Act, it is also important for the Greek state to create tools for companies to effectively navigate the regulatory landscape.

IT IS ALSO
IMPORTANT
FOR THE GREEK
STATE TO CRE-
ATE TOOLS FOR
COMPANIES TO
EFFECTIVELY
NAVIGATE THE
REGULATORY
LANDSCAPE

Proposal 3.11: Create a single government interface for private sector companies to learn about AI and data-related compliance matters.

Despite the significant progress Greece has made in reducing the red tape involved in starting a company, the regulatory compliance burden is still significant. In light of the rapidly changing regulations around data and AI, the importance of getting consistent guidance about how to navigate compliance matters³⁴ has intensified. It is therefore crucial for Greece to offer a centralized resource for private companies looking to obtain definitive information and guidance on these topics.

This is potentially a role that Elevate Greece³⁵ can develop within its ranks, in coordination with the Chief AI Strategy Officer and the Data and AI Office (discussed in the Regulatory Framework and AI and the State chapters of this report) as well as the proposed AI Factory. Elevate Greece should become the definitive interface to ideate, communicate, and execute government programs aimed at promoting innovation in Greece. This should include content and guidance around how to navigate issues relating to AI and data regulations.



34. <https://www.cnil.fr>

35. <https://elevategreece.gov.gr>

3.4 Building AI Ecosystems in Greece

This section presents an approach to building an effective AI ecosystem comprised of stakeholders, relationships, data, and resources, which could be strengthened by government interventions. There are various opportunities for such interventions as discussed in the following subsections.

3.4.1 Attracting leading companies to build R&D centers in Greece

Proposal 3.12: Create programs and outreach to attract global AI leaders and hyperscaler companies to pursue R&D activity in Greece.

Currently, most of the cutting-edge research in AI, especially on the generative AI side, is taking place outside of Greece within large companies such as Alphabet, Meta, Microsoft, OpenAI, etc. Therefore, and consistent with approaches undertaken by other countries' AI advisory committees, it is imperative for Greece to attract these companies' R&D centers in Greece as a way for the Greek innovation ecosystem to have better communication and training in cutting-edge research.

Hyperscalers all have senior Greek personnel in their ranks, many of whom have looked positively at the prospect of relocating back to Greece. For many of these companies, however, the recent tech downturn and asso-

ciated layoffs have put a damper on plans to expand R&D activity abroad. As the global economy improves, such expansion plans to establish R&D centers in Greece should be resurrected with the help of a government "concierge service" that focuses on clearing hurdles and providing incentives, as needed, to increase the attractiveness of such proposals in the eyes of hyperscalers.

In the few cases where hyperscalers already have a Greek R&D presence through M&A or otherwise (e.g., via the acquisition of Accusonus by Meta, the acquisition of Augmenta by CNH Industries, or the establishment of Tesla's engine motor team within Demokritos), the State should proactively investigate what it would take to further promote and encourage the expansion of such activities.

Some ideas for government actions to encourage such activity include tax incentives for AI-re-

lated R&D activity performed in Greece by specific companies; in cases of large public purchases from hyperscalers, stating a requirement to spend some fraction of awarded amounts on local R&D activities; creating a "concierge" service to streamline compliance, permitting, and other perceived overhead costs of establishing a local R&D presence in Greece; and creating and disseminating a "pitch deck" to highlight the strongest arguments for establishing an R&D presence in Greece.

3.4.2 Funding an ecosystem for AI projects

The Greek venture capital and startup ecosystem³⁶ has matured over the past several years, producing a number of notable companies³⁷ and success stories.³⁸ The Hellenic Development Bank of Investments (HDBI)³⁹ has supported a number of equity and debt funds⁴⁰ with matching LP commitments, which has helped kick-start the local venture capital market to an acceptable level.

Corporate venture capital activity has great potential to be enhanced further. By moving beyond the current ad hoc approach, large enterprises can more effectively seek out strategic fits and drive greater innovation. In our discussions with large Greek companies, a number have expressed interest in becoming more actively involved in corporate venture investing, which has been shown across Europe to create value⁴¹ if done right. We would like to see Greece pursue the following relevant opportunities.

Proposal 3.13: Explore incentives to increase corporate venture investing activity.

This could be done by expanding HDBI's mandate to allow corporate entities to apply for matching funds, or by creating tax incentives for capital invested in corporate venture capital activities, similar to how R&D tax credits function.

Proposal 3.14: Compile a list of high value, sophisticated customers for AI-powered products along with financial incentives to promote sales to such customers.

Greece's economy is heavily dependent on exporting goods and services, which account for approximately 50% of the Greek GDP.⁴² This includes technology product and services exports

which are, however, skewed significantly towards exports to lower and middle-income countries. Even so, there exist verticals, such as the maritime industry or cement making, where Greece has enjoyed a competitive advantage and where the quality of exported products and services is truly world-class. Greek industry can thus potentially operate at the highest level of sophistication, even when cutting-edge technologies are involved.

To spur cutting-edge innovation in leading Greek enterprises, we recommend providing incentives for Greek AI-powered products, such as in the form of tax credits, for example, for exports to sophisticated global customers, that is, those customers encompassing, for example, US- or EU-domiciled listed entities above a certain market capitalization.

To further propel local industries to become competitive, the Greek government should adopt high AI procurement standards. High procurement standards can drive quality and capabilities across the industry.

36. <https://marathon.vc>

37. <https://www.endeavor.org.gr>

38. <https://www.cadence.com>

39. <https://hdbi.gr>

40. <https://hdbi.gr>

41. <https://www.pwc.de>

42. <https://data.worldbank.org>

3.4.3 Focused innovation hubs around vertical ecosystems

Proposal 3.15: Repurpose select innovation hub efforts and provide incentives towards thematic AI-related activities, starting with the proposed AI Factory. Prioritize around selected verticals, where Greece has or can develop a competitive advantage.

Innovation ecosystems thrive on robust startup activity around consistent themes. Greece has encouraged the creation of “catch-all” innovation hubs, such as Thess InTech,⁴³ spanning innovation domains as broad as nanotechnology materials and supply-chain software. Because this effort is too broad, the potential impact and attractiveness to startups is diluted. As a result, it has been difficult to attract private investment and create a consistent thematic “buzz” around these efforts (a notable exception has been the R&D Park of ELPEN with a focus on the pharma industry).

We believe a new focus on AI-related startup activity around specific themes, possibly in partnership with existing large developments that would welcome tenants with exciting business activities, could prove both valuable and easier to launch. This would also concentrate the message to investors, operators,

and startups alike, especially if a few larger tenants as anchors can be secured up front.

The creation of the proposed AI Factory represents just such an effort of a “depth-first” approach for verticals that meet the following multiple criteria:

- high national interest;
- high potential for technology leveraging using AI;
- large numbers of citizens positively affected;
- high complementarity with existing efforts to support specific vertical industry development.
- Thinking through this lens, certain candidate verticals could become focus areas:
- dual-use technology companies serving the defense/security, public and private sectors;
- climate adaptation-related products and services, including civil protection applications;

- technology-enabled health-care services;
- biotech/ pharma companies;
- energy sector-related services;
- art and culture-related businesses, such as movie and music production.

We recommend that two or three of these areas be the first pillars around which the AI Factory will focus its efforts, along with consistent efforts to implement the rest of our recommendations for capability and ecosystem-building specific to such verticals. The vertical of dual-use defense technologies is already being planned through the Center for Defense Innovation, as specified in the new law, discussed in the Defense section of the chapter on AI and the State. We envision that similar coordinated efforts can materialize for other verticals of interest.

43. <https://gsri.gov.gr>

3.4.4 Industry partnerships and academic collaborations

The health of a technology ecosystem at least partly depends on the ability of innovative ideas, products and services to bring together capabilities across different ecosystem members. Here, we outline recommendations for reducing friction between academia, established industry players, and startup companies in Greece.

Proposal 3.16: Promote the formation of vertical industry-specific data pools to spur innovation around vertical AI applications.

Based on workshops conducted with large enterprises, multiple ideas for potential collaborations around vertical industry-wide digitization efforts have emerged. Some examples include:

- tourism data, collected by INSETE;⁴⁴
- census data, collected, but not openly available to the industry;
- consumer credit reporting data, currently siloed across financial institutions;
- weather-related agricultural production statistics.

Coordinated by the Chief AI Strategy and the Data and AI offices, proposed in the Chapter Regulatory Framework, and in collaboration with industry representatives for each relevant sector, a small number of data pooling efforts should be evaluated and supported as necessary. This may involve new legislation to allow such data pooling and the formation of independent oversight authorities, if necessary (e.g., for consumer finance data), as well as processes to ensure secure, trustworthy and streamlined access to high quality and well-documented data.

44. <https://insete.gr>

Proposal 3.17: Support industry-academia collaborations and open innovation initiatives, including company spinouts.

Given the central role of talent in advancing AI innovation and adoption, creating more effective, efficient, and porous boundaries between industry and academia can provide multiple benefits and can be achieved through a number of instruments and policies. Firms can share industry insights, innovation opportunities, and problems to be solved, while academia can provide the talent and IP to find

solutions that can be implemented with the support of the industry. Possibilities for researchers to work in between business and academia – see, for example, the CIFRE program in France⁴⁵ – can support such initiatives. Technology transfer offices, with solid and transparent IP and data transfer frameworks, as well as public-private funds and incentives to support open innovation initiatives, should be built and strengthened. Research and innovation collaborations can be complemented by training and industry-academia events that foster exchanges and showcase

the successes of collaborative projects. Initiatives to support both entrepreneurship and intrapreneurship should be considered.

Some ideas to evaluate further include:

- matching fund incentives for industry-sponsored academic research projects;
- standardizing tech transfer and licensing processes across universities;
- expanding HDB funded⁴⁶ or other open challenges⁴⁷ for AI-enabled solutions in relevant sectors.



45. <https://www.enseignementsup-recherche.gouv.fr>

46. <https://elevategreece.gov.gr>

47. <https://www.challenge.gov>

Proposal 3.18: Systematically promote connection formation between startups and larger enterprises around relevant thematic areas.

Here are several examples of successful collaborations between enterprises and startups, which in some cases have led to successful acquisitions.

Still, these collaborations were not the result of a systematic and sustained effort to bring together enterprises and startups. As a result, there is a need for enterprises to gain more exposure to startups working on complementary solutions in their vertical domains, as also identified by AI committees in other countries.

Elevate Greece was established to help promote the Greek startup ecosystem. Consistent with this role, and potentially in collaboration with the proposed AI Factory, Elevate Greece should organize events and provide services for more targeted, systematic connections between enterprises and startups, such as:

- “Enterprise Demo Days” focused on demonstrating vertical industry products and solutions to relevant potential enterprise customers or partners;
- newsletters or other content creation to showcase innovative capabilities developed by startup members;
- regular thematic meetups organized around cutting-edge topics in AI.

PROMOTE
CONNECTION
FORMATION
BETWEEN
STARTUPS AND
LARGER
ENTERPRISES
AROUND
RELEVANT
THEMATIC
AREAS

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04

4. Education and Research



ATHENA
Goddess of wisdom

4.1 Objective – Purpose

AI is being rapidly integrated into our world. As discussed in other parts of this report, it presents opportunities for transforming all facets of human activity, with positive impacts on society and the economy in numerous ways. It also presents various challenges and risks. To prepare citizens for a future where AI is pervasive, adapt the economy and the society to the new realities presented by AI, and capture the opportunities from its development and deployment, it has become essential to introduce AI at all levels of education, from elementary to secondary, vocational, tertiary, and continuing. It has also become essential to boost the country's AI innovation potential by strengthening its capability for research at universities, research centers, companies, and other organizations. The objective of the subcommittee on education and research is to make recommendations regarding AI in education and research. Our recommendations target the use of AI in the educational process and propose ways to improve AI skills across the Greek population, cultivate broader technical competencies such as computational thinking and algorithmic awareness, enable the application of AI in various sectors including via industry-academia collaborations, and increase the capabilities of the Greek research and innovation ecosystem to make

significant contributions to AI, bringing Greece into the circle of countries that most benefit from AI and contribute to its advance. Our recommendations are geared toward fostering an AI culture that welcomes innovation and is committed to the responsible and ethical use of AI. To this end, our proposals intend to also promote AI literacy, which involves teaching “hard” and “soft” AI-skills, i.e., on the one hand, technical skills in programming, statistical thinking, data science, and machine learning; and on the other hand, a broader understanding of AI, its applications, and its limitations, as well as an appreciation of the ethical dimensions of AI. We converged on our recommendations after consulting key stakeholders and gathering information about relevant initiatives in other countries.

4.2 K-12 Education

AI is expected to have a large impact on the workplace. It is expected that close to half of global employment will be impacted by the opportunities and the challenges that AI presents.⁴⁸ In contrast to traditional automation, which targeted more well-defined tasks and the reduction of manual labor, AI is expected to also impact high-skilled jobs and a wider range of industries, from the transportation and the automotive industries to those of healthcare, agriculture, finance, defense, education, entertainment, and more. Indeed, it is expected that more than half of the jobs in advanced economies, with their greater exposure to AI, will feel its effects. About half of those are expected to benefit from increased productivity, while another half of those may face reduced demand, lower wages, and job losses. Meanwhile, AI related jobs are expected to grow rapidly, and widespread AI adoption could eventually drive a 7%, or nearly a \$7 trillion increase in annual global GDP, over the next ten years.⁴⁹



48. <https://www.goldmansachs.com>

49. <https://www.goldmansachs.com>

To prepare citizens for a future where AI is pervasive, and to prepare the labor force for the opportunities and new realities presented by AI, it has become essential to introduce AI at all levels of education. By understanding AI concepts and tools, students, employees, and citizens can develop critical thinking and computational skills, enhance their productivity and creativity, and become more adaptable to technological changes. AI education can also foster a better appreciation of the ethical issues presented by AI and how to address these issues, both

crucial for responsible AI development and use. Moreover, AI can facilitate access to human knowledge and data and enable interdisciplinary approaches to knowledge acquisition and to problem solving. Finally, as a tool, AI can be used to improve educational outcomes, personalize learning experiences, and enhance student engagement. In this section, we make several recommendations for integrating AI in elementary and secondary education. Then, in the next couple of sections, we present our recommendations

for tertiary, vocational, and continuing education, and research. In K-12 education, the existing programs and those under development should be updated so they are more adaptable to the fast-moving developments in AI. This effort should focus on teaching technical skills at different levels of depth, integrating AI into traditional subjects and the educational process, and appreciating the impact of AI in different domains as well as the ethical dimensions of its use. We expand on these points below through a series of recommendations.

AI EDUCATION IS CRUCIAL FOR FUTURE WORK- FORCE READI- NESS

Proposal 4.1: Revise and update the curriculum to incorporate AI through a tiered approach.

We propose a systematic reevaluation of the curriculum and its approach to introducing computational thinking, data science, and AI-related concepts, in K-12 education. Specifically, we believe that computing and AI education needs to be adaptable to the diverse learning needs and interests of students through a tiered approach that allows each learner to engage with computational and AI concepts at a level that matches their skills, abilities, and interests, fostering a more inclusive and effective educational experience. Examples of countries where such curriculum has been developed or is in development include Finland, Sweden, South Korea⁵⁰, India.⁵¹

Tier 1 of such a tiered approach would introduce fundamental computational and AI concepts, expose students to existing AI tools and applications, and prepare them to reflect on ethical considerations arising from the use of AI, for example questions around data privacy, the negative consequences of using inaccurate or biased AI models, the use of AI bots to spread misinformation and disinformation

on online social platforms, etc. This foundational level would be mandatory for all students, providing broad exposure to AI technology, its use, and its impact on society. It would teach students how to use AI tools to enhance their learning, working, problem-solving abilities, and creativity, preparing them for a future where basic AI skills are a necessity.⁵² By emphasizing AI-related ethical issues, students would also learn to engage with questions about its responsible use in the real world. This tier would ensure that every student has a basic understanding of AI and its significance and is able to use available AI tools, regardless of their technical aptitude.

50. Adam, Pushy, B., Fields, H., Taylor, J., Parsons, J. (2020, November 23), “South Korea to introduce AI to High School Education in 2021; to train 5,000 incumbent teachers by 2025”, Synced:

<https://syncedreview.com>

OECD, Country Digital Education Ecosystems and Governance: A Companion to Digital Education Outlook 2023, Korea:

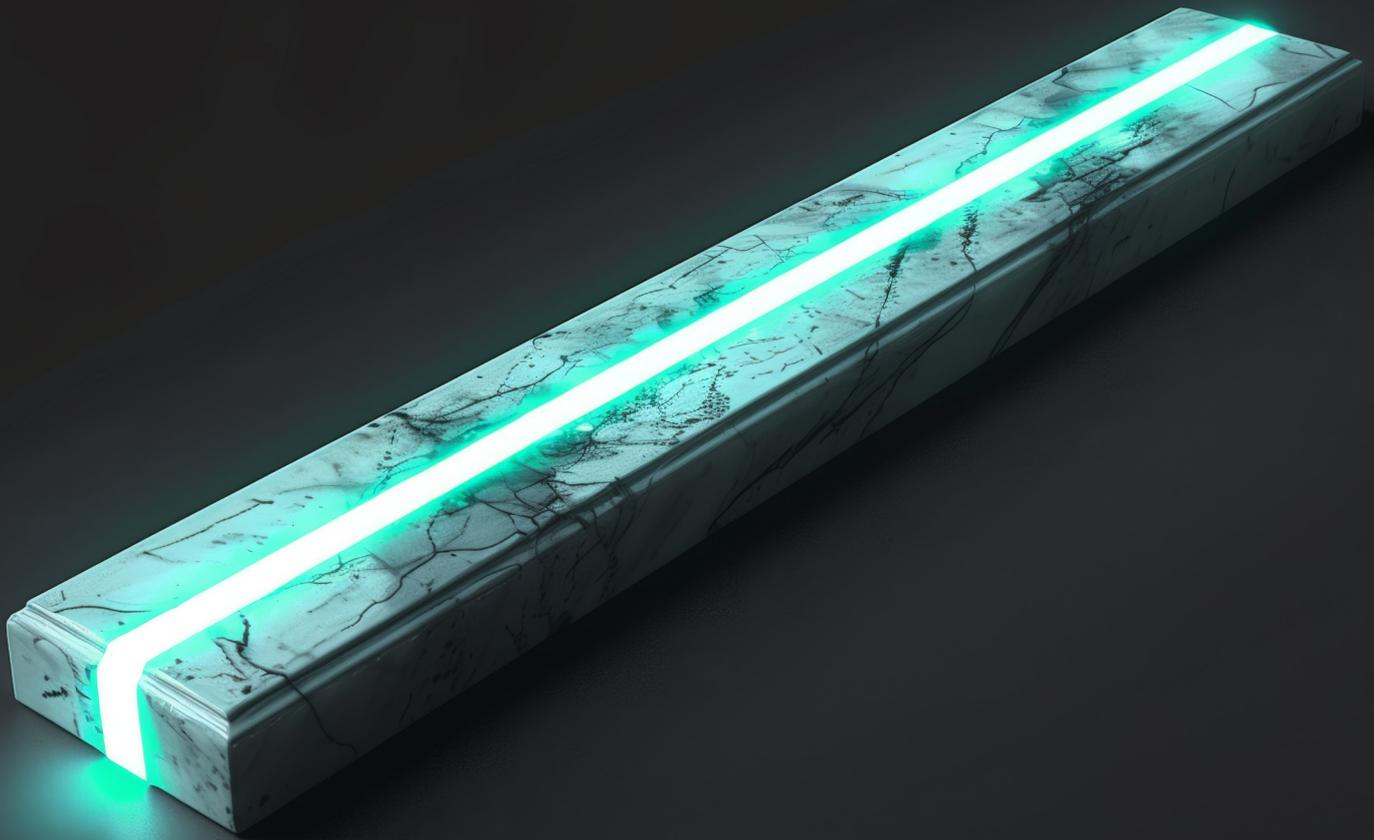
<https://www.oecd-ilibrary.org>

51. Stanly, M. (n.d.). India to have AI education in the school curriculum. INDIAai. <https://indiaai.gov.in>

52. <https://www.hbs.edu/ris>

Tier 2 would introduce programming, machine learning techniques, and problem-solving with AI skills. This intermediate level would target students who have a keen interest in the technical aspects of AI and wish to explore its practical applications. Hands-on AI projects and activities in this tier would allow students to develop their programming skills and apply machine learning algorithms to address specific challenges. This tier is essential for nurturing the next generation of AI developers and innovators.

Tier 3 is aimed at students who wish to pursue advanced studies in AI. This level would cover the mathematical foundations of AI, more advanced programming techniques, and exposure to the computer systems substrate wherein AI models are trained and operate. By providing a deeper understanding of the principles of AI technology, this tier would prepare students for higher education and careers in AI-related fields. It is crucial for developing the expertise needed to drive future advancements in AI technology.



Proposal 4.2: Integrate AI into traditional subjects.

Introducing AI into traditional subjects in K-12 education is crucial to prepare students for a future where AI is deployed in a range of disciplines. We emphasize the importance of incorporating AI into more traditional subjects, similar to the way Finland⁵³ has incorporated AI and computational thinking across subjects such as math, science, and language. For example, AI offers tools that can be used to enhance students' comprehension of literary texts and styles, and it enables the creation of simulation tools that can be used to study and visualize phenomena in biology, genetics, ecology, and physiology, such as the spread of infectious diseases in a population, DNA sequencing, and protein folding. By incorporating AI into elementary education in this integrated manner, students will be encouraged to engage in project-based exploratory learning and will also cultivate the AI skills and knowledge to navigate and contribute to an increasingly AI-driven world.

Proposal 4.3: Deliver AI-related educational materials through a central platform supporting teaching and learning, virtual collaboration, and hosting AI competitions.

Equitable access to high-quality, innovative educational materials is often limited by financial resources and the relative proximity of students to quality educational instruction. This disparity not only undermines the principle of equal opportunity in education but also widens the skill gap between different segments of the population, further entrenching socio-economic divisions. To bridge this gap and provide faster and broader access to high-demand concepts and skills, we propose the initial delivery of AI educational materials, developed by teams of AI experts in academia and industry, through a central online platform that provides infrastructure and software for teaching AI skills. We propose that the government substantially subsidizes this platform to sustain its development and use for certain groups of citizens, including students. Additionally, content creators should be compensated based on the usage of their material, creating incentives for them to produce high-quality, engaging content that effectively meets the learning needs of all students. By doing so, it will be possible to foster a dynamic and sustainable ecosystem for AI education, where excellence is rewarded, and continuous improvement is encouraged.

The same platform can host competitions and hackathons that provide a virtual space where participants can collab-

orate, share ideas, and display their skills in real-time. These events can be structured around specific themes or challenges, encouraging participants to develop innovative solutions using AI and other technologies. The platform can facilitate the submission and evaluation of projects, provide access to relevant datasets and tools, and enable communication among teams and mentors. By hosting competitions and hackathons, the platform can foster a community of learners and practitioners, promote hands-on learning, and inspire creativity and innovation in the field of AI and beyond.

Finally, we propose that the same infrastructure can be used for professional, vocational, and continuing education, as discussed in the corresponding section of this chapter.

Proposal 4.4: Train educators to leverage AI in the classroom.

It is crucial to ensure that educators, in both educational and professional settings, are thoroughly trained in AI concepts and fundamentals.⁵⁴ By equipping teachers with the knowledge and skills to bring AI tools into the classroom and to teach AI concepts, a more cohesive and effective educational framework will be created. Educators should be trained to use multimodal generative AI tools - that is, AI systems that can understand inputs and generate outputs across multiple types of data such as text, images, audio, and video - to design diverse educational experiences, design various curriculum trajectories, and collaborate with their colleagues in an AI-assisted manner.

53. Finland AI Strategy Report. AI Watch. (n.d.). <https://ai-watch.ec.europa.eu>

Proposal 4.5: Introduce new computational subjects.

Given the central role of Computer Science, Statistics, Data Science, and AI in today's technological landscape and the wide range of their applications, it is important that these subjects receive adequate emphasis in the curriculum. These subjects should be taught separately to ensure that students receive a solid foundation in each and should be combined with or integrated into other subjects to expose students to their applications. These subjects would include those proposed under Proposal 4.1 of this section but should have broader coverage of material. The current offerings on these topics should be updated to become more relevant and more rigorous so that they also ensure a solid foundation for advanced study and application. By enhancing students' proficiency in these subjects, those with a keen interest and competence will be drawn to university-level programs, where they can pursue further AI-related studies that contribute to Greece's academic, economic, and industrial standing throughout the world.

Proposal 4.6: Use AI tools in the educational process. Do so cautiously and methodically.

Introducing AI tools in the classroom and teaching process should be approached cautiously and methodically, as the impact of these tools on both learning outcomes and the emotional and social well-being of students is not yet fully understood. It is essential to consult best practices and conduct thorough evaluations to assess the effectiveness of AI in enhancing the educational experience and its impact on students' mental health and social interaction. By implementing AI tools in a measured and evidence-based manner, educators can be sure their integration into the learning environment is beneficial, and not inadvertently harmful to students' overall well-being.

At the forefront of AI applications in education are "AI tutors," that is, virtual assistants that can help students learn at their own pace and receive customized feedback. AI tutors have the potential to enhance the learning experience. However, more research should be conducted to empirically confirm the effectiveness, scalability, and integration of such technology, and to address issues of data protection

and safeguards against bias. Thus, the deployment of these tools must be carefully considered, planned, and tested before they are widely implemented.

There are several other meaningful ways in which AI can be utilized in education.⁵⁵ For example, AI can support instructors in generating detailed and effective class plans, streamlining the lesson planning process to ensure all objectives are met. Additionally, AI tools can be employed to monitor students' well-being and mental health by providing educators with valuable insights to proactively address any concerns. However, when these tools are applied in the educational setting, it is crucial to streamline the General Data Protection Regulation (GDPR) and the EU AI Act requirements to enable the effective use of these tools without compromising students' privacy and data protection rights. By simplifying compliance procedures and providing clear guidelines for the use of AI in such settings, educators can harness benefits from AI benefits while safeguarding students' personal information. Finally, Virtual Reality-based AI tools can transform learning by immersing students in a more interactive and more engaging learning experience.

54. OECD Digital Education Outlook 2023: Towards an Effective Digital Education Ecosystem (Chapter 5. Digital teaching and learning resources & 7. Teacher digital competences: formal approaches to their development):

<https://www.oecd-ilibrary.org>

55. <https://www.researchgate.net>
<https://papers.ssrn.com>
<https://www.researchgate.net>
<https://www.researchgate.net>

STRENGTHEN GREEK AI EDUCATION, RESEARCH, AND INDUSTRY

4.3 Tertiary Education and Research

Greek universities offer a few dozen undergraduate programs in information technology, many of which include AI-related courses. They also offer a few dozen master's programs with AI-related courses, including programs in ethics and digital humanities.⁵⁶ Moreover, most Computer Science, Electrical Engineering, and Computer Engineering departments, as well as several other departments offer PhD programs in AI, AI adjacent, or AI related topics.

Yet, there is a substantial brain drain of graduates from Greek undergraduate programs, who seek research and job opportunities outside of Greece. Moreover, our interviews with large

corporations and our survey of startups reveal that the availability of skilled human capital consistently comes up as the most important factor for companies choosing to invest in AI-related activities.

In this context, Greece is in urgent need of enriching its AI talent pool and create a strong research community that would attract more talent, entrepreneurs, and investors, contributing to a thriving ecosystem that would invigorate the country through the creation of well-paying jobs, start-up growth, and venture capital investments. A main objective of this ecosystem would be to secure Greece's enduring competitiveness in AI.

Another one would be to increase the capability of Greece for frontier research and improve its ability for translating research breakthroughs into commercial products that companies and government agencies can use to realize better outcomes.

Below we make several proposals whose goal is to strengthen undergraduate and graduate education in AI and AI related fields, strengthen Greece's capabilities in AI research and innovation, increase industry-academia collaborations, coordinate an AI research strategy for the country, and encourage innovation in targeted domains that could drive economic development and other societal benefits.

56. <https://masters.minedu.gov.gr/Bachelors>
<https://masters.minedu.gov.gr/>

Proposal 4.7: Launch an AI Center of Excellence, a new graduate school and research center in AI, humanities, and social sciences.

To reap the greatest possible benefit, Greece must invest in projects that propel it forward, alongside other leading countries in innovation and research. One way to do this is to lean into the country's current advantages: a) the significant number of scientists in relevant fields in Greece and, especially, the large number of distinguished scientists in the Greek diaspora; and b) Greece's special historical relationship with the humanities and ethics, which will be called upon in the coming years to address the significant changes that will occur in many areas of life.

To leverage Greece's existing strengths, we propose the establishment of an AI Center of Excellence, a new graduate school and research center whose goal is to do world-class research and education in AI. The Center will also offer interdisciplinary, multidisciplinary, and transdisciplinary programs related to AI, including programs on AI ethics.

The center will serve as a reference point supporting the country's transition into the new era. It will attract the top researchers from Greece's universities and research centers, and members of Greece's scientific diaspora who excel internationally in AI-related fields. It will educate the country's new generation of AI practitioners and scientists, improve Greece's research standing in AI, advise the Greek government on national priorities, support the state for various AI-related projects (e.g., teaching AI in schools), help boost the entrepreneurial and innovation ecosystem, and play a significant role in boosting AI literacy among students, professionals, employees, and the general population.

The center could also develop executive education programs, offering specialized training programs designed for leaders and decision-makers in industry and government. These would focus on AI's practical applications, strategic implications, and ethical considerations. They would equip executives with the knowledge and skills to effectively integrate AI into their organizations to drive innovation and improve operational efficiency. This is important to pursue as well-informed leaders can make better decisions that promote economic growth, enhance public services, and ensure responsible AI usage, helping to create a forward-thinking, and technologically advanced society and economy.

The center should be governed by special legislation that would ensure stability, continuity, independence, flexibility, and efficiency. It would operate with a substantial endowment and draw funding from governmental, industrial, European and philanthropic sources. It could be established in collaboration with a renowned academic institution abroad, or, at any rate, aim to be a world-class institution. The center would pursue international research cooperation which could take the form of joint research programs or joint PhD programs with universities in other countries, or participation in international joint efforts such as ELLIS.⁵⁷ This will allow Greece to upgrade its current capabilities, collaborating with the best in the world and contributing substantially to AI's global development.

57. <https://ellis.eu/>

Proposal 4.8: Coordinate Greece's AI research strategy and design a corresponding funding program.

The state should consult with AI experts and relevant stakeholders, including consulting the AI Center of Excellence, to lay out the foundations for a National Artificial Intelligence Research Program, which will set priorities for AI research in Greece, and develop a strategy for the development of Greece's AI research and innovation capabilities. Such a program could also target the challenges that Greek SMEs face in adopting and deploying AI. The General Secretariat for Research and Innovation (GSRI/ELIDEK/etc.) should design an associated funding program serving the aims of i) increasing the availability of funding for basic research in AI, and ii) directing funds towards AI applications that are expected to have a high economic and societal impact. Funding should also be made available for research at the interface of AI with Social Sciences and the Humanities.

Proposal 4.9: Consolidate educational programs and units within existing structures.

Greek universities and research centers suffer from fragmentation and a lack of coordination and collaboration. We propose that steps are taken to consolidate or coordinate programs that relate to AI. Doing so within and across top universities can create flagship programs with strong name recognition.

Joint ventures can also be created for focused AI research (cf., the model of Germany⁵⁸), which could include access to computational infrastructure, targeted funding (e.g., from ELIDEK), and new positions for faculty members in AI-related subjects.

Proposal 4.10: Enhance multi- and inter-disciplinary undergraduate and post-graduate courses and programs on AI-related subjects, including international programs.

It is important to develop a variety of courses and postgraduate data science and AI programs so that students across various disciplines learn how AI technologies and methods can facilitate tasks and solve problems in their areas of expertise, while also becoming aware of the ethical issues and complexities involved. In particular, these courses and programs should target not only students from natural sciences and technology but also those from the humanities, health, finance, and agriculture. To achieve this, existing initiatives should take an interdisciplinary approach, fostering collaboration between Computer Science (CS) departments and those from the humanities, health, environmental science, engineering, and other fields.

More specifically, this goal can be realized by (i) introducing more AI and data science courses in BSc programs of non-CS departments, and (ii) organizing general-purpose MSc programs on AI fundamentals for students from various disciplines, as well as sector-specific spe-

cializations on AI applications. Coordination between different programs should be pursued to minimize overlaps and maximize value.

Emphasis should be placed on courses that provide knowledge and skills useful in domains where Greece has a competitive advantage, and where high economic and societal impacts are expected, such as maritime transport, tourism and cultural heritage, health, and legal sectors. Agreements between the Education Ministry and the country's tertiary institutions should be established to support this direction.

Another equally salient objective concerns the enhancement of student internship programs for projects utilizing AI methods in commercial technology development and applications. Universities must encourage students to seek internships and engage in global internship programs. More collaborations and agreements with local businesses offering training opportunities for students in AI-related subjects should be established, e.g. in the framework of BSc/diploma theses or as part of dedicated traineeship programs that are part of universities' curricula. Moreover, industrial PhD programs that emphasize collaborations between private or public sector companies and universities should be reinforced. Both internships and industrial PhD programs would offer applied research opportunities to students and would contribute to research and education with translational benefits to the economy.

58. <https://www.oecd.org>

Efforts should be made to create AI programs taught in English to attract international students. Beyond degree programs and certificates, specific incentives, and motivations to engage in AI activities and education could be provided. For example, a national distinction of “AI Expert or Fellow” should be considered upon completion of a series of relevant studies.

In both under- and post graduate programs, women should be encouraged to enter AI and data science fields. A more inclusive, balanced, and diverse body of talent will also mitigate bias in AI systems and lead to innovations with varied perspectives that enhance creative problem-solving.

Proposal 4.11: Develop a next-generation AI skills graduate program.

The Next Generation AI Graduate Program will attract and train job-ready AI specialists through competitive national scholarships.

The scholarships will be co-funded by universities and industry to support students pursuing a master’s or doctoral degree. Students will also engage in tailored training and professional development to build job-ready and complementary skills. These graduates will help eliminate the shortage of AI specialists, which is a pressing challenge when adapting and developing AI technologies.

The Next Generation AI Graduate Program will be designed so that high-performing student teams undertake industry-focused research projects to build real-world experience. This will bridge the research-industry gap by focusing research on industry-specific topics, transferring research directly into industry, and developing students with industry-ready experience.

By increasing the supply of ready-to-work AI specialists, businesses will be better able to adopt, adapt and deploy new and emerging technologies. Access to this pipeline of domestic AI talent will ensure the availability of local talent to fill highly skilled AI jobs in Greece and contribute to the local business competitiveness.

The AI Center of Excellence would be in an excellent position to design the Next Generation AI Graduate Program. Working with universities, industry partners and other stakeholders, the cen-

ter could develop and implement an incentive program to increase the likelihood that students will not leave Greece after completing their studies.

In addition to the Next Generation AI Graduate Program, a further investment in a next generation emerging technology graduate program would attract and train specialists in other emerging technologies such as robotics, cybersecurity, blockchain technologies, etc.

Furthermore, universities could develop “professional master’s programs,” i.e., postgraduate conversion courses in computer science/AI for graduates of other fields of study, preferably in collaboration with private sector companies, with the aim of better linking universities with the job market and addressing the skills mismatch.

Proposal 4.12: Develop an “AI Solutions to Build a Stronger Greece” program.

“AI Solutions to Build a Stronger Greece” will support businesses to collaborate with research bodies on AI pilot projects for challenges of national importance. The goal of these projects would be to develop AI-based solutions that will lead to better health, economic prosperity, and other societal benefits. Challenges can be identified in domains such as:

- **health, ageing and disability:** challenges in this space may include using AI to improve human health through prevention or treatment, achieve healthy ageing, and support people living with disabilities. The solutions related to this proposed specialization of AI are of great value, considering the increasing or high rates of chronic diseases, the ageing of the population and the unsustainable growth of healthcare costs;
- **cities, towns, and infrastructure:** challenges in this space may include using AI to reduce costs and improve the efficiency of the design, construction, operation, and maintenance of built infrastructure. There are significant deficiencies in Greece’s built infrastructure, which are negatively affecting the functioning of our cities. Automation and sensor systems can improve our infrastructure;
- **natural resources and the environment:** challenges in this space may include agricultural robotics, the use of data analytics and machine learning in farms, monitoring the environment and predicting natural disasters, etc. Greece can develop technological solutions for these challenges and export these solutions to a world that is hungry for more food, fiber, metals, and a cleaner and more sustainable environment.

These challenges will require private sector expertise and public data to address, and progress on these challenges may tangibly improve the lives of Greek citizens by improving the nation’s health, built and natural environment, etc. Dual-use technologies, i.e. technologies that can be used for both civilian and military applications, may also be pursued. The development and deployment of solutions in this program must conform with the EU AI act. Further, ethical principles governing these solutions can be incorporated in the calls made by this program.

This program will provide a pathway for organizations to commercialize their AI solution to address a national challenge at the end of the pilot. The development of AI-based solutions will also provide an opportunity to demonstrate the potential of AI technologies, encouraging their greater uptake across the economy.

Proposal 4.13: Facilitate knowledge sharing and access to data for research.

Open access to scientific results is key to promoting AI research, improving the quality of research and the free dissemination of knowledge in society and the economy. To promote an open AI science policy, efforts need to be made towards establishing a national AI network that brings Greek stakeholders into discussions around open science, advocating for the easier production and dissemination of scientific research data with direct scientific, economic, and social impact. This effort may build on the insights provided in the proposal for a National Open Science Strategy, drafted by a team of research centers, universities, and other stakeholders. A set of charting activities and surveys should be undertaken to gain a better understanding of the Greek AI research ecosystem, and to identify the technical, ethical, and cultural challenges arising in choosing an open access model.

The Greek OpenAIRE NOAD,⁵⁹ in collaboration with academic and research organizations, is expected to intensify its efforts to spread awareness through a number of activities: webinars in the Greek language about trends in open access in AI related publications and research data, to provide updates on EU requirements and the European Open Science Cloud, etc.; workshops encouraging all stakeholders to work together on pre-defined issues; and training events on Open Science (e.g. data management plans) and on using specific OpenAIRE services and tools (e.g., Amnesia).



⁵⁹. OpenAIRE is a pan-European infrastructure for open knowledge, a pillar to the European Open Science Cloud (EOSC). OpenAIRE maintains a strong network of experts known as the National Open Access Desks (NOADs) who are committed to supporting the adoption and implementation of Open Science in their national research environments. <https://www.openaire.eu/noad-activities>

4.3 Lifelong Learning, Professional Training, and Vocational Education



The digitization process of the past few decades has already been transforming life and work, and AI is reinforcing that trend. This accelerated momentum underscores the need for education aimed at broadening the understanding of AI by the general public, and programs aimed at developing AI skills and talent in the workforce. In the workplace, AI should not be viewed primarily as a replacement for humans, but as a technology that can be used to augment their capabilities, opening avenues for AI and human collaboration.⁶⁰ On the one hand, humans can design, train and fine-tune AI models for specific applications, enhance the explainability of AI model predictions, and impose ethical boundaries for the use of AI. On the other hand, AI can deliver human-like interfaces with technology and information, generate powerful insights from data, and create new content on demand.

New jobs emerging in this human-AI collaboration space — roles such as AI model engineers, prompt engineers, responsible AI use advisors, data curators, etc. — are already gaining traction but availability of talent is scarce.

Meanwhile, in Greece, AI is poised to significantly enhance productivity across all sectors of the economy. Productivity in the service sector is expected to benefit significantly, much more compared to previous automation technologies. A Google study for Greece⁶¹ estimates that business services, real estate, information technology, finance, public administration, education, and healthcare will experience the most substantial productivity gains, with an anticipated annual increase of 1.5%. The tourism sector, a cornerstone of the Greek economy, is projected to benefit with a 1% annual productivity boost.

While some jobs in Greece (estimated at 6% in the same study) may face partial or full displacement, many more (estimated at 62%) stand to benefit, with AI boosting productivity and creativity. The new space where humans and AI co-exist is exactly the space where new learning programs will need to be created and made broadly available.

60. <https://papers.ssrn.com>

61. <https://implementconsultinggroup.com>

4.4.1 Lifelong Learning

Given the above context, lifelong learning programs must address the needs of both the workforce (producers and users of AI technologies) and the broader public (consumers of AI technologies).

As outlined by the World Economic Forum,⁶² we are experiencing a paradigm shift wherein individual skills are gaining prominence compared to traditional job credentials. As AI continues to advance and automate processes across various industries, human adaptability and continuous skill development are essential to remain relevant. Individuals should embrace a mindset of continuous learning that will help them operate successfully within an evolving work landscape and be ready to adapt to future, yet to be defined jobs.

As the deployment of AI technology becomes increasingly pervasive, a broad understanding of AI by the general public is also crucial for informed decision-making, critical thinking, and “digital citizenship.” Moreover, a well-informed public can better evaluate the potential benefits and risks from AI (including misinformation and disinformation, deep fakes, model bias, etc.), participate in discussions about ethical considerations around AI use, and contribute to shaping AI policies that align with societal values. By fostering a culture of AI literacy and providing educational resources for a broad understanding of AI by the general population, we can ensure that the benefits of AI are widely accessible, and its potential drawbacks are mitigated.

62. <https://www.weforum.org>



4.4.2 Professional Training

In addition to the proactiveness of individuals, organizations (regardless of size) need to rapidly reskill and upskill their workforce. Starting from a thorough analysis of current and future talent needs to identify skill gaps and opportunities, organizations should forge strategic partnerships with public and private educational institutions to develop tailored training programs and foster a culture of experimentation within their operating models to encourage continuous learning and innovation.

At the same time, private and public upskilling or reskilling programs must ensure that they address three different target audiences:

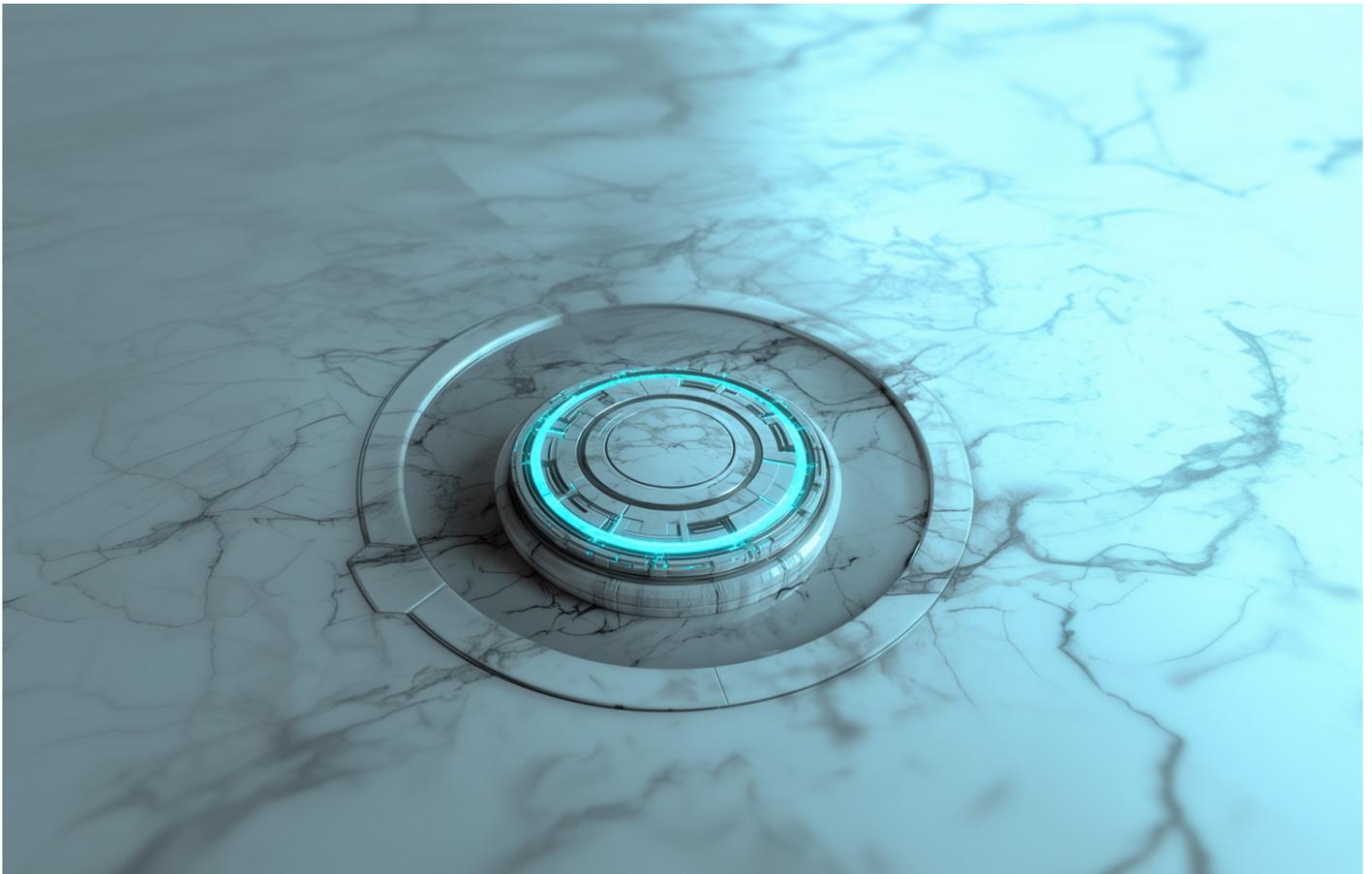
- Technical employees, through tech academies designed to foster the development of current and future skill needs.
- Non-technical employees, through general audience educational resources and interaction with subject matter experts to increase technical fluency.
- Technology leaders, through targeted experiences that enhance their technical acumen and prepare them to govern and advance technological innovation.

The objective of these programs should be to unlock human potential in the workplace, supporting individuals not just during their upskilling or reskilling training but throughout their transformation journey. Although many workers express a willingness to learn AI skills, only 5% of organizations currently offer large-scale training programs.⁶³ This gap needs to be bridged swiftly to meet the demands of an evolving job market.

In Greece, low participation rates in professional training in AI reflect a fragmented professional education landscape. Programs often face bureaucratic hurdles and lack cohesion, resulting in inconsistent quality. To address this, professional training initiatives should be created through strong public-private partnerships. These programs must be transparent and inclusive, and incorporate forward-thinking steering mechanisms to continuously adapt to the latest developments in AI. Universities should play a pivotal role in this process by making reskilling and upskilling opportunities available and accessible by reducing bureaucratic hurdles.

Finally, generative AI is well-suited to enhance the delivery of professional learning programs by creating personalized learning experiences, tailoring education to individual needs rather than following the traditional “one-size-fits-all” approach. A monolithic model does not serve well the needs of adult learners who prefer to learn at their own pace and may have a diversity of knowledge and experience. Generative AI can analyze large amounts of data related to the knowledge, strengths, weaknesses, and learning style of each participant to create a personalized learning plan for them.

63. <https://www.accenture.com>



4.4.3 Vocational education

In the realm of practical AI skills, a robust vocational education program is essential to address the growing demand.

To ensure inclusive access to quality vocational education in AI, we propose establishing regional training centers equipped with state-of-the-art infrastructure, including AI hardware, software, and datasets. These centers should partner with universities for joint vocational programs and collaborate with industry leaders to align curricula with the latest industry trends and job requirements. Additionally, online learning platforms should be leveraged to provide flexible learning options and reach a wider audience, particularly in remote areas. Furthermore, innovative teaching methods, such as project-based learning and simulations, should be encouraged to create engaging and effective AI learning experiences.

The interdisciplinary nature of AI, its rapid evolution, and the ethical considerations of its use underscore the need for continuous professional development for vocational educators. To address this challenge, we propose establishing AI certification programs for vocational educators, complemented by mentorship from experienced AI professionals.

Finally, we propose the establishment of partnerships with leading Greek companies to offer apprenticeships and internships to vocational students, thus bridging the gap between theory and practice. Furthermore, certification programs that recognize the skills acquired through apprenticeships should be developed to enhance the employability of vocational students in the AI field.

Through AI-focused vocational education, we can build a skilled workforce that drives innovation and productivity while preparing for a future shaped by automation and AI. These programs can also promote social mobility, helping to mitigate the risks of unemployment and economic inequality, and creating a resilient and forward-thinking society, equipped to thrive in the digital age.

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5. Regulatory Framework

5.1 Objective – Purpose

The subcommittee on regulatory framework was formed to examine the implications of AI developments for Greece's institutions and lawmakers. The overarching objective of this chapter is to present new institutional arrangements and regulations that can promote innovation in the development of AI while ensuring its safe and responsible use, for the public interest and the common good of all citizens in Greece.



By anticipating areas of strength and opportunities for improvement and considering various alternatives, we recommend the establishment of:

- an AI Supervisory Authority to protect human rights and strengthen AI innovation and research;
- new roles in the Greek government, related to AI strategy and implementation, and data management and governance, which will be instrumental in leveraging data to drive innovation, improve public services, strengthen governance, enhance own-

ership of public data, ensure ethical, morally sound and trustworthy decision-making, and safeguard the necessary conditions for digital sovereignty, that is, Greece's leadership and autonomy in the digital field.

We also propose frameworks for:

- updating existing laws to ensure that Greece harmonizes with the recently introduced EU AI Act;
- updating labor legislation to respond to new labor market, environmental, technological and societal realities introduced by AI;
- protecting and strengthening of democracy at different levels of decision-making;
- and regulating AI to preserve information integrity and safeguarding truth and trust.

5.2 High-impact recommendations

Proposal 5.1: Establish the National Artificial Intelligence Supervisory Authority (NAIA) asked with striking a balance between the protection of human rights and the promotion of innovation and research, as well as between strengthening the market and safeguarding competition; supervising AI systems; and advising the legislator.

The impact of AI on our lives requires its supervision by an independent supervisory authority. The authority that we propose is also mandated by the EU AI Act. Emphasis should be placed on the multidisciplinary expertise of the authority's members, which should reflect all aspects of AI. It is crucial that conflicts of interest are avoided in appointing the

authority's members to ensure the new supervisory authority is aligned with the constitutionally and legally enshrined supervisory authorities.

The proposed NAIA should be appointed and set up within the next year. In addition to its supervisory roles above, it should also take on other important supervisory tasks, including that of supervising the creation (by the entities outlined in Proposal 5.3 of this section) of AI regulatory sandboxes and safe harbors, also discussed in the chapters on Innovation and Entrepreneurship and AI and the State, as crucial to promoting innovation and attracting investment.

Given the importance of the new supervisory authority, strict guarantees of transparency and

political independence must be established. The Greek supervisory authority should be a model for other European supervisory authorities. It is important to note at this point that other independent authorities, such as the Hellenic Data Protection Authority, the Hellenic Authority for Communication Security and Privacy, the National Council for Radio and Television, the Ombudsman, and the Supreme Council for Civil Personnel Selection, enshrined at the constitutional and EU levels, retain their sanctioning and decision-making powers, with the NAIA expressing its opinions on relevant matters. Also, the NAIA will closely cooperate with other authorities established on a national and EU level.

Proposal 5.2: Transform the Data Protection Authority into a Data Protection and Access to Information Authority to ensure a balance between personal data protection and access to information.

Article 85 of GDPR mandates that member states reconcile by law the right to the protection of personal data pursuant to this regulation with the right to freedom of expression and information, including processing for journalistic purposes and the purposes of academic, artistic, or literary expression. Establishing a single administrative authority for Data Protection and Access to Information Authority, as we propose here, will ensure that Greece adheres to these dual protections. This provision will enhance transparency since Data Controllers or AI providers/deployers would not be able to use data protection as a pretext to refuse access to crucial data.

IDENTIFYING SOURCES OF VALUABLE DATA

Proposal 5.3: Introduce two governmental entities: a Chief AI Strategy Officer, with an AI strategy planning mandate, and a Data and AI Office, with a data curation, data governance, and AI implementation mandate. In concert, these entities will pave the way for our country's AI transformation through the implementation of frameworks that enable the curation and governance of data, and the development of a cohesive AI strategy, including around leveraging the power of data for the public good.

In an era seeing rapid technological progress, data accumulation, and AI innovation, it is imperative for the country to define a data collection and utilization strategy that would enable its resilient and sustainable development and ensure its digital sovereignty. Identifying sources of valuable data and leveraging AI to analyze and derive insights from this data is crucial for uncovering patterns, predicting outcomes, and providing actionable insights that enhance strategic planning. Strategic planning allows governments to identify and prioritize critical areas of intervention, allocate resources efficiently, anticipate future challenges and opportunities, and make informed decisions based on a comprehensive analysis. To orchestrate the country's capability on this front, we propose:

- introducing a new role, the **Chief AI Strategy Officer**, with emphasis on strategic planning, oversight, and overall government coordination authorities as part of the Presidency of the Government;
- establishing a **Data and AI Office** (perhaps within the Ministry of Digital Governance) with data curation, data governance, data sandboxing, and an AI implementation mandate.

To develop and oversee long-term strategic plans that are well-aligned with national priorities, and to coordinate government departments to ensure cohesive and unified AI initiatives, we propose the establishment of the Chief AI Strategy Officer. This role will include identifying opportunities for integrating AI and data analytics as a means to support policy, public service provision, and government operations. The Officer will monitor and evaluate the development and implementation of data-driven solutions that are ethically sound, reliable, and aligned with human rights and national interests. The Officer shall be responsible for intervening, wherever necessary, and responding to emerging issues, fostering collaboration with the private sector, academia, and international partners to incorporate best practices and innovative solutions. The Officer shall demonstrate extensive experience in strategic planning and policy development, strong leadership and coordination skills, an ability to foresee the potential impact of strategic decisions, and expertise in AI and data analytics. The AI strategy designed by the Officer would benefit from access to high-quality and high-volume data, and a well-designed data governance policy, with emphasis on open data access. Accordingly, the Officer will coordinate the state's strategy for the collection, curation, storage, and access of data, via frameworks that prioritize data quality, privacy, and security.



On the implementation front, we propose the establishment of the Data and AI Office whose mandate is the implementation of the Greek state's data collection, curation and storage infrastructure, the implementation and enforcement of the state's data governance policy, and the implementation and deployment of AI solutions, in coordination with the Chief AI Strategy Officer and other state entities, and in collaboration with the private sector, academia, and international partners. This new office will be instrumental in Greece's ability to implement solutions that harness the power of data to promote innovation, strengthen governance, and advance public services.

Within this context, frameworks should be established so all governmental departments and public administration entities can provide clearly documented and secure methods for accessing data and related functionalities. This office will develop and implement AI-driven solutions, in collaboration with the Chief

AI Strategy Officer, proposed above, and work with IT and data science teams to integrate these solutions into government operations.

This office will also implement frameworks for safe and secure experimentation with data and AI solutions, including AI regulatory sandboxes and safe harbors, infrastructure playing a critical role in AI innovation, as also discussed in the chapter on Innovation and Entrepreneurship. This office requires expertise in data governance, management, and advanced analytics, proficiency in AI technologies and their practical applications, strong project management skills with a focus on implementation and operationalization, and the ability to communicate complex technical concepts to non-technical stakeholders. This office will play a critical role in collecting, curating, and making available high-quality and high-quantity data to innovation, in promoting responsible and sustainable innovation, and in improving resilience to future challenges.

Proposal 5.4: Modernize and Streamline Data and AI related regulation. An appropriate update of the existing legal framework is proposed to ensure the timely harmonization of Greece with the EU AI Act, where it has regulatory discretion, as well as to ensure proper use of primary and secondary data. With the relevant arrangements, Greece has the potential to become a pole of AI development and data exploration, while it safeguards the protection of human rights and the adherence to AI development principles.

As an EU member state, Greece is expected to pursue regulatory harmonization with the EU AI Act. The EU AI Act is a landmark piece of legislation on AI that follows a risk-based approach, meaning that the higher the risk posed by the AI system according to the classification of risk proposed by the Act, which includes posing risk of harm to the health and safety or the fundamental rights of persons, the stricter the rules for its regulatory compliance. Within this context, Greece will be required to update its own legislation, paving its path towards harmonization with the AI Act, while promoting the development of human-centered, safe, and trustworthy AI systems by both private and public actors, ensuring respect for fundamental rights while fostering innovation and stimulating investment in digital transformation.

The national legislator should incorporate the provisions of the AI Act and address any areas where there is discretion for domestic regulation, in alignment with the proposed governance architecture. This is especially important given that the EU AI Act may have certain structural limitations with respect to the protection of fundamental rights.⁶⁴ This new national harmonized legislation should address the application and specification of tools prescribed in the EU legislation such as the algorithmic impact assessment, fundamental rights impact assessment, codes of conduct, transparency registers, regulatory sandboxes and safe harbors, to name a few. Consistent with our discussion under Proposal 3.10 of the chapter on Innovation and Entrepreneurship, Greece has the opportunity to differentiate itself by placing itself on the more business-friendly end of the spectrum of local regulation. It also has the opportunity to distinguish itself by implementing the provisions of the AI Act speedily and in a way that provides the most clarity, simplicity, and flexibility to companies choosing to operate locally.

Local regulation should be consistent with other relevant national and European legislation, namely the Digital Services Act and its implementing law, the Data Governance Act, the EU Data, the proposed AI Liability Directive (AILD) and the proposed revisions to the Product Liability Directive, and of course the GDPR. Finally, Greece should consider the timely ratification of the Council of Europe's first international, legally binding treaty on AI and human rights, democracy, and the rule of law, ensuring citizens' protection and transparency, accountability, and legal certainty, while upholding the economic prospects of start-ups and SMEs, accelerating their market introduction, and increasing national and European competitiveness.

THE NATIONAL LEGISLATOR SHOULD REFLECT THE PROVISIONS OF THE AI ACT

64. C Green and J Tasioulas, 'The EU's AI Act at a Crossroads for Rights', AI Ethics at Oxford Blog (Dec 4, 2023) <https://www.oxford-aiethics.ox.ac.uk>

J Ober and J Tasioulas, 'The Lyceum Project: AI Ethics with Aristotle', Part II <https://papers.ssrn.com>

Proposal 5.5: Regulate and employ AI to Protect and Enhance Democracy. The use of AI tools to subvert democratic political processes, or manipulate individuals through micro-targeting, is a potential threat to democratic processes. On the other hand, AI tools can enhance democracy by facilitating citizen participation in deliberative processes. Rigorous research is needed to understand these threats and opportunities with a view to crafting policies that mitigate the former while encouraging the latter.

The use of AI technology for the purpose of subverting democratic political processes, through such activities as the spread of misinformation, disinformation, and deepfakes, or the manipulation of individuals through micro-targeting, are threats that cannot be ignored. Concerns about such threats, however,

need to be counter-balanced by an appreciation for the ways in which the innovative use of such technology can enhance deliberative democracy at different levels of decision-making, from the enactment of national legislation to local government and corporate governance, among other domains. AI tools can help scale up democratic deliberation and decision-making, e.g., facilitating consultation, summarizing consultations, and aggregating vast amounts of online input (e.g., the pol.is system employed by Taiwan). In this way, AI technology can also become an important tool in fostering the democratic governance of AI technology itself. Indeed, the production of AI for the benefit of society, in terms of transparency and accountability, cannot happen without the participation of society itself, which deliberative democracy can enable. The above also pertains to building “digital

trust” for platforms, which can be achieved through continuous public evaluation, democratic representation, and participation where critical decisions are made.

One possible experiment in democratic participation, among many others, involves the creation of citizens’ assemblies that engage in collaborative discussions, some of which could be uniquely enabled by open AI tools. Adoption of good democratic consultation practices, using advanced AI applications, is also applicable to parliamentary public deliberation processes during law-making.

The implementation of the recommendations in Proposal 5.5, as well as those of Proposal 5.6 below, can be guided and facilitated by the activities and deliberations of the Global AI Ethics forum proposed in Flagship Program 6 of the Introduction.

REGULATE AND EMPLOY AI TO PROTECT AND ENHANCE DEMOCRACY

Proposal 5.6: Introduce regulation to preserve information integrity. In an era where AI is increasingly shaping the landscape of information dissemination, the risk of AI deception, misinformation, and disinformation has escalated to unprecedented levels. The ability of AI to generate convincing yet false content poses a significant threat to the foundational role that truth and trust play in our society. Therefore, there is an urgent need for a multi-faceted approach to regulate and invest in research to safeguard access to valid information.

The rapid advance of AI has made it challenging to maintain the integrity of information. To counteract the potential negative effects of AI-generated misinformation and disinformation,⁶⁵ a comprehensive strategy that includes regulation, research, collaboration, and interdisciplinary dialogue is essential. By taking decisive action, we can harness the potential of AI while safeguarding the truth and trust, so vital to the functioning of our societies.

To this end, we call for action coordinated by various entities, including the National AI Supervisory Authority (from Proposal 5.1 of this section), the Chief AI Strategy officer (from Proposal 5.3 of this section), and the global AI observatory for the democratic process, proposed as Flagship Program 6 of the Introduction. These actions include the following:

- **Establish regulatory frameworks:** Develop comprehensive regulation that sets clear guidelines for the ethical use of AI in information dissemination.⁶⁶ This should include incorporating the relevant provisions of the EU-AI Act, fleshed out and adapted to Greek law and the Greek reality of journalism and infosphere regulation to improve the transparency, accountability, and veracity of AI-generated content.
- **Foster interdisciplinary dialogue:** Recognize that addressing AI's impact on information integrity is not solely a technical challenge. It requires a dialogue that encompasses legal, ethical, social, and political dimensions. Engage experts from various disciplines to ensure that regulatory and technological solutions are fitting and effective.

65. <https://www.oecd-ilibrary.org>

66. <https://bioethics.gr>

- **Foster collaboration with research centers, startups, and innovators:** Encourage partnerships between government agencies, private sector entities, and academic institutions to advance the understanding of AI's impact on information integrity. This collaboration should aim to develop innovative solutions that enhance the detection and mitigation of AI-generated misinformation. Provide funding and other incentives to startups and researchers focused on developing technologies that counteract misinformation and disinformation. Supporting a vibrant ecosystem of innovators will accelerate the development of tools and methodologies that can help maintain the integrity of information.
- **Promote international collaboration:** Misinformation and disinformation are global challenges that require coordinated efforts. Engage in international collaborations to share best practices, develop common standards, and jointly tackle the cross-border nature of AI-generated false information.
- **Introduce anticipatory regulation for AI-based media:** Regulation must anticipate the coming impact of AI-based media and big platforms on information integrity and the health of the information sphere in general. Hence, a hybrid of state regulation and self-regulation, i.e. co-regulation, is needed so that systems of quality and ethics will be effectively updated and deployed within public and private media organizations, to minimize AI deception risk (see particularly the Media Freedom Act). In this regard, the National Council for Radio and Television (NCRTV) should obtain relevant technical expertise and consultancy.
- **Develop advanced safety technologies and interventions** to create safer and more inclusive and equitable digital spaces - especially fighting the realities of cyberbullying/harm against women and vulnerable groups.
- **Foster strategic foresight activities** to promote and seize potential AI future benefits for the national information environment.

In all, rigorous interdisciplinary research and action needs to be conducted to assess the gravity of any threats AI poses to democracy and, in the light of that assessment, to inform sound policy recommendations to combat any such threats.

Proposal 5.7: Enhance labor regulation to protect work from the new realities presented by AI and ensure the timely harmonization of Greece with the provisions of the EU AI Act related to the use of AI in the workplace. Where Greece has regulatory discretion, develop law that protects workers' rights and presents a clear regulatory environment for developing and deploying AI technology.

As discussed in the Education section of the chapter on Education and Research, AI is expected to transform the workplace, impacting both low-skill and high-skill jobs. Indeed, 60% of jobs in advanced economies, with their greater exposure to AI, are expected to feel its effects, with about half of these jobs benefiting from increased productivity, and about half facing reduced demand, lower wages, and job losses. Local labor regulation should protect workers whose jobs are more likely to be affected by AI technology, e.g. by providing them incentives for reskilling and upskilling in conjunction with compulsory qualification certification mechanisms. It should likewise incentivize employers to support the reskilling and upskilling of their employees. If done successfully, such programs would improve the pace of the country's AI transition.

Greece should also make sure to comply with and harmonize its local regulation with the EU AI Act. This covers several applications of AI in the workplace where it either prohibits certain types of AI systems or requires their treatment as high-risk practices. Local laws should comply with the former and describe clear frameworks and oversight mechanisms for the use of the latter, with the aim of protecting workers' rights as well as presenting a clear regulatory environment for developing and deploying AI technology.

REGULATE AI FOR ETHICAL AND EQUITABLE USE

Importantly, the EU AI Act mandates that AI systems intended to detect the emotional state of individuals should be prohibited in the workplace. It also treats as high-risk AI systems used for decisions related to employment and workers management, such as for the recruitment and selection of workers, for deciding terms of employment, for making promotion and termination decisions, for allocating tasks based on behavior, traits or other characteristics, and for monitoring and evaluating work. Such systems may greatly impact future career prospects, and livelihoods of persons, so it is very important to introduce robust regulatory frameworks and oversight mechanisms that would ensure fair treatment and protection against discrimination. This is especially important as AI systems are prone to incorporating biases contained in their training data, which may reflect historical patterns of discrimination, for example against women, certain age groups, persons with disabilities, or persons of certain racial or ethnic origins or sexual orientation. Moreover,

AI systems used to monitor the performance and behavior of workers may undermine their fundamental rights to data protection and privacy.

These concerns and the need for robust regulation and oversight also become particularly important in the gig economy, where hiring and matching decisions take place on widely automated platforms. As a result, there is an increased risk of algorithmic bias affecting decisions at scale, and sensitive worker information being collected at scale. Labor legislation should appropriately account for platforms that fully automate employment decisions and the management of workers.

Finally, an effective regulatory approach should be developed to protect the intellectual property of artists, authors, and other creatives as well as enterprises and the general population in terms of how their content is used by AI systems, especially generative AI models, which generate text, images, and other content. These models, which play a critical role in the ongoing AI revolution, require access to vast amounts of data

to train, and when they generate some output, it is not always easy to discern which of their training data contributed to its generation. The importance of these models creates an urgent need for a clear regulatory framework specifying what data these models are allowed to use, under what conditions they can use copyrighted data, how creatives and enterprises can be compensated for their intellectual property, and how some content can be opted out from being used. It is important to create an effective regulatory approach that does not stifle the development and deployment of these models, but that also protects intellectual property.

HERCULES

Choosing between good
and evil



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06

6. AI and the State



AI technology has the potential to revolutionize the way government agencies operate, offering solutions that can improve efficiency, accuracy, customization, and service delivery. However, implementing AI projects in the public sector requires the availability and orchestration of resources and a careful consid-

eration of AI's safety, ethical, legal, and social implications. In particular, the various stakeholders need to make sure that AI technology does not only meet its technical specifications but also aligns with the public interest and adheres to the highest standards of transparency, accountability, and fairness.

6.1 Objective – Purpose

The goal of this chapter is to examine the current state of AI adoption at all levels of the Greek government; and to identify opportunities for positioning Greece at the forefront of AI adoption, fostering a more responsive, transparent, and effective government, and providing a competitive national advantage. In more detail, this chapter aims to:

- propose strategic priorities for the advancement and integration of AI technology in different sectors of the government; and
- develop horizontal recommendations to guide future AI initiatives, ensuring they contribute to the overall improvement of public services, enhance operational efficiency, and promote innovation in governance, while being aligned with ethical principles and respect for human rights.

Structure of this chapter: We begin by detailing a list of guidelines that we suggest should be followed when designing and deploying AI-powered solutions. These guidelines help evaluate feasibility and plan implementation, deployment, and maintenance. Next, we discuss high-priority, high-impact initiatives that can catalyze AI integration and foster a healthy AI ecosystem, emphasizing areas

where government support is crucial. We then analyze individual sectors to identify short-term and long-term priorities, tailoring recommendations to each sector’s unique needs. This structured approach provides a roadmap for using AI to drive innovation, efficiency, and growth across various government sectors.

AI Working Guidelines: We outline a set of key guidelines that

should be considered at various stages of an AI-powered project lifecycle, from conception to deployment and beyond, to both ensure that the project is feasible and that it robustly, ethically, and effectively serves the objectives of its various stakeholders. In Appendix I: 12 Guidelines for working with AI, we provide a more detailed discussion of these working guidelines.

1	Make certain your solution truly needs AI;	Feasible and Meaningful AI
2	Ensure that your project is feasible;	
3	Use high-quality data for training your algorithms;	
4	Define processes and guidelines for access to the data;	
5	Ensure that all stakeholders are aligned;	
6	Define what success means, by setting KPIs, metrics of model evaluation, and assessing Risk vs. Value;	
7	Make sure that your infrastructure, organization, and workforce are ready to support deployment;	
8	Assess the interpretability and value-add of your project throughout its lifecycle;	Responsible and Trustworthy AI
9	Remain aware of security risks and take measures to prevent and mitigate them;	
10	Ensure your project complies with legal/data requirements;	
11	Confirm the ethical alignment of your project;	
12	Ensure your project is environmentally sustainable.	

6.2 Horizontal Recommendations

Proposal 6.1: Overhaul and Redesign Greece’s Data Governance and AI Strategy.

To counter the fragmentation of data sources and flows, lack of a streamlined and effective data governance policy, and absence of a coordinated AI strategy, we propose the establishment of two new offices within the Greek government: a Chief AI Strategy Officer, with a strategic planning mandate, and a Data and AI Office, with an implementation mandate, as described in Proposal 5.3 of the Regulatory Framework chapter. Below, we provide more detail on the motivation for these new offices and their mandates from a perspective of enhancing government operations.

In the AI era, data has transcended its traditional role, evolving into a strategic asset that can yield multifaceted national wealth. High-quality, representative, and copious data sets are the lifeblood of AI systems, which can boost the efficiency of government operations, enhance the calibration of government policies, and streamline the delivery of public services. For instance, and as we discuss in later sections of this chapter, a judicious use of data can lead to AI systems that significantly improve healthcare systems (e.g., via predictive diagnostics), education (e.g., by meeting individual interests and learning needs),

the urban planning, energy and transportation sector (e.g., by designing smarter energy grids and transportation services), etc. In the realm of public safety

citizen services, as well as a catalyst for technological innovation that raises the country’s stature and influence, both economically and geopolitically. The proposed



and national security, advanced analytics enable more accurate forecasting in disaster responses, bolster law enforcement, and fortify national defense against both conventional threats and cyber-attacks.

The strategic management of data resources can become a catalyst for the government to boost its internal operations and

offices will work in coordination with one another, at strategic and implementation levels to map and consolidate the existing fragmented and decentralized data sources across all sectors of the government. Through a comprehensive mapping process, these offices will define standards for the collection of high-quality data, and continu-

ously identify and prioritize new high-value data capture opportunities.

In parallel with a comprehensive cataloguing, consolidation, and identification of data assets, establishing a robust and effective data governance policy is indispensable for unlocking the full potential of AI, while also mitigating associated risks and challenges. Data governance refers to a framework of policies, procedures, and processes that ensure data is managed effectively and securely throughout its lifecycle. It encompasses the establishment of data quality and storage standards, and ownership and accountability mechanisms that ensure data integrity, security, confidentiality, availability, and usability. It provides a robust process for defining privacy, re-identification, security and access risk, resolving any ambiguities related to intellectual property, checking consent and servicing data subject access requests. Moreover, data governance plays a critical role in securing compliance with regulatory requirements, such as the General Data Protection Regulation (GDPR) in the European Union, through measures that safeguard sensitive data, enforce data retention policies, and facilitate auditability and transparency. Finally, an important function of an effective data governance policy, indeed one that the EU AI Act has called for, is creating AI regulatory sandboxes and safe harbors, whose function is discussed in Innovation and Entrepreneurship. Both can act as magnets for the development of AI ecosystems, investments, and innovation.

The Chief AI Strategy Officer will be tasked with designing effective strategies for data governance in coordination with the Data and AI Office and various stakeholders and consistently with regulatory and operational requirements arising from national and EU data legislation, including the Data Governance Act⁶⁷ and the Data Act⁶⁸. The data governance policy should take a progressive approach that would open up data access to various government agencies, academic institutions and private companies that find value in this data, while upholding ethical principles, individual privacy rights, and regulatory compliance. The Data and AI Office will coordinate the implementation of the infrastructure that supports the defined data governance policy and its enforcement, including providing the requisite interfaces that would allow various stakeholders to appropriately access the data. Finally, the Chief AI Strategy Officer, in coordination with the Data and AI Office and other stakeholders, will be tasked with identifying strategic priorities for AI projects that are of high value for the country and can benefit from the available data assets, defining, shepherding and providing comprehensive oversight of AI and data-related projects across government sectors, as well as identifying synergies for AI efforts in the government, academia and industry.

As discussed in Proposal 5.3 of the Regulatory Framework chapter, we believe that the Chief AI Strategy Officer should have a holistic view of data and AI-related initiatives in the government, be insightful about high-value AI priorities for the country, and be able to shepherd those initiatives at the highest levels of government planning. As such, we believe a natural home for this officer would be in the Prime Minister's Office. This would also ensure that existing and/or future challenges are identified and addressed promptly.

On the other hand, we believe the Data and AI Office would have a natural home in the Ministry of Digital Governance. This office should have the technical capability of implementing, coordinating, and supervising challenging data and AI infrastructure projects involving various stakeholders, data modalities, technologies, etc. This office's operations would benefit from a network of Data Officers (DOs) who reside in other ministries and other public sector entities and act as liaisons between these entities and the Data and AI Office, in accordance with the data governance policy.

In Appendix II: Chief AI Strategy Officer Mandates we provide more details on the mandates of the two proposed offices.

67. <https://digital-strategy.ec.europa.eu>

68. <https://digital-strategy.ec.europa.eu>

Proposal 6.2: Develop an AI infrastructure strategy.

The transformative potential of AI and the infrastructure it requires for its development and deployment makes important the development of a national AI infrastructure strategy. The AI infrastructure strategy should aim to meet the needs of the local ecosystem, foster innovation, ensure scalability, and enhance national competitiveness within the AI landscape.

The development and deployment of AI technology benefits from various types of infrastructure, including data centers, supercomputers, connectivity, cloud services, regulatory sandboxes, and testbeds. Greece has already seen substantial development in such infrastructure. Indeed, three hyperscalers are already constructing large data centers in Greece, which could facilitate national and regional demand. Greece has already built a national supercomputer for researchers and scientists⁶⁹ and has a national research and education network interconnecting and providing computing and cloud services to academic and research institutions, educational bodies at all levels, and agencies of the public, broader public and private sector.⁷⁰ Greece is presently investing in a new pre-exascale supercom-

puter, called “Daedalus,” which will have the largest peak performance in the region. Daedalus is expected to be ready in 2025 and, among other services, it will provide computational infrastructure for training and serving AI models. Greece has a unified cloud for the public sector⁷¹ and is currently developing a cloud to host its large amounts of health data.⁷² Moreover, Greece has a fast national network and is in the process of building one of the largest fiber links between Europe and Asia,⁷³ establishing Greece as a prominent IT interconnection center and gateway to the EU. Finally, Greece has already built regulatory sandboxes in several sectors which can be leveraged to test AI systems, including a financial technology sandbox,⁷⁴ a sustainable development sandbox,⁷⁵ and an electricity sector sandbox.⁷⁶

69. <http://doc.aris.grnet.gr>

70. <https://grnet.gr>

71. <https://www.gsis.gr>

72. <https://digitalstrategy.gov.gr>

73. <https://www.reuters.com>

74. <https://www.bankofgreece.gr>

75. <https://sandbox.epant.gr>

76. <https://deddie.gr>

FOSTER INNOVATION AND ENHANCE COM- PETITIVENESS

Greece needs to develop an AI Infrastructure strategy that will capitalize on its existing and ongoing infrastructural developments to serve the needs of the local AI ecosystem, foster innovation, ensure scalability, and enhance the overall national competitiveness. To develop its AI infrastructure strategy Greece could focus on (a) building and maintaining its own infrastructure; (b) leasing resources from vendors based on demand; and (c) following a hybrid approach. We think that Greece should follow a hybrid approach to combine the control and customization of having its own infrastructure with the scalability and flexibility provided by access to leased resources. With a hybrid approach, Greece can optimize performance, reduce costs, and mitigate risks, while positioning itself for future growth. Moreover, a hybrid approach would integrate the existing and ongoing infrastructural investments by the government, the private sector, and multinationals, described above.

In implementing its AI infrastructure strategy, Greece can leverage, among other infrastructure in the public and private sector, the concept of the “AI Factory,” introduced in the amended EuroHPC regulation.⁷⁷ As discussed in the chapter on Innovation and Entrepreneurship, pursuing an AI Factory presents an opportunity for Greece to leverage its HPC and its broader AI infrastructure, along with other incentives to energize the development of its AI ecosystem. In addition to the AI Factory, Greece’s AI Infrastructure strategy can pursue, but not limit itself to, the following opportunities and recommendations:

- **Incentivize investment in sustainable computational infrastructures:** The immense computational demands of AI models have a significant environmental impact. To ensure responsible and sustainable AI development, it is crucial to introduce policies that promote sustainable investment in AI infrastructure. These could include: (a) tax breaks and incentives for companies investing in energy-efficient hardware; renewable energy sources for powering data centers; and innovative cooling solutions; (b) government funding for research and development in areas such as neuromorphic computing,⁷⁸ which utilizes less energy for similar processing power compared to traditional methods; (c) standardization of energy efficiency metrics for AI hardware and data centers, allowing for transparent comparisons and promoting best practices; (d) pursuing public-private partnerships for the development of sustainable AI infrastructure, fostering collaboration and accelerating innovation in this critical area.
- **Improve access to computing infrastructure:** Access to the powerful computing resources needed to train and develop competitive AI models is often limited to large corporations and well-funded research institutions. To bridge this gap and unlock the full potential of AI for a wider range of stakeholders, developing an approach that democratizes access to AI infrastructure is essential. This may include: (a) creating cloud-based AI infrastructure platforms that offer affordable access to high-performance computing resources, pre-configured software environments, and training datasets for a diverse range of users; and (b) opening access to anonymized and non-sensitive public datasets.
- **Promote the development of sectoral sandboxes:** Sectoral sandboxes hold immense potential for accelerating responsible AI innovation within specific industries. Actions that would promote their development include: (a) creating a legal framework that defines the parameters for sectoral sandboxes; (b) streamlining the regulatory processes for AI development and testing; (c) establishing mechanisms for collaboration between government agencies, industry leaders, and academic institutions for their development; (d) providing funding and incentives for their development; (e) raising public awareness for the existing sectoral sandboxes and their role in responsible AI development.
- **Standardize AI frameworks:** Standardizing the frameworks used to develop and deploy AI across the various components of the AI infrastructure presents a compelling opportunity to streamline AI development, foster collaboration, and accelerate innovation. This standardization will be promoted by (a) establishing common standards for core functionalities across AI infrastructures; (b) encouraging open-source development and collaboration between AI developers; (c) promoting the development of modular AI systems with a focus on interoperability; (d) having regular reviewing and updating cycles to remain relevant and adapt to new technologies and needs.

77. <https://digital-strategy.ec.europa.eu>

78. <https://www.intel.com>

Proposal 6.3: Develop the Greek Language and Culture Data Space.

The performance of AI models, particularly of Large Language Models such as GPT, deteriorates significantly when handling Greek text and understanding Greek cultural traits and norms, and other aspects of the Greek identity. As such, these models are inadequate for commercial and other applications involving Greek language or used by Greeks and/or in a Greek context and/or in reference to Greek data, as they could misunderstand and misrepresent Greek language and culture.

To counter this, it is important to develop a Greek language and culture data space, defining a data infrastructure and governance framework that would facilitate data collection, pooling, and sharing of high-quality datasets (perhaps curated under the supervision of a suitable institution) that are representative of the Greek language, history, and culture. A data space focusing on the Greek language

and culture, enhanced with multilingual and multimodal elements, would drive the training of foundation models that work better with the Greek language and that better understand and represent Greek culture. Such foundational models, built on the principles of transparency and trustworthiness, would also have profound economical and societal benefits.

CULTURAL UNDER- STANDING FOR BET- TER AI PER- FORMANCE

The most powerful AI models, including Large Language Models (LLMs) such as GPT, experience a large drop in performance when making predictions in contexts that are less well-represented in their training data (typically drawn from the Internet), including understanding text in non-dominant languages, such as Greek, understanding the traits, norms, and other aspects of the identity of cultures that are non-dominant in their training data, and incorporating historical facts and knowledge of cultural artifacts that are less prominent in the training data.

Given the importance of these aspects in reflecting a culture's identity and experience, this is problematic. It means that these models are inadequate for applications involving non-dominant languages, or when used in contexts, or by users, that are less well-represented in the training data.

Not only are these models inaccurate when their application domain is substantially different from the domain in which their training data was sourced, they may also replicate biases reflected in their training data when they make predictions or generate content, creating vicious cycles when this content is subsequently used to train other models. So, these models may misunderstand non-dominant languages and cultures and contribute to a decrease in their representation and preservation in AI generated content.

How can these issues be mitigated? How, for example, does one improve the performance of an LLM for usage with the Greek language or within a Greek context? The standard approaches are to a) use an Application Programming Interface (API) that allows one to use a small-scale dataset to adapt a commercial model to Greek, a process called "fine-tuning;" or to b) fine-tune an open-sourced model to Greek using a small-scale dataset. However, both approaches have limitations. Empirical evidence suggests that models trained on large datasets learn to map text in "semantic spaces" derived from the prevailing languages and cultures in their training data. It also suggests that the post-hoc introduction, via fine-tuning, of new languages, cultural traits and norms, or knowledge about historical events and cultural artifacts can be superficial, and typically does not result in models with the same level of proficiency that these models exhibit in the prevailing languages and cultures that they were originally trained on.

Within this context, Greece needs to foster the creation of models (Large Language Models and others) that more natively and more accurately incorporate the Greek language and culture. This is important for the purpose of having more accurate models for interacting with Greek citizens in the Greek language, and models that have accumulated authoritative information about the Greek culture. In turn, having such models will contribute to the preservation of Greek language and culture in the predictions made by these models and the content they generate. This

would improve their applicability to the Greek language and in the Greek context, and would have a positive impact on economic activity, education, and international collaboration.

The creation of models that better incorporate Greek culture can be facilitated by curating high-quality and high-volume data representing various cultural aspects, artifacts, norms, and other knowledge related to Greek culture, while securing intellectual property rights. This data can be used to fine-tune existing models or to train new models within an appropriate framework that licenses this data.

The creation of a "Greek Data Space" will be a point of reference regarding collection, pooling, curation and sharing of high-quality data, representative of the language and culture, and a means to foster innovation and collaboration under a suitable governance structure. This will also ensure openness, participation, security, transparency, and conformity with ethical and legal requirements, including IP rights and licensing considerations. In turn, models trained on this data and their applications could have profound economic and societal benefits, in addition to language and cultural preservation.

6.3 Health

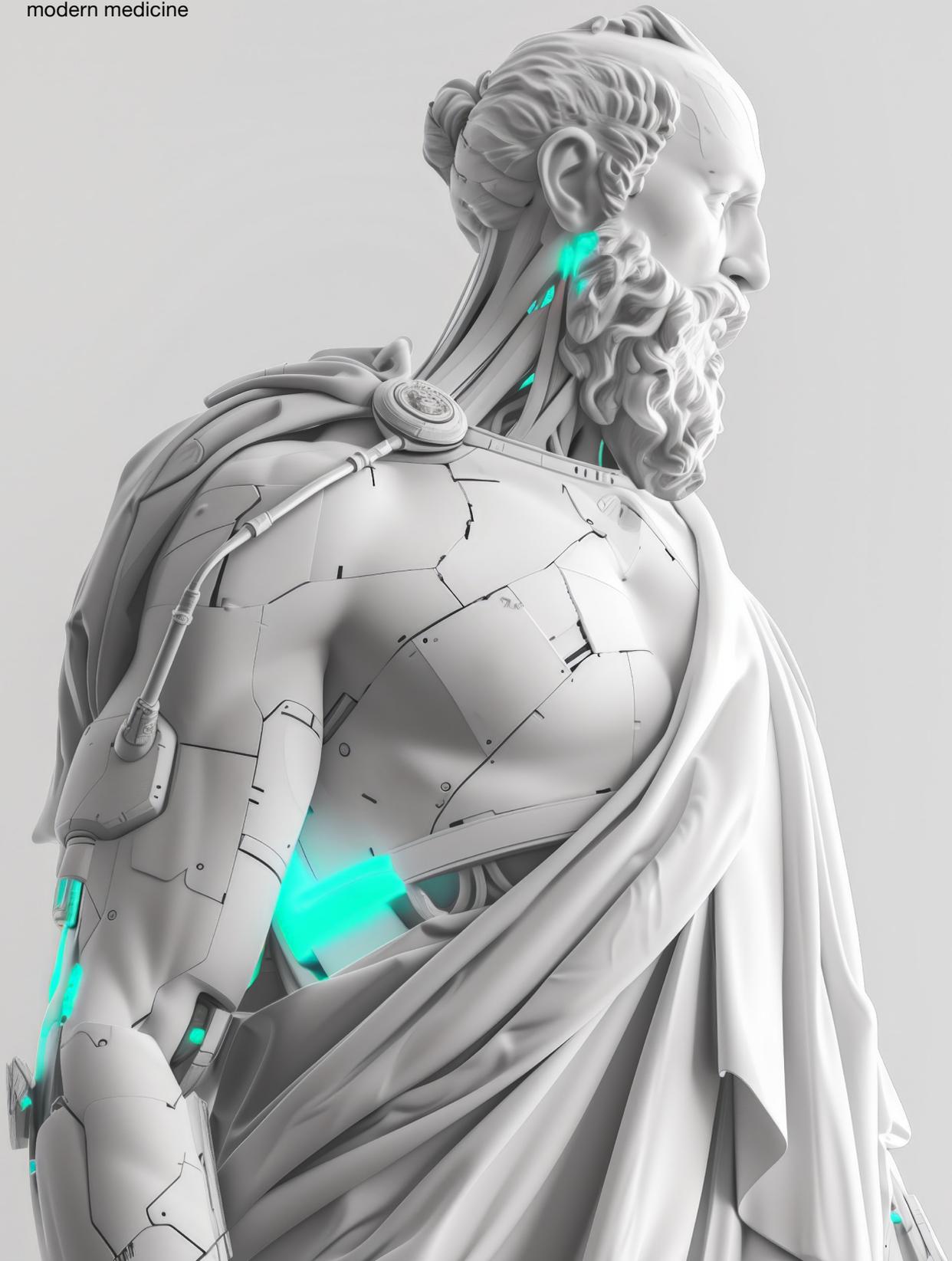
Greece's healthcare system faces numerous challenges, including fragmented and non-digitized data, limited access to and resources for care, and inefficient resource allocation. Embracing digital technologies offers a path toward a more patient-centered, integrated, and efficient healthcare system.

We believe that Greece will gain a great competitive advantage if it builds a national Electronic Health Record (EHR) system that is "AI-Savvy." Such a system would position the country at the forefront of healthcare innovation, creating the conditions for greatly enhancing the quality and efficiency of patient care, and would set a global standard in healthcare technology development.

An AI-savvy EHR would create a vast, trusted, anonymized and secure data pool and an infrastructure to build, experiment with, and deploy AI solutions. A rich and high-quality data repository with population level, longitudinal data can become an invaluable asset for the country, enabling universities, research institutions, start-ups, technology companies, and pharmaceuticals to perform ground-breaking research and development in healthcare, including identifying treatments for genetic and chronic diseases, delivering personalized medicine, and improving the efficiency of the healthcare system. It would foster collaborations between academia and industry and would attract foreign investment as global entities seek to leverage this data. An influx of investment could spur economic growth, fund further medical advances, and establish Greece as a hub for medical research and technology, enabling a virtuous cycle that delivers better healthcare to the Greek people.

HIPPOCRATES

Father of
modern medicine





LEVERAGE AI-POWERED EHR FOR HEALTHCARE INNOVATION

6.3.1 Current state and immediate actions

Based on our interviews with healthcare stakeholders, progress has been made in identifying best practices for data collection and unification, leading to a unified EHR system. The goal of existing projects is to digitize national healthcare system records and connect them with private practices, nationwide, thereby establishing a rich data ecosystem for Business Intelligence (BI) and Artificial Intelligence (AI) applications, in line with the AI Working Guidelines 3 and 7 of Section 6.1.

At the same time, we believe that designing a strategy for data utilization to enhance the quality of care, both clinically and operationally, should precede, or at least occur concurrently with investments in a new EHR system, as discussed in the AI Working Guidelines 1, 2 and 6. The new EHR system presents a unique opportunity for leapfrogging. Its execution and design must align with these guidelines, so Greece's gap in healthcare delivery and innovation, compared to other countries, will not be further amplified.

Several other aspects should also be addressed in the current planning: (i) data governance (AI Working Principle 4) should be studied and rationalized, given the current highly fragmented system that exists in silos across various institutions, and the lack of process standardization. Streamlined, dedicated processes should be developed for the evaluation, approval, prospec-

tive validation, and deployment of AI models in the healthcare sector. Ideally, these processes should be integrated into the IT infrastructure to ensure easy tracking and synchronization with data governance and existing healthcare workflows; (ii) the "AI-savviness" of current designs should be reconsidered to include processes that enable not only data collection but also consistent digitization and transfer to secure computing environments for model development and validation that are accessible to researchers. Importantly, workflows should be able to use data-driven models as input; (iii) a "human in the loop" approach (AI Working Guidelines 5, 7 and 8) should be adopted in the design stage of the project by involving medical professionals during both the scoping and implementation stages. This will ensure that the system meets the needs and complements the existing workflows of its primary users.

Proposal 6.4: Rethink and redesign digitization efforts through the lens of value added and AI-readiness.

To enhance care quality, a strategy for data utilization should precede or accompany EHR system investments with a focus on rationalizing data governance, integrating AI model validation processes into IT infrastructure, reconsidering "AI-savviness" to include data harmonization and model development, and adopting a "human in the loop" approach by involving medical professionals in the design and implementation stages.

6.3.2 Opportunities

Establishing an expansive and AI-integrated data ecosystem, while maintaining the involvement of human decision-makers and patients, holds the promise of significantly improving the quality of healthcare delivery. Below, we present four broader areas, along with illustrative examples that demonstrate the transformative potential of this approach.

- **Clinical Decision-Making:** Digitization and AI can significantly enhance patient care by providing clinicians with advanced diagnostic tools, predictive analytics, and personalized treatment plans. AI models can analyze medical data of different modalities (tabular, images, text) to assist in making more accurate prognoses and prescriptive decisions. Examples include cancer detection from MRIs, dynamic mortality and morbidity preoperative risk calculators, and neurological deterioration for patients in the Intensive Care Unit, among others.
- **Healthcare Operations:** In healthcare operations, data-driven technologies can streamline processes, reduce operational costs, increase transparency, and improve service delivery. Automated scheduling systems for elective procedures and emergency departments, AI-driven inventory management, and dynamic queue prioritization tools can contribute to more efficient and effective management of healthcare operations. AI can also optimize resource allocation, predict patient admission rates, and enhance the overall efficiency of hospital management.
- **Public Health Monitoring:** Analytics can play a crucial role in public health monitoring by analyzing population-level data from the electronic health records system to identify trends, predict outbreaks, and inform public health policies. Digital tools facilitate the real-time tracking of disease spread, vaccine distribution, and population health patterns. AI technologies can enable more proactive responses to public health crises and better resource planning and allocation on a national level.
- **Public Facing Health Services:** AI and digital platforms can offer the general public accessible healthcare information and services. This includes telemedicine services, online health portals for booking appointments and accessing medical records, and AI-powered chatbots for health inquiries and system guidance. These innovations (applied under strict guarantees of anonymization and personal data protection) can enhance accessibility to healthcare services, particularly in remote or underserved areas of the country, and empower individuals to actively engage in their own health management.

To fast-track the development and deployment of AI innovations in healthcare, we recommend establishing a streamlined regulatory approval process that balances rapid innovation with patient rights and ethical considerations.⁷⁹ This framework should include simplified approval procedures to encourage swift adoption, strict ethical guidelines to ensure privacy and data

security, continuous monitoring for safety and performance, and collaboration between AI developers, healthcare professionals, and regulators. Transparent communication with the public about the benefits and risks of AI technologies will maintain trust and accountability.

SIGNIFICANTLY IMPROVING THE QUALITY OF HEALTHCARE DELIVERY

79. <https://bioethics.gr>

6.4 Defense

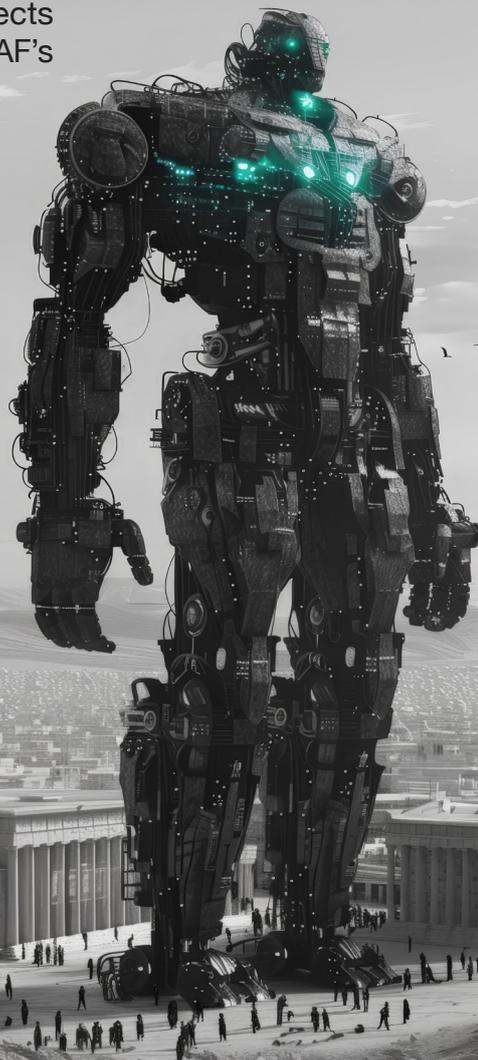
Greece's location and geography present several opportunities and challenges for potential AI applications in defense, especially in the present era of heightened geopolitical tensions around Europe. The mountainous terrain and thousands of dispersed islands form a complex border around the mainland that is difficult to surveil, centrally and continuously. Acute border crises may require Armed Forces (AF) involvement. The urgency of such crises makes it difficult to prioritize important projects related to strengthening the AF's

digital infrastructure, on top of which AI applications can be built. Access to sensitive military multi-modal data, like that obtained from thermal cameras, is not streamlined. Improving the accessibility of such data could significantly enhance Greece's strategic position within both the EU and NATO.

The AF will require dedicated personnel and resources to oversee the consistent digitization of, streamlined access to, and governance of data that can form the basis for AI application development. In addition, it is crucial to create an AF interface with private companies that could design, test, and help in the deployment of cutting-edge AI-enhanced defense solutions.

TALOS

Giant, bronze automaton, defender of Crete.



6.4.1 Current state and immediate actions

There is potential to enhance Greece's readiness in leveraging AI for AF applications. By focusing on acquiring highly qualified human resources through dedicated advanced schooling or training in computer science, data science, and advanced IT skills within the AF, Greece can unlock this potential and drive forward its AI capabilities. In addition, while there are numerous data sources that could be leveraged to train AI models, these sources must be collected, digitized consistently, and annotated.

The most immediate need is for the Greek AF to increase the output of technically proficient personnel in informatics-related fields, including computer science, data science, and AI-related disciplines. We welcome the current legislative proposal to establish a Unified Informatics Force,⁸⁰ which will create career opportunities (including graduate degrees, Intellectual Property rights for work invented, etc.) for officers trained at the highest level of the informatics fields.

In addition to permanent personnel, it would be beneficial to identify and leverage each

cohort's technical talent during their military service period. Individuals with highly specialized AI training (or expertise in other fields attractive to the newly established Center for Defense Innovation, discussed below) should have the opportunity to fulfill their conscription requirements by working on relevant projects within the military or the government. This group includes many Greek expatriates who, having postponed military service to complete advanced studies abroad, may be reluctant to return Greece because this would mean that they must complete their military service. Following other countries' model, the alternative of completing this service by working in tech fields relevant to their expertise can become a sought-after assignment.

To prepare the ground for developing and deploying AI technology, we recommend that the AF embark on an extensive program of centralized collection, digitization, harmonization, annotation, and classification of AF data collected to be used for ground, maritime, and airspace applications, cross-referenced

to terrain analysis and civil protection applications.

Thinking longer term, the AF need to have a dedicated interface towards startup companies that develop dual-use AI technology, and a set of capabilities to evaluate, test, and deploy such innovative solutions across the AF. Models for such entities exist in many other countries, such as the US, France, etc. The proposed legislation for the Center for Defense Innovation is a step in the right direction, assuming the Center gets adequate funding and appropriate personnel.

Proposal 6.5: Enhance technical proficiency, data collection and management, and dual-use AI technology development.

The Greek Armed Forces should enhance informatics-related technical proficiency through a Unified Informatics Force, develop an extensive data collection and management program, and establish an interface for collaboration with startups developing dual-use AI technology, supported by the Center for Defense Innovation.

80. Law 5110/2024 - Government Gazette 75/A/24-5-2024, Establishment of the Hellenic Center for Defense Innovation, modernization of the institutional framework of Higher Military Educational Institutions, establishment of a Joint IT Corps in the Armed Forces, and other provisions, <https://sse.army.gr>

6.4.2 Opportunities

One of the key capabilities that the Center for Defense Innovation should develop is the creation of data sandboxes. These sandboxes should contain sanitized or de-identified data, providing a secure environment where dual-use AI tech startups and enterprises can demonstrate the effectiveness of their solutions. This would not only allow for the safe exploration of innovative solutions but also facilitate the identification of potential AI applications to defense. By providing a platform where technology can be validated, the Center can foster collaboration and accelerate the adoption of cutting-edge AI solutions in defense.

The Center should also facilitate the field testing of pilot capabilities to enhance the development of safe and trustworthy AI. This testing should include benchmarking and safety compliance testing. Benchmarking evaluates AI systems against established standards and performance metrics, ensuring they perform reliably and effectively compared to existing solutions. Safety compliance testing, on the other hand, rigorously assesses AI systems to ensure they adhere to safety standards and regulatory requirements, addressing concerns such as data privacy, fairness, transparency, and accountability.

It is essential to provide funding at both the individual project and company levels. This support can fuel the development of promising technologies and create longer-term returns that can offset the costs of the Center. Indeed, by investing in innovative projects and companies, the Center can drive advances in defense technology while ensuring a sustainable operational model.



We find the most relevant short-term applications for AI in the defense sector will be in the fields of border protection (through sensor fusion, object classification, potential threat identification, etc.), intelligence evaluation, and civil protection. However, supporting world-class investment processes, and setting up private or public-private funds, will ensure continuous successful identification of the best opportunities in this space.

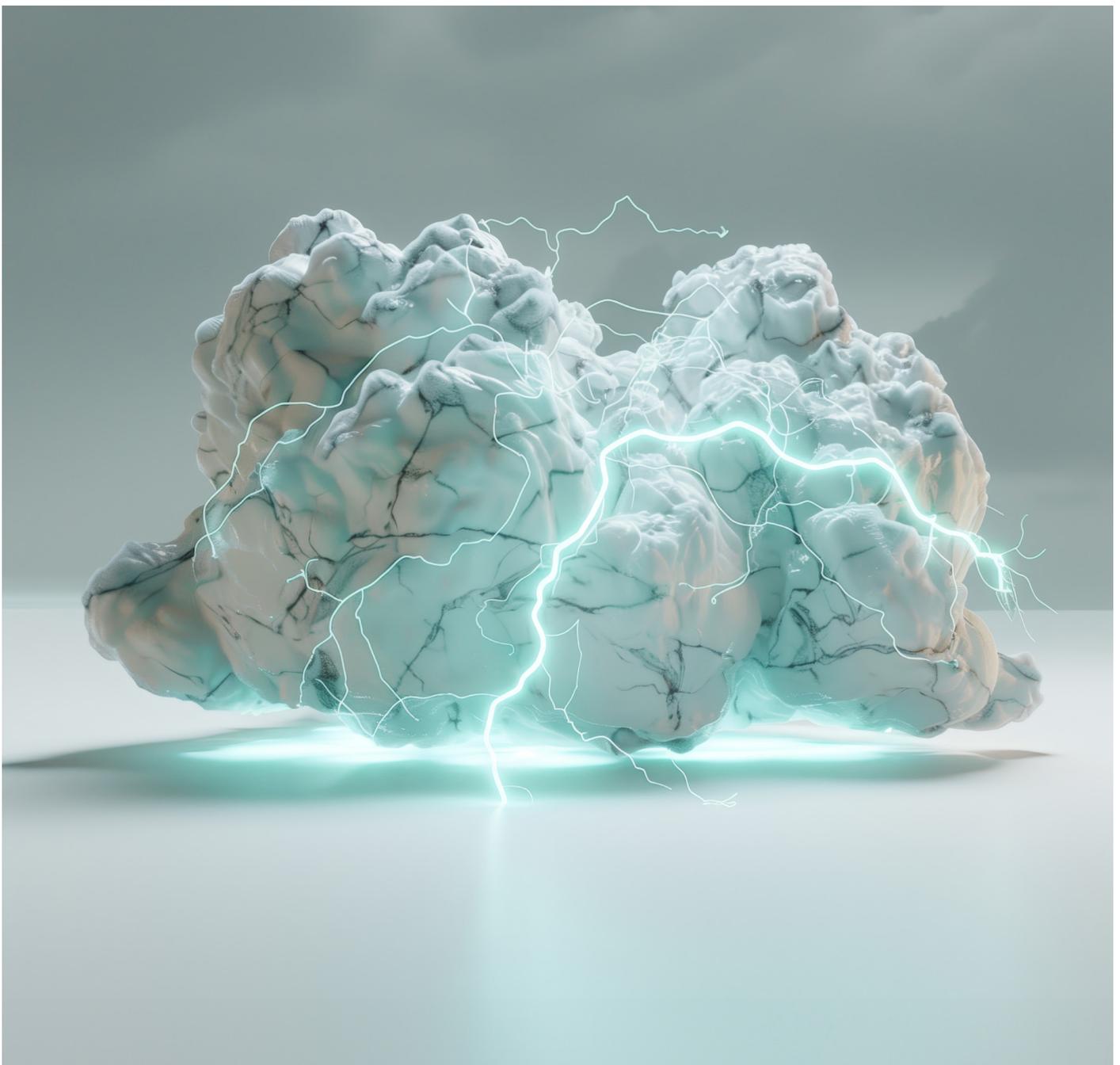
6.5 Civil Protection and Climate Change

Greece's natural landscape, geotectonic location, and urban and rural development over the past decades, pose significant challenges in the context of civil protection and climate security. A number of recent natural disasters have demonstrated the importance of climate security and the importance of respective

risks mitigation and resilience planning, not only on a national but also on a cross-border level. This will require a more strategic collaboration on both an EU and international level.

Digital transformation and capabilities brought by AI can support and provide major improvements in the efficiency

of civil protection, including a common operational picture and better awareness. Cost-efficient solutions powered by predictive and other AI-based analytics have the potential to reinforce Greece in all phases of natural and man-made crisis management: prevention, preparedness, response, and recovery.



DIGITAL TRANS-
FORMATION
AND CAPABILITIES
BROUGHT BY
AI CAN SUPPORT
AND PROVIDE
MAJOR
IMPROVEMENTS
IN THE
EFFICIENCY OF
CIVIL
PROTECTION

6.5.1 Current state and immediate actions

The AI readiness in the civil protection sector is currently assessed as low, mainly due to the fragmentation of processes, tools, and strategic planning across different entities within the system. This fragmentation hinders the establishment of a centralized system capable of quantifying risks from historical and real-time data, making localized predictions, and supporting operations in a coherent and efficient manner. While there are numerous past and ongoing projects that offer models for real-time risk quantification and simulation for various hazards, these solutions are not being systematically used or integrated into civil protection operations. Additionally, the evaluation and digital quantification of impact are often done in an ad-hoc manner, leading to delays, increased administrative costs, and a lack of a streamlined feedback loop to enhance resilience and preparedness.



Despite these challenges, there are promising aspects that could facilitate AI adoption in the civil protection domain. Although fragmented software models, infrastructures, and datasets are in place, there is a mature culture based on experienced and specialized human capital. The Greek research ecosystem has shown strong capabilities in research and innovation, ranking first in EU H2020 funding for Civil Protection and Security. Lessons learned from major disasters and the allocation of additional funds have driven the development of major information systems and ICT upgrades, such as the Fleet management system for Fire Service and Civil Protection vehicles, the ENGAGE information system, and the 112 Emergency Communications Service. These developments, along with the national program “AIGIS” for climate change and natural disaster, indicate an intensification of efforts to enhance the civil protection system’s capabilities.

Within this context, we identified some immediate actions that would contribute to benefiting from the existing momentum, while mitigating the risk of passing on systemic design flaws connected with fragmentation. First, it is urgent to plan and implement a national strategy for the collection, consistent digitization, annotation, and classification of relevant data. This should leverage the existing infrastructure to collect and fuse reliable data from multiple and multi-modal information sources. This action’s urgency relates to the fact that access to high-quality data is particularly challenging in the civil security domain due to the sparsity of historical data, security sensitivity, and privacy concerns. Second, AI-supported prediction, real-time decision support, and evacuation operations should be prioritized, given their potential to immediately benefit the protection of lives and minimize human and material loss.

Proposal 6.6: Enhance data collection, quality and accessibility, and prioritize data-driven civil protection solutions related to prediction, real-time decision support, and evacuation operations.

6.5.2 Opportunities

Over a longer timeframe, we have identified several opportunities for AI deployment in the civil protection domain. Some of these are as follows:

- Prediction, risk mitigation, pre-emptive response, and decision support tools, including early warning systems localized and adapted to the specific risk level.
- Real-time geo-risk evaluation and real-time response tools, including passive crowd-sensing, active crowdsourcing, automated emergency alerts, and call handling.
- Personalized recommendations of evacuation routes and automated evacuation monitoring with location analytics.
- Autonomous and unmanned systems as first responders, for search and rescue missions.
- Aggregation of multiple data sources combining air, ground, sea, and space data, including multi-sensor fusion and multimodal AI for optimized prediction, response, and resource allocation.
- Automated post-crisis support systems that can process citizen accounts of natural disasters, support response strategies, and offer assessment tools that assist faster response to citizens' needs and insurance claims.
- AI-supported personnel training and performance evaluation tools using augmented and/or virtual reality environments.

We emphasize that opportunities from dual-use technology and applications should be considered, and synergies with the Defense sector should be investigated, given the operational contribution and role of the Greek Armed Forces in search and rescue and disaster management operations. This can effectively increase the ROI from projects and allocated funds, including the European Defense Fund and the Greek Defense R&I ecosystem.

Finally, it is important to consider the human factors and social aspects of using AI in the extended civil security domain. These include the ethical and responsible use of AI and the acceptance of this technology from operators, field personnel, and the public. In this context, awareness raising, and capability building are key enablers that should be pursued in an open and inclusive way, ensuring the representation of civil society and vulnerable groups.

6.6 Culture

AI can play a significant role in enhancing access to and experience of culture by enabling new channels for experiencing culture, e.g., via 3D visualizations, virtual reality (VR) and augmented reality (AR) tools, and metaverses, by providing tools for supporting interactive and personalized experiences, and by creating opportunities for new types of experiences, especially through the synergy of culture, research, and technology.

AI can also play a critical role in preserving, restoring, documenting, analyzing, promoting and managing tangible and intangible cultural heritage, including by monitoring and analyzing changes to cultural heritage sites caused by threats such as climate change, natural disasters and armed conflicts.

Finally, AI can support IP rights management, especially when combined with well-curated machine-readable information on content authorship, provenance, attribution, and remuneration.



6.6.1 Current state and immediate actions

Significant progress has already been made in the digitization of cultural heritage (mainly tangible), stimulated by initiatives such as Europeana⁸¹ and Data Spaces.⁸² The ongoing digital transformation of Europe's cultural sector and the plethora of already digitized artifacts can foster the reuse of content in the cultural and creative sectors, enabling new types of experiences for audiences, in physical and online forms. Three-dimensional visualizations and reconstructions, VR and AR applications, and online virtual channels for experiencing culture and visiting cultural sites and collections are already a reality.

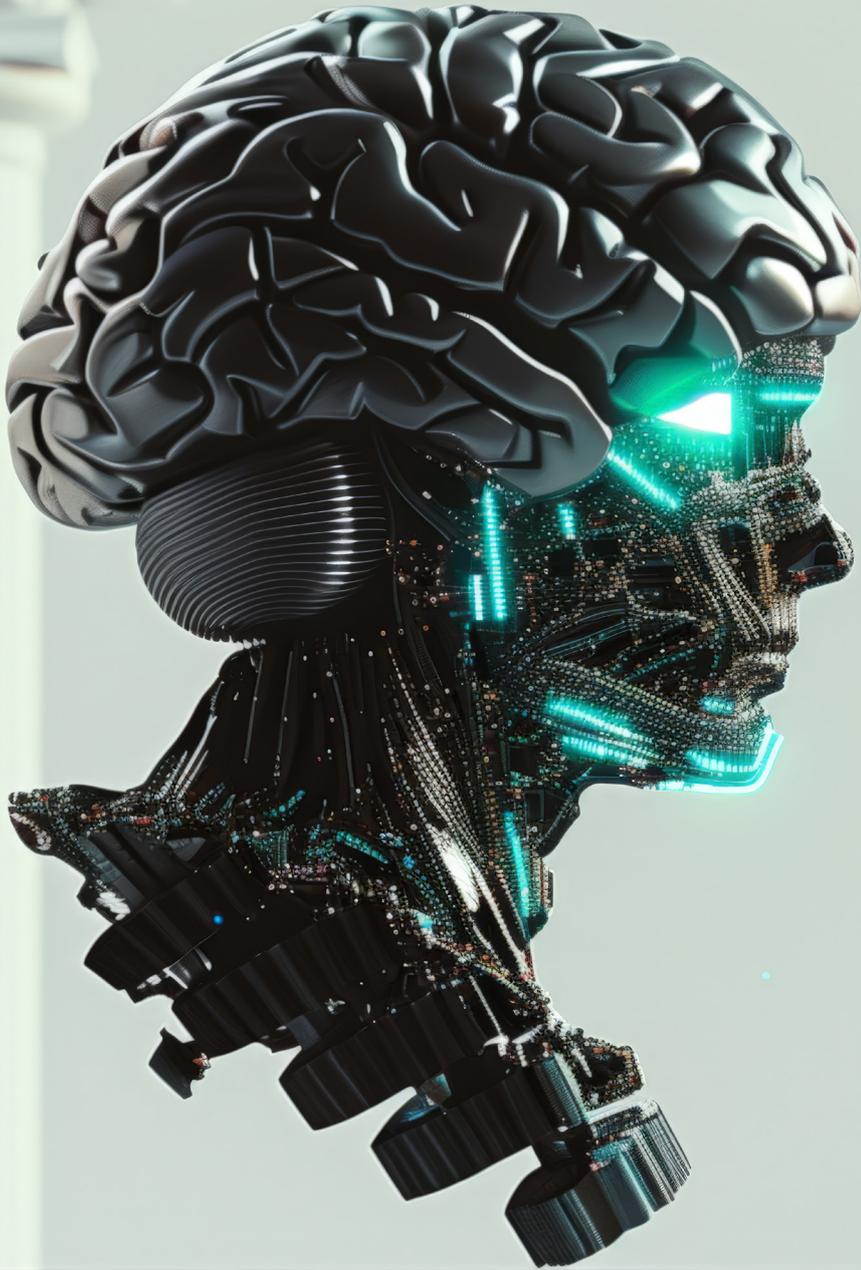
However, AI (especially generative) offers a new world of opportunities by lowering the technical skills required to build such applications, making it easy (in terms of time, resources and skill) to generate new content in various forms (text, speech, images, music, video, or a combination of these) based on existing content and human direction, and empowering human creativity through suggestions, ideas, and inspirations. Thus, Generative AI can be used to democratize the creation of applications that enhance the experience of culture. It can also help preserve culture by helping in the restoration process and by generating new artifacts inspired by existing ones, but it may also violate the IP rights of the ar-

tifacts that it uses to generate new ones. Within this context, some immediate actions to take include a) creating mechanisms for managing IP rights and collecting datasets that are clear of IP rights; b) defining a vision for how existing experiences of culture may be enhanced and proposing new types of experiences aimed at strengthening access to and engagement with culture; and c) exploring the use of generative AI capabilities to preserve culture and stimulate creativity.

Proposal 6.7: Use generative AI to re-imagine the experience of culture, increase the engagement with culture, and help preserve culture.

81. <https://pro.europeana.eu/>

82. <https://digital-strategy.ec.europa.eu>



6.6.2 Opportunities

We discuss further opportunities and considerations at the interface of AI and culture below.

Re-imagining experiences: AI can improve the efficiency of archiving, cataloguing and information management, related to digitizing physical assets and utilizing them within digital environments, while preserving their provenance, authenticity, and veracity. AI has the potential to address several of the other challenges identified in a recent EU parliament report on AI in the context of cultural heritage and museums.⁸³ AI can be used to better understand audiences, and inform and improve visitor experiences; exploit digitized assets and metadata to provide new experiences or experiences in new contexts (e.g., data spaces and metaverses); amplify operational efficiency, by empowering professionals who lack skills, knowledge and AI competence to produce meaningful and relevant content through the use of “prompt engineering” (the skill of guiding a generative AI model using prompts in natural language); reduce the need for resources (including funding and materials). Perhaps the most powerful ability of generative AI is its ability to retrieve, interpret and contextualize data in text, image, and other forms. Striving to be usable by anyone with basic linguistic abilities, even children, AI combined with museological and curatorial knowledge can enhance visitors’ experience by presenting novel experiences, including the following.

83. <https://www.europarl.europa.eu>

1. **Personalized experiences:** AI can enable personalized experiences of culture by tailoring content to someone's preferences; contextualizing experiences in on-site, on-line, and other contexts; catering for someone's needs and goals. An example of the latter is using AI to improve inclusion, e.g. by cross-lingualizing theatrical plays via real-time streaming of multi-lingual subtitles in augmented user interfaces, such as smart glasses or mobile devices, during theatrical performances.
 2. **New types of experience:** AI can facilitate the creation of new kinds of experience, either to enable creative ways to engage with culture, or to engage with culture in the context of a different activity. One example is using AI to create experiences that promote civic awareness to the youth, enabled by interacting with relevant cultural artifacts and personalities from the past using generative AI.
- **Culture preservation and creativity stimulation through AI:** Governments and cultural organizations can play a significant role in shaping generative AI by curating datasets that foster culture preservation and creativity, promoting respect for IP and safety in AI generated content, and promoting transparency, respect for IP, and integrity in the content generated by humans with the help of AI. An interesting example in this direction is provided by the French Ministry of Culture, which actively supports the creation of an open-source dataset to facilitate training of generative AI.
 - **Stakeholder engagement:** Engaging all relevant parties, namely AI developers, creatives, and holders of IP rights as well as representatives of civil society and academia will allow a bottom-up approach towards copyright and remuneration schemas, including limitations and exceptions to copyright protection, and consequently relevant top-down policies.

6.7 The Justice System

AI has the potential to improve the judicial system by enhancing efficiency, accuracy, and accessibility in legal processes. This section explores various applications of AI in the justice system, its potential benefits, and the challenges that must be addressed to ensure a fair and ethical implementation. By understanding the impact of AI on justice, we can better navigate its integration and so more effectively uphold the principles of fairness, transparency, and accountability.

THEMIS

Goddess of natural
and divine law and justice



6.7.1 Current state and immediate actions

As evident in the “Digital Transformation Bible 2020-2025,” Greece has had a plan for the use of AI in Justice since 2021. In the chapter on Justice of that report, there is a provision for “implementing AI applications for processing records and preparing decisions.” To this end, a number of projects are at different stages of maturity including: (i) judicial decisions’ anonymization; (ii) preparatory work for the inclusion of AI in Administrative, Civil and Criminal Justice through IT projects; (iii) using AI technologies to facilitate case and court decision searchability, summarization, and categorization and thus enhanced justice delivery, faster routing of case files, and correlation with jurisprudence.

There are several ongoing projects on anonymization and harmonization of judicial data. We believe that scaling these efforts should be prioritized as, on the one hand, it is crucial to maintain the privacy and confidentiality of individuals involved in legal proceedings and, on the other hand, it is important to create a large volume of judicial data to enable the development of powerful AI models that would enhance the judicial system. Beyond privacy and confidentiality, sanitizing judicial data, including removing from them sensitive information, is a critical step towards ensuring that AI models trained on the sanitized data are less likely to adopt forms of discrimination that may be reflected in the original data. However, this must be done correctly as features that are not deemed sensitive can act as proxies for sensitive ones. Ultimately, the proper anonymization of judicial data is a key step towards leveraging the power of AI to improve the justice system while safeguarding the rights and dignity of all individuals involved.

6.7.2 Opportunities

AI has great potential to revolutionize the judicial system in several ways:

- **Tools for judges:** AI can assist judges by providing them with tools that can analyze complex data, identify relevant precedents, documents or contracts, and predict potential outcomes based on similar cases.
- **Out-of-court dispute resolution:** AI can facilitate alternative dispute resolution mechanisms, such as online mediation or arbitration platforms, where algorithms can help parties reach a settlement without the need for formal court proceedings. This can significantly reduce the burden on the judicial system and provide a quicker, more cost-effective resolution of disputes.
- **Case-management and decision-support tools:** AI could potentially act as a decision-making support tool in certain types of cases, especially those involving routine matters or where the legal issues are well-defined and require less human discretion. This could lead to faster resolution of cases and free up judicial resources for more complex matters.

The above automations can save time and increase efficiency in the legal research process and implement more uniform approaches.⁸⁴ Specifically, by automating certain processes such as the calculation of prison sentences or the application of standard legal principles, AI can help achieve a more uniform approach across different cases, thus reducing the likelihood of disparities and ensuring fairness in the application of the law. Overall, integrating AI into the judicial system has the potential to make justice more accessible, efficient, and fair, while also addressing such court challenges as case backlogs and decision-making inconsistencies. It is important to note that while we do embrace technological advances in the judiciary, it is imperative to proceed with diligence to safeguard essential human rights, including the right to judicial protection and a fair trial. Utilizing police databases for predictive algorithms must be approached with caution to avoid entrenching systemic biases and risking prejudiced outcomes. Concerns arise regarding the reinforcement of existing biases through crime prevention assessments, raising issues of fairness and equality under Article 6 of the European Convention on Human Rights.⁸⁵ It is essential to avoid bias in defendant categorizations, as seen in past applications of these approaches.⁸⁶

Several foundational steps are essential for Greece to fully harness the power of AI to improve its judicial system while upholding human rights. First, it is crucial to provide access to open data when integrating AI into the judiciary. Open data allows for transparency and the development of AI tools that can analyze legal information and aid in judicial processes. Second, the gap created by the absence of a comprehensive state legal database in Greece needs to be narrowed by leveraging the extensive databases already available within the private sector. Integrating these resources can provide a stopgap solution while the state database is being developed. Third, Greece needs to streamline the currently

fragmented management and administration of the courts to create a cohesive environment that supports AI integration. Furthermore, training programs must be introduced to address the pressing need to upskill and reskill human capital, including both judges and administrative personnel, by providing the requisite knowledge to interact effectively with AI technologies and understand their implications in legal decision-making. Finally, because the provision and maintenance of appropriate equipment and necessary data centers are indispensable, these facilities need to become the backbone of AI operations, ensuring that the judiciary has the technological infrastructure to effectively implement AI solutions.

In conclusion, Greece's approach to integrating AI into the judicial system should be multifaceted, addressing data availability and curation, technological infrastructure, and human capital development to achieve an innovative, efficient, and rights-respectful judiciary.

84. <https://rm.coe.int>

85. <https://fra.europa.eu>

86. <https://www.propublica.org>

<https://www.washingtonpost.com>

6.8 Revenue Services

AI can be a game-changer for the State's revenue services by revolutionizing the way it handles tax administration and enforcement. AI can significantly enhance the efficiency and accuracy of tax processing by reducing the errors and discrepancies. By leveraging machine learning algorithms, the relevant organizations can analyze vast amounts of data to identify patterns and trends, allowing them to detect and prevent tax fraud more effectively. Furthermore, AI can streamline customer service operations, providing taxpayers with quicker and more accurate responses to their queries. This can improve taxpayer satisfaction and compliance. Additionally, AI-driven predictive analytics can assist in forecasting revenue and identifying potential areas of non-compliance, aiding in more strategic resource allocation. Overall, the integration of AI can lead to a more efficient, transparent, and fair tax system, benefiting both the government and the taxpayers.

AI CAN BE A GAME- CHANGER

6.8.1 Current state and immediate actions

Based on our interviews with various stakeholders within the Independent Public Revenue Authority, significant progress has been made in identifying Business Intelligence and Artificial Intelligence projects related to (i) improving customer service; (ii) identifying cases of interest; (iii) supporting the work of tax collection; and (iv) identifying fraudulent or illicit activities or organizations through transaction data. In line with the AI Working Guidelines 1-5, these projects are feasible, would benefit from advanced approaches and data that is rich and healthy.

As these projects advance to the next stage, we recommend that a team of data scientists and AI specialists offer more support to the Independent Public Revenue Authority to formally define Key Performance Indicators (KPIs) for these projects and build the technical infrastructure that will enable the deployment of these projects.

Proposal 6.8: Strengthen the AI capabilities of revenue services.

While the data in this domain is abundant and of high quality, and the projects being scoped are compatible with the existing technology and infrastructure, we propose bringing in more technical talent and collaboration with academic institutions and research centers to accelerate AI integration, enhance its quality and efficiency, and yield rapid results.

6.8.2 Opportunities

Given the level of sophistication of existing AI-related projects for the State's revenue services, here we present ideas on how to further advance these efforts.

AI can play a crucial role in assisting with the identification of tax evasion and illicit activities through various means:

Network Analysis: AI can map and analyze the relationships between individuals, entities, and transactions to uncover hidden networks involved in tax evasion or other illegal activities. By understanding the structure and dynamics of these networks, authorities can target their investigations more effectively.

Using different modalities: Modern AI tools can analyze unstructured data of various modalities to identify patterns or keywords associated with tax evasion or illegal activities. It goes without saying that the pursued effectiveness of such approaches should be duly constrained by maintaining a respect for civil rights.

Reinforcement learning approaches: AI can automate the process of checking tax returns and financial statements for compliance with tax laws, reducing the workload for human auditors and increasing the efficiency of tax enforcement. The feedback obtained from the human auditors can be used to continuously improve the models and increase their accuracy and effectiveness.

By leveraging these AI capabilities, tax authorities and law enforcement agencies can enhance their ability to detect and combat tax evasion, money laundering, and other illicit activities, ultimately improving the integrity of the financial system.

AI SYSTEMS
SHOULD BE
TRANSPARENT

6.9 Government management and efficiency

AI holds transformative potential for public administration, offering solutions that can enhance efficiency, accuracy, and accessibility of government operations. By automating routine tasks, analyzing large datasets to inform policy decisions, and improving service delivery through personalized interaction with citizens, AI can significantly streamline administrative processes. Additionally, AI-driven systems can assist in managing resources more effectively and facilitate transparent governance. Through these capabilities, AI not only boosts the government's operational efficiency but also strengthens citizens' trust in and engagement with public administration.

6.9.1 Current state and immediate actions

Several AI-enhanced projects with a direct impact on the quality of public administration are at different stages of design and implementation. These projects include: (i) a platform for semantic information searches and knowledge extraction from the repository of Diavgeia (where all government institutions are obliged to upload their acts and decisions); (ii) the introduction of automation technologies to reduce repetitive administrative tasks; (iii) workforce planning tools that can be used to analyze and support public sector recruitment, allowing more targeted recruitment in the event of an emergency, improve human resources management, contribute to meritocracy, and create personalized career paths within the public sector. The afore-mentioned goals require the immediate implementation of data governance and interoperability, as described in the Horizontal Recommendations section of this chapter, together with the implementation of the AI Working Guidelines 3, 4 and 7.

Proposal 6.9: Adopt algorithmic tools that can facilitate modern administrative practices, while ensuring legal compliance, effectiveness, and the protection of fundamental rights, democracy, and the rule of law.

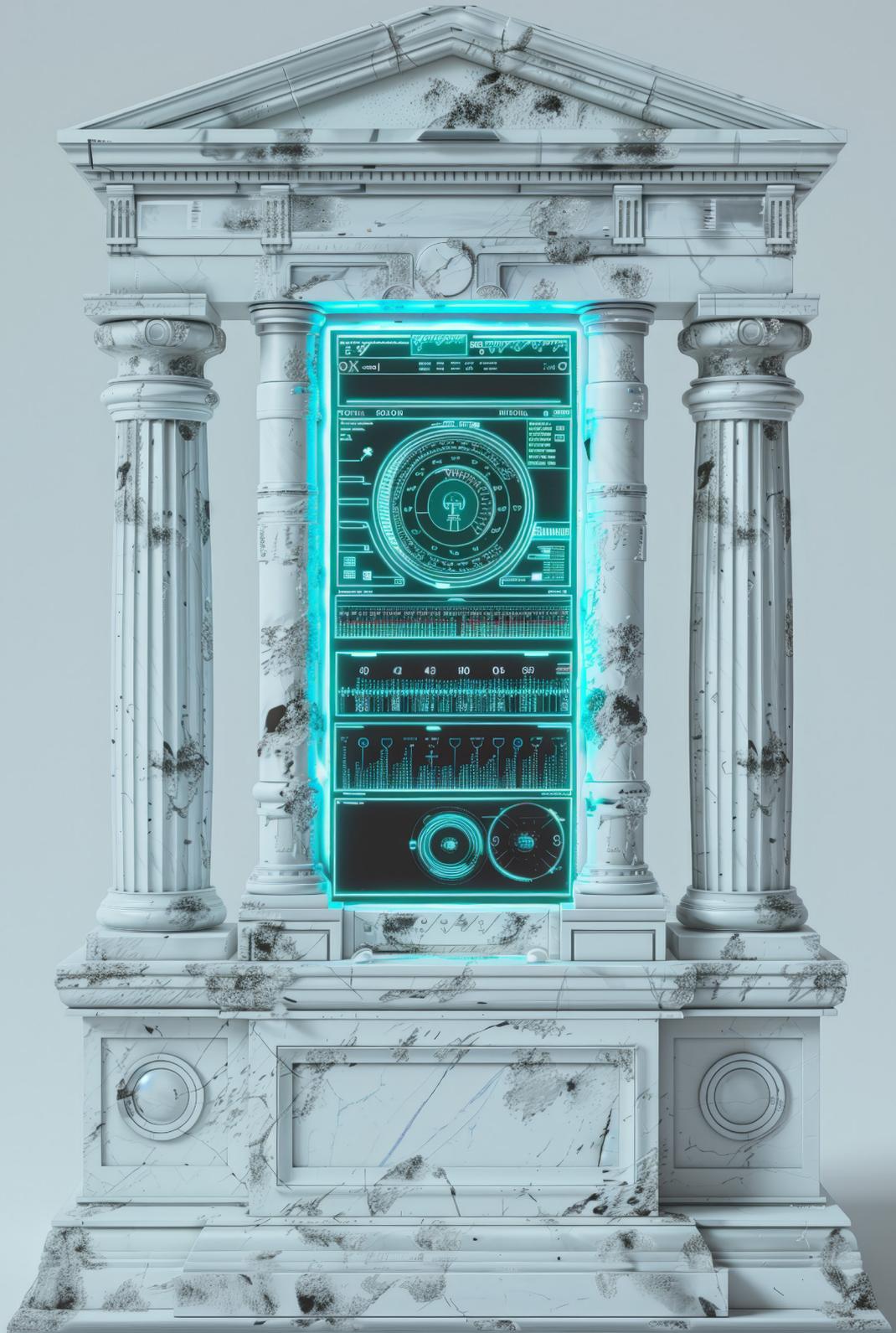
The use of AI in administrative tasks should be consistent with the basic principles of administrative law. These principles include legality, public interest, good administration and fairness, prior hearing, reasoning, proportionality, impartiality. AI systems should be transparent to build trust with all stakeholders.

6.9.2 Opportunities

- **Enhance administrative efficiency and transparency:** Employ data analytics and visualization tools to create detailed maps of administrative workflows between the central administration and various decentralized decision centers. This will help uncover inefficiencies such as bottlenecks, redundancies, and gaps in the decision-making process. It will also help to streamline operations, improve efficiency, and promote transparency, enabling citizens to better understand and engage with government processes.
- **Integrate AI in procurement and analysis of data from Diavgeia:** Leverage AI technologies to refine the procurement processes and enhance the analysis of data from Diavgeia. AI can streamline procurement by optimizing vendor selection, reducing bias, and improving efficiency. Simultaneously, AI can analyze extensive datasets from Diavgeia to uncover insights that might be missed by human analysis, thus enhancing decision-making and policy implementation. This step will not only increase operational efficiency but also bolster government transparency and accountability.
- **Develop and implement AI-based chatbots for administrative navigation rigorously and cautiously:** Design AI-powered chatbots with a focus on accuracy, security, and user privacy. These chatbots should be capable of processing complex administrative queries, providing reliable information, and adapting to new administrative policies based on continuous feedback. The rigorous development and testing of these chatbots are crucial to avoid misinformation, ensuring they serve as effective tools for enhancing public access to administrative services while maintaining trust and legal compliance.

6.10 Smart cities

More than 80% of the population in Greece lives in urban areas, and half of the population resides in just 4.3% of the country's territory. This highly urbanized demographic landscape creates challenges to maintaining quality of life, but it also suggests opportunities for deploying advanced technologies to improve the quality of life. AI-powered smart-city solutions hold such a promise and can be replicated in a (relatively) city-agnostic manner, bringing significant return on the investment that goes into their development.



6.10.1 Current state and immediate actions

The EU prioritizes investment in research and innovation in smart cities to achieve three of its priorities: its Green Deal, its focus on digital technology, and its focus on an economy that benefits people. Greece is committed to introducing measures that contribute to the Horizon Europe flagship initiative “Mission on Climate-Neutral and Smart Cities,” which aims to support 100 EU Cities in becoming climate-neutral by 2030 and serving as role models so that all EU cities can follow suit by 2050. Greece participates with five “fellow” cities: Alexandroupoli, Ioannina, Kifissia, Kozani and Ptolemaida. However, the program has had shortcomings, including a lack of quantitative indicators for impact assessment and a fragmented and limited coordination of the various initiatives.

Meanwhile, in 2021-2022, the Greek Ministry of Digital Governance initiated the “Smart Cities” program with a total budget of about half a billion euros in two phases (for 17 municipalities over 100.000 and 315 municipalities under 100.000 inhabitants, respectively). Through this pro-

gram, each municipality could fund projects aligned with its priorities, selected from a catalog built around seven categories: sustainable mobility; energy savings; reduction of the energy footprint of municipal buildings; improvement of citizen and business services; the improvement of quality of life; the strengthening of local democracy and transparency; protection from cyberattacks and strengthening of digital infrastructures.

While not explicitly encouraging the use of AI, by experimenting with the first smart city solutions, these programs can act as pilots that will guide future project design.

Proposal 6.10: Create a framework for the deployment of AI solutions in cities.

Smart Cities projects should foresee i) the deployment of sensors and digitized documents and processes that will generate high-quality data; ii) the funneling of the generated data into secure data repositories to allow the accumulation of historical data, and iii) the creation of connecting and sharing schemes that provide interoperable and secure access to data. This framework will drive AI solutions’ development and allow the replication of these solutions to cities with similar characteristics (AI Working Guidelines 3, 4, 7 and 9).



6.10.2 Opportunities

AI can play an important role in the development of efficient and sustainable local government operations, improve the overall quality of life of its citizens, and improve visitors' experiences. Some opportunities that arise in different application areas are briefly described below.

Local government operations

- **e-governance.** Chatbots can collect and handle citizen inquiries in real time. AI-enabled document management can replace time-consuming administrative tasks and increase efficiency. AI solutions can assist with accessibility and inclusion.
- **Smart urban planning.** AI-powered analysis of data, such as demographic, traffic, and environmental can support decision-making related to the required infrastructure and actions that will improve the quality of life and sustainability.
- **Waste management.** AI can optimize collection routes, leading to fewer sources of contamination, less street congestion, lower fuel and maintenance costs, reduced CO2 emissions, and more satisfied citizens. AI solutions can also help in the sortition and management of waste.
- **Public safety and emergency response.** Under the necessary constitutional guarantees, data from surveillance cameras, sensors and social media can detect incidents in real-time and provide timely alerts about imminent natural disasters, reducing response time and improving safety.

Mobility

- **Traffic management and smart parking systems.** The dynamic adjustment of traffic lights can optimize traffic flow and reduce congestion and commute times. An analysis of historical traffic data, combined with reports of sudden incidents or weather conditions allows for precautionary actions that increase traffic safety and efficiency.
- **Optimization of public transportation.** Predictive analytics can support decisions about public transportation routes, schedules, and the capacity for efficient operation.
- **Autonomous means of public transportation** can lower costs, improve safety, and increase the efficiency of public transportation.

Energy and Environment

- **Energy-efficient smart buildings.** AI algorithms can forecast energy demand, allow the automatic adjustment of temperature, and shift flexible loads, leading to sustainable and cost-efficient buildings.
- **Environmental parameter monitoring.** AI can detect pollution sources and reveal environmental trends that can assist with urban planning, allow prompt responses, and make planning recommendations to improve quality of life.

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APPENDIX

Appendix

Appendix I: Guidelines for working with AI

AI technology has the potential to revolutionize the way government agencies operate, offering solutions that can improve efficiency, accuracy, and service delivery. At the same time, the implementation of AI projects in the public sector also requires careful consideration of ethical, legal, and social implications.

Therefore, stakeholders in AI-enabled systems need to ensure that these systems are not only successful in achieving their technical objectives but also align with public interests and adhere to the highest standards of transparency, accountability, and fairness.

In the following subsections, we outline key checkpoints that should be considered at various stages of the AI project lifecycle, from conception to deployment and beyond. Additionally, we discuss guidelines that should shape the AI project design process to ensure that projects are robust, ethical, and effective in serving the needs of the public.

The intention of this appendix is to serve as a reliable and expert-informed guide for ethical and effective implementation and deployment of AI projects and products in large organizations such as the Greek government. That said, the audience for this document also includes practitioners, researchers, and policymakers in the field of AI, with guidelines that are applicable and valuable across a broad spectrum of AI applications and contexts.

Goals and non-goals: This appendix aims to provide guidance on best practices, foster an ethical and responsible use of AI, and contribute to the development of effective AI policy. This does not, however, mean it should be regarded as providing detailed technical instructions for AI development, or as addressing every potential regulatory requirement.

Guidelines and checkpoints: The guidelines below emphasize the importance of thoughtful consideration at every stage of AI development, ensuring that each step, from defining the problem to deployment, is taken with intentionality and a clear understanding of its implications.



I.1 Make certain your solution truly needs AI

Before kicking off an AI project, it's essential to ask: "Is AI really needed to solve this problem?"

Many challenges can be addressed using simpler, less resource-intensive technologies. The appeal of AI, with its promise of automation and insight, can sometimes lead people to overlook more straightforward solutions that are more appropriate for the task at hand.

Thus, one should first identify the problem they aim to solve and decide whether it genuinely requires the capabilities of AI. They should consider factors such as complexity, data availability, and the nature of the task. Does the problem involve recognizing patterns, predicting outcomes, or making decisions based on vast amounts of data? Is there any uncertainty in how to solve the problem that data might provide an insight for? If so, AI could be a valuable tool. However, if the problem can be efficiently solved, in a well-understood way using rule-based algorithms or straightforward software solutions, then AI might not be necessary.

Using AI where it is not needed can introduce unnecessary complexity, increase costs and energy consumption, and potentially lead to suboptimal outcomes. It's crucial to conduct a thorough analysis to ensure that the deployment of AI adds real value and is the most effective way to address a problem.

I.2 Ensure that your project is feasible

A comprehensive feasibility assessment is crucial when designing an AI system, as this determines whether a project is likely to succeed or not.

Ethical Feasibility: One should consider ethical implications, such as fairness and transparency, arising from the development and deployment of AI systems when planning their design. They should also assess the degree to which the outcomes of the AI system should be interpretable by non-technical stakeholders.

Technical Feasibility: One should assess whether the current state of technology, infrastructure and human resources can support the development and implementation of a proposed AI solution, considering factors such as the availability of computational resources, appropriate algorithms, and technical expertise.

Data Feasibility: One should evaluate the availability, quality, and relevance of the data required to train and operate the AI system. They should ensure that the data aligns with the problem to be solved and is sufficient in quantity and quality to develop an accurate and reliable AI system. Furthermore, they should ensure that the data is representative, and if not, revisit the data collection process.

Operational Feasibility: One should ascertain whether a system's existing workflows, IT, and decision-making processes can integrate with a proposed

AI solution. They should evaluate and design (e.g., via process maps) the impact of the proposed AI system on the current operations and the changes required to implement it. They should ensure that the processes are in place for the desired level of automation. In the case of a human-in-the-loop implementation, they should document how the system can learn from human feedback in a systematic way.

Economic Feasibility: One should determine whether the AI project is economically viable by estimating the development, deployment, and maintenance costs against the projected benefits and savings. This analysis should include considerations for potential future scalability and data acquisition and cleaning costs.

Legal and Compliance Feasibility: One should verify that the AI system will comply with all relevant laws and regulations, including data protection, privacy, and sector-specific requirements. They should assess the legal implications of making AI-powered decisions and whether there is a framework to address liability issues.

Risk Evaluation: One should identify (i) technical risks; (ii) operational risks, i.e., consider how the AI project might affect existing processes and operations; (iii) market risks, i.e., evaluate the potential market changes that could impact the project's success and ensure they can be sufficiently mitigated.

I.3 Use high-quality data for training your algorithms

The foundation of most AI systems is data. In most cases, without data, even the most sophisticated algorithms cannot build good AI systems. Thus, acquiring high-quality, relevant data is a critical first step. This involves several key activities:

- **Collecting Data:** Identifying the sources from which the data you need can be collected. These might include internal databases, online repositories, or field collections.
- **Acquiring Data:** Acquiring data may involve negotiating access to datasets, ensuring compliance with data privacy laws, and obtaining any necessary permissions to use the data for the AI project, even if that data originates from within the same organization.
- **Synthesizing Data:** In some cases, the exact data that is needed may not exist in a readily usable form. If not, synthesizing data might be possible. This could involve generating simulated data, augmenting existing datasets with additional data whose existence can be imputed, or creating synthetic datasets that mimic real-world data while avoiding privacy violations.
- **Evaluating data:** One ought to ensure that they have access

to a diverse and comprehensive dataset that accurately and fairly represents information relevant to the problem they are trying to solve. Misrepresentation and biases in the data are very hard to address ex-post and should be considered at this stage. The importance of data quality cannot be overstated. The saying “garbage in, garbage out” holds particularly true in the context of AI. High-quality data is clean, well-organized, and free from biases that could skew the AI system’s outputs.

Investing time and resources to ensure data quality upfront will significantly enhance the effectiveness and reliability of AI solutions.

I.4 Define processes and guidelines for access to the data

Broadly speaking, data governance refers to the framework that governs who can take what action on what data, under what conditions, and using what methods. It encompasses policies, procedures, standards, and metrics that ensure the effective, efficient, compliant and ethical use of data so an organization can achieve its goals.

Pertinent to AI development, deployment and use, data governance should address several key considerations, including the following.

Data Access and Sharing: One should identify data owners and “stewards,” responsible for managing the data and making decisions about its use in AI applications. There should be a clear framework in place, specifying who has the right to access or share data, within and outside the organization, including data sharing agreements and partnerships. There should be an ethical review board and a streamlined process for deciding whether a proposed AI system should have permission to use the requested data.

Data Security, Compliance and Privacy: One should implement security measures to prevent data breaches and unauthorized data access, ensuring that data is only accessible to vetted algorithms and individuals. These measures should also protect sensitive data from unauthorized access and ensure that the use of data complies with applicable privacy laws and regulations, such as GDPR. It should be ensured that AI systems adhere to industry-specific regulations and standards, which may dictate how data can be used, processed, and stored.

Data Documentation and Metadata Management: One should keep comprehensive documentation of datasets, including metadata, to ensure that data is well-understood and that its provenance and lineage are clear.

Data Management: One should oversee the entire lifecycle of data, from collection and storage to archiving and deletion, ensuring that data is managed in a controlled and systematic manner. Systems should be implemented that track data usage and alterations, thereby providing transparency and facilitating reporting for internal and external audits.

I.5 Ensure that all stakeholders are aligned

Product Governance: Accountability structures should be placed within the organization that owns an AI system. Moreover, training resources should be provided to its users, and awareness should be raised among all stakeholders around its ethical use and questions related to data protection, and related regulations.

Intellectual Property Rights: One should navigate issues pertaining to the ownership of the AI system, the technology used to train it, and the data that it was trained on. This includes understanding and complying with the terms of use for third-party AI technology and data.



HOMER

Author of the Iliad
and the Odyssey

ATLAS

Condemned to hold up
the sky for eternity



I.6 Define what success means

I.6.2 Specify how you evaluate your system

I.6.1 Set the right KPIs

Key Performance Indicators (KPIs) are essential for measuring the success and impact of AI systems. Defining the right KPIs involves identifying metrics that accurately reflect the project's objectives, potential value, and alignment with broader organizational goals.

These indicators should be SMART: Specific, Measurable, Achievable, Relevant, and Time-bound.

KPIs of AI systems might include metrics related to their accuracy, efficiency improvements, cost savings, user engagement, or revenue growth. However, considering less tangible metrics, such as customer satisfaction, employee adoption rates, and the AI system's ethical impact, is also important.

KPIs should also reflect the state of the overall system wherein an AI system is deployed. For example, when using an AI model that estimates the level of patient acuity in the emergency department, we should measure not only the accuracy of the model but also the decrease in overall length of stay. Another point to consider is that KPIs may need to be separately defined for different segments of our users or observations (i.e., groups of users, or type of patients in the example above).

If AI is integrated into an experience, then KPIs will also include product-specific metrics such as user engagement, retention, satisfaction and so on.

When establishing KPIs, it is important to involve many stakeholders to ensure that the indicators are comprehensive and aligned with various perspectives. This collaborative approach helps identify metrics that reflect both the immediate outcomes of the AI project and its long-term impact.

Ultimately, the right KPIs serve as a compass, guiding the AI project towards its intended goals while providing a clear framework for evaluating progress, making informed decisions, and demonstrating value to stakeholders.

Evaluation serves as the empirical foundation upon which the utility and viability of an AI system are verified. Before deployment, an AI system's evaluation occurs in two primary phases: (i) retrospective, which involves back testing the system on historical data, and (ii) prospective, which includes testing the system's performance on current or real-time data to assess how it will perform in the future, prior to system deployment. In both phases, the AI system is scrutinized against a variety of performance measures that align closely with the value it is intended to generate for the organization. The system's performance metrics should be directly linked to the organization's KPIs to ensure that the AI system contributes meaningfully to the organization's objectives.

I.6.3 Assess and quantify the risk vs. value tradeoff

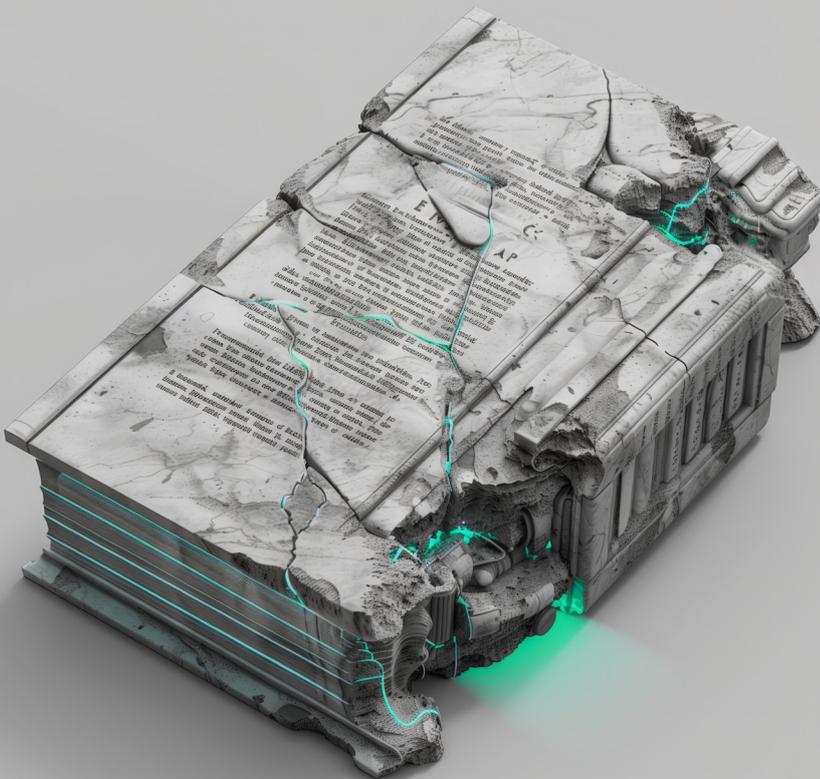
This risk versus value assessment is pivotal to ensuring that deploying an AI system aligns well with an organization's broader goals and risk tolerance. Value captures the expected benefits that will result from the implementation of the AI system for all relevant stakeholders. These benefits can be evaluated using the KPIs mentioned above. However, risk assessment requires a dedicated evaluation process aimed at understanding the potential damage that could be caused by the system in each of the following categories.

Operational Risk: This aspect of risk assessment scrutinizes the AI's integration within an existing system to understand its potential negative impact to workflow efficiency due to the possibility of incorrect predictions or decisions made by the AI, or due to technical failures that could disrupt the overall system's services. It also evaluates the AI's scalability and adaptability to evolving data landscapes, to understand whether operational continuity would be maintained as the AI scales or as the data it relies on changes.

Liability Risk: Liability risks encompass the legal responsibility that might result from the AI system causing harm or damage to its users, or others affected by its use. This includes potential breaches of data privacy, discriminatory outcomes, or erroneous suggestions that led to adverse events in practice.

Technical Risk: It is important to assess the risk of technical malfunctions, such as software or hardware failures, that could impede the AI system's functionality. This includes evaluating the robustness of the codebase and the reliability of the computational infrastructure supporting the AI system. Technical risk evaluation should also focus on measuring how well the model integrates with existing technology stacks, and whether compatibility issues might arise, potentially impacting the model's functionality.

These risks need to be quantified and evaluated so that the final integration of an AI system within some organization maximizes the derived value while minimizing risk exposure.



I.7 Make sure that your infrastructure, organization, and workforce are ready to support deployment

Integration into Existing IT Infrastructure: An AI system must be harmoniously integrated into the organization's existing IT infrastructure. This involves assessing compatibility with current hardware and software, ensuring that the AI system can communicate effectively with other systems, and identifying any upgrades or modifications needed to accommodate the new system. Key considerations include data input/output mechanisms, network capacity, and ensuring the AI system's scalability and security within the existing IT framework.

Process Flow Changes: Introducing an AI system often necessitates changes to organizational workflows. During the system's deployment, it is important to map out how existing processes will be altered and where the AI system might replace or augment human decision-making, as part of the system's evaluation and risk assessment (see Section I.6.3).

Risk Monitoring System: Deploying an AI system introduces risks, as discussed in Section I.6.3. Establishing a robust risk monitoring system is essential to continuously track and evaluate the system's performance and

its adherence to regulatory and ethical standards. This system should include mechanisms for real-time monitoring, alerting, and incident response, ensuring that any issues are promptly addressed to mitigate their impact.

User Adoption and Training: The success of an AI system's deployment is heavily dependent on its acceptance and use by its intended users. This requires comprehensive training programs to familiarize users with the AI system, its capabilities, and limitations. Training should encompass not only technical aspects but also changes in workflow processes and decision-making protocols. Encouraging user feedback and offering continuous support is vital to building confidence and competence in using the AI system.

Human-AI Interaction Evaluation: In the deployment of AI systems, it is vital to balance AI-driven advice with human judgement, ensuring AI support does not overshadow human expertise, while also establishing robust feedback mechanisms for continual AI system refinement based on user input. Equally important is assessing the psychological impact of the AI system's

deployment on humans, fostering their understanding of the capabilities and limitations of the system, and understanding the evolving dynamics of human-AI collaboration, including changes in team roles, communication patterns, and workflows.

Maintenance and Data Drift: Post-deployment, AI systems require continuous maintenance to ensure they remain accurate and relevant. This requires mechanisms that facilitate the adaptation of AI systems to changes in the environment wherein the model is deployed, called "data drift," and adapting to new patterns or trends.

I.8 Assess the interpretability and value-add of your project throughout its lifecycle

Interpretability is a critical aspect of AI systems in many settings, including systems deployed in the government sector where automated decisions can have a significant impact on public welfare and individual rights. In the context of governmental applications, interpretability of an AI system refers to the property that its decisions can be discerned and explained to a human. This is particularly important when these decisions may impact citizens' lives directly, e.g., in applications related to public safety, healthcare, education, work-life balance, and so-

cial services. Ensuring that AI systems are interpretable helps build public trust, ensures transparency, and facilitates accountability, all essential principles in government operations. By connecting the AI system's insights with human intuition and knowledge, one can maximize the impact and value added by AI.

Interpretability of AI systems used in the government sector means that they are designed in a way that their decisions can be discerned and explained to a non-technical audience, including policymakers, stakeholders, and the general public. To accomplish this, one might prefer simpler and more transparent AI system architectures, whenever possible, or might develop tools that assist interpreting the system's decisions, e.g., understanding which features of the input led to a particular decision, or understanding under what counterfactual conditions the system would have made a different decision. Interpretability of an AI system benefits from transparency about the data and algorithms used in its development.

By prioritizing interpretability in the design of AI systems, government project managers can ensure that their AI initiatives are not only effective but also aligned with the principles of good governance and public accountability.

I.9 Ensure awareness of security risks and take measures to prevent and mitigate them

I.9.1 System Security considerations

When designing the IT infrastructure supporting an AI system, ensuring cybersecurity is paramount. Key design principles include implementing a layered security approach, that involves multiple levels of defense, such as firewalls, intrusion detection systems, and encryption to protect against various threats. Regular security assessments and penetration testing should be conducted to identify vulnerabilities and address them promptly. Access control measures, such as role-based access and multi-factor authentication, are crucial for preventing unauthorized access to sensitive data and AI components. Data privacy should be upheld by anonymizing or encrypting personal information and adhering to relevant regulations. Additionally, continuous monitoring and real-time threat detection systems should be in place to quickly identify and respond to potential security incidents. By adhering to these principles, the IT infrastructure of an AI system can be made more resilient against cyber threats, safeguarding the integrity and confidentiality of the data and processes it supports.

I.9.2 Model Security considerations

Cybersecurity for AI systems should be designed and developed following the principle of security by design and by default. AI systems should achieve an appropriate level of accuracy, robustness, safety and consistency throughout their lifecycle, to meet the following criteria.

1. The robustness of AI systems may be achieved through technical redundancy solutions, such as backup or fail-safe plans.
2. AI systems should be resilient to attempts by unauthorized third parties to alter their intended use, behavior, outputs, or performance.
3. AI systems should ensure that “feedback loops” are duly mitigated by technical solutions that prevent data poisoning or model poisoning (manipulation of the training dataset or pre-trained components), adversarial examples or model evasion (inputs designed to cause mistakes), confidentiality attacks or model flaws.



I.9.3 Establish a fallback plan

A fallback mechanism should be put in place that allows overriding the decisions of an automated system and enlisting humans to resolve issues. The choice to opt out should be based on reasonable expectations and focus on accessibility and protecting the public from harm. In some cases, human intervention may be legally required. If an automated system fails, makes errors, or its decision is appealed by the receiving side, there should be a process that involves a qualified person to remedy the issue through a fallback process. This process should be accessible, equitable, effective, well-maintained, and include trained operators. Automated systems used in sensitive areas like criminal justice, employment, education, and health should be purpose-specific, allow oversight, include operator training, and involve humans for significant decisions. Public reports should detail processes for human intervention, including their timeliness, accessibility, outcomes, and effectiveness.

I.10 Ensure your project complies with legal/data requirements

AI systems must comply with relevant legal and data regulation, including the EU AI Act, Greek Law 4961/2022, and other relevant legislation, such as GDPR, the Digital Services Act, the Digital Markets Act, and the EU Data legislation. AI systems should ensure compliance with existing regulation before, during, and after development and deployment, keeping in mind that the deployment of an AI system may cross jurisdictional borders.

Data Protection Impact Assessment and Algorithmic Impact Assessment (AIA) should also be performed to protect (i) the health, safety, and rights of people, communities, and organizations, and (ii) the environment.

AIA can help government agencies better manage the risks associated with automated decision-making systems. This assessment should evaluate their impact on the rights, health, well-being, and economic interests of citizens, communities and organizations. AIA should evaluate the capabilities and risks associated with the use of an automated decision-making system, the interpretability of its decisions, its governance framework including any mechanisms for appealing and/or reversing its decisions, the provenance and ownership of the data that the system was trained on, and the privacy and other data-related risks from its use.

I.11 Confirm the ethical alignment of your project

An ethical approach to the development, deployment and use of AI systems is important to uphold to ensure that these systems respect human rights, promote fairness, uphold societal values, contribute positively to society, and enhance human capabilities. As AI systems become more integrated into everyday life, ethical guidelines and oversight are essential for keeping them trustworthy and human centric.

Key principles to bear in mind include transparency, ensuring that the workings of the AI system are understandable and explainable to users and stakeholders; accountability, ensuring that designers and operators of AI systems are responsible for their outcomes through traceability mechanisms; fairness, which involves actively mitigating biases in data and algorithms to prevent discrimination; and

human oversight. People that are impacted by the use of AI systems should be informed that they are interacting with an AI-powered system and know what the system's capabilities and limitations are.

Algorithmic discrimination occurs when automated systems unjustly differentiate or impact individuals based on attributes such as race, gender, religion, age, disability, or other personal characteristics. This type of discrimination can sometimes breach legal protections. To prevent this, those who design, develop, and deploy these systems must actively and continuously work to ensure that these systems respect fairness and equity. This involves conducting equity assessments during design, using representative data, ensuring accessibility for those with disabilities, testing for disparities before and after

deployment, and maintaining oversight. Independent evaluations and transparent reporting, including results from disparity tests and mitigation efforts, should be conducted and made public whenever feasible to convey these protective measures.

Privacy should be protected by implementing robust data protection measures and respecting individuals' data rights. AI systems should be designed with inclusivity in mind, considering the diverse needs and perspectives of different user groups. Importantly, ethical design also involves ongoing engagement with stakeholders, including affected communities, to understand and address their concerns.

I.12 Ensure your project is environmentally sustainable

Environmental considerations are increasingly important in the development and deployment of AI systems as these can have significant ecological impacts. A key consideration is energy efficiency, as AI systems, especially those involving large-scale data processing and complex computations, can consume substantial amounts of energy. This carbon footprint can be mit-

igated by designing AI systems to be energy-efficient and utilizing renewable energy sources whenever possible. Additionally, the lifecycle management of AI hardware should be considered, including responsibly sourcing materials, minimizing electronic waste, and promoting recycling and reuse. It's also important to consider the indirect environmental benefits of AI applica-

tions, such as their potential to enable more sustainable practices in various sectors, including agriculture, transportation, and energy management. By incorporating these environmental considerations, AI systems can support not only technological advancement but also ecological sustainability

Appendix II: Chief AI Strategy Officer Mandates

We provide a more detailed description of the data mapping, data governance, and AI planning and oversight mandates for the proposed Chief AI Strategy Officer. As discussed in the section Horizontal Recommendations of the chapter AI and the State, the Chief AI Strategy Officer's role is to design policies and frameworks, identify priorities and opportunities, and provide supervision, coordination and oversight of government projects in the data and AI space. While the Chief AI Strategy Officer will have a strategic and supervisory role, it will leverage the technical capabilities of the Data and AI Office to accomplish its mandates. Accordingly, as we list the following mandates, their strategic and supervisory aspects are directed towards the Chief AI Strategy Officer, and their implementation aspects are directed towards the Data and AI office, which will work in coordination with the Chief AI Strategy Officer. We cluster the mandates of these offices in the following categories.

- 1. Map, consolidate, and streamline** the existing fragmented and decentralized data through a comprehensive mapping process that would identify and catalog existing data assets across the sectors of the government. This inventory should detail the nature, location, and custodianship of the datasets. A rigorous evaluation would be performed to assess the quality, accuracy, and relevance of the data, ensuring that only reliable and valuable data is retained for further use, and creating initiatives to improve the data generation and collection processes for missing or low-quality data that are of high strategic value. Once the data landscape is clearly understood, the next phase is to standardize and harmonize the data through a process of data harmonization, establishing common formats, structures, and protocols that enable interoperability between disparate systems. This standardization is critical for the creation of an integrated data ecosystem.
- 2. Define and document clear and effective data governance principles and implement them.** Data governance refers to the framework of policies, procedures, and processes that ensure data is managed effectively and securely throughout its lifecycle. It encompasses the establishment of data standards, definitions, ownership, and accountability mechanisms to maintain data integrity, confidentiality, and availability. It provides a robust process to define privacy and re-identification risk, define security and access risk, solve ambiguities of intellectual property risk, and check the consent and Data Subject Access Requests (DSAR) risk. Moreover, data governance plays a critical role in ensuring compliance with regulatory requirements, such as the General Data Protection Regulation (GDPR) in the European Union, by implementing measures to safeguard sensitive data, enforce data retention policies, and facilitate auditability and transparency. By integrating clear data governance principles into AI development lifecycles, organizations can harness the transformative potential of AI while upholding ethical principles, preserving individual privacy rights, improving safety, and maintaining regulatory compliance.

3. Rationalize, define, and document the processes for access to and collection of data. The key to unlocking AI's full potential lies in ensuring open access to data, while diligently adhering to ethical and regulatory constraints. This necessitates the establishment of robust legal and technical frameworks that facilitate access to and creation of data in a tiered manner, catering not only to government stakeholders but also to research institutions, the private sector, and the general population. These frameworks should be meticulously documented and, wherever feasible, automated to streamline the data access and data collection processes. At the technical level, this involves leading the charge in anonymization efforts that strike a balance between openness and privacy. The goal is to ensure that data is as accessible as possible without infringing upon privacy or other human rights. Relatedly, it is important to define frameworks for regulatory sandboxes and safe harbors. Sandboxes are controlled experimentation environments where innovative products and services can be developed and tested under regulatory supervision, while safe harbors are legal provisions that under specific conditions offer innovators protection from liability for testing AI systems in real-world settings. By implementing these measures, Greece can maximize the value derived from data, fostering innovation, enhancing efficiency, and ultimately contributing to the collective welfare and progress of society.

4. Define strategic priorities and identify synergies for using data and AI. This involves developing a comprehensive strategy that outlines how these technologies can be leveraged to achieve the country's strategic objectives. This process includes identifying key areas where data and data-based strategies can add significant value. Collaboration with various departments, institutions and agencies is essential to understand their data needs and challenges, ensuring that the data strategy is aligned with the broader goals. Advocacy for and oversight of the development of data literacy and AI skills within the workforce are crucial components.

5. Provide comprehensive oversight and coordination of all AI and data-related projects across government sectors. Key responsibilities include facilitating collaboration among different governmental departments, resolving conflicts, and promoting best practices in data management and AI applications. The Chief AI Strategy Officer and the Data and AI office act as a bridge between technical teams, policy makers, and ministries, ensuring clear communication and cohesive progress. They also monitor project timelines and budgets, assess risks, and make strategic recommendations for measuring and optimizing the impact and efficiency of technological implementations.



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