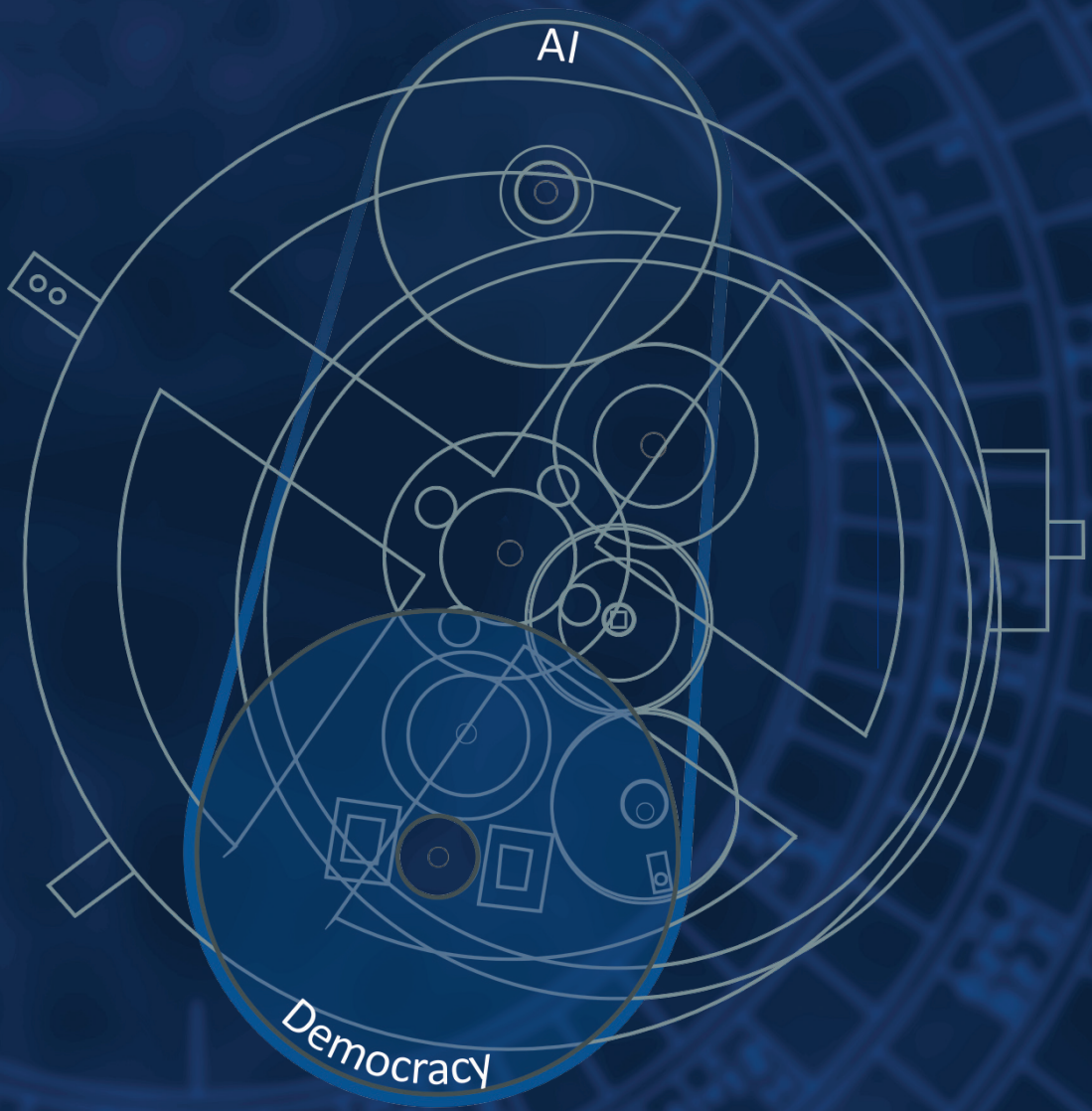
White Paper

Democratising AI

A National Strategy for Greece



Pursuing an AI advantage
by innovating upon our core values

AI
Democracy

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1 Introduction

Artificial Intelligence[1] (AI) is evolving at a high pace. It will reshape our lives, our work, our learning and interaction patterns. AI is able to realise tremendous benefits for economic growth and prosperity for our societies and our planet, by solving a wide range of societal, health and environmental challenges. At the same time, AI entails numerous potential risks related to discrimination and intrusion, as well as individual and collective social harms and the loss of liberty and autonomy, among others. However, the ability of AI to realise its full potential, depends on the way that we will choose to seize this opportunity and address the challenges of this technological revolution at a national and global level.

Greece has recognised the importance and the potential of AI, as well as the possible challenges and risks, and thus aims to foster a technology-enabled future that embraces innovation and development for the benefit of all and for the shared common good.

> Greece aims to innovate upon its core values, which constitute our shared European values, the values and moral ideals of Democracy

Values and ideals that become more relevant in the AI era, as we are confronted with overwhelming negative changes in security, economic, political, health and environmental affairs. An era where more than ever before, we need to protect and promote the freedoms, rights, interests, open collaboration, and welfare of humans and nature.

> The Hellenic AI Strategy is centred around the vision for Greece to become the world's laboratory for Democratising AI in a sustainable way

Greece aims to **Democratise AI**, by placing it at the service of people, society and the environment, and by infusing AI with the principles of Democracy. This way, creating a technology-enabled future that is more democratic, inclusive and sustainable for citizens, society, the economy and the environment, and for the shared common good.

Aligned with the Hellenic Digital Transformation Strategy[2], Greece aims to harness the opportunity of Artificial Intelligence for economic and social growth, based on a system of fundamental rights, values and virtues. This way Greece will promote the design, development, deployment and evaluation of AI in a democratised and sustainable way for all, and for the shared common good.

The purpose of this White Paper is to set out the National AI Strategic Vision for Greece and to provide an initial plan of action on how to achieve this vision. It aims to accelerate the adoption and development of AI in both the private and public sectors in Greece, and increase the relevant skills and the research and development (R&D) base through the provision of the necessary AI infrastructure and enablers that will facilitate the Democratisation of AI.

The current document aims to establish an active dialogue around our National AI Strategy. Thus, it should be seen as a 'living document' that will continuously evolve in a dynamic and collective manner via open consultations, aiming to adopt a participatory, agile approach to AI Strategy development. Therefore, we invite members of the industry, public sector, academia and research communities, the public in general and any interested party, to provide their feedback and to contribute to the future decision-making regarding the Hellenic AI Strategy. This dialogue will converge to a final first version of the Strategy.

[1] According to the definition of the EC, Artificial Intelligence (AI) endows systems with the capability to analyse their environment and take decisions with some degree of autonomy to achieve goals [1].
[2] Ministry of Digital Governance (2020), Βίβλος Ψηφιακού Μετασχηματισμού 2020–2024, Α' ΜΕΡΟΣ - Κατευθυντήριες αρχές και οριζόντιες παρεμβάσεις, under publication [2].

2 The Hellenic AI Vision

Democracy is not just a political process, but a moral ideal that is built on faith in human nature and the possibilities of human nature. Democracy is a system of fundamental rights (individual rights, group action rights, freedom of intellectual, ideological and political movements, the rights of political organisations and participation, and the rights of social protection). It is a system of fundamental values and virtues; an open, distributed, participatory and collective intelligence system (through open social inquiry and social intelligence towards solving social problems). Democracy is a system that has the potential and ability to be self-correcting and self-renewing (through education and social interaction).

Greece aspires to become the world's laboratory for Democratising AI in a sustainable way

A laboratory that will (i) promote the design, development, deployment and evaluation of AI in a democratised way for all and for the shared common good, while (ii) infusing the moral ideals and rights of Democracy in AI.

These democratic ideals are encapsulated in the notion of Democratic Ethos

Democratic Ethos[3] encompasses guiding moral ideals, the fundamental values and virtues of Democracy itself. It depicts a set of values, rights, virtues and commitments embraced by members of a community who are committed to a flourishing Democracy; values that can act as a moral code for AI.

In order for this to be realised, it is important to democratise, not only AI knowledge, data infrastructures and technological infrastructures (AI enablers), but also AI design, development, implementation and evaluation, while at the same time sustain the AI-driven innovation and AI Democratisation process. In this way maximising AI's benefits for all, and for the shared common good.

The Hellenic approach to AI Democratisation (Figure 1), is conceptually aligned with the holistic approach and the interlinked processes of the Antikythera Mechanism (portable cosmos)[4]. It adopts an integrated **value-network, ecosystem-centric perspective**[5], looking at the entire AI and Democracy ecosystem and its key components and aiming to enhance the shared value co-creation across all ecosystem entities, and for the shared common good.

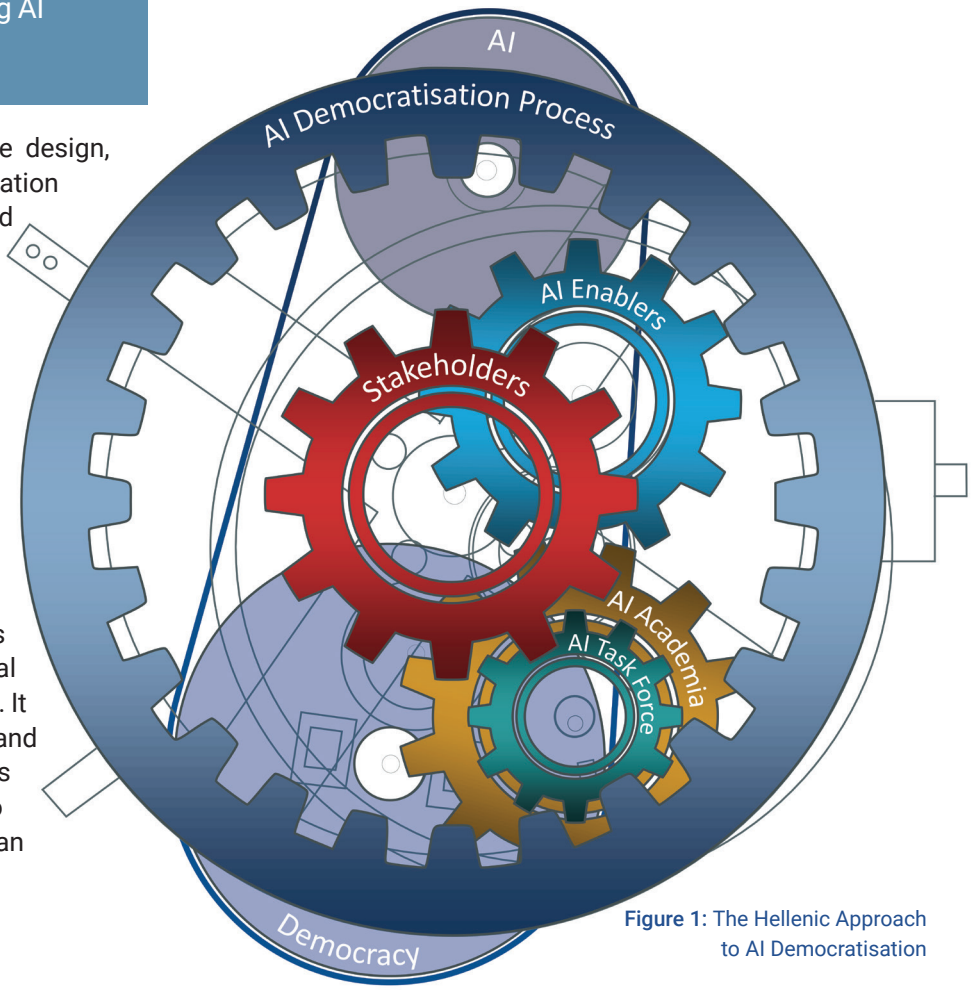
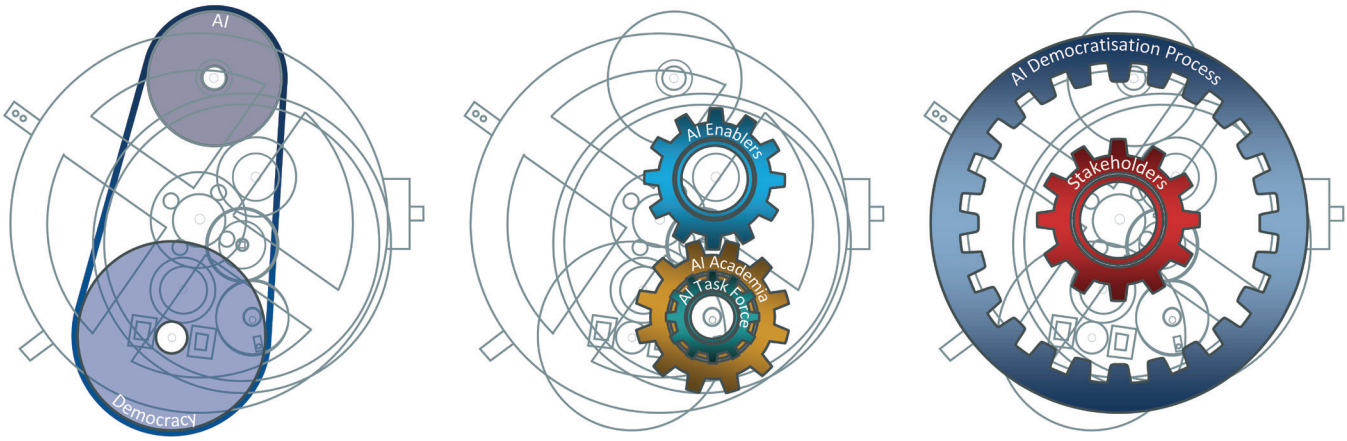


Figure 1: The Hellenic Approach to AI Democratisation

[3] Ethos is a Greek word (ἦθος) that means 'virtue' in the Aristotelian sense and denotes the internal values and the guiding moral ideals that characterise an individual, a community or nation [3]. The word virtue is the translation of the Ancient Greek word 'ἀρετή' - 'arete', which denotes moral excellence and indicates the fundamental qualities that allow people to excel.

[4] The Antikythera Mechanism, acknowledged as the world's first known analogical computer, was used by ancient Greeks to chart and predict astronomical positions and eclipses and even signal the next Olympic Games [4].

[5] The value network perspective provides an interactive value-centric (tangible and intangible value) view [5], and the ecosystem-centric perspective [6] incorporates the holistic (system) view of this complex interconnected environment and its participating network components.



(a) Conceptual Layer

(b) Supporting Layer

(c) Stakeholders & AIDemocratisation process

Figure 2: The AI Democratisation Mechanism

This strategic AI Democratisation mechanism depicts a holistic virtuous system that links together dynamically rotating, circular scales (cycles). These scales are supported by three plates, as seen in Figure 2.

The outer plate (Figure 2a) represents the conceptual layer that interlinks the notions of **Democracy** and **Artificial Intelligence**, that symbolise a continuum, and which are depicted by two circular scales. This layer sets the context upon which all other ecosystem components interlink. Under the holist value-centric approach, this ever-evolving dynamic continuum of value co-creation facilitates our understanding of the whole ecosystem, the relations of its key components (scales and plates) to one another and to the whole, as well as the value-creation parameters within and between them.

The inner plate (Figure 2b) depicts the supporting layer, which connects the AI enablers and the key AI implementation bodies. The **AI enablers** are seen as the core infrastructural AI components that are essential for the AI Democratisation process. These enablers include the data and technological supporting infrastructures, as well as the cultural and investment foundation that will empower the adoption, design, development, implementation and evaluation of AI across the different stakeholder segments. The key **AI implementation bodies** are illustrated as two concentric circular scales, representing the AI Academia and the AI Task Force. These bodies will be responsible for realising the aspirational vision for Greece, and for AI Democratisation in the Global AI community.

The front plate (Figure 2c) interconnects the key stakeholders and the whole system, all in the context of the AI Democratisation process. The **ecosystem stakeholders** are: the public and private sectors, research and academia, civil society, and the environment (quintuple helix model). Their overlapping interactions for knowledge production and innovation foster economic and social development in the context of knowledge-based economies, knowledge-based societies and democracies.

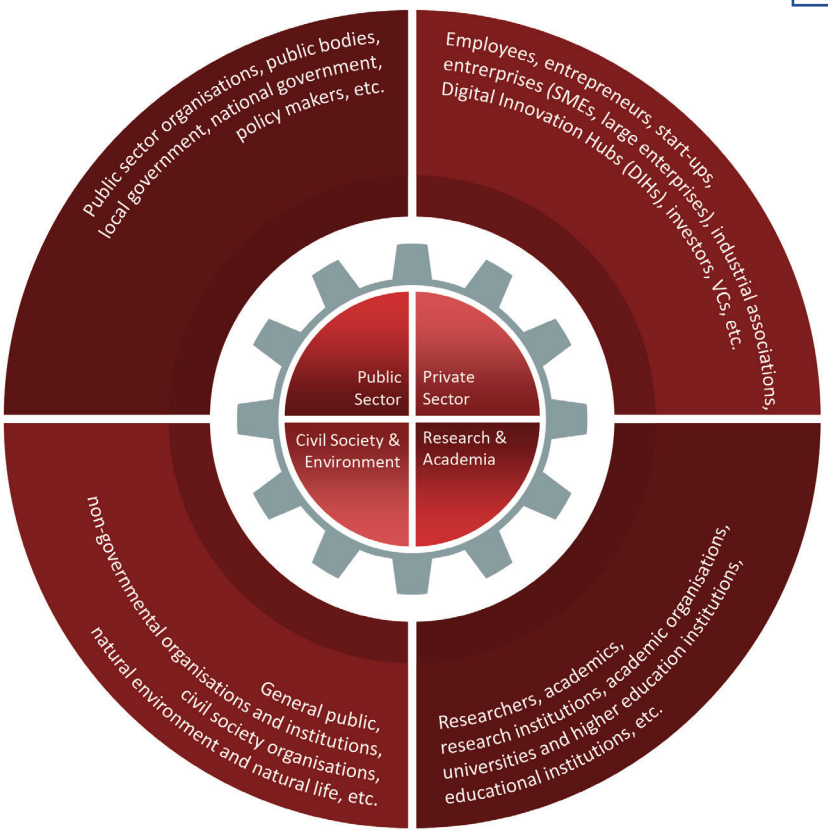


Figure 3: Stakeholder segments

As such, the AI ecosystem stakeholders (Figure 3) constitute the key drivers for shared value (co-) creation, including knowledge creation and AI-driven innovation for all and for the shared common good. Acknowledging environmental deprivation as an existential threat for the future of life, Greece adopts an extended stakeholder segmentation that integrates the environment as one of the key stakeholders. This comes in direct alignment with the European vision for making Europe the world's first climate-neutral continent by 2050 (European Green Deal [7]), as Europe's new growth strategy for a sustainable future. In addition, the integration of the environment (natural life) as a core stakeholder that is directly linked to people (human life)[6] is also in line with the quintuple helix innovation model[7], which supports the symbiosis of ecology, knowledge and innovation. This creates synergies between the economy, society, and democracy [8].

Finally, the outer peripheral cycle (Figure 2c) of this AI value ecosystem involves the **AI Democratisation process**. This cycle essentially integrates the key pillars of AI Democratisation which include: (a) empowering via excellence and Democratisation of AI knowledge and infrastructure, (b) enabling by infusing Democratic Ethos in AI-by-Design, (c) innovating via the implementation of AI Democratisation, and (d) transforming by sustaining AI Democratisation and re-empowering it.

These virtuous cycles of shared value (co-)creation reinforce each other through ongoing feedback loops within and between the different AI ecosystem components and plates. Further elaboration on these concepts, is provided in the following paragraphs.

[6] In this perspective, ecological concerns also represent socioecological concerns that we need to think about and act upon. For this reason they are jointly presented into a single helix in the current document.
[7] The quintuple helix innovation model (Carayiannis and Campbell, 2010 [9]) integrates five subsystems (helices) – academia-government-industry-civil society-natural environment - that act as a symbiotic system between ecology, knowledge and innovation, creating synergies between the economy, society, and democracy.

2.1 AI Enablers

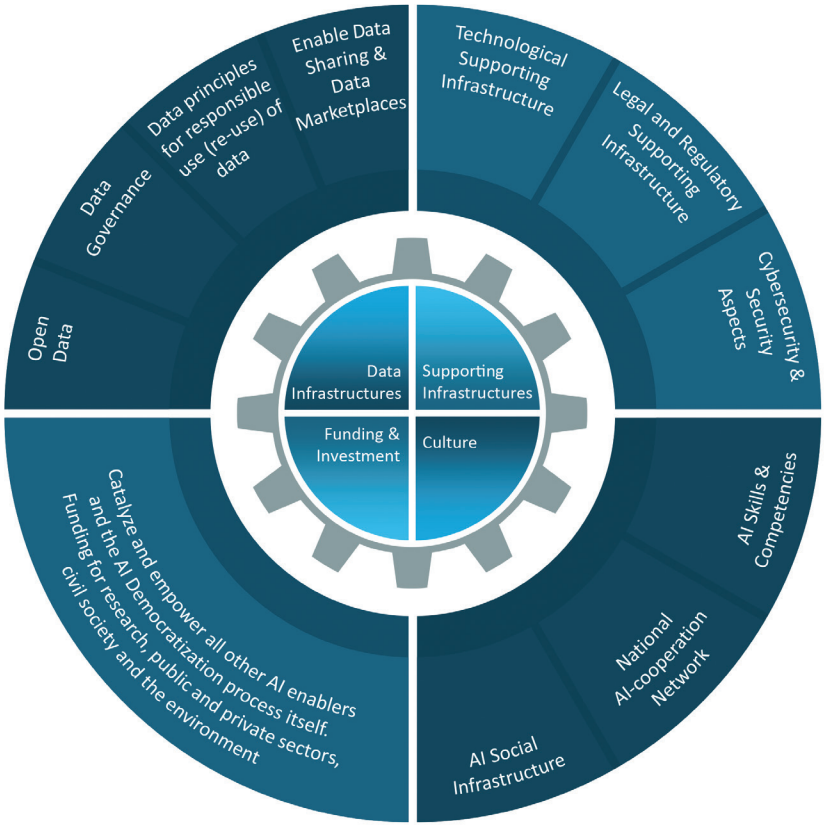


Figure 4: AI Enablers

Artificial Intelligence is seen as a collection of technologies that combine data, algorithms and computing power [1]. Thus, taking advantage of the opportunities of the AI revolution, necessitates that we focus upon and invest in the key AI enablers that will essentially support the AI-driven innovation and the sustainable AI Democratisation for all and for the shared common good. This will be done in cooperation with leading European initiatives or associations, such as AI4EU[8], EurAI[9], CLAIRE-AI[10], ELLIS[11], AI4People[12], as well as with OECD[13] and international communities.

The AI enablers (Figure 4) integrate the core infrastructural components that are needed in order to leverage the benefits of AI for all stakeholder segments. These interlinked enablers are: (i) **data infrastructures** that facilitate the existence and the democratic use of data for AI, (ii) **AI supporting infrastructures** that entail the technological infrastructural components that can manage and exploit data for the shared benefit of all, (iii) **AI culture** and the creation of an AI social infrastructure that will utilise the data and technological infrastructure in place, in order to allow the acceptance, adoption and use of AI, and finally, (iv) **AI funding** that will essentially catalyse and endow all other AI enablers and the AI Democratisation process.

[8] The European AI on Demand Platform (AI4EU).
[9] The European Association for Artificial Intelligence (EurAI).
[10] Confederation of Laboratories for Artificial Intelligence Research in Europe (CLAIRE-AI).
[11] The European Laboratory for Learning and Intelligent Systems (ELLIS).
[12] An Atomium – European Institute for Science, Media and Democracy (EISMD). An initiative designed to lay the foundations for a 'Good AI Society'.
[13] Organisation for Economic Corporation and Development (OECD).

2.1.1 Data Infrastructures

Artificial Intelligence entails the processing of data for the extraction of knowledge and insights, allowing machines to make informed, fair and sustainable decisions. Progress in AI relies on the availability of high-volume and high-quality[14] data sets.

Aligned with the European Data Strategy [10] and the Greek National Digital Transformation Strategy [2], the present document understands data[15] as a high value component for the development of AI applications and services (data-driven AI), as well as a key driver of the digital economy and data-driven AI-powered society. Towards AI Democratisation, data and the underlying information production is considered a public good and non-rival[16]. Thematic Data Repositories as envisioned in the European Data Strategy and 'scale-linking' interconnected data networks[17], operating under multiple models of production (mainstream market practices, data marketplaces, public/private partnerships, etc.) may embrace the notion of non-rival and realise decentralised but interconnected data flows. Such a dynamic environment offers the tools for collective thriving through individual freedom of creation, intellectual flexibility, integrity and respect.

Data infrastructures require a complete set of appropriate governance rules for data access and use which will facilitate open, fair and resilient data networks, markets and communities (locally, regionally and nationally). These will follow rules related to the degree of Democratic Ethos incorporation, the degree of inclusivity in the emergent design and process, and the underlying data lifecycle management principles and compliance, taking into account the inherent power imbalances within the algorithmic data processing space.
As non-rival, data needs to be available and open by design and by default to the greatest extent possible, following the set democratisation scope of the overall data ecosystem. **Democratic Ethos** shall be the main driver and core element for the set scope and the business models to be applied. To that end, relevant interoperability principles and open licensing schema, both permissive and restrictive, shall be adopted to foster maximum data inclusion, maximum AI business, AI research and AI societal agility.

2.1.2 AI Supporting Infrastructures

2.1.2.1 Technological Supporting Infrastructure

The technological supporting infrastructure for AI entails core technological infrastructure offering cloud-based conventional computation services, shared IT infrastructures, AI experimentation infrastructures, and software[18]. Democratisation in this setting implies – among others – the fair sharing of resources, the co-development of new infrastructural components and harmonisation of aims, the societally and environmentally ethical and fair (re-) use of the infrastructure, as well as accessibility (hardware and software).

The core technological infrastructure includes a computing component and a data management and access component. The computing component implies a shared set of computing resources of various types (e.g. CPUs, GPUs, TPUs, and future technologies as they appear). The data management and access component will allow access to storage, management, access and use/reuse of various data, in different modalities. Both components imply appropriate, secure access policies and mechanisms that will enable fair access, use and reuse of the infrastructure. Besides the core technological infrastructure there should also be room for experimenting with alternative computational paradigms, including High-Performance Computing (HPC), Vector multiplication and Quantum Computing (QC).

[14] Data quality is critical as it determines whether information can serve its purpose in a particular context (i.e., data analysis). Data quality includes accuracy, completeness, reliability, integrity, relevance, timeliness and data authenticity among others. Data quality and data interoperability are essential for successful exploitation of data. Under the AI Democratisation perspective, this document recognises data literacy and need for relevant skills acquisition as an underline component for the sustainable democratisation of data-driven AI.
[15] Open data, shared data, standardised data, geospatial data, environmental observation data, meteorological data, industrial data, commercial data, transport data, cultural heritage and health data, among others.
[16] The term, coined by Yochai Benkler (2006) [11], implies that once a piece of information is created, no more resources are needed in creating more information of the kind and all stakeholders can co-use and share the same informational resource.
[17] Inspired by Daniel Christian Wahl, Designing Regenerative Cultures (2016) [12].
[18] Software may be free but not easily accessible.

- In alignment with the National Digital Transformation Strategy [2], the creation of AI Testing and Experimentation Facilities (TEFs) is of critical importance. Novel AI TEFs and AI Sandboxes for the development of innovative AI applications (validations, trials, large-scale and small-scale experiments), powered by open data, AI algorithms and testing frameworks, constitute a key AI enabler. Access to such services is currently extremely limited and costly. Democratisation of these services and resources can boost the applicability and effectiveness of AI in a multitude of domains.

2.1.2.2 Legal and Regulatory Supporting Infrastructure

As AI permeates society and the economy, the legal world has no other option than to encapsulate the emerging properties of the present techno-economic paradigm shift, and to provide appropriate legal support in terms of both regulation and services. Whether Europe opts for a horizontal, GDPR-like, AI legal framework or for targeted concept tweaks, modifications and updates on existing legal frameworks (e.g., privacy, intellectual property, consumer protection, etc.), updating the legal thesauri, hierarchies and ontologies seems to be inevitable.

Greece holds a satisfactory regulatory framework in regard to public sector information and digital governance[19], a necessary tool for the proper functionality of data infrastructures. While anticipating the proceedings for a horizontal European AI Regulation, the present Strategy opts for the update of existing regulatory building blocks of significant legal, technical and infrastructural importance by sufficiently integrating new legal tools such as the Regulation for the Free Flow of Non-Personal Data, the GDPR and personal data principles (e.g. MyData principles [13]). The proposed regulatory mix provides a set of tools and a dynamic framework for the free flow of data under grouped individual empowerment and control. A legal framework that equals collective prosperity and individual fulfillment.

But legal infrastructure is not limited to regulation. Legal infrastructure can be understood as a fundamental AI enabler and as such, it expands beyond regulatory frameworks towards democratic design. Under the AI enabler hat, legal infrastructures need to become inclusive, human centred, usable and fair. In practice, this refers to targeted infrastructural interventions that will affect the wider legal interface and incentivise Democratic Ethos in both supply and demand.

2.1.2.3 Cybersecurity/Security aspects

Physical security and cybersecurity requirements primarily emerge where AI methods access and process sensitive data. The National AI Strategy will be fully aligned with the National Digital Transformation Strategy [2], for which data security is a core subject.

[19] Indicatively: the Public Sector Information Law (L.3448/2006), the Transparency Initiative (Diavgeia Platform) under the Transparency Law 3861/2010, the Greek e-government framework (Law 3979/2011) that defines access and reuse of public sector information, the Open Data Act (L.4305/2014) and the Geospatial Act (L.3882/2010), introduced transparency, proper data release, availability, interoperability and openness.

2.1.3 AI Culture

Fostering an AI culture is of the utmost importance in order to realise the benefits of AI in the AI ecosystem, because they reduce entry barriers and accelerate sustainable adoption. Cultural perspectives relate to both the social and industrial context on a local, regional and national scale. The social context involves the creation of awareness in AI and advanced technologies among the entire population (not just targeted groups) on an ongoing basis, in order to promote inclusion and enable an **AI-powered social infrastructure**. This awareness will therefore enhance the adoption of AI-driven innovation and will strengthen the sustainability of AI-practices, systems and solutions. To this end, the social context clearly requires action by multi-disciplinary groups from various social segments and viewpoints, aiming to create a horizontal fertilisation setting across all application domains. The industrial context relates to the transformation of an AI-corporate culture via the necessary skills, knowledge transfer platforms and digital transformation ecosystems (Digital Innovation Hubs), as well as via the joint activities between industry and academia.

Skills are a critical component of the AI social infrastructure. Skills include a diverse set of (i) AI-related skills such as technical AI-skills (computer science, mathematics, etc.) and non-technical AI-skills, both generic (critical thinking, creativity, problem solving, etc.) and context specific (e.g. industrial context - managerial capabilities to extend AI in business, etc.), but also (ii) data literacy skills among the general population as well as specific stakeholder segments, among others. Under the Democratisation perspective, skills constitute an integral component of the AI enablers needed in order to leverage the benefits of AI for all stakeholder segments.

This AI social infrastructure will involve the creation of an AI-ecosystem in the form of a **national AI-cooperation network**, for all AI stakeholders. Such a network will set the basis for an open AI culture in Greece, promoting an AI experimentation and co-creation mindset. It will foster a culture of exchanging ideas and best practices, and facilitate research, development and collaboration within and between societal entities, sectorial entities and industrial segments of variable territorial grounds. In addition, this network will focus upon the provision of the necessary skills and knowledge for the different stakeholders in a social and industrial context.

2.1.4 AI Funding

The availability of financial support can catalyse and empower all other AI enablers and the AI Democratisation process itself. As such, the financial conditions and financing constitute a key driving force for AI development and adoption for research, public and private sector organisations, civil society and the environment.

The National AI Strategy shall set priorities for funding (short and long-term) research, applications for the public and private sectors, civil society, education and training. In addition, it will examine ways for combining European[20], national and private[21] AI-focused investments, that will pave the way for the sustainable and democratised integration of AI into the economy and society.

Special emphasis will be given to innovation funding (that will be mission-driven so as to increase the effectiveness of funding by pursuing clearly defined targets[22]), the financing of novel AI business models, and the design and development of new technology-advanced products and services that address the current and emerging market needs (national, European and international markets – both in terms of product/customer markets and in terms of company investors/buyers).

[20] The next EU research and innovation framework programme - 'Horizon Europe' - will invest 100 billion euro for research and innovation funding in the years 2021 to 2027.
[21] Including industrial - and crowd-driven funds.
[22] Aligned with the upcoming Horizon Europe programme mission-oriented approach to research and innovation funding.

2.2 AI Democratisation Process

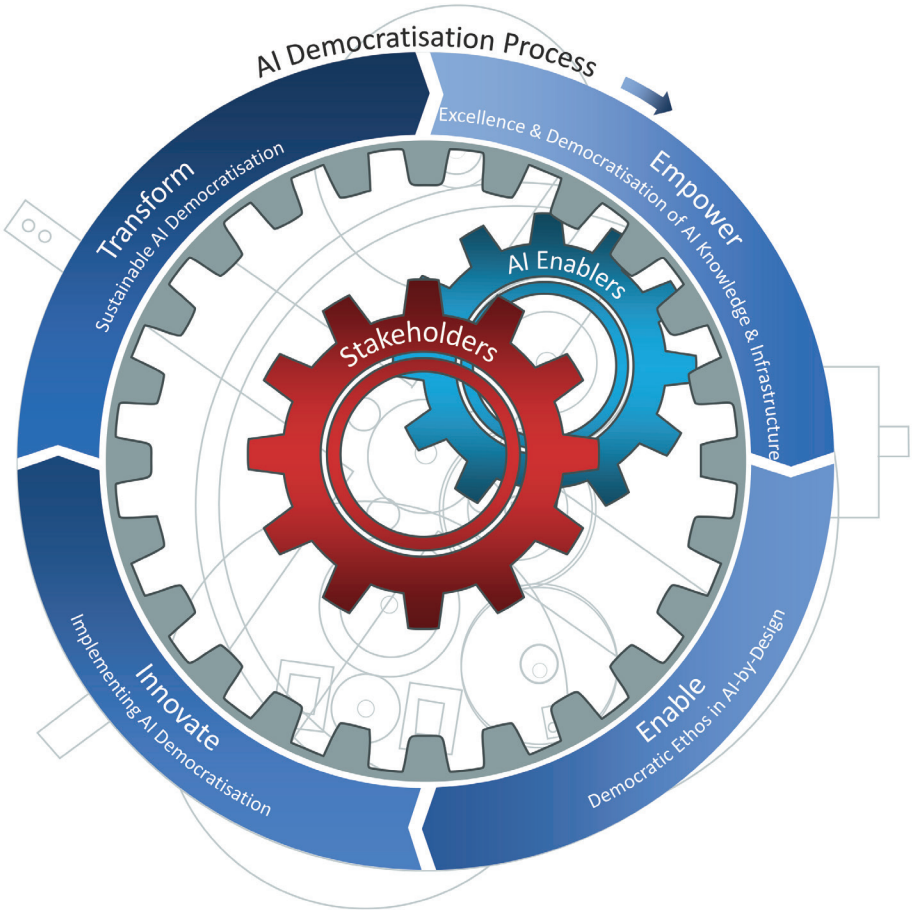


Figure 5: The Pillars for AI Democratisation Process

The upper layer of the strategic **AI Democratisation** framework involves the Democratisation of the entire AI value creation chain (equality of AI opportunity and AI result). This will create the necessary conditions for Democratising AI for all stakeholder segments (public sector, private sector, research and academia, civil society and the environment). In this way triggering sustainable AI-driven innovation, infused with a concrete set of principles that embed the moral and fundamental rights of Democracy, encapsulated in Democratic Ethos in AI, realising positive change for people, civil society and the environment.

This **process** relies on four key pillars (Figure 5) which cover the needs of the ecosystem stakeholders (public sector, private sector, research and academia, civil society and the environment). These include: (i) **Empowering** via excellence and Democratisation of AI knowledge and infrastructure, (ii) **Enabling** by infusing Democratic Ethos in AI-by-Design, (iii) **Innovating** via the implementation of AI Democratisation and (iv) **Transforming** by sustaining AI Democratisation and re-empowering it. The sections that follow provide a detailed overview of these pillars.

2.2.1 EMPOWER: Excellence & Democratisation of AI Knowledge and Infrastructure

Empowering all distinct stakeholder segments in the age of AI entails the following:

Strive for excellence and co-creation of cross-disciplinary AI knowledge and AI expertise within and between scientific fields and sectors. This entails investment, to provide the Greek AI research and higher education institutes with a reliable funding stream, so they can upskill talent through PhD scholarships, industrial scholarship programmes and retained post-doctoral academic positions. Furthermore, the necessary stimuli should be provided in order to establish greater collaboration and co-creation of AI-knowledge across scientific fields covering all aspects of AI (e.g., technical, practical, philosophical, legal, economic, social and humanistic). This will increase the academic and applied research output, adopting a multi- and cross-disciplinary and cross-sectorial approach, actively engaging with leading European initiatives (AI4EU, AI4People, CLAIRE-AI, ELLIS, among others), OECD and international communities that share similar values. Additionally, specialised partnership programmes should be funded in order to foster AI-driven collaboration/co-creation between academia and industry covering all key sectors (cross-sectorial) of the Greek economy.

Democratise AI knowledge. This involves the Democratisation of access to AI knowledge by opening AI knowledge (cross-thematic) and facilitating knowledge-acquisition for all the various stakeholder segments. Firstly, this entails the provision of relevant AI knowledge (open knowledge) to all stakeholder segments (civil society, research community, industrial community, public sector agents), acknowledging the specific needs of each community group. However, to democratise AI knowledge it is essential to not only diffuse AI knowledge and expertise, but also to ensure accessibility (open access) to the digital AI resources and facilitate the acquisition of this knowledge. This can be done via dedicated courses, training, etc., and by addressing the current and emerging needs of all stakeholder groups (via educational curricula and public awareness activities for AI, and the societal, legal and ethical impact of AI). Finally, another crucial component of AI knowledge Democratisation is the nurturing of an inclusive, constructive, on-going AI-dialogue. This will amplify existing knowledge, infuse society with new insights and facilitate the co-creation of policies (e.g. via structured public consultations), standards, etc.

Democratising AI supporting digital infrastructure. Empowering excellence and Democratisation of AI knowledge needs to be tied together with the Democratisation of AI supporting infrastructure (data infrastructures, technological infrastructures, etc). For AI Democratisation, it is essential not only to diffuse AI knowledge and expertise, but also to ensure access to digital assets and computational infrastructures that make it possible to apply this expertise to practical goals. This way, the Democratisation of AI supporting infrastructure will ensure an open, participatory, fair, and responsible AI-driven evolution of our economy and society, that will be beneficial for people, society and the environment.

2.2.2 ENABLE: Democratic Ethos in AI-by-Design

The second pillar is centred around 'enabling' AI Democratisation. This will be achieved by infusing AI with the moral ideals and fundamental rights of Democracy, encapsulated in the notion of **Democratic Ethos**. These democratic principles will complement the European Trustworthy AI ethical principles for a human-centric AI (European Ethics Guidelines for Trustworthy AI[23] and 7 Key Requirements[24]).

Ethos means 'virtue'[25] in the Aristotelian sense and denotes the internal values that characterise an individual. Democratic Ethos encompasses the guiding ideals, the fundamental values and virtues of Democracy itself. It denotes a set of values, virtues, rights, and responsibilities embraced by members of a community who are committed to a flourishing Democracy; values that can act as a moral code for AI. It depicts the need to

[23] European Commission (2018), 'Ethics Guidelines on Artificial Intelligence', June 2018 [14].
[24] The 7 key requirements for Trustworthy AI, include the following: Human agency and oversight, Technical robustness and safety, Privacy and Data Governance, Transparency, Diversity, non-discrimination and fairness, Societal and environmental well-being and Accountability (EC, 2018) [14].
[25] The word 'virtue' is the translation of the Ancient Greek word αρετή - 'árete', which denotes moral excellence and indicates the fundamental qualities that allow people to excel. 'Virtue' in the Aristotelian sense promotes human flourishing and excellence. Honesty, fairness, courage, compassion, generosity, fidelity, integrity, self-control and prudence are examples of virtues.

- protect and promote the freedoms, rights, interests and welfare of people.

> Democratic Ethos in AI-by-Design calls for the moral ideals and fundamental rights of Democracy to be taken into account throughout the whole engineering process of AI, as well as the methods that can subsequently verify that an intelligent agent's conduct and use remain within these moral and democratic bounds (certification).

Democratic Ethos in AI-by-Design is an approach that should be considered when creating and evaluating AI technology and AI systems. An approach that necessitates that by default, **Democratic Ethos** is incorporated into AI technology and AI systems. It acts as a **trust-mark** denoting that AI technology is designed with moral ideals and democratic fundamental rights as a priority, together with the purposes that each system serves.

Greece as the **laboratory for Democratising AI** will promote the design, development, deployment and evaluation of AI in a democractised way, while prioritising that Democratic Ethos is successfully incorporated into AI-by-Design. The operationalisation of the democratic principles will complement the European Guidelines for Trustworthy AI and will ensure their practical implementation so as to successfully enable AI Democratisation.

2.2.3 INNOVATE: Implementing AI Democratisation

The third pillar relates to 'innovation'. The implementation of AI Democratisation will be realised via the design, experimentation, development, deployment and evaluation of **AI-driven innovations** with moral, ethos and cross-sectorial impact, so as to stimulate a future that will maximise AI's benefits for people, society, the economy and the environment. As the **laboratory for Democratising AI**, Greece will stimulate AI-driven innovation infused with Democratic Ethos and the European principles for Trustworthy AI. Hence the focus will be on the creation of hotbeds and sandboxes for AI experimentation (testing and development of AI systems), and the financial incentivisation for the open collaborative creation of value, anchored upon the needs of people, society and the environment, in an ethical and democratic way. The experimentation outputs (positive and/or negative) will enrich the design of future AI-driven innovations and will provide input for the pillars of the AI Democratisation process.

This goal will be realised by specialised AI Testing and Experimentation Facilities (TEFs) on a local, regional and national scale, which will constitute the controlled environments where AI innovations can be co-created, evaluated and matured, in order to minimize risks, maximize positive impact and ascertain socio-cultural compatibility with the deployment settings. Each TEF will need to designate and converge toward appropriate settings for its use. They should also designate best practices for their function and exploitation, and describe the evaluation and control processes for their various uses. The evaluation and control processes will also involve appropriate stakeholders from society, so as to support a human-centric, democratic approach to AI-by-Design.

2.2.4 TRANSFORM: Sustainable AI Democratisation

The fourth pillar is centred around 'transformation'. This transformation will be achieved via sustainable AI Democratisation (sustainable-by-design) that will accelerate the achievements of AI-driven innovation and enhance their adoption across all sectors of the economy and all stakeholder segments – **Democratisation of AI-driven innovation**. In this way, also sustaining the AI-driven innovations that have adopted an AI design approach is aligned with the moral and fundamental rights of Democracy and the European Trustworthy principles.

In order for this to be realised, incentives and enabling supporting measures should be provided for the various stakeholders. Examples may include policy, economic, legislative and social incentives, that will act as a stimulus for the adoption of AI-driven innovations that have prioritised Democratic and Trustworthy AI principles in their system design and development processes (by-design), which in addition to other benefits, are also socially beneficial (i.e. environmentally-friendly). Market demand for such AI systems will thus increase; creating an additional significant incentive for the sustainability of the AI Democratisation process itself. In addition to increased revenues, other powerful market incentives could include the revision of market rules and the expansion of access to such AI markets.

These incentives will grow and transform the AI value creation ecosystem itself, and maximise the economic, social and environmental impact of the AI-driven innovations that are infused with the Democratic and Trustworthy AI principles. This will nurture the on-going evolution and dynamic re-initiation of the AI Democratisation process, while focusing upon the needs of the key stakeholder segments and realising positive change for all, in a democratic way.

3 Implementing the Hellenic AI Strategy

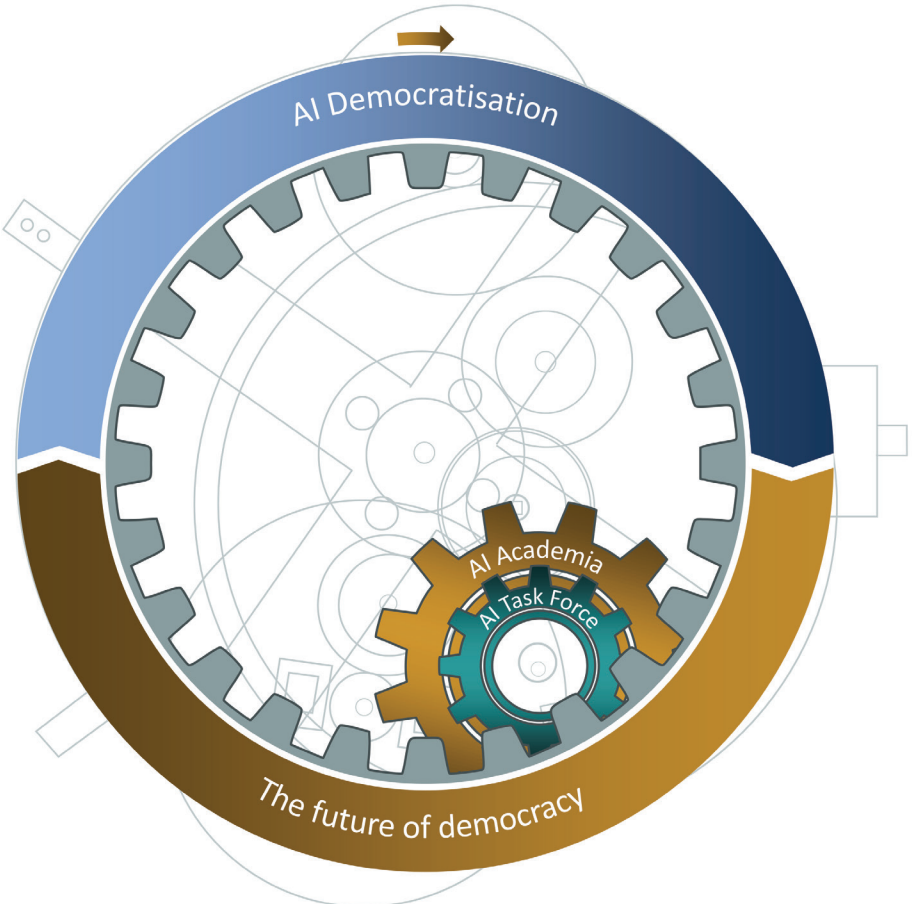


Figure 6: Implementing the Hellenic AI Strategy

The Democratisation of AI constitutes the aspirational vision for Greece in the global AI ecosystem. To realise this vision, a concise implementation plan will be employed. The sections that follow set out an initial set of short-term goals for Greece to achieve through implementing certain actions and policy measures, for the duration of 2020-2022.

In addition to boosting the implementation of AI in the short term, covering the period until 2022, there is also the need to create a long-term Strategic Action Plan for Artificial Intelligence in Greece. This long-term plan will be built upon the short-term actions of the AI Strategy, and take into account the experience gained from the implementation of this short-term strategic plan. Like the ingenious Antikythera mechanism – when every four years the operator could detach and shift the scale by one hole, taking leap years into account – Hellenic AI strategic planning and reporting depicts a corresponding agile and adaptive approach to the implementation of the AI strategy, especially for the long-term.

The planning and implementation of the Hellenic AI Strategic Action Plan, the monitoring of the implemented activities and the design of the long-term AI Strategy, conversant with other national and international strategies, necessitate the creation of specialised working groups. The Hellenic AI Task Force along with the AI Academia (Figure 6), constitute the key **AI implementation bodies**, and will be responsible for the AI planning and implementation activities. We elaborate on these two bodies in the following paragraphs.

3.1 Hellenic AI Task Force

AI Task Force upcoming activities

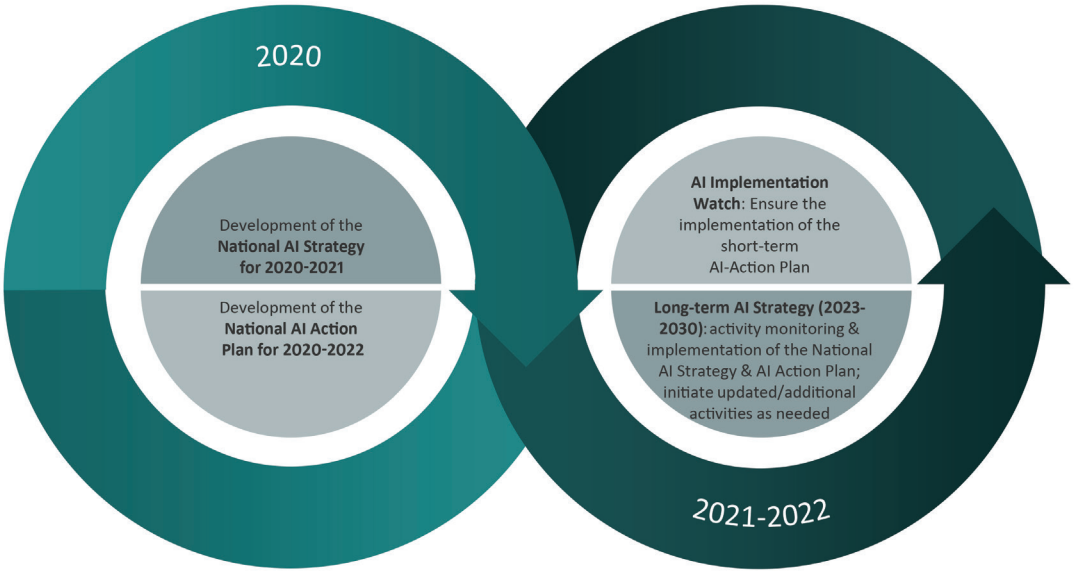


Figure 7: Hellenic AI Task Force Activities – Proposed Activities

The Hellenic Task Force on Artificial Intelligence brings together national leaders in AI and associated fields, to design the National AI Strategy and National AI Action Plans centred around AI Democratisation. These experts will also need to consider the benefits and the challenges posed by the AI revolution, and align with the emerging European and international standards and principles around AI ethics. The aim of the Hellenic AI Task Force is to: (i) create the Hellenic AI Strategy Report by adopting a multi-perspective, open, agile and lean approach, (ii) align with the broader National Digital Transformation Strategy [2] and policies relating to other enabling technologies (IoT, QC, HPC, etc.), and (iii) publish and refine the AI Strategy and AI Action Plan through open stakeholder consultations.

The Task Force will be supported by Working Groups (WG) composed of a broad spectrum of AI experts from all stakeholder segments (industrial, public sector, research and academia and civil society). This multi-thematic and multidisciplinary approach (Table 1) will include the following Working Groups: **WG1 (Technology perspective)** will focus upon the technological AI adoption needs for realising trustworthy AI Democratisation across all sectors of the economy; **WG2 (Business and Innovation perspective)** will examine the business and innovation needs and requirements for AI Democratisation across all stakeholder segments; **WG3 (Social, Ethical, Legal, Democratic & Philosophical perspective)** will focus upon the trustworthy AI Democratisation via the lenses of five diverse perspectives; and **WG4 (Skills perspective)** will focus upon the requirements related to AI talent, the future of work and skill acquisition for all stakeholder segments, and acknowledging their needs.

Furthermore, an International Advisory Board will provide distinct perspectives and have an advisory role to the Hellenic AI Task Force Board. The International Advisory Board will be an influential group of international technology and business AI leaders who represent the major AI initiatives in Europe and the world, and internationally distinguished AI experts from around the world.

Table 1: Multi-thematic approach of the AI Task Force Working Groups

STAKEHOLDER SEGMENTS	WORKING GROUPS			
	WG1 Technology	**WG2** Business & Innovation	**WG3** Social, Ethical, Legal, Democratic, Philosophical	**WG4** Skills
Private Sector	Industrial Technology requirements, AI implementation needs, standardisation and technological barriers	Industrial AI requirements, AI innovation areas of interest for the AI Democratisation and business/ innovation barriers to AI as well as emerging perspectives (to provide input for AI Research)	Trustworthy AI Democratisation needs/barriers of the Industrial Community from a social-ethical-legal-democratic-philosophical perspective, emerging perspectives (to provide input to AI Research)	Private sector perspective on AI Talent, the future of work and skill acquisition needs (skilling, re-skilling)
Public Sector	▪ Public sector Technology requirements, technical implementation needs, standardisation, and barriers ▪ Policies for technological AI Democratisation across sectors	▪ AI requirements across the key public sector, AI-innovation areas (G2C, G2B, G2G) and potential barriers Enhancing the adoption of Trustworthy AI ▪ Democratisation across sectors (policy) and address the potential barriers (i.e., AI Democratisation barriers)	The need for Trustworthy AI Democratisation from a social-ethical-legal-democratic-philosophical perspective, for: (i) the public sector itself, (ii) public policy	▪ AI Talent for the public sector, the future of work and skill acquisition (skilling, re-skilling) ▪ AI talent-related policies (incentives) for attracting and retaining talent ▪ The future of work and skill acquisition policies
Research & Academia	▪ Academia: Technological AI adoption and current practices in the academic community, emerging needs ▪ Research: Research focus, Emerging Technological paradigms/areas, etc.	Business-technology research alignment, AI-innovation research agenda (basic, applied research)	Trustworthy AI Democratisation needs of the Research and Academic community, from a social-ethical-legal-democratic-philosophical perspective	▪ Academia: AI talent creation (new programmes, curricula, life-long learning), industrial-academia joint AI talent training, etc. ▪ Research: emerging skill needs for AI and high-performance AI, European and international cooperation, etc.
Civil Society & Environment	▪ Civil Society perspective: Technological needs for civil society's AI technological Democratisation requirements and barriers; mechanisms to increase trust in AI & AI products/services (certifications) ▪ Environment perspective: AI Democratisation and Natural Life (requirements and perspectives), Nature as a co-creator (Internet of Things – IoT, perspective for AI Democratisation), society-nature interactions	Business-innovation areas of interest for the AI Democratisation of: (i) civil society and (ii) the environment (IoT perspectives, biomimicry perspectives, society-nature interactions, etc.)	▪ Civil Society's need for the implementation of Trustworthy AI Democratisation from a social-ethical-legal-democratic-philosophical perspective ▪ Environmental perspectives integrated into the adoption/implementation of Trustworthy AI Democratisation (society-nature interactions)	▪ Civil Society perspective: Civil society needs for AI awareness, AI-skills, data and digital skill acquisition needs (skilling, re-skilling, life-long learning), citizen-science skills, etc. ▪ Environment perspective: AI-skills needed to preserve natural life and facilitate AI-driven innovations to support natural life

3.1.1 Initial AI Projects

Greece must take immediate advantage of the opportunities offered by Artificial Intelligence. This will entail the integration of AI in public administration and businesses as well as the social integration of AI in Greek society (awareness regarding the benefits, and the ethical and democratic use of this technology). In order to stimulate this immediate AI integration, an agile approach will be utilised. This will allow Greece to gain initial feedback and insight from the implementation of some preliminary AI supporting projects – **Initial AI Projects** (Figure 8).

These projects will enable the country to move forward quickly and also utilise this knowledge for planning its long-term action plan for AI, due to having acquired a better understanding of the possibilities, benefits and risks of AI and its impact on AI Democratisation.

The Hellenic AI Observatory

The first AI project will focus upon the creation and nurturing of the AI ecosystem in Greece. Towards this aim, the Hellenic AI Observatory will be developed so as to facilitate value-adding interactions with Greek stakeholders and AI communities. This National AI Observatory will provide information about: (i) the AI activities in Greece, (ii) the AI ecosystem entities, (iii) the available AI training and educational activities that take place in Greece across all educational levels, including executive and public educational programmes, (iv) the AI research activities that take place in Greece in collaboration with various Greek Research Institutes, Universities, and the Hellenic AI Society (EETN)[26], (v) the AI success stories across different sectors (AI pioneers).

AI Training for Enterprises

Another important AI project entails the creation of a short online AI training module for the private sector. The aim of this training will be to help individual entrepreneurs and businesses understand what Artificial Intelligence is, as well as the ethics, risks, gains and overall impact of AI for the business arena (strategic implication of AI in their industrial context).

The aim is to develop appropriate training material for a variety of industrial settings and related skill sets. These syllabi will define appropriate professional roles, their suggested designated functions within the professional environment, plus an outline of training aims, which can be implemented through appropriate training and certification programmes.

Selective AI Projects in the Public Sector

In the public sector context, the initial AI projects, aligned with the National Digital Transformation Strategy [2], will be in areas expected to have high value potential, such as:

- Improving quality and further exploiting of health data
- Support mechanisms for public oversight bodies to combat tax evasion and avoidance, and to control public procurement.

In order to ensure that the AI systems, which will be employed in the course of these high-impact AI projects, will meet the necessary high ethical, legal and democratic standards, an **AI Auditing Body** will be formed. This AI body will provide the requirements and audit the trustworthiness of AI systems, as well as their compliance with the necessary ethical and legal principles.

AI Infrastructure Project

Another important initial AI project will cover the 'AI Data' enabler category. The aim of this horizontal AI infrastructure project will be to utilise the earth observation data, for enhancing high value areas for the public and private sectors, such as maritime, agriculture, etc.

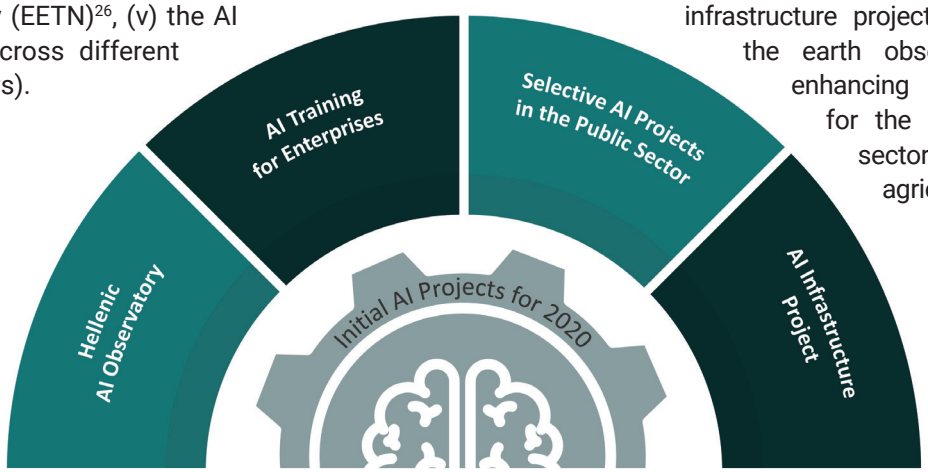


Figure 8: Initial AI Projects for 2020

[26] The Hellenic Artificial Intelligence Society (EETN) is a non-profit scientific organisation devoted to organising and promoting Artificial Intelligence (AI) research in Greece and abroad. Available at https://www.eetn.gr

3.1.2 Roadmap for 2020

The roadmap for the activities that will occur during 2020 are presented in the figure below.

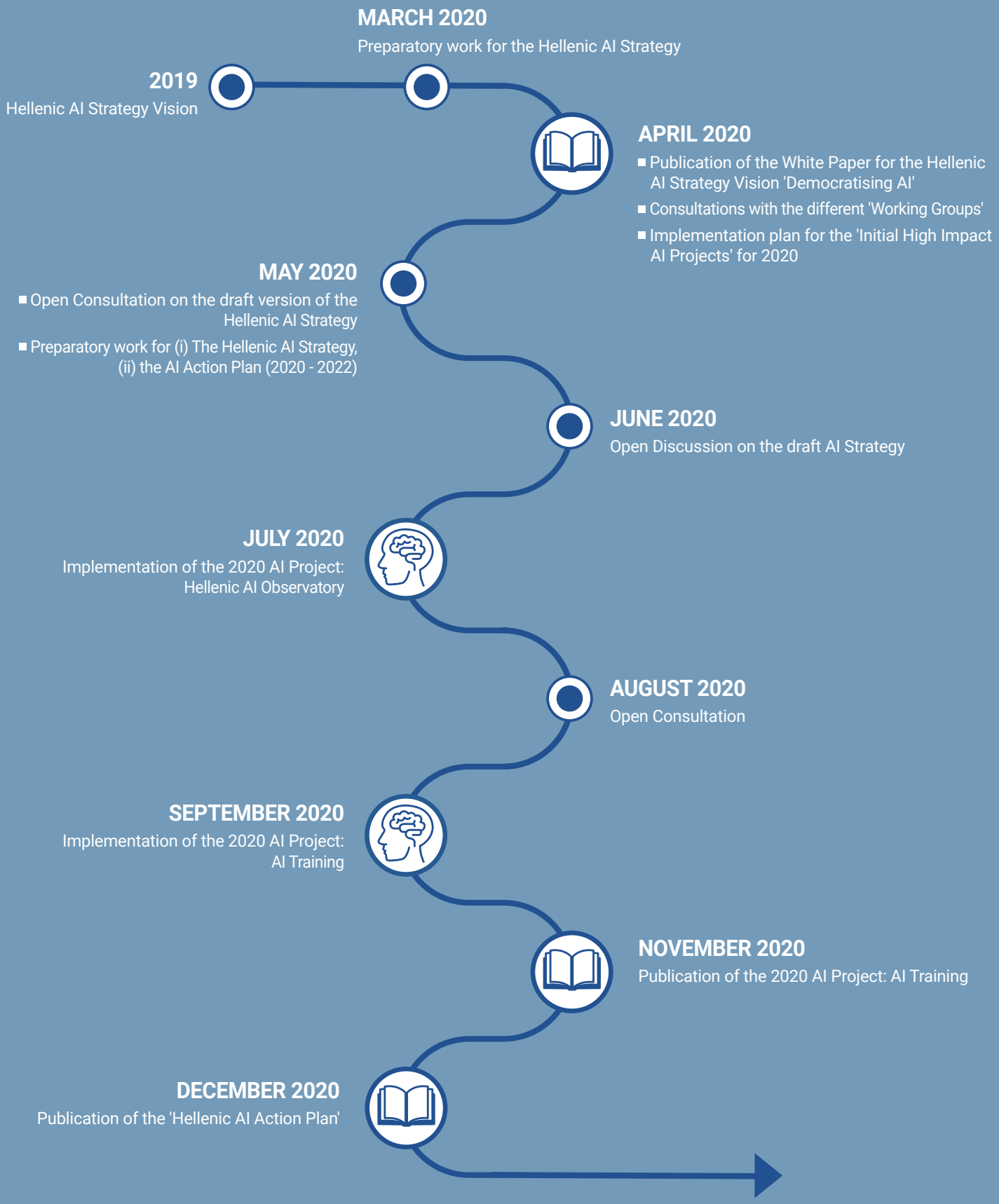


Figure 9: Roadmap for 2020

3.2 AI Academia

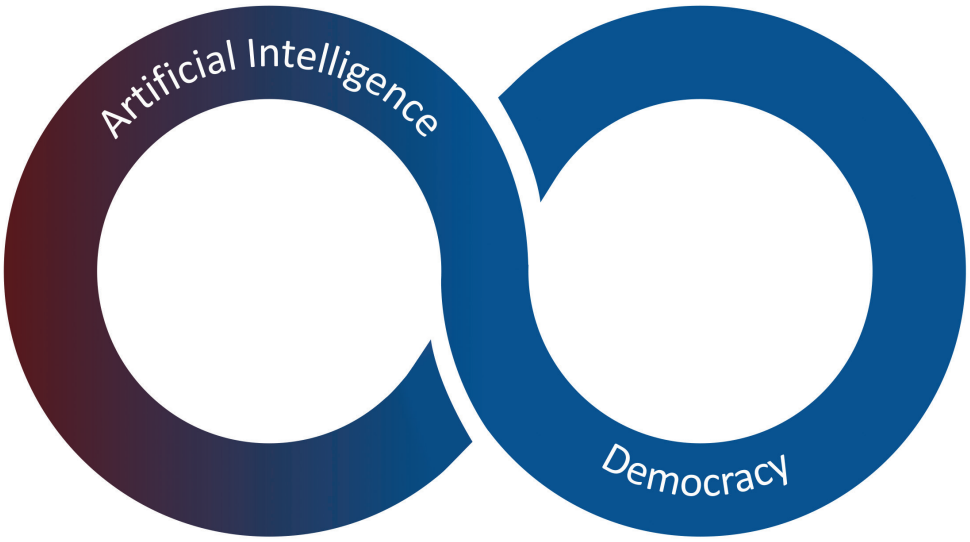


Figure 10: Artificial Intelligence & Democracy Continuum

The AI Academia will be a national, independent initiative. It will act as an open, multi-disciplinary think tank and thought leadership body that will foster a co-creation environment for an open dialogue around the continuum of Democracy and AI. In direct alignment with the Hellenic AI Strategy and the Greek National Digital Transformation Strategy [2], the AI Academia will examine the ever-evolving dynamic continuum of value co-creation between Democracy and Artificial Intelligence.

Artificial Intelligence and Democracy are interlinked (Figure 10). On the one side, we have the Democratisation of AI and the infusion of democratic principles in AI-by-Design centred around the notion of Ethos. On the other side, we have the future of Democracy in an AI-saturated public sphere. Thus, it is crucial to examine the association between the two, and the ways that they can co-create value for all, and for the shared common good.

The focus of the AI Academia will be:

Democratisation of AI

Towards a technology-enabled future that is guided by democratic principles, values and rights, and taking into account the different AI trade-offs that emerge (accuracy vs. privacy, fairness vs. accuracy, fairness vs. privacy, explainability vs. accuracy, etc.). A future that places technology at the service of people[27], society and the environment. A future that is more democratic, trustworthy and sustainable for all, and for the shared common good. A future that will be based on values that we share, as well as 'new values' that humanity never had and which are needed now more than ever before. Values that should guide the ongoing evolution of AI, safeguarding the wellbeing of humans and nature, while protecting human autonomy and freedom. Values that go beyond AI regulation and which we need to co-design with Ethos-in-AI acting as a moral code for AI.

The future of Democracy

Towards a new paradigm - Democracy in the era of AI - how technological advancements in the area of AI can evolve our shared system of fundamental rights, values and virtues. Democracy as a unique experimental system has the inherent potential and ability to self-correct[28] and self-renew[29]. As such, the impact of technological advancements in this regeneration process will be examined, with the underlying aim to understand and resolve the potential conscious and unconscious decisions that will pave the way for an inevitable new Democratic paradigm triggered by AI and technology (Democracy 2.0).

[27] Aiming not only to serve but also to protect human autonomy, human wellbeing and Democracy itself from our conscious and unconscious decisions. For example, how can we develop AI to prevent it from taking over our decision-making, when it is able to decide for us better than we can? – The 'AI Paradox: the more benevolent AI becomes towards humanity, the greater the threat that AI poses for humanity's autonomy' (Th. Scaltsas [15]).

[28] As it allows people to question even its own foundations (Yuval Noah Harari, [16]).

[29] Or termination, as in the case of the emerging notion of 'Predictive Democracy' which implies the end of voting: when computers will be able to 'predict' our voting 'preferences' (Th. Scaltsas, [15]).

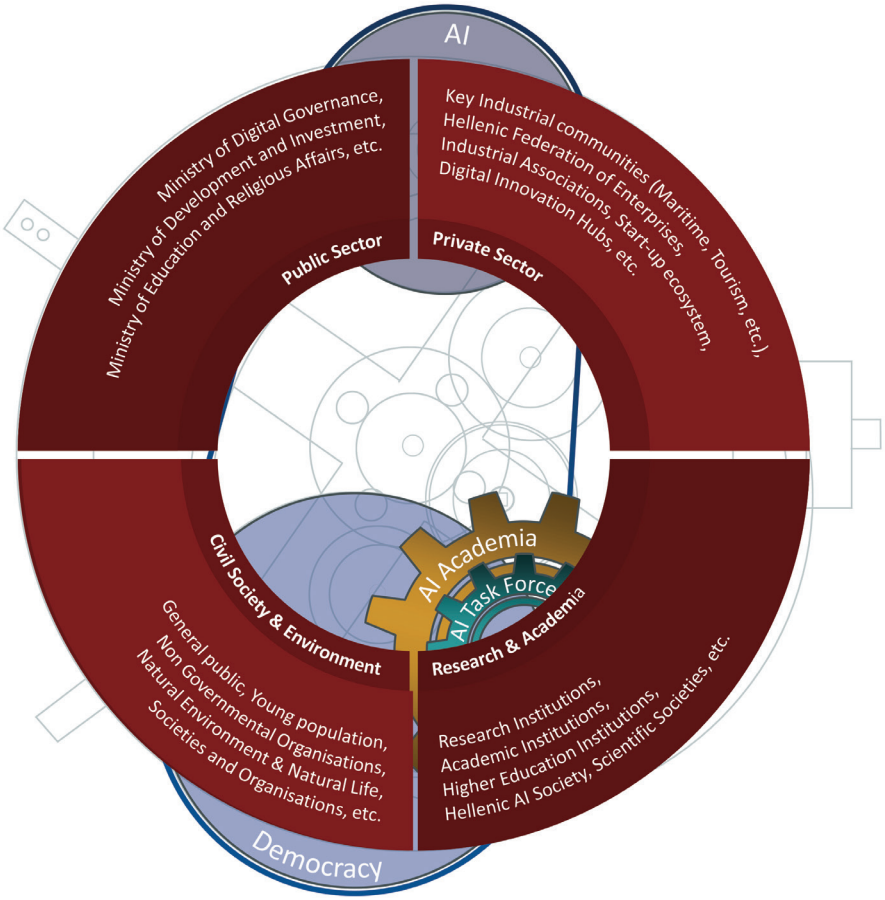


Figure 11: The AI Academia

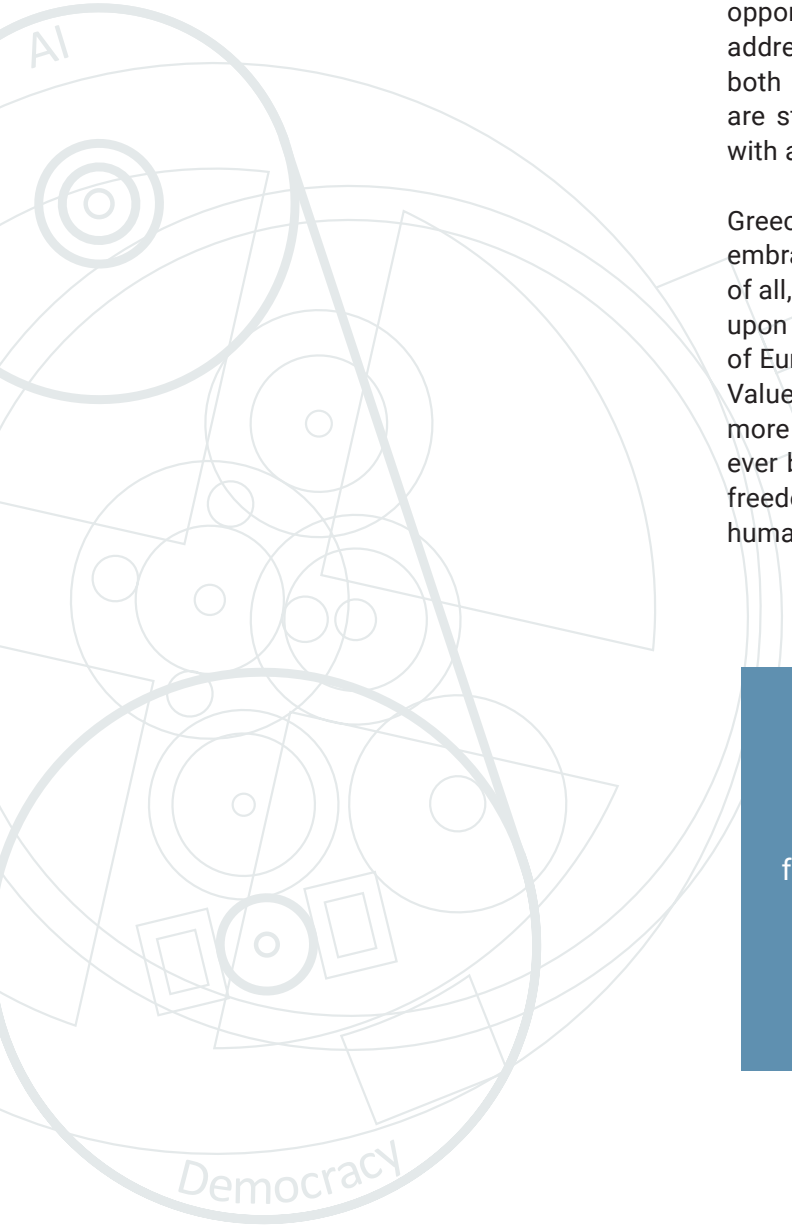
AI Academia will aim at connecting the different spatial and temporal AI arising adoptive cycles. AI Academia shall aggregate the generated knowledge and harvest the emergent properties of the total adoptive cycles towards (i) the development and adaptation of a common language, (ii) the generation of new knowledge, policies and ideas, and (iii) the promotion of the said cognitive, design and managerial output in the central decision-making bodies within Greece and the EU. To that end, AI Academia will emphasise the formulation of a critical, high skilled, specialised and certified human capital.

The AI Academia (Figure 11) will be a cross-cutting network that will engage a broad spectrum of representatives for all relevant stakeholder segments (public sector delegates, private sector representatives, academia and research stakeholders, civil society and representatives of environmental communities), aiming to create an inclusive community and address the key topics and issues around the Artificial Intelligence and Democracy continuum. The steering group of the AI Academia will be the Hellenic AI Task Force.

4 Conclusion

Artificial Intelligence has started to influence and transform our lives in multiple ways. While the importance and the potential benefits of AI are tremendous, the same can be claimed for the risks and challenges associated with AI. However, it lies upon us to choose the way that we will seize this opportunity, so as to realise its full potential and address the challenges of this technological evolution both at a national and global level. The fact that we are still at the beginning of this AI era, provides us with a window of opportunity.

Greece aims to foster a technology-enabled future that embraces innovation and development for the benefit of all, and for the shared common good, by innovating upon its core values that constitute the core values of Europe; the values and moral ideals of Democracy. Values, ideals and fundamental rights that become more relevant in the AI era. An era where more than ever before, we will need to protect and promote the freedoms, rights, autonomy, interests and welfare of humans and nature.

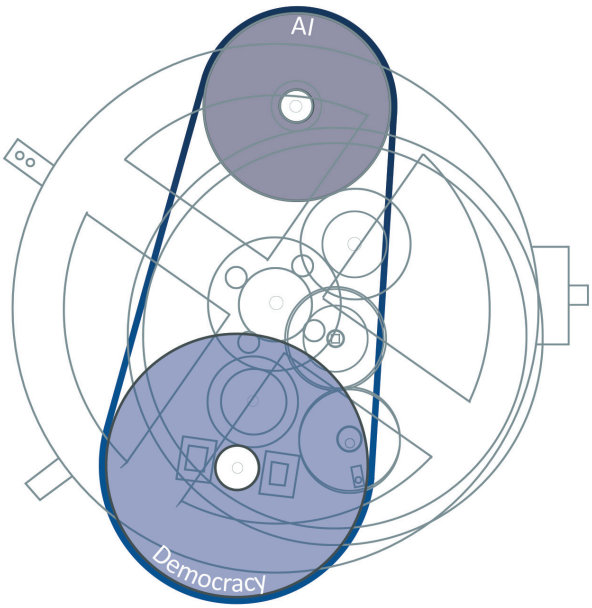


The ambition is for Greece to become the world's experimental laboratory for the sustainable Democratisation of AI and the infusion of the democratic principles in AI-by-Design.

A laboratory that will create the necessary conditions for Democratising AI for all stakeholder segments, following a concrete set of principles that embed **Democratic Ethos** in AI, realising positive change for people, society and the environment. These democratic principles will complement the European Trustworthy AI principles for a human-centric AI.

The Greek AI Strategy is a plan of action that the Greek government will adopt in order to accelerate the adoption and development of AI in both the private and public sectors; to increase the relevant skills and its research and development (R&D) base; to support the awareness of Greek society of the benefits and ethical use of such technology, as well as to provide the necessary AI infrastructure and enablers advancing AI in Greece.

Furthermore, the know-how generated through the implementation of the Hellenic AI Strategy will allow the unique positioning and competitive advantage of Greece in the AI landscape, while also striving for the shared common good.



References

[1] **European Commission** (2020), White Paper on Artificial Intelligence – A European approach to excellence and trust, European Commission, Brussels, 19.2.2020, COM(2020) 65 final.

[2] **Ministry of Digital Governance** (2020), Βίβλος Ψηφιακού Μετασχηματισμού 2020–2024, Α' ΜΕΡΟΣ - Κατευθυντήριες αρχές και οριζόντιες παρεμβάσεις, under publication.

[3] **Aristotle**, *Nicomachean Ethics*, Book 2 (1103a17).

[4] **Efstathiou K., Efstathiou M.**, (2018), "Celestial Gearbox the Oldest Known Computer is a Mechanism Designed to Calculate the Location of the Sun, Moon, and Planets", *Mechanical Engineering*, 140(09), pp: 31–35.

[5] **Allee V.**, (2003), The Future of Knowledge: *Increasing Prosperity through Value Networks*. Butterworth-Heinemann.

[6] **Moore J.F.**, (1993), "Predators and prey: a new ecology of competition", *Harvard Business Review*. May - June, 71(3), pp: 75-86.

[7] **European Commission** (2019), Communication: European Green Deal, COM (2019) 640 final, Dec. 2019.

[8] **Carayannis E., Barth T., and Campbell D.**, (2012), "The Quintuple Helix innovation model: global warming as a challenge and driver for innovation", *Journal of Innovation Entrepreneurship*, 1(2).

[9] **Carayannis E., Campbell D.**, (2010), "Triple Helix, Quadruple Helix and Quintuple Helix and how do knowledge, innovation and the environment relate to each other? A proposed framework for a trans-disciplinary analysis of sustainable development and social ecology", *International Journal of Social Ecology and Sustainable Development*, 1(1), pp: 41–69.

[10] **European Commission** (2020), Communication: A European Strategy for Data, COM (2020) 66 final, Feb. 2020.

[11] **Benkler Yochai** (2006), *The Wealth of Networks: How Social Production Transforms Markets and Freedom*. Yale University Press.

[12] **Wahl Daniel Christian** (2016), *Designing Regenerative Cultures*, Axminster. England: Triarchy Press.

[13] **Poikola A., Kuikkaniemi K., and Honko H.**, (2018), My Data- A Nordic Model for human-centered personal data management and processing. Ministry of Transport and Communications, Finland.

[14] **European Commission** (2018), Ethics Guidelines on Artificial Intelligence, June 2018.

[15] **Scaltsas Theodore** (2020), Personal communication based on his "Four Slogans".

[16] **Harari Yuval Noah** (2018), *21 Lessons for the 21st Century*. Spiegel & Grau.

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