TECHNOLOGY
EDUCATION
INFRASTRUCTURE
LAW
WORKFORCE
DOMESTIC
SKILL
WELFARE
DIGITAL TRANSFORMATION
HUMAN
DEVELOPMENT
DATA ECONOMY
COMPETITION
NATIONAL

BIG
DATA
BLOCKCHAIN
AUTONOMOUS
CLOUD COMPUTING
CYBER SECURITY
QUANTUM
INTERNET OF THINGS
OPEN GOVERNMENT DATA
ROBOTICS

NATIONAL ARTIFICIAL INTELLIGENCE STRATEGY

2021-2025

RESEARCH
AGILE
INVESTMENT
COLLABORATION
OPEN SOURCE
ECOSYSTEM
UNIQUE
SUSTAINABLE
INNOVATIVE
START-UP

EXPLAINABLE
RELIABLE
FAIRNESS
JUST
SOCIAL
PROPORTIONAL
RESPONSIBLE
TRANSPARENT
ACCOUNTABLE
ETHICAL

REPUBLIC OF TURKEY
MINISTRY OF INDUSTRY
AND TECHNOLOGY

PRESIDENCY OF THE REPUBLIC OF TURKEY
DIGITAL TRANSFORMATION OFFICE

NATIONAL ARTIFICIAL INTELLIGENCE STRATEGY

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August 2021

REPUBLIC OF TURKEY
MINISTRY OF INDUSTRY
AND TECHNOLOGY

PRESIDENCY OF THE REPUBLIC OF TURKEY
DIGITAL TRANSFORMATION OFFICE

“We believe that the time has come for our country to make a new human-oriented breakthrough in the field of artificial intelligence.”

Recep Tayyip ERDOĞAN
President

Foreword

Recep Tayyip ERDOĞAN
President

The first quarter of the 21st century is a period in which the incompatibility between the social, economic and political structures transformed by digital data and algorithms and the notions of the analogue era comes to light. The radical transformative impact of rapidly developing artificial intelligence supported systems on production processes, occupations, daily life and institutional structures has brought mankind to the brink of a new age. With their ever-expanding scope of application, artificial intelligence technologies are expected to have a greater impact on the global economic structure than the Internet revolution.

Al-Jazari of Şırnak, who is considered the founder of cybernetics, achieved the "impossible" for his time with the hydraulic machines he developed centuries ago. As the Thessaloniki Ordinarius Professor Cahit Arf, who took the first contemporary step towards artificial intelligence in our country, emphasized in his 1959 presentation titled "Can Machines Think and How?": "finding a way to our desire for knowledge depends on the spread of confidence in reason". Many Turkish citizens of similar traits working both in Turkey and abroad from the past to the present contribute to the advancements in the field of artificial intelligence. With this confidence, we believe that the time has come for our country to make a new breakthrough in the field of artificial intelligence.

We are living in a period where all countries are taking serious steps towards the potential gains of artificial intelligence. However, artificial intelligence technologies, which have many opportunities in terms of socioeconomic development, also bring some uncertainties and risks to the agenda. Unknowingly, we are transforming from people struggling with nature to individuals stuck between algorithms. In addition, artificial intelligence systems trained with our codified preferences, judgments and discourses also lead the human beings to question themselves. This situation is actually an opportunity for our nation. We will take steps beyond shaping our development paradigm around economic welfare and public order in the field of artificial intelligence.

Taking part in the field of artificial intelligence is not a matter of choice as it is one of the strongest pillars of our development goals in line with the "Digital Turkey" vision and the "National Technology Initiative". By designing artificial intelligence systems with an understanding reflecting the development and operation of artificial intelligence systems in accordance with our common values, we have the opportunity to add value to all humanity by making a new technoeconomic breakthrough combined with our deep-rooted civilization experience.

The National Artificial Intelligence Strategy is a comprehensive effort to which all the relevant stakeholders have contributed in order to support this transformation that, is currently being experienced on a global scale and fed by artificial intelligence technologies, on behalf of humanity and to ensure that our country benefits from this process to the possible extent.

I would like to thank all public institutions and organizations, non-governmental organizations, academics and private sector representatives who contributed to the preparation of the Strategy, especially the Digital Transformation Office and the Ministry of Industry and Technology. I wish that the National Artificial Intelligence Strategy, which we will be implemented with the contribution of all relevant parties in the next five years will yield auspicious outcomes for our country.

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Abbreviations

AI	Artificial Intelligence
CAHAI	Ad Hoc Committee on Artificial Intelligence
CoHE	Council of Higher Education
DTO	Presidency of Turkey Digital Transformation Office
EU	European Union
GDNT	General Directorate of National Technology
GDP	Gross Domestic Product
GPAI	Global Partnership on AI
ICT	Information and Communication Technologies
ILO	International Labour Organization
IT	Information Technologies
ITU	International Telecommunication Union
MoIT	Ministry of Industry and Technology
MoNE	Ministry of National Education
NAIS	National Artificial Intelligence Strategy
NDD	National Data Dictionary
NGO	Non-Governmental Organization
OECD	Organisation for Economic Co-operation and Development
OECD ONE AI	OECD Network of Experts on Artificial Intelligence
STIPC	Science, Technology and Innovation Policies Council
TDZ	Technology Development Zone
TurkStat	Turkish Statistical Institute
TÜBİTAK	Scientific and Technological Research Council of Turkey
ULAKBİM	Turkish Academic Network and Information Center
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
USA	United States of America
WEF	The World Economic Forum

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President

Executive Summary

The National Artificial Intelligence Strategy (NAIS) was prepared in line with the Eleventh Development Plan and the Presidential Annual Program for 2021. The Strategy determines the measures that will put our country's efforts in the domain of artificial intelligence (AI) on a common ground between the years 2021-2025 and the governance mechanism that will be established to implement these measures.

NAIS was prepared by the Digital Transformation Office of the Presidency of the Republic of Turkey (DTO) and the Ministry of Industry and Technology (MoIT) in accordance with "Measure 473.1" in the Presidential Annual Program 2021. NAIS is of an exploratory nature since it is the first national strategy of our country in this field and due to the rapid development of AI and the development of strategies in other countries over time. The strategic priorities, objectives, measures, and governance mechanism determined in this context have been designed to respond to the opportunities, risks and uncertainties that may arise for our country over time.

As part of NAIS preparations, interviews were conducted with public institutions, universities, private sector organizations, NGOs, and international organizations on physical and online platforms, workshops were held and domain experts of different disciplines were asked to provide their evaluations. In this framework, the Strategy was finalized by taking into account the global trends shaped by the paradigm shift in economic and social life that emerged due to AI, as well as the recent situation and development goals of our country. In this context, the vision of NAIS was determined as: **creating value on a global scale with an agile and sustainable AI ecosystem for a prosperous Turkey** In order to realize this vision, NAIS was designed around 6 strategic priorities in line with both national policies and needs along with the AI strategy recommendations of international organizations.

Figure 1. National AI Strategy Vision and Strategic Priorities

Within the framework of these strategic priorities, **24 objectives** and **119 measures** were identified. These objectives and measures outline the actions that the implementing institutions will determine in detail. The priorities of the NAIS, as well as the objectives and measures determined in this context, have been designed in harmony with our country's vision of “Digital Turkey” and the “National Technology Initiative”.

As the domain of AI technologies expands, the compliance pressure on individual habits, ways of doing business, professions, and institutional structures triggers a radical transformation in the socioeconomic structure. Although it is clear that this transformation has started and will continue to accelerate, the means and speed of the interaction of this transformation with existing social, institutional, and economic structures is unclear. Therefore, it is inevitable that a long-term national strategy to be determined in the field of AI, where such uncertainties exist, is to be based on the creation of an ecosystem that tries, discovers, learns and constantly updates itself accordingly. Moreover, in order to adapt Turkey's socioeconomic structure to rapid developments in the field of AI, it is necessary to act prudently enough not to make major mistakes on the one hand, and act quickly enough to take advantage of opportunities on the other. In this regard, the structure of NAIS is suitable for both experimenting and implementing, and it aims to create an agile and sustainable ecosystem that can manage the transformation in the socioeconomic structure and reduce the possible inefficiencies in the functioning of this ecosystem as much as possible. Due to the above-mentioned uncertainties and the ongoing dynamic process, it will be necessary to review the needs, possibilities and opportunities and shape the steps accordingly during the implementation period of the NAIS. It is observed that other countries have updated their strategy documents in the process due to similar needs. Due to all these reasons, the common points in NAIS and the guides envisaged to be prepared in this context are living and constantly evolving references.

The focus of NAIS is on strategic compliance and end-to-end governance, which will have repercussions at the inter-institutional and internal level, with competence areas consisting of quality data, advanced skills and technical infrastructure. Thanks to the measures to be implemented, it is aimed to create value from data through AI applications at institutions and at the sectoral level, to carry out AI projects effectively, and to increase the maturity level of our country's AI ecosystem within this framework.

In line with this main focus and objectives;

- Employment of researchers and practitioners to develop institutional competencies in the field of AI will be supported throughout all public organizations, especially in central public institutions, as well as the private sector and universities. Efforts to increase the quality and quantity of employment in the field of AI by enriching the training content, including the existing online platforms, will be carried out with the private sector, relevant NGOs, and universities. Professional definitions and competencies will be determined for the development of skills in the field of AI. With new undergraduate, graduate, and supporting research programs to be launched at universities, the number of new graduates with domain-specific competencies will be increased. Incentives for increasing scientific productivity in the field of AI will be improved. Thematic programs in which pre-higher education students will receive training on algorithmic and critical thinking, ethics, and AI applications will be generalized.

- Steps will be taken to increase the number and quality of initiatives operating in the

field of AI. In this context, cooperation with entrepreneurial networks, technology development, innovation, and incubation centers will be strengthened. Activation of AI-oriented venture capital (VC) funds will be prioritized. In this direction, public incentives and supports given specifically to the field will be improved. Interdisciplinary projects will be brought to the fore by establishing clusters and centers of excellence where advanced R&D activities can be carried out.

- Administrative, legal, and technical works on easy access to quality data, which is essential for AI projects and activities, and secure data sharing between institutions and sectors will be carried out. Testing and implementation processes of AI products and services will be improved through infrastructures that are in operation and those that will be newly established for high-performance computing, ready platforms, data storage, rapidtransmission, and secure sharing. The capacity of existing R&D centers will be improved, and commercialization processes will be accelerated by emphasizing collaborations with public institutions and organizations, the private sector and universities. Thanks to the Open Government Data Portal and the National Data Dictionary, the data quality of public institutions will be increased and anonymized datasets will be produced and shared. A “Public Data Space” will be established to ensure secure data governance among public institutions. In order to generate more value from this data, activities that support external participation and develop the open-source ecosystem will be carried out.

- Research will be carried out to ensure the adaptation of administrative and legal regulations to AI-induced socioeconomic transformation and to evaluate its possible consequences beforehand. Activities addressing ethical and legal aspects of AI applications will be carried out, and international studies in this field will be followed. By creating regulatory sandboxes and testbeds, initiatives will be facilitated in the development, testing, and commercialization processes. Data capacity will be improved to better understand and track transformation dynamics.

- Our country will be ensured to participate actively in reliable and responsible AI studies carried out at the international level. In addition, activities will be carried out to launch international projects in our country, and cooperation with international organizations will be supported. Participation in projects with cross-border calls, particularly the multi-annual financial frameworks of the European Union and the Union Programs within this scope, will be encouraged.

- Structural and workforce transformation of public institutions and private sector organizations will be supported in line with the developments in the domain of AI. AI Maturity Model and AI Project Management Guide will be prepared to accelerate the structural transformation and put it on a healthy footing. With the Public AI Platform to be offered as a service, the pre-implementation preparation process and experience transfer will be facilitated. It will be ensured to create problem pools and identify usage scenarios for both public institutions and the private sector. The Trustworthy AI Seal approach will be tested to encourage the use of reference models in application development and operation. Considering the new professions emerging with AI, training and certification programs for the existing workforce will be carried out with sectoral collaborations.

The action plans to be implemented within the scope of the measures outlined above will be prepared by the responsible public institutions under the coordination of the DTO and the MoIT.

A two-layered governance mechanism has been established in order to effectively implement the measures and action plans to be prepared within the scope of NAIS. The first layer will coordinate strategically, while the second layer will coordinate at the administrative and technical levels. In the first layer, high-level coordination and decision-making mechanisms are involved, while the technical and administrative mechanisms for the effective design and execution of the works to be implemented in accordance with the NAIS will be created in the second layer.

On the other hand, two different AI development environments will be established for public institutions and organizations and the common use of the AI ecosystem. In this context, the "Public AI Ecosystem" to be implemented under the coordination of the Digital Transformation Office Department of Big Data and AI Applications, will ensure following and supporting AI and advanced analytics projects of central and local government institutions and organizations in line with the guidelines to be prepared.

In addition, under the coordination of the MoIT General Directorate of National Technology Department of Digital Technologies; "Sectoral Co-Creation Laboratories" will be established within the TÜBİTAK Artificial Intelligence Institute for the common use of the AI ecosystem. These laboratories, which will be expanded in line with the needs, will support institutions with infrastructure and data spaces to be provided for them so that multi-stakeholder sectoral AI applications can be developed and tested. The laboratories will facilitate institutions defining problems, creating usage scenarios, sharing and annotating data, and meeting with domain experts and industry representatives.

In this document, the definitions of the concepts and related technologies in the field of AI are also included in the Annex in order to establish a common language in terms of the concepts used.

The high-level objectives foreseen to be reached in 2025, which is the end of the implementation period of NAIS, are as below:

- The contribution of AI to GDP will be raised to 5%.
- Employment in the field of AI will be increased to 50,000 people.
- Employment in the field of AI in central and local government institutions and organizations will be increased to 1,000 people.
- The number of graduate-level diploma holders in the field of AI will be increased 10,000.
- AI applications developed by the local ecosystem will be prioritized in public procurement and commercialization will be supported.
- The regulatory studies and standardization processes of international organizations in the field of reliable and responsible AI and cross-border data sharing will be contributed to actively.
- It will be ensured that Turkey ranks among the top 20 countries in international AI indices.

Introduction

This section briefly defines the concept of AI and explains how strategic priorities are determined, and the preparation of the NAIS.

Overview of the National Artificial Intelligence Strategy

Since the end of the 1990s, various policies for the information society have been implemented in our country, and with the transition to the Presidential Government System in 2018, the importance of digital transformation has been brought to a higher level. In this context, the realization of **"Digital Turkey"** has begun to be strongly emphasized on both political and administrative grounds. The Digital Turkey vision aims for a globally competitive Turkey with the increase in productivity it provides by using digital technology, products and services in social, economic and public activities, and the value it generates from data. On the other hand, the effect of turmoil and structural transformations in the global economy has resulted in localization of critical technologies becoming an important political priority for both increasing social welfare and strengthening national security. In this context, policies and practices that will increase Turkey's global competitiveness, strengthen its economic and technological independence, and provide breakthroughs in critical technologies have been structured under the **"National Technology Initiative"** as an objection to monopolization in scientific and technological developments.

In this framework, it is the common goal of the Digital Turkey vision and the National Technology Move to contribute to the establishment of an economic order in our country based on innovation and creating value from data, by implementing AI in all areas of socioeconomic life and increasing locality in the development of AI technologies.

In line with this common goal, AI was determined as one of the critical technology areas for our country in the Eleventh Development Plan and the 2023 Industry and Technology Strategy. Measure No. 473.1 of the 2021 Presidential Annual Program prepared within the framework of the Eleventh Development Plan commissioned the preparation of the National Artificial Intelligence Strategy to the DTO and MoIT.

The future expectations regarding the maturity level that AI technologies have reached today and the effects of these technologies in different application areas require that policies and strategies in areas such as digital government, cybersecurity, smart cities, broadband infrastructure, manufacturing industry, software industry, education and employment should be taken into account during the preparation of a national strategy document on artificial intelligence. In this context, NAIS was prepared in line with the Digital Turkey vision, the National Technology Initiative, and high-level national policy documents, taking into account sectoral and thematic strategy documents.

Determination of Strategic Priority Areas

While determining the strategic priority areas of the NAIS, the priorities highlighted in our country's national policy documents and sectoral and thematic strategies were taken into account. In addition, the tendencies and approaches of international organizations in the field of AI, other relevant national strategy documents prepared by various countries and the measurement methodologies of international benchmarking studies were also evaluated.

Various international organizations are setting recommendations and priorities to advance the transformative impact of AI on the socioeconomic structure in a positive way. Organization for Economic Cooperation and Development (OECD) Council Recommendation on Artificial Intelligence, which our country is a party to and was later recognized by the G20 and the European

Union (EU), provides recommendations on "research-development", "digital ecosystem", "regulatory framework", "AI domain experts", "labor market" and "international cooperation" to the countries.[1]

Considering the strategies of EU countries, policy headings regarding "AI domain experts", "transition from laboratory to market", "networking for generalization", "regulation" and "infrastructure" stand out.[2] Similarly, the World Economic Forum (WEF) recommends focusing on the areas of "capacity", "investment", "adoption" and "expansion" and "regulation".[3]

Similar headings stand out in international comparison studies as well. In the Public Administration AI Readiness Index Report prepared by Oxford Insights and the International Development Research Center (IDRC), it is seen that analyzes are made on 3 the main axes of "public administration", "technology sector" and "data and infrastructure".[4]

The AI Index Report prepared by Stanford University Human-Centered Artificial Intelligence Institute is based on "research and development", "economy" and "inclusion".[5] Another study is the Global AI Index prepared by Tortoise Media, which includes comparisons made within the scope of "investment", "innovation" and "application" axes.[6]

It is evident that the main axes are similar in the national policy and strategy documents of various countries.[7, 8]

In the Conceptual Report prepared by the Turkish Informatics Association on Opinions and Proposals for the Development of Artificial Intelligence in Turkey, the problems of our country in the field of AI were evaluated under the headings of "infrastructure", "human resources", "stakeholder roles", "legal and ethical dimensions", "standards", "data sharing" and "strategies", and solutions were proposed. In this direction, it is suggested to focus on the creation of an AI ecosystem and its integration into international systems, the development of AI technologies in Turkey, discussing the legal and ethical dimensions of AI and creating solutions.[9]

The adopted AI policies mainly focus on the following 6 main areas of influence according to the aforementioned studies:

- **Training experts equipped with advanced AI skills and harmonization of the education system in this context:** Artificial intelligence is related to many technology fields such as cloud computing, robotics, Internet of Things, augmented reality, data science, cybersecurity and is affected by developments in these fields. For this reason, both the development of AI technologies and the successful implementation of these technologies in all sectors require researchers and practitioners with advanced technical skills.

- **Increasing the number of R&D studies in the field of AI, developing entrepreneurship, providing access to high-quality data and technical infrastructure:** Intense R&D studies, pre-competitive collaborations and innovative initiatives are needed to be successful in the field of AI since it is newly developing. In this context, regulation of intellectual property rights in line with the changing needs is also important for the sustainability of innovation. In addition, since the development and implementation of AI technologies requires data collection, storage, sharing and processing on a large scale, secure and scalable technical infrastructures and governance mechanisms should be established to allow this.

- **Establishing an appropriate ethical and legal framework for AI:** AI technologies becoming more common and widespread is changing the expectations and assumptions about human-machine interactions. For the first time in history, identity, rights, values and responsibilities for human-made objects have become the subject of intense debates. The implementation of AI technologies also raises privacy and national security concerns in many cases. In addition, the widespread use of AI-assisted autonomous or semi-autonomous decision-making mechanisms raises ethical problems such as the protection of human rights and the prevention of discrimination. Therefore, building an effective AI ecosystem requires establishing an appropriate ethical and legal framework that takes into account the technological nature of AI.

- **Developing international collaborations in the field of AI:** Thanks to the the effect of remote working methods facilitated by current technologies, it is possible to reach the competent workforce all over the world. In addition, it is possible to develop more successful technologies and applications in the field of AI through the joint use of data repositories with domain experts and technical infrastructure resources that belong to different countries. Moreover, the development of AI technologies and the collection of large-scale data that usually belongs to the citizens of different countries, cause tensions between large technology companies and the countries that own the data, leading to discussions on digital sovereignty. Therefore, there is a need to develop international collaborations in the field of AI in order to manage the above-mentioned tensions and benefit more from AI technologies on a global scale.

- **Managing the impact of AI on employment and professions:** Since AI technologies facilitate the automation of routine and repetitive jobs, there are extensive discussions on various platforms regarding issues such as preventing employment losses that may occur in large segments of society working in such jobs; communication, creativity and group work necessary to be productive in a work environment where AI is heavily used; current and next generation of employees gaining the ability to work with machines; the current labor market of models such as remote and flexible working and its impact on employer-employee relations and social security systems. In this context, in order to protect and strengthen the innovation and productivity of the national economy in the age of AI, it is necessary to ensure the adaptation of existing employees to the new working environment that has emerged with the generalization of AI technologies, to manage the social tensions that will arise in this process, and to equip the youth with competencies suitable for the labor market of the future.

- **Transforming institutions and companies with AI applications:** Thanks to AI technologies, it is possible to make proactive decisions as a result of processing the large amount of data collected on the inputs used in business processes, products and services. This situation presents opportunities in terms of increasing the competitiveness by increasing productivity both at the company and country scale. In order to realize this potential, effective measures are needed on several issues such as technical infrastructures that need to be created at sector and/or company scale, applications that have to be developed, workforce that has to be trained, and business processes that have to be redesigned. In this context, it is important to establish multi-stakeholder coordination mechanisms.

NAIS has been designed around the “Organizational Competence”, “Strategic Consistency” and “Governance” aspects within the framework of strategic priorities determined by considering the above-mentioned impact areas and our country's national, sectoral and thematic policies and strategies. As shown in Figure 2, NAIS focuses on three core AI competencies, which are “skills”, “data” and “infrastructure”. The Organizational competence aspect focuses on activities aimed at increasing the maturity of core competencies within institutions. The governance aspect aims to provide administrative and technical coordination within and between institutions for the continuous development of basic competencies. Finally, the strategic consistency aspect complements the organizational competency and governance aspects and aims to coordinate at the levels of public policy, NAIS, sectoral transformation and international organization for the sustainability of the AI ecosystem.

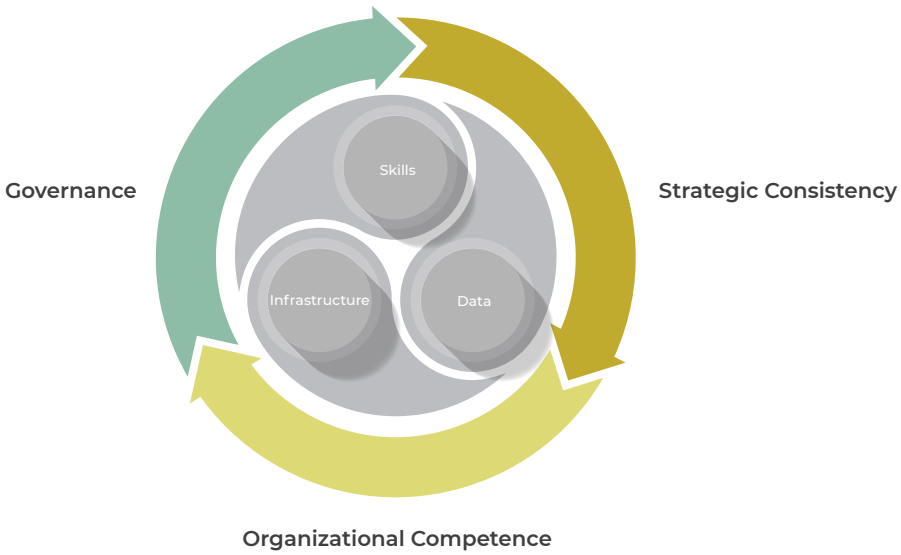

Figure 2. Dimensions of the National AI Strategy

NAIS defines the strategic measures that will enable to follow a maturation route that starts with raising awareness for individuals, companies and public institutions and progresses as testing, implementing, managing and finally realizing the structural transformation. For this purpose, these measures have been grouped under the following strategic priority areas:

- AI Experts and Employment in the Domain
- Research, Entrepreneurship and Innovation
- Technical Infrastructure, Platforms and Data
- Harmonization and Regulations in Socioeconomic Structure
- International Collaborations
- Structural and Workforce Transformation

Preparation of the NAIS

NAIS was prepared with a participatory approach by examining global developments in AI, the policies of international organizations and the strategy documents of various countries, and by taking the opinions and contributions of relevant stakeholders at the local level. In this context;

- National strategies, plans and programs, especially the Eleventh Development Plan, Science, Technology and Innovation Policy Board Decisions, 2020-2023 Smart Cities Strategy and Action Plan, 2023 Education Vision, 2023 Industry and Technology Strategy, 2020-2023 National Smart Transportation Systems Strategy Document and Action Plan, and 2020-2023 National Cyber Security Strategy and Action Plan were examined.
- Interviews were held with the Presidency of the Republic of Turkey and its affiliates (7), ministries (16) and affiliates (13), the private sector (38), NGOs (3), universities (26), and domain experts in different disciplines (103).
- In order to determine the current situation and institutional needs in the domain and ecosystem of AI, two workshops were held under the coordination of the DTO and MoIT that were attended by public institutions (40), private sector organizations (38), academia (26) and NGOs (4), where the strengths and weaknesses of our country and possible opportunities and threats were determined. Workshops and studies on AI on a national scale (10) were actively participated in, and needs/trends were identified.
- The works carried out by public institutions and organizations regarding the field of AI and its effects on the socioeconomic structure were evaluated.
- Ideas were exchanged with international organizations and experts from countries (4) that have prepared an AI strategy. Field studies of international organizations and leading countries, as well as the evaluations of consultancy firms and think tanks were analyzed.
- “Artificial Intelligence Activity Survey” was held to obtain information about the AI studies of companies operating in Technology Development Zones (TDZ) and companies with R&D centers.
- Sample implementations in the private sector and the entrepreneurial ecosystem and the sectoral problems that can be solved were examined.

Prepared in the light of the above-mentioned efforts, NAIS consists of 6 main sections:

- **Introduction** section briefly defines the concept of AI, provides an overview of NAIS explains how strategic priorities are determined.
- **Global Developments and Trends** section examines the studies, projections and strategies of international organizations and other countries in the field of AI, as well as main trends within the framework of strategic priority areas.
- **Current Situation in Turkey** section evaluates the current situation of our country in the context of AI-related top policy documents and strategic priority areas.
- **AI Values and Principles** section explains the AI values and principles adopted to shed light on the determination of current strategies and the practices to be carried out in this regard in the coming period.
- **Strategic Priorities, Objectives and Measures** section includes strategic priorities, the objectives determined within the scope of these priorities, measures determined in the light of AI values and principles to achieve these objectives, and the goals related to each strategic priority.
- **Governance Mechanism** section explains the governance mechanism for the implementation and coordination of the NAIS.

Artificial Intelligence Values and Principles

This section explains the AI values and principles adopted to shed light on the determination of current strategies and the practices to be carried out in this regard in the coming period.

AI ethical frameworks are published by international organizations in order to help strengthen a global policy ecosystem that protect

- **human rights,**
- **democratic values and**
- **rule of law**

and to develop a common attitude by mitigating social concerns that may arise.

Our country is a stakeholder of human-oriented AI principles determined by OECD, G20, EU and UNESCO, and adopts "reliable and responsible AI" values and principles.

NAIS was prepared on the basis of values and principles detailed below. It is to be carried out with a human-oriented approach in harmony, cooperation and coordination with the participation of central and local government public institutions and organizations, private sector, academia, international organizations and NGOs. It is expected that these values and principles will act as a reference throughout the lifecycle of AI systems that will be developed or put into use in our country, in line with the guidelines to be prepared following the implementation of the NAIS.

AI Values

Respect of Human Rights, Democracy and the Rule of Law

Human dignity, human rights and fundamental freedoms must be fundamental throughout the lifecycle of AI systems. All AI technologies to be developed in our country should be designed in compliance with national ethical values and by prioritizing human rights, democratic values and the rule of law so that all segments of society can benefit from such technologies. No human should be harmed physically, economically, socially, politically or psychologically at any stage in the lifecycle of AI systems. In interactions with AI systems throughout their lifecycle, people should never be objectified, their dignity should never be harmed, and their human rights should never be violated or abused.

Environment and Biological Ecosystem Flourishing

Environmental and biological ecosystem development is vital for humans and other living things to benefit from advances in AI. Therefore, they must be recognized and supported throughout the lifecycle of AI systems. All actors involved in the lifecycle of AI systems should adhere to relevant international and national legislations, standards and practices designed for the protection, restoration and sustainable development of the environment and ecosystem.

Ensuring Diversity and Inclusiveness

Respect, protection and promotion for diversity and inclusion must be ensured throughout the lifecycle of AI systems, in a manner consistent with demographic, cultural, social diversity and inclusion, as well as international human rights law, standards and principles. The scope of lifestyle choices, beliefs, ideas, expressions, or personal experiences, including the discretionary use and design of AI systems, should in no way be restricted at any stage of the lifecycle of AI systems. Technological infrastructure, training and skills gaps should be eliminated, and awareness level should be raised in order to benefit from AI systems and increase inclusion. The production, development and implementation of AI technologies should not result in discrimination in any way, and datasets should be audited in this regard. Effective public participation should be ensured so that all segments of society can make informed decisions about the use of AI systems and to protect AI systems from undesirable effects.

Living in Peaceful, Just and Interconnected Societies

AI actors should play a facilitating role in helping everyone benefit from an interconnected future for a harmonious and peaceful life. AI systems should contribute to the harmony and interconnectedness of all living things and the natural environment throughout their lifecycle. AI systems should not objectify, differentiate, or endanger any party.

AI Principles

Proportionality

Legitimate goals and objectives must be adhered to throughout all stages of the lifecycle of AI systems and everything must remain relevant to the context of said systems. Adequate risk analysis should be carried out against any possible harm to human, environment or biological ecosystem and necessary measures should be taken to prevent damage. The AI techniques to be used should be determined in a way that is suitable for legitimate purposes and does not allow the violation of AI values.

Safety and Security

In order to ensure the safety and security of humans, the environment and the biological ecosystem, damage and vulnerabilities must be avoided throughout the lifecycle of AI systems. All AI systems to be deployed or designed must be robust, stable and reliable; and potential risks must be continuously evaluated and managed. For AI systems to be safe and secure, they must be supported by sustainable and privacy-maintaining data access frameworks that can enable better training of AI models using quality data.

Fairness

AI systems should be designed to provide an equal and fair service to all stakeholders while adhering to the rule of law and fundamental rights and freedoms. The fairness of AI systems means that the benefits of AI technology are shared at local, national and international levels, while taking into account the special needs of different age groups, different cultural systems, different language groups, people with disabilities, and disadvantaged, marginalized and vulnerable segments of society. It should be ensured that decisions made based on algorithms do not create discriminatory or unfair effects on different demographic segments. In order to prevent the emergence of unintentional discrimination in decision-making processes, monitoring and accountability mechanisms should be developed and said mechanisms should be included in the implementation process.

Privacy

Privacy is a necessary right for human dignity and human autonomy that must be respected and protected throughout the lifecycle of AI systems, at both the personal and societal levels. It is important to collect, use, share, archive and delete the data used in AI systems in accordance with AI values and principles. AI systems should be developed and operated in a way that does not compromise the privacy and protection of personal data. The source and means of collection of personal data and how decisions made based on said data will affect people should always be open to audit. Universal and cultural ethical rules and the confidentiality of personal data should also be evaluated with the same regard.

Transparency and Explainability

Person(s) and organizations involved in the lifecycle of AI systems should ensure that the AI system is transparent and explainable in accordance with its context. People have the right to be informed of a decision that was made based on AI algorithms and to request explanatory information from public institutions and private sector organizations in such cases. It should be possible to explain to the end user and other stakeholders in non-technical terms and in plain language, why, how, where and for what purpose the decisions made based on automatic and algorithmic decisions, the data leading to said decisions and the information obtained from that data are used.

Responsibility and Accountability

Person(s) and organizations involved in the lifecycle of AI systems are ultimately responsible for the proper functioning of AI systems and the application of AI principles. In line with their roles in the lifecycle, the context of the system and technological possibilities, these actors and their ethical responsibilities should be able to be related to their liabilities regarding their decisions and actions. Accountability should be appropriately distributed among actors. Necessary mechanisms for human audit, impact analysis and risk assessment should be established. Technical and organizational design should ensure auditing and traceability of compliance with AI values. Audit data should be available for third parties to research and review behavior patterns of the AI system, in accordance with their mandate.

Data Sovereignty

International rules should be adhered to in the use of data throughout the lifecycle of AI systems and the sovereignity rights of the parties should be respected. Measures should be taken to activate secure data circulation in line with international obligations, national legislation and AI values in the regulation of digital data produced in or passing through sovereignty areas. Data sharing between individuals and institutions should be provided in accordance with the measures taken and the legal framework. In situations where the legal framework is unclear, AI values and principles, especially human rights and privacy, should be prioritized.

Multi-Stakeholder Governance

The participation of different stakeholders throughout the lifecycle of AI systems is essential for inclusive and agile AI governance, the benefits of AI passing on to society, and for AI to contribute to technological progress and development. Stakeholders of AI systems include public institutions, NGOs, international organizations, researchers, academia, media, educators, policy makers, the private sector, human rights institutions, and other bodies established for the youth and children. It is important to adopt open standards and interoperability to facilitate collaboration among AI stakeholders. Agile governance measures should be taken in line with technological developments and new sociotechnical needs.

Strategic Priorities, Objectives and Measures

NAIS was designed in line with the strategic priorities determined within the framework of the vision stated below.

The strategy defines the objectives defined in line with these priorities, the high-level measures planned to be implemented to achieve these objectives, and the objectives expected to be realized through the implementation of the measures.

V I S I O N

> **Creating value on a global scale with an agile and sustainable AI ecosystem for a prosperous Turkey.**

Objective 1.1. AI domain expert employment will be increased in line with sectoral needs and priorities.
Objective 1.2. The academic and technical capacity of universities in the field of AI will be developed and new programs will be opened.
Objective 1.3. The number and quality of students receiving associate, undergraduate and graduate education in the field of AI will be increased.
Objective 1.4. In line with their interests, abilities and temperaments, pre-higher education students will be provided with algorithmic thinking, coding and AI applied training in accordance with their education level.

Objective 2.1. Public support for the development and application of AI technologies will be increased, and monitoring and evaluation mechanisms will be activated.
Objective 2.2. The number and quality of initiatives that develop original AI products, services and applications will be increased.
Objective 2.3. AI-oriented venture capital funds will be established and scaled up.
Objective 2.4. Clusters where advanced R&D activities can be carried out in the field of AI and innovation and centers of excellence will be established.

Objective 3.1. Shared access opportunities will be provided to researchers and initiatives that need high-performance computing infrastructures in AI studies.
Objective 3.2. Open source software and algorithm libraries for AI will be compiled and made available to the AI ecosystem.
Objective 3.3. Open data sharing will be generalized.
Objective 3.4. A data governance mechanism will be established for the reliable sharing of data to be used in AI and advanced analytical research.

Objective 4.1. An agile and inclusive legal harmonization process will be implemented so that ethical and legal scenarios can be tested and discussed.
Objective 4.2. In order to support reliability in AI studies, a governance mechanism that will facilitate impartiality, data privacy and ethical values audits and algorithmic accountability will be implemented.
Objective 4.3. Scientific research and awareness on the effects and risks of AI technologies and systems on the socioeconomic structure will be increased.
Objective 4.4. Data capacity will be improved in order to evaluate the impact of developments in the field of AI on the socioeconomic structure.

Objective 5.1. Active participation in global data governance, reliable and responsible AI studies will be ensured.
Objective 5.2. Participation in cross-border field projects will be ensured, with a priority in the multi-annual financial frameworks of the European Union.
Objective 5.3. Joint projects and cooperation activities will be carried out at the international level with leading organizations in the field and strategically priority countries.

Objective 6.1. DTO will establish a public AI ecosystem and technical infrastructure to speed up AI and advanced analytics studies in public institutions.
Objective 6.2. The structural and competency transformation towards the effective use of AI technologies in public institutions will be accelerated.
Objective 6.3. Sectors and research areas will be structured in a way that TÜBİTAK Artificial Intelligence Institute will cross horizontally in order to play an accelerating role in the development of the AI ecosystem.
Objective 6.4. Studies focusing on sectoral implementation areas, prioritizing experience sharing and open to all stakeholders will be carried out.
Objective 6.5. With regard to new professions, training and certification programs for the existing workforce will be carried out and compliance will be accelerated with sectoral cooperation.

Figure 3. National AI Strategic Priorities and Objectives

Strategic Priority 1

Training AI Experts and Increasing Employment in the Domain

The number and quality of AI experts who will be the architects of the socioeconomic transformation will be increased, and the employment of researchers and practitioners in this field will be increased.

Objectives

0.1. AI domain expert employment will be increased in line with sectoral needs and priorities.

0.2. The academic and technical capacity of universities in the field of AI will be developed and new programs will be opened.

0.3. The number and quality of students receiving associate, undergraduate and graduate education in the field of AI will be increased.

0.4. In line with their interests, abilities and temperaments, pre-higher education students will be provided with algorithmic thinking, coding and AI applied training in accordance with their education level.

The goals set under Strategic Priority 1 are as follows:

- Employment in the field of AI will be increased to 50,000 people.
- AI domain expert employment in the field of AI in public institutions and organizations will be increased to 1,000 people.
- The number of graduate-level diploma holders in the field of AI will be increased to 10,000.
- The number of academicians working in the field of AI will be increased to 5,000.
- It will be ensured that the number of postgraduate theses on social and technical fields of AI is at least 1,000.

Strategic
Priority 2

Supporting Research, Entrepreneurship and Innovation

In order to develop the AI ecosystem in our country, research activities, entrepreneurship and innovation in the field will be supported.

Objectives

0.1. Public support for the development and application of AI technologies will be increased, and monitoring and evaluation mechanisms will be activated.

0.2. The number and quality of initiatives that develop original AI products, services and applications will be increased.

0.3. AI-oriented venture capital funds will be established and scaled up.

0.4. Clusters where advanced R&D activities can be carried out in the field of AI and innovation and centers of excellence will be established.

The goals set under Strategic Priority 2 are as follows:

- It will be ensured that the ratio of AI R&D expenditures to total R&D expenditures is at least 15%.
- The number of start-ups in the field of AI will be increased to 1,000.
- The commercialization of developed AI solutions will be supported by prioritizing them in public procurement.
- At least 5 spin-offs operating in the field of AI technologies will be established from public institutions and companies.
- At least 1 global initiative will be established in the field of natural language processing.
- At least 10 pre-competitive cooperation projects will be initiated in the field of AI technology, especially in image processing.

Strategic
Priority 3

Facilitating Access to Quality Data and Technical Infrastructure

Access to quality data and high-capacity technical infrastructure, which is the main requirement of AI studies, will be facilitated.

Objectives

0.1. Shared access opportunities will be provided to researchers and initiatives that need high-performance computing infrastructures in AI studies.

0.2. Open source software and algorithm libraries for AI will be compiled and made available to the AI ecosystem.

0.3. Open data sharing will be generalized.

0.4. A data governance mechanism will be established for the secure sharing of data to be used in AI and advanced analytical research.

The goals set under Strategic Priority 3 are as follows:

- It will be ensured that the number of public institutions and enterprises providing access to common high-performance computing infrastructures will be at least 200.
- At least 50 institutions will be included in the Public Data Space.
- At least 10 sectoral cloud platforms for data sharing will be established.
- The number of individual AI project developers will be increased to at least 1,000 within Turkey Open Source Platform.
- At least 1,000 open datasets will be shared via the Open Data Portal.

Strategic
Priority 4

Regulating to Accelerate Socioeconomic Adaptation

Regulations to facilitate and accelerate adaptation to the transformations that will result from the widespread use of AI in daily life and economic activities will be implemented, and activities and researches will be diversified to raise awareness.

Objectives

0.1. An agile and inclusive legal harmonization process will be implemented so that ethical and legal scenarios can be tested and discussed.

0.2. In order to support reliability in AI studies, a governance mechanism that will facilitate fairness, data privacy and ethical values control and algorithmic accountability will be implemented.

0.3. Scientific research and awareness on the effects and risks of AI technologies and systems on the socioeconomic structure will be increased.

0.4. Data capacity will be improved in order to evaluate the impact of developments in the field of AI on the socioeconomic structure.

The goals set under Strategic Priority 4 are as follows:

- It will be ensured that at least 20 enterprises benefit from the regulatory sandbox.
- At least 10 sociotechnical research projects will be conducted in the field of AI.
- Research on brain drain and reverse brain drain in AI will be published on a yearly basis.
- AI education workforce surveys will be published on a yearly basis.
- It will be ensured that 1 million people benefit from digital content shared on different platforms for promotional and informational purposes every year.

Strategic
Priority 5

Strengthening International Cooperations

International multi-lateral and bilateral cooperation will be strengthened in order to follow international developments in the field of AI, contribute to studies on international platforms, and increase the interaction of the domestic ecosystem with its stakeholders in other countries.

Objectives

0.1. Active participation in global data governance, reliable and responsible AI studies will be ensured.

0.2. Participation in cross-border field projects will be ensured, with a priority in the multi-annual financial frameworks of the European Union.

0.3. Joint projects and cooperation activities will be carried out at the international level with leading organizations in the field and strategically priority countries.

The goals set under Strategic Priority 5 are as follows:

- Participation in at least 100 cross-border invited AI projects will be ensured.
- At least 2 Turkey-oriented international reports will be conducted in the field of Reliable and Responsible AI.
- At least 10 international competition and project calls will be launched in the field of AI.

Strategic
Priority 6

Accelerating Structural and Labor Transformation

Structural and workforce transformation will be accelerated, which will ensure that public institutions and private sector organizations benefit from the innovations and opportunities brought about by AI at the highest level.

Objectives

O.1. DTO will establish a public AI ecosystem and technical infrastructure to speed up AI and advanced analytics studies in public institutions.

O.2. The structural and competency transformation towards the effective use of AI technologies in public institutions will be accelerated.

O.3. Sectors and research areas will be structured in a way that TÜBİTAK Artificial Intelligence Institute will cross horizontally in order to play an accelerating role in the development of the AI ecosystem.

O.4. Works focusing on sectoral implementation domains, prioritizing experience sharing and open to all stakeholders will be carried out.

O.5. With regard to new professions, training and certification programs for the existing workforce will be carried out and compliance will be accelerated with sectoral cooperation.

The goals set under Strategic Priority 6 are as follows:

- Employment in the field of AI in central and local government public institutions and organizations will be increased to 1,000 people.
- At least 40 projects will be developed in the Public AI Ecosystem.
- At least 100 projects will be developed in Sectoral Co-Creation Laboratories.
- It will be ensured that the number of institutions and organizations using the Public AI-as-a-Service Platform is at least 100.
- At least 20 thematic and award-winning competitions will be held in the field of AI.
- AI maturity model and project management guidelines will be implemented in at least 150 institutions and organizations.
- At least 50,000 employees in central and local governments will be provided with awareness training.
- It will be ensured that at least 250 municipalities actively make use of AI technologies within the scope of smart city applications.
- At least 100 AI applications that receive the Trustworthy AI Seal will be released.
- At least 350,000 people will benefit from the applied training and awareness activities carried out in the Innovation and Digital Transformation Centers.

Governance Mechanism

This section explains the governance mechanism for the implementation of the NAIS and the coordination of the process.

For the effective implementation of the NAIS, two-layered and agile governance mechanism will be established based on the main dimensions of the Strategy, namely "Organizational Competence", "Governance" and "Strategic Consistency":

- "Steering Mechanism for National AI Strategy" for strategic alignment, maintaining the visionary attitude and high-level coordination.
- "AI Ecosystem Administrative and Technical Governance Mechanism" for administrative, technical and legal coordination, and application of AI values and principles, developing solutions and implementing actions.

The two-layered governance mechanism of the NAIS consists of 6 main elements and is defined and color-coded in Figure 4.

Figure 4. Key Elements of the National Strategy Governance Mechanism

National Artificial Intelligence Strategy Steering Mechanizm

A “National Artificial Intelligence Strategy Steering Committee” will be established in order to ensure the necessary high-level coordination for monitoring the NAIS with a result-oriented approach and achieve the strategic priorities and objectives more effectively and quickly in line with the Digital Turkey vision and the National Technology Initiative.

An “AI Ecosystem Advisory Group” that includes representatives of the private sector, academia and NGOs will be formed in order to monitor the implementation process of the NAIS and to make suggestions to the Steering Committee to increase its effectiveness.

In addition, “Action Plan Coordination Groups” will be established for the ministries responsible for preparing action plans and coordinating their implementation. In addition to the DTO and MoIT, representatives from public institutions relevant to the actions will be included in these coordination groups. NGO representatives, academics and industry professionals deemed appropriate by the coordinating ministry may also be invited to join the coordination group.

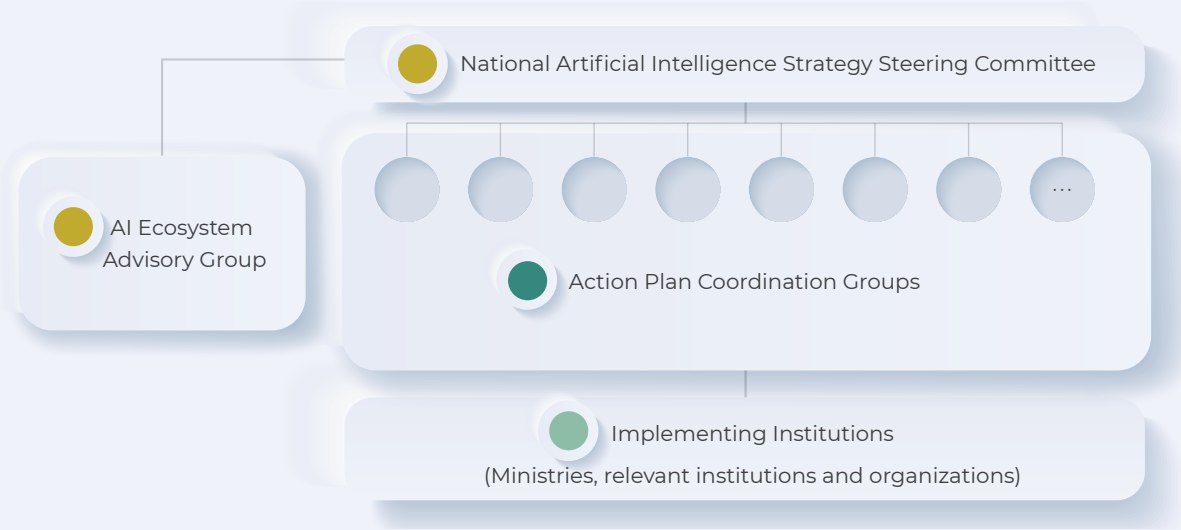

Figure 5. The Steering Mechanism for the Governance of the National AI Strategy

AI Ecosystem Administrative and Technical Governance Mechanism

The following governance mechanism will be established under the coordination of DTO Department of Big Data and Artificial Intelligence Applications, GDNT Department of Digital Technologies and TÜBİTAK Artificial Intelligence Institute in order to fulfill the necessary administrative and technical coordination functions necessary for the implementation of action plans at the level of ministries, to develop applications in line with usage scenarios and to increase institutional maturity levels.

Figure 6. AI Ecosystem Administrative and Technical Governance Mechanism

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