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National Programme to Promote the Development and Use of Artificial Intelligence in the Republic of Slovenia by 2025 (NpAI)

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Glossary of acronyms

AI	Artificial intelligence
AI4EU	Name of the project co-funded by the EU Horizon 2020 programme
ARRS	Slovenian Research Agency
CLAIRE-AI	Confederation of Laboratories for Artificial Intelligence Research in Europe
CRP	Target research programme
DIH	Digital Innovation Hub
DESI	Digital Economy and Society Index
ELLIS	European Lab for Learning and Intelligent Systems
EU	European Union
EUR	Euro
EurAI	European Association for Artificial Intelligence
FAIR	Findability, accessibility, interoperability, and reusability
GDPR	General Data Protection Regulation
HPC	High Performance Computing
ICT	Information and communications technology
IoT	Internet of Things
LAWS	Lethal Autonomous Weapon Systems
NGO	Non-governmental organisation
OECD	Organisation for Economic Co-operation and Development
PRACE	Partnership for Advanced Computing in Europe
PCP	Pre-commercial procurement
RDI	Research, development and innovation
SRIP	Strategic Research and Innovation Partnership
STEM	Science, Technology, Engineering and Mathematics
UNESCO	United Nations Educational, Scientific and Cultural Organisation

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Summary

AI is already exerting an increasingly profound influence on our lives through its outcomes, and this impact will be further amplified in the future. Through this national programme on AI, Slovenia will leverage its unquestionable potential in this field to improve the well-being of its citizens, bolster and strengthen the competitiveness of its economy, and facilitate the smooth functioning of society, enabling it to effectively address forthcoming challenges. To achieve this, it is essential to provide coherent support for activities and stakeholders across the entire innovation cycle, encompassing research on, innovation in, implementation and use of AI, which can shape a comprehensive innovation ecosystem with targeted and intelligent support mechanisms, and can initiate a spiral of supply and demand in select key sectors of the national economy, non-economic activities, and state functions, while using these sectoral advances as reference activities for the international community. Specific and limited unrelated activities will have no effect.

AI is a general purpose technology that, unlike other technologies, strives to perform to the greatest extent possible such activities that were until recently limited only to human capabilities and intelligence. It has immense potential to benefit individuals, society and humanity as a whole. Systems using AI methods enable us to find new answers and solutions in fields ranging from medicine, transport, engineering, finance, insurance, communication and entertainment, to litigation, law enforcement and security. Various methods of AI as enabling technologies are increasingly permeating all kinds of products and services, bearing the potential with their expanding and rapid market penetration to transform existing dynamics in society’s economic, legal and even political realms. The speed and potential impact of AI’s adoption foreshadow social and geopolitical changes that are likely to shape the future development of the entire world. This is why individual countries are paying particular attention to this area, with some predicting that whoever masters AI will master the world. To tackle these challenges, it is crucial to implement smart and effective public policies that ensure equitable access to the benefits of AI for everyone worldwide, especially in improving living conditions and raising the standards of living.

Slovenia can be exceptionally ambitious as regards AI, drawing upon over 40 years of experience in research and internationally comparable research results in AI, which gives it an advantage over many developed countries in the world. With its relatively large number of AI experts per capita, Slovenia can strategically engage them in research, development and implementation of AI through targeted and intelligent support mechanisms. This will help shape a comprehensive innovation ecosystem and initiate a spiral of supply and demand in selected key sectors of the national economy, non-economic activities, and the country as a whole. Furthermore, Slovenia can showcase these activities as references to the international community. Some of Slovenia's international activities are already moving in this direction, but this requires the unified coordination and planning of all activities with complementary implementation activities in priority areas where a critical mass of knowledge, resources and positive impact on the quality of life of citizens can be created. Slovenia benefits from being sufficiently large to encompass the interdisciplinary knowledge, both technical and non-technical, necessary to understand and tackle the challenges of integrating AI into specific sectors of society. Additionally, its manageable size enables implementation of comprehensive projects within the limitations of time and available resources.

Key to this is understanding the role of AI in the society of the future and the concept of coexistence between humans and AI. It seems that from the perspective of our relationship with technological advancements, humans are increasingly being leveraged as a source of information necessary for the further development and implementation of new technologies, including AI. This can be observed in the context of internet development, which relies on extensive and pervasive collection of data about human activities, both online and through the growing integration with data from the physical world, serving as the foundation for the development of new internet services and increasingly AI-based solutions. However, it is worth noting that in different parts of the world, there is an increasing inclination to exert

control and dominance over human activities. This trend is evident in the commercial domain, where there is a desire to confine users of internet services within proprietary ecosystems, such as applications, social networks, and devices. These ecosystems are often controlled by large multinational providers of ICT services and equipment or, in the context of internet access, by individual countries. In this context, we can also expect the increased use of AI. Slovenia advocates for AI that primarily serves humans as a tool to improve the quality of their lives. In doing so, Slovenia aligns itself with the vision of EU Member States, which prioritise human-centred development and implementation of AI for the benefit of individuals and society as a whole. The key to this is to ensure the public's acceptance of AI, which must be based on the confidence that the introduction of AI will actually have a positive impact on people's lives. To achieve this, it is necessary to establish an appropriate legal and ethical framework that preserves and guarantees the protection of human rights and fundamental freedoms. This framework should safeguard everyone's civil, political, economic, social, and cultural rights, regardless of the level of implementation of new AI solutions. Slovenia therefore joins the EU[1] in its aim to become a leader in delivering trustworthy and human-centred AI, as an approach that will be competitive with those in other parts of the world. In this respect, it is essential that all activities are planned in a complementary manner and implemented in an integrated way with those EU activities in which Slovenia will actively participate, thus avoiding duplication of activities.

Slovenia has, therefore, as part of its activities at EU level, embarked on the preparation of a comprehensive national programme for the development and use of AI, with the following concrete vision:

Upgrade more than 40 years of research achievements in the field of AI in Slovenia and become internationally recognised for the competences of knowledge transfer of high-quality, ethical and safe AI technologies in human-friendly and trustworthy services and products while ensuring national cultural identity.

By providing comprehensive support to Slovenian research and innovation stakeholders in the development of AI-based technologies and solutions, by deploying and establishing AI-based reference solutions in cooperation with all social groups in Slovenia, and by supporting the recognition of Slovenian stakeholders in AI in the international environment, we aim to accelerate economic growth and, on this basis, to establish Slovenia's visibility as a credible partner in the further deployment and regulation of AI in society in a human-centred manner and for its own benefit.

With its national programme on AI (NpAI), Slovenia is clearly and unequivocally expressing its interest in strengthening all activities related to AI – comprehensively, in a coordinated manner and across the entire innovation life cycle – to accelerate research, development, deployment and use of AI technologies and tools at the national level, thus enabling Slovenia and national stakeholders to be visible and actively involved in key European and international activities in this field. With this, Slovenia is joining the EU initiative that launched a pan-European collaboration initiative on AI on 10 April 2018. For successful cooperation, Slovenia should establish a comprehensive framework of mutually aligned support measures, increase financial support, ensure unified coordination and targeted implementation of all activities, and encourage the public and private sectors to pro-actively adapt to the socio-economic changes driven by the continued advancement and adoption of AI in Slovenia.

This national programme on AI for 2020-2025 therefore includes 10 strategic objectives that Slovenia will achieve through actions in six implementation areas. The measures address the entire innovation lifecycle, with individual measures addressing issues for which various ministries are responsible. The programme therefore foresees the establishment of an appropriate coordination structure for implementation at the national level, allowing all ministries to effectively lead or participate in specific

[1] European Commission Communication – Building Trust in Human-Centric Artificial Intelligence, COM(2019) 168 final

activities. It also ensures the coherent provision of necessary human resources and funding for the implementation. The programme's implementation will be dynamic, with periodic monitoring of the status of measure implementation and goal achievement. Over the years, these measures may be appropriately modified and supplemented based on identified needs (taking into account developments in AI at home and abroad) as well as the implementation capabilities and capacities, particularly in relation to supporting action at the EU level. According to the AI WATCH[2] report analysing AI investments in EU countries in 2018, Slovenia's per capita investment during that period amounted to EUR 3.4. This places Slovenia fourth from the bottom among all EU[3] countries (unfortunately, this ranking was partly influenced by the unavailability of certain data for Slovenia). To make the programme a success, Slovenia needs to increase these funds. It is expected to invest around EUR 110 million over five years to implement this programme, which would increase investments to around EUR 52.5 per capita over the whole period, or EUR 10.5 per capita per year, putting it 15th in the EU in terms of investment in 2018. Given the increase in AI investments both globally and in the EU, we aim to ensure at least an average level of investment over this period relative to other EU countries, which are also set to increase their level of investment in line with the European Commission's commitment to increase the overall level of investment in the EU to at least 20 billion per year over the next decade[4].

[2] AI Watch: Estimating investments in General Purpose Technologies: The case of AI Investments in Europe, https://publications.jrc.ec.europa.eu/repository/bitstream/JRC118953/jrc118953_eu_ai_investment.pdf
[3] Denmark is the leader in AI investments, with EUR 42.7 per capita.
[4] European Commission Communication – Building Trust in Human-Centric Artificial Intelligence, COM(2019) 168 final

1 Introduction

The term artificial intelligence (AI) has been defined and used very differently at different times over the past sixty years since the term first appeared, and generally includes a wide variety of technologies that help computers analyse their environment and act on it to achieve specific goals. Unlike other technologies, AI strives, to the greatest extent possible, to perform activities that were conventionally confined to human capabilities and associated with human intelligence. Speech, image and environmental recognition, learning in conjunction with decision-making and abstract reasoning, and thus increasingly autonomous response to different changes in the environment, are increasingly moving into the domain of AI methods and algorithms, and of the systems based thereon. They are becoming more closely interconnected through the internet into global digital ecosystems, which are increasingly playing a pivotal role in shaping life across the world. This scale of integration, along with devices' expanding availability and processing power, the growing abundance, variety, and complexity of heterogeneous data, and the continual advancements in AI methods and algorithms, is significantly enhancing the capability to process information, largely surpassing human capacity. This opens the door wide not only to the development of highly advanced services and products that can be used to help people in their work and life, but also to solutions that have the potential to actually replace people in many areas. AI is therefore a versatile technology with the potential to revolutionise numerous economic and societal activities, thereby exerting a far-reaching impact on future life beyond the scope of technological advancements alone.

The Slovenian Development Strategy 2030 highlights that the fourth industrial revolution, driven by the digital economy, sensor, robotics and AI development, is ushering in new business models and work practices, closing outdated job positions while opening new ones. This transformation requires the development of new knowledge and skills, as well as adaptations across various domains of economic, social and environmental development[5].

Among the many significant technological leaps we have witnessed in the past few decades, the AI breakthrough may appear to be just one of the many research discoveries from a field that has been present in some capacity since the 1960s. But the reality is that it is now opening the door to a multitude of solutions with concrete applications in almost every sector of the economy, and above all in everyone's daily lives. This time it is no longer about the use or assistance of tools, machines, and robots in non-creative, clearly structured or repetitive work. This time it is about AI systems being able to autonomously build models for planning, optimising, predicting, decision-making and ultimately acting autonomously without human intervention, for example using big data, creating a case of what are called General Purpose Technologies (GPTs), e.g. electricity, the steam engine, the internet, etc., which have the fundamental characteristic of potentially being able to transform the whole economy and establish new social relations. The significance and influence of AI are remarkable precisely due to its impact on the digital transformation of society as a whole, not solely limited to the influence of the technology sector on AI itself. The use of such systems yields substantial economic and social effects, which, however, are not easy to ensure. The algorithms and the applications based on them are easily accessible and can be assembled and used in a variety of domains, even on common devices (laptops, tablets, mobile phones, etc.), which on the one hand allows them to be widely used in everyday life, and on the other hand allows for the extremely wide-ranging possibility of collecting data on usage and users, which form the basis for the further development of these same algorithms and applications. Whoever develops and masters these applications also masters more and more data, and thus the whole field of development and use in a given area. As a result, the largest global multinational companies effectively dominate a growing portion of users' activities (transportation, hotel reservations, social interactions,

[5] Slovenian Development Strategy 2030, http://www.vlada.si/fileadmin/dokumenti/si/projekti/2017/srs2030/Strategija_razvoja_Slovenije_2030.pdf

etc.), granting them unprecedented competitive advantage and influence, not only in business but also in various aspects of public life.

In today's world, the use of information systems and networks is constantly increasing, and so is the importance of these systems for the successful development of economic and non-economic activities and for the life and well-being of society as a whole. It is important to recognise that the most technologically advanced countries of the 21st century will benefit greatly from AI. It is a strategic technology of general interest, and smart systems based on AI will be the backbone of humanity's future development.

> "Like the steam engine or electricity in the past, AI is now transforming our world. It presents new challenges that need to be tackled together in Europe to make AI work for all. By the end of 2020, we need to invest at least EUR 20 billion to develop this area. The Commission is doing its part: today's stimulus is for researchers to develop the next generation of AI technologies and applications, and for companies to adopt and use them."
>
> Andrus Ansip, Vice-President for the Digital Single Market, 25 April 2018

According to some studies, the implementation of AI is already among the central factors contributing to the increased value of products and services. In the next medium-term period, it will be a decisive factor for value-added and competitiveness, as it impacts nearly all stages in the value chain.[6]. The key impact of AI can be expected primarily in industrial production automation in connection with robotics. Its contribution will be noticeable through innovative solutions in various fields, including medicine, education, social services, transportation, disaster prevention and management, cybersecurity and hybrid threats, as well as climate change mitigation.

It can be expected that the use of AI will significantly impact the type and quantity of available jobs in the coming decades. While some studies mention the elimination of the need for many jobs with well-structured and repetitive activities, the introduction of AI will also transform professions that require more complex skills and creativity, and will thus have a stronger impact on the transformation of the whole work environment and different business models. According to certain estimates, approximately 30% of jobs may become obsolete, while an additional 20% are expected to undergo substantial changes through the use of AI. AI is also predicted to usher in an unemployment problem that some compare to the industrial revolution. The introduction of AI will therefore have different employment effects in different parts of the world, depending on the current state and structure of their economies. The new jobs that will potentially be created will also not be distributed evenly.

Slovenia has already identified AI as among the key factors for further economic growth and development in the Slovenian Smart Specialisation Strategy (S4)[7], which is based on statistical data on comparative advantages and driven by entrepreneurial discovery. Specific aspects of AI are thus integrated into different S4 domains such as Smart Cities and Communities with ICT horizontal network, Sustainable Food Production, Smart Factories and Health-Medicine, along with other enabling technologies (robotics, photonics, process control technologies). The relevant Strategic Research and Innovation Partnerships (SRIPs) are also already participating in the European Platform for the Modernisation of Industries within the AI initiative[8]. The national programme on AI is therefore based primarily on the real potential and current state of research and development of AI in Slovenia, on the one hand, and on the real needs of economic and societal application, on the other.

[6] How AI boosts Industrial Profits and Innovation, Accenture, 2017 and Rethinking the Value Chains KPMG, 2018
[7] https://www.gov.si/zbirke/projekti-in-programi/izvajanje-slovenske-strategije-pametne-specializacije/
[8] http://s3platform.jrc.ec.europa.eu/artificial-intelligence

Slovenia aims to be at the forefront among EU member states in comprehending the challenges related to the development and implementation of AI. We need to further strengthen and enhance our previous work and experience, acquired primarily in our research and higher education spheres, by transferring knowledge into reference services and products of both the public and private sectors. This needs to be further enriched through strengthened international cooperation, based on the previous international successes of Slovenian stakeholders.

The development and implementation of AI in society must be based on respect for human rights and fundamental freedoms, as enshrined in the Constitution of the Republic of Slovenia, the Charter of Fundamental Rights of the European Union, the Universal Declaration of Human Rights, and other essential international instruments on human rights. It must respect the fundamental values of Slovenian society and the principles of the rule of law and democracy, and it must ensure economic and political stability. By implementing the national programme, Slovenia will effectively upgrade its national support system for various activities. This will involve the participation of representatives from the government, business sector, research and education, professional associations and non-governmental organisations. To accelerate progress, stakeholders will need to consolidate their financial resources and human capital, directing them towards the defined activities of the supportive measures within the program to ensure effective collaboration.

Slovenia's efforts are in line with the European Union's plans, as Slovenia has signed the EU Declaration on cooperation in the field of AI[9]. The national AI programme is aligned with the European Coordinated Plan on Artificial Intelligence[10], which operationalised this declaration, as well as with the Proposal for a Regulation of the European Parliament and of the Council establishing the Digital Europe programme for the period 2021-2027, of 14 June 2018, which proposes that the programme focus on five priority areas, including AI. The latter foresees support for the development and strengthening of core AI capabilities, such as data resources and AI algorithm libraries, and their accessibility to all businesses, public administration and the broader public sector, as well as the strengthening and fostering of integration between existing R&D capabilities in Member States.

Slovenia's efforts are also in line with the OECD Principles on Artificial Intelligence, which promote AI that is innovative, trustworthy and respectful of human rights and democratic values. OECD member countries adopted the Principles in May 2019 when they endorsed the Recommendation of the Council on Artificial Intelligence (OECD). The OECD Principles on Artificial Intelligence are the first internationally endorsed principles, having been signed by the governments of OECD member countries[11].

2 AI system definition

In the future, AI as a general-purpose technology will be used in a wide variety of contexts and areas, such as environmental protection, circular and green economy, smart agriculture, Industry 4.0, health and social systems, smart cities and communities, and mobility. At the same time, the use of AI is becoming more and more prevalent in the military. If we want to effectively manage and regulate AI in such diverse fields, it is crucial to use a unified, agreed-upon, and sufficiently objective definition of the AI system that can be effectively applied across the entire spectrum of research, development, implementation and use. An internationally harmonised definition, open enough to accommodate future developments and changes, can make a decisive contribution to ensuring that the framework for

[9] Declaration on Cooperation on Artificial Intelligence, https://ec.europa.eu/digital-single-market/en/news/eu-member-states-sign-cooperate-artificial-intelligence
[10] Coordinated Plan on Artificial Intelligence COM(2018) 795, https://ec.europa.eu/transparency/regdoc/rep/1/2018/SL/COM-2018-795-F1-SL-ANNEX-1-PART-1.PDF
[11] OECD Principles on Artificial Intelligence, https://www.oecd.org/going-digital/ai/principles/

understanding and regulating AI in all its aspects does not become outdated, redundant and unusable. International standardisation and international standardisation organisations can help to define the technical characteristics of AI methods and algorithms, which is a key prerequisite for any societal or economic regulation.

The term "AI" has undergone various definitions and interpretations throughout the six decades since its inception. It encompasses a broad range of methods, algorithms, and technologies that enable computers to analyse their surroundings and take action to accomplish specific objectives. By doing so, AI exhibits intelligent behaviour that has traditionally been associated with human capabilities. The two most relevant definitions of AI from the perspective of AI policies in Slovenia are that provided by the European Commission and that of an AI system as defined by the OECD in its principles on AI.

European Commission Communication AI for Europe (COM(2018) 237), April 2018:

Artificial intelligence refers to systems that demonstrate intelligent behaviour by analysing their environment and taking (partially autonomous) actions to achieve predefined objectives. AI systems can either be entirely software-based, operating in a virtual environment (such as voice assistants, image analysis software, search engines, speech and facial recognition systems), or they can be embedded in hardware (such as advanced robots, autonomous vehicles, unmanned aerial vehicles, or Internet of Things applications).

We use artificial intelligence every day, for example for text translation, generating subtitles in videos or blocking unwanted emails. Many AI technologies need data to work better. When their performance is at an appropriate level, they can help improve and automate decision-making in the same domain. An artificial intelligence system can be trained and subsequently employed, for instance, to analyse data from a given network or system and detect cyber-attacks.

OECD Principles on Artificial Intelligence (OECD/LEGAL/0449), May 2019:

An AI system is a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments. It uses machine and/or human-based data and inputs to:

i) perceive and/or analyse real and/or virtual environments;
ii) abstract these perceptions into models through analysis in an automated manner or manually; and
iii) use model inference to formulate options for outcomes.

AI systems are designed to operate with varying levels of autonomy.

For the purposes of the national programme, Slovenia will use the more detailed definition of an AI system as adopted by the OECD Expert Group led by Slovenian experts[12], as part of the OECD Principles for Ethical and Trustworthy AI[13]. The definition of the AI system is shown graphically in Figure **Error! Reference source not found.**, which shows the basic building blocks of the AI system[14].

[12] Marko Grobelnik, Jožef Stefan Institute
[13] OECD AI Principles, https://oecd.ai/ai-principles, May 2019.
[14] The image shows a semantic difference between the elements in blue, where element number 9, unlike the other elements, represents a meaningful description or explanation rather than concrete input data.

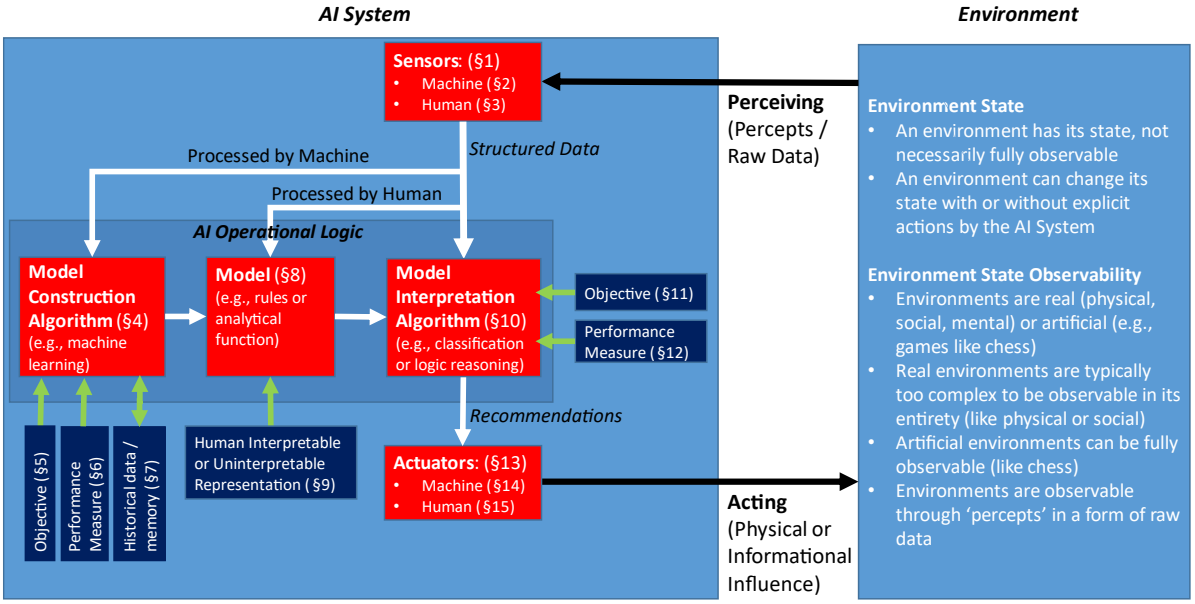


Figure 1: OECD AI system definition

Slovenia will advocate for the appropriate unification and harmonisation of the EU definition with the OECD definition, as this is currently the only internationally harmonised definition that is sufficiently clear and detailed including at the technical level (definition of the AI system) and as it is increasingly being followed by countries around the world. The technical level of definition is also important for the further implementation of the coordinated AI development and deployment plan, and the activities of standardisation and regulation of AI solutions foreseen in this context, where a technically clear, theoretically relevant and objective definition of the AI system is a key prerequisite for further work on policy, legislation and technological development.

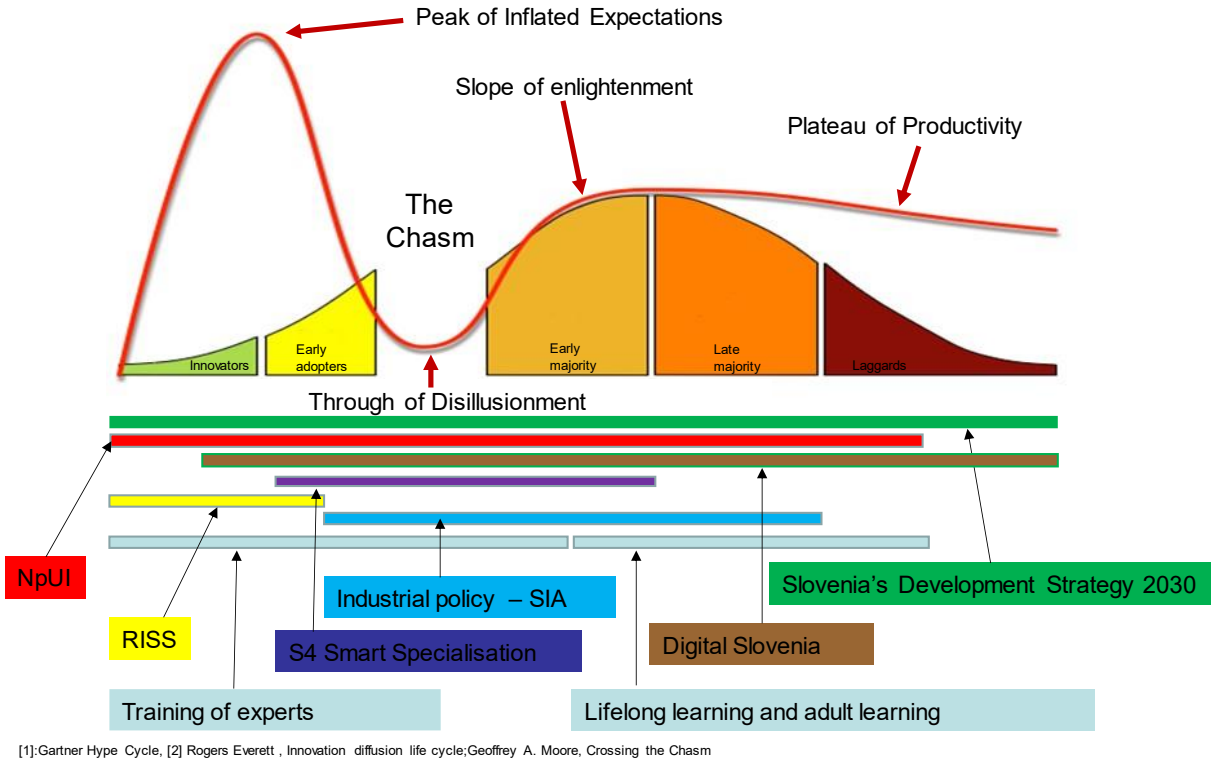
A unified definition is also important for any development of a comprehensive framework of indicators to monitor the societal and economic development and uptake of AI at the EU level, as this will be the basis for monitoring this area in all EU countries and will therefore also be used for the purposes of monitoring the implementation of this programme. Cooperation with the OECD, and in particular the coordination of activities for defining and monitoring indicators under the AI WATCH[15] project, was, therefore, already announced by the European Commission at the time of the establishment of the OECD AI Observatory, which was set up by Slovenian experts from Jožef Stefan Institute. Therefore, Slovenia will continue to actively participate in these efforts.

[15] Project EU AI WATCH, https://ec.europa.eu/knowledge4policy/ai-watch_en

3 Incorporating the programme into strategic planning

AI is a key technology that, due to its impact and influence on various aspects of society, requires a comprehensive approach in Slovenia. Given the relatively limited resources available, this approach is essential for effectively harnessing the opportunities presented by AI and successfully mitigating the risks associated with it.

NpAI is a programme that comprehensively defines the strategic framework for supporting the development and implementation of AI in Slovenia. It simultaneously concentrates on implementing targeted measures in areas where we can attain critical mass and desired outcomes at the national level, while also aligning with the programme's objectives on the international stage. This approach is necessary due to the complexity and scope of the diverse impacts that AI brings to various sectors of society, for which different ministries hold responsibility. It is only by adopting this approach that Slovenia can ensure the achievement of the programme's objectives. The programme, with its comprehensive set of measures, encompasses various sectors (research, education, economy, health, culture, public administration, etc.) and consequently influences the various strategic orientations that define objectives and actions within these sectors. To ensure the programme's successful implementation, it is vital to integrate it into strategic planning and ensure its alignment with sectoral strategies. **Error! Reference source not found.** illustrates the relationship of some relevant sectoral strategies in the context of the innovation life cycle[16,17,18].



[1]:Gartner Hype Cycle, [2] Rogers Everett , Innovation diffusion life cycle;Geoffrey A. Moore, Crossing the Chasm

[16] Everett Rogers, https://en.wikipedia.org/wiki/Diffusion_of_innovations
[17] Geoffrey Moore, https://en.wikipedia.org/wiki/Crossing_the_Chasm
[18] Gartner hype cycle, https://www.gartner.com/en/research/methodologies/gartner-hype-cycle

Figure 2: Relationship between the NpAI programme and sectoral strategies

The NpAI programme is aligned with the Development Strategy of Slovenia 2030 (SrS 2030)[19]. Given its cross-sectoral nature, it complements sector-specific strategies and action plans that solely concentrate on individual areas. The NpAI programme, within the context of comprehensive treatment, addresses these specific areas, ensuring a holistic approach.

As a subordinate program, NpAI aligns with the overarching National Development Strategy 2030, which also includes among global challenges the "fourth industrial revolution characterised by the digital economy and the development of sensors, robotics, and AI, giving rise to new business models, work dynamics, and job opportunities. Consequently, it necessitates the development of new knowledge and skills as well as adaptations in various domains of economic, social and environmental development".

The National Development Strategy 2030 clearly defines "quality of life for all" as a central goal of the strategy. The NpAI programme aligns with this objective through its vision, strategic goals, and measures. The focus on human-centricity and the introduction of AI for the benefit of people is the key vision of the programme. This will be achieved through the establishment of an ethical and regulatory framework for the development and utilisation of AI in society. Additionally, the programme will provide concrete support for research, development and innovation of safe, reliable, and trustworthy AI technologies. It will also promote the implementation of reference services based on AI in priority areas, all guided by the development of appropriate international standards and corresponding certification. These efforts will have a significant impact on the quality of life for everyone. By implementing reference services in the priority areas of healthcare, language technologies and public administration, the programme aligns with the strategic direction of the National Development Strategy 2030, which aims to ensure an "inclusive, healthy, safe and responsible society" to improve the quality of life and achieve **Objective 1**: Healthy and active life", "**Objective 4**: Culture and language as fundamental factors of national identity" and "**Objective 12**: Efficient governance and quality public services". The programme also addresses the problem of ensuring that appropriate AI knowledge and skills are available to the broadest possible population, both for R&D activities and for the deployment and use of AI-based solutions, thus aligning with the strategic orientation of ensuring "learning for and throughout life" and will contribute to the achievement of the objectives" **Objective 2:** Knowledge and skills for quality life and work" and "**Objective 7**: Inclusive labour market and quality jobs". By supporting the creation of an ecosystem for research, development and innovation with the participation of all stakeholders, by supporting standardisation and by concretely supporting research, development, innovation and the deployment of Industry 4.0 reference solutions, the programme will be in line with the strategic orientation of ensuring "a high level of participation, competence and efficiency in governance" and "a highly productive economy creating added value for all" and will contribute to the achievement of the objectives "**Objective 5**: Economic stability" and "**Objective 6**: A competitive and socially responsible business and research sector".

In terms of sectoral strategies, the NpAI programme builds upon the coordination of action areas by incorporating input from key stakeholders and the outcomes of implementing existing strategies, typically planned until 2020. Additionally, it introduces specific input requirements for the preparation or refreshment of these strategies for the post-2020 period.

The NpAI programme is thus in line with some of the key objectives of the information society development strategy Digital Slovenia 2020 (DS2020)[20], which defines the strategic goals of digitalisation in Slovenia by 2020. DS2020 places a strong emphasis on ICT and the internet, which form an omnipresent communication network of information resources. This network is fundamentally

[19] https://www.gov.si/assets/vladne-sluzbe/Government Office for Development and European Cohesion Policy/Strategija-razvoja-Slovenije-2030/Strategija_razvoja_Slovenije_2030.pdf
[20] https://www.gov.si/assets/ministrstva/Ministry of Public Administration/DID/Strategija-razvoja-informacijske-druzbe-2020.pdf

reshaping the functioning of modern society by providing easy access to a vast array of content and services. Consequently, internet access and the utilisation of its services are widely recognised as crucial facilitators of 21st-century life. The use of AI is already changing these activities today and will change them even more rapidly in the future. The NpAI programme thus follows the DS2020 vision "to seize the development opportunities of ICT and the internet to become an advanced digital society and a reference environment for the deployment of innovative approaches in the use of digital technologies." With a vision of supporting the development and deployment of AI, focusing on human-centricity and the well-being of people, as well as the associated regulation of AI development and usage in society, and providing concrete support for the implementation of AI-based reference solutions in priority areas such as healthcare, public administration and language technologies, the programme contributes to the achievement of the DS2020 goal of an "inclusive digital society". By supporting development and innovation activities, the programme contributes to achieving the goal of fostering "competitive digital entrepreneurship and digitised industry for digital growth." Through its support for reference implementation projects in priority areas, aimed at AI adoption, the programme helps realise the objective of promoting "intensive and innovative use of ICT and the internet across all segments of society." Furthermore, its comprehensive approach to supporting activities throughout the innovation life cycle significantly contributes to the realisation of the goal of positioning Slovenia as a "reference environment for implementing innovative approaches in the use of digital technologies."

The NpAI programme is also consistent with some of the key objectives of the Smart Specialisation Strategy (S4)[21], which is an implementation plan for the transition to a highly productive economy through strengthening innovation capacity, fostering the transformation and diversification of industries into new activities, and stimulating the growth of new and high-growth firms. Smart specialisation is a framework for focusing development investments on areas where Slovenia has a critical mass of knowledge, capacity and competence, and where it has the innovation potential to position itself on global markets. S4 is placed within the framework of strategic planning in the context of already adopted Slovenian strategic documents (e.g. Research and Innovation Strategy of Slovenia 2011-2020 - RISS, Slovenian Industrial Policy - SIP, Digital Slovenia 2020 - DS2020) for the period 2013-2020, which typically address a broader spectrum of areas of action. In this respect, S4 is complementary to the NpAI programme, which must take into account the overall strategic orientations as well as the achievements of the actions that have been and will continue to be implemented under this strategy until 2023, and which are also relevant for the implementation of this programme. At the same time, the NpAI programme is one of the input requirements for the preparation of S4 for the new post-2020 period, in particular in the part dealing with research and innovation activities and the economic sector, where support and specific actions will depend in particular on entrepreneurial discovery. Supporting and embedding AI in these actions will therefore be crucial.

The NpAI programme is consistent with S4, in particular as regards support for innovation and development activities aimed at increasing the capacity of innovation and development stakeholders to develop innovative products and services based on AI. The NpAI programme is expected to make a significant contribution towards the achievement of all three fundamental objectives of S4:

- Increasing value added per employee;
- Improving competitiveness in global markets by increasing the volume of knowledge and technologies in Slovenia's exports; and
- Boosting entrepreneurial activity.

The planning of the NpAI programme, as well as of strategic goals and supporting instruments, takes into account the results of the S4 support measures to date, in which strategic partnerships were established in the context of entrepreneurial discovery. On this basis, the Strategic Development and Innovation Partnerships - SRIPs - have been established, of which the key ones for AI are the SRIP - Factories of the Future and the SRIP - Smart Cities (including the ICT horizontal network) and

[21] https://www.gov.si/zbirke/projekti-in-programi/izvajanje-slovenske-strategije-pametne-specializacije/

Communities. Both are already integrating AI as a key enabling technology in the design of their activities. Representatives of the two SRIPs have also been actively involved in the preparation of this programme, thus ensuring appropriate coherence with the objectives of the two partnerships.

4 Overview of the current situation

4.1 AI in the EU

In May 2017, the European Commission published the mid-term review of the Digital Single Market Strategy, underlining the importance of building on Europe's scientific and industrial strengths and innovative start-ups to lead the development of AI technologies, platforms and applications[22]. It states that AI can bring significant benefits to our society and will be a key driver of future economic and productivity growth. By incorporating intelligent capabilities, devices and services can achieve enhanced responsiveness and autonomy. Europe aims to become a leading region globally in the development and deployment of cutting-edge, ethical, and secure AI, while promoting a human-centric approach in a global context.

The European Commission and the EU Member States, including Slovenia, wrote in the Declaration on AI Cooperation signed on 10 April 2018[23], that Europe has world-class AI researchers, labs and start-ups. Europe is also advanced in robotics and is a global leader in areas such as transportation, healthcare and manufacturing. To maintain its competitiveness, Europe must begin utilising AI in these domains. Due to intense international competition, it is important for us to implement coordinated European measures that will help the EU establish itself as a prominent player in AI development. On 25 April 2018, the European Commission presented a framework of actions aimed at harnessing AI for the benefit of Europeans and enhancing European competitiveness in this field. It proposed a three-pronged approach: (1) increasing public and private investment in AI, (2) preparing for socio-economic change, and (3) ensuring an appropriate legal and ethical framework. This initiative is a response to the proposal by European leaders to develop a European approach to AI[24].

On 7 December 2018, the European Commission presented Communication Coordinated Plan on Artificial Intelligence[25]. The main objectives of the coordinated plan are to maximise the impact of investments at EU and national level, to promote synergies and cooperation across the EU, including on ethics, to foster the exchange of best practices and to jointly plan future actions. The Communication argues that by working together, the EU can increase its impact and become globally competitive. The need for coordinated action was identified in investments, excellence in and the dissemination of AI, data availability, social change, ethics and regulatory frameworks. The measures apply to both the private and public sectors and create numerous synergies. The plan encourages all Member States to develop and share national strategies or programmes for AI with other Member States and the Commission, either as standalone AI strategies or by incorporating the AI dimension into other relevant strategies and programmes. These strategies or programmes should outline the level of investments and implementation measures, taking into account this coordinated plan. Each Member State shall

[22] A Connected Digital Single Market for All COM(2017) 228 final, https://eur-lex.europa.eu/resource.html?uri=cellar:a4215207-362b-11e7-a08e-01aa75ed71a1.0014.02/DOC_1&format=PDF
[23] Declaration on Cooperation on Artificial Intelligence, https://ec.europa.eu/digital-single-market/en/news/eu-member-states-sign-cooperate-artificial-intelligence
[24] AI for Europe, COM(2018) 237, https://ec.europa.eu/transparency/regdoc/rep/1/2018/SL/COM-2018-237-F1-SL-MAIN-PART-1.PDF
[25] Coordinated Plan on Artificial Intelligence, COM(2018) 795, https://ec.europa.eu/digital-single-market/en/news/coordinated-plan-artificial-intelligence

determine the format, content and governance of national AI strategies on the basis of national characteristics.

On 18 February 2019, the Council of the EU adopted conclusions on the proposed coordinated plan for the development and deployment of AI produced in Europe. The EU Council, in its conclusions, emphasises the crucial importance of promoting the development and use of AI in Europe. This includes increasing investments, increasing excellence in AI technologies and applications, and strengthening collaboration in research and innovation in the field between industry and R&D..

In line with this, the European Commission established an independent high-level expert group on AI, which released the Ethics Guidelines for Trustworthy AI in April 2019[26]. According to the Guidelines, trustworthy AI should possess three elements that should be achieved throughout a given system's entire life cycle. Trustworthy AI should be: lawful, ethical and robust. In line with this, it establishes seven criteria to ensure the latter two elements: (1) human agency and oversight, (2) technical robustness and safety, (3) privacy and data governance, (4) transparency, (5) diversity, non-discrimination and fairness, (6) environmental and societal well-being, and (7) accountability. The Communication highlights the need to be mindful "that there might be fundamental tensions between different principles and requirements. These trade-offs and their solutions should be continuously identified, evaluated, documented and communicated." To operationalise these criteria, the Communication also includes a specific check-list for assessing trustworthy AI. However, it clearly points out that the assessment should be tailored to specific use cases and circumstances of each system, and therefore "such an assessment list will never be exhaustive. Ensuring trustworthy AI is not about ticking boxes, but about continuously identifying requirements, evaluating solutions and ensuring improved outcomes throughout the AI system's life cycle, and involving stakeholders therein." In terms of the criteria and their evaluation, the Communication defined a pilot period for comments, feedback and suggestions for change from all interested stakeholders until the end of 2019, which allowed a new revised version to be prepared in July 2020[27].

In February 2020, the European Commission presented a new set of digitalisation orientations, including an AI strategy[28], a data strategy[29] and an overall strategy for Europe's digital future[30]. The overall orientations are based on openness, fairness, diversity, democracy and self-confidence, and promote the digitalisation of European society, putting people first by pursuing three key objectives: technology that works for people, a fair and competitive digital economy, and an open, democratic and sustainable society. In this context, AI and the data strategy play a key role, which is also reflected in the planning of funding in the future financial perspective and in the actions foreseen in the European programmes to support research, development, innovation and the deployment of ICT in the economy and society (e.g. Horizon Europe, Digital Europe, Connecting Europe Facility). The NpAI follows these guidelines and seeks to define a complementary national framework for supporting AI by seeking synergies with other international activities (OECD, UNESCO) and, above all, to support activities to enable and ensure Slovenia's cultural identity in the digital world of the future. The whole set of EU strategies was in the public debate phase in the first part of 2020, and Slovenia has based its views on this programme, in particular on the AI strategy and on the response to the forthcoming orientations and proposals of the European Commission, which will also be an important basis for the upcoming Slovenian Presidency of the EU Council in 2021.

[26] Ethics Guidelines for Trustworthy AI, https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai
[27] ALTAI – The Assessment List on Trustworthy Artificial Intelligence, https://futurium.ec.europa.eu/en/european-ai-alliance/pages/altai-assessment-list-trustworthy-artificial-intelligence
[28] White Paper on Artificial Intelligence - A European approach to excellence and trust, COM(2020) 65 final, 19 February 2020, https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020_sl.pdf
[29] A European strategy for data, COM(2020) 66 final, 19 February 2020, https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1582551099377&uri=CELEX:52020DC0066
[30] Shaping Europe's digital future, 19 February 2020, https://ec.europa.eu/info/sites/info/files/communication-shaping-europes-digital-future-feb2020_en_4.pdf

4.2 AI in Slovenia

Slovenia has a long-standing tradition of over 40 years in research on AI and other advanced technologies, where our scientists and experts have achieved top-notch results, even on a global scale. The main driving force behind these achievements are the researchers from our universities, particularly the University of Ljubljana and the University of Maribor, as well as the researchers at the Jožef Stefan Institute.

A pioneer and eminent figure in the research sphere at the world level is Acad. Prof. Dr Ivan Bratko, whose pioneering work on AI, through his research and teaching, began in the early 1980s, laying the foundations and putting Slovenia on the world map, as well as educating a number of today's top experts in the field. In Slovenia, research on AI began in 1972 at the Jožef Stefan Institute (Jožef Stefan Institute) in Ljubljana. Later on, research activities in AI were also initiated at the Faculty of Electrical Engineering of the University of Ljubljana. The Jožef Stefan Institute established an AI Group in 1979, which was renamed the AI Laboratory in 1985. A laboratory of the same name was established at the Faculty of Electrical Engineering of the University of Ljubljana in 1981. The two laboratories gradually grew into several research sections at the Jožef Stefan Institute and several research laboratories operating within the Department of AI at the Faculty of Computer and Information Science of the University of Ljubljana. The Artificial Intelligence Laboratory at the Faculty of Electrical Engineering and Computer Science of the University of Maribor was established in 1989. Similar laboratories and centres have been developed at most Slovenian universities, some research institutes and companies, especially those working in computer science and information and communication technologies. According to the Slovenian current research information system (SICRIS), 98 research groups were active in Slovenia at the beginning of 2020 within 65 registered research and development organisations under public and private law, whose work covered several fields within AI (AI, expert systems, intelligent systems, computer vision, systems and cybernetics and machine learning)[31].

In terms of securing stable national funding for research activities, a significant portion of the funds supporting the Slovenian research community in fundamental and applied AI research is provided by the Slovenian Research Agency (hereinafter: ARRS) through funding of research programmes. The overall national funding for research activities was drastically reduced in 2012 and only in 2018 reached the 2011 level. Competitive funding for AI research projects by ARRS is also very limited, as from the entire field of computer science (not only AI), only one project (EUR 100,000/year for three years) is usually approved in each call for proposals. In recent years, the research community has primarily relied on the success of acquiring funds from EU grants, with an emphasis on projects based on applied research and development, but not equally on fundamental research. In this regard, it is important to remember that the relatively favourable current state of having a high level of knowledge on AI in Slovenia is the result of previous support for fundamental research, which yields its fruits later (today) and in the long term. Perhaps this is why ICT, and within it AI, has been one of the most successful areas of the EU Framework Programmes for Slovenian applicants, both in terms of the number of projects awarded and the funding received.

Under the 2014-2020 Operational Programme at the level of Priority Axis 1, which includes investments in research infrastructure, the Ministry of Education, Science and Sport co-financed the upgrading of several national research infrastructures. In the context of AI, it is worth mentioning the HPC RIVR project, with a budget of EUR 20 million, which provides co-funding for upgrading the computational capacity of existing HPC research infrastructure. Through the RIVR HPC Cohesion Project, Slovenia has joined the EU's flagship computing project EuroHPC, bringing the total investment in HPC capacity (Slovenian and EU part) to EUR 26.5 million.

Slovenia realizes the future importance of quantum technologies, which will have a significant impact on all areas of computer and information science, including AI. This is why Slovenia (Ministry of

[31] SICRIS database, January 2020

Education, Science and Sport) is participating in the Horizon 2020 umbrella initiative "FET Flagship on Quantum Technologies" (FF QT), which aims to develop the quantum internet, quantum computers, quantum simulators and quantum sensors. Slovenian research organisations are also participating in this initiative through the EU QuantERA project, which also involves the Ministry of Education, Science and Sport. In addition, research organisations are participating in two prestigious European Research Council projects in this field. Slovenian organisations active in quantum computing are linked to the national QUTES[32]network. Slovenia signed the Declaration on Quantum Communication Infrastructure at the end of 2019. The signatories committed to establishing a EuroQCI cooperation framework for a common approach to the implementation of an EU quantum communication infrastructure.

In education, Slovenia has a long tradition of AI studies at higher education institutions. AI has been represented in the ICT curricula of higher education institutions for more than 30 years. Today, AI is one of the main fields of study at the Faculty of Computer and Information Science of the University of Ljubljana, at the undergraduate, postgraduate and doctoral levels. There are two special programmes of master's studies: Data Science and Cognitive Science. In a narrower sense, AI is included in at least ten courses within six educational programmes at the Faculty of Electrical Engineering, University of Ljubljana. Additionally, AI is also incorporated in the curriculum of the Faculty of Mathematics and Physics, University of Ljubljana. AI is well represented in the curriculum of the Faculty of Electrical Engineering and Computer Science of the University of Maribor. Alongside various courses in AI, machine learning and data mining, it offers a study module called Intelligent Information Solutions. Additionally, it has an accredited independent study programme in Data Science. The International Postgraduate School Jožef Stefan also offers educational programmes related to AI. At the doctoral level, it offers the Knowledge Technologies, Intelligent Systems and Robotics study modules. AI content is also offered by the Faculty of Mathematics, Natural Sciences and Information Technologies of the University of Primorska, which offers an accredited Data Science programme at the master's level. AI topics - especially knowledge discovery in data, machine learning, data science - are also represented at the master's and doctoral level in the course curricula of other faculties (Faculty of Mechanical Engineering, Faculty of Information Studies, Faculty of Organisational Sciences at the University of Maribor). AI is also studied from a legal, philosophical and security perspective at other Slovenian faculties and research organisations, but it is not included in the curricula as a subject in its own right.

In general, higher education programmes related to AI are well represented, but AI-related topics should also be included in secondary and primary school curricula. But here Slovenia is lagging behind. There is no course in this area at primary or secondary level. In 2019, the Ministry of Education, Science and Sport stepped up further activities of the Expert Working Group for the Analysis of the Presence of Computer and Information Science in Primary and Secondary School Curricula (RINOS), which is working on an action plan for the integration of the core content of computing, informatics, and computational thinking in primary and secondary school curricula and kindergarten curricula. The systematic upgrading of digital pedagogical competences is also an ongoing concern. The RINOS Action Plan aims to systematically regulate the acquisition and testing of young people's digital competences, as well as the core content of computer and information science, once and for all throughout the education system. The implementation of the RINOS Action Plan will be carried out in particular in the framework of the project under the Ministry of Education and Science, co-financed by the Recovery and Resilience Fund (RRF), where systemic changes are foreseen, as well as the provision of access to basic skills to the current generations. In terms of AI deployment, the X5gon project (Horizon 2020) has been running since 2017, developing intelligent approaches to ensure accessibility and wider use of Open Educational Resources (OER). Since the beginning of 2021, the Ministry of Education, Science and Sport has also been actively participating in the three-year European project Artificial Intelligence for Teachers (AI4T), co-funded by the Erasmus+ programme (Key Action 3 - KA 3) for policy reform or experimentation.

[32] http://www.qutes.si

Slovenia has a significant community of experts working on of AI, comprising researchers from various fields such as machine learning, data science, natural language processing, computational intelligence, reconfigurable systems, decision support systems, computer vision, and related areas including robotics. Additionally, experts from social sciences and humanities are also involved, addressing the social, legal and ethical implications of AI technologies. Today, Slovenia has approximately 250 researchers working on AI, taking into account the small size of the available population in Slovenia. Each year, around 200 students graduate of computer science and mathematics, but only a portion of them pursue careers in AI. It remains a fact that Slovenia, like other countries, struggles to produce an adequate number of computer science professionals and specifically AI experts to meet the growing demand in research, education and industry. The leading institutions are Jožef Stefan Institute and the Faculty of Computer and Information Science of the University of Ljubljana. Slovenian AI researchers are associated in the Slovenian Artificial Intelligence Society (Slovenian Artificial Intelligence Society)[33]. The Society has around 140 members and is a full member of the European Association for Artificial Intelligence (EurAI). Furthermore, experts on AI also join associations that are specifically dedicated to various aspects of AI, such as the Slovenian Association for Language Technologies (Slovenian Language Technologies Society))[34] and the Slovenian Pattern Recognition Society (Slovenian Pattern Recognition Society)[35]. Experts and individuals interested in AI also gather in informal groups, such as the Deep Learning Ljubljana meetup group (approximately 800 members)[36], Data Science Slovenia meetup group (approximately 971 members)[37] and PyData Ljubljana meetup group (484 members)[38], which hold various workshops to present and share best practices and innovations in deep learning, machine learning and AI. Information on artificial intelligence and data science is also informally exchanged through social media groups, such as Artificial Intelligence Slovenia (LinkedIn, 313 members) and Data Science Slovenia (Facebook, 522 members).

Despite a relatively good and successful research and educational environment regarding AI, Slovenia is increasingly facing brain drain among its younger, highly educated population. This is coupled with discouraging arrangements for rewarding and stimulating talented individuals working in public research and higher education, which is a consequence of the salary system in the public sector. Our researchers, with their knowledge and experience, can find better opportunities at foreign universities or in the industry, where, for example, younger AI professionals in Slovenia are already earning salaries three to five times higher. There is a critical shortage of young researchers and post-doctoral fellows in AI, which is increasingly reflected in the outflow of young academic staff to the industry. As a result, higher education institutions are facing greater challenges in maintaining their workforce. The entire personnel structure of the most important educational institutions in Slovenia is being disrupted. The growth of technologically advanced companies in Slovenia will only further exacerbate this gap. A change in the salary system and the reward system based on (project) performance rather than just education is therefore necessary in the research and higher education sectors to maintain or improve the personnel situation, which has significantly deteriorated over the past decade.

On the other hand, new employment opportunities are opening up for experts, for example in robotics, where Slovenia has a ratio of 1 researcher in AI and robotics per 7,000 inhabitants, placing us among the world leaders in this field. Slovenia is recognised as a favourable destination for investments in robotics, as evidenced by successful companies such as Gorenje GAIO, INTECH-LES, Kolektor Vision, Pontess, Revoz, RLS and Yaskawa Slovenia)[39]. AI is increasingly being used in the ICT sector, making good use of the knowledge generated in the research sector (e.g. AI Collective)[40]. There has been an

[33] http://slais.ijs.si/
[34] http://www.sdjt.si/wp/
[35] http://sdrv.fe.uni-lj.si/sl/domov/
[36] https://www.meetup.com/Deep-Learning-Ljubljana/
[37] https://www.meetup.com/Data-Science-Slovenia/
[38] https://www.meetup.com/PyData-Slovenia-Meetup/
[39] https://www.see-industry.com/en/robotics-industry-in-slovenia/2/1836/
[40] http://www.comtrade.ai/

increase in AI in start-ups, but there is still a significant lack of start-up entrepreneurial activity and also of the development of entrepreneurial ventures in the field of AI. An informal overview of the state of the development ecosystem of AI companies in Slovenia[41] in 2020 showed that 156 companies are connected to AI in various ways. In the first group, there are companies that offer general services related to custom implementations of AI systems in the market. There are 29 of them. Among them, one possible division is between those that are more narrowly specialised in AI (14 companies) and those that offer AI-related services to complement a broader range of services, mostly related to business intelligence (BI) systems, data warehouse setups, etc. (15 companies). The second group consists of multinationals offering a very diverse range of services and products, including those related to AI. There are 7 such companies. In most cases, they do not have large teams of data scientists, but where they do, they are mostly not involved in development, but more in a sales support role. The third group are companies that specialise in a specific field of application with a product or service. There are 71 in total, many of them start-ups. Application areas that are well represented are health (10 companies), image and video processing (9 companies), business process automation (7 companies), industry and robotics (7 companies). The fourth group consists of companies that do not directly offer a product or service based on the use of AI, but have an in-house team of data scientists whose work supports the company's operations. There are 49 such companies, including larger companies in the fields of banking, retail and manufacturing, as well as several technology companies. It is worth highlighting a group of companies registered abroad but with engineering departments in Slovenia, where data scientists work. According to this overview, it is estimated that there are between 300 and 500 data scientists working in the Slovenian business sector. However, the official naming for their profession is not as uniformly established as it is abroad, so they often appear under different job titles (analysts, business intelligence specialists, software developers, etc.), even though they actually perform the work of data scientists and possess the relevant competencies.

This shows that a dynamic entrepreneurial ecosystem is already being established in Slovenia, which is crucial to further support the development and deployment of AI in Slovenia. In this context, support organisations have already been set up to bring together stakeholders. The Slovenian Digital Coalition[42], which aims to coordinate the digital transformation of Slovenia in line with the adopted Digital Slovenia 2020 strategic documents, in cooperation with a wide range of stakeholders from business sector, the R&D sector, civil society and the public sector, is already actively preparing for the deployment of AI. The ICT Horizon Network of the SRIP ICT Horizontal Network under SRIP Smart Cities and Communities has also created the AI4SI initiative, which complements the existing AI ecosystem, especially in the economic field. The AI4SI initiative aims to promote the adoption of AI in all sectors and industries of the Slovenian economy and ensure the more efficient transfer of research institution results to the business sector. AI4SI also serves as a connecting link between providers of AI solutions and companies aiming to incorporate AI in their operations. In doing so, the initiative strives to actively and creatively contribute to strengthening Slovenia's position among the most advanced countries as regards AI.

Slovenia is also active internationally. In March 2020, the Government of the Republic of Slovenia signed an agreement with the United Nations Educational, Scientific and Cultural Organisation (UNESCO) to establish the first International Research Centre on Artificial Intelligence under the auspices of UNESCO (IRCAI) in Ljubljana. The centre’s purpose will be to provide an open and transparent environment that will not only support AI research, address global challenges through AI technologies, and provide global AI education and discussion, but also offer substantive support to stakeholders around the world in the development of AI policies and action plans. The centre will be inclusive and will therefore connect expertise on AI in Slovenia and around the world, while promoting and coordinating the establishment of similar centres in other countries worldwide. Slovenia, as a founding member, has also joined the Global Partnership on AI (GPAI), initiated by France and Canada. GPAI brings together all countries

[41] Informal analysis by Dr Boris Cergol, ComTrade, 2020, https://medium.com/@boris.cergol/discovering-slovenias-artificial-intelligence-and-data-science-landscape-1940d2c860aa
[42] digitalna.si

committed to developing ethical and trustworthy AI in accordance with the principles of the OECD. The partnership is currently being formed, and a number of countries from around the world have already expressed their interest in participating.

4.3 Assessment of strengths, weaknesses, opportunities and threats

Slovenia has long-standing research experience with AI and a relatively high number of professionally educated personnel, which is a key requirement for understanding AI models, algorithms and technologies, as well as their potential applications in various products and services for specific use cases. This applies to the development of AI products and services, the integration of AI technologies into various other products and services, and, ultimately, the use of products and services in specific contexts. On the other hand, we have a well-developed tertiary level of professional education [43] (higher education) in AI, which must be further enhanced by introducing AI content into educational programmes (technical and non-technical) where AI methods can be successfully applied to solve specific problems (electrical engineering, mechanical engineering, medicine, law, social sciences, etc.). Simultaneously, to ensure a continuous supply of experts, especially considering brain drain, it is necessary to introduce content relevant to AI (computer science, general ICT, STEM, etc.) into the education system at the primary and secondary school levels. This will promote AI to potential future professionals and encourage them to pursue careers in this domain. Slovenia is small enough to combine development and user knowledge quickly and efficiently in a wide variety of interdisciplinary fields, which allows it to effectively develop specific pilot reference solutions that, on the one hand, enable everyone to gain the necessary experience and knowledge, while at the same time enabling effective knowledge transfer between the various stakeholders involved in the innovation cycle, from researchers to development engineers to end-users. Thanks to its integration into the international environment, Slovenia has excellent opportunities to penetrate international markets with such solutions. This would make Slovenian stakeholders more noticeable on a global scale, fostering further collaboration and accelerating development in AI. More detailed definitions of strengths, weaknesses, opportunities and threats are provided in the SWOT table below.

[43] The Slovenian education system and the Slovenian Qualifications Framework, https://www.gov.si/teme/slovenski-solski-sistem-in-slovensko-ogrodje-kvalifikacij/

	STRENGTHS	WEAKNESSES
INTERNAL FACTORepublic of Slovenia	1. More than 40 years of higher education (undergraduate and postgraduate) specialist training and research in AI. 2. Relatively high number of AI-trained engineers and researchers per capita. 3. The "right size" of the country and its sectors to effectively combine development and user competences in an ecosystem for the development and deployment of AI-based reference solutions. 4. Understanding the challenges of deploying AI based on successful pilot projects in a wide range of fields (public administration, health and medicine, agriculture, manufacturing, etc.). 5. International involvement and visibility of Slovenia and Slovenian stakeholders in AI (UNESCO, OECD, Council of Europe, EU programmes and projects). 6. Already established RDI stakeholder communities in specific priority policy areas (e.g. SRIP Factories of the Future, SRIP Smart Cities), which comprise a critical mass for the implementation of some of the planned activities. 7. We have most of the necessary stakeholders to build a high-quality AI ecosystem, including a network of labs covering a wide variety of AI fields, larger companies that have already built in-house teams of data scientists, start-ups offering products and services in diverse AI fields, a fairly active start-up environment and an active civic sphere. 8. Internationally successful AI infrastructure solutions from Slovenian stakeholders (e.g. Orange, OECD AI Observatory, Event Registry, Text Garden, DeXi). 9. Political support for the creation of infrastructure key to AI-based solutions (HPC, data access, IoT, 5G). 10. Supporting the development of an AI-based infrastructure for language technologies (speech recognition, text recognition and processing, speech generation, translation, etc.) as a central prerequisite for ensuring national cultural identity in a globalised digital world.	1. Relatively limited resources for investing in AI in all segments of the innovation cycle (research, innovation, deployment, education) - according to the draft analysis of AI WATCH 2018, Slovenia ranks 24th among EU countries in terms of the level of investment in AI, and 23rd in terms of investment per capita at EUR 3.4 (ahead of Greece, Bulgaria and Croatia, and behind Hungary, Malta and Portugal; Denmark spends the most at EUR 42.7, Ireland EUR 36.6 and Finland EUR 36.4). 2. Difficult integration and cooperation of stakeholders to implement joint projects. 3. There is a lack of a clear overview of who is actively involved in AI in both the public and private sectors, resulting in poor cross-sectoral coordination. 4. There is a lack of coordinated efforts to promote the development and implementation of AI at the national, regional or local level (collaboration with the business sector, non-governmental institutions, journalists, local communities and public officials for the development and use of AI). 5. AI has not been established as a specific priority task in the country. 6. Frequently inaccessible and inconsistent data for AI usage, poor quality, bias, lack of standards. 7. Fear of the risk of AI abuse, mistrust in AI-based solutions. 8. Inadequate legislative framework in certain segments of AI implementation. 9. Computer science and IT knowledge and competencies are not systematically included in the educational process at the primary and secondary school levels. 10. There are no HRD policies and guidelines for AI (education, recruitment, training, awareness-raising). 11. A discouraging system of rewards and incentives for personnel in public research and higher education, hindering the long-term availability of a skilled workforce. 12. Limited awareness of opportunities and inadequate capacity for integrating AI in the wider public sector and business landscape. 13. Lack of standards for the development, deployment and use of AI, lack of standards and good procurement practices for innovative AI-based solutions. 14. Fragmented and inconsistent infrastructure for the development and implementation of AI across various sectors.

	OPPORTUNITIES	THREATS
EXTERNAL FACTORRepublic of Slovenia	1. Exploring opportunities for reference AI solutions in niche domains that have the potential for international recognition. 2. The public administration can be a key first mover in implementing reference AI solutions for the public sector. 3. Developing national policies and guidelines to establish an enabling environment for the implementation of advanced reference AI solutions at both the national and local levels. 4. Improved public sector services tailored to users' needs. 5. Implementation of data-driven policies and decision-making. 6. Accelerated implementation of AI in the healthcare sector based on over 40 years of research collaboration between AI experts (Faculty of Computer and Information Science, University of Ljubljana, Jožef Stefan Institute) and healthcare professionals (Faculty of Medicine, University of Ljubljana, University Medical Centre Ljubljana), as well as successful solutions developed by Slovenian companies in this field. 7. Accelerated implementation of AI in the manufacturing and robotics sectors based on Slovenia's excellent international reputation in robot integration in production and the competencies of Slovenian stakeholders (research organisations and companies) in both fields. 8. New opportunities for education and lifelong learning. 9. Promotion of the country in the international arena in terms of knowledge and technology transfer into real-life applications based on existing success stories (UNESCO OER, UNESCO IRCAI, GPAI). 10. Attracting foreign investments through the establishment of multinational companies' research and development centres in Slovenia. 11. The field of AI can provide a good opportunity for testing new forms of collaboration between the business sector, public administration and the research sector. It also offers an opportunity to explore new approaches to project funding and evaluation, as well as to advance population education and training.	1. The use of AI for generating fake news and content (such as deepfakes), cyber-attacks, and other activities that undermine society's trust in democratic processes and lead to erosion of ethical principles. 2. Lack of awareness among decision-makers, misguided objectives and insufficient political will to support AI. 3. Insufficient user knowledge, misuse and the tendency to limit AI to exclusive expert circles. 4. Brain drain leading to a shortage of AI professionals. 5. Reduced funding for basic research and the resulting shortage of talent in research and higher education. 6. Lack of a stimulating environment for recruiting skilled professionals in the public sector, coupled with the resulting shortage of expertise for successful implementation of AI in the public sector. 7. There is a lack of dedicated government funding to ensure the re-skilling of the workforce and support the development and implementation of AI. 8. Unfavourable effects of AI implementation on the elimination and transformation of jobs and employment, affecting not only routine tasks but also professional positions. 9. The threat to individuals' privacy and the possibility of unauthorised state or corporate surveillance over society. 10. The coercion of the state by corporations wielding control over data and AI technologies. 11. The loss of national cultural identity in the digital world, accompanied by the diminishing use of the Slovenian language. 12. Undesirable decisions resulting from the use of AI tools based on poor data: lack of representativeness, bias, discrimination (such as gender or other personal circumstances where discrimination is prohibited). 13. Users of AI solutions often exploit the lack of clear responsibility and legal regulations in specific areas of AI implementation as excuses for non-functionality, poor performance and evading accountability. 14. Loss of digital sovereignty and dependence on others at the level of the state and citizens - without the knowledge, experience and use of AI, the state and citizens will be dependent on corporations and other countries. 15. Complex regulation and insufficient legal support for stakeholders can hinder the implementation of AI in business sector and society.

5 Vision and strategic framework of the programme

With the national AI programme, we want to support the achievement of the objectives of the Slovenian Development Strategy 2030, establish a system for coherent support for research, innovation, deployment and use of AI technologies and accelerate digitalisation processes in Slovenia for the benefit of citizens. In doing so, we will pursue the following vision:

Upgrade more than 40 years of research achievements in the field of AI in Slovenia and become internationally recognised for the competences of knowledge transfer of high-quality, ethical and safe AI technologies in human-friendly and trustworthy services and products while ensuring national cultural identity.

Through providing comprehensive support to Slovenian research and innovation stakeholders in the development of AI-based technologies and solutions, as well as introducing and establishing reference solutions based on AI, in collaboration with all social groups in Slovenia, and by supporting the international establishment of Slovenian stakeholders in AI, our goal is to expedite economic growth. Building upon this, we seek to establish Slovenia's recognition as a trustworthy partner in further advancing and regulating AI in society, prioritising a people-centred approach and their well-being.

To achieve the vision, the programme sets the following strategic goals (SG) for the period until 2025:

SO1: Setting up dynamic ecosystem for research, innovation and deployment of AI;
SO2: Education and strengthening of human resources;
SO3: Supporting AI research and innovation;
SO4: Deploying AI reference implementations in business sector, public sector, public administration and society;
SO5: Establishing the technical infrastructure for research, development and use of AI;
SO6: Strengthening security by using AI;
SO7: Increasing public confidence in AI;
SO8: Ensuring an appropriate legal and ethical framework;
SO9: Strengthening international cooperation;
SO10: Establishing a national AI observatory in Slovenia.

To achieve each of the defined strategic objectives, the programme specifies a series of measures that need to be implemented using various support instruments. The implementation of measures will involve direct and indirect support instruments throughout the entire innovation life cycle. It will be carried out in the following thematic areas of implementation:

- AI research, development and innovation;
- Deployment of AI;
- Setting up an AI infrastructure;
- Preparing for and responding to change, including the following sub-areas:
  - Ensuring appropriate e-skills and e-competences,
  - Ensuring ethical principles for the development and use of AI,
  - Effective regulation of AI,
  - Promoting public trust in AI;
- Standardisation in AI;
- International cooperation on AI.

Error! Reference source not found. depicts a schematic representation of the programme implementation area.

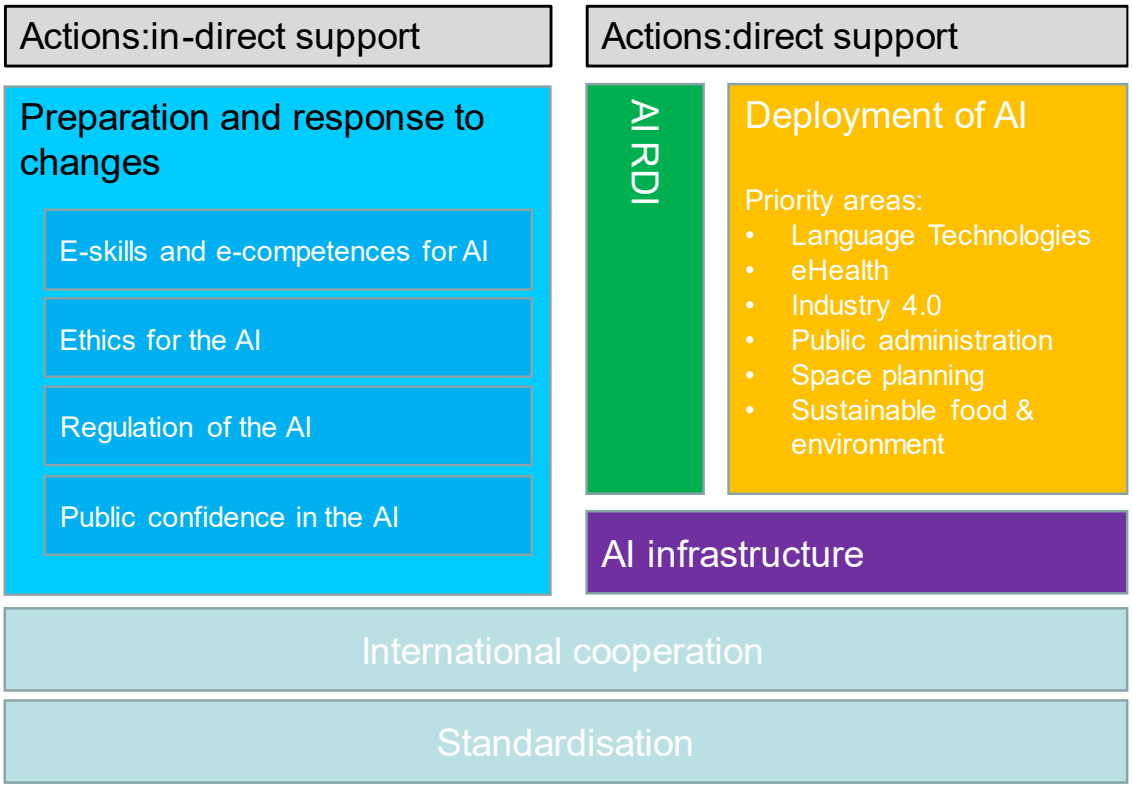


Figure 3: Areas of implementation of the NpAI programme

Table 1 shows the areas of programme implementation in terms of addressing each of the strategic objectives.

No	Areas of action / Strategic objectives	RDI AI	AI deployment	AI infrastructure	Preparing for and responding to change	International cooperation	Standardisation
1	Setting up dynamic ecosystem for research, innovation and deployment of AI	X	X	X	X		X
2	Education and strengthening of human resources	X	X		X		
3	Supporting AI research and innovation	X				X	X
4	Deploying AI reference solutions in business sector, public sector, public administration and society	X	X		X		X
5	Establishing the technological infrastructure for research, development and use of AI	X		X	X	X	
6	Strengthening security by using AI		X		X		
7	Increasing public confidence in AI				X		
8	Ensuring an appropriate legal and ethical framework				X		
9	Strengthening international cooperation					X	
10	Establishing a national AI observatory in Slovenia				X	X	

Table 1: Strategic objectives and implementation areas of the NpAI programme

6 Strategic objectives and actions

6.1 SO1: Setting up dynamic ecosystem for research, innovation and deployment of AI

Slovenia aims to create a supportive and dynamic environment that encourages the quick and efficient sharing of information, experiences and best practices. This environment will serve as a platform for all research and innovation stakeholders to engage in research, development and the adoption and testing of AI technologies, while users will have the opportunity to understand the impact of AI on their operations and businesses. This understanding will enable them to prepare for implementation and to evaluate the performance of AI algorithms and technologies in real-world situations. Creating an environment of effective collaboration is essential for acquiring and sharing the necessary knowledge about AI technologies. It enables a better understanding of the opportunities and potential risks involved in implementing AI in specific solution scenarios. This collaborative environment is crucial for ensuring a critical mass of resources, including financial, human, and expertise, to successfully undertake key activities throughout the entire innovation life cycle.

To achieve the objective, the following measures will be implemented:

1.1	Establishing a central coordination of national stakeholders for AI development under the Slovenian Digital Coalition, in collaboration with stakeholders from the research and higher education sector, the business community, non-governmental organisations and civil society.
1.2	Establishing a supportive environment for AI adoption within at least one digital innovation hub in the country, providing assistance, education and consultancy for the development and implementation of AI in both the private and public sectors. This initiative aligns with the guidelines and activities at the EU level, as well as its supporting mechanisms for Digital Innovation Hubs (DIHs).
1.3	Implementing coordination for the introduction of AI in specific priority areas, envisioning collaboration between the business sector, research sphere, government and/or non-governmental sector.
1.4	Establishing inter-ministerial coordination for the planning and implementation of measures and activities within this programme, aligning with initiatives in the areas of open science, high-performance computing (HPC), big data, the Internet of Things (IoT), blockchain and potentially other priority enabling technologies.
1.5	Establishing a coordination of national stakeholders to shape standardization in AI.

The measures will be implemented using the following implementing instruments:

- Public administration project (supported by PP) (1.1);
- Call for proposals (1.2);
- Sectoral activities of ministries: Ministry of Public Administration, Ministry of Education, Science and Sport, Ministry of Economic Development and Technology, Ministry of Defence (1.3, 1.4);
- Sectoral activities of ministries: Ministry of Economic Development and Technology (Slovenian Institute for Standardisation), Ministry of Public Administration (1.5);
- Stakeholders' own activities (1.1, 1.3, 1.5).

Indicators of the achievement of the objective:

Action	Indicator	2020	2025
1.1	Establishing a central coordination of national development stakeholders for AI	1	1
1.2	Setting up DIH for AI	0	2
1.3	Establishing stakeholder coordination for the deployment of AI for priority areas	0	4
1.4	Establishing inter-ministerial coordination of planning and implementation of actions	0	1
1.5	Coordination established for cooperation on standardisation activities for AI	0	1

6.2 SO2: Education and strengthening of human resources

Timely and relevant knowledge is a crucial condition for successful development and implementation of AI in society. The programme aims to provide support in three areas: (1) Ensuring the necessary knowledge on AI for research and development (including skilled personnel for researching and developing AI technologies and solutions, as well as the development of new innovative products and services incorporating AI); (2) Providing the knowledge of AI necessary for its use in work and employment (employees with knowledge and professional qualifications in AI required to use products and services incorporating AI in their work), and (3) Ensuring general awareness, understanding, knowledge and competencies for the use of services and products based on AI for the general public (the wider population).

AI education requires that AI-relevant content in computer and information science, or content in areas necessary for understanding AI (e.g. computational thinking), is present at all levels of formal education[44], from primary school to doctoral studies (tertiary level) and also in adult education. Education in Slovenia should align with social and technological advancements, while considering significant labour market trends. It should focus on fostering relevant competences for specific occupations and promoting employee mobility between jobs. This approach aims to enhance the capacity of workforce to adapt to labour market changes resulting from the increased utilisation and implementation of AI, including in terms of gender equality. In this regard, Slovenia will pay close attention to the outcomes of a study conducted by the European Institute for Gender Equality on the possibilities and challenges of new forms of work related to AI and gender equality. The country will utilise and promote the outcomes of the study within the context of national and European activities. Competence models for the so-called professions of the future are already being developed at various levels and will be the basis for the creation of new advanced jobs, which will also be vital for Slovenia. These models are crucial for transforming the labour market, ensuring the successful adaptation of job profiles to accommodate AI deployment. Moreover, they facilitate the integration of AI technologies into innovative products and services across various sectors, including the business sector and priority public services. Additionally, the application of AI in business enables the optimisation of processes and the creation of innovative business models. A key condition for the successful deployment of AI is the general public's confidence in AI and, on this basis, an understanding of the opportunities and threats that AI brings to their lives.

[44] The Slovenian education system and the Slovenian Qualifications Framework, https://www.gov.si/teme/slovenski-solski-sistem-in-slovensko-ogrodje-kvalifikacij/

This requires appropriate lifelong learning in the face of rapid and likely widespread change in society as a result of AI, as the changes will not be a one-off event and will require major adjustments in work and private life throughout people's lifespans. Supporting lifelong AI education, including for more vulnerable groups and people with disabilities,[45] will help reduce the risk of social and digital exclusion, which could be exacerbated in some areas of society by the introduction of AI.

Applying AI to all areas of work will require a change in approach and methods, including in the area of training and assessment. Education will have to move away from the simple transmission of information and knowledge towards more flexible teaching and training, taking into account individual potential and talents. AI will enable more effective and meaningful use of AI for personalised learning (learner-centred approach, special educational needs), smart teaching (learning analytics, problem-solving in teaching, bridging gaps in teaching), quality assurance of educational content (learning resources and curricula that respond to the real needs of society and labour markets, translation), etc., thus also adapting more effectively to frequent changes in the environment (work and private). The use of AI in education will enable fairer access to education for vulnerable groups and individuals with special needs. The utilisation of AI solutions allows for customisation of educational resources and methods to cater to each individual's needs and preferences. It is particularly important that teachers at all levels of education are familiar with and understand AI solutions well enough to actively use them as tools that facilitate their work. AI can help teachers better understand their students' needs, conduct necessary analyses, facilitate assessments and ultimately further their own professional development.

Activities in these areas are already underway, but unfortunately, they are being carried out in an unsystematic and uncoordinated manner, lacking adequate financial support and necessary impact monitoring. In addition to reviewing study programmes and curricula, it is crucial to conduct a systematic review of the activities that are already taking place, such as workshops, summer schools, conferences, doctoral seminars, etc. To achieve a harmonious and human-centred integration of AI into society, coordinated implementation and funding of appropriate educational measures are essential.

To achieve the objective, the following measures will be implemented:

2.1	Systematic review of the curricula of all study programmes at the tertiary level, analysing them in terms of needs and opportunities for the use of AI and including relevant AI content.
2.2	Systematic review and analysis of the curricula of professional training programmes in AI at the tertiary level and their updating in the light of the latest developments in the field of AI worldwide.
2.3	Systematic review and updating of educational curricula at primary and secondary level to include the core content of computer and information science and the content required by the development and deployment of AI (e.g. computational thinking) and to implement the RINOS proposals by 2023.
2.4	Analysis of the needs and opportunities for the creation of interdisciplinary study programmes at tertiary level, linking AI and data science on the one hand, and humanities and law on the other.
2.5	Supporting extra-curricular activities (e.g. summer schools, courses, workshops and building on these activities with regional, national competitions) for primary, secondary and university students to introduce them to the topics needed to understand, develop, deploy and use AI.

[45] This term includes people with disabilities as defined by the UN Convention on the Rights of Persons with Disabilities (CRPD), http://www.pisrs.si/Pis.web/pregledPredpisa?id=ZAKO5314

2.6	Developing a platform and educational content for distance education at all levels of formal education and lifelong learning, with the aim of enabling the acquisition of advanced professional digital skills, in particular in AI and data science, and the social, ethical and legal aspects of AI.
2.7	Analysis of possible measures to create a stimulating environment for the work and life of highly educated AI professionals in Slovenia and to mitigate the problem of brain drain (in public higher education and research, and in the business sector), including instruments to support the retention of Slovenia's own highly educated talent and the return of domestic and attraction of foreign professionals to Slovenia from abroad.
2.8	Analysis of the transformation of the labour market, employment relations, working conditions and organisation, job profiles and jobs in different sectors in Slovenia that have the potential to be replaced or changed by the introduction of AI, including in terms of gender equality, over a ten-year period.
2.9	Support for staff training programmes (courses, seminars) to acquire new knowledge, skills and professional qualifications in AI (re-skilling).
2.10	Support for digital training and literacy programmes for the broadest population, including vulnerable groups and in particular people with disabilities, helping acquire digital competences and user skills in AI (general lifelong learning, computer literacy for adults).
2.11	Developing educational content and examples of AI's use in various subjects and activities in primary and secondary schools (e.g. Slovenian, history, chemistry, biology, art), with a focus on practical demonstrations of AI's usefulness in teaching subject content.

The measures will be implemented using the following implementing instruments:

- Sectoral activities of ministries and public organisations: Ministry of Education, Science and Sport, RINOS group, Institute for Vocational Education and Training, National Education Institute (2.1,2.2, 2.3);
- CRP (2.4, 2.7, 2.8, 2.11);
- Call for proposals (2.5, 2.6, 2.9, 2.10);
- Public administration project (supported by PCP) (2.9);
- Stakeholders' own activities (2.1, 2.2, 2.3);
- Sectoral activities of ministries - Ministry of Labour, Family, Social Affairs and Equal Opportunities, Ministry of Economic Development and Technology, Ministry of Education, Science and Sport (2.6, 2.7, 2.8, 2.9, 2.10).

Indicators of the achievement of the objective:

Action	Indicator	2020	2025
2.1	Analysis of curricula at tertiary level with proposals and actions identified	0	3
2.2.	Analysis carried out in higher education institutions, including dedicated professional courses in and research on AI	0	2
2.3	Analysis of options and introduction of computer science and ICT content from an AI perspective in primary and secondary education curricula (RINOS group activity)	0	1

2.4	CRP implemented	0	1
2.5	Workshops held No. of workshop participants	0 0	50 50 x 20
2.6	Platform established	0	1
2.7	CRP implemented	0	1
2.8	CRP implemented	0	1
2.9	Staff training workshops held No. of workshop participants	0 0	100 100 x 20
2.10	Lifelong learning and adult literacy workshops held No. of workshop participants	0 0	100 100 x 20
2.11	CRP implemented No. of supported subjects in primary and secondary schools	0 0	1 10

6.3 SO3: Supporting AI research and innovation

The research sector is key to understanding the opportunities that AI offers to people, businesses and society. There is a relatively high potential for AI research in Slovenia, where AI research has been ongoing for more than 40 years. Slovenia's established researchers and well-known R&D organisations are an advantage, including in the international environment. The State will therefore support targeted research to ensure research excellence and capacity in AI, as well as R&D and innovation projects in AI to ensure the application of AI in innovative products and services (in the private and public sectors) that have the potential to contribute to competitiveness, economic development and the overall quality of life of people. In these activities, the government will promote interdisciplinary links between research and higher education, business and the non-governmental sector in Slovenia and on an international scale. It will thus help to create a critical mass of professionals, thereby forming a variety of public-private partnerships capable of developing innovative, human-friendly products and services with high added value to respond to current and emerging pressing societal challenges, both at home and globally. We will strive to create more comprehensive support options for research and innovation projects aimed at addressing key social challenges. This will be achieved through a phased and targeted approach to project support and selection, where projects progress to the next stage based on demonstrating the best results in the previous phase.

The support activities will not be limited to specific areas but will be open to all initiatives that demonstrate the potential for scientific or technological advancement. This includes fields such as healthcare, agriculture, smart cities and communities, environment, energy, transport, manufacturing and language technologies. The government will provide adequate funding to establish a centre of excellence dedicated to supporting research on AI models, algorithms and technologies classified within Technology Readiness Levels (TRL)[46]1-3. This is to ensure the collaboration of national AI research stakeholders to continuously support research activities, including the exploration of fundamental

[46] Technology Readiness Level, https://en.wikipedia.org/wiki/Technology_readiness_level

algorithms and models in the field of AI, where we have the expertise for international visibility. To facilitate effective knowledge sharing, we will support consortium projects involving research organisations, companies, solution users, relevant non-governmental organisations and experts from key areas crucial for successful development and implementation of trustworthy AI. These areas may include ethics, legislation, security, privacy, standardisation, user experience and sector-specific knowledge related to the challenges of AI adoption. We will support technology research projects (TRL 2-4) and innovation projects to transfer R&D results into new products and services (TRL 5-8). To ensure the efficient transfer of knowledge from research to practical solutions, it will be necessary to provide continuous prioritised funding for projects throughout their journey from TRL 1 to 9. The aim is to expedite the swift transfer of domestic knowledge throughout the entire life cycle, from research to practical products and solutions. In addition to such projects, it is crucial to support open innovation initiatives that, through the use of agile development methods, focus more closely on specific user requirements and explore marketable products and services within the startup ecosystem. Different projects require different support instruments and financing mechanisms and, therefore, relevant stakeholders in Slovenia must contribute to providing the necessary resources. As a result, collaboration between various ministries, agencies, private investors and investment funds supporting research and development is a top priority. We will strive to create an attractive research and development ecosystem for AI that is appealing to both domestic and international stakeholders. This includes making efforts to collaborate with multinational companies that have an interest in establishing their development centres in Slovenia. The key to this is the coordinated implementation of all instruments and the efficient use of all grants and non-grants from the integral and EU funds.

To achieve the objective, the following measures will be implemented:

3.1	Establishment and operation of an AI Centre of Excellence.
3.2	Support for consortium technology research projects (TRL 2-4) in the context of AI and selected technology areas (e.g. big data, HPC, AI at the edge, information security, language technologies, Internet of Things, blockchain, robotics, management technologies in manufacturing).
3.3	Support for consortia interdisciplinary innovation projects (TRL 5-8) for the development of new products and services in selected priority areas (e.g. public administration, culture, environment, energy, agriculture, smart cities and communities, transport, smart factories).
3.4	Promoting the development of innovative market solutions for AI by innovative companies (demo projects).
3.5	State support for national AI stakeholders to engage in EU community programmes (e.g. Horizon Europe, Digital Europe).
3.6	Promoting the standardisation activities of Slovenian stakeholders in AI research, development and innovation and supporting their participation in national, EU and international standardisation organisations.
3.7	State support to integrate EU-level support for AI into cohesion policy, regional development and framework programmes (Horizon Europe, Digital Europe).

The measures will be implemented using the following implementing instruments:

- Sectoral activities of ministries: Ministry of Education, Science and Sport, Ministry of Economic Development and Technology, Ministry of Public Administration, Ministry of Defence (3.1, 3.2, 3.3);

- Sectoral activities of ministries: Ministry of Public Administration, Ministry of Education, Science and Sport (3.5);
- Call for proposals (3.1, 3.2, 3.3, 3.6);
- Sectoral activities of ministries: Ministry of Economic Development and Technology (3.4);
- Sectoral activities of ministries: Ministry of Public Administration, Ministry of Education, Science and Sport, Ministry of Economic Development and Technology (3.7);
- Stakeholders' own activities (3.6);

Indicators of the achievement of the objective:

Action	Indicator	2020	2025
3.1	Establishing an AI centre of excellence	0	1
3.2.	No. of supported technology research projects (TRL 2-4)	0	40
3.3	Number of supported innovation projects (TRL 5-8)	0	40
3.4	No. of supported SME demo projects	0	100
3.5	Establishing a stakeholder support contact	0	3
3.6	No. of supported experts No. of supported meetings	0 0	20 20 x 3
3.7	No. of programmes with AI content	0	2

6.4 SO4: Deploying AI reference implementations in business sector, public sector, public administration and society

Slovenia has a strong AI research community and expertise, which we want to transfer as efficiently and quickly as possible into applications in the private as well as in the public sector (including public administration), which is a key vision of this programme. The integration of AI to enhance business operations and drive digital transformation in both the private and public sectors can greatly facilitate the adoption of new business approaches and streamline the execution of business processes. AI methods can revolutionise business operations, enabling new possibilities and significantly enhancing work quality in various domains. For instance, AI can be utilised in healthcare for improved diagnostics and prognostics. In the private sector, it can optimise production processes, resource allocation and planning. AI-powered speech understanding and generation facilitate seamless human-machine communication. Additionally, AI plays a crucial role in developing user-friendly public services tailored to individual needs. It also supports the transformation of business models towards circularity, promoting positive changes in operations for employees and users alike. On the other hand, AI as a generic technology, with unprecedented capabilities for independent perception, learning, understanding, decision-making and response, can perform activities that were previously limited mostly to humans. It can replace humans not only in repetitive and structured tasks but also increasingly in unstructured tasks. This enables the substitution of human tasks and automation in areas where it was not possible until recently. AI's ability to carry out non-routine and unstructured tasks expands the possibilities for its application and paves the way for advancements in various fields. This can have far-reaching (including negative) consequences for jobs and employment, leading to a fundamental restructuring of the private sector, the public sector and society.

The programme will therefore support innovative reference implementation projects for the deployment of AI in concrete solutions in companies and public sector organisations. As a development programme, it will support innovative projects that have demonstration potential or can serve as reference solutions to address specific deployment challenges that are relevant to the wider community and thus have the potential to accelerate the uptake of AI in a wider environment (bridging the gap between early adopters and the early majority[47]). Projects will be supported in identified priority areas where there is sufficient expertise (in both AI and business) and resources for implementation (human, financial, time), as well as where a significant impact on business and society can be expected. Given resource constraints, it is crucial that support ensures a critical mass of R&D potential, interest in deploying AI and the willingness of stakeholders to participate in the envisaged activities. The priority areas will be subject to revision during the programme's implementation in accordance with the envisaged implementation and management procedures. On the basis of the activities carried out to date and the critical mass identified in research, industry, the public sector and users, we have identified the following areas as current priorities with potential at national level:

1. Health and medicine
   Slovenia has a long experience in researching the use of AI in health and medicine (e.g. in machine learning for diagnostics), where a productive collaboration between medical and AI researchers has already been established. At the same time, there are several companies in Slovenia that are developing innovative ICT solutions for health and medicine, which are already in use in Slovenian healthcare. In previous years, the government has already supported various forms of collaboration among RDI stakeholders in areas that include health and medicine, as part of its targeted areas of operation. This support has included the establishment of competency centres such as CC BME (Competency Centre for Biomedical Engineering), CC BRIN (Competency Centre for Biotechnological Development and Innovation), and CC Bio-Pharm for personnel development in biotechnology and pharmaceuticals. Additionally, there is currently a strategic research and innovation partnership called SRIP Health and Medicine. It has already positioned itself within the European Personalised Medicine Platform, where a project is underway to ensure the ethical and legal security of the use of personal data and to ensure the cross-border use of common databases, which is crucial for the further development of personalised medicine. All these activities ensure a high level of medical and AI knowledge, but also, thanks to their experience, an adequate understanding of the issues and the possibilities that AI offers to solve specific problems. On the other hand, in terms of the digitalisation of public services, according to the DESI[48] index at EU level, in 2018 and 2019, Slovenia ranked 6th among EU countries (above the EU average) in terms of the civilian use of eHealth services, which is mainly due to the introduction of e-referral, e-appointment and e-prescription, and which demonstrates the enormous potential of single system solutions for healthcare. Therefore, we believe that the potential impact of introducing AI for health and medicine can be significant, both in terms of personalised medicine, resulting in more successful treatment of people, and potentially in the more efficient and better functioning of the healthcare system, in particular for reducing waiting lists. Demographic trends make the use of AI to support the elderly a very important area for Slovenia.

2. Industry 4.0 and robotics
   Industrial robots are central components of digitised and automated production as used in Industry 4.0, which also has immense potential in terms of integration with AI. AI is a key part of computer vision, representing the first successful industrial commercialisation of AI, which has become established primarily in quality control in the manufacturing process. New methods harnessing the advancements in 3D computer vision, increased processing speed, data availability and deep learning techniques are rapidly gaining widespread adoption in robotic applications, product inspection and industrial metrology. Moreover, these methods hold the potential for transferability

[47] Crossing the Chasm: Marketing and Selling High-Tech Products to Mainstream Customers, Geoffrey A. Moore, 1991
[48] Digital Economy and Society Index, https://ec.europa.eu/digital-single-market/en/digital-economy-and-society-index-desi

to various non-industrial domains. Computer vision methods can be combined with AR/VR/XR methods to enable easy remote control, maintenance and functional representation of complex processes and machines in the digital world. SRIP Factories of the Future, together with the Ljubljana Technology Park and Slovenian and foreign companies, are preparing an inter-regional demonstration pilot based in Slovenia as part of the AI&HMI initiative. AI methods also have great potential for process control technology, as this is in many ways based on the analysis of the processes that are subject to control and optimisation. Control technology (automation, cybernetics, informatisation) is a distinctly infrastructural enabling technology, integrated into virtually all modern devices, machines, production processes and systems with the task of ensuring their functionality, reliability, safety and operational efficiency. A number of advanced technologies have already been applied in the Smart Factory Demonstration Centre at the Faculty of Mechanical Engineering, University of Ljubljana, which was set up in parallel with the GOSTOP programme, the largest Smart Specialisation S4 programme in the field of smart factories in Slovenia. The aim of the demonstration centre is to showcase the innovative use and deployment of Industry 4.0 technologies and the smart factory concept in a real industrial environment. Here, a global digital twin and a global digital agent or AI, supported by machine vision, form the backbone of the smart factory. In the past, the introduction of advanced technologies in manufacturing was supported by various enabling activities that fostered collaboration and knowledge transfer between the research sphere and industry. These activities have been targeted at a broader spectrum of manufacturing technologies, with support mechanisms ranging from national manufacturing clusters, technology platforms (e.g. ARTEMIS embedded systems), competence centres (CC STV - Competence Centre for Advanced Control Technologies) to the current strategic research and innovation partnerships (SRIP ToP - Factories of the Future). This has had a positive impact on building an innovation ecosystem that has accelerated the development of technology, as well as its deployment. We believe that this has contributed to the current intensive use of robotics in manufacturing in Slovenia, as shown in the report of the International Federation of Robotics[49], which showed that 174 robots per 10,000 workers were used in Slovenia in 2018, which is significantly higher than the European (114) and global (99) averages. The automotive industry plays a strong role in this, and in 2017 Slovenia was ranked 7th in the world for the share of robots in the automotive industry, joining an elite club of countries that use more than 1,000 robots per 10,000 workers in the automotive industry. This proves that Slovenia has a tremendous opportunity in the development, introduction and application of AI, robotics and other advanced technologies in manufacturing, as it has a highly developed research sphere (which not only participates in, but also coordinates EU projects in this field), higher education and industry, which enables the achievement of significant positive effects on the optimisation of production, the re-engineering of business processes and, as a result, on competitiveness and economic development, as well as opportunities for further investment in Slovenia.

3. Language technologies, cultural identity and the art of research

The development of ICT products, the internet, and mobile technologies over the last 20 years has created an increasingly unified platform for the operations of companies and for everyone to work and live. With the emergence of an increasingly global and integrated ICT environment, there is also a tendency towards greater standardisation of the way we work, think and live, which is slowly blurring the cultural differences between different parts of the world. The key impact of digitalisation is also observed in cultural identity where, for example, the use of national languages as key elements of cultural identity is increasingly giving way to the uniform use of English as a global language in a digitalised society. According to UNESCO, there are around 6,000 languages in the world, and one language disappears every two weeks. With the development and application of AI in language technologies, we can now actually reverse these trends. Slovenia has many years of experience in the development of digital language resources and technologies, and its activities have been supported by several government support measures. Thus, we already have a research

[49]https://ifr.org/downloads/press2018/IFR%20World%20Robotics%20Presentation%20-%2018%20Sept%202019.pdf

and development environment and stakeholders (public organisations and companies) that provide the necessary expertise in terms of language knowledge and the technologies and resources to digitise it. In recent years, AI methods have been developed that have facilitated significant progress in efficiently solving related problems. Given the stakeholders' excellent research and development expertise in AI, it is through the use of AI that Slovenia can also provide modern digital sources and language technologies[50] to ensure the effective use of the Slovene language in the digital environment, thus ensuring one of the most important conditions for the long-term preservation of cultural identity, even in an increasingly globalised and fast-changing digital world. Cultural identity is also maintained with AI in the more effective preservation of cultural heritage and archival material. From a cultural heritage perspective, AI facilitates documentation and the greater and more interesting accessibility of cultural heritage by creating new ways of interpreting it. The benefits of using AI are well known in metadata creation, machine indexing or motive recognition, as well as (old) font recognition. The use of geospatial AI provides new opportunities for analysing the status of cultural heritage, archaeological sites and other heritage assets in space. In terms of long-term preservation and archiving, AI tools can also be used for the machine evaluation and sorting of archival material, as well as for more efficient searching and contextual matching of material. Slovenia therefore advocates European policies that emphasise Europe's leadership in digital cultural heritage and its potential for deploying new technologies, such as AI. In addition, it sees specific potential for artificial intelligence in the field of intermedia art, where projects are created as part of intermedia research art, which illustrates in an artistic, creative, reflective and exploratory way the processes, products and impacts of modern technologies on phenomena in contemporary society. There are currently two networks of artistic and cultural research centres that also undertake AI projects. The projects are designed to foster positive links between culture, creativity, innovation, and the broader economy, allowing culture to make direct contributions to model solutions for new services and products. It's about new ideas and approaches, and mirroring them in innovative new products and services.

4. Digital services of public administration

The main objective and task of public administration is to make it easier, simpler, and more efficient for individuals and legal entities to complete all procedures related to the state. It, therefore, constitutes a prerequisite for improving the quality of life and business in the country. Slovenian public administration is already implementing various projects using a wide range of AI methods and tools (e.g. machine learning, text understanding and language technologies). Several projects are underway to utilise AI in order to increase efficiency and transparency in the public sector (e.g. analysis and monitoring of public procurement, anti-fraud analytics, automatic anonymization of documents, data flow optimiser between data sources and data users, semantic analyser of Slovenian texts). The objectives of these projects are to develop and deploy the fundamental building blocks for creating reusable AI solutions in public administration, aiming to enhance internal efficiency and improve the usability of digital public services. In terms of technological development, the State therefore assumes a variety of roles:

- as a facilitator: by adopting an overall strategy, which represents a political commitment at the highest level;
- as a financier: usually by providing direct or indirect funding, supporting research, development and adoption of new technologies;
- as a direct user and co-creator: tailored solutions can also be delivered through innovative public procurement practices or as a proactive co-developer through public-private partnerships and other forms of cooperation;

[50] Language technologies is a collective term for a variety of computer tools and applications that use existing linguistic (meta)data to solve users' practical language-related dilemmas (speech recognition and synthesis systems, machine translation, machine-assisted translation, spellers, grammar checkers, automatic question-answering systems, text mining, etc.) or for computer-assisted natural language analysis processes for the production, in particular, of digital language manuals and sources (tokenisation, morphosyntactic annotation, syntactic parsing, automatic word sense-disambiguation, automatic coreference resolution, named-entity recognition, etc.).
(http://www.jezikovna-politika.si/opremljenost/tehnologije/)

- as a regulator: the diversity of challenges posed by digitalisation calls for a re-evaluation of the existing regulatory frameworks, integrated approaches to ensure compliance of individual policies and international cooperation.

In the context of the innovation lifecycle, government measures to stimulate demand play a crucial role in promoting technology transfer and can be an essential part of building an innovation-friendly ecosystem and deploying technological solutions in a manner that ensures their positive societal impact. AI tools will be used in public administration to, among other things, enhance internal efficiency and user experience on service and information portals (e-Government, GOV.si, SPOT and other platforms that cater to citizens, businesses, and society as a whole). E-government (e-uprava) is an area where the state, as a direct user of AI technologies, can accelerate the creation of a critical mass of knowledge in deploying technology into usable and operational solutions, and thus, especially in its role as a first mover, accelerate demand beyond the public sector. Reference pilot projects, which focus on both technological development and application in specific domains, are typical measures in this sense, as they provide key knowledge and experience of the deployment of technologies in concrete scenarios and environments to all players involved. Slovenia has many years of experience in developing e-government solutions. In terms of the digitalisation of public services, according to the Digital Economy and Society Index (DESI), Slovenia ranked 14th at the EU level in 2018, above the EU average, with a particularly good performance in the category of access to open data (7th). Slovenia also has a strong and competent ICT sector for the development of e-government solutions, which can ensure the implementation of innovative reference pilot projects with the cooperation of AI organisations.

5. Sustainable food production and environment

Digitalisation and the use of digital technologies are increasingly characteristic of the modern agricultural sector, and advances will be crucial, for example in robotics for precision farming, sustainable food production combined with environmental protection, and Common Agricultural Policy (CAP) implementation systems based on digital data management solutions. Data analytics supporting decision-making is a major challenge for the agricultural sector. As part of the transition of the current CAP to a results-based policy, the Ministry of Agriculture, Forestry and Food (Ministry of Agriculture, Forestry and Food) has undertaken projects aimed at developing IT solutions to support the CAP, including the areas of digitalisation and successful applications of advanced computational approaches and AI. The databases in this area are carefully designed, well maintained but fragmented, and contain different records and registers, which are generally not yet properly linked and coordinated. Data organisation and piloting of data analytics schemes are still part of research projects. The result is also beginnings of a data space (data warehousing) in agriculture, as foreseen in the EU Data Strategy. Accordingly, the Ministry of Agriculture, Forestry and Food is prioritising digitalisation in the CAP Strategic Plan 2021–2027, where the reformed agricultural policy already addresses the mandatory use of data mining tools. This will require special attention to standardisation, data integration, and openness, as well as the development and utilisation of universal tools to enhance the efficiency and transparency of decision-making. At the EU level, Slovenia is one of 25 countries that have signed the declaration on “A smart and sustainable digital future for European agriculture and rural areas” (Brussels, 2019), with a view to adopting several measures to support the successful digitalisation of agriculture and rural areas in Europe. The problem is evident in modern food production, for example, where the agricultural sector is confronted with a growing set of seemingly conflicting demands. On the one hand, the Earth's rapidly growing population necessitates high yields of quality crops, while on the other hand, increasing environmental pressures on the Earth's ecosystems call for sustainable agricultural practices that minimise environmental impacts, prioritizing the preservation of biodiversity rather than posing a threat to it. Meeting these conflicting demands is no easy task. Managing agricultural ecosystems has thus become an increasingly knowledge-intensive undertaking, as is the case with environmental protection. For both tasks, the use of AI methods can therefore be crucial, especially in conjunction with data from, for example, remote sensing or Earth observation from space. In Slovenia, the environment and food production have already been supported in the past through

the current Strategic Research and Innovation Partnership (SRIP Food), which has already enabled the creation of an ecosystem of cooperation and knowledge transfer between research and industry. In Slovenia, the research community and some companies have also developed high-profile AI solutions (e.g. pest monitoring and forecasting), which may form the basis for further AI deployment in this field.

6. Spatial planning
   Geospatial Artificial Intelligence (GeoAI) is a field that uses machine learning to extract knowledge from spatial data to automatically detect changes in a given area. Due to the exponentially increasing amount of remote sensing data (e.g. time series of aerial photographs and satellite imagery) and data sensed in the Internet of Things (IoT), which provide global spatial coverage with increasing levels of granularity (spatial and temporal resolution), automation with AI tools is crucial for efficiently processing and delivering spatial data in real time. The two Slovenian satellites (NEMinistry of Defence-HD and Trisat) will also make a significant contribution to the availability of remotely sensed data. By increasing the efficiency, accessibility and cost-effectiveness of these tools, tremendous savings and efficiency gains are expected in terms of spatial monitoring, real estate recording, spatial planning, building construction and the environment. In the future, we can expect the fully automatic detection of changes in built and natural environments. While current machine learning applications for spatial data focus on obtaining data on facilities and objects, a wider range of applications based on spatial data collected through the system and services on autonomous mobility, sustainable smart city management, augmented building, and energy management will be available to users in the future. Slovenia has competent stakeholders in the development and deployment of these solutions, which it has already supported, for example through SRIP Smart Cities and Communities. Together with organisations of potential users – interested cities and municipalities (e.g. ministries, the Association of Municipalities and Towns of Slovenia and the Association of Urban Municipalities of Slovenia, the business sector and the public) – they make up the basis for further support for the introduction of AI into solutions in this field.

The successful deployment of AI in the business sector and the public sector requires not only direct support for deployment projects, but also an appropriate environment that enables and facilitates AI deployment. This requires adequate demand for AI solutions, enabling effective knowledge transfer to users, and a predictable regulatory environment (especially from a security and privacy perspective) for the use of AI.

To increase the demand for AI solutions, one key condition is relevant knowledge – AI expertise, as well as knowledge and understanding of the specific operations and issues where AI is being deployed. The introduction of new solutions based on generic technologies such as AI typically entails a change in business processes and models, resulting in organizational changes. It is therefore crucial that executive personnel (decision-makers) understand the scope and potential changes to the operations so that they can plan appropriate resources and provide support for the introduction and the envisaged changes in collaboration with the employees involved. Supporting opportunities to share good practice both within and outside the organisation is crucial to accelerate learning. The national programme should, therefore, provide awareness-raising programmes, additional training, and up-skilling opportunities for staff in both the business sector and the public sector. It should also establish an environment for the effective sharing of good practices and case studies, including cooperation on standardization activities related to the use of AI in various sectors. In keeping with the programme's core focus on the development and deployment of trusted and human-centric AI, public and private sector players need to be provided with appropriate education and awareness-raising on the ethical and legal aspects of AI development and use, including a focus on the various risks to human rights.

To facilitate the transfer of knowledge to users and to ensure the development capacity of various business sectors, it is crucial to foster direct investments from the business sector in AI, but in a way that maximises its impact. Slovenia is already taking action in this direction through the support

instruments of smart specialisation, where additional support for the existing and new SRIPs makes sense and is needed from the AI deployment perspective. In addition to these activities, it is crucial to foster the establishment of innovative companies and the development of their solutions based on or incorporating AI to transfer knowledge and to increase the chances of deploying innovative solutions to address the diverse requirements of users in different verticals. Standardisation based on open standards can play a key role by enabling interoperability of solutions, reducing the investment threshold for market entry and thus opening up a wide range of opportunities for the development and deployment of innovative user solutions. This promotes competition, prevents lock-in, fosters innovation and rapid market expansion, reduces duplication of efforts and implementation costs, and enables the involvement of all interested stakeholders. All this enables rapidly increasing awareness of and understanding and trust in the new AI technology by both development stakeholders and users, thus shortening the learning curve. To create a predictable environment for the entire ecosystem, the programme will support the harmonisation and production of legal (e.g. regulatory sandbox) and other conditions to stimulate the establishment and scale-up of spin-offs, start-ups, and support standardisation and internationalisation activities in the field of AI. We will work to make Slovenia an attractive destination for investors (foreign and domestic) interested in investing in AI companies.

To achieve this objective, the following measures will be implemented:

4.1	Supporting professional training programmes (seminars, courses) on specific AI models, methods and algorithms in selected priority areas of AI deployment, targeting development teams from companies and the public sector
4.2	Supporting awareness-raising programmes (courses, seminars) for the management of companies and public sector organisations on the possibilities, advantages and disadvantages of AI deployment in companies' operations
4.3	Supporting the work of Strategic Research and Innovation Partnerships (SRIPs) that integrate AI into their action plans and projects
4.4	Supporting the transfer of research knowledge to the business sector and the public sector (at the appropriate stage of technological maturity) and the introduction of effective communication to the business sector and the public sector of the results of AI research relevant to their field of activity
4.5	Alignment of legislation and conditions to stimulate start-ups and spin-offs in the field of AI (e.g. an AI regulatory sandbox)
4.6	Identifying AI as one of the priority areas in support mechanisms for the start-up and scale-up of innovative companies
4.7	Supporting reference implementation projects for the deployment of AI (TRL 9) to support the operations of companies and the public sector (including public administration) (e.g. digitalisation of processes, optimisation of operations, the establishment of innovative business models and solutions, production digitalisation) in identified priority areas
4.8	Supporting the education of and raising awareness among companies and the public sector about ensuring a legal and ethical framework for the development, deployment and application of AI, including human rights compliance issues
4.9	Promoting the standardisation activities of Slovenian stakeholders in AI introduction and application, and supporting their participation in national, EU and international standardisation organisations

The measures will be implemented using the following implementing instruments:

- Public administration project (supported by PP) (4.1, 4.2, 4.7, 4.8);
- Call for proposals (4.1, 4.2, 4.3, 4.7, 4.8, 4.9);
- Public administration project (supported by PCP) (4.7);
- Voucher system of consultancy (4.2, 4.4, 4.8);
- Young researchers in industry instrument (4.4);
- Young researchers in the public sector instrument[51] (4.4);
- Supporting start-ups/SMEs(4.6);
- Sectoral activities of ministries: Ministry of Economic Development and Technology (4.5, 4.6);
- Sectoral activities of ministries: Ministry of Economic Development and Technology, Ministry of Public Administration, Ministry of Education, Science and Sport (4.4);
- Stakeholders' own activities (4.9);

Indicators of the achievement of the objective:

Measure	Indicator	2020	2025
4.1	No. of seminars supported for development groups	0	8
	No. of participants supported in seminars	0	8 x 15
	No. of companies supported by the voucher system of consultancy	0	25
4.2.	No. of supported seminars for senior managements of companies and public organisations	0	12
	No. of participants supported in seminars	0	12 x 20
	No. of companies supported by the voucher system of consultancy	0	25
4.3	No. of SRIPs supported	0	4
4.4	No. of companies supported by the voucher system of consultancy	0	20
	No. of young researchers in industry	0	10
	No. of young researchers in the public sector	0	10
4.5	Harmonisation of legislation to support AI	0	1
4.6	No. of AI companies supported	0	10
4.7	No. of reference implementation projects supported	0	10
4.8	No. of supported seminars for senior managements of companies and public organisations	0	20
	No. of participants supported in seminars	0	20 x 30
	No. of companies supported by the voucher system	0	25

[51] The public sector will be supported, with the exception of organisations in research and higher education, for which calls for young researchers are already carried out by ARRS.

4.9	No. of supported experts No. of supported meetings	0 0	20 20 x 3

6.5 SO5: Establishing the technical infrastructure for research, development and use of AI

The development and future use of AI will typically require an appropriate infrastructure comprising diverse data (structured and unstructured), computing systems (with sufficient processing power), mobile and physical broadband infrastructure to support increasingly interconnected and global services, as well as a range of smart devices and sensors (i.e. the Internet of Things).

From a data perspective, the key is to provide reliable and high-quality data that is accessible to a wide range of users in a robust and accessible manner. Standardised data formats and data interoperability are the basis for linking and aggregating different types of data. To this end, Slovenia has set up a national open data portal OPSI[52] at the Ministry of Public Administration, which will be the basis for further construction of data space in cooperation with the EU. Again, from an AI perspective, particular attention should be placed on protecting people and the processing of their personal data, which is elevated to a fundamental human right at the EU level on the basis of Article 8 of the EU Charter of Fundamental Rights. Slovenia is therefore also committed to ensuring that any integration, use and processing of personal data align with the fundamental rights in the EU Charter of Fundamental Rights, including in particular the principles of data protection. Non-personal data also need to be provided with an appropriate legal framework to enable its management (e.g. collection, access, sharing, use, modification or updating, including in terms of ownership, accountability, copyright, etc.), in light of ensuring a robust and legally predictable environment for the data economy, which must ensure that data is used for the public good. It is important that data is collected, stored, transferred and used in a lawful and fair manner. The government ensures that open public sector data is accessible to a wide range of users. Recognising the role of various social networks and platforms that generate, collect and store data, we advocate the principle of open access to data. From an AI perspective, we can see great potential in integrating data from different public and private sector sources in the areas of language sources, environmental observation, health, spatial planning, transport, etc., and linking them with data from industry, finance, tourism, etc. However, it should be borne in mind that, from an AI perspective, the wide integration of different sources of non-personal data may nevertheless also lead to problems related to the protection of fundamental rights of the individual, e.g. discriminatory decisions by IT systems based on machine learning, using algorithms that lead to discriminatory results based on data (e.g. due to unrepresentative, inaccurate, incomplete data or bias of various models and algorithms). This is particularly evident in the context of the use of AI tools, which, even on the basis of a mass of non-personal data, can very well and precisely identify (profile) individual people and their activities, thereby indirectly impacting also their rights (e.g. right to privacy, right to non-discrimination). To address such challenges and understand the specific opportunities and threats posed by data integration, which is also crucial from the perspective of the envisaged regulation, it is essential to rely primarily on concrete examples that illustrate the actual technological capabilities and limitations of different AI tools and systems. To this end, the programme will support the implementation of data hackathons (in various sectoral areas, linking different data from the public, business, and research sectors) with appropriate support from accompanying educational activities.

As AI involves a variety of computationally intensive algorithms, its development, deployment and use in the digital ecosystem require the use of computing systems with adequate processing power. Two

[52] Open Data of Slovenia – OPSI, https://podatki.gov.si/

concepts are emerging in the world – centralised cloud processing and distributed processing with edge processing. As regards the first of these, Slovenia is setting up an HPC centre with a VEGA supercomputer at IZUM, a public infrastructure institute, as part of the RIVR cohesion project. The new infrastructure is part of the EuroHPC JU[53], a pan-European supercomputing company initiated by the European Commission. The VEGA supercomputer will have a rated capacity of 6 Pflop/s. Half of this capacity is based on GPU technology, which is particularly suited for AI research. The VEGA Supercomputer Centre has entered into a consortium partnership with CINECA[54] where they are setting up a high-performance (pre-Exsascale) computer, which will provide Slovenian researchers with additional opportunities in the field of computing infrastructures. The RIVR project will also set up a data lake with a gross capacity of over 30 PB. The national supercomputing infrastructure will be jointly managed by the Slovenian Supercomputer Network (SLING) consortium[55]. Access to the national supercomputing infrastructure will be based on the principle of open science – open research infrastructure – and will be provided free of charge to all researchers working in Slovenia. The new infrastructure will enable Slovenian researchers to participate on an equal footing on the international stage, providing them with a competitive advantage. Through the SLING consortium, Slovenian researchers are involved in international associations and initiatives in the field of supercomputing (e.g. PRACE[56], EGI[57], EUDAT[58], CECAM[59]). Coordinated cooperation in these organisations allows for the provision of adequate infrastructure at the national level, while also contributing to greater visibility in the international environment. In addition to centralised approaches, several fields (e.g. manufacturing, logistics, autonomous driving) are increasingly deploying Edge AI concepts, which is based on distributed systems of different smart devices that perform the necessary processing locally. Such architectures can significantly improve availability and robustness, and in particular the required real-time responsiveness of the system. This requires an appropriate broadband infrastructure, both fixed and mobile, that provides the robustness, speed and capacity needed to meet the needs of different distributed AI algorithms and systems. This is also a prerequisite for the development of the Internet of Things and the integration of data from different sensors, which present a significant opportunity for the use of AI. The development of services that integrate data from digital networks with data from physical life (offline-merge-online – OMO) and related new innovative services is gaining momentum. Slovenia will therefore advocate for the creation of single platforms for the integration of and access to such data for the development and testing of AI solutions in several domains (data spaces) where there is interest in deploying reference solutions (e.g. smart cities and communities, industry 4.0, public administration, health and medicine, environment and space, mobility, energy, agriculture).

To achieve the objective, the following measures will be implemented:

5.1	Supporting the activities of the EuroHPC initiative at the EU level, and upgrading the HPC capacity in Slovenia for the development, testing, deployment and application of AI methods and solutions
5.2	Establishing national data spaces in different fields (e.g. manufacturing, environment and space, mobility, health and medicine, finance, energy, agriculture, public administration, skills) for the application of AI
5.3	Slovenia's participation and support in the establishment/integration of data spaces at the EU level within the implementation of EU programmes (Horizon Europe and Digital Europe)

[53] https://eurohpc-ju.europa.eu/
[54] https://www.cineca.it
[55] http://www.sling.si/
[56] https://prace-ri.eu/
[57] https://www.egi.eu/
[58] https://eudat.eu/
[59] https://www.cecam.org/

5.4	Analysis of the mechanisms and definition of the legal and ethical framework for the management (collection, storage, access, use, modification, etc.) of non-personal data within and between the business, public, and research sectors (including from a right to privacy perspective), in line and in cooperation with relevant activities at the EU level
5.5	Supporting awareness-raising of the opportunities and threats of data integration, sharing and use, in particular in the business, public, and research sectors
5.6	Supporting prototyping (hackathons) of data integration, sharing and use with the development of various solutions based on AI tools
5.7	Supporting further development of the CLARIN.SI national infrastructure portal with tools and language resources in the field of language technologies
5.8	Setting up a national platform of AI tools and algorithms based on tools developed in Slovenia (Orange[60], DEXi[61], Text-Garden[62] etc.).
5.9	Slovenia's cooperation and support in setting up test and experimental platforms for AI tools and algorithms in selected areas (e.g. health and medicine, agriculture, public administration, AI at the edge, Industry 4.0) in line with the activities at the EU level in the framework of the implementation of EU programmes (Horizon Europe and Digital Europe)
5.10	Establishing an IoT data aggregation platform for the development, testing, deployment and use of AI methods and solutions

The measures will be implemented using the following implementing instruments:

- Public administration project (supported by PP) (5.2, 5.6, 5.7, 5.8, 5.9, 5.10);
- Call for proposals (5.1, 5.2, 5.5, 5.6, 5.9);
- Sectoral activities of ministries: Ministry of Public Administration, Ministry of Economic Development and Technology, Ministry of Health, Ministry of the Environment and Spatial Planning (5.2, 5.3, 5.4, 5.5, 5.9);
- Sectoral activities of ministries: Ministry of Education, Science and Sport (5.1);
- CRP (5.4);
- Stakeholders' activities (5.5);

Indicators of the achievement of the objective:

Measure	Indicator	2020	2025
5.1	Support for projects applying AI solutions to HPC	0	10
5.2.	Established data spaces	0	4
5.3	Supporting data spaces at the EU level	0	4
5.4	CRP implemented	0	1

[60] https://orange.biolab.si/
[61] http://kt.ijs.si/MarkoBohanec/dexi.html
[62] http://kt.ijs.si/software/TextGarden/

5.5	No. of supported seminars No. of participants supported in seminars	0 0	10 10 x 20
5.6	No. of supported hackathons	0	8
5.7	Portal established	0	1
5.8	Platform for AI tools in place	0	1
5.9	Supporting projects to set up AI test and experimentation platforms	0	4
5.10	IoT platform launched	0	1

6.6 SO6: Strengthening security by using AI

AI can play an important role in ensuring security, but its use, in particular by authorities responsible for public security, law enforcement, intelligence agencies and armed forces, must comply with the law and fundamental rights. Security authorities only deploy AI in the performance of their work tasks if it is necessary from the point of view of efficiency and effectiveness, and if the solutions do not compromise human rights and fundamental freedoms, and are ethical, lawful and proportionate. In terms of freedom, security and justice, just as in some other areas (such as procedures and decisions in healthcare), people must have control over the use of AI and must therefore be given the right and opportunity to request reviews and tests of decisions taken using AI. Final decisions must be the responsibility of a clearly identifiable decision-maker. Systems operating in this area need to be transparent and, in addition to assessments or proposals, offer explanations wherever AI techniques allow (the problem of transparency and interpretability of AI methods). In areas where the decision's interpretation is an essential element of the decision-making process, only those AI methods should be used that allow for sufficient verification of their accuracy by the parties involved, and thus the possibility of identifying possible non-compliance with the legislation. It is therefore essential to link the relevant authorities (e.g. public administration, health, law enforcement, courts) in these areas with research institutes and universities, as well as with the business sector, preferably before or at the time of the deployment and periodic evaluation of the impact of AI.

AI based on the rules of law and ethical principles can help law enforcement fight crime more effectively. In April 2020, the EC set up an Expert Working Group on policy development, cooperation and exchange of good practices in AI and domestic affairs (E03727[63]). The EU Security Union Strategy 2020–2025[64], published by the EC in July 2020, focuses on actions to strengthen capabilities and capacities to ensure a future-proof security environment. It will also rely on AI, which it sees as a powerful tool in the fight against crime. Such applications of AI are very diverse and include automated big data analysis (e.g. identifying money laundering elements in banking transaction data and using predictive models to detect and assess risks for better police planning), analysis of multimedia content (e.g. efficiently reviewing large volumes of child sexual abuse images and videos, automatic facial recognition of the perpetrators of the most serious crimes), more efficient screening of publicly available sources (OSINT) (e.g. automatic identification of terrorist content, child sexual abuse, identification of posts related to migrant smuggling, identification of hateful, intolerant and discriminatory online content, and identification of fake online posts) and the use of robots in policing (e.g. deactivation of explosive devices and use of drones to monitor dangerous areas). Given the increasing volumes of data and staff shortages, the introduction of AI and new IT technologies in this field is a necessity. It also offers a great opportunity to engage with

[63] https://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetail&groupID=3727
[64] Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions on the EU Security Union Strategy No. 10010/20 of 30 July 2020

the professional community in the field of AI, as well as ethics and law. The Slovenian police has been monitoring these technologies for a long time and has been involved in projects funded by EU programmes (e.g. Horizon 2020 and the Internal Security Fund - ISF), which aim to develop IT solutions using AI to increase the efficiency and effectiveness of criminal investigations.

Through international cooperation, AI tools can also reinforce the dimension of the EU's Common Foreign and Security Policy through situational awareness, monitoring of developments in security risk areas, the integration of AI into early-warning and intervention systems, and the detection and analysis of (dis)information.

The European Commission's AI strategy[65] also includes a cyber-security dimension. On the one hand, the deployment of AI in cyber security products and services brings opportunities for economic development, but on the other hand, it brings new risks that are not foreseen in current EU legislation. The EC therefore proposes to strengthen the legislative framework to adequately cover the change in the concept of security. Risks may be present at the time products and services are placed on the market, for example due to integrated software adapting the performance of products and services based on machine learning of the circumstances and characteristics of their use, or they may arise later as a result of software upgrades. The EU must do more to identify these risks and calls for the experience of the European Cyber Security Agency (ENISA) to be used in this regard. At the same time, the risks of the development of quantum computing and communications must also be taken into account, as they will be crucial for cyber security in the future.

Society as a whole must be able to function within a secure communications and information environment. In doing so, more focus is directed towards areas that emerge in the ongoing analyses of the situation as critical and essential for functioning. As the Internet of Things (IoT) drives the development of smart solutions (cities, communities, networks, factories/industry), and as unified data spaces are deployed across sectors (e.g. public administration, health and medicine, law enforcement, judiciary, energy), coupled with the growing centralisation of cloud processing, the spectrum of cyber-security risks will broaden and intensify with the increasing use of AI. AI solutions can also be used for delivering timely and accurate situational analyses, detecting fraud, enhancing system resilience, and implementing swift and effective response and remediation mechanisms against cyber threats and attacks. Based on the data collected from the attacked networks and systems, we will use AI to identify a cyber-attack in time and mitigate its impact. A higher level of system resilience will be achieved, ensuring a higher probability of “survival” – in terms of the attacked system’s functionality. The European Commission is already encouraging SMEs to seek out innovative security technologies that harness the potential of AI. The emerging European Cybersecurity Industrial, Technology and Research Competence Centre and the network of national centres being established by the EU Regulation in 2021 can therefore also become a space of professional cooperation between national cyber-security authorities, Slovenian industry, critical infrastructure operators, providers of essential services, the financial sector and other public institutions in the area of AI. Researchers of University of Maribor, Faculty of Electrical Engineering and Computer Science are already involved in the European project CyberSec4Europe (Cyber Security Network of Competence Centres for Europe), which focuses on testing potential governance structures for a future cyber-security competence network, as well as in the Concordia (Cyber Security Competence for Research and Innovation) project, which aims to implement a common roadmap for research and innovation in the field of cyber security.

It is important to remember that all vital AI systems must also be adequately backed up/protected. This has to be borne in mind already when designing the systems, considering the principle of built-in security, as it is all the more difficult to ensure the security of AI systems afterwards. Cyber security is not only about AI as a potential tool to defend cyberspace. In the future, AI will also be exposed as a primary target of cyber-attacks, as attackers could achieve their goals by modifying AI performance parameters. It is important to realise that without functional AI algorithms today’s ICT infrastructure (e.g.

[65] White Paper on Artificial Intelligence – A European approach to excellence and trust, COM(2020) 65 final, 19 February 2020

data centres, cloud computing infrastructure) is already rendered useless, and will continue to be so in the future. These abuses could therefore have long-term and irreversible consequences for the business sector and society as a whole.

The use of AI in security, and especially defence, also raises other ethical dilemmas. In August 2017, 116 founders of leading international robotics and AI companies sent an open letter to the United Nations calling on governments to prevent an arms race with lethal autonomous weapons and to counter the destabilising effects of these technologies, in line with the European Parliament's resolution of 12 September 2018 on autonomous weapon systems (2018/2752(Republic of SloveniaP))[66], which sets limits on the use of "Lethal Autonomous Weapon Systems" (LAWS). As these are weapons systems without meaningful human control over the critical functions of selecting and attacking individual targets, they raise fundamental ethical and legal questions of human control. We believe that AI-powered machines and robots cannot make human-like decisions involving the legal principles of distinction, proportionality and precaution. Only humans can be accountable for decisions concerning life and death.

To achieve the objective, the following measures shall be implemented:

6.1	Implementation of a pilot project on the use of AI in cyber security
6.2	Actively supporting a human-in-command approach to artificial intelligence and a ban on lethal autonomous weapon systems
6.3	Implementation of a pilot project on the legal and ethically compliant use and implementation of AI methods to increase police effectiveness
6.4	Involvement of AI stakeholders in the activities of the National Cyber Security Coordination Centre

The measures will be implemented using the following implementing instruments:

- Public administration project (supported by PP) (6.1, 6.3);
- Sectoral activities of ministries: Ministry of Public Administration, Ministry of Defence, Ministry of the Interior, Ministry of Foreign Affairs, Information Security Administration of the Republic of Slovenia (6.2, 6.4);
- Stakeholders' own activities (6.4);
- CRP (6.4).

Indicators of the achievement of the objective:

Measure	Indicator	2020	2025
6.1	Pilot project implemented	0	1
6.2.	Slovenian government's position	0	1
6.3	Pilot project implemented	0	2
6.4	Involvement of AI stakeholders in the activities of the National Cyber Security Coordination Centre CRP implemented	0 0	1 1

[66] http://www.europarl.europa.eu/doceo/document/TA-8-2018-0341_S.html

6.7 SO7: Increasing public confidence in AI

Slovenia will strengthen awareness-raising about the importance, advantages and disadvantages of AI for the further development of individuals and society. The country must bridge the gap created by rapid technological advancements in AI on the one hand, and, on the other hand, experienced by people who are confronted with these changes on a daily basis, but who, without knowledge and confidence, struggle to accept their consequences, which can result in various social conflicts. The speed of AI's deployment and its impact on society largely depend on people's confidence that the solutions are safe and robust, and that they make a real difference to their lives and their freedoms, human rights and democratic processes. A key factor in the deployment of intelligent systems is therefore people's acceptance and confidence in various AI technologies, which requires individuals to understand as much as possible about the basics of how these technologies operate, know how their data is used, and to comprehend the decisions that are made based on this, and the impact of these decisions on their lives. NGOs working in the domains of education, lifelong learning, the information society, culture and research, and integrating AI issues into their work can play an important role in this. Through their activities, involvement and engagement with the public, they can play a key role in reducing undue concern, raising awareness of the real opportunities and problems of AI deployment, and checking that actions are in line with the expectations of diverse target communities.

For example, transparency of algorithms, including aspects of impartiality, traceability, accessibility, clarity, and clear accountability for decisions made or actions taken, especially with autonomous systems, can be one of the key elements for the public's understanding and acceptance of AI, in particular from the perspective of verifying operational compliance. It must be emphasised that this also touches on the theoretical aspect of particular AI algorithms and models, e.g. based on computational intelligence (e.g. artificial neural networks), which are prevalent in certain problem areas (e.g. image recognition, speech recognition) and are also in widespread use in some countries. The clarity and traceability of these algorithms/decisions is also a theoretical problem, and therefore a proper understanding of the relationship between the theoretical and technological characteristics of individual AI technologies (and methodologies for the development and deployment of AI solutions) with the concepts of 'human-centricity' and the requirements to protect the underlying ethical and legal principles of AI solutions can be a key factor in the success or failure of this approach to the deployment of AI in society.

Two ways that can significantly contribute to upholding ethical and legal principles in AI solutions, as well as to enabling objective verification of such AI systems' compliance with these principles, are standardisation and the resulting certification of AI products and services, and the development of Free, Libre and Open Source Software (FLOSS).

Standards that would clearly and objectively define the legal and ethical principles for specific cases and contexts of using AI technologies in different AI solutions in specific application areas are one of the key opportunities and possibilities for ensuring the objective verification of such systems' compliance. Based on standards, the predictable and trustworthy operation of AI systems can be ensured through the use of certifications which, together with appropriate publicly provided oversight mechanisms, ensure that AI-based solutions and their use in specific environments comply with legal, ethical and operational requirements, in line with the EU's framework for delivering trustworthy AI. Cooperation at the EU level, as well as on a broader international scale, is crucial in this respect.

The use of software licensed on a free or open source basis can, in certain instances, significantly contribute to public confidence in AI solutions as it allows independent peer reviews of how software works, and thus how it does or does not comply with legal and ethical principles. FLOSS has a longstanding tradition worldwide and can be found in practically all areas of IT – server infrastructure, business applications and also end-user applications. FLOSS is also used in standardisation, where it is typically used for reference implementations of technical solutions foreseen in standards. The intersection of algorithm transparency, the establishment of suitable standards and the possibility to use

FLOSS software in mission-critical applications will therefore be an important way to shape the future trusted IT environment for AI deployment, especially in the case of increasingly autonomous AI solutions.

To achieve the objective, the following measures will be implemented:

7.1	Establishing and strengthening dialogue with the media and opinion leaders to inform and raise awareness about AI activities, opportunities and threats
7.2	Supporting activities (conferences, workshops, etc.) to raise awareness among companies, the public sector and the public on the advantages, disadvantages, opportunities and threats of AI
7.3	Establishing a single information point through the appointment of a national “AI Ambassador” to raise awareness, inform and publicise AI activities at national level
7.4	Establishing a single communication platform to collect and disseminate good practices and case studies on the deployment and use of AI in different segments of society
7.5	Defining a framework for public confidence in AI solutions based on the link between the technological characteristics of AI technologies, methodologies for the development and use of AI solutions, standardisation and use of FLOSS software on the one hand, and ethical and legal principles on the other
7.6	Supporting networking and coordination of NGOs to participate in AI research, development, deployment and application activities at national and EU level
7.7	Promoting NGO projects to ensure public confidence in AI

The measures will be implemented using the following implementing instruments:

- Call for proposals (7.2, 7.6, 7.7);
- Public administration project (supported by PP) (7.2, 7.3, 7.4);
- Sectoral activities of ministries: Ministry of Public Administration, Ministry of Education, Science and Sport, Ministry of Economic Development and Technology, Ministry of Foreign Affairs, Ministry of Health (7.1, 7.2);
- CRP (7.5);
- Stakeholders' own activities (7.1).

Indicators of the achievement of the objective:

Measure	Indicator	2020	2025
7.1	List of persons responsible for AI at ministries	0	1
7.2.	Supported activities (conferences, workshops, etc.) to raise awareness among the business sector and the public	0	20
7.3	National information point established with the appointment of an “AI Ambassador”	0	2
7.4	Platform for sharing good practices established	0	1

7.5	CRP implemented	0	1
7.6	Support for networking and coordination of NGOs established	0	1
7.7	No. of supported NGO projects	0	20

6.8 SO8: Ensuring an appropriate legal and ethical framework

An appropriate environment for the development, deployment and use of AI includes legislation and regulations that ensure that AI-based solutions are developed and used in a manner that is acceptable to society. Slovenia is committed to high quality, transparent and ethical AI in which citizens can have confidence. The legal and ethical framework will be established in cooperation with European partners on the basis of the existing European guidelines governing the ethical and legal aspects of the development and use of AI[67]. It will be based on the universal values of the European Union and on human rights and fundamental freedoms, with an emphasis on privacy, dignity, the right to a fair trial, the protection of consumer rights and non-discrimination. In the case of AI, special attention must be paid to the protection of privacy and personal data and non-discrimination and, in general, we must strive to ensure that the development and use of AI is based on ethical guidelines[68] and criteria to ensure this, such as human agency and control, technical robustness and safety, privacy and data governance, transparency, diversity, non-discrimination and fairness, societal and environmental well-being, and clear accountability. Ethical principles must therefore be reflected in an appropriate regulation of AI. Although there is no legal vacuum in AI with regard to human rights protection, regulation is necessary for the effective enforcement of already existing sector-specific norms, such as anti-discrimination (international, EU and national) law. Such regulation must therefore provide genuinely effective remedies available before the competent authorities, for example in cases where the use of AI-based technologies results in discriminatory effects. In this context, it is crucial for the law to ensure transparency in the operation of AI (regarding the ability to verify the appropriateness of the models, algorithms and data used by individual AI systems) and a clear identification and determination of the alleged infringer and their liability[69]. AI must not be used to the detriment of people and society in terms of democratic principles and procedures (especially not in the context of democratic elections). It is also important to be aware AI's impact on society and the environment, and to encourage AI-led systems to be sustainable and environmentally friendly.

Slovenia supports the activities conducted at the EU level to define an ethical framework for AI, where the EU has already defined ethical principles and criteria for trustworthy AI and, in particular, has already operationalised a concrete checklist for assessing the compliance of AI applications and systems with ethical principles and criteria[70] and, following an expert review, has also prepared a web-based tool to support the assessment of ALTAI-compliance (Assessment List on Trustworthy Artificial Intelligence)[71]. This will serve as the basis for the development of relevant legislation at the EU level to address AI itself and to build on legislation already addressing safety (e.g. Machinery Directive 2006/42/EC, Radio Equipment Directive 2014/53/EU, General Product Safety Directive 2001/95/EC, Medical Devices

[67] The *European Ethical Charter on the use of Artificial Intelligence in judicial systems and their environment* adopted by the Council of Europe, and the E*thics Guidelines for Trustworthy AI* developed at the level of the European Union.
[68] Ethics Guidelines for Trustworthy AI, https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai
[69] European Network of Equality Bodies EQUINET / Allen R. and Masters D. (2020) Regulating for an Equal AI: A New Role for Equality Bodies, https://equineteurope.org/wp-content/uploads/2020/06/ai_report_digital.pdf
[70] Assessment List for Trustworthy AI, https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=68342
[71] ALTAI online tool, https://altai.insight-centre.org/

Directive 3/42/EEC) and liability[72] (e.g. Directive on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products 85/374/EC) as regards various types of products. To this end, the European Commission has already prepared an analysis of the directives relevant to AI, together with the AI strategy[73]. In light of this, the establishment of a suitable legal and ethical framework in Slovenia will be influenced by these and other potential future initiatives (both legislative and non-legislative) already foreseen by the European Commission in its White Paper on AI of 19 February 2020, which will need to be taken into account in any further regulation of the field in Slovenia. At the EU level, for example, we anticipate clear and balanced rules concerning liability for damages, which will on the one hand instil in consumers the confidence to embrace AI-based products and services, as well as legal predictability for developers and providers of AI technology and other market participants to ensure the safety and stability of their solutions. This should be based on the existing concepts of liability for damages, which may require adjustments in response to emerging issues in this domain concerning the specific attributes of AI systems (e.g. opacity, complexity, autonomy, unpredictability).

Slovenia will strive to analyse legal issues and new challenges, including those in international law, with the aim of establishing an internationally harmonised legal framework for AI. In this respect, it supports the activities of the Council of Europe, where in September 2019 the Committee of Ministers of the Council of Europe established an ad hoc Committee on Artificial Intelligence – CAHAI. Through extensive multi-stakeholder consultations, it will explore the feasibility or necessity and potential elements for designing a legal framework to govern the development, deployment, and utilization of AI based on the standards set by the Council of Europe in the areas of human rights, democracy, and the rule of law. The committee, comprising representatives from 47 Member States of the organisation, will exchange views with leading experts on the influence of AI's role on people and society, on existing soft law instruments dealing specifically with AI, and on the existing legally binding international framework that would apply to AI.

Both technical and non-technical methods can be used to realise trustworthy AI. These methods can either complement or serve as alternatives to each other, as diverse environments and usage scenarios of AI may necessitate different approaches to ensuring trustworthy use. Technical methods encompass built-in ethics, built-in privacy (including privacy by default), considering transparency from the beginning of the design process to the final product, explanatory methods, testing and validation methods for performance and quality of services. Non-technical methods include the regulatory framework, codes of conduct, system certification, social dialogue and stakeholder engagement, and education and awareness-raising to promote ethical conduct.

To achieve the objective, the following measures will be implemented:

8.1	Involving humanities, social sciences, legal and security experts and NGO representatives in AI activities, in the support pillar of the Slovenian Digital Coalition
8.2	Active monitoring and participation in discussions regarding the advancement of AI within international organizations (such as the EU, UNESCO, and Council of Europe) that have been addressing or will address ethical and legal aspects in the field of AI
8.3	Analysis of the appropriate legal and ethical framework for the development, deployment and use of AI-based systems, including in decision-making systems on the rights and obligations of natural and legal persons, while taking into account the appropriateness of various AI models

[72] Liability for emerging digital technologies, SWD(2018) 137 final, https://ec.europa.eu/digital-single-market/en/news/european-commission-staff-working-document-liability-emerging-digital-technologies
[73] Report on the safety and liability implications of Artificial Intelligence, the Internet of Things and robotics, COM(2020) 64 final https://ec.europa.eu/info/publications/commission-report-safety-and-liability-implications-ai-internet-things-and-robotics-0_en

8.4	Establishing a framework for certifying and overseeing AI-based solutions in alignment with the EU's framework for ensuring trustworthy AI in terms of ethical and robustness requirements
8.5	Establishing a national oversight mechanism to monitor and verify the legal compliance of AI-based solutions in line with the EU's framework for trustworthy AI
8.6	Organising an annual conference on the legal and ethical framework for the development, deployment and use of AI in different areas (e.g. crime fighting, autonomous vehicles, health, taxation)
8.7	Collaboration with knowledge centres (e.g. UNESCO International Centre for AI Research) on legal, social and ethical issues of AI. The cooperation will involve scholars from the humanities and social sciences, along with representatives from NGOs.

The measures will be implemented using the following implementing instruments:

- Public administration project (supported by PA) (8.6);
- Sectoral activities of ministries: Ministry of Justice, Ministry of Public Administration, Ministry of Education, Science and Sport, Ministry of Foreign Affairs, Ministry of Defence (8.2, 8.4, 8.5, 8.6, 8.7);
- Stakeholders' own activities (8.1, 8.2, 8.6, 8.7);
- CRP (8.3, 8.4, 8.5).

Indicators of the achievement of the objective:

Measure	Indicator	2020	2025
8.1	Organised working group of experts within the Slovenian Digital Coalition	0	1
8.2.	Organised working group on legal and ethical issues	0	1
8.3	CRP implemented	0	1
8.4	CRP implemented	0	1
8.5	CRP implemented	0	1
8.6	Annual conference implemented	0	5
8.7	Working group at IRCAI established	0	1

6.9 SO9: Strengthening international cooperation

Slovenia will strengthen cooperation at the international level in the areas of research, development and innovation, education, scientific and economic diplomacy, development regulation, the implementation and use of AI in accordance with respect for human rights and fundamental freedoms, the development of an appropriate legal and ethical framework, international development cooperation, and the strengthening of North-South cooperation and support for sustainable development and the achievement of the sustainable development goals.

Slovenia will advocate the exchange of good practices and joint projects in the above-mentioned areas, especially with EU countries, with like-minded countries within international initiatives and partnerships, such as the Global Partnership for AI (GPAI), of which Slovenia is a founding member, as well as within international organisations, such as OECD, the Council of Europe, NATO, the United Nations and its specialised agencies, especially UNESCO and WHO.

It will support the provision of adequate funding at both the national and European levels to expedite the development and deployment of AI in line with a coordinated approach at the EU level, and will support the proposal for AI support activities in the planning of the EU's new Financial Perspective 2020–2027 in its communitarian programmes for research on, innovation in and deployment of digital technologies (Horizon Europe and Digital Europe programmes) and other relevant support mechanisms (e.g. Made in Europe). Slovenia sees the AI support mechanisms in these programmes as an important opportunity for international cooperation in higher education, research and commerce and industry. However, close cooperation between national stakeholders and national programme coordinators will be needed, along with the maximum involvement of economic diplomacy to foster international cooperation beyond EU programmes.

We will support Slovenian researchers, companies, public organisations and institutions to maintain their active participation in international cooperation within the Council of Europe, OECD, the EU, GPAI, and other international organisations and initiatives where they can represent Slovenia's interests. Currently, Slovenian experts, companies and public organisations are actively involved in many EU-funded projects related to the development of AI methods and their application to tackle economic and societal challenges. Slovenian researchers, companies, institutions and SRIPs also actively participate in European efforts to foster connections among AI stakeholders, such as CLAIRE-AI, ELLIS, the AI4EU platform, the cross-regional platform (JRC AI & HMI) and the national Smart Specialisation Platforms (S4). As regards AI in manufacturing, the SRIP Factories of the Future is also very active in the EU associations EFFRA, SPIRE, EU Robotics and the Vaguard initiative. All these activities must be supported in a coordinated manner through an appropriate unified presentation of all national IA products, services and solutions (as a result of RDI activities of companies, the public sector and research organisations or of the reference deployment of AI solutions in the business and public sectors and society), in particular through the support of economic diplomacy, which would be useful for international promotion, involvement in international events, conferences and workshops, or exhibitions, as well as visits by international delegations.

To achieve the objective, the following measures will be implemented:

9.1	Active participation in activities under the EU's Coordinated Plan on AI cooperation
9.2	Active participation in the activities of OECD, the Council of Europe, UNESCO and GPAI, along with other relevant international activities where Slovenia expresses an interest in working on AI
9.3	Supporting the work of UNESCO's International Research Centre on AI – IRCAI, which focuses on the areas of AI research and education, addressing the challenges of introducing AI into society, international assistance to countries around the world in deploying AI in their countries, and assistance to business and the public sectors in the development and deployment of AI
9.4	Ensuring conditions for the participation of Slovenian experts in relevant international working bodies and associations on AI
9.5	Ensuring the conditions for cooperation with like-minded countries at a bilateral level and within international initiatives, partnerships and international organisations

9.6	Preparing materials for a unified presentation of AI products, services and solutions to national companies, the public sector, research organisations and other stakeholders for the purpose of international promotion

The measures will be implemented using the following implementing instruments:

- Call for proposals (9.4);
- Sectoral activities of ministries: Ministry of Public Administration, Ministry of Foreign Affairs, Ministry of Justice, Ministry of Education, Science and Sport (9.1, 9.2, 9.5);
- Sectoral activities of ministries: Ministry of Education, Science and Sport, Ministry of Foreign Affairs (9.3);
- Sectoral activities of ministries: Ministry of Economic Development and Technology, Ministry of Foreign Affairs, Ministry of Public Administration, Ministry of Defence (9.6);
- Stakeholders' own activities (9.2, 9.6);
- Public administration project (supported by PP) (9.6).

Indicators of the achievement of the objective:

Measure	Indicator	2020	2025
9.1	Setting up a working group to participate in the EU AI initiative	0	1
9.2	Involvement in OECD working groups	0	1
9.3	Establishing the cooperation of ministries with IRCAI	0	4
9.4	No. of supported experts No. of supported meetings	0 0	10 10 x 5
9.5	Cooperating with like-minded countries at a bilateral level and within international initiatives, partnerships and international organisations	0	3
9.6	Preparation of material	0	1

6.10 SO10: Establishing a national AI observatory in Slovenia

AI as a field has undergone rapid development and changes in recent years. The national programme outlines the basic guidelines for AI development in Slovenia. However, it is essential to continuously adapt these guidelines in response to the rapid advancements of AI in Slovenia and worldwide, meaning that these are strategic objectives and actions that are part of a highly dynamic process. To effectively manage this process, it is necessary to provide a framework and tools to monitor AI development, deployment and use in Slovenia and, on this basis, to evaluate properly and, if necessary, modify the implementation of measures and assess the impact of those already put in place. In cooperation with such activities at the EU level (e.g. AI WATCH), it is important to establish a suitable set of indicators to support the dynamic planning and implementation of AI policy in Slovenia throughout the programme period.

To this end, there is an urgent need for a transparent framework that monitors the status of the AI potential of Slovenian stakeholders (public and private research organisations, innovative companies

developing AI technologies, innovative companies using AI for the development of their products and services, public and private users of AI for the provision of end services to citizens that improve their lives), with which Slovenia can act throughout the innovation cycle, both in the national context in the development of solutions in Slovenia, as well as at the international level in various international initiatives, projects and programmes. It is crucial to understand the characteristics and dynamics of the creation and dissemination of AI expertise by different stakeholders, which is the key element of understanding and effectively supporting the country's overall AI ecosystem.

An appropriate model must be defined to address and define more detailed indicators of the potential for research, development, innovation and use of AI, based on the various indicators currently available (e.g. Statistical Office of the Republic of Slovenia, EU DESI, AI WATCH, OECD AI Observatory, AI Index[74], etc.). Indicators and a methodology for data collection must be defined to facilitate the analysis of the situation, the monitoring of potentials and comparisons with other sectors and countries. Activities must be coordinated and implemented in cooperation with the Statistical Office of the Republic of Slovenia (Statistical Office of the Republic of Slovenia), the EU AI WATCH project and the activities of the OECD AI Observatory (set up by Jožef Stefan Institute).

To achieve the objective, the following measures shall be implemented:

10.1	Definition of a model of indicators and a methodology for assessing and monitoring the R&D and innovation potential of Slovenian AI stakeholders, with an overview of the situation in Slovenia and an analysis and identification of specific stakeholders in Slovenia (public and private research organisations; innovative companies developing AI technologies; innovative companies using AI for the development of their marketable products and services), with an analysis of their capacity for development (human resources, financial resources, technological areas)
10.2	Definition of a model of indicators and a methodology for assessing and monitoring the potential for AI deployment in the private and public sectors in Slovenia, with an overview of the situation in Slovenia and an analysis and identification of specific stakeholders in Slovenia (public and private organisations – AI users, which use it to improve and optimise their own operations and business processes, or to create new innovative services for their users, suppliers or customers), with an analysis of their capacity for deploying AI (human resources, financial resources, technological areas).
10.3	Development of the National AI Observatory Portal (an IT platform and tools for the ongoing identification of AI potential in Slovenia), which is a key prerequisite to effectively support the monitoring, planning and implementation of the measures of this programme Comparison with the situation in EU Member states and countries worldwide in cooperation with OECD and EU activities (AI WATCH)

The measures will be implemented using the following implementing instruments:

- CRP (10.1, 10.2, 10.3).

Indicators of the achievement of the objective:

[74] https://hai.stanford.edu/sites/g/files/sbiybj10986/f/ai_index_2019_report.pdf

Measure	Indicator	2020	2025
10.1	CRP implemented	0	1
10.2	CRP implemented	0	1
10.3	CRP implemented	0	1

7 National programme implementation plan

7.1 Concept of planning and implementation

Considering the limited resources available for AI in Slovenia in comparison to the international landscape, the implementation of this national programme and the attainment of its objectives require that these are planned in a coherent and complementary manner. This includes human resources, expertise, access to infrastructure and financial resources, which necessitate a combination of public and private investment. The programme's prime objective is to foster a critical mass of activities in its priority areas, which will enable Slovenian stakeholders to sustain growth, development, and the requisite cooperation and integration in an increasingly challenging and competitive international environment. One of the most important elements in this regard is ensuring the coordinated management and monitoring of activities, both in terms of national activities and activities in the international environment. This is particularly important for ensuring the complementarity of national activities with those conducted by the EU, especially regarding AI legislation and regulation, as well as with the support activities under key EU support programmes, such as Horizon Europe and Digital Europe, where Slovenia wants and needs to enable the active participation of national stakeholders.

Programme implementation activities will be planned and coordinated in a unified way at the national level, with sector-specific implementation within the activities of individual ministries, which is a prerequisite for ensuring maximum efficiency in the implementation of activities, considering the limitations of human and financial resources. This requires the establishment of appropriate coordination at the level of the government and the ministries involved, to ensure coherence between the sectoral strategies and action plans and their corresponding financial plans (national funds, EU cohesion funds, EU programme funds), as well as the implementation of individual measures. The latter is particularly important for measures addressing a wider range of stakeholders, who also need to adequately plan their own resources for the implementation of the measures in order to actively participate in the envisaged activities. Overlapping measures and inadequate planning of the phases of their implementation can radically reduce the impact of the overall programme and the envisaged impact of the measures in Slovenia.

A number of measures will be implemented to achieve the objectives of the NpAI programme. If in implementing the programme there arises the need for changes, the measures may be supplemented or amended accordingly. The implementation of the programme will be based on upgrading and complementing the existing implementing instruments already delivered by the line ministries, while taking into account the current situation and actual capacities.

7.2 Strategic alignment with post-2020 sectoral strategies

For the programme's successful implementation, it is important to duly consider and align its strategic objectives and measures in the planning and implementation of all post-2020 sectoral strategies. The

implementing instruments that the sectoral strategies will provide for this purpose must be aligned and harmonised accordingly. The proper coordination of financial programming at all levels of planning in the integral budget is of particular importance, as well as in the planning of EU cohesion funds and funds from other EU sources (e.g. RRF) and, in this respect, in particular in the preparation of programming documents, which are the basis for planning the implementation of activities from these sources and which address the areas in which AI can make a key contribution to the achievement of their identified objectives, in line with this programme.

Accordingly, the alignment of sectoral strategies, action plans and programmes in the areas addressed in this programme is particularly important:

- Information society strategy (DSI2030);
- Cyber Security Strategy;
- Smart Specialisation Strategy S4 and SRIP action plans;
- Slovenian Industrial Strategy (SIS);
- Research and Innovation Strategy (RISS);
- National Language Policy Programme;
- Vocational education and training policies;
- National Higher Education Programme;
- National Adult Education Programme;
- eHealth Strategy;
- Spatial Development Strategy,
- Digital Education Action Plan.

7.3 The programme's governance structure

The Slovenian government is responsible for the programme’s effective implementation within the framework foreseen therein (finance, organisation, implementation).

Key ministries are responsible for implementing each of the implementing instruments and for aligning the programme's objectives and actions with sectoral strategies and action plans. The ministry responsible for the information society is responsible for the overall coordination and monitoring of the NpAI programme’s implementation.

The programme’s implementation is guided and steered by the NpAI Steering Committee (SCAI), composed of the state secretaries of the participating ministries. It is chaired by the state secretary of the ministry responsible for the information society. The Programme Council is established and appointed by a decision of the Government of the Republic of Slovenia. The ministry responsible for the information society carries out all activities in support of the operation of the SCAI and the coordination of implementing all measures. Once per year, it reports to the Slovenian government on the objectives achieved and the measures implemented under this programme.

Working groups may be established to address specific horizontal issues or areas of implementation within the national programme, with members from each ministry and with the possibility of involving external experts in the field concerned. The NpAI Steering Committee confirms the working group’s establishment by a decision, and also designates the line and participating ministries. The line ministry is identified according to the role or responsibility it has for implementing the activities or measures in each thematic area or in terms of the relevant support instruments to be addressed by the working group. The working group is headed by a member of the line ministry and reports on the activities of the working group to the NpAI Steering Committee. The working group may be composed of external experts in the field concerned, who are selected by the line ministry. The working group shall be set up by a decision of the line ministry, including the envisaged organisation chart, the working group’s members and the rules of procedure.

In order to ensure effective implementation of the NpAI programme and to provide adequate technical support for planning, analysis and monitoring the achievement of the objectives, as well as for monitoring AI developments globally, the Ministry of Public Administration, as the ministry responsible for the information society (within the organisational unit responsible for the information society) sets up a multi-stakeholder, inter-ministerial expert group, which will include representatives from all relevant line ministries, as well as AI external experts, the business sector and civil society. To this end, it builds on the existing inter-ministerial group working on the NpAI national programme, which is being restructured accordingly. The multi-stakeholder inter-ministerial expert group will be set up by a decision of the ministry, including the envisaged organisation chart, the working group's members and the rules of procedure.

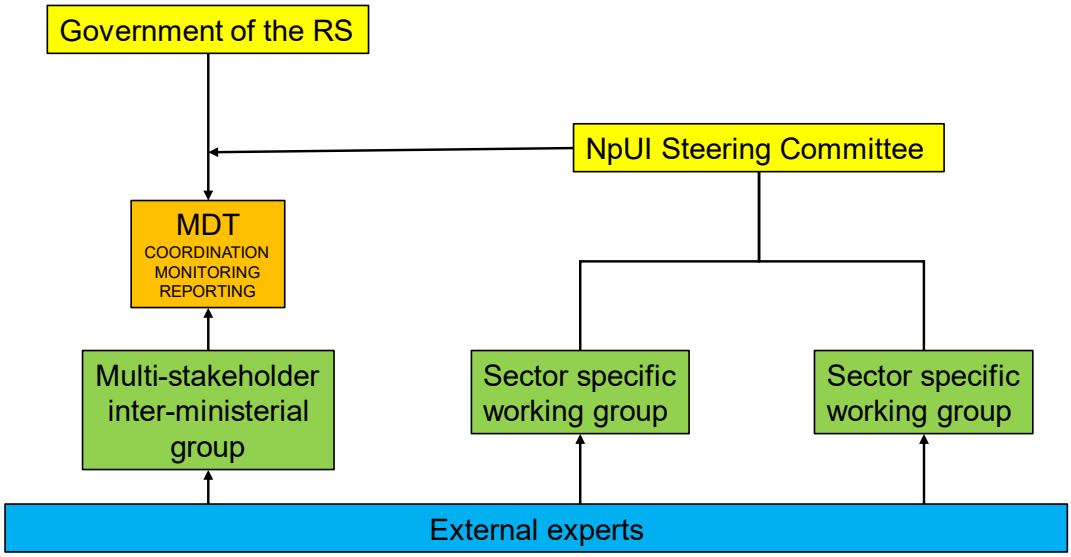


Figure 4: Governance structure for the NpAI programme implementation

The support instruments for the implementation of the national programme measures will be run in an inter-ministerial manner, in cooperation with the ministries concerned, and under the supervision of the NpAI Steering Committee and under the coordination of an appropriately constituted working group. Table 2 shows the role of each ministry in ensuring the implementing instruments for each of the programme areas. The line ministries are identified by the letter L and the participating ministries by the letter P.

Areas of action / Ministries	RDI AI	AI deployment	AI infrastructure	Preparing for and responding to change	International cooperation	Standardisation
Ministry of Economic Development and Technology	**L**	**L**			**L**	**P**
Ministry of Education, Science and Sport	**L**	**L**	**L**	**L**	**L**	
Ministry of Public Administration	**L**	**L**	**L**	**L**	**L**	**L**
Ministry of Culture		**P**	**P**			

Ministry of Justice				**P**	**L**	
Ministry of Agriculture, Forestry and Food		**P**		**P**		
Ministry of Health	**P**	**L**		**P**		**P**
Ministry of Foreign Affairs		**P**		**P**	**L**	
Ministry of Labour, Family, Social Affairs and Equal Opportunities				**L**		
Government Office for Development and European Cohesion Policy	**P**	**P**			**P**	
Ministry of the Environment and Spatial Planning			**L**			
Ministry of Defence	**P**			**P**	**P**	

Table 2: Role of line ministries in the implementation of the NpAI programme

7.4 Key stakeholders in the programme implementation

Key stakeholders in the programme implementation include R&D organisations engaged in R&D activities in the field of AI – public research organisations (institutes, higher education institutions) or R&D groups in the business sector. Research organisations have an important role to play in addressing the legal, ethical, environmental and other societal aspects of AI development and deployment in society.

A key stakeholder in the deployment of AI in innovative products and services is the business sector, which includes in particular ICT development companies (ICT sector) that develop AI technologies, as well as companies that use AI technologies to develop new, innovative products and services in all segments of the business sector and society. Vocational associations (e.g. Chamber of Commerce and Industry and regional chambers of commerce, Chamber of Crafts and Small Business of Slovenia) and professional associations (e.g. Slovenian Artificial Intelligence Society, Slovenian Language Technologies Society, Slovenian Pattern Recognition Society, AI4SI) as well as strategic partnerships of development stakeholders (e.g. SRIP Smart Cities and Communities, SRIP Factories of the Future, SRIP Health, SRIP Food) also have a role to play in introducing AI in the development of innovative products and services.

Key stakeholders in commercial AI deployment are all public and private organisations introducing AI to enhance their business. In line with the programme's priorities and objectives, these are organisations in the fields of education (formal, lifelong and vocational), health, public administration, industry, spatial planning, culture, agriculture and the environment. Other sectors (e.g. energy, transport, social services, internal affairs, cyber security) are involved in supporting the programme's development, innovation or training activities, depending on their capacity and interest.

Key stakeholders in AI development and deployment of AI are public and private sector infrastructure and service providers relevant to both the development and deployment of AI (e.g. 5G communication infrastructures, HPC processing infrastructures, cloud service providers, data providers). In this context, various ministries that hold a wide variety of public sector data are important. In terms of data access infrastructure, the key are the Open Data Portal OPSI at the Ministry of Public Administration and the Open Data Hub, which supports and promotes broader openness and data re-use.

More generally, stakeholders involved in AI deployment in Slovenia include the Slovenian Digital Coalition and all NGOs, civil society, trade unions and individuals who wish to participate in this. NGOs,

civil society and organisations that ensure respect for fundamental human and individual rights are important supervising stakeholders in ensuring that ethical AI is developed and implemented to enhance societal well-being.

The role of media (e.g. radio, television, digital media) in introducing AI in Slovenia, as well as in monitoring IA development and use in various products and services, is significant. Through objective reporting, they can contribute to dispelling fears and stereotypes, and draw attention to the opportunities and threats that AI brings to society.

7.5 Investments in AI

Slovenia will invest approximately EUR 110 million of public funds in implementing this programme's measures by 2025. This will increase AI investment relative to the per capita investment of EU countries, where in 2018, according to AI WATCH analysis, Slovenia ranked 3rd from last in the EU in terms of total investment in AI, and 4th from last in terms of per capita investment at EUR 3.40 (ahead of Greece, Bulgaria and Croatia, and behind Hungary, Malta and Portugal). Considering Slovenia's investment volumes in 2018 (ranking 12th from the bottom), while the highest per capita investment volumes were in Denmark (EUR 42.70), Ireland (EUR 36.60) and Finland (EUR 36.40), Slovenia's projected investment volumes over the next five years would put it in the bottom half of EU countries, at around EUE 52.50 per capita or EUR 10.5 per capita annually. Given Slovenia's capacity and expertise in AI, our aim is to align with the EU average through planned investments in the period up to 2025. The programme also aims to stimulate private sector investment, which is key to a successful start of the innovation cycle.

Table **3** shows the distribution of public investment by strategic objective and area of programme implementation,
Table 4 by support instrument and programme area (in EUR thousand).

No	Areas of implementation / Strategic objective	RDI AI	AI deployment	AI infrastructure	Preparing for and responding to change	International cooperation	Standardisation	TOTAL
1	Setting up dynamic ecosystem for research, innovation and deployment of AI	167	167	0	67	0	0	**400**
2	Education and strengthening of human resources	50	1,000	0	3,050	0	0	**4,100**
3	Supporting AI research and innovation	40,000	0	0	0	0	100	**40,100**
4	Deploying AI reference implementations in business sector, public sector, public administration and society	4,600	39,300	0	3,950	0	100	**47,950**
5	Establishing the technical infrastructure for research, development and use of AI	500	0	8,600	480	2,000	0	**11,580**
6	Strengthening security by using AI	0	1,400	0	100	0	0	**1,500**
7	Increasing public confidence in AI	0	0	0	1,500	0	0	**1,500**
8	Ensuring an appropriate legal and ethical framework	0	0	0	700	0	0	**700**
9	Strengthening international cooperation	0	0	0	0	1,800	0	**1,800**
10	Establishing a national AI observatory in Slovenia	0	0	0	295	75	0	**370**
	TOTAL	**45,317**	**41,867**	**8,600**	**10,142**	**3,875**	**200**	**110,000**

Table 3: Allocation of funds by strategic objective and area of implementation of the NpAI programme

No	Areas of implementation Implementing instruments	RDI AI	AI deployment	AI infrastructure	Preparing for and responding to change	International cooperation	Standardisation	TOTAL
1	Call for proposals – RDI consortium projects	30,500	0	3,500	0	1,000	0	**35,000**
2	Call for proposals – networking/coordination	1,317	942	0	4,142	700	200	**7,300**
3	Call for proposals – reference implementing projects	0	16,000	0	0	0	0	**16,000**
4	Call for proposals – SME demo projects	10,000	0	0	0	0	0	**10,000**
5	Public administration project (supported by PPI)	350	21,875	5,100	1,655	2,100	0	**31,080**
6	Voucher system of consultancy	100	50	0	200	0	0	**350**
7	Young researchers in industry	1,250	0	0	1,250	0	0	**2,500**
8	Young researchers in the public sector	1,250	0	0	1,250	0	0	**2,500**
9	Supporting start-ups/SMEs	500	0	0	0	0	0	**500**
10	CRP	50	0	0	1,495	75	0	**1,620**
11	Public administration project (supported by PCP)	0	3,000	0	0	0	0	**3,000**
12	Legislation	0	0	0	150	0	0	**150**
13	Sectoral activities of ministries	0	0	0	0	0	0	**0**
14	Stakeholders' own activities	0	0	0	0	0	0	**0**
	TOTAL	**45,317**	**41,867**	**8,600**	**10,142**	**3,875**	**200**	**110,000**

Table 4: Allocation of funds by implementing instrument and area of implementation of the NpAI programme

In line with the AI investment monitoring framework being developed by the AI WATCH[75] project for the coordinated AI roadmap, the 2018 draft investment analysis shows the situation in Slovenia, but does not yet include all relevant data for Slovenia (e.g. salary data for higher education teachers, salary data for ICT experts, R&D investment). **Error! Reference source not found.** shows the share of investment by indicator and by public and private sector respectively. We want to use public funds to ensure complementary investment from the private sector, especially in areas where investment is currently non-existent (talent, skills and lifelong learning; from laboratory to market).

	Talent, skills and life-long learning			From the lab to the market				Data, technology and infrastructure			
Source	ICT specialists' compensation	Academic teachers' compensation	Corporate training	Research & development	Organisational capital	Brand	Design	Computer hardware	Computer software and databases	Telecommunications equipment	Grand Total
Private	0.0%		2.2%	0.0%	6.6%	4.1%	3.7%	17.1%	38.6%	14.4%	86.6%
Public	0.0%	0.0%	0.4%	0.0%	0.5%	0.1%	0.3%	4.4%	6.4%	1.2%	13.4%
Grand Total	0.0%	0.0%	2.6%	0.0%	7.2%	4.2%	4.0%	21.5%	45.0%	15.6%	100.0%

Figure 5: Share of investment according to EU WATCH indicators by sector

The AI WATCH monitoring framework is currently undergoing further development both in terms of indicators and their monitoring, and Slovenia needs to prepare for AI WATCH the data necessary for

[75] AI Watch: Estimating investments in General Purpose Technologies: The case of AI Investments in Europe, https://publications.jrc.ec.europa.eu/repository/bitstream/JRC118953/jrc118953_eu_ai_investment.pdf

the final assessment of the state of investment at the national level, in particular in terms of monitoring the achievement of this programme's envisaged financial objectives.

7.6 Indicators

To monitor the development and uptake of AI, a framework for monitoring and evaluating the situation by country and sector is being developed within various international organisations. In order to coordinate support mechanisms and concerted efforts toward AI at the EU level, and in particular to monitor investments to accelerate AI deployment, the European Commission developed this framework for monitoring AI investments within the AI WATCH project. The indicator framework is based on the fundamental observation that AI is a General Purpose Technology (GPT) that has a horizontal impact on the whole spectrum of the functioning of the economy and society, and that due to its impact on digital transformation its effects in this respect are much larger and more important than those of the AI technology sector alone. For this reason, the acceleration of AI deployment (and thus the monitoring) should not be limited to supporting technological development, but should also include support for complementary activities such as knowledge, skills and infrastructure. The key here is the need for coordinated public and private sector investment, with the primary role of public investment being the creation of a risk-mitigating environment for AI development and deployment, and the role of the private sector being the development of AI technologies, products and services and their commercialisation. To support the coordination of activities at the EU level, AI WATCH defines a coherent framework of indicators that monitor investments in the three target areas:

- Talent, skills and lifelong learning (includes a sub-area of investments in ICT experts' salaries, higher education teachers' salaries, in-company training);
- From laboratory to market (includes the sub-areas of investment in organisational capital, branding, design, R&D);
- Data, technology and infrastructure (includes the sub-area of investments in hardware, software and databases, and telecommunications equipment).

The development of the methodology and indicators at the EU level is currently underway, and Slovenia is joining these activities to obtain comparable indicators and a methodology for monitoring the state of AI comparable to EU countries. **Error! Reference source not found.** shows an assessment of the state of AI investment in Slovenia based on the draft 2018 AI WATCH analysis[76], which does not yet include all relevant data for Slovenia (e.g. data on the salaries of higher education teachers, salaries of ICT experts, R&D investment).

[76] AI Watch: Estimating investments in General Purpose Technologies: The case of AI Investments in Europe, https://publications.jrc.ec.europa.eu/repository/bitstream/JRC118953/jrc118953_eu_ai_investment.pdf

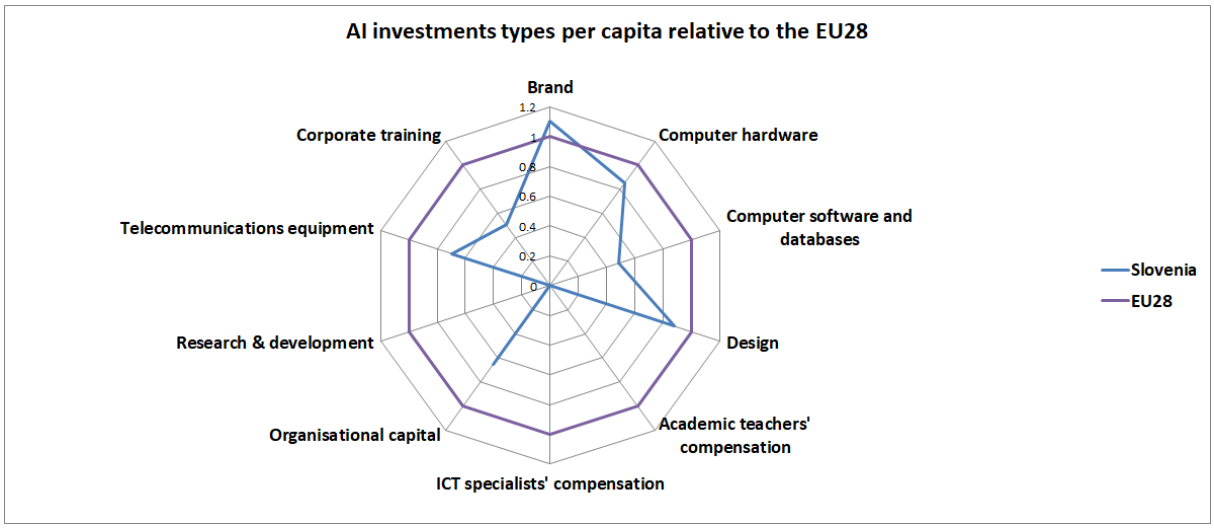


Figure 6: Assessment of Slovenia's situation compared to the EU in 2018 in terms of per capita investment in AI

Slovenia will participate in the development of a single framework for comprehensively monitoring the state of AI deployment at the EU level, for which preparations are currently being made in cooperation between EU WATCH and the OECD AI Observatory. This framework will serve as the basis for monitoring this programme as well.

To monitor this programme's implementation, indicators for the implementation of measures to achieve the programme's specified strategic objectives are defined for each measure separately.

As a sub-programme of measures, the individual measures and the programme as a whole will contribute to the achievement of the SrS 2030 objectives, in particular in terms of the following SrS 2030 indicators:

- PISA – average results in maths, reading and science: Maintaining the ranking in top quartile of EU countries;
- Risk of social exclusion: < 16%;
- GDP per capita (in purchasing power standards): the EU average in 2030.

Appendix 1: Some key stakeholders in the field of AI

Some key stakeholders in the field of AI in Slovenia:

- **Slovenian government**
  In December 2017, the Slovenian government adopted the Slovenian Development Strategy 2030, which recognises the challenges of the Fourth Industrial Revolution characterised by the digital economy and the development of robotics and artificial intelligence, and establishes new models of business, work and jobs, which demands the development of new knowledge and skills and adaptation in numerous areas of economic, social and environmental development.

  The area of AI is also addressed in the information society development strategy – Digital Slovenia 2020 and the Smart Specialisation Strategy, which established the Strategic Development and Innovation Partnerships – SRIPs.

  Some of the key ministries for the implementation of the NpAI Programme and measures are:
  - Ministry of Public Administration, responsible for the information society, digitalisation of public administration, information security and the preparation of the NpAI programme;
  - Ministry of Education, Science and Sport, responsible for research, science and education (formal and vocational);
  - Ministry of Foreign Affairs, responsible for international cooperation and the promotion of Slovenia and strengthening Slovenia's global role in the field of AI;
  - Ministry of Justice, responsible for the ethical and legal principles surrounding AI through the prism of the EU/Council of Europe and the three main pillars of fundamental values (human rights, democracy and the rule of law);
  - Ministry of Economic Development and Technology, responsible for the economy, support for innovative entrepreneurship and standardisation;
  - Ministry of Culture, responsible for the Slovenian language, cultural identity and intermedia art;
  - Ministry of Health, responsible for health and healthcare;
  - Ministry of the Environment and Spatial Planning, responsible for the environment and spatial planning.

- **Jožef Stefan Institute**
  Jamova cesta 39, 1000 Ljubljana
  Director: Prof. Dr Boštjan Zalar
  Email: info@ijs.si
  http://www.ijs.si

  The Jožef Stefan Institute is the oldest research organisation focusing on AI in Slovenia. The beginning of AI research in Slovenia dates back to 1972, when research began at the Computer Systems Department at the Jožef Stefan Institute in Ljubljana. Later, research also commenced at the department of the Faculty of Electrical Engineering, University of Ljubljana (which over time was transformed into the Faculty of Electrical Engineering and Computer Science, and eventually into the newly-formed Faculty of Computer and Information Science), which was founded by the esteemed and internationally recognized AI researcher, Prof. Dr Ivan Bratko. The AI Group at the Jožef Stefan Institute was formally established in 1979 and transformed into the AI Laboratory in 1985. Currently, there are three research departments in the field of AI:
  - Artificial Intelligence (E3) – https://www.ijs.si/ijsw/E3,
  - Knowledge Technologies (E8) – https://www.ijs.si/ijsw/E8,
  - Intelligent Systems (E9) – https://www.ijs.si/ijsw/E9.

Jožef Stefan Institute also has its own Jožef Stefan International Postgraduate School. At PhD level, it offers Knowledge Technologies, Intelligent Systems and Robotics study modules.

- **International Research Centre for Artificial Intelligence (IRCAI)**
  Cesta 39, 1000 Ljubljana
  Director: Prof. Dr John Shawe-Taylor
  Email: info@ircai.org
  http://ircai.org

  On 5 March 2020, the Government of the Republic of Slovenia (Ministry of Education, Science and Sport) and UNESCO signed an agreement on the establishment of the International Research Centre for Artificial Intelligence (IRCAI) under the auspices of UNESCO. It is the first research centre of its kind in the world. The IRCAI will advise governments, international and domestic organisations, companies and the general public on the systemic and strategic solutions available for introducing AI in various facets of life. It will help to develop and expand capacities in various ways, including by establishing auxiliary research centres around the world, designing training programmes, raising global awareness, and creating a network for the exchange of research and knowledge.

- **Faculty of Computer and Information Science of the University of Ljubljana**
  Večna pot 113, 1000 Ljubljana
  Dean: Assoc. Prof. Dr Mojca Ciglarič
  Email: dekanat@fri.uni-lj.si
  https://www.fri.uni-lj.si/sl

  AI research and education began in 1981 at the Department of the Faculty of Electrical Engineering, University of Ljubljana, which over time transformed into the Faculty of Electrical Engineering and Computer Science and later into the Faculty of Computer and Information Science, founded by the internationally renowned AI researcher Prof. Dr Ivan Bratko. Currently, AI is one of the main fields of study at the Faculty of Computer and Information Science, at the undergraduate, postgraduate and doctoral levels. There are two special programmes of master's studies: Data Science and Cognitive Science. The Department of AI includes the Cognitive Modelling Laboratory, Bioinformatics Laboratory, the Computer Vision Laboratory, Artificial Intelligence Laboratory and the Visual Cognitive Systems Laboratory. AI-related topics are also covered by the Laboratory for Adaptive Systems and Parallel Processing and the Laboratory for Data Technologies.

- **Faculty of Electrical Engineering, University of Ljubljana**
  Tržaška 25, 1000 Ljubljana
  Dean: Prof. Dr Gregor Dolinar
  Email: dekanat@fe.uni-lj.si
  http://www.fe.uni-lj.si/

  The beginnings of research on AI at the Faculty of Electrical Engineering, University of Ljubljana (University of Ljubljana Faculty of Electrical Engineering) can be traced back to the early 1970s. Over time, this field has grown considerably, so that today a few dozen employees in at least five laboratories (Machine Intelligence Laboratory, Laboratory for Automation and Cybernetics, Laboratory for User-Centred Communications and Ambient Intelligence, Laboratory for Imaging Technologies, Laboratory for Robotics) in four departments conduct research and teach in this field. More than ten courses within six educational programmes at all three levels are dedicated to the narrower field of intelligent systems. In addition to basic research, researchers at University of Ljubljana Faculty of Electrical Engineering have successfully integrated AI-based solutions into many practical implementations in the fields of computer and machine vision, automation of technological and manufacturing processes, medical diagnostics, biometric technology, speech and language technology, robotics, ambient intelligence, etc.

- **Faculty of Electrical Engineering and Computer Science, University of Maribor**
  Koroška cesta 46, 2000 Maribor
  Dean: Prof. Dr Gorazd Štumberger
  Email: feri@um.si
  https://feri.um.si/

  Formally, AI research at University of Maribor, Faculty of Electrical Engineering and Computer Science started with the establishment of the Artificial Intelligence Laboratory in 1989, and later research on AI, machine learning, remote sensing, data science and environmental intelligence expanded to several other laboratories and research groups, until the establishment of the joint Artificial Intelligence Centre at University of Maribor, Faculty of Electrical Engineering and Computer Science in 2019. AI research and development, and its interplay with other disciplines, is one of the faculty's primary focuses today. Currently, the Intelligent Systems Laboratory and the Geospatial Modelling, Multimedia and Artificial Intelligence Laboratory focus primarily on artificial intelligence. AI is also well covered at University of Maribor, Faculty of Electrical Engineering and Computer Science from a pedagogical point of view. Students at all levels of study are offered various courses in AI, machine learning and knowledge discovery in data. Additionally, they have the opportunity to pursue a study module called Intelligent Information Solutions, and in early 2021 an independent study programme in Data Science was accredited.

- **Faculty of Mathematics, Natural Sciences and Information Technologies, University of Primorska**
  Glagoljaška 8, 6000 Koper
  Dean: Assoc. Prof. Dr Ademir Hujdurović
  Email: dekanat@famnit.upr.si
  http://www.famnit.upr.si/

  At the Faculty of Mathematics, Natural Sciences and Information Technologies of the University of Primorska (University of Primorska, Faculty of Mathematics, Natural Sciences and Information Technologies), the field of AI has been present in research and teaching since its establishment in 2006. AI courses are represented in the study programmes at bachelor's and master's levels, as well as in the supervisor-led doctoral programme. In the 2019/2020 academic year, University of Primorska, Faculty of Mathematics, Natural Sciences and Information Technologies launched the accredited master's programme Data Science. AI and related topics are addressed by researchers from the Department of Information Science and Technology and the Department of Mathematics. The most represented AI research areas are machine learning, natural language processing, medical diagnostics, virtual, augmented and mixed reality, recommender systems, bioinformatics, etc.

- **Slovenian Artificial Intelligence Society (Slovenian Artificial Intelligence Society)**
  Cesta 39, 1000 Ljubljana
  Chair: Dr Sašo Džeroski
  Email: saso.dzeroski@ijs.si
  http://slais.ijs.si/

  Slovenian Artificial Intelligence Society is an association of AI researchers and practitioners in Slovenia. Most of them come from universities and research institutes, but there are also members from the business sector. The society promotes theoretical and applied research, as well as the transfer of AI technology to industrial and commercial environments. Slovenian Artificial Intelligence Society was founded in 1992 and is a member of EurAI (European Association for Artificial Intelligence).

- **Slovenian Language Technologies Society (Slovenian Language Technologies Society)**
  Cesta 39, 1000 Ljubljana
  Chair: Dr Simon Dobrišek
  Email: sdjt@ijs.si
  http://www.sdjt.si/wp/

  The Slovenian Language Technologies Society was founded in 1998 and brings together all those who work on or are interested in language technologies from research, development, pedagogical or user perspectives. The Society's work is mainly focused on language technologies for the Slovene language. Since 2011, it has had the status of a public-interest research society.

- **Slovenian Pattern Recognition Society (SDRP)**
  Tržaška cesta 25, 1000 Ljubljana
  Chair: Dr Vitomir Štruc
  Email: sdrv@fe.uni-lj.si
  http://sdrv.fe.uni-lj.si/sl/domov/

  The Slovenian Society for Pattern Recognition (Slovenian Pattern Recognition Society) is an interdisciplinary scientific and professional organisation that monitors, develops and informs the Slovenian public about science and technology on pattern recognition. It also keeps track of developments in other countries. The society was founded in 1992 with the approval of the Slovenian Pattern Recognition Society articles of association and the election of the first Executive Committee. In 1992, it became a member of IAPR (International Association for Pattern Recognition).

- **Slovenian Digital Coalition (SDK)**
  Information Technology and Telecommunications Association, Chamber of Commerce and Industry of Slovenia
  Dimičeva ulica 13, 1000 Ljubljana
  Chairman of the Management Board: Igor Zorko
  Email: info@digitalna.si
  http://digitalna.si/

  SDK remains a central open space for exchanging views and experiences and seeking opportunities for cooperation in various projects and areas of e-skills, legislation and the digitalisation of Industry 4.0. SDK sets time-bound targets for a specific relevant topic related to digital transformation, as mentioned above. As AI is becoming increasingly important, SDK is a focal point for further discussions and exchanges related to AI and Digital Industry 4.0.

- **AI4SI Association (AI for SLOVENIA)**
  Chamber of Commerce and Industry of Slovenia
  Dimičeva ulica 13, 1000 Ljubljana
  Chair: Mitja Trampuž
  Email: ai4si@gzs.si
  https://www.ai4.si/

  AI4SI aims to accelerate the translation of research results into work processes, particularly in the business sector, as analyses indicate that AI will have a decisive impact on companies' competitiveness and productivity already in the near future. The group will include representatives from the business sector, public administration, research and development organisations active in the field of artificial intelligence, and other stakeholders.

- **Factories of the Future Strategic Development-Innovation Partnership (SRIP ToP)**
  Teslova ulica 30, 1000 Ljubljana
  Head of the SRIP: Rudi Panjtar, Jožef Stefan Institute
  Email: rudi.panjtar@ijs.si
  http://ctop.ijs.si/en/partnership/

  SRIP ToP is Slovenia's largest innovation cluster, bringing together Slovenian research and innovation expertise from and industrial, research, and educational experience in the factories of the future, while highlighting breakthrough areas for new products, technologies and services. SRIP is led by Jožef Stefan Institute, which together with other partners (CC STV, Tecos, Chamber of Commerce and Industry) is responsible for the cooperation of more than 100 companies and research and educational institutions. The Strategic Research and Innovation Partnerships of the Factories of the Future (SRIP ToP) has focused on the following areas: robotic systems and components, intelligent control systems for future factories, smart mechatronic tools, intelligent laser systems, smart plasma systems, advanced sensors, new materials, smart factory.

- **Smart Cities and Communities Strategic Development-Innovation Partnership (SRIP PMiS),**
  Parmova 30, 1000 Ljubljana
  Head of the SRIP: Nevenka Cukjati, PhD, Jožef Stefan Institute
  Email: nevenka.cukjati@ijs.si
  http://pmis.ijs.si/en/partnership/
  ICT Horizontal Network (ICT Horizontal Network under SRIP Smart Cities and Communities), Slovenian Chamber of Commerce and Industry, Information Technology and Telecommunications Association
  Email: andreja.lampe@gzs.si
  https://ikthm.gzs.si/

  Smart Cities and Communities SRIP brings together more than 140 organisations, from companies of all sizes to institutes and universities. It is led by the Jožef Stefan Institute. The action plan has been prepared separately for the six industry verticals (health, energy and utilities, mobility, transport and logistics, security, smart city ecosystem and quality of life in the city) and for the six different technology areas gathered under the ICT Horizontal Network, whose activities support all the SRIP PMiS verticals as well as other SRIPs (Cyber Security, Digital Transformation, GIS-T Location Services, HPC and Big Data, IoS and IoT).

- **Centre of Information Technology, Law and Ethics (CITPE)**
  Poljanski nasip 2, 1000 Ljubljana
  Head: Dr Aleš Završnik
  Email: citpe@pf.uni-lj.si

  The CITPE Centre acts as a liaison between the Faculty of Law in Ljubljana and its two institutes, the Institute of Criminology and the Institute for Comparative Law, with the aim of guiding and coordinating the research, education and publishing activities of the participating institutions regarding legal and ethical issues related to information technologies. The centre’s research activity is currently focused primarily on the legal and ethical aspects of AI, social networks, big data, artificial intelligence and autonomous driving. Within AI, its research focuses on the legal and ethical framework for the development, deployment and use of AI-based systems in various areas of social life, including justice.

Appendix 2: Proposed implementing instruments for key measures – for the business and public sectors

Implementing instrument	Call for proposals – Supporting AI educational workshops
Measure	Measure 2.5: Supporting extra-curricular activities (e.g. summer schools, courses, workshops and building on these activities with regional, national competitions) for primary, secondary and university students to introduce them to the topics needed to understand, develop, deploy and use AI.
Target group	Primary and secondary school pupils and students – individuals
Duration	2020–2025
Aid scheme	De minimis
Form of aid	Call for proposals – cofinancing
Eligible costs / Activities	Cost of a workshop on the use of AI: • staff costs – labour • costs of external services • costs of materials • space and equipment rental costs • costs of prizes for competition winners
Participating institutions	To be determined during the programme's implementation by the SCAI
Selection criteria	The selection criteria will be defined in a meaningful way on the basis of the objectives set out in the call for proposals. They are expected to be identified in the context of: • quality of the AI workshop • impact of the workshop on the introduction of AI • the adequacy of the workshop's implementation (financial, staffing and time components)
Aid intensity	50% of eligible costs (max. EUR 10,000, of which max. EUR 1,000 for the prizes)
Final beneficiaries and conditions	• companies and sole traders registered in the Republic of Slovenia under the Companies Act for performing educational activities • public or private institutes, registered in the Republic of Slovenia for performing educational activities • ICT associations registered under the Societies Acts
Estimation of financial resources	EUR 500,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Public call – Support for staff training workshops on AI
Measure	Measure 2.9: Supporting staff training programmes (courses, seminars) to acquire new knowledge, skills and professional qualifications in the field of AI (re-skilling)
Target group	Employees – individuals
Duration	2020–2025
Aid scheme	De minimis
Form of aid	Call for proposals – cofinancing
Eligible costs / Activities	Costs of the training workshop: • staff costs – labour • costs of external services • costs of materials • space and equipment rental costs
Participating institutions	To be determined during the programme's implementation by the SCAI
Selection criteria	The selection criteria will be defined in a meaningful way on the basis of the objectives set out in the call for proposals. They are expected to be identified in the context of: • the AI workshop's quality • the workshop's impact on AI introduction • the adequacy of the workshop's implementation (financial, staffing and time components)
Aid intensity	50% of eligible costs (max. EUR 10,000)
Final beneficiaries and conditions	• companies and sole traders registered in the Republic of Slovenia under the Companies Act for performing educational activities • public or private institutes, registered in the Republic of Slovenia for performing educational activities • ICT associations registered under the Societies Act
Estimation of financial resources	EUR 500,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Public call – Support for staff training workshops on AI
Measure	Measure 2.10: Supporting digital training and literacy programmes for the broadest population, including vulnerable groups and in particular people with special needs, to acquire digital competences and user skills in AI (general lifelong learning, computer literacy for adults)
Target group	General public **–** individuals
Duration	2020–2025
Aid scheme	De minimis
Form of aid	Call for proposals – cofinancing
Eligible costs / Activities	Costs of the training workshop: • staff costs – labour • costs of external services • costs of materials • space and equipment rental costs
Participating institutions	To be determined during the programme's implementation by the SCAI
Selection criteria	The selection criteria will be defined in a meaningful way on the basis of the objectives set out in the call for proposals. They are expected to be identified in the context of: • the AI workshop's quality • the workshop's impact on AI introduction • the adequacy of the workshop's implementation (financial, staffing and time components)
Aid intensity	50% of eligible costs (max. EUR 10,000)
Final beneficiaries and conditions	• companies and sole traders registered in the Republic of Slovenia under the Companies Act for performing educational activities • public or private institutes, registered in the Republic of Slovenia for performing educational activities • ICT associations registered under the Societies Act
Estimation of financial resources	EUR 1,000,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Public call – Support for technology R&D projects (TRL 2-4) in the field of AI
Measure	Measure 3.2: Supporting consortium technology research projects (TRL 2-4) in the context of AI and selected technology areas (e.g. big data, HPC, AI at the edge, information security, language technologies, Internet of Things, blockchain, robotics, management technologies in production)
Target group	Consortia of companies and public institutions
Duration	2020–2025
Aid scheme	State aid scheme for RDI
Form of aid	Call for proposals – cofinancing
Eligible costs / Activities	Cost of implementing RDI projects: • staff costs – labour • costs of external services • costs of amortisation/depreciation of fixed assets • travel costs • indirect costs
Participating institutions	To be determined during the programme's implementation by the SCAI
Selection criteria	The selection criteria will be defined in a meaningful way on the basis of the objectives set out in the call for proposals. They are expected to be identified in the context of: • quality of the RDI project for AI deployment • the RDI project's impact on AI deployment • the adequacy of the RDI project implementation (financial, staffing and time components)
Aid intensity	Under the State aid scheme for RDI
Final beneficiaries and conditions	Private and public RDI organisations
Estimation of financial resources	EUR 10,000,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Call for proposals – Support for interdisciplinary innovation projects (TRL 5-8) in the field of AI
Measure	Measure 3.3: Supporting the consortium interdisciplinary innovation projects (TRL 5-8) for the development of new products and services in selected priority areas (e.g. public administration, culture, environment, energy, agriculture, smart cities and communities, transport, smart factories)
Target group	Consortia of companies and public institutions
Duration	2020–2025
Aid scheme	State aid scheme for RDI
Form of aid	Call for proposals – cofinancing
Eligible costs / Activities	Cost of implementing RDI projects: • staff costs – labour • costs of external services • costs of amortisation/depreciation of fixed assets • travel costs • indirect costs
Participating institutions	To be determined during the programme's implementation by the SCAI
Selection criteria	The selection criteria will be defined in a meaningful way on the basis of the objectives set out in the call for proposals. They are expected to be identified in the context of: • the quality of the RDI project for AI deployment • the RDI project's impact on AI deployment • the adequacy of the RDI project's implementation (financial, staffing and time components)
Aid intensity	Under the State aid scheme for RDI
Final beneficiaries and conditions	Private and public RDI organisations
Estimation of financial resources	EUR 10,000,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Call for proposals – Support for standardisation activities of Slovenian AI stakeholders
Measure	Measure 3.6: Promoting the standardisation activities of Slovenian stakeholders in AI research, development and innovation, and supporting their participation in national, EU and international standardisation organisations Measure 4.9: Promoting the standardisation activities of Slovenian stakeholders in the introduction and application of AI, and supporting their participation in national, EU and international standardisation organisations
Target group	Experts from companies or public institutions – individuals
Duration	2020–2025
Aid scheme	N/A
Form of aid	Call for proposals – cofinancing
Eligible costs / Activities	Costs of attending standardisation meetings: • travel costs to attend standardisation meetings (subsistence, accommodation, travel expenses) • cost of the annual membership fee to the standardisation organisation
Participating institutions	To be determined during the programme's implementation by the SCAI
Selection criteria	The selection criteria will be defined in a meaningful way on the basis of the objectives set out in the call for proposals. They are expected to be identified in the context of: • expertise of the participant and the relevance of the SDO to AI • impact of participation in SDOs on RDI or AI deployment • relevance of the cooperation proposal (financial, staffing and time components)
Aid intensity	Travel costs: 100% SDO membership fee costs: 50%
Final beneficiaries and conditions	Experts – individuals
Estimation of financial resources	EUR 100,000 (M3.6) + EUR 100,000 (M4.9)
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Call for proposals – Support for professional training programmes in the field of AI
Measure	Measure 4.1: Supporting professional training programmes (seminars, courses) on specific AI models, methods and algorithms in selected priority areas of AI deployment, targeting development teams from companies and the public sector
Target group	Professional development personnel in companies and public institutions
Duration	2020–2025
Aid scheme	De minimis
Form of aid	Call for proposals – cofinancing
Eligible costs / Activities	Costs of the training workshop: • staff costs – labour • costs of external services • costs of materials • space and equipment rental costs
Participating institutions	To be determined during the programme's implementation by the SCAI
Selection criteria	The selection criteria will be defined in a meaningful way on the basis of the objectives set out in the call for proposals. They are expected to be identified in the context of: • the AI workshop's quality • the workshop's impact on the introduction of AI • the adequacy of the workshop's implementation (financial, staffing and time components)
Aid intensity	60% of eligible costs - State aid scheme for AI?
Final beneficiaries and conditions	• companies and sole traders registered in the Republic of Slovenia under the Companies Act for performing educational activities • public or private institutes, registered in the Republic of Slovenia for performing educational activities • ICT associations registered under the Societies Act
Estimation of financial resources	EUR 500,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Call for proposals – Support for programmes to raise awareness of the advantages and disadvantages of AI among the senior management of companies and public sector organisations
Measure	Measure 4.2: Supporting awareness-raising programmes (courses, seminars) for the management of companies and public sector organisations on the possibilities, advantages and disadvantages of AI deployment in companies' operations
Target group	Senior management of companies and public institutions
Duration	2020–2025
Aid scheme	De minimis
Form of aid	Call for proposals – cofinancing
Eligible costs / Activities	Costs of the training workshop: • staff costs – labour • costs of external services • costs of materials • space and equipment rental costs
Participating institutions	To be determined during the programme's implementation by the SCAI
Selection criteria	The selection criteria will be defined in a meaningful way on the basis of the objectives set out in the call for proposals. They are expected to be identified in the context of: • the AI workshop's quality • the workshop's impact on the introduction of AI • the adequacy of the workshop's implementation (financial, staffing and time components)
Aid intensity	60% of eligible costs – State aid scheme for AI?
Final beneficiaries and conditions	• companies and sole traders registered in the Republic of Slovenia under the Companies Act for performing educational activities • public or private institutes, registered in the Republic of Slovenia for performing educational activities • ICT associations registered under the Societies Act
Estimation of financial resources	EUR 250,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Call for proposals – Support for education on the legal and ethical aspects of AI development and deployment
Measure	Measure 4.8: Supporting the education and awareness-raising of companies and the public sector about ensuring a legal and ethical framework for the development, deployment and application of AI, including human rights compliance issues
Target group	Employees in companies and public institutions
Duration	2020–2025
Aid scheme	De minimis
Form of aid	Call for proposals – cofinancing
Eligible costs / Activities	Costs of the training workshop: • staff costs – labour • costs of external services • costs of materials • space and equipment rental costs
Participating institutions	To be determined during the programme's implementation by the SCAI
Selection criteria	The selection criteria will be defined in a meaningful way on the basis of the objectives set out in the call for proposals. They are expected to be identified in the context of: • the AI workshop's quality • the workshop's impact on the introduction of AI • the adequacy of the workshop's implementation (financial, staffing and time components)
Aid intensity	60% of eligible costs – State aid scheme for AI?
Final beneficiaries and conditions	• companies and sole traders registered in the Republic of Slovenia under the Companies Act for performing educational activities • public or private institutes, registered in the Republic of Slovenia for performing educational activities • ICT associations registered under the Societies Act
Estimation of financial resources	EUR 250,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Call for proposals – Support for the establishment of national AI data spaces
Measure	Measure 5.2: Establishing national data spaces in various fields (e.g. manufacturing, environment and space, mobility, health and medicine, finance, energy, agriculture, public administration, skills) for the application of AI
Target group	Consortia of companies and public institutions
Duration	2020–2025
Aid scheme	State aid scheme for RDI
Form of aid	Call for proposals – cofinancing
Eligible costs / Activities	Cost of implementing RDI projects: • staff costs – labour • costs of external services • costs of amortisation/depreciation of fixed assets • travel costs • indirect costs
Participating institutions	To be determined during the programme's implementation by the SCAI
Selection criteria	The selection criteria will be defined in a meaningful way on the basis of the objectives set out in the call for proposals. They are expected to be identified in the context of: • the RDI project's quality • the RDI project's impact • the adequacy of the RDI project's implementation (financial, staffing and time components)
Aid intensity	Under the State aid scheme for RDI
Final beneficiaries and conditions	Private and public RDI organisations
Estimation of financial resources	EUR 2,000,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Call for proposals – Support for education on the opportunities and risks of data integration and sharing
Measure	Measure 5.5: Supporting awareness-raising about the opportunities and threats of data integration, sharing and use, in particular among companies, the public sector and the research sphere
Target group	Professional development personnel in companies and public institutions, management of companies and public institutions, employees at companies and public institutions
Duration	2020–2025
Aid scheme	De minimis
Form of aid	Call for proposals – cofinancing
Eligible costs / Activities	Costs of the training workshop: • staff costs – labour • costs of external services • costs of materials • space and equipment rental costs
Participating institutions	To be determined during the programme's implementation by the SCAI
Selection criteria	The selection criteria will be defined in a meaningful way on the basis of the objectives set out in the call for proposals. They are expected to be identified in the context of: • the AI workshop's quality • the workshop's impact on the introduction of AI • the adequacy of the workshop's implementation (financial, staffing and time components)
Aid intensity	50% of eligible costs
Final beneficiaries and conditions	• companies and sole traders registered in the Republic of Slovenia under the Companies Act for performing educational activities • public or private institutes, registered in the Republic of Slovenia for performing educational activities • ICT associations registered under the Societies Act
Estimation of financial resources	EUR 150,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Call for proposals – Support for education on the opportunities and risks of data integration and sharing
Measure	Measure 5.6: Supporting prototyping (hackathons) of data linking, sharing and using with the development of various different solutions based on AI tools
Target group	Data holders – public and private sector organisations, development companies and research organisations
Duration	2020–2025
Aid scheme	De minimis
Form of aid	Call for proposals – cofinancing
Eligible costs / Activities	Costs of the training workshop: • staff costs – labour • costs of external services • costs of materials • space and equipment rental costs • costs of prizes
Participating institutions	To be determined during the programme's implementation by the SCAI
Selection criteria	The selection criteria will be defined in a meaningful way on the basis of the objectives set out in the call for proposals. They are expected to be identified in the context of: • quality of the hackathon design • data quality and type • the hackathon's impact in terms of understanding opportunities and risks • the adequacy of the workshop's implementation (financial, staffing and time components)
Aid intensity	75% of eligible costs (max. EUR 20,000)
Final beneficiaries and conditions	• companies and sole traders registered in the Republic of Slovenia under the Companies Act for performing educational activities • public or private institutes, registered in the Republic of Slovenia for performing educational activities • ICT associations registered under the Societies Act
Estimation of financial resources	EUR 80,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Call for proposals – Support for the establishment of national AI data spaces
Measure	Measure 5.9: Cooperation and support of Slovenia in setting up test and experimental platforms for AI tools and algorithms in selected areas (e.g. health and medicine, agriculture, public administration, AI at the edge, Industry 4.0) in line with activities at the EU level in the framework of the implementation of EU programmes (Horizon Europe and Digital Europe)
Target group	Consortia of companies and public institutions
Duration	2020–2025
Aid scheme	State aid scheme for RDI
Form of aid	Call for proposals – cofinancing
Eligible costs / Activities	Cost of implementing RDI projects: • staff costs – labour • costs of external services • costs of amortisation/depreciation of fixed assets • travel costs • indirect costs
Participating institutions	To be determined during the programme's implementation by the SCAI
Selection criteria	The selection criteria will be defined in a meaningful way on the basis of the objectives set out in the call for proposals. They are expected to be identified in the context of: • the RDI project's quality • the RDI project's impact • the adequacy of the RDI project's implementation (financial, staffing and time components)
Aid intensity	Under the State aid scheme for RDI
Final beneficiaries and conditions	Private and public RDI organisations
Estimation of financial resources	EUR 2,000.000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Public call – Support for conferences and workshops to raise awareness among companies and the public
Measure	Measure 7.2: Supporting activities (conferences, workshops, etc.) to raise awareness among companies, the public sector and the public on AI's strengths, weaknesses, opportunities and threats
Target group	General public
Duration	2020–2025
Aid scheme	De minimis
Form of aid	Call for proposals – cofinancing
Eligible costs / Activities	Costs of the training workshop: • staff costs – labour • costs of external services • costs of materials • space and equipment rental costs
Participating institutions	To be determined during the programme's implementation by the SCAI
Selection criteria	The selection criteria will be defined in a meaningful way on the basis of the objectives set out in the call for proposals. They are expected to be identified in the context of: • relevance of the conference from an AI perspective • the quality of the conference plan • the workshop's on the general public • the adequacy of the workshop's implementation (financial, staffing and time components)
Aid intensity	60% of eligible costs – State aid scheme for AI?
Final beneficiaries and conditions	• companies and sole traders registered in the Republic of Slovenia under the Companies Act for performing educational activities • public or private institutes, registered in the Republic of Slovenia for performing educational activities • ICT associations registered under the Societies Act
Estimation of financial resources	EUR 350,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Call for proposals – Support for the cooperation of NGOs in the field of AI
Measure	Measure 7.6: Supporting networking and coordination of NGOs to participate in AI research, development, deployment and application activities at the national and EU levels
Target group	NGOs
Duration	2020–2025
Aid scheme	N/A
Form of aid	Call for proposals – cofinancing
Eligible costs / Activities	Costs of project implementation: • staff costs – labour • costs of external services • costs of amortisation/depreciation of fixed assets • travel costs • indirect costs
Participating institutions	To be determined during the programme's implementation by the SCAI
Selection criteria	The selection criteria will be defined in a meaningful way on the basis of the objectives set out in the call for proposals. They are expected to be identified in the context of: • project quality • impact of the project on NGO cooperation and coordination • adequacy of the project implementation (financial, staffing and time components)
Aid intensity	100% of eligible costs
Final beneficiaries and conditions	NGOs: • registered for an activity related to the development, deployment or use of AI, or an activity related to the legal, ethical, social, cultural, economic or educational aspects of AI • whose activities can contribute to the objective of ensuring public confidence in the research, development, deployment or use of AI
Estimation of financial resources	EUR 100.000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Call for proposals – Support for NGO projects to ensure public confidence in AI
Measure	Measure 7.7: Promoting NGO projects to ensure public confidence in AI
Target group	NGOs
Duration	2020–2025
Aid scheme	N/A
Form of aid	Call for proposals – cofinancing
Eligible costs / Activities	Costs of project implementation: • staff costs – labour • costs of external services • costs of amortisation/depreciation of fixed assets • travel costs • indirect costs
Participating institutions	To be determined during the programme's implementation by the SCAI
Selection criteria	The selection criteria will be defined in a meaningful way on the basis of the objectives set out in the call for proposals. They are expected to be identified in the context of: • the project's quality • the project's impact on public confidence in AI • the adequacy of the project's implementation (financial, staffing and time components)
Aid intensity	100% of eligible costs
Final beneficiaries and conditions	NGOs: • registered for an activity related to the development, deployment or use of AI, or an activity related to the legal, ethical, social, cultural, economic or educational aspects of AI • whose activities can contribute to the objective of ensuring public confidence in the research, development, deployment or use of AI
Estimation of financial resources	EUR 500,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Call for proposals – Support for the participation of Slovenian experts in relevant international AI working bodies and associations
Measure	Measure 9.4: Ensuring conditions for the participation of Slovenian experts in relevant international AI working bodies and associations
Target group	AI experts – individuals
Duration	2020–2025
Aid scheme	N/A
Form of aid	Call for proposals – cofinancing
Eligible costs / Activities	Costs of attending standardisation meetings: • travel costs to attend standardisation meetings (subsistence, accommodation, travel expenses) • costs of the annual membership fee of the association • other
Participating institutions	To be determined during the programme's implementation by the SCAI
Selection criteria	The selection criteria will be defined in a meaningful way on the basis of the objectives set out in the call for proposals. They are expected to be identified in the context of: • professionalism of the participant and the adequacy of the organisation for the AI • impact of participation in the organisation for Slovenia • relevance of the cooperation proposal (financial, staffing and time components)
Aid intensity	Travel costs: up to 100%, max. EUR 2,000 per trip Membership fee costs: 50%
Final beneficiaries and conditions	Experts – individuals
Estimation of financial resources	EUR 500,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Appendix 3: Proposal for implementing instruments for key measures – public administration

Implementing instrument	**Public administration's own project – Training of public administration staff**
Measure	Measure 2.9: Supporting staff training programmes (courses, seminars) to acquire new knowledge, skills and professional qualifications in the field of AI (re-skilling)
Target group	Public administration
Duration	2020–2025
Source of funds	EU funds, budgetary funds
Format of implementation	Educational workshop
Eligible costs / Activities	Costs of project implementation: • costs of lecturers • lecture room and computer equipment costs • promotional costs • other costs
Participating institutions	Administration Academy
Selection criteria for beneficiaries	The selection criteria will be defined in a meaningful way on the basis of the objectives defined in the public call. They are expected to be identified in the context of: • relevance of AI for the employer • beneficiary's field of work in terms of the need for AI expertise • other conditions
Level of financing	100%
Final beneficiaries and conditions	Public administration employees
Estimated financial resources for implementation	EUR 500,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Public administration's own project – Training of development teams in public administration
Measure	Measure 4.1: Supporting professional training programmes (seminars, courses) on specific AI models, methods and algorithms in selected priority areas of AI deployment, targeting development teams from companies and the public sector
Target group	Public administration
Duration	2020–2025
Source of funds	EU funds, budgetary funds
Format of implementation	Educational workshop
Eligible costs / Activities	Costs of project implementation: • costs of lecturers • lecture room and computer equipment costs • promotional costs • other costs
Participating institutions	Administration Academy
Selection criteria for beneficiaries	The selection criteria will be defined in a meaningful way on the basis of the objectives defined in the public call. They are expected to be identified in the context of: • relevance of AI for the employer • beneficiary's field of work in terms of the need for AI expertise • other conditions
Level of financing	100%
Final beneficiaries and conditions	Public administration employees developing or deploying AI-based solutions
Estimated financial resources for implementation	EUR 500,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Public administration's own project – Raising awareness of AI among public administration management
Measure	Measure 4.2: Supporting awareness-raising programmes (courses, seminars) for the management of companies and public sector organisations on the possibilities, advantages and disadvantages of AI deployment in companies' operations
Target group	Public administration
Duration	2020–2025
Source of funds	EU funds, budgetary funds
Format of implementation	Educational workshop
Eligible costs / Activities	Costs of project implementation: • costs of lecturers • lecture room and computer equipment costs • promotional costs • other costs
Participating institutions	Administration Academy
Selection criteria for beneficiaries	The selection criteria will be defined in a meaningful way on the basis of the objectives defined in the public call. They are expected to be identified in the context of: • relevance of AI for the employer • the beneficiary's field of work in terms of the need for AI expertise • other conditions
Level of financing	100%
Final beneficiaries and conditions	Management in public administration bodies
Estimated financial resources for implementation	EUR 250,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Public administration's own project – Reference implementation projects for AI deployment in public administration
Measure	Measure 4.7: Supporting reference implementation projects for AI deployment (TRL 9) to support the operations of companies, the public sector (including public administrations) (e.g. digitalisation of processes, optimisation of operations, the establishment of innovative business models and solutions, production digitalisation) in identified priority areas
Target group	State and public administration bodies
Duration	2020–2025
Source of funds	EU funds, budgetary funds
Format of implementation	IT project
Eligible costs / Activities	Costs of project implementation: • establishment of an IT environment for designing, developing, testing, implementing pilots and prototypes, and the solution's deployment into the production environment • purchase of SW and HW licences (required for the project) • designing, developing, testing, implementing pilots and prototypes, and deploying the solution into the production environment • regular maintenance and upgrading • other costs
Participating institutions	State and public administration bodies
Conditions for the selection of beneficiaries	The selection criteria will be defined in a meaningful way on the basis of the objectives defined in the call for proposals. They are expected to be identified in the context of: • expertise of the provider in AI technologies • references (e.g. comparable projects carried out in public administration, public sector or with comparable contracting authorities) • relevance of the proposed solution • ability to carry out maintenance works • economic advantage of the offer • other conditions relating to the object of the call for proposals
Level of financing	100%
Final beneficiaries and conditions	State and public administration bodies and contractors selected via public or pre-commercial procurement
Estimated financial resources for implementation	Projects of public administration bodies (PP): EUR 20,000,000 projects of public administration bodies (PCP): EUR 3,000,000
Type of investment – OP intervention categories	

Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	**Public administration's own project – Training of public administration employees on the ethical and legal framework for AI deployment**
Measure	Measure 4.8: Supporting the education and awareness-raising of companies and the public sector about ensuring a legal and ethical framework for the development, deployment and application of AI, including human rights compliance issues
Target group	Public administration
Duration	2020–2025
Source of funds	EU funds, budgetary funds
Format of implementation	Educational workshop
Eligible costs / Activities	Costs of project implementation: • costs of lecturers • lecture room and computer equipment costs • promotional costs • other costs
Participating institutions	Administration Academy
Conditions for the selection of beneficiaries	The selection criteria will be defined in a meaningful way on the basis of the objectives defined in the public call. They are expected to be identified in the context of: • relevance of AI for the employer • beneficiary's field of work in terms of the need for AI expertise • other conditions
Level of financing	100%
Final beneficiaries and conditions	Public administration employees
Estimated financial resources for implementation	EUR 250,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Public administration's own project – Setting up data spaces in public administration
Measure	Measure 5.2: Establishing national data spaces in different fields (e.g. manufacturing, environment and space, mobility, health and medicine, finance, energy, agriculture, public administration, skills) for the application of AI
Target group	Government administration
Duration	2020–2025
Source of funds	EU funds, budgetary funds
Format of implementation	IT project
Eligible costs / Activities	Costs of project implementation: • setting up an IT environment for designing, developing, testing, implementing pilots and prototypes, and deploying the solution into the production environment • purchase of SW and HW licences (required for the project) • designing, developing, testing, implementing pilots and prototypes, and deploying the solution into the production environment • regular maintenance and upgrading • other costs
Participating institutions	Ministry of Public Administration
Conditions for the selection of beneficiaries	The selection criteria will be defined in a meaningful way on the basis of the objectives defined in the call for proposals. They are expected to be identified in the context of: • expertise of the provider in AI technologies • references (e.g. comparable projects carried out in public administration, public sector or with comparable contracting authorities) • relevance of the proposed solution • ability to carry out maintenance works • economic advantage of the offer • other conditions relating to the object of the call for proposals
Level of financing	100%
Final beneficiaries and conditions	Ministry of Public Administration and contractors selected via public procurement
Estimated financial resources for implementation	EUR 2,000,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Public administration's own project – Running hackathons
Measure	Measure 5.6: Supporting prototyping (hackathons) of data linking, sharing and using with the development of various different solutions based on AI tools
Target group	Public administration
Duration	2020–2025
Source of funds	EU funds, budgetary funds
Format of implementation	IT project
Eligible costs / Activities	Costs of project implementation: • costs of external services – preparation and implementation of the hackathon • costs of materials • space and equipment rental costs • costs of hackathon prizes for participants
Participating institutions	Ministry of Public Administration
Conditions for the selection of beneficiaries	The selection criteria will be defined in a meaningful way on the basis of the objectives defined in the call for proposals. They are expected to be identified in the context of: • quality of the hackathon design • data quality and type • professionalism of the contractor in the field of hackathons • contractor's references (e.g. comparable projects carried out) • adequacy of the hackathon implementation (staffing and time components) • economic advantage of the offer • other conditions relating to the object of the call for proposals
Level of financing	100%
Final beneficiaries and conditions	Ministry of Public Administration, selected contractors and hackathon participants
Estimated financial resources for implementation	EUR 80,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Public administration's own project – Support for the portal and tools in the field of language resources
Measure	Measure 5.7: Supporting further development of the CLARIN.SI national infrastructure portal with tools and language resources in the field of language technologies
Target group	Public administration
Duration	2020–2025
Source of funds	EU funds, budgetary funds
Format of implementation	IT project
Eligible costs / Activities	Costs of project implementation: • setting up an IT environment for designing, developing, testing, implementing pilots and prototypes, and deploying the solution into the production environment • purchase of SW and HW licences (required for the project) • designing, developing, testing, implementing pilots and prototypes, and deploying the solution into the production environment • regular maintenance and upgrading • other costs
Participating institutions	Ministry of Public Administration
Conditions for the selection of beneficiaries	The selection criteria will be defined in a meaningful way on the basis of the objectives defined in the call for proposals. They are expected to be identified in the context of: • expertise of the provider in AI technologies • references (e.g. comparable projects carried out in public administration, public sector or with comparable contracting authorities) • relevance of the proposed solution • ability to carry out maintenance works • economic advantage of the offer • other conditions relating to the object of the call for proposals
Level of financing	100%
Final beneficiaries and conditions	Ministry of Public Administration and contractors selected via public procurement
Estimated financial resources for implementation	EUR 150,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Public administration's own portal – Support for the portal of AI tools
Measure	Measure 5.8: Setting up a national platform of AI tools and algorithms based on tools developed in Slovenia (Orange, DEXi, Text-Garden, etc.)
Target group	Public administration
Duration	2020–2025
Source of funds	EU funds, budgetary funds
Format of implementation	IT project
Eligible costs / Activities	Costs of project implementation: • establishment of an IT environment for designing, developing, testing, implementing pilots and prototypes, and the solution's deployment into the production environment • purchase of SW and HW licences (required for the project) • designing, developing, testing, implementing pilots and prototypes, and deploying the solution into the production environment • regular maintenance and upgrading • other costs
Participating institutions	Ministry of Public Administration
Conditions for the selection of beneficiaries	The selection criteria will be defined in a meaningful way on the basis of the objectives defined in the call for proposals. They are expected to be identified in the context of: • expertise of the provider in AI technologies • references (e.g. comparable projects carried out in Public administration, public sector or with comparable contracting authorities) • relevance of the proposed solution • ability to carry out maintenance works • economic advantage of the offer • other conditions relating to the object of the call for proposals
Level of financing	100%
Final beneficiaries and conditions	Ministry of Public Administration and contractors selected via public procurement
Estimated financial resources for implementation	EUR 800,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Public administration's own project – Platform for IoT data aggregation for AI
Measure	Measure 5.10: Establishing an IoT data aggregation platform for the development, testing, deployment and use of AI methods and solutions
Target group	Public administration
Duration	2020–2025
Source of funds	EU funds, budgetary funds
Format of implementation	IT project
Eligible costs / Activities	Costs of project implementation: • establishment of an IT environment for designing, developing, testing, implementing pilots and prototypes, and the solution's deployment into the production environment • purchase of SW and HW licences (required for the project) • designing, developing, testing, implementing pilots and prototypes, and deploying the solution into the production environment • regular maintenance and upgrading • other costs
Participating institutions	Ministry of Public Administration
Conditions for the selection of beneficiaries	The selection criteria will be defined in a meaningful way on the basis of the objectives defined in the call for proposals. They are expected to be identified in the context of: • expertise of the provider in AI technologies • references (e.g. comparable projects carried out in public administration, public sector or with comparable contracting authorities) • relevance of the proposed solution • ability to carry out maintenance works • economic advantage of the offer • other conditions relating to the object of the call for proposals
Level of financing	100%
Final beneficiaries and conditions	Ministry of Public Administration and contractors selected via public procurement
Estimated financial resources for implementation	EUR 1,000,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Public administration's own project – AI application project
Measure	Measure 6.1: Pilot project on AI use in the field of cyber security
Target group	Public administration
Duration	2020–2025
Source of funds	EU funds, budgetary funds
Format of implementation	IT project
Eligible costs / Activities	Costs of project implementation: • establishment of an IT environment for designing, developing, testing, implementing pilots and prototypes, and the solution's deployment into the production environment • purchase of SW and HW licences (required for the project) • designing, developing, testing, implementing pilots and prototypes, and deploying the solution into the production environment • regular maintenance and upgrading • other costs
Participating institutions	Ministry of Public Administration
Conditions for the selection of beneficiaries	The selection criteria will be defined in a meaningful way on the basis of the objectives defined in the call for proposals. They are expected to be identified in the context of: • the provider's expertise in AI technologies • references (e.g. comparable projects carried out in public administration, public sector or with comparable contracting authorities) • relevance of the proposed solution • ability to carry out maintenance works • economic advantage of the offer • other conditions relating to the object of the call for proposals
Level of financing	100%
Final beneficiaries and conditions	Ministry of Public Administration and contractors selected via public procurement
Estimated financial resources for implementation	EUR 1,000,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Public administration's own project – AI application project
Measure	Measure 6.3: Implementation of a pilot project on the legal and ethically compliant use and implementation of AI methods to increase the effectiveness of policing
Target group	Public administration
Duration	2020–2025
Source of funds	EU funds, budgetary funds
Format of implementation	IT project
Eligible costs / Activities	Costs of project implementation: • establishment of an IT environment for designing, developing, testing, implementing pilots and prototypes, and the solution's deployment into the production environment • purchase of SW and HW licences (required for the project) • designing, developing, testing, implementing pilots and prototypes, and deploying the solution into the production environment • regular maintenance and upgrading • other costs
Participating institutions	Ministry of the Interior
Conditions for the selection of beneficiaries	The selection criteria will be defined in a meaningful way on the basis of the objectives defined in the call for proposals. They are expected to be identified in the context of: • expertise of the provider in AI technologies • references (e.g. comparable projects carried out in public administration, public sector or with comparable contracting authorities) • relevance of the proposed solution • ability to carry out maintenance works • economic advantage of the offer • other conditions relating to the object of the call for proposals
Level of financing	100%
Final beneficiaries and conditions	Ministry of the Interior and contractors selected via public procurement
Estimated financial resources for implementation	EUR 500,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia

Implementing instrument	Public administration's own project – AI training for public administration
Measure	Measure 7.2: Supporting activities (conferences, workshops, etc.) to raise awareness among companies, the public sector and the public on AI strengths, weaknesses, opportunities and threats
Target group	General public
Duration	2020–2025
Source of funds	EU funds, budgetary funds
Format of implementation	Educational conference/workshop
Eligible costs / Activities	Costs of project implementation: • costs of lecturers • costs of premises • costs of preparing and holding the conference • promotional costs • other costs
Participating institutions	Ministry of Public Administration
Selection criteria for beneficiaries	The selection criteria will be defined in a meaningful way on the basis of the objectives defined in the call for proposals. They are expected to be identified in the context of: • suitability of the premises for the conference • conference design (finance, space, time) • price of implementation • other conditions
Level of financing	100%
Final beneficiaries and conditions	Ministry of Public Administration and contractors selected in a public procurement procedure
Estimated financial resources for implementation	EUR 250,000
Type of investment – OP intervention categories	
Connection to the OP	
Territorial aspect	Slovenia