European Union

Ministry of Public Administration

UNDP

# Artificial Intelligence Landscape Assessment (AILA)

## Shaping AI to be an empowering force for people and planet

MONTENEGRO, 2024

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# Executive summary

The Montenegro government, in collaboration with the United Nations Development Programme (UNDP) in Montenegro and the Chief Digital Office (CDO), has taken a significant step towards embracing the transformative power of Artificial Intelligence (AI). This initiative underscores the country's commitment to leveraging AI to address societal challenges, enhance public services, and drive economic growth in line with the Sustainable Development Goals (SDGs).

Central to this effort is the launch of the AI Landscape Assessment (AILA) by the UNDP, a comprehensive tool designed to evaluate a country's readiness for ethical AI integration. AILA, through its methodical approach, focuses on three fundamental pillars: the government as an AI user, its role as an enabler in the AI ecosystem, and fostering the development of ethical AI nationwide. This assessment tool, leveraging both quantitative and qualitative data, aims to analyze the government's preparedness to adopt and enable AI ethically and responsibly.

Montenegro stands at a pivotal juncture, with the potential to harness AI to advance its progress towards the Sustainable Development Goals (SDGs). This aligns with the nation's overarching vision, particularly in critical sectors such as poverty alleviation, healthcare, education, and economic development. However, the journey towards effective AI integration is not without challenges. Research identifies key areas such as the need for enhanced digital infrastructure, improved AI-specific skills, robust governance frameworks, and ethical safeguards.

The AI Landscape Assessment report provides an in-depth analysis of Montenegro's current AI landscape, highlighting both capabilities and challenges. Among its key findings is the identification of opportunities to integrate AI into public services, foster innovation through public-private partnerships, and address pressing issues such as data interoperability and inclusivity. The report suggests prioritizing AI applications in sectors where Montenegro has competitive advantages, such as tourism, environmental management, and public administration, while also focusing on foundational investments in skills development and infrastructure.

In addressing these priorities and challenges, Montenegro can position itself as a regional leader in ethical and impactful AI adoption, leveraging the transformative potential of AI to improve citizens' quality of life and advance sustainable development.

## Background note

The transformative potential of artificial intelligence (AI) spans various industries and holds the promise of significantly contributing to the Sustainable Development Goals (SDGs). Recognizing this, governments have a key role in ensuring that AI is applied in a manner that upholds human rights and governance principles. AI readiness, therefore, encompasses a government's preparedness to ethically leverage AI technology for public good, entailing the development of strategies, policies, standards, and laws, both as facilitators of the AI-driven economy and as users of AI in public administration and services.

As AI emerges as a dominant force in the global economic landscape, the concept of AI readiness becomes increasingly critical. Governments equipped to deploy AI in public services can harness its advantages — enhanced efficiency, and improved decision-making processes — while addressing potential risks like bias and privacy concerns. Such readiness ensures a competitive advantage in sectors like trade, manufacturing, and security and safeguards citizens' rights and freedoms. An AI-ready government is competent in navigating and mitigating AI-related challenges, including workforce displacement and ethical issues, fostering a balanced and responsible integration of AI into societal and economic frameworks.

Montenegro's digital landscape provides a robust foundation for advancing AI readiness, with approximately 80% of households connected to the internet and mobile phone penetration reaching nearly 80% of the population. Urban areas, including the capital Podgorica, enjoy extensive 4G coverage, while the gradual rollout of 5G infrastructure presents opportunities for enhanced digital services. With a median population age of 39.6 years, Montenegro boasts a workforce primed for digital skill development, supporting AI integration. Furthermore, Montenegro's legislative framework, anchored by the Personal Data Protection Law, that will be aligned with GDPR standards, ensuring a robust regulatory environment for data privacy and security. These elements collectively position Montenegro as a promising candidate for leveraging AI to bolster public administration and catalyze economic innovation.

# Introduction

## Background

Supporting this assessment is the United Nations Development Programme (UNDP) in Montenegro and the Chief Digital Office (CDO), which have jointly collaborated to launch the AI Landscape Assessment (AILA). The AILA, crafted by UNDP, is an evaluative tool designed to assess a country's current AI capabilities and aims at informing Montenegro's AI strategy. It examines three core pillars: government as a user of AI in public service delivery and operations, government as an enabler of a wider AI ecosystem, and the country-wide development of ethical AI principles and practices. Drawing on surveys, workshops, key informant interviews, and external indicators, this robust assessment calculates scores across a series of dimensions and sub-dimensions within each pillar to determine readiness on a spectrum from basic (>0 to ≤1) to transformational (>4 to ≤5)

## Purpose and scope

This report aims to provide a comprehensive analysis of Montenegro's AI readiness. It outlines the purpose of the assessment, which is to evaluate the country's preparedness to leverage AI technology ethically and effectively. The scope covers various dimensions and sub-dimensions within the three core pillars of the assessment framework.

## Methodology

The methodology section briefly describes the approaches used for data collection and analysis. It includes surveys, workshops, key informant interviews, and external indicators. The section also highlights any challenges faced during data collection and how they were mitigated. For complete details on the AILA methodology and scoring approach, please refer to Annex I

Our assessment began with a comprehensive workshop exploring the intricacies of AI deployment in both the broader economy and the public sector, laying essential groundwork for our analysis. In the first part of the workshop, we focused on identifying areas where AI is or could potentially be developed and deployed across various economic sectors. We examined where AI is currently utilized, understood barriers impeding the deployment of advanced technologies, and discussed how government initiatives support technological advancements, highlighting successful interventions and the roles of different ministries or departments.

In the second part, the workshop shifted focus to the application of AI within the public sector. We discussed the varying levels of readiness and appetite for change and innovation across different ministries.

We evaluated current technology use in government, debated strategies for technology adoption—whether to build in-house or procure from the private sector or academia—and addressed the main barriers to further technological innovation. We explored current and potential uses of technology in public services and examined which departments or public bodies regularly collect data, assessing data accessibility and sharing within government entities.

Building on the workshop, we conducted 19 key informant interviews (KIIs) to deepen our understanding of Montenegro's AI landscape within its socio-economic and technological context. The key informants comprised specialists from academia, the private sector, the public sector, and experts with deep knowledge of Montenegro. Academics provided detailed insights into the country's current AI research and education landscape, including academic capabilities, research focuses, and challenges and opportunities in developing local AI expertise. Private sector specialists offered practical perspectives on AI use in Montenegro's commercial landscape, discussing industry implementation, impacts on operations, and obstacles to integrating AI into existing business models. Public sector officials contributed government perspectives on legislative initiatives, regulatory frameworks, and AI usage in public services, crucial for understanding the government's role in promoting AI development, addressing ethical and regulatory issues, and leveraging AI for public benefit.

The results were then validated, shared with key stakeholders for feedback, and prepared for publication.


Artificial Intelligence Landscape Assessment workshop with Government representatives and UNDP experts, October 2024

# Overview of priorities, interests and challenges in Montenegro

## ➤ Observed priorities and interests

AI has the potential to revolutionize economies and societies, changing how we tackle complex issues and take advantage of new possibilities. The analysis of responses on AI interest areas revealed a broad spectrum of sectors where AI is seen as impactful. There was a notable interest in improvement of Public Services, Integration and Safe Use of Artificial Intelligence (AI), Applications in Education, Innovation in Analysis and Statistics, Digitalization for SMEs and Entrepreneurs, Integrating AI into State Systems, and Innovating Service Provision to Beneficiaries.

The survey responses, when discussing national priorities, aligned closely with the key informant interviews (KIIs), emphasizing three core areas:

**1. Digital Transformation and Cybersecurity:** Both the survey responses and KIIs highlighted the importance of digitalization across various sectors, with a focus on transforming public services to be more efficient, accessible, and secure. Cybersecurity was repeatedly mentioned as a crucial aspect, underscoring the need for robust measures to protect digital infrastructure and ensure interoperability across systems.

**2. Economic Development and Sectoral Support:** There was a strong emphasis on economic growth strategies, particularly through investments in tourism, energy, and infrastructure. Both the survey and KIIs identified the need for targeted financial support to key sectors, including micro, small, and medium enterprises (MSMEs), and regional development initiatives to drive economic resilience and diversification.

**3. Quality of Life through Health, Education, and Climate Adaptation:** Prioritizing high-quality healthcare services, educational systems aligned with European standards, and climate change mitigation strategies were identified as national priorities. The alignment between survey responses and KIIs on these topics highlights the focus on improving citizens' quality of life through sustainable and inclusive development.

## ➤ Observed challenges

The challenges faced by government agencies in implementing AI and data initiatives are multidimensional, as indicated by the variety of difficulties raised in survey responses. The most notable of these are (sorted by number of mentions):

- **Lack of Expertise and Skills in AI and IT** – A recurring challenge is the lack of technical skills and expertise in AI, IT, and cybersecurity among government employees and the general workforce.
- **Need for Improved IT Infrastructure** – There is a recognized need to upgrade IT infrastructure to support AI implementation effectively…. Can we be specific? Maybe refer to computing power or energy?
- **Legislative and Normative Obstacles** – Insufficiently fast legislative changes and regulatory updates to accommodate AI technologies are seen as significant barriers.
- **Traditional Work Mentality and Awareness** – The existing mindset and low awareness of the benefits of AI and data use in government agencies create resistance to adopting new technologies.
- **Lack of Interconnectivity Among Government Bodies** – The absence of automatic data exchange and interconnectivity between state and local government entities hinders efficient digital transformation.

These challenges are also complemented by the findings from the Key Informant Interviews. A key informant pointed out :

- **Lack of Publicly Available Large Datasets:** Representatives from the academic sector emphasized that the absence of large, publicly accessible datasets limits the ability to train and develop AI models effectively. This shortage poses a major barrier to advancing AI research and innovation locally.
- **Dependency on External AI Models:** Some key informants noted that most AI solutions under development are based on models like ChatGPT or similar third-party platforms. This reliance indicates:
  - A lack of proprietary AI solutions tailored to specific local needs.
  - Dependency on external sources, which may affect data sovereignty and limit customization.

- **Alignment with Broader Challenges:** The KIIs also echoed the broader issues identified in the survey, including:
  - Lack of expertise and technical skills in AI and IT.
  - Need for enhanced IT infrastructure to support AI integration.
  - Insufficiently fast legislative and normative changes to accommodate emerging AI technologies.
  - Traditional work mentality and low awareness of AI's potential benefits within government bodies.
  - Lack of interconnectivity among government entities, hampering data sharing and collaboration.

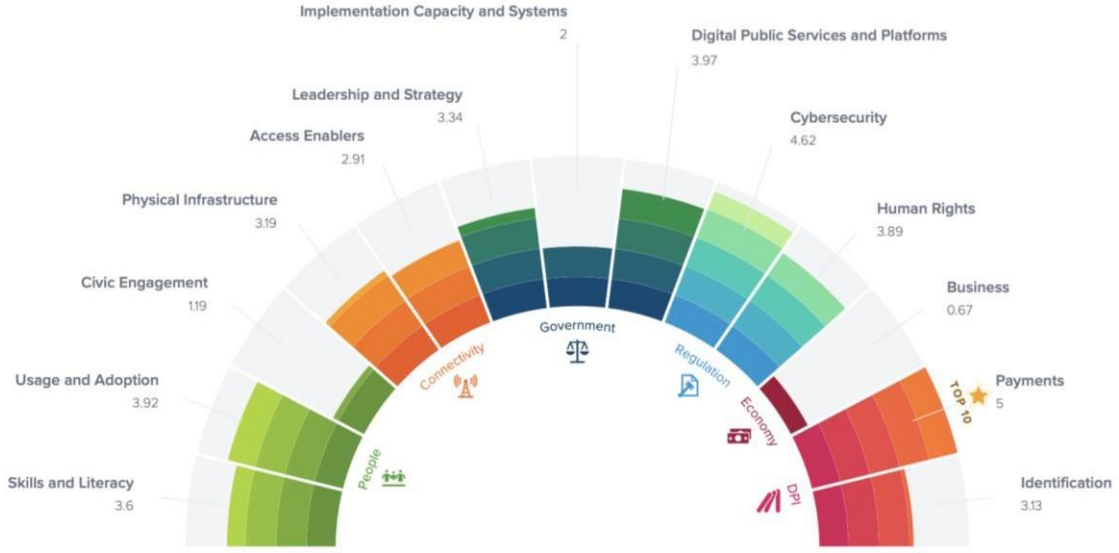
# Digital landscape of Montenegro

## Current state:

The digital landscape in Montenegro is characterized by moderate internet and mobile connectivity, with specific areas needing improvement. Approximately 80% of households in Montenegro have internet access, and 79.8% of the population have mobile phones, facilitating substantial digital engagement, primarily in urban areas.

Montenegro's mobile connectivity is extensive, with 4G coverage reaching 98.2% of the population. However, 5G infrastructure, while expanding, currently covers about 75% of the population, primarily in urban areas. This reflects the ongoing development of high-speed mobile connectivity, suggesting opportunities for further expansion to support enhanced digital services.

Social media usage in Montenegro is significant, with approximately 75.4% of the population actively engaged on platforms like Facebook and Instagram. This high level of engagement underscores the country's digital interaction, particularly among younger users, reflecting a tech-savvy and digitally active population. However, challenges remain, especially in rural areas where high-speed connectivity is less accessible, underscoring the need for a comprehensive digital infrastructure to support equitable growth in Montenegro's digital economy. (source https://www.digitaldevelopmentcompass.org/country/MNE )



## Demographic insights

Montenegro's demographic profile provides valuable insights into its digital adoption and AI readiness.

**Population Statistics** (source Monstat)

**Total Population:** According to the preliminary results of the 2023 Census, Montenegro has 633,158 inhabitants.

**Urbanization:** A significant portion of the population resides in urban areas, with Podgorica, the capital city, being the most populous municipality. (Graph 1.)

**Age Distribution** (Graph 2.):

The average age of the population is approximately 39.6 years.

Age Structure:

- 0-14 years: 18.14%
- 15-24 years: 12.78%
- 25-54 years: 39.65%
- 55-64 years: 13.41%
- 65 years and over: 16.02%

**Implications for Digital Adoption and AI Readiness**

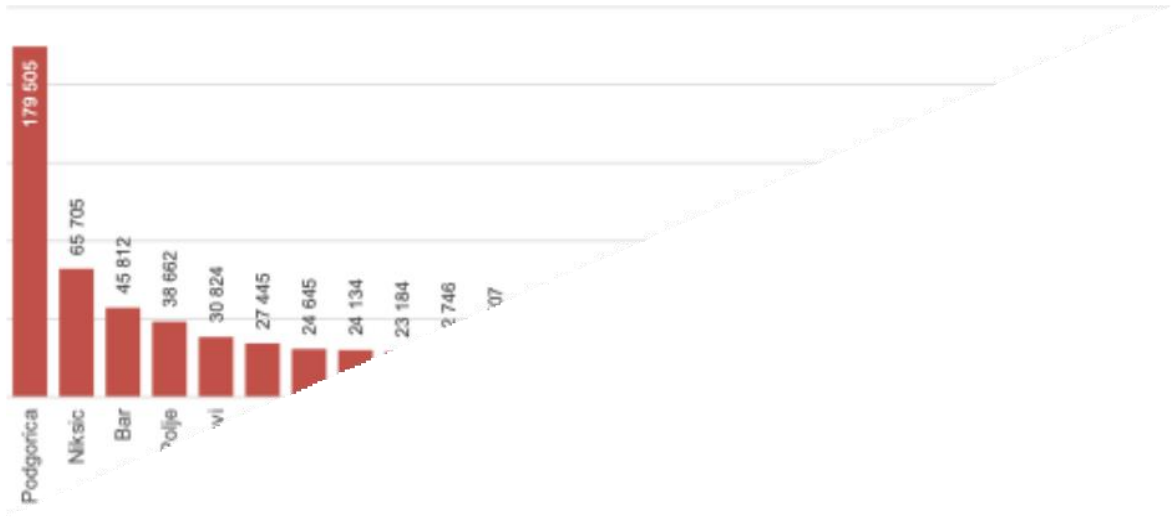
**Urbanization:** The concentration of the population in urban areas suggests a higher potential for digital infrastructure development and technology adoption, as urban regions typically have better access to digital services.

**Median Age**

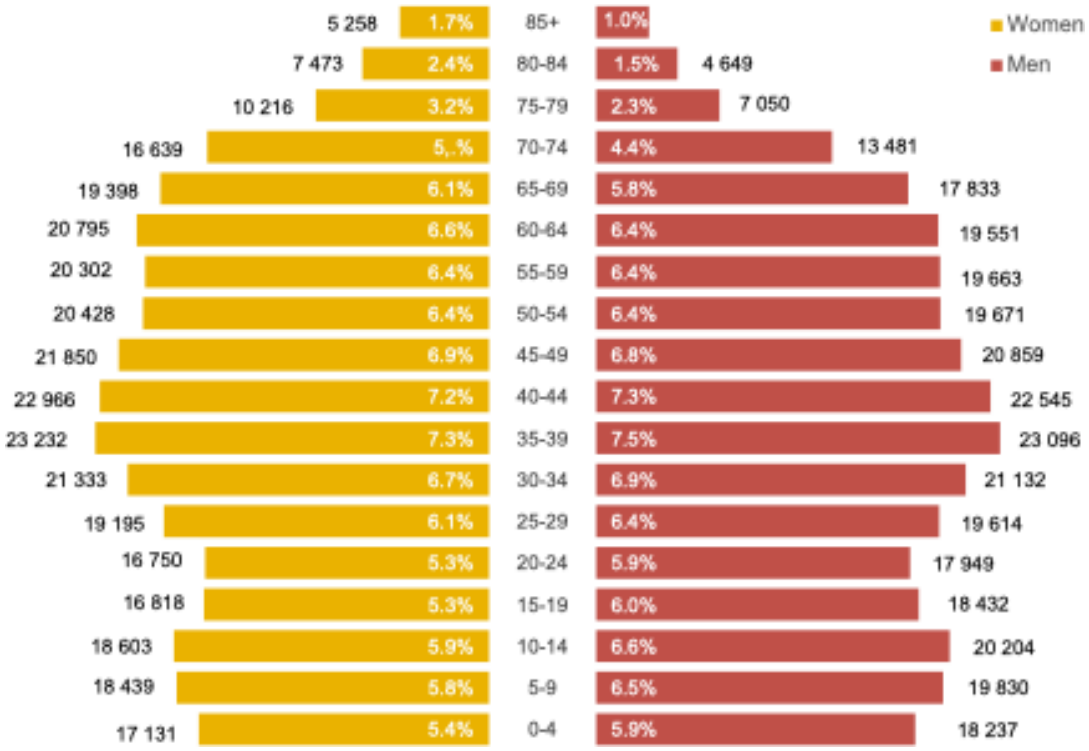
An average age of approximately 39.6 years indicates a workforce that is mature yet adaptable, which is beneficial for integrating new technologies like AI.

**Age Structure:**

The substantial proportion of the population in the 25-54 age bracket represents a strong base of working-age individuals who can be trained in digital skills, supporting AI readiness.




Graph 1. The population of Montenegro, by municipalities




Graph 2. Population of Montenegro, by age and sex

## Data governance:

Montenegro's data governance framework is primarily structured around the Personal Data Protection Law (PDPL), which establishes the legal basis for data privacy and security in the country. The PDPL, first enacted in December 2008 and last amended in April 2017, aligns with the principles of the EU's Data Protection Directive (Directive 95/46/EC). (source DLA Paper Data Protection)

**Key Legislation and Policies:**

- **Personal Data Protection Law (PDPL):** This law outlines the rights of individuals regarding their personal data and sets obligations for data controllers and processors. It covers aspects such as data collection, processing, storage, and transfer, ensuring that personal data is handled lawfully and transparently. (source AZLP)
- **Agency for Personal Data Protection and Free Access to Information (AZLP):** Established under the PDPL, the AZLP serves as the supervisory authority overseeing the implementation and enforcement of data protection regulations. The agency operates autonomously and independently, ensuring compliance with data protection laws and addressing violations.
- **International Alignment:** Montenegro is a signatory to the Council of Europe Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data. This commitment reflects the country's dedication to upholding international standards in data protection. (source Council of Europe)

**Recent Developments**

In March 2024, the Ministry of Interior prepared a draft of a new Personal Data Protection Act, aiming to align Montenegro's data protection framework more closely with the EU's General Data Protection Regulation (GDPR). As of September 2024, the draft had undergone public consultations and was under review by the AZLP. The Montenegrin Parliament is expected to enact the new law in 2025, following the European Commission's examination as part of Montenegro's EU accession process. (source Data Guidance)

**Implications for Data Privacy and Security**

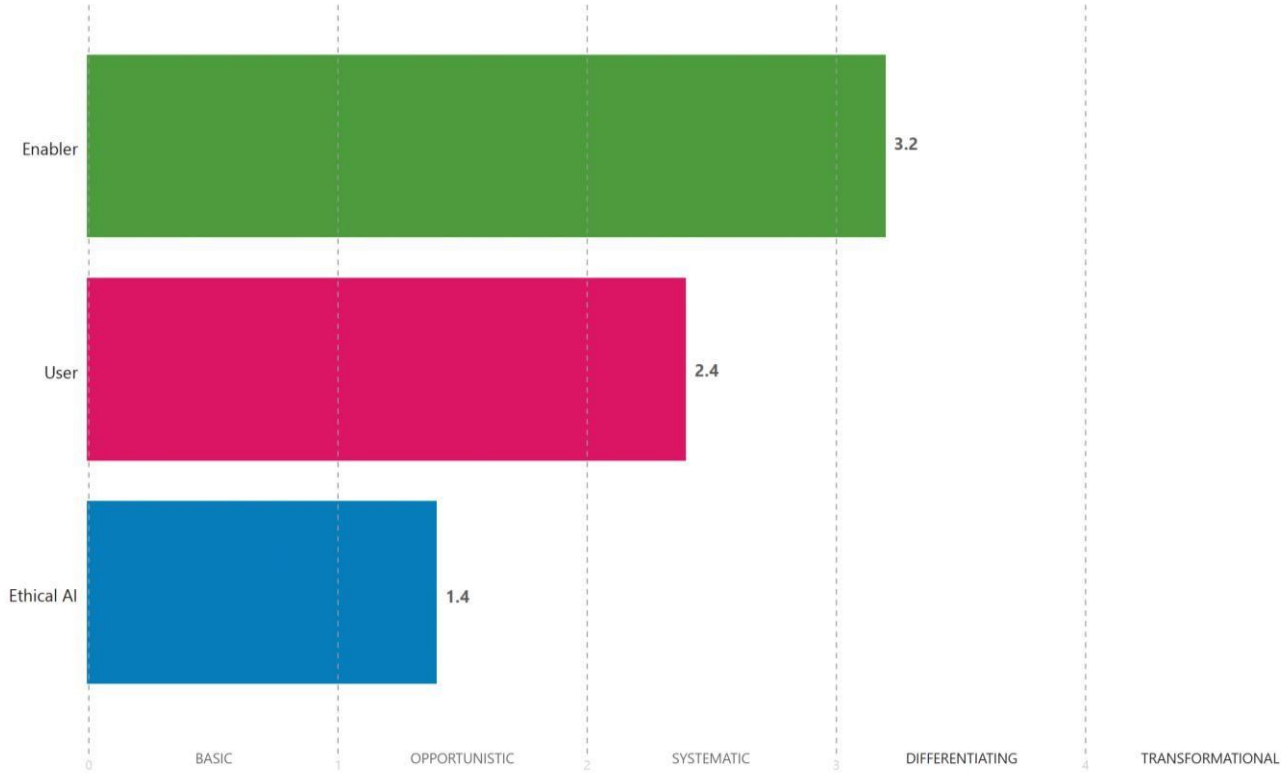
The existing PDPL provides a foundational framework for data privacy and security in Montenegro. However, the anticipated adoption of the new Personal Data Protection Act is expected to enhance this framework by incorporating more comprehensive protections and aligning with EU standards. This progression underscores Montenegro's commitment to strengthening data governance and ensuring robust data privacy and security measures.

# Assessment results and recommendations

This section will provide a complete study and analysis of Montenegro's artificial intelligence (AI) landscape and readiness. The three main pillars are Government as a User, Government as an Enabler, and Ethical AI.

## ➤ Analysis by pillar

**Figure 1: Overview of Montenegro's AI Readiness Scores per Pillar**



Pillar 1

## Government as a user

In the context of government AI usage, Montenegro lies in the Systematic phase with the score 2.4 where there is a comprehensive and coordinated effort towards preparing for the deployment and integration of artificial intelligence. This phase is characterized by coordinated preparation for the use of AI and data, with support for developing the necessary skills, structures, and systems within government.

Pillar 2

## Government as an enabler

In the role of government as an enabler for AI development, Montenegro falls within the Differentiating phase with a score of 3.2 This phase indicates a whole-of-government approach that is either formalized or in the process of formalization, with strong support for developing the necessary enabling conditions.

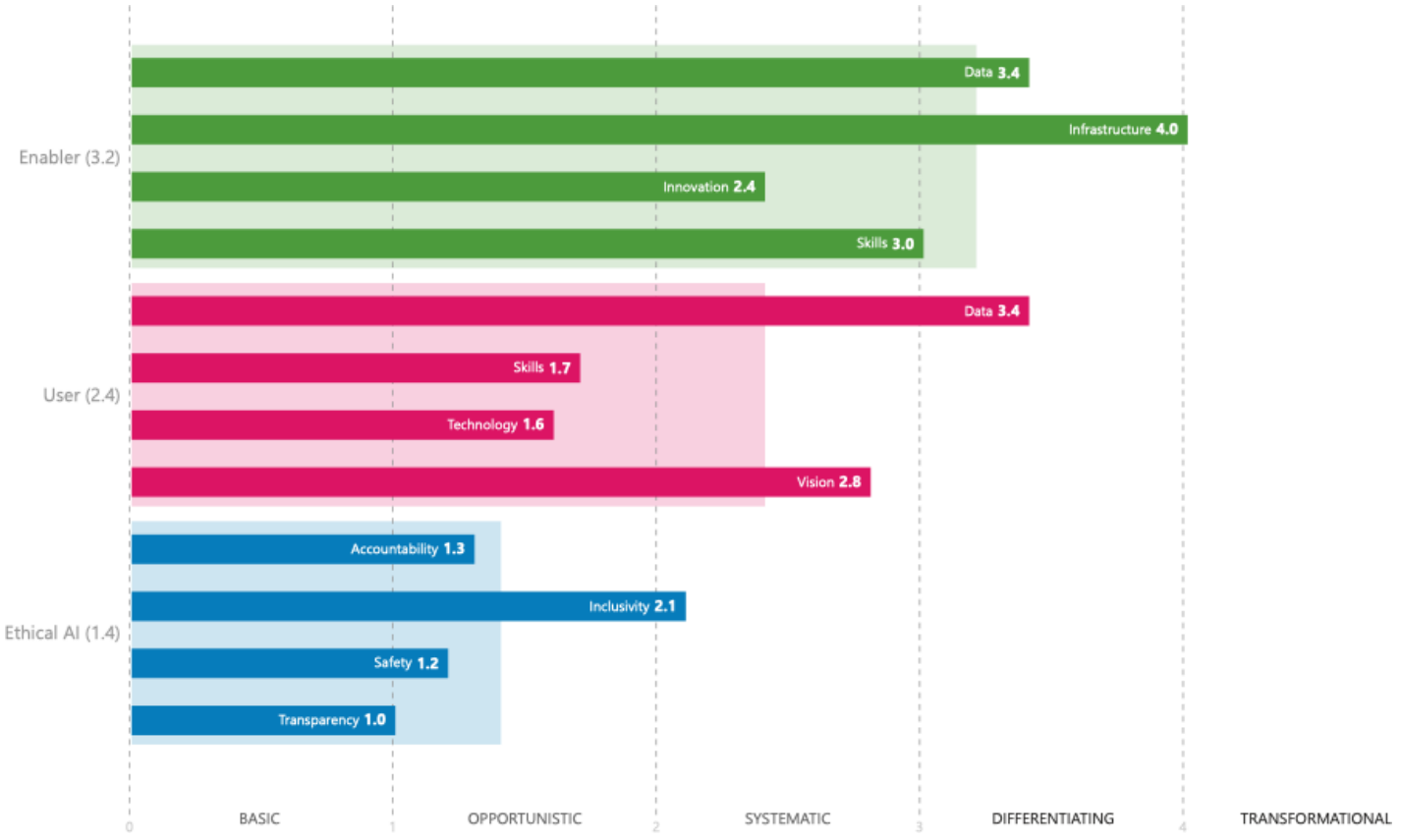
Pillar 3

## Ethical AI

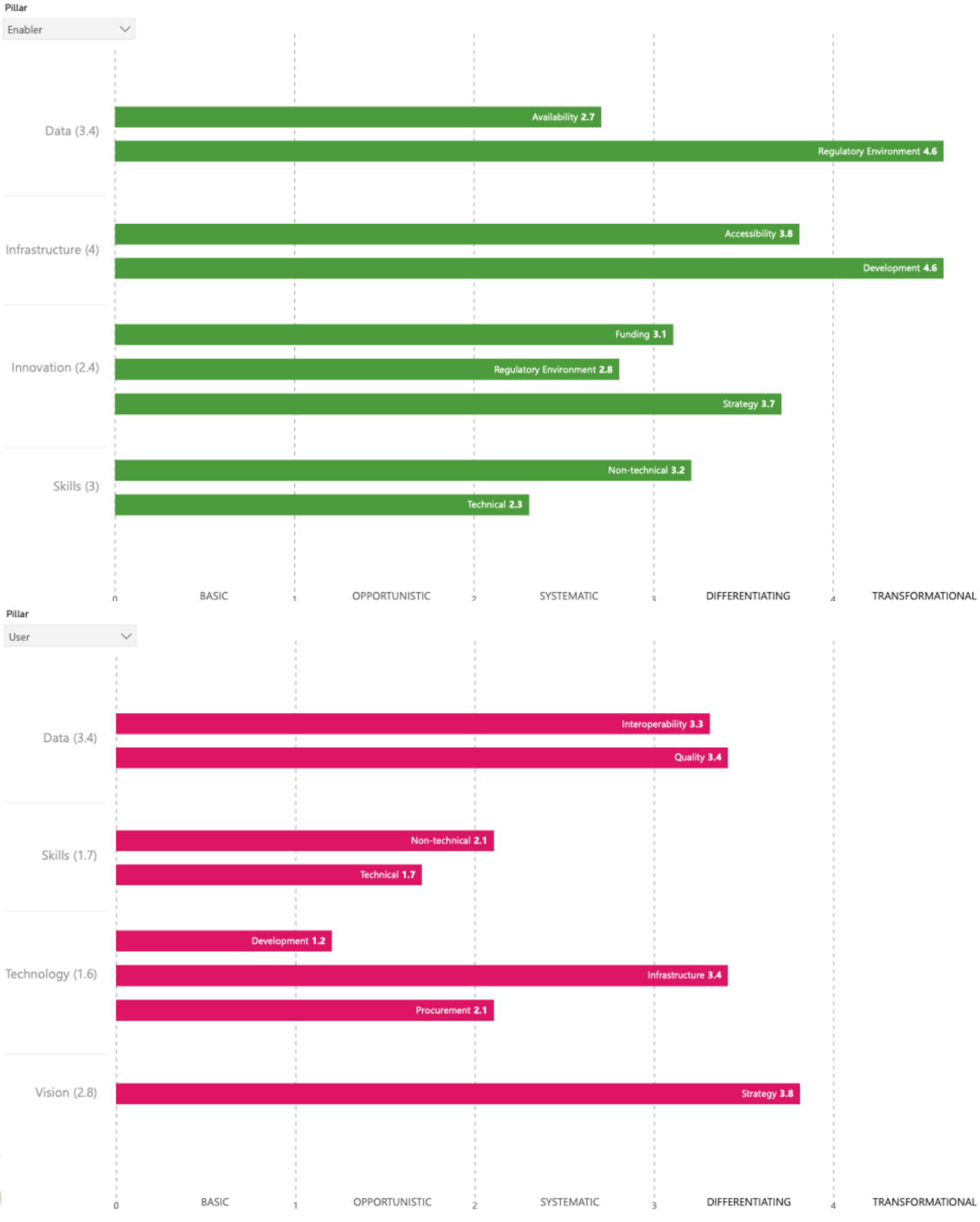
Regarding ethical AI, Montenegro is currently in the Opportunistic phase with a score of 1.4. This stage indicates that some legal and policy work has been undertaken to guide ethical AI, though societal factors may act as inhibitors.

# Analysis per dimension and subdimension

**Figure 2: Overview of Montenegro's AI readiness scores per dimension**



## Figure 3: Overview of Montenegro's AI readiness scores per subdimension



Pillar 1

# Government as a **user** of AI

This pillar includes technology, data, skills and vision as dimensions.

## 1. Technology

### ➤ Analysis

Governments do not just enable technology—they also use it. Governments both build AI tools internally and purchase AI tools from external suppliers through procurement. The subdimensions of technology are development, procurement, and infrastructure. The subdimensions for data are quality and interoperability. The breakdown of dimensions is shown in Figure 2.

**The overall AI Readiness phase for Technology is Opportunistic with score 1.6 which implies that Montenegro is in the very early stages of developing and integrating AI-related technologies within government operations. This score reflects limited activity in AI technology adoption, with most current use limited to individual instances of ChatGPT by some employees, rather than any formal or system-wide AI tools.**

The subdimension **Development** is rated at 1.2 (Opportunistic), indicating minimal in-house efforts to build AI tools or investing in AI-specific research and development.

**Infrastructure** scores 3.4 (Differentiating), showing that while there is some foundational digital infrastructure, it is not yet tailored to fully support AI initiatives.

Lastly, **Procurement** is rated at 2.1 (Systematic), suggesting that while there may be initial procedures in place for acquiring technology, there is no specific focus or strategy for AI procurement.

To move beyond this level, Montenegro would need to strengthen its internal capacity to develop AI, improve AI-specific infrastructure, and establish a structured approach to procuring AI solutions. These advancements would help the government transition from isolated, opportunistic uses of AI to a more coordinated and impactful integration of AI technologies.

## ➤ Recommendations

1. **Recognize AI Within National Regulation:** Establish legal recognition of AI within Montenegro's national regulatory framework. This involves defining AI technologies, outlining governance principles, and setting standards for ethical, transparent, and secure AI use in both public and private sectors. Recognizing AI in national regulations will create a foundation for structured development and accountability in AI initiatives.

2. **Develop a Government AI Technology Strategy:** Create a strategy focused on AI technology adoption in government, covering goals for in-house development, procurement standards, and infrastructure requirements. This strategy should prioritize identifying areas where AI can enhance public services and outline a roadmap for AI integration.

3. **Enhance Digital Infrastructure for AI Readiness:** Invest in upgrading government digital infrastructure to support AI applications. This may include expanding cloud capabilities, data storage solutions, and cybersecurity measures that are critical for safely deploying AI tools across government departments.

4. **Establish AI-Specific Procurement Guidelines:** Develop guidelines and standards for AI procurement, ensuring that AI solutions acquired from external suppliers meet ethical, transparent, and security requirements. This could include implementing vendor assessment criteria focused on AI expertise, data handling practices, and algorithm transparency.

5. **Create Capacity for In-House AI Development:** Build internal AI development capabilities by investing in training and resources for government employees. Encouraging upskilling in data science, machine learning, and AI development can enable departments to create customized AI solutions tailored to Montenegro's needs.

6. **Launch Pilot Programs for AI Tools in Government Services:** Begin with pilot projects that apply AI to specific government functions, such as public service delivery or administrative processes. These pilot programs can provide valuable insights, help evaluate the effectiveness of AI tools, and guide broader adoption of AI technologies in government.

# 2. Data

## ➤ Analysis

Access to high-quality, representative data is vital to developing accurate, non-discriminatory AI. Within government, the value of AI will also be maximized if information can be exchanged between different systems, in what is known as interoperability.

**The overall AI Readiness phase for data is Differentiating with a score of 3.4 which implies that Montenegro has made progress in developing the data infrastructure needed to support AI, though gaps remain, particularly in interoperability. This phase reflects a foundational level where data quality and exchange between systems are starting to meet the requirements for effective AI implementation.**

Specifically, **Interoperability** is rated at 3.3 (Differentiating), suggesting that while some systems can exchange information, there are still limitations that prevent seamless data integration across government departments. Key Informant Interviews (KIIs) indicated that interoperability is a critical area that needs improvement to enhance AI's value in public administration.

**Data Quality**, rated at 3.4 (Differentiating), indicates that Montenegro has established certain standards for high-quality data, which supports the development of accurate and fair AI models. However, ensuring consistent quality across datasets remains a work in progress, especially as new AI applications emerge.

To progress further, Montenegro would need to enhance data interoperability and consistently maintain high standards for data quality, enabling more reliable and equitable AI systems across government sectors.

## ➤ Recommendations

1. **Strengthen Data Interoperability Standards:** Establish and enforce standardized protocols for data exchange across government systems to improve interoperability. This may include adopting common data formats, implementing APIs for data sharing, and aligning with international data interoperability standards.

2. **Enhance Data Quality Monitoring and Improvement Programs:** Implement regular data quality assessments and establish a centralized body responsible for setting and enforcing data quality standards across government departments. This body can ensure that data used for AI applications is accurate, complete, and up-to-date. Incorporating mechanisms for identifying and reporting data errors can further improve overall data reliability.

3. **Invest in Infrastructure to Support Seamless Data Integration:** Upgrade digital infrastructure to facilitate data sharing and interoperability between government departments. This could involve integrating data warehouses, cloud storage, and secure data-sharing platforms to ensure data flows smoothly across systems.

4. **Create a Training Program for Data Management and Interoperability:** Provide government employees with training on best practices for data management and interoperability. Building capacity in these areas will improve data handling across departments and help ensure that AI systems are supported by consistent, high-quality data.

# 3. Skills

## ➤ Analysis

In order to build or use AI, governments need both technical skills for building and adopting AI tools and non-technical skills to support the use and integration of new technologies. The subdimensions for skills are technical and non-technical.

**The overall AI Readiness phase for skills is Opportunistic, with a score of 1.7 which implies that Montenegro is in the early stages of developing the workforce capabilities needed to support AI adoption. This score indicates that the government currently lacks the technical and non-technical skills required for effectively building and integrating AI tools.**

**Technical skills** are rated at 1.7 (Opportunistic), reflecting minimal capacity among government employees to develop or manage AI systems, as confirmed by Key Informant Interviews (KIIs) where stakeholders noted a significant skills gap in AI-related competencies.

**Non-technical skills**, rated at 2.1 (Systematic), suggest that while there is a basic understanding of AI-related processes, support for change management, strategic thinking, and integration is limited.

To advance beyond this stage, Montenegro would need to invest in both technical and non-technical training programs, focusing on upskilling government employees to effectively support and manage AI initiatives. Building this foundational skill set is essential for enabling responsible and successful AI implementation across government services.

## ➤ Recommendations

1. **Develop a Comprehensive AI Training Program:** Establish a structured training program for government employees focused on building foundational technical skills in AI, data science, and machine learning. This program should include both introductory and advanced courses to gradually develop the necessary skills for AI adoption. The training should cover practical aspects such as how to use AI, which tools are available, and how to apply them in an ethical manner. This initiative can be carried out in collaboration with the academic sector to ensure a robust and well-informed approach to training.

2. **Promote Non-Technical Skill Development for AI Integration:** Provide workshops and seminars on non-technical skills such as strategic planning, change management, and digital ethics to support the smooth integration of AI technologies within government processes. Non-technical training will help employees understand the broader implications of AI and prepare for its effective use.

# 4. Vision

## ➤ Analysis

Within the public sector, a clear, coordinated vision for how AI will be used across departments is important to maximize AI's impact. This vision is especially integral to the governance of potentially harmful technologies. The subdimension of vision is strategy.

**The overall AI Readiness phase for vision is Systematic, with a score of 2.8, implying that Montenegro has some foundational elements in place for developing a coordinated approach to AI but lacks a fully cohesive vision across the public sector.**

Although the Subdimension **Strategy**, with a score of 3.8 (Differentiating), indicates that some strategic initiatives exist, this strategy is not yet fully integrated or supported by a clear, overarching vision for AI's role in government.

Key Informant Interviews (KIIs) suggest that there is a perceived lack of vision and coordinated strategic initiatives in this domain.

To progress beyond this stage, Montenegro would need to establish a unified, cross-departmental vision for AI that aligns strategic efforts and maximizes AI's impact in addressing public sector challenges, ensuring responsible governance of AI technologies.

## ➤ Recommendations

1. **Develop a National AI Strategy and Vision:** Formulate a unified, cross-departmental AI strategy that outlines a clear vision for AI's role in the public sector. This strategy should define specific goals, timelines, and metrics for AI adoption, emphasizing responsible and impactful use across government functions.

2. **Establish an AI Coordination Body:** Create a central AI governance body to oversee the implementation of the national AI strategy and coordinate efforts across departments. This body would ensure alignment with the vision, monitor progress, and facilitate communication between stakeholders. (It could be established, for example, as part of a Digital Transformation Coordinating Body led by the Ministry of Public Administration.)

3. **Engage Stakeholders in Vision-Building:** Involve key public and private sector stakeholders in the development of the AI vision, including government officials, industry experts, academia, and civil society. This collaborative approach can help build consensus and ensure the vision reflects the diverse needs of the country.

Pillar 2

# Government as an **enabler** of AI

This pillar includes infrastructure, skills, data and innovation as dimensions.

## 1. Infrastructure

### ➤ Analysis

A strong AI infrastructure provides the networks to connect different technologies and researchers to develop and deploy AI at scale. For AI to be a useful tool for the population, basic IT infrastructure needs to be in place. The subdimensions of infrastructure are development and accessibility.

**The overall AI Readiness phase for infrastructure is Differentiating, with a score of 4.0, which implies a robust foundation for AI development. This phase indicates that Montenegro has implemented a whole-of-government approach at a high standard, with significant support for developing the enabling conditions required for AI integration across various sectors.**

However, this score encompasses two subdimensions: **Accessibility**, which is rated at 3.8 (Differentiating), and **Development**, which achieves a higher rating of 4.6 (Transformational). This disparity suggests that while Montenegro has established a strong telecommunications network that supports digital and AI-related initiatives, the accessibility of this infrastructure remains a barrier, especially in rural and underserved regions.

Key Informant Interviews (KIIs) highlighted that, despite the high-quality telecommunications network, the infrastructure within government bodies could benefit from enhancements in stability, scalability, and cybersecurity. Addressing these areas could support Montenegro in maximizing the potential of its AI infrastructure and moving toward comprehensive readiness.

## ➤ Recommendations

1. **Enhance Government IT Infrastructure:** Strengthen the stability, scalability, and resilience of IT infrastructure within government institutions to support AI deployment. This could include investing in advanced data centers, upgrading existing hardware and software systems, and ensuring compatibility with AI technologies.

2. **Bolster Cybersecurity Measures:** Invest in robust cybersecurity frameworks to protect government data and AI systems. This could involve implementing more stringent security protocols, conducting regular vulnerability assessments, and training government personnel in cybersecurity best practices in alignment NIS2 Directive.

3. **Expand Accessibility of Digital Infrastructure:** Focus on increasing infrastructure accessibility, especially in rural and underserved areas, to ensure equitable access to AI-driven services. This could include expanding broadband and mobile network coverage and creating incentives for private sector partnerships to reach remote communities.

4. **Invest in IT Skills and Capacity Building:** Address gaps in technical skills within government bodies by conducting regular training programs focused on AI, cybersecurity, and digital infrastructure management. This would build the capacity needed to maintain, operate, and secure AI systems effectively.

5. **Promote Data Sharing and Interoperability:** To fully leverage AI across government services and promote data sharing and interoperability between departments. Establish standards and protocols that facilitate secure, seamless data exchanges, which can improve decision-making and enable a more integrated use of AI technologies.

6. **Encourage Public-Private Partnerships (PPPs):** Collaborate with private sector companies to advance AI infrastructure. PPPs can bring in additional expertise, technology, and funding, accelerating infrastructure development and enhancing accessibility.

# 2. Skills

## ➤ Analysis

Multiple skills are required to develop, validate and deploy AI systems. Policy experts point to a global 'skill gap'—a large gap between demand and supply for both technical and non-technical skills. The subdimensions of skills are technical and non-technical skills.

**The overall AI Readiness phase for skills is Differentiating with a score of 3.0 which implies that Montenegro has made progress in developing both technical and non-technical skills, but significant gaps remain.**

Specifically, **non-technical skills** are rated at a score of 3.2 (Differentiating), indicating that there is some foundation in AI policy and governance knowledge, which enables stakeholders to start guiding AI initiatives. However, **technical skills** are rated at only 2.3 (Systematic), reflecting a more basic stage where foundational digital competencies and technical expertise are still developing, and only limited support exists for advanced IT and AI-specific skills.

Insights from the Key Informant Interviews (KIIs) further highlight that Montenegro faces a substantial shortage in the technical and IT skills necessary for AI adoption and digital transformation. There is a recognized need to improve digital competencies across government and society as a whole, including foundational skills in data management, cybersecurity, and IT infrastructure management, which are essential to support AI initiatives. Addressing these skill gaps is critical for ensuring that Montenegro can move from developing basic AI capacities to achieving a transformative impact across sectors.

## ➤ Recommendations

1. **Invest in Technical Skill Development Programs:** To address the shortage in foundational and advanced technical skills, the government should invest in dedicated training programs focused on data management, cybersecurity, IT infrastructure, and AI-specific skills. Collaborating with universities and private sector partners to offer these programs could build a robust talent pipeline equipped to support AI initiatives.

2. **Enhance Digital Competency Training Across Government:** Given the limited digital competencies in government institutions, there should be a structured approach to upskill public sector employees in essential digital skills. This could include regular workshops and certification programs in data handling, cybersecurity, and AI literacy to prepare government staff for AI implementation and management.

3. **Establish a National AI and Data Skills Initiative:** Create a coordinated national program aimed at increasing both technical and non-technical AI skills. This initiative could include developing a public-private partnership to offer courses, workshops, and mentorship in AI policy, governance, ethics, and technical skills, ensuring a balanced approach to both subdimensions of skills.

4. **Provide Incentives for STEM Education and AI Careers:** To encourage more students to pursue careers in AI and technology fields, the government could offer scholarships, internships, and job placement programs in STEM and AI-related fields, similar to initiatives already implemented by some private companies for computer science and electrical engineering students at State University. Incentives for pursuing education and careers in data science, machine learning, and AI could help address the long-term skills gap.

5. **Encourage Upskilling Through Online and Remote Learning:** Partner with online learning platforms to provide accessible training in AI, machine learning, and digital skills. Offering subsidies or financial support for these courses can make them more accessible, particularly in underserved areas.

6. **Establish AI and Digital Skills Centers in Rural Areas:** To promote equitable skill development, especially in underserved regions, set up regional AI and digital skills centers that provide training, resources, and mentorship. This will help address geographic disparities in access to AI education and increase overall digital literacy across the country.

7. **Strengthen Non-Technical AI Skills:** Develop training modules focused on AI policy, ethics, and governance for non-technical stakeholders, including policymakers and administrators. This could improve understanding of AI's broader implications and foster informed decision-making around AI deployment.

8. **Promote AI Awareness and Literacy Among the General Population:** Increase public awareness of AI through educational campaigns and community workshops. Improving basic AI literacy among citizens can reduce resistance to digital transformation and promote a culture of digital adoption across Montenegro.

9. **Foster Collaboration with International Experts and Institutions:** Establish partnerships with international AI experts and institutions to bring global knowledge and training resources to Montenegro. This can accelerate skill-building efforts and allow Montenegro to adopt best practices in AI training and capacity building.

10. **Implement a Skills Gap Monitoring Mechanism:** Regularly assess the skills landscape in Montenegro to monitor progress and address emerging gaps. This could involve setting up an AI skills council or task force to oversee skill development initiatives, assess workforce readiness, and update training programs as needed.

**UNDP can help by :**

- Gender data lab: This initiative aims to strengthen the capacities of National Statistical Offices (NSOs) and related government entities in effectively integrating, analyzing, and utilizing gender data for informed policy and decision-making.

- AI Strategy and Policy Development: UNDP offers comprehensive support to countries in developing AI strategies and policies that reflect global best practices. Leveraging a fully empowered global workforce and a vast pool of experts, this assistance is coordinated through local UNDP offices to ensure relevance and effectiveness.

- AI Product Development: UNDP has the capacity to develop and assist in the creation of AI products across a wide range of industries, including health, governance, agriculture, education, and more. Through local UNDP offices and an extensive global network of experts, we provide both technical and product management support from inception to completion.

- Digital Transformation Course: Collaborate on creating a comprehensive curriculum on digital transformation, leveraging existing public resources or collaborating with a MOOC providers. This curriculum should be made easily accessible through different platforms such as digital-capacity.org. The aim is to provide policymakers in these regions with essential skills and knowledge, promoting effective digital advancement.

- UNDP Data to Policy Initiative: UNDP has established a comprehensive framework to support policymakers in harnessing data for effective policy design and improvement. This framework includes

  » Data to Policy Navigator: A global resource center offering inspiration and practical guidance for policymakers on leveraging data for impact. It aims to provide real-world examples and actionable insights for identifying, accessing, and analyzing data.

  » Data to Policy Network: A regionally anchored network designed to connect policymakers both regionally and with the broader data ecosystem, fostering collaborative learning and sharing.

  » Data to Policy Accelerator: A targeted support system for policymakers facing specific data challenges. This accelerator will offer direct assistance in areas such as establishing private sector data partnerships, developing data governance frameworks, and building data infrastructure.

# 3. Data

## ➤ Analysis

Data underpins the training and scaling of AI models. The availability of high-quality data, that is regulated in a responsible manner, is essential for AI readiness. The subdimensions of data are quality and interoperability.

**The availability and quality of open data are crucial to AI development and implementation.** The report's insights into the problems and solutions for enhancing data accessibility and quality have a direct impact on Montenegro's ability to effectively use AI. Improving the open data infrastructure, as stated, will not only help AI research and development, but will also aid in the ethical and efficient deployment of AI technologies in the public and private sectors, which is critical for AI readiness.

**The overall AI Readiness phase for Data is Differentiating with a score of 3.4 which implies that Montenegro has made progress in developing data policies and frameworks, but significant challenges remain in data accessibility.**

Specifically, **Availability** is rated at 2.7 (Systematic), indicating that there is a basic infrastructure for data sharing, but limited availability of high-quality, open datasets hinders AI development. Both the university and startup segments highlighted a lack of accessible open data, which restricts opportunities for building and training contextualized AI models.

In contrast, the **Regulatory Environment** for data is rated at 4.6 (Transformational), showing that Montenegro has a well-established regulatory framework for data governance. This regulatory maturity provides a solid foundation for responsibly handling data, which is crucial for ethical AI deployment. However, the gap between the regulatory environment and data availability suggests that while policies are in place, practical implementation in terms of data sharing and accessibility is lagging.

This disparity indicates that while Montenegro is prepared to handle data responsibly, improving the availability and quality of open data will be essential for fostering AI research and development, supporting innovation in both public and private sectors, and ultimately advancing AI readiness.

## ➤ Recommendations

1. **Develop a National Open Data Initiative:** Establish a government-led open data initiative focused on increasing the availability of high-quality datasets. This initiative should prioritize datasets relevant to AI development, including sectors like healthcare, transportation, environmental monitoring, and public services. Creating a centralized open data portal can facilitate easier access and standardization of data.

2. **Incentivize Data Sharing Across Sectors:** Encourage both public and private entities to share datasets by offering incentives, such as funding, partnerships, or recognition programs. This can be particularly beneficial in sectors where data can drive impactful AI applications, such as energy, healthcare, and education. Establish data-sharing agreements and frameworks to ensure consistent data contributions.

3. **Invest in Data Infrastructure to Enhance Quality:** Improve data quality by investing in infrastructure that supports data collection, storage, and processing. This may include upgrading data systems, implementing data validation and cleaning tools, and adopting best practices in data governance. Ensuring high-quality, accurate, and up-to-date data will increase its usefulness for AI training and development.

4. **Enhance Data Interoperability Standards:** Establish and enforce interoperability standards that facilitate seamless data exchange between government departments, research institutions, and private organizations. These standards should align with international best practices to ensure data from different sources can be easily integrated and used for AI model training.

5. **Promote Partnerships with Universities and Startups:** Collaborate with universities and the startup ecosystem to identify critical datasets required for AI research and development. By involving these segments, the government can focus on making relevant datasets available, thereby supporting innovation and enabling the development of locally relevant AI solutions.

6. **Conduct Regular Assessments of Data Needs for AI:** Perform regular assessments to identify gaps in data availability for AI applications. This includes consulting with key stakeholders in academia, industry, and government to understand which datasets are most needed and to prioritize data acquisition or generation efforts accordingly.

7. **Monitor and Refine Data Regulations to Encourage Practical Implementation:** While the regulatory environment is well-developed, focus on translating these regulations into actionable guidelines and standards for data sharing and accessibility. Establish a monitoring body or task force to oversee compliance and address practical challenges in data implementation.

8. **Establish Data Privacy and Security Protocols for Open Data:** Ensure that data privacy and security are integral to the open data strategy by implementing strict protocols. This includes anonymizing sensitive data, using secure data storage solutions, and conducting regular audits to ensure compliance with ethical standards.

9. **Engage in International Data-Sharing Initiatives:** Participate in international data-sharing partnerships to gain access to global datasets, which can enrich local AI models and support research. Collaborate with regional and global organizations to leverage their expertise and resources for building a stronger open data ecosystem.

# 4. Innovation

## ➤ Analysis

Innovation is the process of generating new ideas, products and institutions. Innovation of AI in the wider economy requires a fair entrepreneurial regulatory environment, committed funding, and a coordinated government strategy around AI. The Subdimensions of innovation are strategy, environment, and funding.

**The overall AI Readiness phase for Innovation is Systematic with score 2.4 which implies that Montenegro has established some foundational elements to support innovation in general but has yet to fully develop a cohesive, high-impact ecosystem.**

Specifically, **Funding** is rated at 3.1 (Transformational), indicating that there is committed support for financing innovative initiatives, particularly through major government pillars like the Innovation Fund and the Science and Technology Park. The government funding framework includes also mechanisms to incentivize private sector investments in innovative companies, creating a supportive environment for innovation-driven projects.

However, the **Regulatory Environment** is rated at 2.8 (Systematic), reflecting that while there are policies in place to support innovation, they remain basic and limited in effectiveness. This score suggests that regulatory policies are still developing and lack the depth needed to fully encourage and protect innovation across sectors.

In contrast, **Strategy** is rated at 3.7 (Transformational), indicating that Montenegro has a relatively strong strategic focus on fostering innovation. This includes the development of specific laws aimed at incentivizing private investment in innovation, showing a high-level commitment to integrating innovation into the wider economy. Nevertheless, the gap between strategy, funding, and regulatory support suggests that while the government has established a vision and resources for fostering innovation, the regulatory framework needs further strengthening to create a balanced, comprehensive ecosystem.

This stage underscores that Montenegro's innovation environment is on the path to maturity, with strategic priorities and funding mechanisms in place but still needing enhancements in regulatory support to achieve full readiness for innovation-driven economic transformation.

The key themes relating to regulatory barriers that emerged across stakeholder interviews included:

- Outdated or Ineffective Regulations
- Insufficient Development of Digital Services
- Lack of Recognition of Modern Business Models
- Strong Foreign Competition
- Resistance to Change and Traditional Business Models
- Lack of Knowledge and Awareness
- Staffing Issues

## ➤ Recommendations

1. **Encourage Local Competitiveness:** To counter strong foreign competition, introduce support programs specifically designed to help local startups and SMEs participate in public procurement and large-scale projects. Providing incentives for using local technology solutions could strengthen the domestic tech industry.

2. **Update and Streamline Regulatory Frameworks:** Review and modernize outdated regulations to support new business models and technological advancements. Streamlining regulatory processes, such as simplifying company registration through digital channels, can make it easier for entrepreneurs to start and grow businesses.

3. **Enhance Digital Services Infrastructure:** Invest in the development of digital services within government agencies to improve efficiency and accessibility for technology entrepreneurs. This could include implementing digital platforms for permits, licensing, and business services, thereby reducing administrative burdens.

4. **Promote Flexibility in Business Models:** Develop and implement policies that recognize and support modern business models, including tech startups and digital enterprises. This may involve updating tax codes, labor laws, and business classifications to accommodate evolving industry practices.

5. **Foster a Culture of Innovation and Change:** Encourage openness to innovation within the government and private sector by offering workshops, awareness campaigns, and incentives to adopt new technologies. This could help shift the mindset toward embracing innovation and reduce resistance to change.

6. **Invest in Knowledge and Awareness Initiatives:** Conduct educational campaigns and training programs to raise awareness about the benefits of digital innovation and the role of AI in economic growth. Building a more informed society will help foster an environment that supports technological advancements.

7. **Support Skills Development and Talent Acquisition:** Address staffing challenges by creating programs to upskill the local workforce in critical areas such as digital literacy, AI, and data science. The government could also establish incentives for attracting skilled professionals from abroad to strengthen Montenegro's tech talent pool.

8. **Strengthen Public-Private Partnerships for Innovation:** Enhance collaboration between government, academia, and the private sector through public-private partnerships. These partnerships can foster a more cohesive innovation ecosystem, driving advancements in digital infrastructure and knowledge sharing.

9. **Expand Funding Opportunities for Innovation:** In addition to existing funds, establish specific grants or loan programs for high-potential, innovation-driven projects. This could include funding for pilot projects and proof-of-concept studies to encourage risk-taking and experimentation.

Pillar 3

# AI ethics

## 1. Accountability

### ➤ Analysis

AI actors should be accountable for the proper functioning of AI systems. They should be accountable to citizens through mechanisms such as the right to challenge public sector algorithms, and accountable to institutions through AI ethics policy frameworks, strategies and targets.

**The overall AI Readiness phase for accountability is Opportunistic 's with score 1.3 which implies that Montenegro is at an early stage in developing mechanisms for AI accountability. This phase suggests that while some basic awareness of accountability needs may exist, there is minimal formal policy or infrastructure in place to ensure that AI actors are held responsible for the outcomes of AI systems.**

Currently, mechanisms such as public oversight, the right for citizens to challenge algorithmic decisions, and comprehensive AI ethics frameworks are either lacking or underdeveloped. The low score highlights a need for foundational work to establish policies, standards, and institutional structures that can ensure AI systems are transparent, ethical, and fair.

Moving forward, a more structured approach to accountability, including the development of clear guidelines for ethical AI use and accountability frameworks, will be essential. This can help protect citizens' rights, foster public trust, and align AI deployment with Montenegro's broader social and economic objectives.

### ➤ Recommendations

1. **Establish an AI Ethics and Accountability Framework:** Create a national framework with clear standards on ethical AI practices, focusing on fairness, transparency, and public accountability.

2. **Implement Citizen Oversight Mechanisms:** Enable citizens to challenge AI-driven decisions through mechanisms such as a public grievance platform or an AI ombudsman.

3. **Develop Regulatory Guidelines for AI:** Introduce guidelines requiring AI developers to document decision-making processes and conduct regular audits and risk assessments.

4. **Mandate Transparency in Public Sector AI:** Require government institutions to disclose algorithmic information, including intended use, potential risks, and transparency reports to build public trust.

5. **Introduce Mandatory AI Ethics Training:** Provide regular training for developers, policymakers, and public sector staff to foster a culture of ethical responsibility and accountability in AI use.

# 2. Inclusivity

## ➤ Analysis

AI, like other transformational technologies, should advance inclusion of underrepresented populations, reducing economic, social, gender and other inequalities. This should be incorporated into the design of AI systems, policies, and service design.

**The AI Readiness phase for inclusivity is currently at a Systematic level with score 2.1 indicating that Montenegro has taken some initial steps to address inclusivity in AI but lacks a fully developed framework to ensure broad and equitable access. This score suggests that while there are some policies or initiatives that aim to promote inclusivity, they are not comprehensive or sufficiently integrated across AI projects and services.**

At this stage, inclusivity efforts may be limited to certain groups or sectors, without a cohesive strategy to ensure that AI benefits extend to all underrepresented populations, including those from various socioeconomic backgrounds, genders, and geographic regions. To move beyond this level, Montenegro would need to establish more robust policies, guidelines, and programs that specifically focus on using AI to reduce inequalities and ensure that AI systems are designed with inclusivity as a core principle.

## ➤ Recommendations

1. **Develop a National AI Inclusivity Framework:** Create a framework that explicitly addresses inclusivity goals for AI, focusing on reducing inequalities across socioeconomic, gender, geographic, and other demographic lines. This framework should outline specific actions to incorporate inclusivity into AI policies, system designs, and public services.

2. **Promote Inclusive Data Collection Practices:** Ensure that data used in AI systems is representative of all population segments, including underrepresented groups. Encourage practices that mitigate bias in data collection, preparation, and model training to promote fairness in AI outcomes.

3. **Establish Programs to Increase AI Accessibility for Underrepresented Groups:** Implement programs that make AI education, training, and tools accessible to marginalized communities, women, and people from rural areas. This could include scholarships, grants, and partnerships with educational institutions to promote digital and AI literacy.

4. **Mandate Gender and Diversity Audits for AI Systems:** Require AI systems, especially those used in the public sector, to undergo regular audits to assess their impact on different population groups. These audits can help identify potential biases and inequalities, ensuring that AI systems are equitable in their impact.

5. **Include Inclusivity Metrics in AI Project Evaluations:** Define and measure specific inclusivity metrics, such as the diversity of user representation, socioeconomic accessibility, and gender impact. These metrics should be part of every AI project's evaluation to ensure they meet inclusivity standards.

6. **Engage Civil Society and Minority Groups in AI Policy Development:** Involve representatives from civil society, gender advocacy groups, and minority communities in discussions about AI policy and project design. Their insights can ensure that AI policies address the unique needs of underrepresented populations.

7. **Promote the Use of AI for Social Good:** Encourage AI projects that focus on solving issues related to inequality, such as AI applications in education, healthcare, and employment for marginalized groups. Funding and support should prioritize initiatives that aim to improve social and economic inclusivity.

8. **Create Public Awareness Campaigns on Inclusive AI:** Launch public awareness campaigns that educate citizens on the potential of AI to reduce inequalities and the importance of inclusivity in AI design. This can help foster a culture of inclusion and empower underrepresented groups to participate in AI-related opportunities.

9. **Provide Incentives for Inclusive AI Innovation in the Private Sector:** Offer tax incentives, grants, or recognition for companies that actively work to make their AI products and services inclusive. This can encourage private sector participation in creating AI solutions that benefit all demographic groups.

10. **Establish a Monitoring Body for Inclusivity in AI:** Form a dedicated body to monitor and report on inclusivity in AI projects and policies. This body could track progress, highlight best practices, and recommend improvements to ensure inclusivity remains a priority as AI development advances.

# 3. Safety

## ➤ Analysis

In both the public and private sector, the management of the risk associated with AI systems should be considered, to prevent malicious or unintended use, as well as reducing any potential existential risk that may arise.

**The AI Readiness phase for safety is currently classified at an Opportunistic level with score 1.2 indicating that Montenegro has only taken initial steps toward managing AI-related risks, but lacks a comprehensive approach to ensure AI safety. This score suggests that there may be limited awareness of AI safety issues, and while some isolated policies or measures may exist, they are not systematically implemented across sectors.**

At this stage, safety considerations are likely ad hoc, without consistent standards for risk assessment, mitigation, or monitoring of AI systems. To progress beyond this level, Montenegro would need to develop structured policies, guidelines, and oversight mechanisms that address the ethical, security, and existential risks associated with AI. Building a stronger foundation for AI safety would ensure that both the public and private sectors can deploy AI responsibly and securely.

## ➤ Recommendations

1. **Establish a Comprehensive AI Safety Framework:** Develop a national AI safety policy that includes standards for risk assessment, ethical guidelines, cybersecurity, and privacy protocols, ensuring that AI systems are deployed securely across both public and private sectors.

2. **Form a National AI Risk and Oversight Committee:** In collaboration with UNDP and other partners, accelerate the creation of a national AI committee with a mandate to oversee AI safety, conduct regular risk assessments, and coordinate efforts to address security and ethical risks in AI deployment.

3. **Increase AI Safety Awareness and Training:** Implement training programs for government officials, developers, and business leaders focused on AI safety, risk management, and ethical standards to build a foundational understanding of AI safety.

4. **Mandate Transparency and Accountability:** Require AI developers to document and disclose the purpose, design, and risks associated with their AI systems, with regular audits and reporting to ensure compliance with safety standards.

5. **Adopt International Best Practices for AI Safety:** Align Montenegro's AI safety standards with international frameworks, such as those from the OECD or EU, to ensure that AI systems meet globally recognized safety and ethical standards.

# 4. Transparency

## ➤ Analysis

AI actors should provide meaningful information to foster a general understanding of AI systems and make stakeholders aware of when and how they will be affected by AI. Additionally, citizens should be able to know, where possible, why AI systems have arrived at an output. AI governance should also enable those adversely affected by an AI system to be able to challenge its outcome.

**The AI Readiness phase for transparency is currently classified at an Basic level with score 1 indicating that Montenegro is at an initial stage in implementing transparency measures for AI systems. Given that no government systems currently rely on AI, there are limited policies or frameworks in place to guide transparency, public awareness, or accountability in AI applications.**

This level reflects an environment where citizens and stakeholders have minimal access to information about AI processes or potential impacts, as these systems are not yet in use within government. Consequently, there are no established mechanisms for explaining AI outputs or allowing individuals to challenge decisions made by AI. To progress beyond this stage, Montenegro would need to proactively develop foundational policies and tools for transparency, setting clear expectations for explainability and accountability in preparation for future AI implementation. This groundwork would ensure that when AI systems are introduced, they are transparent, accessible, and accountable to those they affect.

## ➤ Recommendations

1. **Develop an AI Transparency Framework:** Establish a framework that outlines requirements for transparency, including clear guidelines on how AI systems should disclose their processes and impacts. This framework should prepare for future AI deployments by setting standards for explainability, accountability, and stakeholder communication.

2. **Implement Public Awareness and Education Initiatives:** Increase public understanding of AI by creating educational programs and resources to inform citizens about AI technology, its potential impacts, and the importance of transparency. Early education can foster public trust and prepare citizens to engage meaningfully with AI systems.

3. **Establish Clear Mechanisms for Challenging AI Decisions:** Proactively design a system for citizens to challenge AI-driven decisions, especially in future public sector applications. This could include a grievance process or dedicated platform where individuals can raise concerns about AI outcomes and seek recourse.

4. **Prepare Policies for Explainability Requirements:** Develop policies that mandate explainability for any future AI systems used by the government, ensuring that AI-driven decisions are understandable to affected stakeholders. Such policies can specify requirements for documentation, algorithmic transparency, and explainable outputs.

5. **Create an AI Governance Body for Oversight: Set** up an AI governance committee or task force that would oversee transparency and accountability in AI use. This body could evaluate compliance with transparency standards, manage public concerns, and ensure AI systems are implemented responsibly as they become part of government operations.

# Strategic recommendations

Montenegro's journey toward harnessing artificial intelligence (AI) as a transformative tool for societal and economic progress requires strategic interventions across multiple dimensions. By positioning the government as both a proactive user of AI and an enabler of broader ecosystem growth, while upholding the highest ethical standards, Montenegro can unlock AI's potential to address pressing challenges and foster innovation. Below are the key strategic recommendations, prioritized for their significant impact and alignment with national development goals.

### Government as a user of AI

1. Develop a Government AI Strategy: Formulate a national strategy focused on integrating AI into public services, outlining clear objectives, targeted sectors, and implementation timelines to maximize the efficiency and quality of public administration.

2. Invest in Digital Infrastructure for AI Readiness: Upgrade government IT systems, including cloud storage, data-sharing platforms, and cybersecurity measures, to support scalable and secure AI deployment.

3. Launch Pilot AI Projects in Public Services: Initiate pilot programs in critical areas such as healthcare, education, and administrative processes to demonstrate AI's potential impact and refine its implementation strategies.

4. Enhance Workforce Skills through AI Training: Provide comprehensive training for government employees, focusing on technical AI capabilities and change management to build institutional capacity for AI integration.

5. Establish an AI Governance Framework: Create an AI governance body to oversee implementation, ensure accountability, and align AI applications with national development priorities.

### Government as an enabler of AI

1. Promote Public-Private Partnerships: Collaborate with the private sector and academia to foster innovation, share resources, and accelerate AI adoption in key economic sectors.

2. Create a National Open Data Platform: Enhance data accessibility by establishing a centralized repository of high-quality, interoperable datasets to drive AI research and innovation.

3. Support AI-Focused Startups and SMEs: Introduce funding programs, tax incentives, and regulatory support to stimulate the growth of local AI-driven businesses and entrepreneurship.

4. Expand Broadband and 5G Connectivity: Ensure equitable digital infrastructure development, particularly in rural and underserved areas, to enable widespread access to AI-driven solutions.

5. Establish AI Research and Innovation Centers: Develop dedicated hubs for AI research, education, and collaboration to build local expertise and drive technological advancements.

**Ethical AI**

1. Adopt a Comprehensive AI Ethics Framework: Creation and operationalization of an AI Ethics committee/body, which willdefine national standards for ethical AI use, focusing on transparency, accountability, and fairness in both public and private sector applications.

2. Mandate Explainability and Transparency in AI Systems: Require AI models, particularly those used in public services, to provide clear, understandable justifications for their decisions and outputs.

3. Launch Public Awareness Campaigns on AI Ethics: Educate citizens about the ethical implications of AI and promote informed public discourse on its societal impacts.

4. Implement Inclusive AI Development Practices: Ensure AI systems are designed to address inequalities and promote inclusivity, with a focus on underrepresented groups and underserved regions.

# Conclusion

The AI Landscape Assessment for Montenegro underscores the nation's potential to leverage artificial intelligence as a transformative force for societal and economic development. The findings reveal both opportunities and challenges, with a need for strategic investments, robust policy frameworks, and a commitment to ethical AI integration.

**Montenegro is positioned to capitalize on its emerging digital infrastructure, improving connectivity, and a maturing workforce. However, the journey ahead demands addressing key gaps in AI governance, workforce skills, and data accessibility. The strategic recommendations emphasize the importance of coordinated actions across three pillars:**

- **Government as a User of AI:** In adopting a clear AI strategy, upgrading infrastructure, launching pilot projects, and enhancing workforce skills, the government can drive efficiency and innovation in public services.
- **Government as an Enabler of AI:** Supporting public-private partnerships, expanding digital infrastructure, fostering startups, and creating research hubs will stimulate a thriving AI ecosystem that benefits all sectors.
- **Ethical AI:** Implementing a comprehensive AI ethics framework, ensuring transparency, promoting inclusivity, and establishing oversight mechanisms will safeguard citizen rights and promote trust in AI systems.

### Final Thoughts

Montenegro stands at a pivotal moment to harness AI's potential while mitigating risks such as bias, workforce disruption, and ethical dilemmas. Success will require not only technical advancements but also a cultural shift toward embracing innovation and collaboration across sectors. Given that only a very small number of countries have so far adopted a regulatory framework in the field of AI, this process is extremely challenging and most often follows the adoption of a national strategy. Strengthening local expertise and aligning with international standards will enhance the country's competitiveness in the global AI landscape.

### Upcoming Opportunities and Risks

- **Opportunities:** Advancements in 5G connectivity, partnerships with regional and international stakeholders, and emerging funding opportunities for AI-driven initiatives present a unique chance for Montenegro to leapfrog in digital transformation.
- **Risks:** Potential risks include insufficient policy implementation, unequal access to digital services, and a lack of preparedness for managing AI-related ethical and societal

challenges. In proactively addressing these challenges and capitalizing on opportunities, Montenegro can position itself as a leader in ethical and impactful AI adoption, fostering sustainable growth and improving the quality of life for its citizens.

# Annex I: Methodology

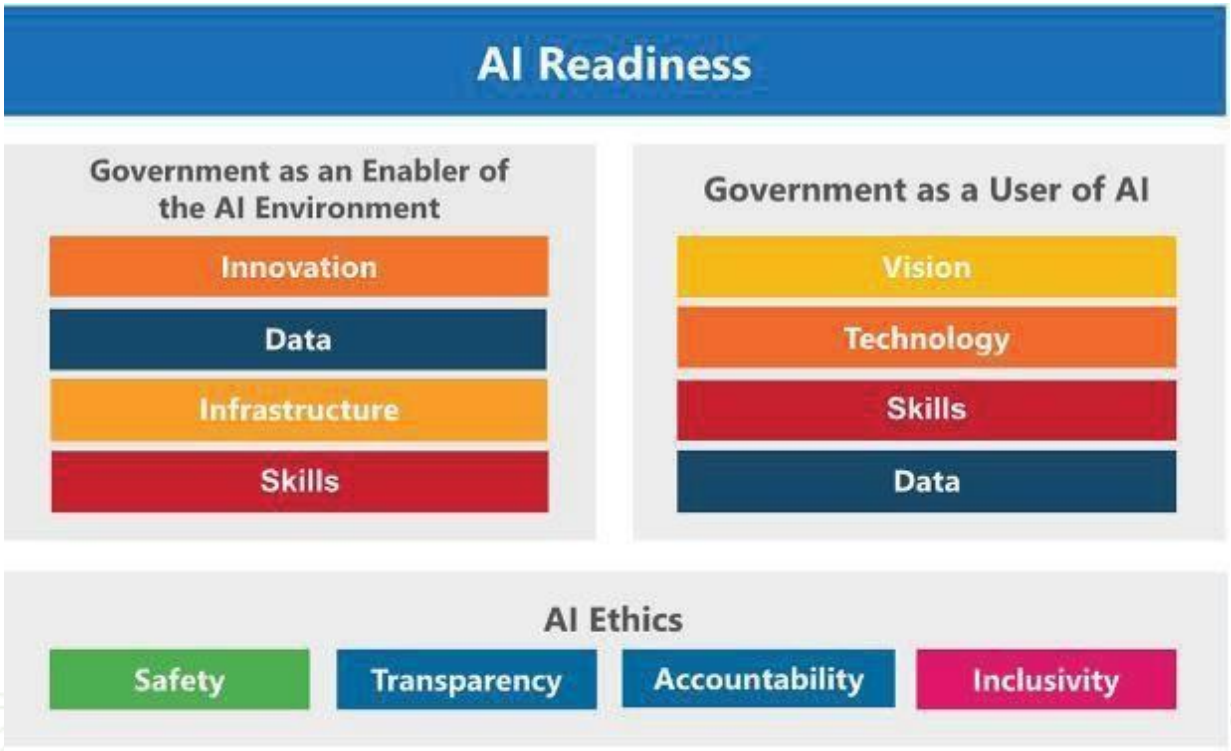
The AI Landscape Assessment (AILA) framework considers the role of government as both a user of AI and an enabler of the larger AI ecosystem. Developing AI and other innovative technologies necessitates a vibrant technology ecosystem within a country's economy, and the government is a critical enabler of this ecosystem by establishing the rules and regulations under which it operates.

Government policy can also direct financing and attention to specific areas of the economy, while also promoting the development of technical infrastructure and assisting citizens in acquiring digital skills. Government AI readiness also indicates that the government can leverage AI to improve its core processes and public service delivery. To deploy complicated technologies, the government must have the necessary tools and skills in place.

The government's functions as an enabler and user are likewise interrelated. If the government has the necessary abilities and willingness to adapt to become an effective user of AI, it is more likely that officials will have the skills and motivation to assist the larger AI ecosystem. And if the larger ecosystem is growing, the government will have access to a greater pool of skilled individuals as well as a ready supply of new technologies.

Finally, ethical usage of AI is required if it is to be used for citizens' advantage rather than as a tool of surveillance and discrimination. We regard the ethical use of AI to be a distinct section of the framework, but we also propose measuring elements of AI ethics throughout the other pillars. The independent pillar allows us to go deeper into the various components of AI ethics, but governments must also grasp that these principles are not an afterthought, but rather woven across all aspects of AI development.

**Figure 4: AI Landscape Assessment framework**




## Methodological Details

The assessment methodology involves both qualitative and quantitative approaches to provide a comprehensive evaluation of AI readiness. The methodology includes the following key components:

- Data Sources: The assessment relies on a mix of primary and secondary data sources. Primary data is collected through surveys and interviews with key informants from various sectors, including government institutions, academia, and private organizations. Secondary data is sourced from existing reports, policy documents, and statistical databases.
- Collection Methods: Data collection methods include structured surveys distributed to stakeholders via a Microsoft Form survey link, in-depth interviews with AI and policy experts, and workshops designed to gather insights and feedback. These methods ensure that a wide range of perspectives is captured.
- Analytical Techniques: The collected data is analyzed using a combination of statistical analysis and qualitative coding. Quantitative data from surveys is used to calculate scores for different dimensions and pillars. Qualitative data from interviews and workshops is analyzed to identify key themes and insights. The results are then synthesized to provide a comprehensive view of AI readiness.

## Calculation of Results

The results of the AI Landscape Assessment are calculated through a systematic process that combines both quantitative and qualitative data analysis:

1. **Weighted Aggregation:** Each dimension within the pillars is assigned a weight based on its relative importance to overall AI readiness. The normalized scores for each dimension are then multiplied by these weights to produce weighted scores.
2. **Dimension and Pillar Scores:** Weighted scores for individual dimensions are aggregated to calculate overall scores for each dimension. These dimension scores are then averaged (considering their weights) to produce scores for each of the three pillars: Government as an Enabler of AI, Government as a User of AI, and Ethical AI.
3. **Qualitative Insights:** In addition to quantitative scores, qualitative data from interviews and workshops are analyzed to provide context and deeper insights into the scores. The themes and patterns identified from qualitative analysis are used to support and explain the quantitative results.
4. **Final Scoring and Labeling:** Each pillar and dimension is assigned a final score, translated into qualitative labels for clarity: "Basic" (>0 to ≤1), "Opportunistic" (>1 to ≤2), "Systematic" (>2 to ≤3), "Differentiating" (>3 to ≤4), and "Transformational" (>4 to ≤5). These labels offer a straightforward summary of a country's AI readiness status.
5. **Validation:** The calculated scores and findings are validated through stakeholder feedback and expert review to ensure accuracy and relevance. This step involves presenting preliminary results to key stakeholders for verification and refinement.

The phases of AI readiness per pillar are outlined in Table 1 below, where they range from basic (>0 to ≤1) to transformational (>4 to ≤5)

**Table 1: AI readiness phases per pillar**

| | Basic | Opportunistic | Systematic | Differentiating | Transformational |
|---|---|---|---|---|---|
| **Government as an enabler of the AI environment** | Little policy work.<br><br>Enabling conditions are underdeveloped and given limited supported. | Limited policy work.<br><br>Enabling conditions at a basic level and there may be some support. | Targeted policy work.<br><br>Enabling conditions are supported and advancing. | Whole of government approach is formalized or being formalized.<br><br>Strong support for and development of enabling conditions. | Whole of government approach formalized and policy work at highest standard.<br><br>Strong support for and advanced development of enabling conditions, likely using innovative methods. |
| **Government as a user of AI** | Lack of government organizational structures, systems and policies needed for using AI.<br><br>Limited availability of technical skills. | There are some efforts to develop skills, structures, and systems in government that are necessary for the use of AI and for improving data applications. | Coordinated preparation for the use of AI and data.<br><br>There is support for developing the required skills, structures, and systems in government. | Approach to the use of AI and data applications is formalized and underway.<br><br>The required skills, structures, and systems are likely at the level required to do so. | Vision for and implementation of AI in government is advanced.<br><br>Whole of government organized in a way that supports AI use, including a formalized whole-of-government approach. |
| **Ethical AI** | Societal backdrop and legal and policy environment not conducive to ethical development and use of AI. | There has been some legal and policy work on directing ethical AI.<br><br>Societal backdrop may be an inhibitor. | Policy work is underway on ethical AI.<br><br>Societal backdrop is not a significant inhibitor. | Advanced policy work on ethical AI.<br><br>Positive societal backdrop. | World-leading policy work on creating the conditions for ethical AI.<br><br>Positive societal backdrop. |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