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الزمالـة التقنيـة للشـباب العربـي

ARAB YOUTH TECHNOLOGY FELLOWSHIP

Second Edition

Foreword

الزمالة التقنية للشباب العربي
ARAB YOUTH TECHNOLOGY FELLOWSHIP

مركز الشباب العربي
ARAB YOUTH CENTER

We truly have an opportunity to change the course of the Arab world by educating and empowering young people. We warmly welcome this challenge and look forward to seeing the fruits of our work.

We are here to create a better tomorrow by empowering the youth.

Shamma Al Mazrui,
Minister of State for Youth
Vice President of the Arab Youth Center

In today's world, any discussion of technological development progress must refer to the role of youth. This young **"digital"** generation has been building, improving, adapting, and consuming technology at an accelerated pace. Arab youth is no exception.

Our countries are rapidly advancing in digitalization strategies and embracing the use of technology to build societies with smart, nimble and resilient businesses and government institutions.

As such, one of our priorities is to prepare our youth for this digital future. In fact, they are with us step by step. The **Arab Youth Center** launched the **Arab Youth Technology Fellowship Program**, in order to empower youth and identify new skills required by Artificial Intelligence (AI). As we witness the emergence of new industries, products, and services, our partners at **Why5 Research** have developed valuable insights and recommendations about the skills in demand in this job market.

Through our partnership in this report, we have been able to **highlight the skills** young people need to navigate the world of jobs driven by big data and AI technologies. A world where **technological skills** and literacy in coding are key to understanding and developing AI, not forgetting the **interpersonal, leadership, and creative skills** that are becoming more central as human power is increasingly devoted to creative work. Currently, employees are expected to maintain a **lifelong learning approach** and stay up-to-date with what's new.

We believe that investing in youth training and skills development, now will secure their places in the future, and will help them become effective partners in development and economic growth in our region.

The **United Arab Emirates is accustomed to navigating the rapid changes and developments in today's world. As such, we will continue to invest locally and regionally in the potential of young people. No one will be left behind. They are our most precious asset** and the makers of our future. If we miss this opportunity to prepare young people for the future, we will lose the tremendous talent and ingenuity that can change our region.

We truly have an opportunity to change the course of the Arab world by educating and empowering young people. We warmly welcome this challenge and look forward to seeing the fruits.

Foreword

Rapid technological developments are constantly challenging the workforce to acquire the skills needed for emerging roles in the labor market. Education and training can ensure the development of skills and competencies that are compatible with the future requirements of technologies, including AI technologies. This research paper aims to highlight **the basic skills needed to develop artificial intelligence,** especially **technical competencies**. This focus reflects sponsor's **(Arab Youth Center)** real interest in young people, the future of the young workforce, and their ability to keep abreast of everything new and secure their place in future labor markets.

To participate actively in economic and social development, the new workforce must keep pace with the dynamics and evolution of technological advancements. This entails being **proactive, committed, innovative, leader, and trained** to take charge, and benefit from all that new technologies offer to help us serve society and create a better quality of life and a happier future.

Achieving this requires carefully **building bridges of trust between the youth and their governments,** through the latter's commitment and support for young talent. It is also key to providing the basis for an active partnership between industries, academic institutions, international organizations, and youth empowerment organizations. Then, the young Arab talents will be able to implement their ideas and translate their creativity into innovation.

With its human-centered philosophy, Why5 Research seeks to support all efforts in aspects of human development and to promote sustainable development through the in-depth understanding of people, their behavior, needs and addressing them. Therefore, in collaboration with the **Arab Youth Center**, we seek to identify the real needs of youth and the skills they really need for the jobs of tomorrow.

Managing Director
Why5 Research
Middle East & North Africa
Ahmed Sulaye

Executive
Summary

Despite the cognitive challenges facing Arab youth and their ability to adapt to the demands of AI, studies show that the workforce, regardless of age, is ready to integrate the new digital reality and keen to acquire skills that will help them stay relevant with AI.

The changing demand for the skills required for **artificial intelligence**, as well as rapid technological advancements put Arab youth in a situation of constant challenge. These skills must be gained through practice and experience and not just in the classroom. To **closely link technology to education**, it is of paramount importance that governments, educational institutions, and companies constantly innovate, focus on developing technological research, and better engage the industrial sector, as well as enhance international cooperation in the field of education.

Knowledge based in mathematics and statistics (algebra, linear algebra, calculus, data analysis statistics, probability) is essential for **learning AI. An in-depth understanding of the Python programming language and its various libraries is another important requirement.** For Arab youth to succeed in entering the workforce and secure their share of the new jobs created by new technologies, it is essential that they develop these new skills. In addition, the development of specialized cognitive skills is just as important as investing in the development of interpersonal skills, which include a combination of four important skills: (Complex thinking, creativity, social and emotional intelligence, and perceptual skills), which are essential for leadership and management roles , in fact these roles will be fundamental with the spread of smart technologies and the dedication of human to innovation and creativity.

The efforts needed to prepare today's youth for the future economies driven by AI are enormous and the path is long and continuous. This requires the **adoption of a lifelong learning approach**, through **specialized** education that responds to the needs of the workforce, that is **rapid and continuous,** adapted to the dynamics of technological development, as well as **experimental** enough to enhance the technical knowledge base. Emphasizing the need for increased effort and perseverance is the large knowledge gap reported in the World Digital Competitiveness rankings; only four Arab countries **(United Arab Emirates, Kingdom of Saudi Arabia, Qatar and Jordan)** ranked. Despite the improved classification of the UAE, exporting a technologically skilled labor force is still a long way off.

Table of Content
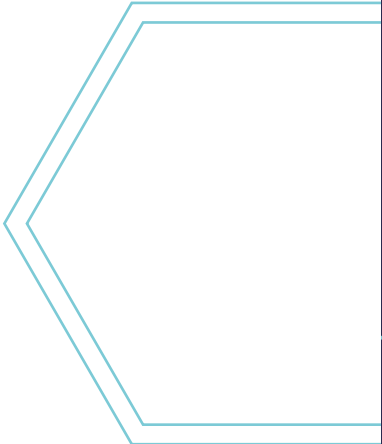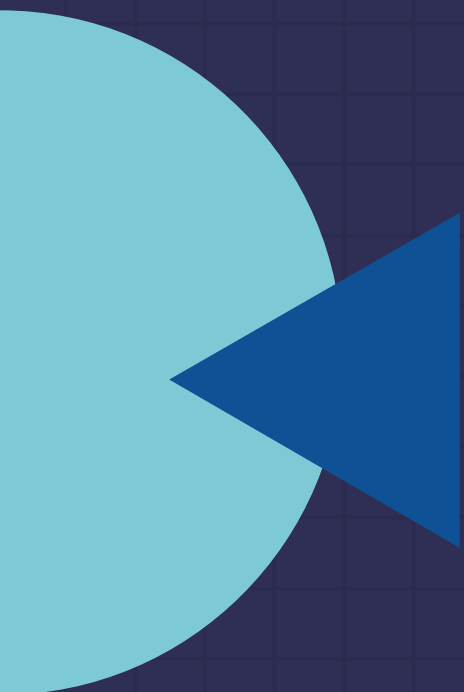
Introduction
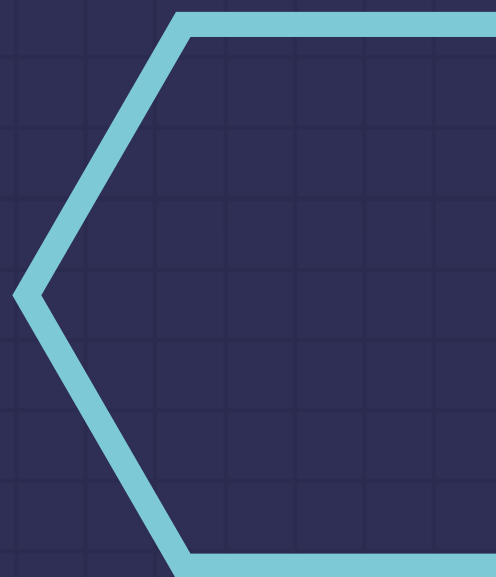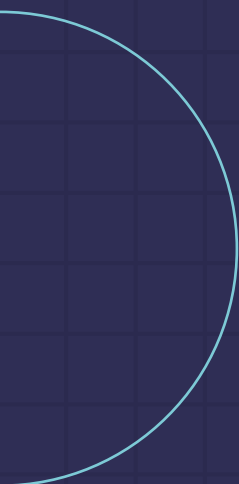
Introduction

The fourth industrial revolution that the world is witnessing today is characterized by the emergence of many global technologies that have begun to change the face of the world. These include Artificial Intelligence (AI), Internet of Things (IoT), Genetics, 3D Printing, Quantum Computing, Nanotechnology, Self-driving Cars, Big Data, Virtual Currencies, and other technologies and scientific advancements. What distinguishes this revolution from its three predecessors are three main pillars.

1	**The rapid spread with which the technologies of this revolution have spread**
2	**The breadth and depth of its effects in all areas**
3	**Its ability to bring about a radical change in production systems and economic relations**

In fact, this revolution contributes to bringing about tangible changes in economic models, as it will lead to **the restructuring of economic systems and infrastructure and the shift towards sectors of knowledge production and technologies with high added value**, in return for a decline in the economic contribution of traditional production sectors, especially those that did not benefit from technological progress of this revolution that focus on finding cheaper, more sustainable, and environmentally friendly alternatives to raw materials will reduce their cost and the cost of basic commodities by eliminating the scarcity factor that was driving their high prices.

These developments are motivating every society and country to adapt to the demands, trends, and potential impacts of this rapidly growing technological revolution. Indeed, it provides an **opportunity** for leaders around the world, including the Middle East and North Africa (MENA), to diversify their economies, boost economic growth and create jobs by utilizing accompanying technologies, especially **AI technologies,** to build a more sustainable future and a better quality of life.

The Definition of Artificial Intelligence

The Definition of Artificial Intelligence

The term Artificial Intelligence (AI) refers to the systems and machines that mimic human intelligence to perform tasks. These systems and machines can improve their performance based on the data they collect. In other words, AI is "the ability of a system to correctly interpret external data, learn from that data, and use that knowledge to achieve specific goals and tasks through flexible adaptation."

The term was first coined in 1956 by John McCarthy, a scientist and professor of computer science at Stanford University. McCarthy suggested that human intelligence could be replicated, more accurately, and suggested the possibility of producing a machine that could simulate human behavior.

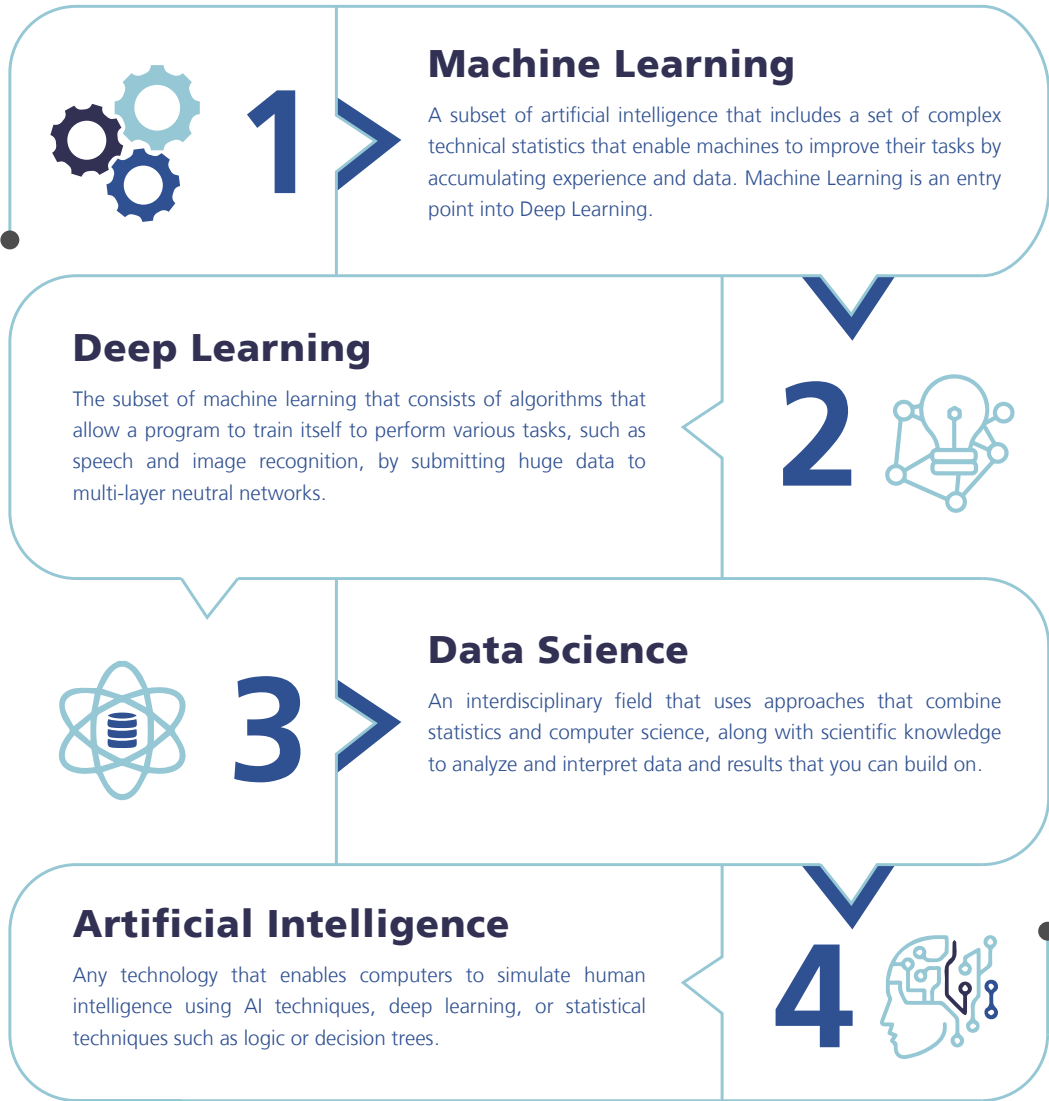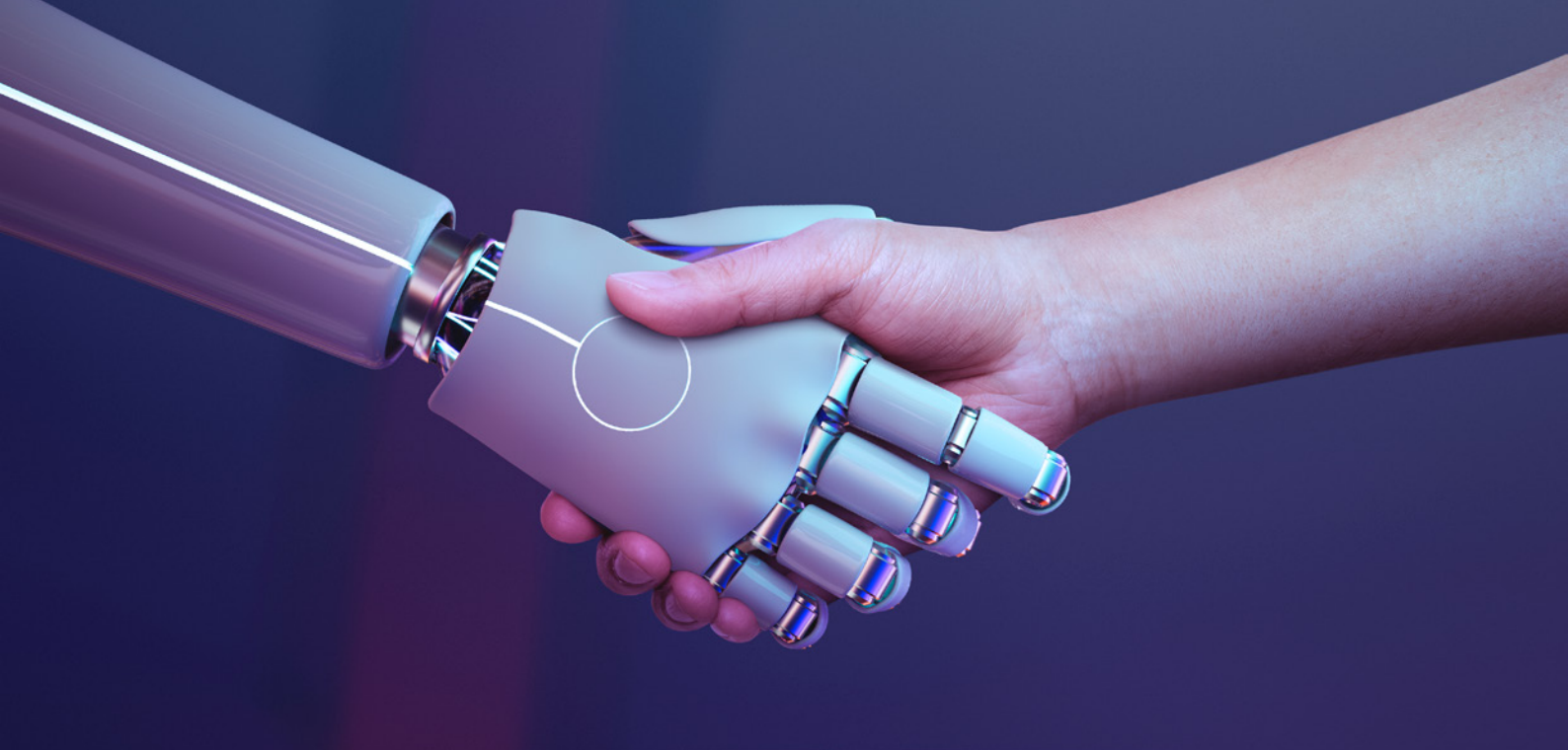AI systems are powered by algorithms that use techniques including:
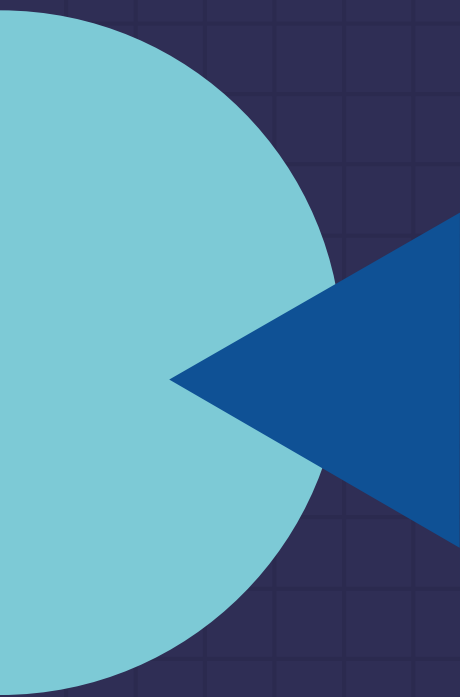
1 Machine learning   **2** Deep Learning   **3** Data Science

These **technologies** show that machines are "intelligent", since the development of the future of AI depends largely on investment in **Data Science and Deep Learning**, which bring deductive reasoning to AI, independent thinking, and self-learning. In fact, deep learning uses multiple layers of algorithms that mimic human neurons, which enable AI to process and analyze massive amounts of data and deduce patterns that translate them into meanings and ideas.

By analyzing images and sounds the way the human brain works and building a reaction or opinion around it, data science techniques have enabled AI to see what we see, machines to hear as we hear, and to succeed in voice recognition.

1 > Machine Learning

A subset of artificial intelligence that includes a set of complex technical statistics that enable machines to improve their tasks by accumulating experience and data. Machine Learning is an entry point into Deep Learning.

Deep Learning 2

The subset of machine learning that consists of algorithms that allow a program to train itself to perform various tasks, such as speech and image recognition, by submitting huge data to multi-layer neutral networks.

3 > Data Science

An interdisciplinary field that uses approaches that combine statistics and computer science, along with scientific knowledge to analyze and interpret data and results that you can build on.

Artificial Intelligence 4

Any technology that enables computers to simulate human intelligence using AI techniques, deep learning, or statistical techniques such as logic or decision trees.

The Definition of Artificial Intelligence
Source: Why5Research Analysis framework 2022
The Economist Intelligence Unit

AI Enablers

Artificial Intelligence Enablers

Once technological developments and AI technologies enable machines to handle a large portion of human work today, they present an important opportunity for governments that use them to diversify their sources of income and to refocus human capabilities on creative tasks. This opportunity requires a deep understanding of how human intelligence complements machine intelligence, a reassessment of skills needed for the future, as well as how this flow of new technologies integrates with learning methods. This necessitates the adoption of **lifelong learning** to keep pace with these rapid technological developments.

Taking advantage of AI technologies requires countries to plan, keep pace, and balance the available human, technical and economic capabilities and the requirements for adopting AI. In fact, studies have predicted that AI technologies could boost the global economy by $2.95 trillion in the next decade, while McKinsey & Company estimates that AI could generate $13 trillion by 2030. Thus, the extent to which countries prepare themselves and proactive in the adoption of AI technologies will determine their share of the wealth generated by AI.

What are the basic requirements for developing AI?

An appropriate ecosystem for growth and development is essential to investing in and using AI technologies, as well as identifying the key factors that will enable the advancement of AI.

The two key prerequisites for the development of AI are:

1 **Primary Capabilities**

2 **Institutions**

Securing key AI enablers as well as establishing ethical standards and guidelines will fuel the development of responsible AI and maximize its benefits.

1 Primary Capabilities

It is considered one of the main inputs that determine the successful development of AI technologies, and these include:
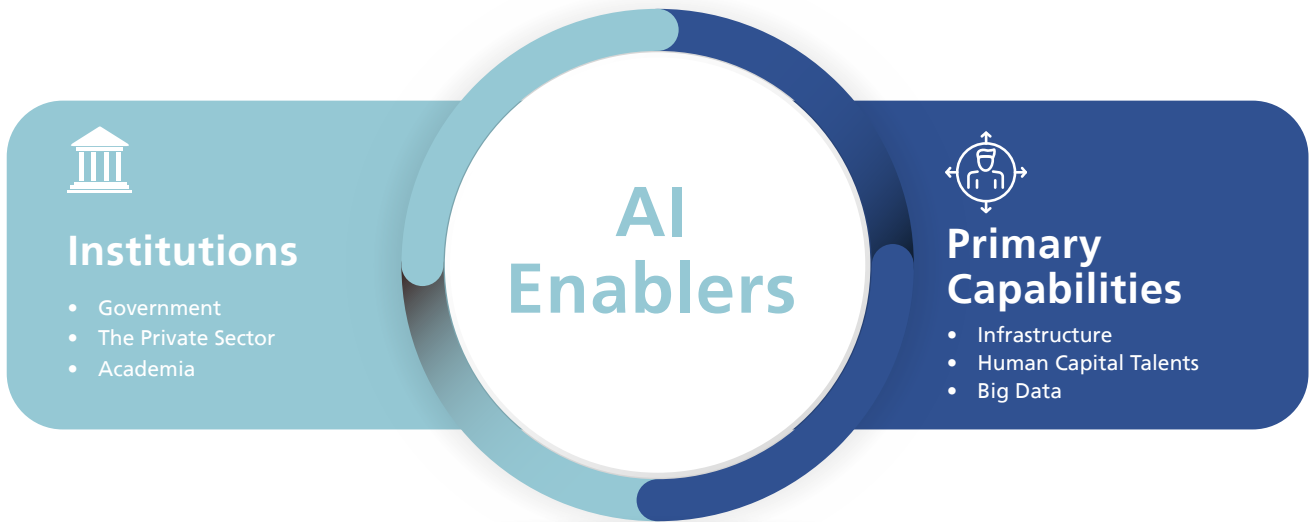
- **Technical Infrastructure:** Communication infrastructure, basic internet access, and the computing power needed to produce and develop AI systems.

- **Human Capital Talents:** those required to understand and develop AI systems, taking into account early education in science techniques, technology, engineering, mathematics, with a focus on integrating AI technologies into higher education and lifelong learning.

- **Data:** refers to Big Data and high-quality data that can be used to train AI (machine learning) algorithms to minimize the level of biases that are pre-existing in discriminatory outcomes to a minimum level.

2 Institutions

The institutional basis for developing responsible AI through its ecosystem includes:

- **Government:** to develop policy frameworks regulating the development of AI, or an authority that can be responsible for the development of AI technologies. This authority will develop the country's vision of AI, estimate its technological capabilities (tools and their availability), as well as assess the government's readiness to deploy AI technologies in the provision of public services to its citizens.

- **Private Sector:** includes developers and investors in the field of AI, who can stimulate innovation and investment in AI technologies and contribute to the economy.

- **Academia:** especially scientists who contribute to R&D in the field of AI and to the training and development of the workforce.
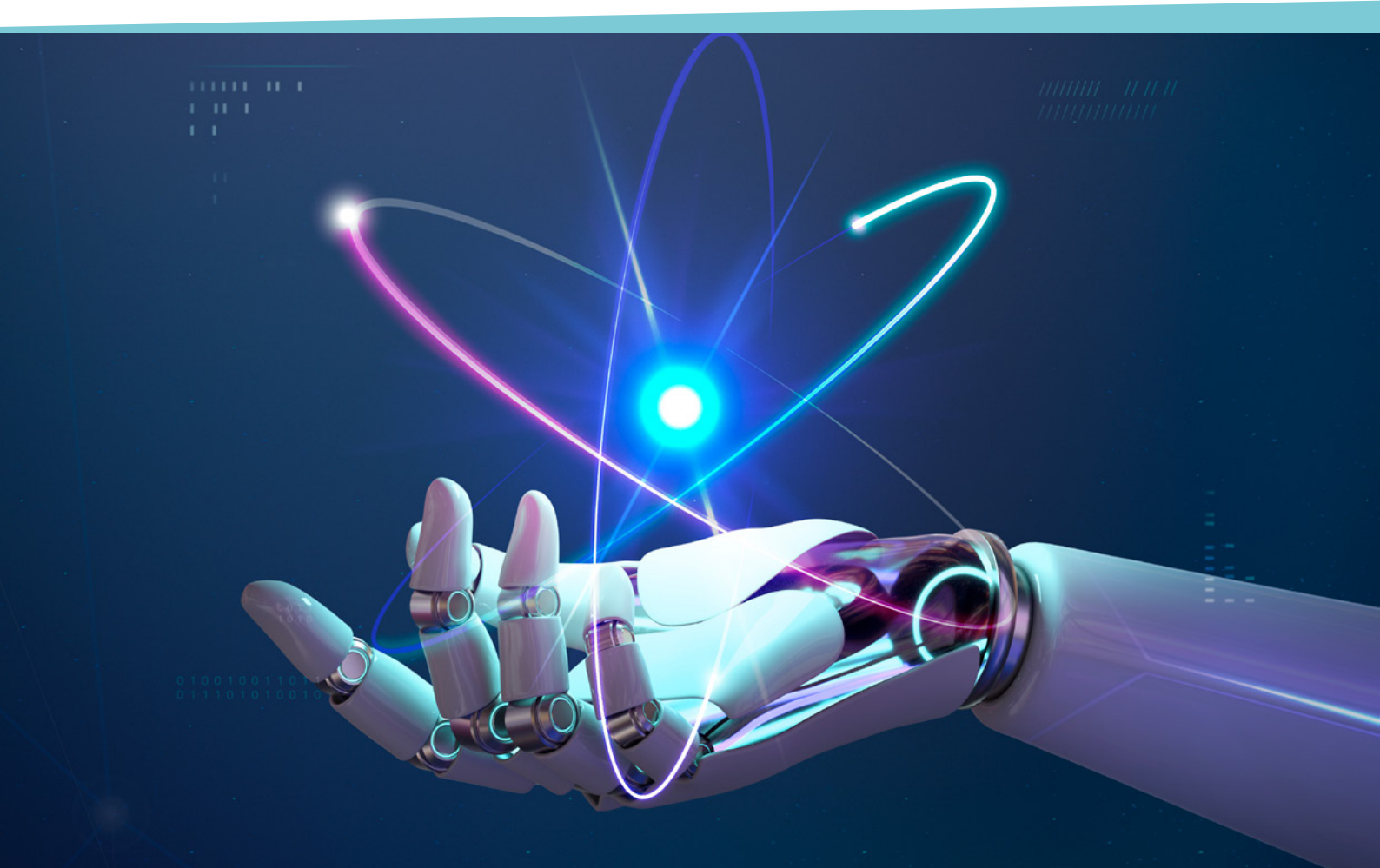
Guidelines & Ethics

Institutions
- Government
- The Private Sector
- Academia

AI Enablers

Primary Capabilities
- Infrastructure
- Human Capital Talents
- Big Data

AI Enablers
Why5Research analysis framework 2022
Sources: Tortoise Media (2021); Oxford Insights (2021); Economist Intelligence Unit (2018).

AI Readiness in the Arab Region

AI Readiness in the Arab Region

AI Readiness in the Arab Region

The human element is one of the main inputs to the development of AI technologies. Investing in people is one of the most basic requirements to reap the benefits of AI. **The Arab region has good potential for growth as young people under the age of 30 make up about 60% of its population** and are the generation most adapted to the needs of AI. Young people use the internet better and better in response to new technologies. This indicates that investing in and benefiting from younger generations has a positive demographic impact on economic development. These returns require a reassessment of current skill sets and those required for future success. This is even more important given the technical advances brought about by AI, which have imposed new dynamics in the labor market, creating new jobs while eliminating many traditional jobs. The knowledge economy has a significant impact on modern employment trends.

The demand for unskilled labor is expected to decline by **25% to 50%**, while the demand for workers with skills in technology, engineering, mathematics, science, logical analysis, creative thinking, and problem-solving will increase. Projections show that technological developments will create about **58 million** new jobs, primarily in industries related to AI technologies.

> Future job opportunities are reserved for the skilled and trained while the workforce in the MENA region challenged by this knowledge gap.

The numbers reflect a large gap in the labor market in the MENA region. The skills provided are well below the requirements, especially technical skills related to computing and AI. The Global Digital Competitiveness Ranking, which ranks 63 countries, **includes only 4 Arab countries: UAE, Saudi Arabia, Jordan & Qatar.**

The UAE ranked 12th globally and 1st in the Arab world in the Global Digital Competitiveness Ranking in 2022 . When it comes to the "Knowledge" factor, which is one of the main components of the index, the UAE ranked 18th in 2021 and 2nd in terms of the availability of the related sub-factor "Foreign Employees with High Skills". Government's efforts were reflected in the Index on a different level when it came to "Funding for Technological Development" (the UAE ranked 8th) and "The Use of Big Data and Analytics" (the UAE ranked 3rd). The country has also made significant progress in its ranking in "Training and Education" sub-factor, moving from 57 in 2017 to 25 in 2021.

Regarding the "High-Tech Exports" sub-factor, the UAE's score is still low (ranked 39 out of 63 in 2021), indicating that the country still needs to put a lot of effort into producing high-quality technologies such as AI technology.

Results in other Arab countries are similar to those in the UAE. In 2022, Qatar ranked 18th in the general index, while Saudi Arabia Saudi Arabia and Jordan ranked 24th and 56th, respectively.

Bahrain made significant technological progress in 2022 and was the first to be included in the Global Digital Competitiveness Ranking and ranked 30, making it a very promising market for investment in AI technology. In fact, the country is rapidly improving its technological performance metrics globally, while at the same time making significant investments in technological solutions for sustainable development.

Country	UAE	Qatar	KSA	Jordan	Bahrain
Global Rank 2020	9	14	24	58	-
2021	9	17	32	49	-
2022	12	18	24	56	30
Knowledge 2020	31	45	46	54	-
2021	18	44	50	48	-
2022	-	-	-	-	-
Technology 2020	4	25	24	44	-
2021	5	19	24	43	-
2022	-	-	-	-	-
Future Readiness 2020	11	24	28	58	-
2021	12	23	32	56	-
2022	-	-	-	-	-

Source: IMD world Digital Competitive Ranking 2021

Sub-Factor - Qatar

	2020	2021
Training and education	53	54
Digital/Technological skills	8	12
Foreign highly skilled personnel	7	8
Funding for technological development	8	10
Use of big data and analytics	1	2
High-tech exports (%)	62	60

Sub-Factor - UAE

	2020	2021
Training and education	44	25
Digital/Technological skills	17	10
Foreign highly skilled personnel	3	2
Funding for technological development	11	8
Use of big data and analytics	2	3
High-tech exports (%)	58	39

Sub-Factor - KSA

	2020	2021
Training and education	34	34
Digital/Technological skills	15	17
Foreign highly skilled personnel	13	15
Funding for technological development	7	18
Use of big data and analytics	24	28
High-tech exports (%)	61	62

Jordan succeeded in ranking 18th in terms of availability of "Digital/Technological Skills" 32nd in terms of availability of "Foreign Highly Skilled Personnel" (much less than GCC countries), and 33rd in providing high quality "Training and Education", despite the country's overall ranking in terms of digital competitiveness and knowledge factor (ranked 48 in Khnowledge subfactor in 2021).

Sub-Factor - Jordan

	2020	2021
Training and education	33	33
Digital/Technological skills	29	18
Foreign highly skilled personnel		32
Funding for technological development	28	24
Use of big data and analytics	11	1
High-tech exports (%)	60	61

Source: IMD world Digital Competitive Ranking 2021

Egypt has not yet achieved internationally recognized technological developments. However, the Egyptian government is currently addressing the labor market gap by offering significant scholarships to youth in the fields of digital training and technology. One of the major national initiatives, Egypt FWD, has trained more than 250,000 young people in 2 years in data analysis, programming, web development, digital marketing, and machine learning. These initiatives may soon succeed in transforming Egyptian human capital into a promising component of the AI labor market.

The above figures highlight the disparities between the capabilities of Arab countries regarding adoption of AI, when it comes to the availability of talent and technical skills as well as technical infrastructure. On the other hand, it reflects the commitment of governments to advance the use of AI in their societies, by adopting a clear vision, policies for continuous training and empowerment, as well as adapting educational systems to better suit technical trends in AI. The fact that only 4 Arab countries are included in the Index reflects the regional contradictions within the region, and the different levels of effort needed to reap the benefits of AI.

Government-Led AI Strategies: The Economic Impact

Government-Led AI Strategies: The Economic Impact

The Arab region is characterized by a government-led investment strategy aimed at stimulating emerging technology sectors. Governments allocate relatively large budgets to invest in strengthening their national AI capabilities.

Saudi Arabia has pledged $20 billion in public investment to create 300 tech startups by 2030 , in the context of diversifying its economy and the need to stimulate its relatively small technology economic sector.

In the UAE, these investments are paying off; Careem became the first technology startup in the region to become a unicorn company. Other success stories include STC Pay in KSA, which is valued at more than $1 billion.

Governments in the region are heavily involved in creating AI ecosystems, in addition to their efforts towards integrating AI into government institutions. AI is seen as a key tool for accelerating public sector operations and improving the quality of public services.

This is expected to reduce costs in the long run. A study estimated that efficiencies provided by AI technologies could boost public budgets in the Middle East by **$7 billion each year.**

The potential impact of AI on economic growth in the MENA region ranges between **20% and 34%**, with the highest growth expected in the UAE followed by Saudi Arabia.
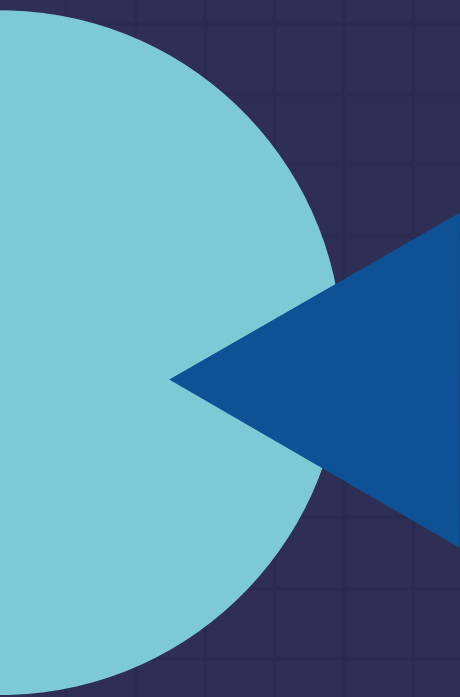
Sectors that drive such growth (percentage contribution to GDP):

- Retail by up to **19%**
- Public Sector (health and education) **19%**
- Transport and Logistics **15%**
- Technology, Media and Telecommunication **14%**
- Financial Services **14%**

When it comes to implementing national AI policies, it is clear that the governments of the region have made significant progress. Through these actions, countries stressed on the importance of promoting local talent, and securing an enabling environment for AI. However, none of these countries has established a national framework for ethical and responsible AI.

Although Qatar mentions ethics in its AI strategy, similarly Eygpt mentions launching a charter for responsible AI. Dubai is the only emirate that has developed a set of tools for AI ethics that includes principles and guidelines, along with a self-assessment model for developers who want to ensure reliable and safe use of AI.

AI strategies in the MENA region place a strong emphasis on building AI talent and fostering an AI-friendly corporate environment. In terms of stategies, efforts still needed to formulate an ethical framework for more responsible AI.

AI
Required
Skills

AI Required Skills

The changing demand for the skills required for AI is putting Arab youth in a constant state of challenge. These skills must be gained through practice and experience and not just in the classroom, lecture hall, or library. Academic and training institutions are not currently equipped for capacity building because **curricula need to adapt to evolving skill requirements; innovation means survival.** In order to **closely link technology to education,** it is of paramount importance that governments, educational institutions, and companies continuously innovate, focus on developing technological research, and better engage the industrial sector, as well as enhance international cooperation in the field of education.

Learning AI requires a knowledge base of mathematics and statistics (algebra, linear algebra, calculus, data analysis statistics, probability). **Another prerequisite is extensive knowledge of the Python programming language and its various libraries (Pandas, Numpy, scikit-learn, statsmodel, Eli5, MLflow, TensorFlow, keras).**

It is imperative that Arab youth acquire these new skills, in order to move smoothly into the labor market and to secure their share of the new roles defined by new technologies. Studies show that developing specialized cognitive skills is just as important as developing **personal skills**. The combination of four main areas is essential especially in leadership and management positions, namely: **complex thinking, creativity, social and emotional intelligence, and perceptual skills**. In fact, the importance of leadership and management positions is expected to expand with the spread of smart technologies and the increased dedication of human power to innovation and creativity.

The **skills required for AI need to match the dynamic nature of AI technologies,** hence the importance of adopting a **PACE** (Personalized, Accelerated, Continuous, Experiential) **educational curriculum**. This curriculum entails the provision of continuous and rapid educational plans that are inclusive of all workers, as well as adaptable to the training needs of the workforce and the needs of start-ups with full consideration of gender balance and the unskilled workforce in all the empowerment and training programmes.

AI Required Skills

Basic Skills

Science Skills
Mathematics & Logical
Analysis STEM

Professional Skills

Data Analysis
Programming Languages
such as Python

Personal Skills

Creative Thinking
Emotional & Social
Intelligence

AI Required Skills
Sources: Why5Research analysis framework 2022
Arab Youth Technology Fellowship - Accenture Middle East

Building skills in AI requires a specialization in programming and data science, along with creative interpersonal skills that nurture leadership and direction for AI technologies. The focus should also be on adopting a customized, rapid, continuous, and experiential learning approach.

In order to mitigate the effects of AI on unemployment in general and on youth unemployment, developing basic AI skills is extremely important in the Arab world. This is especially true for people in the MENA region who fall into the 15-24 age group, have an unemployment rate of 27.2% in 2021, are four times more likely to be unemployed than adults and have a lower probability of getting well-paying jobs.

According to the Global Digital Competitiveness Ranking Report, only 4 Arab countries participated in the rankings, and none of them ranked highly in the knowledge sub-factor. This reflects the required efforts to develop the skills and capabilities of the workforce.

Despite the cognitive challenges facing Arab youth and their ability to adapt to the requirements of AI, the 2022 Accenture surveys indicated that the workforce, of all ages, is ready to adopt the new digital reality, and keen to acquire the skills that will help them stay relevant with AI.

Python
AI Skill

Python - AI Skill

Python and R are the main programming languages used in deep learning algorithms. However, **Python is the most popular language for developing deep learning algorithms**, especially after the release of its latest version, **Python 3.8.0**. Over **57%** of developers use Python and **33%** rate it as their first choice for algorithm development. On the other hand, **31%** of developers use R to develop deep learning models and **5%** consider it the first choice for algorithm development.

Python has also been at the forefront of deep learning development over the past couple of years, introducing high-level frameworks and interfaces (API) with its Tensor Flow library, which also contributed to coding and encoding that made machine learning and deep learning easier. Python also offers a wide range of other libraries that support programming in different areas of AI, such as Theano, Scipy, Pytorch, scikit-learn, keras, and MXNet.
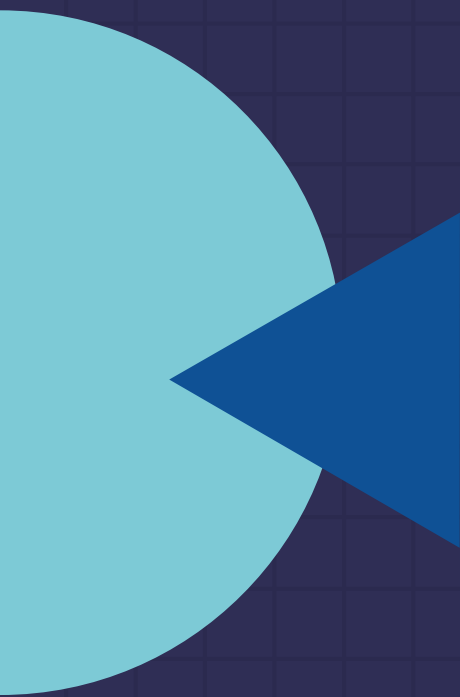
> Python is quickly rising to prominence as the leading programming language in computer science in general and in AI in particular.

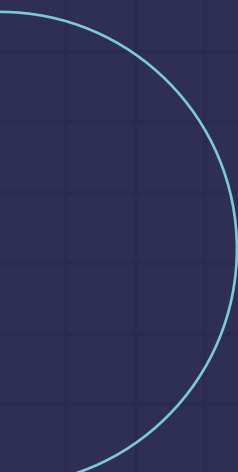## Several features of Python make it popular and relevant for developers and programmers:

- A **language that is constantly evolving:** programmers are **constantly** working on its development along with its various applications, and there is an integrated library for processing GUI, HTML, and XML.

- **Ease of writing the code in a unified system,** that can be used in different systems. It's also easy to read, organize, and format Python codes and can be used for Windows, Linux, and Mac OS X.

- Python is a free open source language that everyone can use, and all its tools are freely available.

- Python offers many applications and uses, whether as a major programming language for AI models and fields, or as a tool in data analysis and data science in general.

- Python is the fastest in terms of processing big data among different languages due to its large libraries.

- Python offers advanced support for audio & audio data and can be used in 2D graphic design and photography such as Scribu, Paint Shop Pro, GIMP and INKscape. Python can also be used for 3D animation along with many other uses in computing, programming, and business development.

- Python also offers high-level neural libraries for machine learning and deep learning such as TensorFlow, a neural library that can be used for deep learning algorithms, and Scikit-Learn library that can be used for data mining and analysis in addition to machine learning.

AI Future Trends

AI Future Trends

AI is the future, deep learning is the future of AI, and the development of neural networks is the future of deep learning and the way forward in the field of AI. In fact, the use of AI in life today and in the future will go beyond our imagination. AI algorithms will be used across all fields; from weather prediction, satellite navigation, medical operations, and market analysis, to expanding production of self-driving cars among other developments. **In short, the shadow of AI lies in all aspects of life.**

Advances in this field will generally fuel manufacturing machines that operate with the least amount of complexity and the lowest possible margin of error. As deep learning labs **develop more powerful robotic models with nearly zero error rate, deep learning has a major headline in the future of technology.** These labs focus on developing new computational methods (electronic cleaning system-ECS), including neural networks, to reach more effective uses of AI.

Key Trends in the future of deep learning and development of neural networks:

Self-Supervised Learning:

A machine can learn just like humans and with self-supervision, which makes it less expensive especially in the case of large models. As such researchers seek to reduce costs by developing automated models for self-training and self-learning. Developers work in smart laboratories to generate data algorithms capable of performing such operations.

Natural Language Processing (NLP):

By developing "Non-textual NLP" or what is known as a Generative Spoken Language Model (GSLM), a tool for modeling language, especially spoken language, by creating and extracting speech from audio and video without any label or text. This paves the way for modeling and definition of all the world's languages even those spoken or unwritten.

Neuroscience Based on Deep Learning:

The main goal is to build a deep artificial neural network that can simulate and try to surpass human capabilities . It is based on investing in the development of research-based deep learning in the development of neural networks, through which researchers are working to bring about strong developments in this field.

Recent developments and future trends in AI underscore the need for academic and training programs to integrate data science and coding languages, the most important of which is Python, to provide the workforce with the knowledge and skills to understand and build deep learning in AI. This will lead to great leaps in the future of AI and improve the uses and benefits of its current technologies.

AI Challenges
in the
Arab Region

AI Challenges
in the Arab Region

AI provides countries with a unique opportunity to improve the quality of life in the future, dedicating human resources to creative tasks. However, seizing this opportunity requires planning, keeping pace and harmonization between the available human and economic capabilities and its requirements in terms of primary capabilities and institutional structure. By integrating these two aspects, countries' can increase and share the benefits and advantages of AI.

Therefore, when talking about the challenges facing AI, we focus on the shortcomings of these two factors, and the countries of the MENA region are no exception. The challenges facing AI in this region include gaps in the prerequisites for developing AI first in terms of **Primary Capabilities: (1) Technical Infrastructure** (basic internet access, the computing power needed to operate and develop AI systems), **(2) Talent/Human Capital:** (for understanding and developing AI systems), and **(3) Lack of Good Big Data** (for use in training AI algorithms). In fact, the countries of the MENA region differ in their primary capabilities, however the GCC countries, specifically the UAE, are at the forefront in terms of technical capabilities, and infrastructure available for AI yet they are all constantly working to improve their technological capabilities and infrastructure.

Institutions are also a critical component of creating an appropriate environment for AI and its enablers, both in terms of (1) a clear vision for AI, (2) an overall commitment to investing in AI, (3) providing training and empowerment, (4) as well as integrating the efforts of the public sector, private agencies, and academic institutions.

Again, the performance of the Arab countries varies when it comes to Institutions. A national strategy for AI, which will be necessary to coordinate efforts and direct them towards the effective and responsible use of AI technologies in line with the progress and future demands of AI, has not yet been adopted by all countries in the MENA region. **The Global Digital Competitiveness Ranking, which includes only four Arab countries, reflects the scale and scope of the challenges the region faces when it comes to the prerequisites for developing AI** (Primary Capabilities and Institutions).
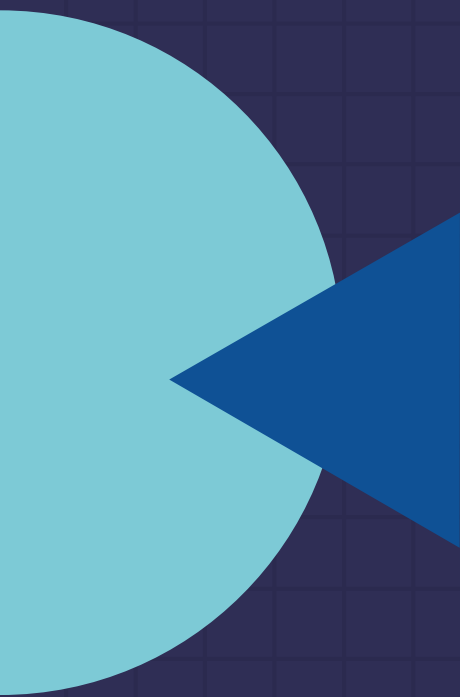
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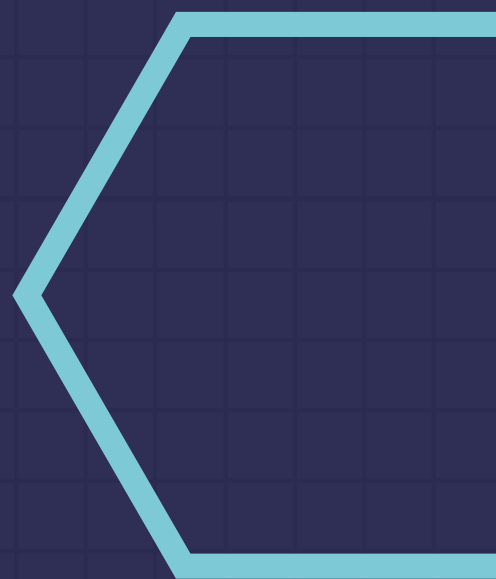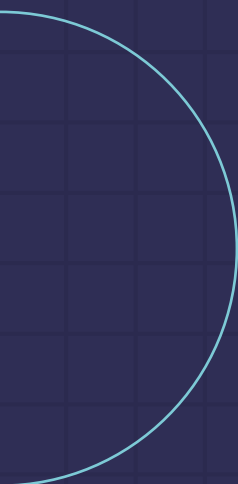
Recommendations

Advances in AI technologies requires efforts to nurture the two prerequisites for AI development: The recommendations of this report are presented along the two key prerequisites for AI:

1 Primary Capabilities

First: Digital Infrastructure and Data

▶ Enhancing fast access to the internet across the Arab countries as well as developing cyber and data security for more reliable use.

▶ Developing tools for data processing in Arabic, given that this language is rich and diverse and that most of the data in the region is in Arabic. This step is crucial and necessary to build databases for AI.

▶ Securing high-quality, up-to-date, and relevant data is essential because the effective functioning of AI technologies requires intelligent data. This can be done by monitoring data centers and transferring all web data, application data, database performance, user experience, and log data to a cloud-based data system, which can automatically monitor limits and detect anomalies.

Second: Human Skills

▶ Develop human skills and capabilities to develop AI solutions that can be scaled up to meet evolving needs.

▶ Develop specialized curricula in AI, training graduates, and nurturing young talents in this field.

▶ Focus on programming languages, particularly Python and Data Science as an entry point for developing expertise and skills in the field of AI.

▶ Highlight the importance of personal skills: such as leadership, creative thinking, complex thinking, emotional and social intelligence. Incorporate these skills into school curricula and in the early years to direct the human force towards creative work that requires confident, proactive, and ambitious personalities.

▶ Emphasize the importance of adopting curricula tailored to the needs of the workforce, an accelerated, continuous, experience-based approach that offers strong and sustainable skills.

▶ Develop the ethical and guiding framework for AI technologies as part of national strategies in the Arab countries.

▶ Train policy makers on AI technologies so that they can understand the rapid developments in this field and make decisions accordingly.

▶ Promote research and development (R&D) in the field of AI, with a focus on managing the risks associated with it.

▶ Strengthen partnerships between the industrial sector, the private sector, and academic institutions, to better track market demands and adapt curricula, as well as encourage and develop private investments in the field of AI.

▶ Emphasize the importance of exchanging experiences and Arab success stories to build on what exists and the lessons learned in this field.

▶ Embrace creativity and talent in the field of AI by providing appropriate enabling environments in terms of skills and institutions willing to implement, develop, and finance creative ideas.

▶ Encourage citizens to set up their own projects and establish businesses, as the Arab workforce tends towards working in the public sector, leaving fewer applicants eager to start or join AI projects.

▶ Develop advanced global fellowships in the field of AI to stay informed and explore future trends.

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للشـباب العربـي
ARAB YOUTH TECHNOLOGY FELLOWSHIP

مركز
الشباب
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ARAB YOUTH CENTER

About the Arab Youth Center

The **Arab Youth Center (AYC)** was established to realize the vision of His Highness Sheikh Mansour bin Zayed Al Nahyan, Deputy Prime Minister and Minister of Presidential Affairs, to empower Arab youth and address their needs.

The Center provides a unique platform for developing youth capabilities and supporting innovation and creativity among youth. AYC implements meaningful initiatives across diverse sectors, as well as conducts research on Arab youth to help decision makers shape policies that will enable them to advance.

The **Arab Youth Technology Fellowship,** one of the Center's initiatives, aims to contribute to the technological and digital empowerment of Arab youth, through theoretical and practical training on a global level.

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