United Arab Emirates

# Science, Technology & Innovation Policy

## in the United Arab Emirates

United Arab Emirates



1st Edition, November 2015


الإمارات العربية المتحدة

"Innovation, scientific research and a knowledge economy will create sustainable opportunity for our future generations. The new Science, Technology and Innovation Policy is a turning point in our march for development and progress."

**His Highness Sheikh Khalifa bin Zayed Al Nahyan,**
President of the UAE

"The Science, Technology and Innovation Policy is our roadmap to building a better future for generations to come. We have the human capital, effective governance and financial resources to accomplish a transformation of scientific progress in the UAE."

**His Highness Sheikh Mohammed bin Rashid Al Maktoum,**
UAE Vice President, Prime Minister, and Ruler of Dubai

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# INTRODUCTION

This Science, Technology and Innovation (STI) policy, adopted by His Highness Sheikh Khalifa bin Zayed Al Nahyan, President of the UAE, is a turning point in the country's march towards progress, economic diversification and prosperity, and aims mainly to prepare the UAE for a post oil world.

The timing of the policy coincides with the announcement of 2015 as the Year of Innovation in the UAE, as per the directives of His Highness the President of the UAE. It is also in line with the overall guidance of His Highness Sheikh Mohammed bin Rashid Al Maktoum, UAE Vice President, Prime Minister, and Ruler of Dubai, to launch the National Innovation Strategy and to form the National Science, Technology and Innovation Committee. This policy represents one of the Committee's most important output for this year.

This document starts with a brief review of the UAE Vision 2021 and the National Innovation Strategy that form the umbrella and the main purpose for setting this policy; it then highlights the importance of science, technology and innovation as well as the current assets of the UAE. Finally, it details the policy's general framework that includes the UAE's ambition in the fields of science, technology and innovation, the focus areas for this policy and its enablers.

The UAE government will work on implementing this policy and achieving its ambition, in order to make the UAE among the most innovative countries in the world, owing to advanced and innovative talent, resources, legislations and infrastructure.

# THE UAE VISION 2021

The UAE and its prudent leadership recognition of the importance of innovation and the primary role it plays in economic progress is reflected in the UAE Vision 2021 that highlights science, technology and innovation as main drivers of growth and progress. It asserts their role in the UAE's transition towards a knowledge-based economy and in ensuring sustainable development for the country.

> **"Innovation, research, science and technology will form the pillars of a knowledge-based, highly productive and competitive economy, driven by entrepreneurs in a business-friendly environment where public and private sectors form effective partnerships"**
>
> **UAE Vision 2021**

Supporting this government drive, the UAE's National Agenda 2021 identified many indicators in science, technology and innovation and set ambitious targets for them. These include the UAE becoming one of the top ten countries in the world in the Global Innovation Index, and increasing Research and Development expenditure three folds by 2021. Because of the great role of human capital in enhancing innovation, the UAE is also seeking to increase the share of knowledge workers to 40% of total workforce, and to advance the rank of its students in mathematics, science and reading to become among the 20 highest ranked countries by 2021.

# NATIONAL INNOVATION STRATEGY

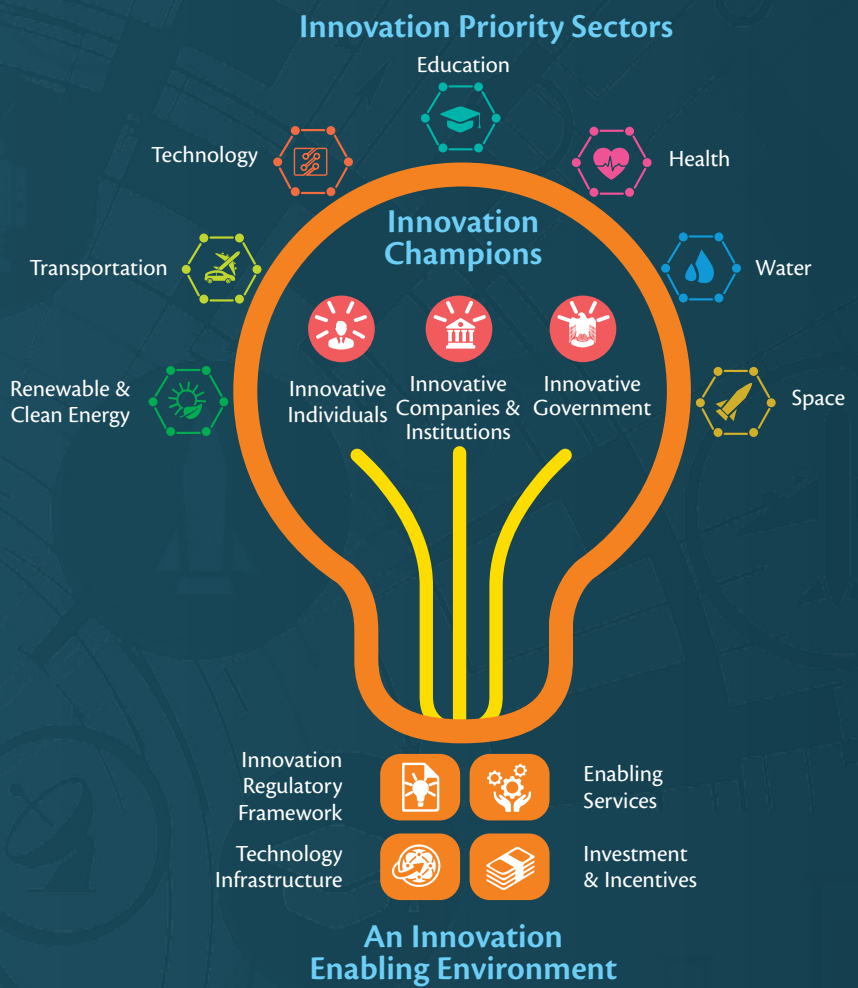
The National Innovation Strategy (NIS), launched by His Highness Sheikh Mohammed bin Rashid Al Maktoum, UAE Vice President, Prime Minister and Ruler of Dubai, is considered the main umbrella of the Science, Technology and Innovation policy. The NIS aims at realizing the UAE's 2021 Vision, to be among the world's most innovative countries by the Golden Jubilee of the Union. The strategy defines innovation as:

**"The aspiration to achieve development by generating creative ideas and introducing new products, services and operations that improve the overall quality of life."**

**The strategy aims to achieve this goal through the following:**

1) Insuring an innovation friendly ecosystem (including enhanced regulatory framework, technology infrastructure, supporting services, investments and incentives).
2) Creating a culture of innovation among individuals, firms, and the public sector.
3) Focusing on seven main sectors to lead innovation on the national level.

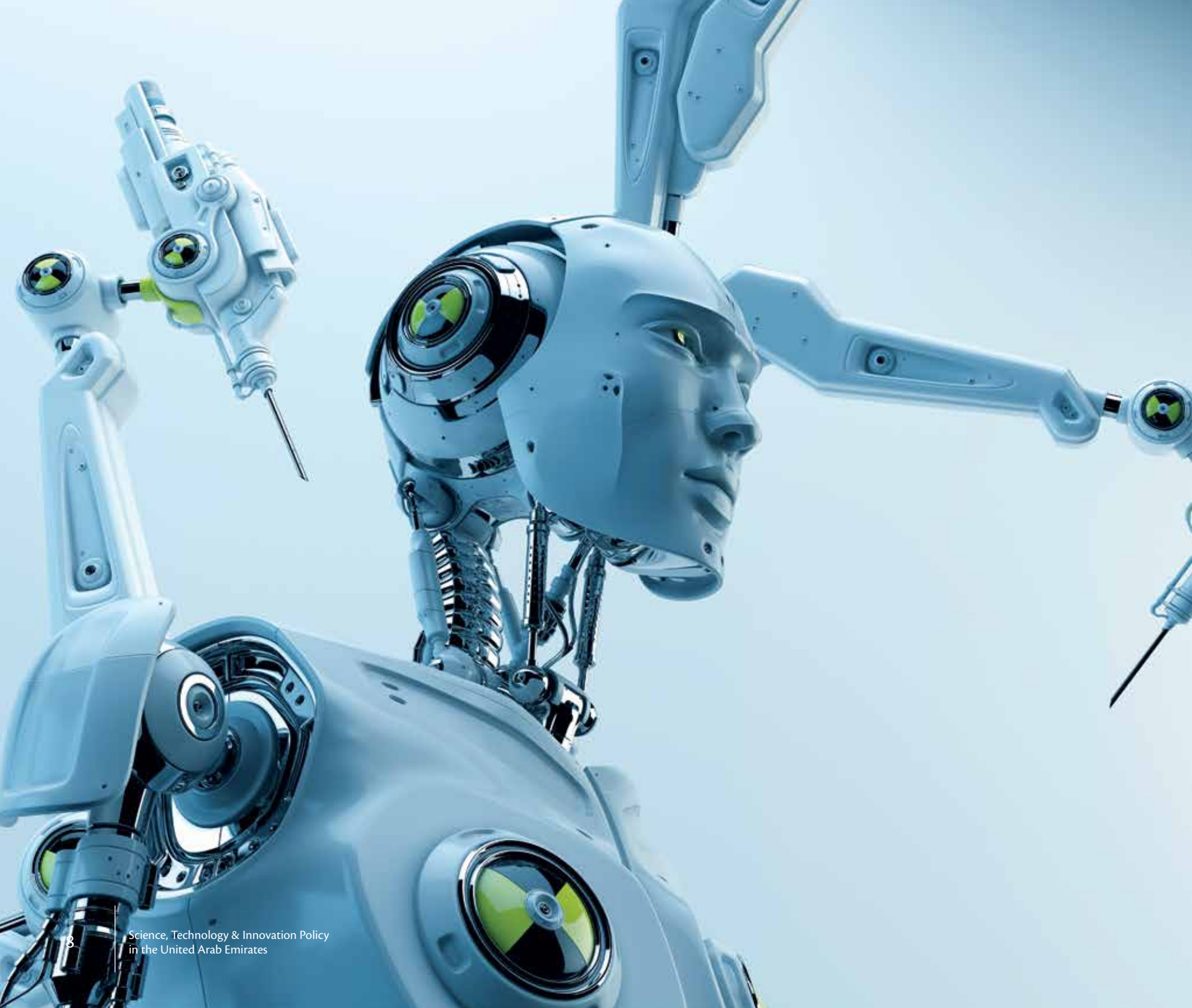
# National Innovation Strategy Framework




In November 2014, the National Science, Technology and Innovation Committee was formed to bring under its umbrella a number of Ministers and Chairmen of federal government entities leading the innovation sectors. The Committee comprises of:

- **H.E. Mohammed Abdullah Al Gergawi, Minister for Cabinet Affairs (Chairman)**
- **H.E. Sheikh Hamdan bin Mubarak Al Nahyan, Minister of Higher Education and Scientific Research**
- **H.E. Eng. Sultan Saeed Al Mansouri, Minister of Economy**
- **H.E. Hussain Ibrahim Al Hammadi, Minister of Education**
- **H.E. Abdul Rahman Mohammed Al Owais, Minister of Health**
- **H.E. Suhail Mohammed Al Mazrouei, Minister of Energy**
- **H.E. Obaid Humaid Al Tayer, Minister of State for Financial Affairs**
- **H.E. Dr Sultan Ahmed Al Jaber, Minister of State**
- **H. E. Mohammed Ahmed Al Qamzi, Chairman of Telecommunications Regulatory Authority**
- **H.E. Dr. Khalifa Mohammed Al-Romaithi, Chairman of UAE Space Agency**

The Committee is mandated to monitor the implementation of the National Innovation Strategy and the policies and initiatives that emanate from it; enhance coordination, cooperation and exchange of expertise among federal and local entities; follow up progress of innovation initiatives and its related indices nationwide; and engage the private sector and ensure that its social and economic contributions stimulate innovation. The National Science, Technology and Innovation Committee and the different working teams emanating from it worked on the development of the STI policy, which will be updated on an annual basis.



# THE IMPORTANCE OF A SCIENCE, TECHNOLOGY AND INNOVATION POLICY

Governments all over the world understand the importance of investing in Science, Technology and Innovation (STI) in order to achieve socio-economic development, as STI opens up opportunities for faster economic growth and creates sustainable wealth that independent of natural and non-renewable resources. Moreover, a focus on STI fosters investment in talent and human capital required for development, and provides innovative solutions for a number of challenges in health, security, environment and society.

International Comparisons systematically show a strong relation between the Research and Development (R&D) activities carried out by countries and their level of economic development, as the countries focused on STI through spending on R&D have higher per capita income levels. It is also now well recognized that public investment in R&D contributed to achieving big leaps in innovation and development in many fields such as the Internet, space and public health, while various evidence point to high returns on investment for the firms in the private sector that invest in R&D.

In this regards, in its attempt to remain one of the most prosperous countries in the long run, the UAE is set on transitioning into a knowledge and innovation based economy independant of oil resources, and on enhancing scientific and technological innovations in its public, private and academic sectors. That is why the UAE is in a unique position to invest and create the right environment and enhance the required culture to successfully achieve innovation based on science and technology.

# THE ESSENTIAL ROLE OF SCIENCE & TECHNOLOGY IN INNOVATION

There are three main types of innovation: Business innovation, technology-based innovation, and science-based innovation.

1. Business Innovation: The most important input to business innovation is good and innovative ideas. Business innovation does not require formal scientific or technological expertise. The investment needed to see such innovation through to market use is often modest, and the time to develop the expertise required to succeed at business innovation is minimal. Numerous innovators have created extraordinary personal wealth and public value through this type of innovation.

Examples of business innovation:

- Shared economy applications (e.g. transportation and hospitality)
- Internet-based crowdfunding platforms

2. Technology-based Innovation: technology-based innovation requires subject matter expertise, and may also require specialized infrastructure. Software development, for example, requires coding expertise and some computing equipment. Development of the touchscreen computer interface, on the other hand, required expertise in several areas including computer science, electrical engineering, and mechanical engineering. Mastering these various fields of knowledge requires more time and infrastructure than simply learning to code.

Examples of Technology-based innovation:

- Self-driving vehicles
- Intelligent and virtual personal assistants

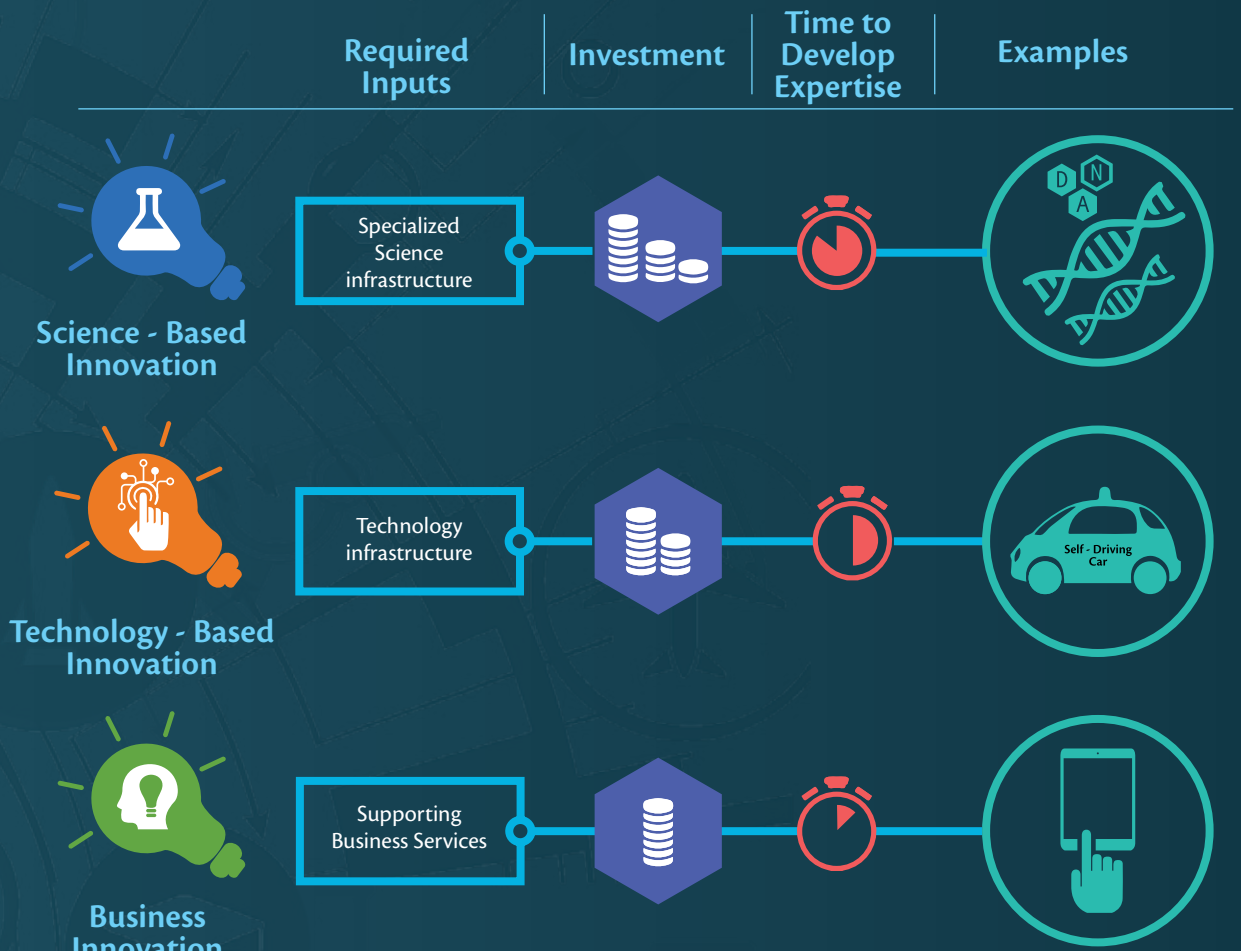
3. Science-based innovation: This type of innovation requires the highest degree of expertise. It can usually be done only by those with highest levels of knowledge and experience, and with access to specialized and usually expensive laboratory equipment and facilities. It also typically requires cooperation of teams of scientists and other technical experts, as is the case for the development of new pharmaceuticals. It is worth noting that Science-based innovation provides higher return on investment compared to the other two types.

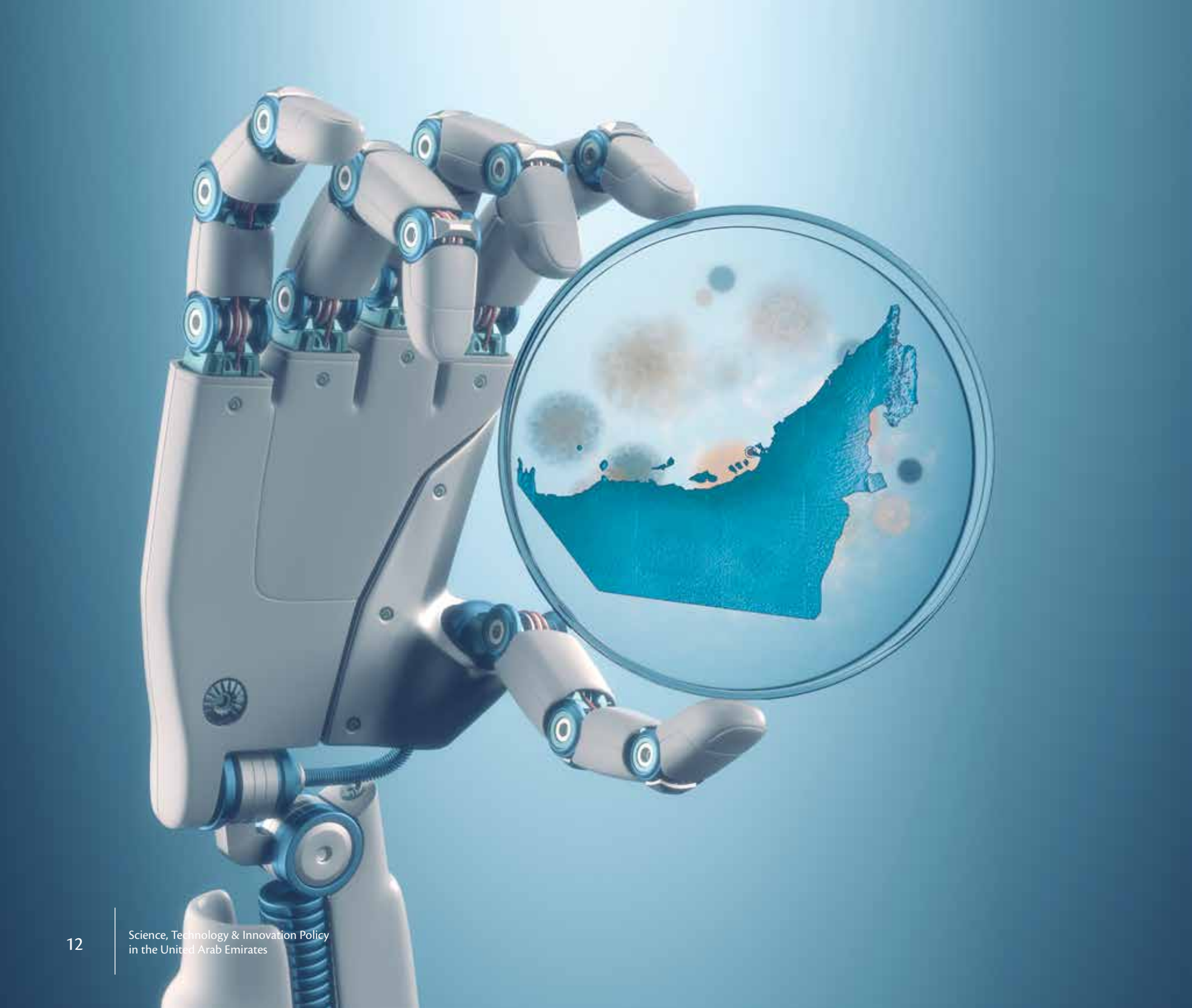
Examples of Science-based innovation:

- Genomics and biotechnology
- Solar cells

The goal of the UAE's Science, Technology & Innovation policy is to achieve robust science and technology-based innovation.

# Types of Innovation





# THE UAE STRENGTHS

The UAE is blessed with several assets that create a flourishing environment for STI. Human capital, infrastructure, availability of capital, and government efficiency are the most relevant among these assets

On the human capital front, recent statistics show a significant number of UAE citizens registered in higher education science and engineering programs, locally and abroad. The UAE has also become the destination of choice for work, and has attracted talents from all around the world. This abundance of talents and their mix made the UAE a regional and international hub for interaction and innovation. The launch of numerous innovative initiatives in various areas (e.g. renewable energy, space, and healthcare) and the high quality of life should further enhance the availability of scientists, researchers and innovators in the UAE.

In terms of research infrastructure, the UAE has the privilege of having universities and specialized research centers in important fields, in addition to having several high quality science labs, which encourage scientific research in the country. Furthermore, the UAE has excellent relations with many leading countries and organizations globally in the field of science and technology. This resulted in partnerships in research and innovative projects in many areas.

The UAE has invested widely in developing a first-class IT infrastructure, thus contributing to science and technology-based innovations. The country currently ranks high in international indices measuring Networked Readiness and internet penetration, with highly connected schools and universities in all areas. The UAE government has launched the Smart Government initiative aiming to facilitate customers' access to government service anytime and anywhere using technology. In addition, the smart cities and open data initiatives will help encourage growth of technology and innovation in the public and private sectors for the years to come.

The availability of capital is a key element in the success of STI policies. The UAE is rich with financial resources, and has high savings due to investing oil revenues in sovereign funds. Today, the UAE is the home of many large national businesses seeking new investment opportunities, complemented by regional and international investors. The country has established several funds to finance pioneering and innovative projects, and it has the proper infrastructure needed to facilitate the flow of capital into investments. The UAE's financial markets have ranked first internationally in attracting and listing global Islamic bonds (Sukuk). All of this will provide the support needed to fund the growth and development of STI market in the UAE.

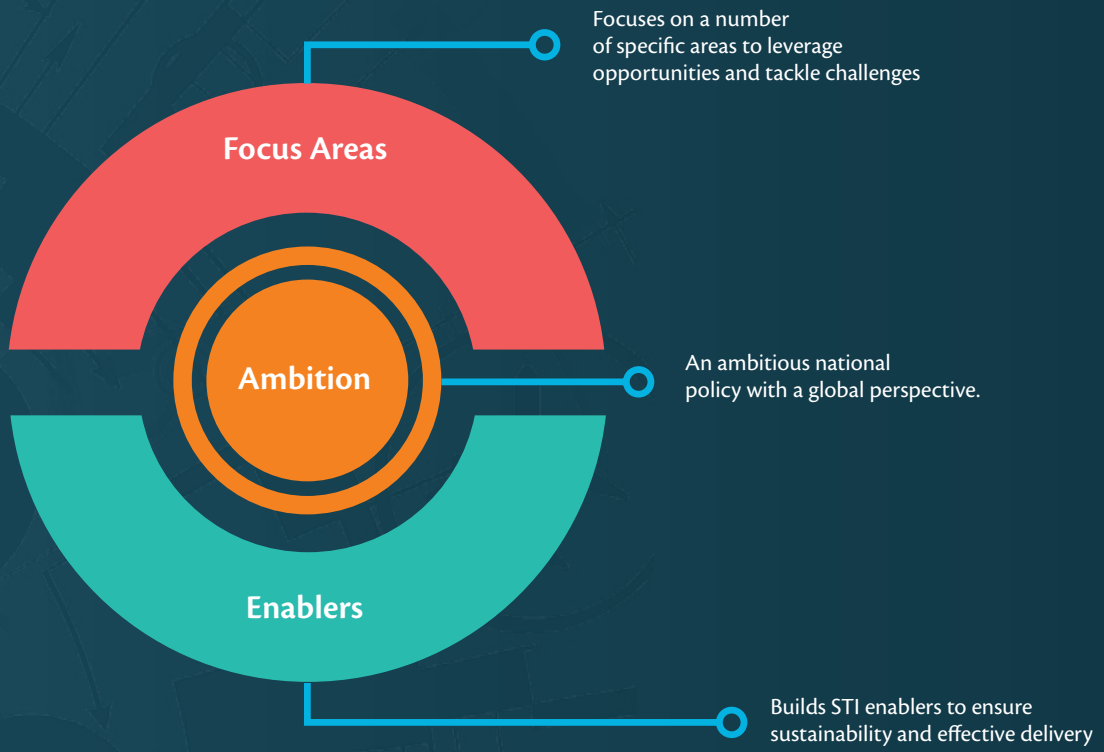
The UAE has a unique leadership that foresees the future, and a government that works according to a clear agenda. Among its priorities is the execution of important initiatives that place high importance on the progress of its citizens as well as strengthening the country's competitiveness. The UAE government is also determined to enhance innovation, not only in businesses and in universities, but also in the public sector, as reflected in the high ranks that the UAE holds in government efficiency indices. All of this will contribute highly in making the UAE the perfect environment to incubate science and technology based innovations.

# THE GENERAL FRAMEWORK OF THE SCIENCE, TECHNOLOGY & INNOVATION POLICY

The Science, Technology and Innovation Policy is a strategic decision for the UAE that aims to change the national economy equation to drive it away from depending on limited oil resources. This policy aims to foster sustainable innovation based on science and technology, in an attempt to build a true knowledge-based economy. Focusing on science and technology will help the UAE leapfrog to achieve its global ambition and vision for the year 2021.

The UAE STI policy stems from a big ambition that does not only aim at finding solutions for the national challenges, but to seize global opportunities as well. This ambition results in a number of areas that the country intends to focus on. In order to achieve success in the areas of focus, the STI policy will strengthen a number of enablers for innovation.

# Science, Technology & Innovation Policy Framework

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# THE UAE'S AMBITION FOR SCIENCE, TECHNOLOGY & INNOVATION

The UAE aspires that science, technology and innovation become the real drivers for sustainable socio-economic development, leveraging its current assets when it comes to human and financial resources as well as infrastructure and government efficiency. This aspiration builds on the leading and innovative initiatives launched in many sectors such as aerospace, renewable energy, education, health, transport and water, as well as the focus on human development and economic diversity to achieve prosperity for future generations. Particularly, the UAE's STI strategy aspires to enhance science- and technology-based innovation to fulfill national aspirations and to address international challenges.

This ambition goes along with the global trends in STI policies becoming more mission driven, and complies with the best international practices. The UAE is capable of realizing huge and rapid leaps in the desired change.

# FOCUS AREAS OF THE SCIENCE, TECHNOLOGY & INNOVATION POLICY

The STI policy's focus areas have been identified according to the following criteria:

1. Meeting present and future national needs, so that these areas contribute to tackling some challenges that are faced both nationally and regionally.
2. Aligning with present and future international trends, so that these areas contribute to benefiting from opportunities and developments emerging worldwide.
3. Aligning with the country's capabilities and unique assets, so that the UAE can become a world leader and simultaneously achieve high returns.

In total, 24 focus areas for science & technology-based innovation have been determined by the UAE. These areas represent a mix of opportunities (e.g. Semiconductor Process Development) and challenges (e.g. Water Management & Economics) nationally and internationally. The selected areas are:

## Strategic Sectors in the UAE

- Education
- Health
- Water
- Renewable and Clean Energy
- Space
- Technology
- Transportation

## Focus Areas of the STI Policy

- Education Innovation and Technology
- Health Information Technology and Bioinformatics
- Public Health, Non-Communicable Diseases and Wellness
- Biotechnology and Genomics
- Water Management and Economics
- Solar and Alternative Energy Technology Systems
- Space Sciences
- Cubesats and Nanosatellites
- Cybersecurity
- Semiconductor Process Development
- Robotics and Artificial Intelligence
- Smart City Applications and Solutions
- Architecture and Urban Design
- Arabic Digital Technology
- Financial Services Technology
- Petroleum Geosciences
- Internet of Things and Big Data
- Additive Manufacturing (3D Printing)
- Advanced Building and Construction Materials
- Food Security
- Transportation Logistics, Analytics and Security
- Aerospace Advanced Materials, Manufacturing, Maintenance and Testing
- Commercial Unmanned Aerial Vehicles
- Autonomous Vehicles

## 1 Education Innovation and Technology

Technology in education comprises the array of tools used to advance student learning, including software and digital materials (e.g., courseware, digital textbooks, online learning platforms, learning management systems), as well as hardware, network infrastructure, telecommunications and Internet services to enable these technologies, and even robotics. The UAE has invested in smart learning and launched a number of initiatives concerning innovation in education, which qualifies it to become a regional leader in generating innovative educational platforms, materials, applications and technologies.

## 2 Health Information Technology and Bioinformatics

Health information technology and bioinformatics serve the growing use of data to improve the efficiency and outcome of medical services and advance biomedical research and drug discovery. The range of health IT applications extends from distance medicine to management of patient records, to data analysis and bioinformatics. Increased adoption of health technology and bioinformatics will serve the UAE's goals and its orientation towards innovation in the health sector..

## 3 Public Health, Non-Communicable Diseases and Wellness

The public health and wellness sector provides healthcare services, conducts medical and healthcare policy research, and supports healthy lifestyles and habits that prevent and mitigate diseases. This sector also encompasses the adoption of health information technology to help improve the accessibility, quality, and outcomes of healthcare services. Focusing on this area would improve the quality of life, and establish the UAE as a leader in medical research, especially through the development of health IT and medical devices, as well as research in non-communicable diseases and behavior.

## 4 Biotechnology and Genomics

Biotechnology is a very broad area in which biological processes, organisms, cells, or cellular components are exploited to develop new technologies. New tools and products developed by biotechnologists are useful in research, agriculture, industry and healthcare delivery. Moreover, scientific progress in genomics led to a revolution in the field of scientific research concerning comprehending the biological systems (such as the brain, the complete DNA sequence and genetic mapping). The UAE has an active, emerging biotechnology sector, including effective universities in the field of biotechnology and genetic engineering research, demonstrating the potential for innovation in this field.

## 5 Water Management and Economics

The scarcity of water resources in the region and some parts of the world gives the UAE the opportunity to innovate in this area, especially with the country's launch of many relevant initiatives, such as UAE Water Aid and The Institute Center for Water and Environment (iWater) in Masdar. The most important R&D areas in this field include: (1) water recycling and waste management technologies and systems; (2) produced water from oil and gas exploration treatment; (3) desalinization technologies; and (4) water pricing and incentives in desert and drought environments. There is a great opportunity to develop modern technologies to address these challenges. These technologies can then be exported to other parts of the world facing similar water challenges.

## 6 Solar and Alternative Energy Technology Systems

This sector focuses on the R&D and economic models needed to advance the deployment and adoption of solar and alternative energy technology systems. There are a number of issues related to the usage of solar and alternative energy in the region, that present opportunities for research and development; such as using solar energy in water desalination, generating and distributing solar energy and reducing its cost. The UAE has enormous solar energy resources and a number of huge ongoing projects in this field, which represent a good opportunity to focus on deploying the utilization of solar energy.

## 7 Space Sciences

Space sciences have great importance due to their connection to a number of technological and scientific innovations that served humanity on a large scale in many fields such as health, transportation, environment, industry and security. The UAE leadership gives great importance to the space sector, and has set a goal to send the first Arab probe to Mars by 2021. The main opportunities that present themselves for the UAE in this respect are exploring celestial bodies, developing satellite communications technology, in addition to deploying the latest space technologies in terrestrial applications.

## 8 Cubesats and Nanosatellites

The scaling down of satellite components has opened the satellite market to many new satellite applications and developers. Developing, building, and operating satellites requires a host of specialized services and technologies at every point of the value chain. There is a great need in the region for the applications of remote sensing through satellites, including natural resource mapping, environmental monitoring, land-use planning, and security. The UAE could build on its recent space initiatives and become a pioneer in this field..

## 9 Cybersecurity

The rapid growth of smart systems and increased international traffic and trade have greatly increased the need for security for systems that include smart manufacturing, smart grid and utilities, smart buildings and infrastructure, smart transportation and mobility, smart healthcare, and smart border controls. The UAE has a great interest in technologies that lie at the nexus of digital security due to its focus on being a leader in the area of smart city and smart government applications, its position as a center for international banking, commerce, logistics, and transportation, and the growing use of social networking, cloud computing, smartphones and smart applications. Hence, focusing on science and technology research in this field would be of great importance.e.

## 10 Semiconductor Process Development

The importance of semiconductors lies in their being among the most important technological means in modern times (such as computers, mobile phones and TVs) and a number of electronic parts (such as transistors and solar cells). The global semiconductor market is experiencing almost double-digit growth per year. There is a significant space for UAE expanded participation through developing semiconductor manufacturing and testing services in the UAE, and increasing the relevant research projects in national universities, especially that it owns one of the largest semiconductor manufacturers in the world.

## 11 Robotics and Artificial Intelligence

Applications for robots and artificial intelligence (AI) are limitless; however, the focus is on the social and human service applications is innovative. The UAE is exerting great efforts in investing in robotics and AI through a number of initiatives (such as The Mohamed bin Zayed International Robotics Challenge, and The UAE AI & Robotics Award for Good which focuses on education, healthcare, and social services applications). The UAE can build on this international reputation and work on providing a regulative environment that encourages using robotics and AI in different sectors. It can also utilize the strong research being conducted in its universities in the areas of engineering and materials, in order to develop robotics and AI capabilities centered on social applications. This will enable the UAE to address broader application markets, including transportation/logistics, aerospace, space and smart cities

## 12 Smart City Applications and Solutions

Smart Cities exploit technological solutions to improve the lives of urban dwellers and increase efficiency. Smart-city science and technology cut across many domains and addresses multiple solution areas, including traffic and living conditions, resource management, waste management and other utilities, public health and safety, and infrastructure security. The UAE is leading in promoting and launching smart city initiatives, and with its rapidly-growing urban environments, it provides an ideal proving ground for smart city application development. This focus area will also provide a boon to the country's IT and application development sectors.

## 13 Architecture and Urban Design

This sector intersects with smart cities activities and associated energy and resource efficiency goals, and draws upon and enhances the country's existing expertise in architectural design. This is a cross-cutting opportunity that draws on many social, cultural, and environmental assets within the UAE to develop futuristic, unique, UAE- and Arabic-specific designs in architecture and urban planning. Moreover, work in this area will have major practical benefits, such as encouraging more healthy lifestyles and creating environmentally-friendly living spaces.

## 14 Arabic Digital Technology

The rapid growth of the youth population in the region and their preference for social media and mobile technology will increase the demand for digital media and Arabic language software. The opportunity for "Arabic apps" in the UAE and for the broader Arabic speaking world is already significant, due to the presence of the suitable environment and infrastructure, and the rapid grow in its social, commercial, industrial, medical, government, and entertainment uses.

## 15 Financial Services Technology

Financial Services Technology provides the operational platform for global financial services, including traditional and Islamic retail and commercial banking, capital markets services, and financial exchanges. The UAE is a global financial hub; countless major financial institutions have located significant operations in the country. Championing Financial Services Technology in the region will solidify the UAE position as a financial hub and will attract new important players in this sector.

## 16 Petroleum Geosciences

Petroleum Geosciences represent the core S&T underpinning of petroleum exploration, extraction, and refinement. While the globe's mix of fuel and energy sources continues to evolve and include more renewables, petroleum remains the most essential fuel for commercial energy needs, especially those requiring high energy density, such as air flight, and a key input to an enormous range of downstream petrochemical products. The UAE can enhance its leadership in petroleum geosciences, especially in improving extraction efficiency and innovating in non-potable water treatment.

## 17 Internet of Things and Big Data

The Internet of Things (IoT) refers to the interconnection of an enormous range of objects to the internet via the internet protocol. The UAE's exiting internet infrastructure position qualifies it for rapid research in IoT technology, while the large investment in zones specialized in IT provides a unique test bed for experimentation in IoT applications. The Internet of Things development dovetails with several UAE focus areas, including transportation, smart cities, renewable energy, and health.

## 18 Additive Manufacturing (3D Printing)


Additive Manufacturing, also known as 3D Printing, refers to technologies that build 3D objects by adding successive layers of material, including plastic, metal, concrete, or other material. The technology is developing quickly, as are its applications, which will grow to include an almost unlimited set of uses. The UAE has already launched a number of big initiatives in this area, as the construction of the first office totally printed using the 3D technology was announced in 2015. Moreover, Materials Sciences and Engineering, the primary S&T disciplines that support additive manufacturing R&D, are strengths of UAE universities. There is a potential for significant synergies with other areas, including space, health, transportation and construction.

## 19 Advanced Building and Construction Materials

Materials play a critical role in many aspects of construction, providing for a structure's strength, environmental resistance, durability and energy efficiency. There is also an expanding research into how materials interact with one another and how they are assembled to form constructed systems, such as buildings, bridges, and space stations. The UAE is home to several of the world's largest and most advanced construction projects, while its universities and private sector excel at materials science and engineering, providing a strong foundation for research in this area.

## 20 Food Security

The UAE imports the majority of its food, like all nations in the region. While annual rainfall limits the type of agriculture that can be successfully pursued in desert environments, advances in agriculture science hold the promise of meaningful increases in desert agricultural efficiency. The environment of the UAE gives it the opportunity to enhance its research in the field of food security, especially with the presence of some of the most prestigious food and agricultural colleges in the region.

## 21 Transportation Logistics, Analytics and Security

Transportation logistics, analytics and security is a broad, multidisciplinary sector that drives multiple technologies, including everything from big data management systems to security technologies. There are global opportunities for innovation in this field with new technologies, such as incorporation of unmanned aerial vehicles (UAVs) and autonomous vehicles into existing transportation infrastructure. The UAE can draw on its existing expertise in international transportation logistics to create technologies and innovative systems that address myriad transportation challenges in the UAE and abroad.

## 22 Aerospace Advanced Materials, Manufacturing, Maintenance and Testing

New aircraft composites will require new manufacturing processes, new non-destructive testing methods, as well as expertise in the maintenance of aircraft equipped with the new materials. In addition to new testing methods, research will also be needed on the unique challenges of advanced aircraft maintenance in hot, dusty, and desert environments. As the home base for the largest carriers in the world and a global mega hub for air travel, the UAE is well suited to manufacture, conduct research on and test new aircraft materials. UAE universities can partner with UAE petrochemical companies to develop new materials and can collaborate with manufacturers to develop new testing techniques and manufacturing processes for use in aircraft.

## 23 Commercial Unmanned Aerial Vehicles

Unmanned Aerial Vehicle (UAV) technologies are the focus of extensive research around the globe focusing on sensors, control technologies, and materials and composites for autonomous UAVs. UAVs are widely deployed by governments and militaries; however, there is still an opportunity for the large-scale commercialization and growth of the UAV market for private use. By acting quickly and adopting a favorable regulatory environment, the UAE could position itself as a leader in developing commercial UAVs. Moreover, it can encourage universities and organizations to conduct research pertaining to this kind of aerial vehicles.

## 24 Autonomous Vehicles

Autonomous vehicles, also known as driverless vehicles, are an emerging technology that includes control systems, sensors and other hardware, as well as several enabling technologies. Large-scale deployment of autonomous vehicles will require the development of the regulatory environment and the deployment of supporting infrastructure for the tracking and navigation of the vehicles, and integration into existing infrastructure systems. The UAE has an opportunity to act quickly to embrace the use of autonomous vehicles for private use by developing the supporting regulations and infrastructure. This would attract companies developing autonomous vehicle technologies to the country and enhance the country's transport sector.

# ENABLERS OF THE SCIENCE, TECHNOLOGY & INNOVATION POLICY

The main enablers for the UAE STI policy include talent; investment & incentives; universities & supporting institutions; intellectual property (IP) & regulation; and partnerships & networks.

## Talent

Skilled human capital is an essential building block of science and technology. To become a leading innovative nation, the UAE will need a workforce with excellent Science, Technology, Engineering and Mathematics (STEM) skills at every level, as well as a pipeline of higher education students receiving STEM training, in addition to enhancing R&D management skills.

### Goals for Talent

- Focus on strong STEM skills development in all school years and achieve excellent education outcomes
- Establish a strong local STEM workforce
- Employ and retain UAE nationals in R&D work fields
- Develop strong local R&D management skills
- Attract and retain the best STEM minds and talents from all over the world
- Ensure knowledge transfer between global and local talents

## Investment & Incentives

The development of science, technology, and innovation capacity requires investment in basic science, adequate funding for applied R&D, and availability of financing and early stage risk capital to turn research and ideas into business ventures. As important is the need of a cultural that encourages and rewards entrepreneurs and innovators, and accepts failure so that STI activities become more productive.

### Goals for Investments and Incentives

- Provide adequate government funding of basic scientific research
- Increase industry funding of R&D activities
- Ensure availability of risk capital to support entrepreneurial activity
- Encourage the growth of SME's in the fields of Science and Technology

## Universities & Supporting Institutions

A world-class innovation ecosystem requires that university researchers have access to specialized and advanced R&D infrastructure, including laboratories, equipment, and IT infrastructure. It also requires that the entrepreneurs and the startup businesses that spin out of university R&D have access to flexible, inexpensive space for growing their businesses, as well as low-cost access to labs and prototyping facilities. In addition to this physical infrastructure, innovation also requires a variety of specialized "soft infrastructure," including institutions that facilitate R&D and technology transfer, offer business services, and provide mentoring and advice.

### Goals for Universities & Supporting Institutions

- Strengthen higher education, and basic and applied research in the fields of science and technology in universities
- Equip universities with world-class laboratories, equipment, and computing
- Expand specialized R&D facilities to support key innovation sectors
- Ensure the availability of supporting institutions for technology transfer and incubating innovation

## Regulation & IP Protection

Effective and flexible regulations are fundamental to the proper functioning of all aspects of the innovation system. Regulation defines what activities are allowed, and provides protection for all parties involved in S&T-based innovation. Strong intellectual property laws are necessary to protect inventors and business owners of their rights and returns on their IP. In addition to IP laws, a host of regulations is needed to support the flow of talent, critical technological equipment and materials essential to a strong S&T enterprise, in addition to regulations that reward boldness and venture such as the bankruptcy regulation.

### Goals for Regulation & IP Protection

- Develop flexible regulations that encourage the growth of innovative projects and businesses in the country
- Provide best protection of intellectual property
- Facilitate the import of technology, equipment, and materials critical to research
- Encourage the inflow of scientists, researchers and innovators
- Develop mechanisms and incentives to strengthen individual and corporate innovation
- Encourage innovation, entrepreneurship and reward risk-taking

## Partnerships & Networks

Partnerships are essential in the field of science and technology, as they help in finding solutions for the challenges that require different specialties and diversified expertise. Partnerships also give universities support in marketing researches and innovations, as well as providing the financial and human resources needed for conducting advanced research. Collaboration between the academic and private sectors is an obvious and effective strategy for stimulating innovation. Collaboration should not be limited to the UAE, but should include cooperation between UAE institutions and organizations based in other countries. The increased scale and cross-fertilization created by partnerships between universities, industry, government, research institutions, and others will ensure a strong innovation system and hasten the development of institutional capacity.

### Goals for Partnerships & Networks

- Enhance cooperation between universities and private sector in STI
- Make government R&D accessible to the private sector
- Encourage international partnerships with universities and big research institutions
- Establish distinguished expertise in certain unique areas through partnerships

# CONCLUSION

This policy sets the course for the UAE's economy in a post-oil world. Achieving its goals requires concerted effort from the public, private and academic sectors. The policy includes several initiatives which will support the UAE's focus areas in STI, and enhance the innovation ecosystem enablers. Achieving the UAE's vision to be one of the best countries in the world by 2021 is the intended destination for this policy, while at the same time realizing the national aspirations and tackling international challenges.