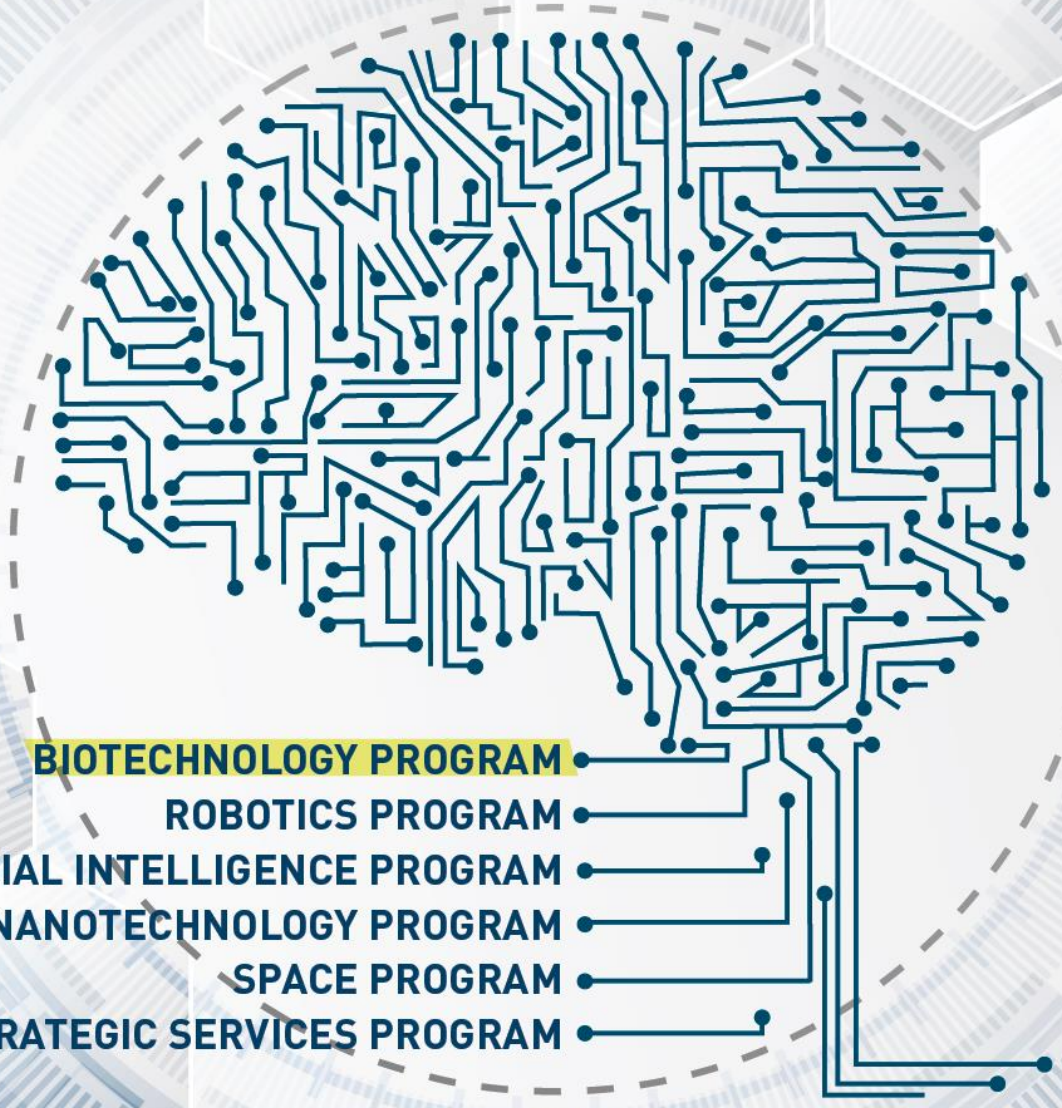
(Biotechnology I Robotics I Artificial Intelligence I Nanotechnology I Space I Strategic Services)

BRAINS² TÜRKİYE

BIOTECHNOLOGY PROGRAM

"Development of Vision, Strategy, Ecosystem and Market, through the International Comparison"



BIOTECHNOLOGY PROGRAM
ROBOTICS PROGRAM
ARTIFICIAL INTELLIGENCE PROGRAM
NANOTECHNOLOGY PROGRAM
SPACE PROGRAM
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(**Biotechnology** | **R**obotics | **A**rtificial **I**ntelligence | **N**anotechnology | **S**pace | **S**trategic Services)

BRAINS² TÜRKİYE* BIOTECHNOLOGY PROGRAM

"Development of Vision, Strategy, Ecosystem and Market, through the International Comparison"

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* **BRAINS² TÜRKİYE** is a brand/initiative with multi-programs based in Turkey which develops market, ecosystem and capacity in the '**Biotechnology**', 'Robotics', 'Artificial Intelligence', 'Nanotechnology', **'**Space' and 'Strategic Services' fields. The programs planned through identical visions and strategies for each main fields which transforms the new business models and multidimensional power distribution in the global economy, are implemented under the common title of **BRAINS² TÜRKİYE.**

VISION (DRAFT)

Biotechnology is an interdisciplinary field which contains the research, development and production processes of products with economic value by the using living materials. Due to recent developments in genetic techniques; the transfer of genetic materials between organisms and the existence of organisms which are suitable for the production and optimization of new metabolites with commercial importance have accelerated the applications in this field.

As the biotechnology aims to understand, intervene, change and direct the functions of human, animal and plant cells; various techniques and processes are used in this field. Thus, it is possible to produce new products which are not produced by microorganisms which are genetically manipulated in order to gain the desired specifications. The importance of these products with high economic value increases the importance of the related studies. Developments in biotechnology and molecular biology are very important for the fields such as environment & energy and food production.

Biotechnology is also defined as the methods which are used to apply genetic modification on plants, animals and microorganisms or to obtain new organisms through applying technology in natural sciences in order to treat living creatures or to develop products for industrial use. The biotechnology where natural sciences such as cell and tissue biology culture, molecular biology, microbiology, physiology and biochemistry are used mutually with the engineering branches such as genetics, machinery, electronics and computers; covers all studies performed by using DNA technology in order to develop plants, animals and microorganisms, and to obtain materials or products which cannot be found naturally or found very rarely.

BIOTECHNOLOGY PROGRAM

Biotechnology, which differs from other technologies through creating its own demand as it transforms basic inventions into useful commercial products in a short time, has a very wide activity field such as protein and hormone production for human health; production of vitamins, antibodies and antibiotics; purification of organism enzymes and biomolecules which live in difficult conditions and their usage in industry; production of new vegetable and fruit; elimination of harmful genes in humans; production of vaccines, pesticides, medicinal plants; even the production of artificial organs and tissues to replace damaged or non-functioning organs and tissues. The global market shares of biotechnological products are as follows; 77% in food industry, 12% in antibiotics industry, 7% in medicine and 3% in agriculture.

The biotechnological applications which covers many fields in our daily life, are classified with sub-sectors by considering fields of activity through assigning the colors codes such as "Red" (health and diagnosis), "blue" (water and sea), "yellow" (food and nutrition), "green" (agriculture and environment), "brown" (irrigation and desert), "white" (industry and R&D), "gray" (fermentation and bioprocess), "gold" (bioinformatics and nano-biotechnology), "black" (bio-terrorism and bio-crime).

The vision of Turkey is determined as “to take place among the leading countries of the world through increasing the technological knowledge level and value added production in the field of biotechnology" through taking opinions of the responsible and related public institutions beside the universities and non-governmental organizations which bear responsibilities within the scope of Turkey’s Biotechnology Strategy and Action Plan; and the general purpose is determined as “to improve our R&D and innovation ecosystem capacity in biotechnology field, to make our country an attraction center which develops technology and which produces innovative, value added and suitable products towards global competition”.

The below given three sub-objectives are determined in the strategy for the "health biotechnology", "agricultural biotechnology" and "industrial biotechnology" fields: 1) To develop a health biotechnology sector which develops, produces and exports high value-added and innovative products such as bioactive molecules, drugs, systems, tissues and organs; which is qualified and compatible with international standards and which has qualified researchers, technological infrastructure and which has reached international competitive capacity, which is integrated with the world and which complies with regulations and ethical rules. 2) To develop and produce innovative products and to create and industrial scale structure which adopts green production through efficient use of genetic resources of Turkey created by the bio-diversity and the recyclable resources. 3) To become a country which focus on R&D studies in order to develop biotechnological techniques and practices through considering the risks in terms of environment and human health in the agricultural sector and which applies the biosafety criterion effectively regarding the produced products through utilizing advanced technology by considering international developments.

BIOTECHNOLOGY PROGRAM

The objectives within the scope of the action plan are as follows respectively; “To Perform Legal and Administrative Arrangements”, “To Improve Technical Infrastructure”, “To Improve Production Infrastructure”, “To Improve Health Biotechnology Sector”, “To Improve Industrial Biotechnology Sector”, “To Improve Agricultural Biotechnology Sector”.

Even many European countries – same like Turkey - has kept the distance against the biotechnology for a long time because of the negative reputation of GMOs, the “Bio-economy” which represents trade activities on biological systems in the free market is ascending in Europe. Bio-economy is based on mainly agriculture and animal farming sectors beside chemistry, health, medicine, cosmetics, energy and many other sectors. The current volume of the bio-economy in Europe is over 1.5 trillion Euros.

According to the "Biotechnology Sector Innovation System" report of Turkey Technology Development Foundation; as the USA lead the global biotechnology, volume of bio-economy is 100 billion $ as the share of agriculture is 76 billion $ in USA, the volume of bio-economy in Canada 87 billion $. Israel, Ireland, South Korea, China, Singapore and India have taken a competitive position in this field within last years. While the yearly growth rate of biotechnological sector was calculated as 17% in developed countries since the beginning of the century, this figure has reached 36% in developing Asian countries. Venture capital funds are allocated towards “Biotechnology” which is determined as a strategic sector in these countries, and the programs towards training qualified specialists are featured and legal arrangements are applied to facilitate for such trainings.

This new ecosystem, which is still considered in infancy period, currently offers a huge market on this scale - which has no matured competition and provides many new opportunities - as it creates new markets with the volume of tens of billion dollars for SMEs, main contractors and technology companies, and continues to grow through many technological developments and private sector initiatives.

Our country has no specific road map in the field of Biotechnology even though a Biotechnology Specialization Commission was established within the scope of the 7th Development Plan. It is very hard to find proper market data. If we assume that the industrial biotechnology consists of companies which develop products from biological raw materials by using enzymatic/microbial transformations techniques; we can say that our bio-economy has grown regarding the enzymes, bread yeast, starter cultures, green chemicals, biomaterials, bio-preparations, biofuels, vaccines, natural intermediates, environmental technologies etc. In recent years, studies related with this sector have been increasing especially in universities and the biotechnology initiatives have increased significantly through the increasing interest of the private sector. It is very important for Turkey to support the existing and new initiatives through preparing a strong program and road map in order to increase the it’s’ share in the world bio-economy.

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BIOTECHNOLOGY PROGRAM

BRAINS² TÜRKİYE Biotechnology Program will analyze which Biotechnology fields would provide highest potential for future growth and which benefits can be gained from this growth by the Turkish Biotechnology sector, through considering Turkey's available strength and potential both in academic and industrial sectors.

Upon determining the industrial fields together with their sizes and scales as a result of the studies performed towards discovering the idle potential of Biotechnology industry in order to find the most reasonable and promising interests for the **National Biotechnology Sector** and to increase the efficiency of the private and public sector; such determined industrial fields shall be considered as the sectors which might have the strongest contribution to the competitiveness of the country, the efficiency of the economy and the welfare of the nation.

BRAINS² TÜRKİYE Biotechnology Program; aims to provide "Biotechnology Strategy" options to Turkey and to be one of the leading stakeholders in the field of Biotechnology in Turkey through asking the right persons ** the right questions***.

The purpose of the program includes: “Connecting the global trends with local needs” through the contributions of Turkish experts in ; bringing the Biotechnology experts in Turkey and to utilize the output of such meetings and knowledge for the benefit of the Country; preparing an environment for events to strengthen the connections between the expert community; **contributing Turkey's commercial position in the market which grows rapidly, determining the products which Turkish companies are capable to produce and which potential customers to which Turkish companies are capable to serve depending on the capability analysis and the potential of the markets, in order to contribute the Turkey's biotechnology capacity, ecosystem and market development.**

BRAINS² TÜRKİYE Biotechnology Program; will match the products and customers in accordance with the domestic and global position of the Turkish companies through analyzing the capabilities of the leading Turkish companies while finding answers regarding where our country should be positioned in that sector.

Within the scope of this Program; the multidimensional specific studies and activities which comparatively examines the Biotechnology Strategies/documents and markets of the countries such as US, Russian Federation, China, France, Germany and Japan, and in which the ideal strategy option for Turkey is presented shall be analyzed.

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BIOTECHNOLOGY PROGRAM

Main Theme

Development of Vision, Strategy, Ecosystem and Market through the International Comparison

Sub-Themes

Development/Inventory of Biotechnology R&D

Biotechnology Sources Ecosystem

Biotechnology Governance and Regulation

Biotechnology Human Resource

Biotechnology and Security

Sectorial Analysis and Classification of Global Biotechnology Market

Analysis of Leading Turkish Firms and Product Matching

Cooperation and Competition through International Comparison

Diplomacy of Biotechnology

STRATEGY (DRAFT)

To develop social awareness towards Biotechnology

- To increase the awareness of youth about the professions of future and to forward them towards these professions
- To increase awareness about biotechnology
- To develop forecasting approaches for sub-branches of such professions

Planning the Workforces and Professions of Future

- Detailed assessment of the workforce and professions of future towards finding out the skills required for these professions
- To determine the professions for biotechnology industry and to plan alternative education and employment fields for the people who want to be qualified for this profession
- To develop the occupational skills of the people who will develop and support products/services by using the “biotechnology” which will be needed by the labor market in the near future.

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BIOTECHNOLOGY PROGRAM

Focusing on the Use of Biotechnology in Defense and Security Fields

- To establish a center where institutions and individuals from all over the country can apply for the implementation of education and information activities towards “Biotechnology”
- As the center to be established will have a crucial importance for achieving the development in a better way, it shall be established as an institute where orienting and sector based trainings can be provided.
- To provide R&D funds and facilities for primary topics determined for researchers in this center which will be supported by the government or authorities.

Focusing on Usage of Biotechnology in Education

- To lead the establishment of a biotechnology -focused “data collection policy” for the stakeholders in education
- To contribute the development of products/services which will support the teachers at preparation, process and evaluation of Biotechnology-themed content during the teaching activities.
- To collect data about the individual learning for personalization of education on every aspect of the development of Biotechnology

To Arrange Trainings to Train Experts in Biotechnology

- To provide trainings in order to ensure development of products/services (for experts in physics, chemistry, computer, electronics, machinery, biomedical engineering and information technologies) by using Biotechnology
- To provide trainings on topics for training assistant and intermediate personnel required for the development of tools and materials which will be used by the specialists in the sub-fields of biotechnology.
- To create awareness among the researchers in universities about the biotechnology applications
- To contribute arrangement of the curriculum to include sector-based use of biotechnology applications especially at the undergraduate degree of the universities.
- To provide trainings for researchers from different disciplines (health, law, education, fine arts, etc.) to ensure them to use Biotechnology and outcomes in their researches.
- To arrange informative studies on Biotechnology application areas
- To provide trainings for entrepreneurs about the Biotechnology applications

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BIOTECHNOLOGY PROGRAM

Sectorial Review and Classification of Global Biotechnology Market

- To divide the global Biotechnology market into sectors, and to determine the market potential for the future through analyzing the related global markets and customers
- To analyze and classify the R&D, education, application, software, hardware, production, service etc. sub-sectors in the Biotechnology market mainly for the **Agriculture and Food Processing** [Plant Breeding Technology, Animal Breeding Technology, Functional Food Products, Food Diagnosis and Safety], **Wood Processing and Pulp Production** [Enzymes in Pulp and Paper Industry], **Chemical Industry** [Bio Based Chemicals], **Environmental Technologies** [Bio-remediation], **Energy Industry** [Bio-energy], **Health Care** [Therapeutic Products, Diagnosis, Drug Invention Technologies, Bio-processing], **National Security** [Bio Defense].

Analysis of Turkish companies that will lead the sector and product matching

- To determine in which sectors of this market Turkey would be a significant actor
- To determine the leading companies for these sectors
- To determine the competent universities and institutions regarding R&D studies towards these sectors
- To determine the required certificates and processes for the market
- To determine the products which can be produced by these companies
- To match the products and leading companies which are determined for these sectors

Informative Studies for Adaptation of the Biotechnology in the Social Life and Industry

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**** Right Persons**

It is also very important for achieving the goal of this program to ask right questions as well as asking the right questions to the right people. It shall be ensured that the ecosystem shall include all stakeholders in order to analyze the global trends accurately and to determine the right options for Turkey. Therefore, it is a priority to ensure the inclusion of the representatives of the private sector, who create and experience this transformation, besides ensuring all stakeholders such as academicians, public and non-governmental organizations etc.

BIOTECHNOLOGY PROGRAM

*** Right Questions

It is one of the most important steps of this Program to identify and ask the right questions. Targets of this program towards achieving "holistic and holistic results" and maintaining the focused approach, are highly dependent on asking the right questions.

- Does Turkey really need a Biotechnology strategy? If so, why?
- What should be the scale of Turkey's Biotechnology target? Should it compete globally or compete just with equivalent countries?
- How can we participate the international organizations the policy building processes for Biotechnology and what kind of contributions can we provide?
- On which Biotechnology areas should Turkey focus? Developing and expanding biotechnology methods and usages? Producing biotechnology products/services? Producing and commercializing software, hardware and materials used in biotechnology education? etc.
- What should Turkey aim for raising its' labor force? Should our education system train experts who develop Biotechnology products and services, or should it train people who will be employed in the ecosystem created by Biotechnology sector?
- If Biotechnology will be developed, what should be done in order to proceed in compliance with national and international ethics and law and in order to establish required institutional infrastructures?
- What is the current situation of the products and services which are required to develop biotechnology software, hardware, materials in Turkey?
- In which critical sectors the biotechnology would increase the efficiency exponentially? Which steps should be taken if production and development studies are initiated towards these sectors?
- Which export markets should be targeted if Turkey produces biotechnology products and services?
- How to deal with prejudices and errors in the field of biotechnology? Is there a model about these issues which can be presented by Turkey for the world?
- Should it be considered in the Biotechnology strategy to develop policies for the sectors where the employment rates will decrease as the Biotechnology usage expands?
- How Biotechnology education would be delivered at universities? Through opening focused specific undergraduate departments or through adapting curriculum of the relevant faculties?

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ROBOTICS PROGRAM

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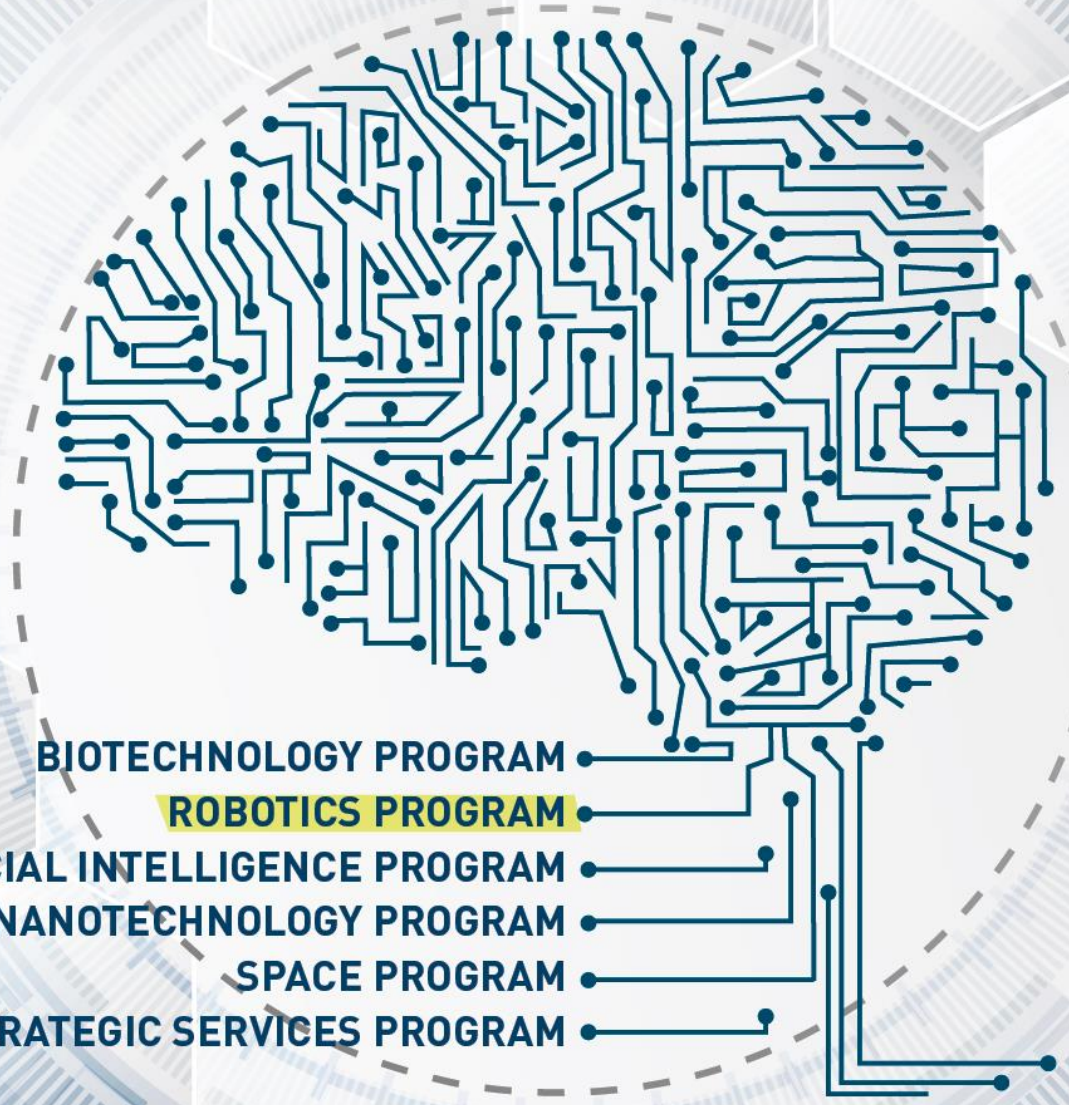

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BRAINS^2 TÜRKİYE* ROBOTICS PROGRAM

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VISION (DRAFT)

The science of robotics has been initiated as the automatic machines were designed by El-Cezeri and Ktesibius, who performed their studies beyond the age they lived. Currently, sophisticated machines which provide labor and value through software which manage them, are called as "robots". Beside the programmable, multi-axis, automatic controlled, fixed and mobile industrial robots which are used for multi-purposes in the industry; also the service robots which are used for different applications in various fields of our lives, lead to radical changes in simple facts regarding the safety and comfort of humans.

Robotics, which is the discipline towards the integration and application of scientific and technological developments on robots, and which continues to progress interactively all along the ages; is also a mutual working field for machinery, aircraft, space, electronics, computer and control engineering. Currently, in that field the education is provided from undergraduate level to the doctorate level in the university departments of Mechatronics in our country same like in the rest of the world.

Robots are classified depending on the axes tools, types, drive elements etc. More significantly, the production rate and quality have been increased through inducing the serial production as these robots has been started to be used in the electronics industry. The robots which perform placement, cutting, bonding, drilling, silicon application, measurement, test operations, quality control, packaging, sorting, loading, carrying, unloading etc. duties are used in many production processes in electronics, white appliances, food, furniture, automotive, chemistry, glass, metal, ceramics, paper and many more industrial sectors. In the working areas which are not suitable for human labor as performed at the underwater, radiation, space, etc. conditions, these operational remote control robotics which are for specific purpose, uses power transmission or radio frequency and requires high technology; constitute the foundations of this sector.

ROBOTICS PROGRAM

The Medical Robotics focuses to develop smart orthopedic prostheses with artificial tendon system which detect the commands of the brain through sensors and send power to the muscles gradually, and on the other hand it also focuses on surgery robots which enable surgeons to perform surgery operations on patients at different places through the systems which can be controlled by remote access.

In the software development field, it is very important to develop new algorithms through artificial intelligence research, coding and database query languages within the scope of intelligence and control systems. As it is not possible to reach the flexibility and skills of the human brain by using the currently available silicon technology; the biological and molecular systems are investigated. While the electronic and materials science cooperate together with medical science in order to ensure the system mimics the living tissues within the scope of cybernetic studies, in other words constructive architectural studies which focus on body and appearance; the constructive physics, hydraulic, pneumatic, machinery etc. basic science and engineering branches are also used in such studies. Anthropomorphic Robotics is a sub-branch of cybernetics, which focuses on hominoid and live-like robots. The first commercial outputs of related theoretical studies are the Robotic toys which include mechanical and electronic systems. The hobby of many people around the world can be focused on various fields of robotics depending on their interest areas. There are many national and international papers and competitions in this field. The robotic activities which are considered as a component of learning in STEM (Science, Technology, Engineering, and Mathematics) Education, are also used efficiently for out-of-school education. Even in the kindergartens the robotic coding lessons are delivered.

The "robotics technologies" will be one of the most profitable sectors undoubtedly in Industry 4.0 movement. Now, the robots shall undertake most critical functions in unmanned industrial production processes. While these smart machines which can be controlled or autonomously operated, provide significant benefits, inevitably the competition between the producers and developers of these robots shall be very tough. Hence, the global industry firms, entrepreneurs and mutual funds will give significant efforts to make new investments or acquisitions in this sector. The current number of service robots sold is higher than the number of industrial robots sold. The International Robotic Federation (IFR) reports that 6,7 million individual service robots and 59,706 professional robots were sold in 2016, in comparison with the sales volume of the industrial robots which was realized as 294,312, and 21,700 of these robots were co-robots. It is considered that if the rate of co-robots continues to increase so, which constitute 7% of the sales of industrial robots; co-robots will be very important for the future of industrial robotics. While the industrial robot sales was tripled in the Asian market and Australia in the past decade, as a significant driving force, it has increased only by 76% in Europe and America. On the other hand, the premises prefer co-robots which are more flexible than traditional industrial robots.

ROBOTICS PROGRAM

While the number of robots in the world was just 1.5 million in 2015, it has reached 2.5 million in 2019, and the Asian countries have highest number of robots. Robotization is a clear indicator of technological development of the countries. The leading countries of the world in robotization are S. Korea, Japan and Germany which have reached to the advanced level in the industry and have the giant global brands in all strategic sectors such as automotive. The robotization rate of the countries is calculated as ratio of number of robots per 10,000 production workers. Currently, Asia's rate is 550 in general while it is 18 for Turkey. The current number of industrial robots in our country is 8,000. It is predicted that the total production volume will increase by 50% until 2025 thanks to the robots which are designed to work in cooperation with the human in some jobs and fields, and also through going beyond the mechanical forms of the robots which will be used to automate jobs in many different fields, and this will contribute to the global economy nearly by 2 trillion dollars every year.

This new ecosystem, which is still considered in infancy period, currently offers a huge market on this scale - which has no matured competition and provides many new opportunities - as it creates new markets for SMEs, main contractors and technology companies, and continues to grow with the private sector initiative.

It is anticipated that the robots will be essential part of life in the following 10 years from production to home life, from security to agriculture; and the number of robots that help people through interaction will increase day by day. The usage areas of heavy industrial robots is limited, the usage of light robots increases in the health, search & rescue fields due to the developments in material technologies achieved within recent years. Robotic systems enable us to reduce production costs and achieve high quality standards; they also enable us to operate mental processes through software and machines. Hence, the number of companies which invest in robotics and automation technologies increases rapidly.

BRAINS² TÜRKİYE Robotics Program will analyze which Robotics fields would provide highest potential for future growth and which benefits can be gained from this growth by the Turkish Robotics sector, through considering Turkey's available strength and potential both in academic and industrial sectors.

Upon determining the industrial fields together with their sizes and scales as a result of the studies performed towards discovering the idle potential of Robotics industry in order to find the most reasonable and promising interests for the **National Robotics Sector** and to increase the efficiency of the private and public sector; such determined industrial fields shall be considered as the sectors which might have the strongest contribution to the competitiveness of the country, the efficiency of the economy and the welfare of the nation.

(Biotechnology | Robotics | Artificial Intelligence | Nanotechnology | Space | Strategic Services) BRAINS² TÜRKİYE

ROBOTICS PROGRAM

BRAINS² TÜRKİYE Robotics Program; aims to provide "Robotics Strategy" options to Turkey and to be one of the leading stakeholders in the field of Robotics in Turkey through asking the right persons ** the right questions***. The purpose of the program includes: “Connecting the global trends with local needs” through the contributions of Turkish experts; bringing the robotics experts in Turkey and to utilize the output of such meetings and knowledge for the benefit of the Country; preparing an environment for events to strengthen the connections between the expert community; **contributing Turkey's commercial position in the market which grows rapidly, determining the products which Turkish companies are capable to produce and which potential customers to which Turkish companies are capable to serve depending on the capability analysis and the potential of the markets, in order to contribute the Turkey's robotics capacity, ecosystem and market development.**

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Main Theme

Development of Vision, Strategy, Ecosystem and Market through the International Comparison

Sub-Themes

Development/Inventory of Robotics R&D

Robotics Sources Ecosystem

Robotics Governance and Regulation

Robotics Human Resource

Robotics and Security

Sectorial Analysis and Classification of Global Robotics Market

Analysis of Leading Turkish Firms and Product Matching

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ROBOTICS PROGRAM

STRATEGY (DRAFT)

To Develop Social Awareness towards Robotics

- To increase the awareness of youth about the professions of future and to forward them towards these professions
- To increase awareness about robotics
- To develop forecasting approaches for sub-branches of such professions

Planning the Workforces and Professions of Future

- Detailed assessment of the workforce and professions of future towards finding out the skills required for these professions
- To determine the professions for robotics industry and to plan alternative education and employment fields for the people who want to be qualified for this profession
- To develop the occupational skills of the people who will develop and support products/services by using the “Robotics” which will be needed by the labor market in the near future.

Focusing on the Use of Robotics in Defense and Security Fields

- To establish a center where institutions and individuals from all over the country can apply for the implementation of education and information activities towards “Robotics”
- As the center to be established will have a crucial importance for achieving the development in a better way, it shall be established as an institute where orienting and sector based trainings can be provided.
- To provide R&D funds and facilities for primary topics determined for researchers in this center which will be supported by the government or authorities.

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- To lead the establishment of a robotic-focused “data collection policy” for the stakeholders in education
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- To collect data about the individual learning for personalization of education on every aspect of the development of Robotics

ROBOTICS PROGRAM

To Arrange Trainings to Train Experts in Robotics

- To provide trainings in order to ensure development of products/services (for computer, electronics, machinery, biomedical engineers and information technology experts) by using robotics
- To provide trainings on topics for training assistant and intermediate personnel required for the development of tools and materials which will be used by the specialists in the sub-fields of robotics.
- To create awareness among the researchers in universities about Robotics applications
- To contribute arrangement of the curriculum to include sector-based use of robotics technology applications especially at the undergraduate degree of the universities.
- To provide trainings for researchers from different disciplines (health, education, fine arts, etc.) to ensure them to use Robotics technologies and outcomes in their researches.
- To arrange informative studies on robotics' application areas
- To provide trainings for entrepreneurs about the robotics applications

Sectorial Review and Classification of Global Robotics Market

- To divide the global robotics market into sectors, and to determine the market potential for the future through analyzing the related global markets and customers
- To analyze and classify the R&D, education, application, software, hardware, production, service etc. sub-sectors in the robotics market.

Health Services

Medical and pharmaceutical companies use robots with AI to perform various medical procedures, such as diagnoses, anesthesia and surgery. In some cases, these robots have better performance than doctors (like IBM's Watson). The robot caregivers which support the recovery of patients, are also being developed (for example, Robear which is designed by scientists of Sumitomo Rico Company in Japan, helps patients to recover their walking, etc. abilities). The sector is developing rapidly and the robot industry has already started to take a big share in the cake at many points in health services.

Agriculture

The robots are currently used agriculture industry, but new generation robots are designed for sensitive agriculture operations as such machines can process big data with new generation artificial intelligence and take advantage of low-cost sensors. Agricultural robots which operate with high efficiency can perform planting, watering, weeding etc. processes as they can be used also for fertilization, milk, flock, transportation processes. The agricultural robots will be able to work nearly with full autonomy, and the industry will continue to grow

rapidly as the robot sensors and sophisticated learning abilities are improved. The agricultural robots have already created a significant impact on the labor force, and it will cause many jobs to be eliminated in the very near future, however this result will provide new opportunities in the programming and operation of the automated systems. This study will determine which of these opportunities would be benefited by Turkey and Turkish firms.

Industrial Production

In Canada and the USA, it was observed that the 13% of the job losses were caused by international trade but 85% of the job losses were caused by automation (5.6 million people) between 2000-2010. Production is the first sector which uses robots with artificial intelligence in assembly and packing the products for transportation. These robots are used to assemble complex items, including electronics, cars and home appliances. Furthermore, production output of these robots was increased significantly in recent years. Through this study, it will be determined where Turkey and Turkish companies will be located in this sector and which companies will lead the sector.

Military and Defense

This sector is one of the fastest growing sectors in this field. The developments and growths rates of this sector are very high, and the global turnover amount increases exponentially every year. The robots are currently used in many related sub-sectors (intelligence-surveillance-exploration, search-rescue, war support, mine clearance, disposal of explosive-ammo, and fire-fighting [especially on the navy side]).

Service

The best practices of the service sector are achieved in customer services and it is observed that many brands receive orders through the stands they have prepared for the sales of products and services. The tourism sector will also be one of the leading sectors in this field in the very near future. The use of robots in food preparation sub-sector is also growing rapidly.

Finance

The companies which provide various financial services prefer artificial intelligence in their systems in order to keep records of financial data which increases day by day. The robots are programmed with deep learning method that can use forecasting systems and market data to forecast stock exchange market trends and to manage funds more efficiently than humans. Furthermore, financial consulting is being more automated day by day through employing “robot consultants” which provide suggestions for simple financial problems. Automation has already begun to undertake some accounting tasks for recording logs, reconciling accounting books, performing transactions between companies and protecting accounting master data.

Transportation

Autonomous vehicles, metros and trains aren't a new concept anymore. It is expected that the most significant developments shall occur in road transportation and the leading trucks manufacturers have already started to design the vehicles of future. It is very crucial for Turkey to jump higher ranks in this sector as we consider its' potential.

Analysis of Turkish Companies that will Lead the Sector and Product Matching

- To determine in which sectors of this market Turkey would be a significant actor
- To determine the leading companies for these sectors
- To determine the competent universities and institutions regarding R&D studies towards these sectors
- To determine the required certificates and processes for the market
- To determine the products which can be produced by these companies
- To match the products and leading companies which are determined for these sectors

Informative Studies for Adaptation of the Robotics in the Social Life and Industry

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** Right Persons

It is also very important for achieving the goal of this program to ask right questions as well as asking the right questions to the right people. It shall be ensured that the ecosystem shall include all stakeholders in order to analyze the global trends accurately and to determine the right options for Turkey. Therefore, it is a priority to ensure the inclusion of the representatives of the private sector, who create and experience this transformation, besides ensuring all stakeholders such as academicians, public and non-governmental organizations etc.

*** Right Questions

It is one of the most important steps of this Program to identify and ask the right questions. Targets of this program towards achieving "holistic and holistic results" and maintaining the focused approach, are highly dependent on asking the right questions.

- Does Turkey really need a Robotics strategy? If so, why?

ROBOTICS PROGRAM

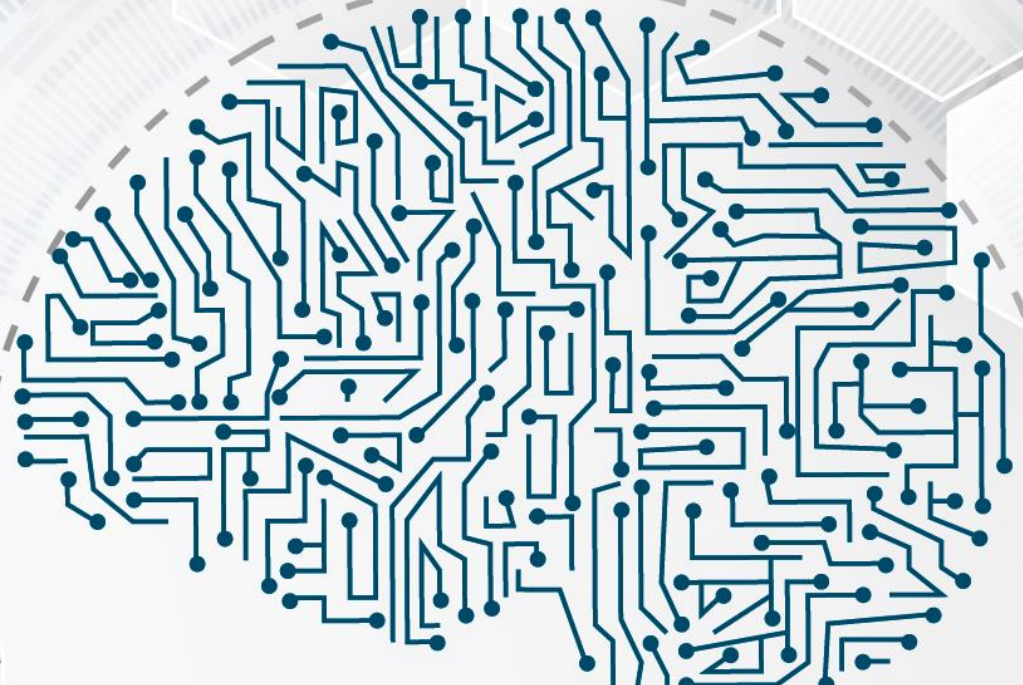
- What should be the scale of Turkey's Robotics target? Should it compete globally or compete just with equivalent countries?
- How can we participate the international organizations' the policy building processes for Robotics and what kind of contributions can we provide?
- On which robotics areas should Turkey focus? Should it develop and extend robotics methods and their usages? Should it produce robotics products/services? Should it produce and commercialize software, hardware and materials used in robotics education? etc.
- What should Turkey aim for raising its' labor force? Should our education system train experts who develop Robotics products and services, or should it train people who will be employed in the ecosystem created by Robotics sector?
- If Robotics products and services will be developed, what should be done in order to proceed in compliance with national and international ethics and law and in order to establish required institutional infrastructures?
- What is the current situation of the products and services which are required to develop robotics software, hardware, materials in Turkey?
- In which critical sectors the robotics would increase the efficiency exponentially? Which steps should be taken if production and development studies are initiated towards these sectors?
- Which export markets should be targeted if Turkey produces robotics products and services?
- How to deal with prejudices and errors in the field of robotics? Is there a model about these issues which can be presented by Turkey for the world?
- Should it be considered in the Robotics strategy to develop policies for the sectors where the employment rates will decrease as the Robotics usage expands?
- How Robotics education would be delivered at universities? Through opening focused specific undergraduate departments or through adapting curriculum of the relevant faculties?

(Biotechnology I Robotics I Artificial Intelligence I Nanotechnology I Space I Strategic Services)

BRAINS² TÜRKİYE

ARTIFICIAL INTELLIGENCE PROGRAM

"Development of Vision, Strategy, Ecosystem and Market, through the International Comparison"



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BRAINS^2 TÜRKİYE* ARTIFICIAL INTELLIGENCE PROGRAM

"Development of Vision, Strategy, Ecosystem and Market, through the International Comparison"

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* **BRAINS^2 TÜRKİYE** is a brand/initiative with multi-programs based in Turkey which develops market, ecosystem and capacity in the 'Biotechnology', 'Robotics', '**Artificial Intelligence**', 'Nanotechnology', 'Space' and 'Strategic Services' fields. The programs planned through identical visions and strategies for each main fields which transforms the new business models and multidimensional power distribution in the global economy, are implemented under the common title of **BRAINS^2 TÜRKİYE.**

VISION (DRAFT)

The economy based on the production with muscle force and mechanical tools is replaced by knowledge-based economy through the production of high value-added products. The primary element of new economic order is digitalization. The processes of production and service sectors are digitalized day by day which requires new skills in the labor market. Traditional jobs and craftsmanship are replaced by technological skills which require advanced engineering knowledge.

It is very hard for a person to catch this quickly developing and changing technology, hence it ish also harder for societies. After the "Industry 4.0" concept was defined by Germany in 2011, Japan presented the concept of "Society 5.0". Afterwards, other countries have presented their own strategies towards digitalization in the areas from production to the service sector. One of the areas which is influenced by this concept is "Human Resources", as it causes a radical change in the use of labor in production systems. It is anticipated that this concept, which will continue to affect human resources in many ways, would lead to radical changes especially in the labor force.

The effect of such a change in work force is defined by the human resources professionals as the idle labor will shift to new jobs. It is observed that the labor force share of agriculture sector in the USA was 100% once, while it corresponds to only 2% of the total workforce today, and a large industrial manufacturing economy has been established through employing idle workers in the factories. The same approach is also considered today for robots, especially the workforce which is required for works based on physical power and repetitive processes would be idle and shifted to other areas.

ARTIFICIAL INTELLIGENCE PROGRAM

Besides, “learning” which is the most important skill of human, has become a feature of the machines. Upon the development of machines which are operated by "Artificial Intelligence" - as a top level technology of digitalization; the technologies such as facial and voice recognition systems, autonomous (unmanned) vehicles, voice assistants, digital assistants for assisting the people with disabilities, smart applications for human and environmental health, management of energy efficiency are improving day by day.

Although it causes conjectural uncertainties both in business and daily life, it is possible to take advantage of this technology through utilizing it with correct actions. In this period, where the information and communication sectors will be leading sectors, there will be no demand for unskilled labor while the demand for skilled labor will continue to increase.

The artificial intelligence which is used and integrated in finance, national security, health services, criminal justice, transportation and smart city projects would also provide great opportunities for economic development.

It anticipated that the Artificial intelligence technologies would increase the global GDP by 15.7 trillion $ or 14% until 2030. The regional distribution of this figure is; China by 7 trillion $, North America by 3.7 trillion $, North Europe by 1.8 trillion $, Africa and its surrounding regions by 1.2 trillion $, and Asia rest of China by 0.9 trillion $, Southern Europe by 0.7 trillion $ and Latin America by 0.5 trillion $. China aims to become a global leader by 2030 through investing 150 billion dollars in this sector domestically.

It is predicted that the artificial intelligence based automation would induce the productivity through creating 0.8 - 1.4% growth in yearly GDP of the Chinese economy - depending on the application speed. China is currently felt behind the US and the UK, however most of the artificial intelligence market provides tremendous opportunities for China in terms of preliminary experience and developments in the future.

This new ecosystem, which is developed in the Artificial Intelligence axis with the acceleration of technological and sociological developments, especially in the terms of 'Industry 4.0' and 'Community 5.0' in 2011, and which is still considered in infancy period, currently offers a huge market on this scale - which has no matured competition and provides many new opportunities - as it creates new markets for SMEs, main contractors and technology companies, and continues to grow with the private sector initiative.

(Biotechnology | Robotics | Artificial Intelligence | Nanotechnology | Space | Strategic Services) BRAINS² TÜRKİYE

ARTIFICIAL INTELLIGENCE PROGRAM

The world is in a transformation period which is caused by artificial intelligence and data analysis that affect many sectors, however as society will be affected by these technologies, it is required to understand the development paths of artificial intelligence systems. These technologies are utilized in order to transform decision-processes, business-patterns, risk-analysis and system performance in finance, national security, health services, criminal justice, transportation and smart city projects. Such developments create important economic and social benefits.

Even though, the path at which artificial intelligence systems appears would create important results for the society in general. It is very important to find answers for the questions such as: How political issues are handled? How ethical conflicts are reconciled? How legal realities are accommodated? What level of transparency is required in artificial intelligence and data analysis?

The preferences of people regarding the software development process will affect their decisions and their integration methods into corporate routines. A better understanding is required regarding how these processes are performed. Because, these developments will have significant effects on the society in the near future. Artificial intelligence would lead a revolution in human relationships and it would be the most influential human innovation in history.

It is important to increase the public and private investment, to expand the scope of data access, to encourage the development of artificial intelligence labor force, to create a national consultancy board, to produce effective policies through determining comprehensive targets and to promote cyber security in order to proceed with artificial intelligence through balancing the technological developments with basic human values.

BRAINS² TÜRKİYE Artificial Intelligence Program will analyze which AI fields would provide highest potential for future growth and which benefits can be gained from this growth by the Turkish AI sector, through considering Turkey's available strength and potential both in academic and industrial sectors.

Upon determining the industrial fields together with their sizes and scales as a result of the studies performed towards discovering the idle potential of AI industry in order to find the most reasonable and promising interests for the **National Artificial Intelligence Sector** and to increase the efficiency of the private and public sector; such determined industrial fields shall be considered as the sectors which might have the strongest contribution to the competitiveness of the country, the efficiency of the economy and the welfare of the nation.

BRAINS² TÜRKİYE Artificial Intelligence Program; aims to provide "Artificial Intelligence Strategy" options to Turkey and to be one of the leading stakeholders in the field of Artificial Intelligence in Turkey through asking the right persons** the right questions ***.

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The purpose of the program includes: “Connecting the global trends with local needs” through the contributions of Turkish experts; bringing the AI experts in Turkey and to utilize the output of such meetings and knowledge for the benefit of the Country; preparing an environment for events to strengthen the connections between the expert community; **contributing Turkey's commercial position in the market which grows rapidly, determining the products which Turkish companies are capable to produce and which potential customers to which Turkish companies are capable to serve depending on the capability analysis and the potential of the markets, in order to contribute the Turkey's AI capacity, ecosystem and market development and** to offer a holistic / integrated vision to the Presidential Digital Conversion Office which has prepared the Turkey's Artificial Intelligence Strategy Document.

BRAINS² TÜRKİYE Artificial Intelligence Program; will match the products and customers in accordance with the domestic and global position of the Turkish companies through analyzing the capabilities of the leading Turkish companies while finding answers regarding where our country should be positioned in that sector. Within the scope of this Program; the multidimensional specific studies and activities which comparatively examines the AI Strategies/documents and markets of the countries such as US, Russia, China, France, Germany and Japan, and in which the ideal strategy option for Turkey is presented shall be analyzed.

Main Theme

Development of Vision, Strategy, Ecosystem and Market through the International Comparison

Sub-Themes

Development/Inventory of Artificial Intelligence R&D

Artificial Intelligence Sources Ecosystem

Artificial Intelligence Governance and Regulation

Artificial Intelligence Human Resource

Artificial Intelligence and Security

Sectorial Analysis and Classification of Global Artificial Intelligence Market

Analysis of Leading Turkish Firms and Product Matching

Cooperation and Competition through International Comparison

Diplomacy of Artificial Intelligence

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ARTIFICIAL INTELLIGENCE PROGRAM

STRATEGY (DRAFT)

To Develop Social Awareness towards Artificial Intelligence

- To increase the awareness of youth about the professions of future and to forward them towards these professions
- To increase awareness about Digital Transformation
- To develop forecasting approaches for sub-branches of such professions

Planning the Workforces and Professions of Future

- Detailed assessment of the workforce and professions of future towards finding out the skills required for these professions
- To determine the professions whose procedures and principles will change through the Digital Transformation and to plan alternative education and employment fields for the people who want to be qualified for this profession
- To develop the occupational skills of the people who will develop and support products/services by using the “Artificial Intelligence” which will be needed by the labor market in the near future.

Focusing on the Use of Artificial Intelligence in Defense and Security Fields

- To establish a center where institutions and individuals from all over the country can apply for the implementation of education and information activities towards “Artificial Intelligence” and “Open Data”
- As the center to be established will have a crucial importance for achieving the development in a better way, it shall be established as an institute where orienting and sector based trainings can be provided.
- To provide R&D funds and facilities for primary topics determined for researchers in this center which will be supported by the government or authorities.

Focusing on Usage of Artificial Intelligence in Education

- To lead the establishment of “data collection policy” for the stakeholders (to determine the procedures for collecting, processing, storing and transferring data from various education stakeholders such as students, teachers, parents, school workers, administrators, employers etc.) in education
- To contribute the development of products which will support the teachers during the content preparation, process and evaluation studies during the teaching activities.

ARTIFICIAL INTELLIGENCE PROGRAM

- To perform studies towards collecting data about the individual learning for personalization of education and to ensure the usage such data in the "teaching design" process, which is characterized through determining the teaching content, process and product

To Arrange Trainings to Train Experts in Artificial Intelligence

- To provide trainings in order to ensure development of products (for computer, electronics, machinery, biomedical engineers and information technology experts) by using Artificial Intelligence
- To provide trainings on topics (data labeling, data cleaning, sharing the data to support the studies when this data is required to be stored regularly on a platform determined by the government etc.) for training assistant and intermediate personnel required for the development of tools and materials which will be used by the specialists in the sub-fields of Artificial Intelligence.
- To create awareness among the researchers in universities about Artificial Intelligence applications
- To contribute arrangement of the curriculum to include sector-based use of Artificial Intelligence especially at the undergraduate degree of the universities.
- To provide trainings for researchers from different disciplines (health, law, education, history, fine arts etc.) to ensure them to use Artificial Intelligence technologies and outcomes in their researches.
- To arrange informative studies on Artificial Intelligence application areas
- To provide trainings for entrepreneurs about the “Machine Learning” and “Deep Learning”

Sectorial Review and Classification of Global Artificial Intelligence Market

- To divide the global Artificial Intelligence market into sectors, and to determine the market potential for the future through analyzing the related global markets and customers
- To analyze and classify sub/side-sectors of R&D, education, application, software, hardware, production, service etc. sectors in the Artificial Intelligence market.

Analysis of Turkish Companies that will Lead the Sector and Product Matching

- To determine in which sectors of this market Turkey would be a significant actor
- To determine the leading companies for these sectors
- To determine the competent universities and institutions for R&D studies related to these sectors
- To determine the required certificates and processes for the market

- To determine the products which can be produced by these companies
- To match the products and leading companies which are determined for these sectors

Informative Studies for Adaptation of the Artificial Intelligence in the Social Life and Industry

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** Right Persons

It is also very important for achieving the goal of this program to ask right questions as well as asking the right questions to the right people. It shall be ensured that the ecosystem shall include all stakeholders in order to analyze the global trends accurately and to determine the right options for Turkey. Therefore, it is a priority to ensure the inclusion of the representatives of the private sector, who create and experience this transformation, besides ensuring all stakeholders such as academicians, public and non-governmental organizations etc.

*** Right Questions

It is one of the most important steps of this Program to identify and ask the right questions. Targets of this program towards achieving “holistic and holistic results” and maintaining the focused approach, are highly dependent on asking the right questions.

- Does Turkey really need a Artificial Intelligence strategy? If so, why?
- What should be the scale of Turkey's Artificial Intelligence target? Should it compete globally or compete just with equivalent countries?
- How can we participate the international organizations’ the policy building processes for AI and what kind of contributions can we provide?
- On which Artificial Intelligence areas should Turkey focus? To produce artificial intelligence software? To develop packages for existing software? To produce and commercialize processed data sets which are used in Artificial Intelligence education? etc.
- What should Turkey aim for raising its’ labor force? Should our education system train engineers who produce Artificial Intelligence software? Should we train people towards the professions that will emerge through the new economic system with Artificial Intelligence?

ARTIFICIAL INTELLIGENCE PROGRAM

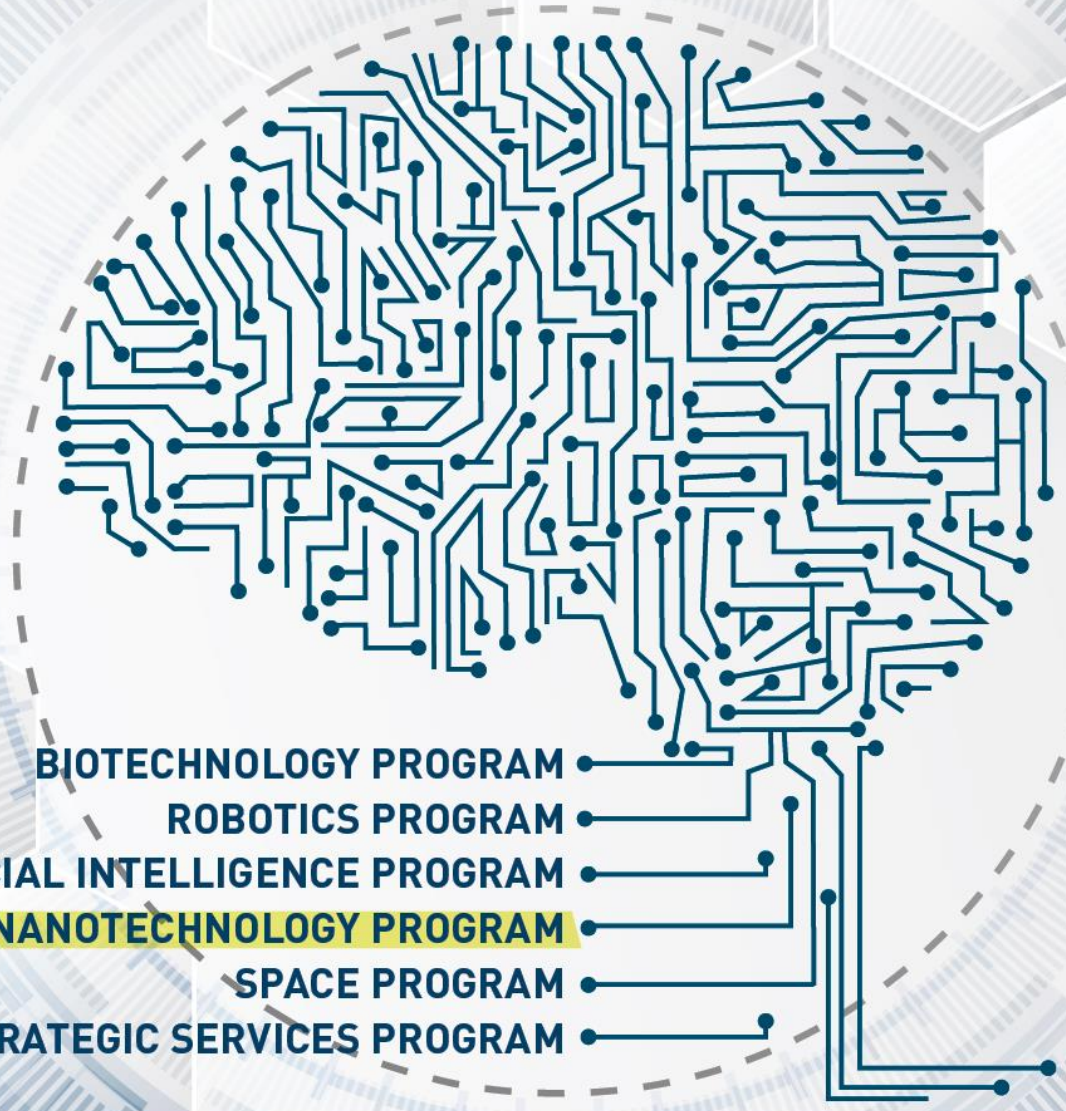
- If we will develop Artificial Intelligence, what should be done to establish the institutional infrastructures which are necessary to make the required data sets suitable for Machine Learning and to process these data sets in accordance with data privacy?
- What is the current situation of semiconductor manufacturing in Turkey as infrastructure products which is required to develop Artificial Intelligence?
- In which critical sectors the Artificial Intelligence would increase the efficiency exponentially? Which steps should be taken if production and development studies are initiated towards these sectors?
- Which export markets should be targeted if Turkey produces Artificial Intelligence products and services?
- How to deal with algorithmic prejudices and errors? Is there a model about these issues which can be presented by Turkey for the world?
- How Artificial Intelligence education would be delivered at universities? Through opening focused specific undergraduate departments or through adapting curriculum of computer departments in the relevant faculties?

(Biotechnology | Robotics | Artificial Intelligence | Nanotechnology | Space | Strategic Services)

BRAINS² TÜRKİYE

NANOTECHNOLOGY PROGRAM

"Development of Vision, Strategy, Ecosystem and Market, through the International Comparison"



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BRAINS^2 TÜRKİYE* NANOTECHNOLOGY PROGRAM

"Development of Vision, Strategy, Ecosystem and Market, through the International Comparison"

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VISION (DRAFT)

Nanotechnology is a science which creates new materials and systems through changing the physical, chemical and biological characteristics of atomic structures or components. Its' main purpose is to increase the quality of life through production nanoscale materials in a controlled way in order to ensure more efficient use of limited resources.

As the Nanotechnology which focuses on the special characteristics of materials at quantum scale in the manufacture of macro scale products; covers the sciences such as earth science, molecular biology, organic chemistry, semiconductor physics, micro fabrication etc.; the practices and researches which is related with Nanotechnology has wide range of application areas such as developing new materials with nano dimensions, controlling the atomic scale directly, extensions of non-atomic device physics, new approaches towards based on the molecular self-assembly. It invests billions of dollars, especially in industrial and military applications. Governments invest billions of dollars in nanotechnology research, especially in industrial and military applications.

Through production capabilities of Nanotechnology in electronics, computers, pharmaceuticals, textiles, biomaterials and energy; it can produce many materials and tools which has wide range of application areas such as biotechnology, medicine, environment, space and defense, etc. The most important benefits of the nano scale products are their lighter and more robust characteristics in addition to their programmable structures and they require less material and energy in production.

According to the researchers, it seems inevitable that the innovations in the field of nanotechnology as the capacity of information technologies increases and consequently the materials and productions with nano scale will increase.

NANOTECHNOLOGY PROGRAM

Beside all these benefit provided by nanotechnology, it is also required to take some measures. Especially, the protective measures must be taken in order to ensure safety of environments where the nanoscale production and systems located.

It is very important to control and to take the protective measures in order to avoid the formation of nanostructures which might damage the environment and people due to their extremely small size. It is required to perform production activities in sterile environments in order to avoid spread of the wastes to the environment that might occur in such processes. Same like all new technologies; the nanotechnology might also cause some suspicions and problems such as toxicity, environmental impacts, its' potential impacts on the global economy and various doomsday scenarios etc. These concerns raise discussions about the necessity of official regulations for nanotechnology.

New methods have been applied to increase the quality of people's life especially in the health, and to meet human needs through technological advances induced by the use of scientifically validated techniques. Nano science and nano technology concepts which arise as a result of technological developments must also be considered within this scope. It is understood that a hardly competitive environment will occur in the following period under the light of the scientific studies carried out in this field, the new products that it develops and the economic impact that it creates. Therefore, the countries which allocate significant amount of funds for R&D investments, give a special importance to nanotechnology.

USA and Germany, South Korea, Japan and Taiwan are more prominent than other countries if we consider their scientific studies on nanotechnology, received patents, actively operating companies, qualified labor force and technology transfer.

China's investments and patents are rapidly increasing in this field. While the total R&D expenses was 1.2 billion $in 2000, it has increased to 15 billion $ in 2008 (the share of USA is nearly 5 billion $).

It is projected that the workforce to reach 6 million people and the market size to reach 3 trillion dollars in the short term, in this new ecosystem which is still considered in infancy period, currently offers a huge market on this scale - which has no matured competition and provides many new opportunities - as it creates new markets for SMEs, main contractors and technology companies, and continues to grow with the private sector initiative.

(Biotechnology | Robotics | Artificial Intelligence | Nanotechnology | Space | Strategic Services) BRAINS² TÜRKİYE

NANOTECHNOLOGY PROGRAM

Under the Nanotechnology title referred in Turkey's Vision for 2023 Strategy; nano-electronics, nano-materials, nano-magnetism, nano-characterization, nano-fabrication, nano-photonics, quantum information processing in nano-scale and nano-biotechnology are determined as primary topics. There are considerable number of scientific studies and research centers in our country. Nanotechnology Engineering departments, which were established as of 2011 in our universities, contribute to the purpose of increasing the R&D activities and designing new products in this field through supplying the educated labor required by the industry.

BRAINS² TÜRKİYE Nanotechnology Program will analyze which Nanotechnology fields would provide highest potential for future growth and which benefits can be gained from this growth by the Turkish Nanotechnology sector, through considering Turkey's available strength and potential both in academic and industrial sectors.

Upon determining the industrial fields together with their sizes and scales as a result of the studies performed towards discovering the idle potential of Nanotechnology industry in order to find the most reasonable and promising interests for the **National Nanotechnology Sector** and to increase the efficiency of the private and public sector; such determined industrial fields shall be considered as the sectors which might have the strongest contribution to the competitiveness of the country, the efficiency of the economy and the welfare of the nation.

BRAINS² TÜRKİYE Nanotechnology Program; aims to provide "Nanotechnology Strategy" options to Turkey and to be one of the leading stakeholders in the field of Nanotechnology in Turkey through asking the right persons** the right questions***. The purpose of the program includes: "Connecting the global trends with local needs" through the contributions of Turkish experts; bringing the nanotechnology experts in Turkey and to utilize the output of such meetings and knowledge for the benefit of the Country; preparing an environment for events to strengthen the connections between the expert community; **contributing Turkey's commercial position in the market which grows rapidly, determining the products which Turkish companies are capable to produce and which potential customers to which Turkish companies are capable to serve depending on the capability analysis and the potential of the markets, in order to contribute Turkey's nanotechnology capacity, ecosystem and market development.**

BRAINS² TÜRKİYE Nanotechnology Program; will match the products and customers in accordance with the domestic and global position of the Turkish companies through analyzing the capabilities of the leading Turkish companies while finding answers regarding where our country should be positioned in that sector. Within the scope of this Program; the multidimensional specific studies and activities which comparatively examines the Nanotechnology Strategies/documents and markets of the countries such as US, England, Russian Federation, China, France, Germany and Japan, and in which the ideal strategy option for Turkey is presented shall be analyzed.

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NANOTECHNOLOGY PROGRAM

Main Theme

Development of Vision, Strategy, Ecosystem and Market, through the International Comparison

Sub-Themes

Development/Inventory of Nanotechnology R&D

Nanotechnology Sources Ecosystem

Nanotechnology Governance and Regulation

Nanotechnology Human Resource

Nanotechnology and Security

Sectorial Analysis and Classification of Global Nanotechnology Market

Analysis of Leading Turkish Firms and Product Matching

Cooperation and Competition through International Comparison

Diplomacy of Nanotechnology

STRATEGY (DRAFT)

To Develop Social Awareness towards Nanotechnology

- To increase the awareness of youth about the professions of future and to forward them towards these professions
- To increase awareness about nanotechnology
- To develop forecasting approaches for sub-branches of such professions

Planning the Workforces and Professions of Future

- Detailed assessment of the workforce and professions of future towards finding out the skills required for these professions
- To determine the professions for nanotechnology industry and to plan alternative education and employment fields for the people who want to be qualified for this profession
- To develop the occupational skills of the people who will develop and support products/services by using the “Nanotechnology” which will be needed by the labor market in the near future.

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NANOTECHNOLOGY PROGRAM

Focusing on the Use of Nanotechnology in Defense and Security Fields

- To establish a center where institutions and individuals from all over the country can apply for the implementation of education and information activities towards “Nanotechnology”
- As the center to be established will have a crucial importance for achieving the development in a better way, it shall be established as an institute where orienting and sector based trainings can be provided.
- To provide R&D funds and facilities for primary topics determined for researchers in this center which will be supported by the government or authorities.

Focusing on Usage of Nanotechnology in Education

- To lead the establishment of a nanotechnology focused “data collection policy” for the stakeholders in education
- To contribute the development of products/services which will support the teachers at preparation, process and evaluation of Nanotechnology themed content during the teaching activities.
- Collecting data about the individual learning for personalization of education on every aspect of the development of Nanotechnology

To Arrange Trainings to Train Experts in Nanotechnology

- To provide trainings in order to ensure development of products/services (for physics, chemistry, computer, electronics, machinery, biomedical engineers and information technology experts) by using nanotechnology
- To provide trainings on topics for training assistant and intermediate personnel required for the development of tools and materials which will be used by the specialists in the sub-fields of nanotechnology.
- To create awareness among the researchers in universities about Nanotechnology applications
- To contribute arrangement of the curriculum to include sector-based use of nanotechnology applications especially at the undergraduate degree of the universities.
- To provide trainings for researchers from different disciplines (health, education, fine arts, etc.) to ensure them to use Nanotechnology technologies and outcomes in their researches.
- To arrange informative studies on Nanotechnology application areas
- To provide trainings for entrepreneurs about the Nanotechnology applications

NANOTECHNOLOGY PROGRAM

Sectorial Review and Classification of Global Nanotechnology Market

- To divide the global nanotechnology market into sectors, and to determine the market potential for the future through analyzing the related global markets and customers
- To analyze and classify the R&D, education, application, software, hardware, production, service etc. sub-sectors in the nanotechnology market.

(The potential sectors will also be analyzed on the basis of opportunities which might be offered by this sector in the future despite the studies of the program mostly focus on these sub-sectors in which the nanotechnology is used widely today.)

Health Sector

Through the application of this technology in the health sector, exciting opportunities occurred for manufacturers in the nanotechnology market. As the nanoparticles facilitate the drug, etc. to be deliver specific cells in the human body, nanotechnology is used mainly as drug distributor in the health sector. Many international institutions report that improvements in usage nanotechnology in pharmaceutical industry will face an accelerated growth in the very near future. According to the report of the International Pharmaceutical Federation for the year 2017, in addition to 56 new drugs, also 7,000 new compounds are in the development phase. This technology is also being used widely in diagnostic techniques and antibacterial treatments. In addition to many new applications developed in the health sector, especially cell repair applications, also some other developments which support the nanotechnology market are also being developed.

Applications in Wastewater Treatment and Other Environmental Areas

The wastewater treatment is a profitable sector due to general growth in industry and regulations on wastewater. Wastewater is treated through membranes used in treatment plants, and as the number of wastewater treatment plants increases, the expectations towards a growing nanotechnology market also increases. Industries also use nano-EHS which is one of the lucrative applications of nanotechnology, in order to provide better safety. As the nano materials are environmental friendly and due to increasing concern towards protecting the environment, in order to produce such products nanotechnology is also used. Environmental applications of nanotechnology create new opportunities for actors in the nanotechnology market.

Nanotechnology for Advanced Renewable Energy

Nanotechnology is used to produce panels generating solar energy and to increase efficiency of panels via PV cells. The solar PV market is boosting due to the increasing demand for solar energy in various countries located in Europe, North America and APAC. Furthermore, the African solar energy market will absolutely show a sharp growth in the future. The use of nanotechnology in the solar energy industry is expected to offer opportunities in the nanotechnology market.

(The rapidly growing markets which are listed below will be detailed in this study.)

Nanotechnology for Lighter but Stronger Materials

As nanotechnology is applied on composites, the devices built by using new generation graphene and carbon nanotube, will be lighter and stronger. This trend will grow and there is a strong and profitable growth potential in nanoplatelets market.

Nanotechnology in Construction Materials

The future is getting prepared for a noticeable boost in nanotechnology applications in the construction materials. It is a globally agreed fact that such a boost will emerge primarily in the insulation materials, cement and glass industries. Many countries and private sector players have already started to invest in this sector.

Analysis of Turkish Companies that will Lead the Sector and Product Matching

- To determine in which sectors of this market Turkey would be a significant actor
- To determine the leading companies for these sectors
- To determine the competent universities and institutions regarding R&D studies towards these sectors
- To determine the required certificates and processes for the market
- To determine the products which can be produced by these companies
- To match the products and leading companies which are determined for these sectors

Informative Studies for Adaptation of the Nanotechnology in the Social Life and Industry

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**** Right Persons**

It is also very important for achieving the goal of this program to ask right questions as well as asking the right questions to the right people. It shall be ensured that the ecosystem shall include all stakeholders in order to analyze the global trends accurately and to determine the right options for Turkey. Therefore, it is a priority to ensure the inclusion of the representatives of the private sector, who create and experience this transformation, besides ensuring all stakeholders such as academicians, public and non-governmental organizations etc.

NANOTECHNOLOGY PROGRAM

*** Right Questions

It is one of the most important steps of this Program to identify and ask the right questions. Targets of this program towards achieving "holistic and holistic results" and maintaining the focused approach, are highly dependent on asking the right questions.

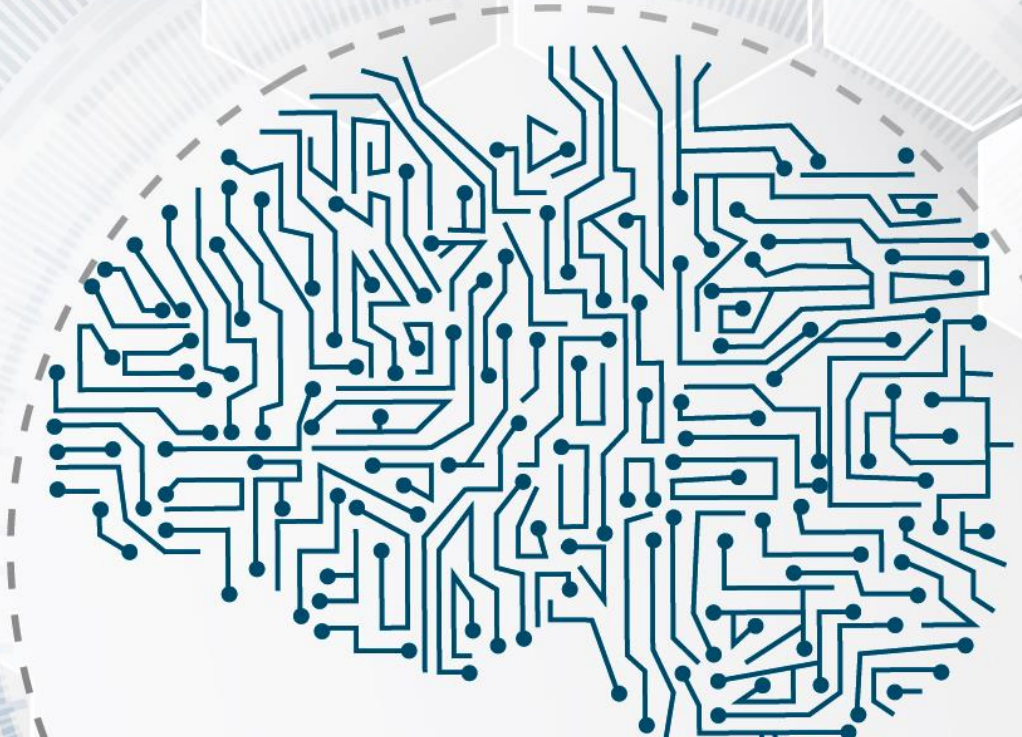
- Does Turkey really need a Nanotechnology strategy? If so, why?
- What should be the scale of Turkey's Nanotechnology target? Should it compete globally or compete just with equivalent countries?
- How can we participate the international organizations the policy building processes for Nanotechnology and what kind of contributions can we provide?
- On which Nanotechnology areas should Turkey focus? Should it develop and extend nanotechnology methods and their usages? Should it produce nanotechnology products/services? Should it produce and commercialize software, hardware and materials used in nanotechnology education? Etc.
- What should Turkey aim for raising its' labor force? Should our education system train experts who develop Nanotechnology products and services, or should it train people who will be employed in the ecosystem created by Nanotechnology sector?
- If Nanotechnology will be developed, what should be done in order to proceed in compliance with national and international ethics and law and in order to establish required institutional infrastructures?
- What is the current situation of the products and services which are required to develop nanotechnology software, hardware, materials in Turkey?
- In which critical sectors the nanotechnology would increase the efficiency exponentially? Which steps should be taken if production and development studies are initiated towards these sectors?
- Which export markets should be targeted if Turkey produces nanotechnology products and services?
- How to deal with prejudices and errors in the field of nanotechnology? Is there a model about these issues which can be presented by Turkey for the world?
- Should it be considered in the nanotechnology strategy to develop policies for the sectors where the employment rates will decrease as the Nanotechnology usage expands?
- How Nanotechnology education would be delivered at universities? Through opening focused specific undergraduate departments or through adapting curriculum of the relevant faculties?

(Biotechnology I Robotics I Artificial Intelligence I Nanotechnology I Space I Strategic Services)

BRAINS² TÜRKİYE

SPACE PROGRAM

"Development of Vision, Strategy, Ecosystem and Market, through the International Comparison"



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BRAINS^2 TÜRKİYE* SPACE PROGRAM

"Development of Vision, Strategy, Ecosystem and Market, through the International Comparison"

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* **BRAINS^2 TÜRKİYE** is a brand/initiative with multi-programs based in Turkey which develops market, ecosystem and capacity in the 'Biotechnology', 'Robotics', 'Artificial Intelligence', 'Nanotechnology', '**Space**' and 'Strategic Services' fields. The programs planned through identical visions and strategies for each main fields which transforms the new business models and multidimensional power distribution in the global economy, are implemented under the common title of **BRAINS^2 TÜRKİYE.**

VISION (DRAFT)

Launch of "Sputnik 1", the first artificial satellite in the world, into space in 1957 is considered as the beginning of the competition in space, which is one of the most important fields of the Cold War period. Such unpredicted achievements of Soviet Union raised the concerns in USA and the Western block in this era, and led the importance of space regarding the military issues to be noticed. Just after the launch of Sputnik 1, USA declared national mobilization with all its military and civilian sources, at least in order to catch its' rival. The fact that firstly the Soviets, and afterwards the US sent human to space in the early 1960s, oriented a very rapid advance on the competition in space. In 1969, the United States transported humans to the Moon surface for the first time and it was noted as a "one giant leap for mankind".

The efforts towards space studies were mainly focused on military applications in the early period as it was also applied in scientific and civil fields. Two superpower countries of this era determined to get more advantage in military application of space science. As the satellites has highest observation view range, it provide military advantage which are not possible to gain from the earth for discovery, intelligence, communication and navigational support practices. The satellites are able to fly over any place of the world with any altitude between 400 and 40,000 km depending on its purpose.

Space armament would have unimaginable destructive power if we consider its' other usage areas apart from the communication category. This situation caused USA and the Soviet Union to start the negotiations towards regulating the space activities in 1959 in the UN. OST (Outer Space Treaty) was executed in 1967. OST was approved through being signed by almost every countries in the world, including all the ones which have space capabilities.

SPACE PROGRAM

OST is the main document of space law and stipulates that every country has right to travel space and to use space; and it prohibits establishing mass destruction weapons into the space while adopting the principle of using space for peaceful purposes. However, it is not prohibited to establish weapons in space other than the nuclear, biological, chemical and radiologic weapons. In fact, it is commonly known that the explicit and implicit researches on space-specific weapons which are not considered as mass destruction weapons are being performed. Military competition in space still continues even the Soviet Union was collapsed in the 1990s. Today, China has joined the leading countries in military space beside the USA and Russia. However, it is known that the European Union, Japan and some other countries have some superior technological abilities, not for military purposes. The space is used for wide range of purposes in many scientific, civil and commercial fields. In fact, we can say that we have become fully dependent on satellites. Observation satellites provide up to date information to us about agriculture, environment, forest, urbanism, etc. and gives warnings about climate trends through allowing closely examine the polar and oceans, as well as daily meteorological data. Thanks to the communication satellites, ten millions of houses are able to watch live news, sports and concert broadcasts from all over the world. Intercontinental banking and commerce services are facilitated by satellites. Navigation satellites allow us to find our routes not only in cities, but also all over the world, deserts, seas, etc. The competition in space is very intense and the total annual income of the space activities of the global private sector is over 300 billion $.

This new ecosystem, which has emerged after the space competition in 1957 and which is still considered in infancy period, currently offers a huge market on this scale - which has no matured competition and provides many new opportunities - as it creates new markets for SMEs through offering billions of dollars market growth for main contractors and technology companies, and continues to grow with the private sector initiative.

Many new topics are included in the space economy in recent years. One of these topics is space tourism and the other one is asteroid mining. As there are precious mines in asteroids and other celestial bodies, the visionary companies has emerged which intend to drive and aspire the future and to operate and profit from this opportunity. However, by considering the difficulties, costs and time required to develop the necessary technologies, some initiatives are continue realistically (Elon Musk's SpaceX projects etc.), even though these ideas can be perceived as crazy projects by the society for now.

In addition to all these developments, legal debates are also continuing. On the one hand, one party says “celestial bodies are the common property of humankind”, on the other hand, the ones who has space abilities say “commercial activities on celestial bodies are not prohibited”.

SPACE PROGRAM

The countries which are aware about the importance of space activities regarding the military and economic fields, continue their activities within the bounds of their own resources and capabilities. China, USA and Russia are able to neutralize the satellites of their rivals. It is known that other countries are interested in space weapons and perform research at least on a theoretical level, even they have no such capacity. In 2018, US President Mr. Trump decided to establish space forces as a branch of the US army. In addition to the land, air, coast guard and naval forces; the space forces will be a sixth armed force of USA. If it is considered in commercial manner; the ones who get ready for space activities will be the leader of this sector as the countries will take space technologies into consideration while preparing their budgets.

There is a paradigm shift in space technologies used in the civil areas. In addition to the big space projects and big satellites of the big countries; smaller states, smaller companies and even universities are able to produce and launch small satellites. Today, the satellites weight a few kilograms; they are no longer weight tons. The satellite budgets are not a few hundred million dollars, even a few million dollars, the cost of a satellite can be less than a million dollar. Within next few years, the number of launched small satellites will be expressed with thousand figures, and the missile companies will emerge which deal with only launching small satellites. As the size of the satellites get smaller, this situations offers new possibilities for many intermediate level states such as Turkey to involve in the space technology. And also it is clear that such smaller satellites will lead new developments in security issues.

BRAINS² TÜRKİYE Space Program will analyze which Space fields would provide highest potential for future growth and which benefits can be gained from this growth by the Turkish Space sector, through considering Turkey's available strength and potential both in academic and industrial sectors.

Upon determining the industrial fields together with their sizes and scales as a result of the studies performed towards discovering the idle potential of Space industry in order to find the most reasonable and promising interests for the **National Space Sector** and to increase the efficiency of the private and public sector; such determined industrial fields shall be considered as the sectors which might have the strongest contribution to the competitiveness of the country, the efficiency of the economy and the welfare of the nation.

BRAINS² TÜRKİYE Space Program; aims to provide "Space Strategy" options to Turkey and to be one of the leading stakeholders in the field of Space in Turkey through asking the right people** the right questions***.

(Biotechnology I Robotics I Artificial Intelligence I Nanotechnology I Space I Strategic Services) BRAINS² TÜRKİYE

SPACE PROGRAM

The purpose of the program includes: “Connecting the global trends with local needs” through the contributions of Turkish experts; bringing the space experts in Turkey and to utilize the output of such meetings and knowledge for the benefit of the Country; preparing an environment for events to strengthen the connections between the expert community; **contributing Turkey's commercial position in the market which grows rapidly, determining the products which Turkish companies are capable to produce and which potential customers to which Turkish companies are capable to serve depending on the capability analysis and the potential of the markets, in order to contribute the Turkey's space capacity, ecosystem and market development.**

BRAINS² TÜRKİYE Space Program; will match the products and customers in accordance with the domestic and global position of the Turkish companies through analyzing the capabilities of the leading Turkish companies while finding answers regarding where our country should be positioned in that sector. Within the scope of this Program; the multidimensional specific studies and activities which comparatively examines the Space Strategies/documents and markets of the countries such as US, Russia, China, Germany and in which the ideal strategy option for Turkey is presented shall be analyzed.

Main Theme

Development of Vision, Strategy, Ecosystem and Market through the International Comparison

Sub-Themes

Development/Inventory of Space R&D

Space Sources Ecosystem

Space Governance and Regulation

Space Human Resource

Space and Security

Sectorial Analysis and Classification of Global Space Market

Analysis of Leading Turkish Firms and Product Matching

Cooperation and Competition through International Comparison

Journey to the Moon, Mars and Other Destinations

Commercial Space and Licensing

Commercial Space Traffic and Regime

Military Space Operations

Diplomacy of Space

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SPACE PROGRAM

STRATEGY (DRAFT)

To Develop Social Awareness towards Space

- To increase the awareness of youth about the professions of future and to forward them towards these professions
- To increase the awareness about the current and near future space technologies and specialization areas
- To develop forecasting approaches for sub-branches of such professions

Planning the Space Brains and Workforces towards the Professions of Future

- Detailed assessment of the Space brains, workforce and professions of future towards finding out the skills required for these professions and to reveal related academic and occupational skills.
- To determine the professions with changing basis and procedures for focusing on the space industry and to plan alternative education and employment fields for the people who want to be qualified for this profession
- To develop the academic and occupational skills of the people who will develop and support products/services which will be required by “Space studies” in the near future within the scope of brain and workforce

Focusing on the Use of Space Technologies in Defense and Security Fields

- To establish a center where institutions and individuals from all over the country can apply for the implementation of education and information activities towards “Space Conjuncture” and “Space Technologies”.
- As the center to be established will have a crucial importance for achieving the development in a better way, it shall be established as an institute where orienting and sector based trainings can be provided.
- To provide R&D funds and facilities for primary topics determined for researchers in this center which will be supported by the government or authorities.

Focusing on Usage of Space in Education

- To lead the establishment of a Space-focused “data collection policy” at all levels of education
- To contribute the development of products which will support the teachers at preparation, process and evaluation of Space-themed content during the teaching activities.

SPACE PROGRAM

- To collect data about the individual learning for personalization of education on every aspect of the development of Space
- To perform studies regarding the use of collected data in the "teaching design" process, which is specified through determining the teaching content, processes and product.

To Arrange Trainings to Train Experts in Space

- To provide trainings in order to ensure development and usage of space technologies (for aerospace, aircraft, computer, electronics, machinery, biomedical engineering and information technology experts)
- To provide trainings on topics (data labeling, data cleaning, sharing the data to support the studies when this data is required to be stored regularly on a platform determined by the government etc.) for training assistant and intermediate personnel required for the development of tools which will be used by the Space professionals.
- To create awareness among the researchers in universities about Space applications
- To contribute arrangement of the curriculum to include sector-based use of space technologies especially at the undergraduate degree of the universities.
- To provide trainings for researchers from different disciplines (health, law, education, history etc.) to ensure them to use Space technologies and outcomes in their researches.
- To arrange informative studies on space application areas
- To provide trainings for entrepreneurs about the “Space Conjuncture, Technologies and Opportunities”

Sectorial Review and Classification of Global Space Market

- To divide the global space market into sectors, and to determine the market potential for the future through analyzing the related global markets and customers
- To analyze and classify mainly the **Satellite Production**, **Launching Services**, **from Satellite directly to house TV**, **Satellite Radio**, **Satellite Broadband**, **Satellite Services**, **Fixed Satellite Services**, **Transponder Leasing**, **SUS Managed Services**, **Mobile Communications**, **Monitoring the Earth** [Ground Monitoring], **Data Analytics Based on Earth Monitoring**, **Consumer Earth Equipment**, **Global Navigation Satellite System Devices**, **Chipsets and Applications**, **Earth Network Equipment**, **Ubiquitous Global Broadband**, **Commercial Space Situational Awareness**, **Launching Special Small Satellites** [Micro Satellite Launch], **Small Satellite Production** [Micro Satellite Production], **Suborbital Human Space Flight** sub/side-sectors of R&D, education, application, software, hardware, production, service etc. sectors in the Space market.

SPACE PROGRAM

Analysis of Turkish Companies that will Lead the Sector and Product Matching

- To determine in which sectors of this market Turkey would be a significant actor
- To determine the leading companies for these sectors
- To determine the required certificates and processes for the market
- To determine the products which can be produced by these companies
- To match the products and leading companies which are determined for these sectors

Informative Studies for Adaptation of the Space in the Social Life and Industry

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** Right Persons

It is also very important for achieving the goal of this program to ask right questions as well as asking the right questions to the right people. It shall be ensured that the ecosystem shall include all stakeholders in order to analyze the global trends accurately and to determine the right options for Turkey. Therefore, it is a priority to ensure the inclusion of the representatives of the private sector, who create and experience this transformation, besides ensuring all stakeholders such as academicians, public and non-governmental organizations etc.

*** Right Questions

It is one of the most important steps of this Program to identify and ask the right questions. Targets of this program towards achieving “holistic and holistic results” and maintaining the focused approach, are highly dependent on asking the right questions.

- Does Turkey really need a Space strategy? If so, why?
- What should be the scale of Turkey's Space target? Should it compete globally or compete just with equivalent countries?
- How can we participate the international organizations’ - NATO, UN etc. - the policy building processes for Space and what kind of contributions can we provide?
- On which space areas should Turkey focus? Science, military, industrial or commercial areas? Should related studies be undertaken by the Government, and should the civil and private sectors also be encouraged? etc.
- What should Turkey aim for raising its’ labor force regarding the space objectives?

SPACE PROGRAM

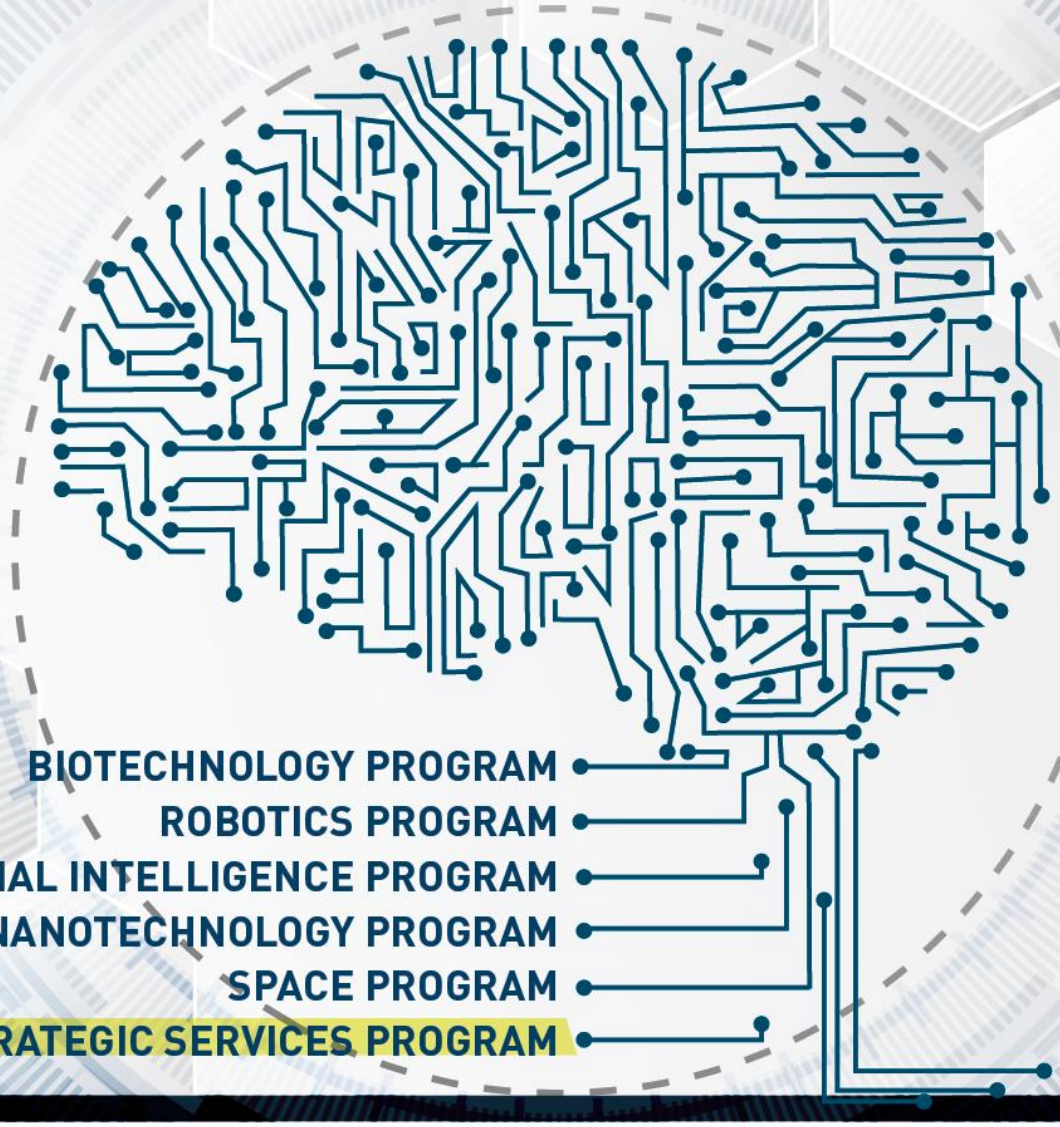
- What should be the priority and methodology of Turkey regarding the studies towards hardware and software which are required for technological and industrial progress in the Space?
- How should the criterion and roadmap of Turkey be shaped in order to generate/develop, transfer/adapt Space technologies and to benefit from such technologies to the maximum extend?
- What is the current situation of the infrastructure in Turkey which is required for the production and development of space technology products?
- In which critical sectors the space technology would increase the efficiency exponentially? Which steps should be taken if production and development studies are initiated towards these sectors?
- Which export markets should be targeted if Turkey produces space products and services?
- How to deal with prejudices and errors in the field of space field? Is there a model about these issues which can be presented by Turkey for the world?
- Should it be considered in the Space strategy to develop policies for the sectors where the employment rates will decrease as the usage of the Space technology expands?
- How Space education would be delivered at universities?

(Biotechnology I Robotics I Artificial Intelligence I Nanotechnology I Space I Strategic Services)

BRAINS² TÜRKİYE

STRATEGIC SERVICES PROGRAM

"Development of Vision, Strategy, Ecosystem and Market, through the International Comparison"



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BRAINS^2 TÜRKİYE* STRATEGIC SERVICES PROGRAM

"Development of Vision, Strategy, Ecosystem and Market, through the International Comparison"

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VISION (DRAFT)

Strategic Services is a concept that exists since the age when the humankind has started to develop an order. The early examples of this field were observed mostly in the military consultancy and policy consultancy services as it was provided individually. Throughout the history, these Strategic Services was continued to be offered between institutions and countries as well as among the individuals in different fields.

The content of Strategic Services began to develop in the 16th century, as the dam construction, engineering and contracting services which were considered as the advanced technology of the period, was provided by China to its' neighboring countries. The East India Company which was established at the beginning of the 17th century, through its services on transportation, which is one of the critical sectors for every country and business; it has become a part of the private sector through privatizing this sector, which was previously run and managed through governments and businessmen, as well as provided ground towards forming the foundations of today's cargo and transportation market. As time goes on, the concept of Strategic Services continued to expand and develop through the emergence of new commercial, military, financial, social concepts.

Strategic Services which was defined firstly as a sector which provides services to the public via private entrepreneurship companies, started to expand its field of activity in line with the changing dynamics of the world in 19th century. In the 20th century, these services began to be rendered to the private sector as a result of new formations that emerge in many fields such as finance, international trade, management etc. It was clear that these professional services were needed by the public and private sectors after the Great Depression and has increased importance of this sector globally. The globalization of the sector has extended the historical definition of the Strategic Services through the emergence of new order and technological developments.

STRATEGIC SERVICES PROGRAM

Currently, the strategic consultancy has become a sector which affects the strategies and policies of both public and private institutions, and it also affects the development of economy and humankind. Today, volume of service exports exceeded volume of product exports in a few developed countries. Even though there are many reasons for this situation, one of the most effective reasons is the rapid development of technology. Upon the rapid development in technology, many disciplines such as economic, industrial, administrative etc. are changing accordingly, the private sector institutions and especially public institutions have difficulty in adapting to this change and the demand for strategic services increases rapidly.

BRAINS² TÜRKİYE Strategic Services Program will analyze which Strategic Services fields would provide highest potential for future growth and which benefits can be gained from this growth by the Turkish Strategic Services sector, through considering Turkey's available strength and potential both in academic and industrial sectors.

Upon determining the industrial fields together with their sizes and scales as a result of the studies performed towards discovering the idle potential of Strategic Services industry in order to find the most reasonable and promising interests for the **National Strategic Services Sector** and to increase the efficiency of the private and public sector; such determined industrial fields shall be considered as the sectors which might have the strongest contribution to the competitiveness of the country, the efficiency of the economy and the welfare of the nation.

BRAINS² TÜRKİYE Strategic Services Program; aims to provide " Strategic Services Strategy" options to Turkey and to be one of the leading stakeholders in the field of Strategic Services in Turkey through asking the right questions*** to the right people***. The purpose of the program includes: “Connecting the global trends with local needs” through the contributions of Turkish experts; bringing the Strategic Services experts in Turkey and to utilize the output of such meetings and knowledge for the benefit of the Country; preparing an environment for events to strengthen the connections between the expert community; **contributing Turkey's commercial position in the market which grows rapidly, determining the products which Turkish companies are capable to produce and which potential customers to which Turkish companies are capable to serve depending on the capability analysis and the potential of the markets, in order to contribute the Turkey's Strategic Services capacity, ecosystem and market development.**

BRAINS² TÜRKİYE Strategic Services Program will examine which institutions would lead the determined sectors and to what extend the public-private partnership will be important for the development of this sector and will try to find answer in which sectors the advantages can be used which are provided by manpower and geography of Turkey while try to find answers especially regarding where our country should be positioned in Strategic Services sector.

Within the scope of this Program; the multidimensional specific studies and activities which comparatively examines the Strategic Services Strategies/documents and markets of the countries such as England, China, France, Germany and Japan, and in which the ideal strategy option for Turkey is presented shall be analyzed.

Main Theme

Development of Vision, Strategy, Ecosystem and Market through the International Comparison

Sub-Themes

Development/Inventory of Strategic Services R&D

Strategic Services Sources Ecosystem

Strategic Services Governance and Regulation

Strategic Services Human Resource

Strategic Services and Security

Sectorial Analysis and Classification of Global Strategic Services Market

Analysis of Leading Turkish Firms and Product Matching

Cooperation and Competition through International Comparison

Diplomacy of Strategic Services

STRATEGY (DRAFT)

To Develop Social Awareness towards Strategic Services

- To increase the awareness of youth about the professions of future and to forward them towards these professions
- To increase awareness about strategic services
- To develop forecasting approaches for sub-branches of such professions

Planning the Workforces and Professions of Future

- To determine the workforce and professions that will meet the current and future needs of the sectors determined upon the studies carried out within this program.

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STRATEGIC SERVICES PROGRAM

- Detailed assessment of the workforce and professions of future towards finding out the skills required for these professions
- To determine the professions for strategic services and to plan alternative education and employment fields for the people who want to be qualified for this profession
- To develop the occupational skills of the people who will develop and support “strategic services” which will be needed by the labor market in the near future.

Focusing on the Use of Strategic Services in Defense and Security Fields

- To establish a center where institutions and individuals from all over the country can apply for the implementation of education and information activities towards “strategic services”
- As the center to be established will have a crucial importance for achieving the development in a better way, it shall be established as an institute where orienting and sector based trainings can be provided.
- To provide R&D funds and facilities for primary topics determined for researchers in this center which will be supported by the government or authorities.

Focusing on Usage of Strategic Services in Education

- To lead the establishment of a strategic services -focused “data collection policy” for the stakeholders in education
- To contribute the development of products/services which will support the teachers at preparation, process and evaluation of strategic services-themed content during the teaching activities.
- To collect data about the individual learning for personalization of education on every aspect of the development of strategic services
- To focus on the export of education, to determined the areas in which Turkey has strength in the education sector, to determine in which regions our country can be competitive in the global market and to create of data banks through analyzing potential contacts
- To ensure all educational institutions in Turkey to cooperate in order to give more accurate decisions through accessing more robust and reliable sources for analysis and information instead of performing their researches individually with high costs and lack of quality

To Arrange Trainings to Train Experts in Strategic Services

- To determination and develop the required trainings for the sectors which will be determined in accordance with the program studies

STRATEGIC SERVICES PROGRAM

- To create awareness among the researchers in universities about strategic services field
- To perform studies towards establishment of supporting elements for Strategic Services
- To perform studies towards training assistant and intermediate personnel required for the development of services and applications which will be used by the specialists in the sub-fields of strategic services.
- To contribute to the curriculum studies towards the use of the content based supportive fields and contents on Strategic Services in universities including the relevant applications in the related departments, especially at the undergraduate level
- To provide trainings for researchers from different disciplines (politics, science, technology, sociology, culture, history etc.) to ensure them to use Strategic Services and outcomes in their researches.
- To arrange informative studies on Strategic Services' application areas
- To provide informative studies for entrepreneurs about the applications of Strategic Services

Sectorial Review and Classification of Global Strategic Services Market

- To divide the global Strategic Services market into sectors, and to determine potential the sector through analyzing the related global markets and stakeholders
- To analyze and classify the sub-sectors and branches in the strategic services market primarily regarding the R&D, education, application, software, hardware, production, service etc. sectors

Marketing

The competition has become even more challenging in today's world due to rapid increase in production. Many manufacturers face serious difficulties to access their customers. Today, marketing has gone far beyond the promotion and advertising activities performed for the products. The primary objective of all businesses and organizations is to be an actor in the national and global markets or to promote itself. This field show a rapid growth in recent years as a service sector. All businesses that provide services to global markets or want to enter the global market; have more tendency to receive services regarding new approaches such as brand, pricing policy, customer, data and market analysis, return on marketing investments, management of customer life cycle, from the companies which provide professional service.

Education

Education has always been one of the most important areas throughout human history and its' importance continues to increase even today. In fact, education has also become an industry and started to provide significant amount of income for many countries.

STRATEGIC SERVICES PROGRAM

Management of Economic Development, Management of Human Development, Policy Management, Governance

The demand of the services which are provided by the management consultancy companies increases rapidly as both the public and private sector required consultancy for "non-governmental" institutions and entrepreneurs which aim to achieve effective and sustainable growth of the societies to which they provide services through benefiting from the power of markets and commercial business models related to economic development, human development, policy management and similar studies.

Digital Transformation (Private and Public)

The usage of technology increases in critical operations which aim to reduce costs and improve service quality, in line with the increasing role of technology in our daily life. The companies, private & official institutions will be in an infinite cycle of digital transformation as the technology improves. The need for specialized organizations which are able to provide professional services in this field, is rapidly increasing as all the developed new technologies are used and applied in this field very quickly as a result of the competition.

Military Consultancy

Military consultancy is a strategic service sector since ancient times. Today, the demand for private consultancy firms that can meet the demand arising from the conflicts between disciplines and the adaptation of new doctrines is growing rapidly in today's world in accordance with the rapid development of technology.

Mergers and Acquisitions,

As a result of the globalization effect, many businesses aim to become an actor in the global market and to enter the markets through acquisitions or mergers with other companies in different countries in order to increase their competitiveness. This sector has rapidly developed since the beginning of 2000s and today there are many institutions which provide services in this field. As it has a very critical importance to perform the right analysis and the right acquisitions or mergers for the success of the strategy, the number of companies is increasing which provide services regarding research and analysis in this field. These companies deepen and develop their operations through specializing on the sectors that they deal with.

Advanced Engineering Consultancy

It covers the Production, Technology, Application and Construction applications in Space, Nuclear, etc. fields

STRATEGIC SERVICES PROGRAM

Finance

The concept of money improves itself in line with the developments in our world. It was transformed into paper money and digital money over time while it was used to be gold. During this transformation phase, the financial sector revises itself sharply and creates new and complex financial structures. It hard to follow these complex structures even for the people in this sector; and it directly affects trade, economic development and many parameters. Funding is the biggest problem for many improvements and developments. The demand for companies that follow the newly developed systems in the finance sector and which have an expertise and interaction network to perform required operations in such complex systems, is increasing both in the public and private sector. Even public authorities receive such services from private consultancy companies in order find fund sources in this complex structure. As long as the trade exists, this sector will continue to develop in line with the technological developments through adding new systems to existing complex system. The volume of the service procurement demand will continue to increase accordingly.

Analysis of Turkish Companies that will Lead the Sector and Product Matching

- To determine in which sectors of this market Turkey would be a significant actor
- To determine the leading institutions of these sectors
- To determine the competent universities and institutions regarding R&D studies towards these sectors
- To determine the required certificates and processes for the sector
- To determine which services can be rendered by these institutions
- To match the services and leading companies which are determined for these sectors

Informative Studies for Adaptation of the Strategic Services in the Social and Political Life

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** Right Persons

It is also very important for achieving the goal of this program to ask right questions as well as asking the right questions to the right people. It shall be ensured that the ecosystem shall include all stakeholders in order to analyze the global trends accurately and to determine the right options for Turkey. Therefore, it is a priority to ensure the inclusion of the representatives of the private sector, who create and experience this transformation, besides ensuring all stakeholders such as academicians, public and non-governmental organizations etc.

STRATEGIC SERVICES PROGRAM

*** Right Questions

It is one of the most important steps of this Program to identify and ask the right questions. Targets of this program towards achieving “holistic and holistic results” and maintaining the focused approach, are highly dependent on asking the right questions.

- Does Turkey “really” need a Strategic Service Strategy? If so, why?
- What should be the scale of Turkey's Strategic Service target? Should it compete globally or compete just with equivalent countries?
- On which Strategic Service areas should Turkey focus? Should it develop and extend only Strategic Service projects and programs? Should it produce and commercialize software, hardware and materials used in Strategic Service education? etc.
- What should Turkey aim for raising its’ labor force? Should our education system train experts who develop Strategic Services, or should it train people who will be employed in the ecosystem created by Strategic Services sector?
- If Strategic Services will be developed, what should be done in order to proceed in compliance with national and international ethics and law and in order to establish required institutional infrastructures?
- What is the current situation of the system, technique and methodology in Turkey which are required to develop Strategic Services beside the software, hardware, materials, products and services?
- In which critical sectors the Strategic Services would increase the efficiency exponentially? Which steps should be taken if production and development studies are initiated towards these sectors?
- Which export markets should be targeted if Turkey produces projects and products by using Strategic Services?
- How to deal with prejudices and errors in the field of Strategic Services? Is there a model about these issues which can be presented by Turkey for the world?
- Should it be considered in the Strategic Services strategy to develop policies for the sectors where the employment rates will decrease as the Strategic Services usage expands?
- How Strategic Services education would be delivered at universities?