



REPUBLIC OF TURKEY  
MINISTRY OF INDUSTRY  
AND TECHNOLOGY



Turkish  
Space Agency

# NATIONAL SPACE PROGRAM

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Turkish  
Space Agency

“The only way to ensure justice in  
the world is to exist in the space in  
a powerful manner”

  
RECEP TAYYIP  
**ERDOĞAN**  
PRESIDENT OF TURKEY





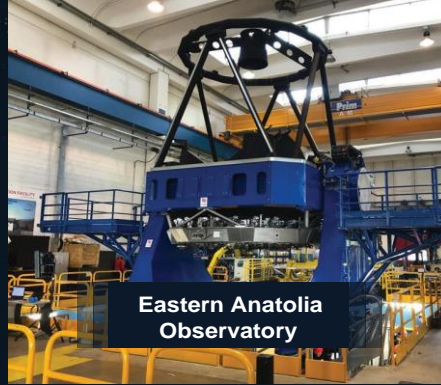
# What is National Space Program?

**National Space Program** is a comprehensive document which takes into account the latest developments in the world, aims to ensure that the vision, strategies, objectives and projects on space policies are carried out in a coordinated and integrated manner and the potential of our country in these areas is fulfilled.

## Objectives of the National Space Program

- Developing relevant technologies and infrastructure on space technologies in Turkey in line with the needs and skills available,
- Reducing Turkey's dependency on foreign resources in terms of space technologies,
- Ensuring that space technologies contribute to the development of our country,
- Further advancing the current technologies and success in space-related issues through national efforts and technologies,
- Contributing to the scientific knowledge of the mankind,
- Increasing the awareness of public, particularly the young people, on space.





# Why is the National Space Program so significant?

- Space programs have very high costs on the budgets of countries. The achievements, reputation and power gained as the result of the implementation of such programs will make the cost negligible.
- Space programs increase the geographical value of countries, add up to their technological capabilities, economic capacity, boost countries' abilities to cooperate internationally and increase their reputation in the international arena.
- Space activities boost innovation; pave the way for new inventions and technologies to be used in different sectors. Therefore, space programs and activities are not limited to space only – they increase employment and productivity in all the sectors.
- Space activities touch the very lives of many people and generate value. Knowingly or unknowingly; the public benefits from the outputs of space programs and the economic benefits created by space industry in Turkey has increased tremendously.





Turkish Space Agency, Workshop on National Space Program - 19 January 2019



Turkish Space Agency, Workshops on National Space Program and Road Map, 28 September - 8 October 2020





# Why are Space Programs so significant?

- Space related activities ease people's lives;
  - ◇ With the production of micro-scale satellites, remote sensing has become possible, thus increasing the productivity in many areas particularly in agricultural sector.
  - ◇ Thanks to the capabilities of remote-sensing satellites, it is now possible to monitor the natural resources, transportation networks, cities, agricultural fields in real-time and significant intelligence could be gathered for national defense purposes.
  - ◇ Communication satellites are actively used in TV broadcasts and other communication areas. In the near future, satellites around the world will enable access to fast internet connection everywhere in the world. Moreover, in the near future fast internet connection will be available in every part of the world through satellites.
  - ◇ Location and time information could be collected at any time in the world in a fast and accurate manner.
- In the years to come; space economy will develop further in areas such as space tourism, satellite systems, production in the space, space mining etc.



# Turkish Space Agency

- As space has become a greater priority politically and economically in the world's agenda in recent years, Turkey has also accelerated its initiatives on space.
- Turkey has increased its resources allocated to space activities since 2000's and thanks to its space industry that has acquired significant skills through communications and earth observation satellites as well as its qualified labor force, Turkey is a candidate for becoming an important actor in the space.
- Turkey's space policy gives the priority to national and domestic resources and capabilities therefore creating an ecosystem for space activities within the country is considered a priority. Dynamic entrepreneurs and other actors in the private sector are also taking part in this ecosystem. In line with these developments:
  - ◇ Turkish Space Agency was established as an affiliated body of the Ministry of Industry and Technology upon Presidential Decree No. 23 dated 13.12.2018.
  - ◇ The President and the members of the Executive Board of Turkish Space Agency were appointed upon Presidential Decree dated 07.08.2019.





# Turkish Space Agency

## Objectives

- Creating and acquiring facilities and technologies that would ensure independent access to space through the development of space and aeronautics industries,
- Decreasing the dependency on foreign resources, enhancing competitiveness in the international arena,
- Developing the relevant human resources and enhancing our skills and capabilities on space-related activities

## Duties

**In line with the welfare and national interests of our society;**

- Ensuring that the use of space and aeronautics technologies become more widespread,
- Developing scientific and technological infrastructure in space and aeronautics technology,
- Building these skills and enhancing capabilities,
- Carrying out relevant work to ensure that other sectors of the national defense industry benefit from the expertise and knowledge acquired through space and aeronautics technologies,
- Supporting R&D and high-tech entrepreneurship,
- Keeping the records of objects on behalf of the State launched into space through international agreements,
- Carrying out the registration work or assigning relevant authorities to carry out the registration work within the UN.



ISS



# Space Activities in the World

- High-cost space activities were a privilege that could be achieved only by a handful of countries back in 20<sup>th</sup> century and brought great prestige to those countries. At this stage the real motivation source was science, technology development and political competition whereas commercial achievements came the second.
- Space activities began with telescopic and earth observations followed by other areas of importance in people's daily lives such as internet, positioning and intelligence satellite. As for the 21<sup>st</sup> century; space activities increased with declining costs and gaining commercial intensity.
- Space activities have gained a whole new dimension in today's world. Missions to Mars and the Moon, mining and production activities to be carried out in space and launching systems shall become important aspects of space applications. Building of space stations has begun back in 1970s which aims to provide a permanent base/habitat in space.

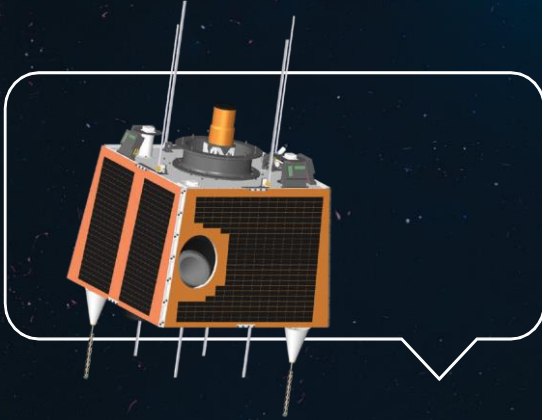
# Space Budget in the World (2019, Million \$)



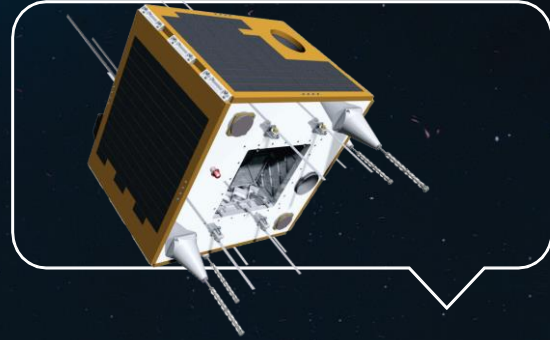
# Space Activities in the World

- Navigation satellite systems applications have begun in 1970's. Among its major application areas are civil aviation, defense, precision agriculture, smart transportation systems and urban planning. It is now possible to benefit from navigation data individually in automobiles, telephones and similar devices.
- Access to space is a critical skill which is acquired by more than ten countries, pioneering this quest. Access to space is no longer in the monopoly of states but has become an area of great commercial interest.
- As of 2019, the budget allocated to space-related activities in the world has broken a new record, exceeding 80 billion dollars and 50 billion USD of this budget has been used for civil purposes.
- USA, China and Russia lead the space race. EU, India and Japan follow these countries. A group of countries including Turkey also move towards the front row in this race.





**BiSAT**



**RASAT**

# Turkey's Space Activities

- Turkey has taken its very first step towards space activities with communication satellites. After the launching of Türksat 1B in 1994, Türksat 1C, Türksat 2A, Türksat 3A satellites have been launched respectively. After 2010; communication satellites Türksat 4A, Türksat 4B, Türksat 5A have been launched. Türksat 5B will be launched during the second quarter of 2021.
- Turkey's satellite development efforts have increased since 2000's and earth observation satellites have come to the front. BİLSAT – developed through technology transfer, several components of which were designed by TÜBİTAK UZAY, was launched in 2003 as Turkey's first earth monitoring and remote sensing satellite.
- Using the skills and capabilities acquired during the development of BİLSAT; RASAT has been designed and produced by TÜBİTAK UZAY. RASAT has been launched for the first time 2011 as the first national and domestic micro-scale satellite in Turkey.

  
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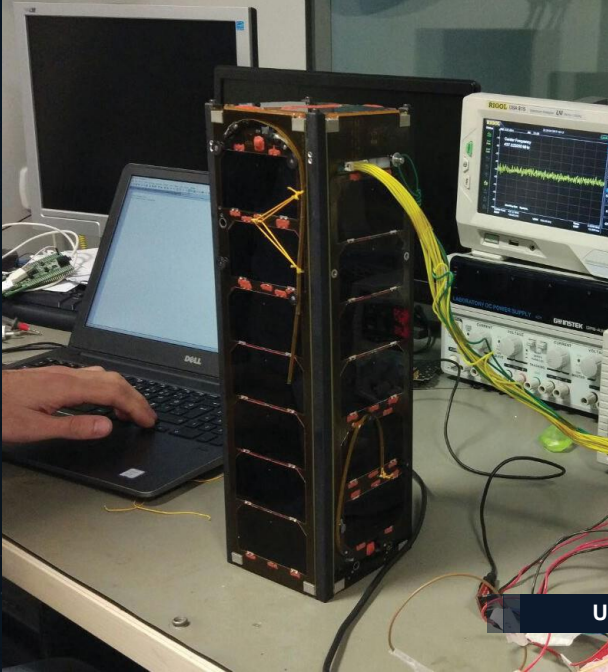


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# Turkey's Space Activities

- Our first reconnaissance satellite Göktürk 2, designed in cooperation between TÜBİTAK UZAY and TURKISH AEROSPACE in 2007 with 2,5 meters of resolution was launched in 2012. In addition to its satellite system, its mission computer and mission software are completely designed and produced through national and domestic resources.
- With Göktürk 1, the reconnaissance satellite launched in 2016, it is now possible to retrieve sub-meter images.
- Based on the experience gained through former satellite production projects, the production of sub-systems to be used in sub-meter satellites nationally and locally began with IMECE satellite project. The installation of IMECE satellite was completed in 2020 and the satellite will be launched in 2022.
- TÜRKSAT 6A is planned to be launched in 2022, the design of which began in 2014. TÜRKSAT 6A shall boost the capacity in safe data transmission and introduce critical capabilities.



UBAKUSAT- İTÜ-USTTL

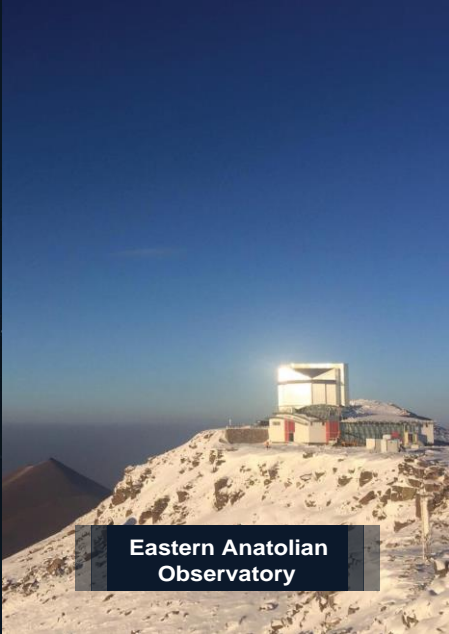


UBAKUSAT Cubic Satellite was launched on May 11, 2018 from the International Space Station.

# Turkey's Space Activities

- Satellite Systems Integration and Test Center, a facility that is critical for the production of satellites weighing up to 5 tones, has been established within TURKISH AEROSPACE. In addition to this Center, there are also design, production and test infrastructures and capabilities in Turkey in institutions like TÜBİTAK UZAY, ROKETSAN, DeltaV, TÜRKSAT, ASELSAN, İTÜ-USTTL, İTÜ-UHUZAM and TÜBİTAK SAGE.
- Turkey has also recorded tremendous progress in terms of cubic satellites. İTÜpSAT1, our first cubic satellite project, was launched into space in 2009. Since then, many cubic satellite projects have been completed.
- There are significant studies in our universities in space sciences including space weather.
- The first observatory in Turkey was established in Kandilli-İstanbul in 1911. Later, new observatories have been established within universities and under TÜBİTAK. There are many observatories in Turkey as of 2020.

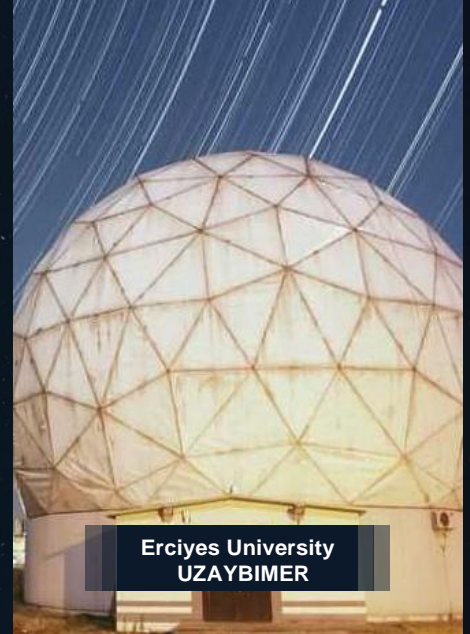




**Eastern Anatolian  
Observatory**



**TÜBİTAK National  
Observatory**



**Erciyes University  
UZAYBİMER**



# Turkey's Space Activities

- **TUBİTAK National Observatory (TUG)** is a pioneering national research institution established jointly by scientists working for and conducting research at astronomy and astrophysics departments at universities and centers in Turkey.
- **Eastern Anatolia Observatory (DAG)** will become Turkey's and the region's largest infra-red telescope with 4 meters of mirror diameter.
- In addition to this, a production ecosystem exists in Turkey which could contribute to the development of other skills to be used in other sectors. This dynamic entrepreneurial system manifests itself through clusters and technology development regions and attracts the necessary qualified labor force working abroad into Turkey.

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The background of the slide is a deep space scene. At the top, the curved horizon of the Earth is visible, showing a blue atmosphere and a white, cloud-covered surface. Below the horizon, the dark expanse of space is filled with numerous stars of varying brightness and colors, including some reddish and bluish hues. The overall tone is dark and cosmic.

# STRATEGIC GOALS

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# 1-Moon Mission

## Goal

In memory of the 100<sup>th</sup> Anniversary of the Foundation of the Republic of Turkey, the first contact with the moon will be established.

## Stages of the Mission

- During the first stage, the first rough landing will be made on the Moon with our national and authentic hybrid rocket that shall be launched into orbit in the end of 2023 through international cooperation
- During the second stage, the initial launching, which carried our probe to the orbit, will be made through our own rockets and soft landing will be made on the moon

## Goals

- To ensure that our country is one of the few countries that could conduct scientific activities on Moon,
- To acquire experience and knowledge on launching technologies and deep space systems,
- To create the infrastructure necessary for many areas ranging from the technology of radiation-resistant equipment to communications, from autonomy to artificial intelligence,
- To enable the commercialization of sub-systems developed through national and domestic resources,
- To increase the awareness within the society on space



TÜBİTAK UZAY / OPMER

## 2-To Merge Satellite Production Activities Under One Single Authority and the Program for Developing National Satellites

### Goal

To create an internationally competent brand on new-generation satellite production and development

### Strategy

- Satellite production capabilities required by our country shall be met through one single national authority coordinated by the Turkish Space Agency
- Attention will be paid for the preservation of competitive structure
- A model, which enables the sharing of all the available resources in an efficient manner, will be created to meet the needs of all the Parties

### Achievements

- Satellite production activities will be carried out with highest productivity and efficiency
- Independence in satellite technologies will be achieved







## 3-Regional Positioning and Timing System

### Goal

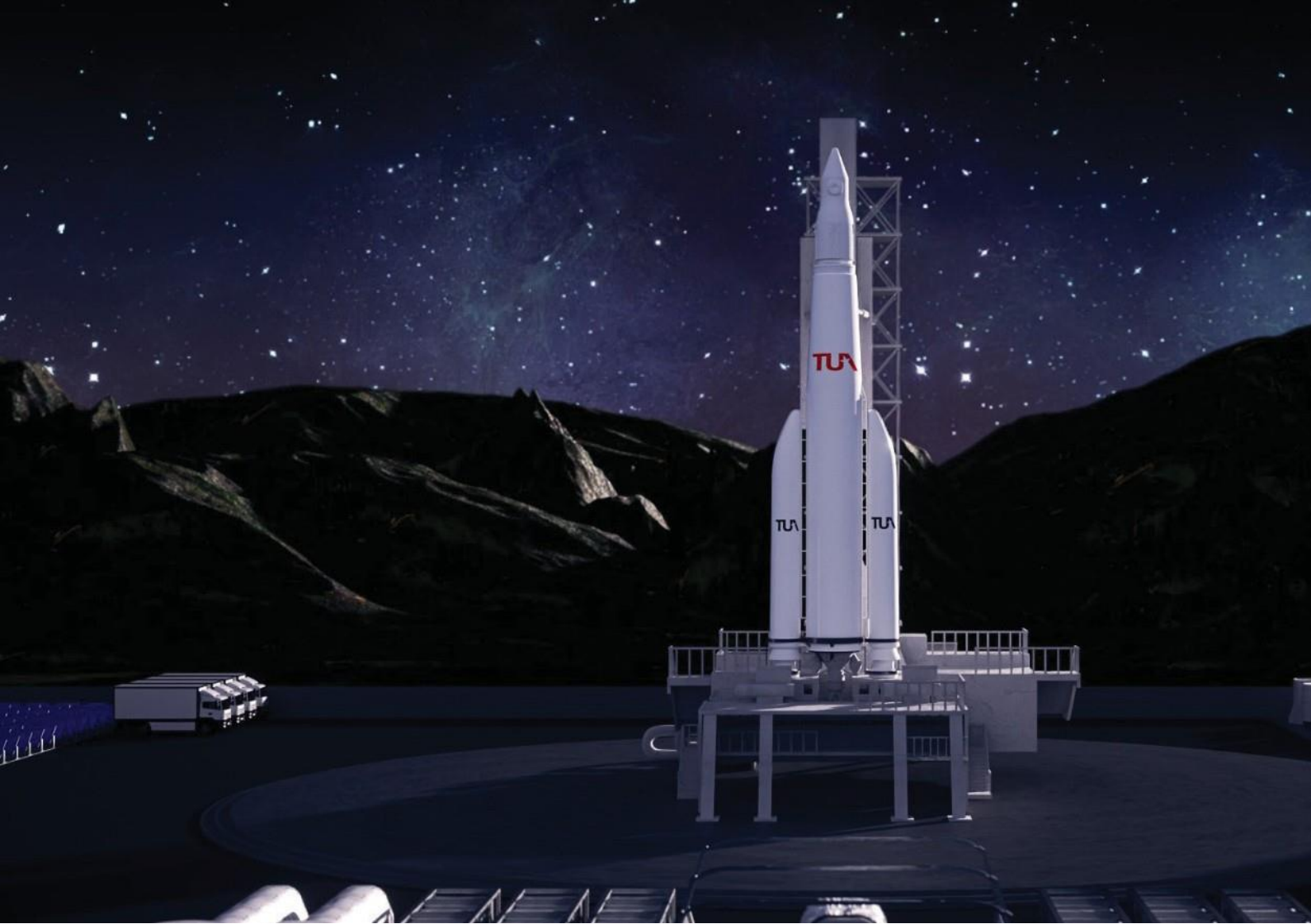
Developing a regional positioning and timing system for Turkey

### Strategy

- Investing in positioning and timing through projects involving critical technologies
- Creating international collaboration
- Through small-budget technology workshops; the organization of technology show-off events
- Designing and planning an earth-based and space-based structure in a progressive manner

### Achievements

- Our country will acquire the skill of independent positioning and timing
- We will develop our own precise navigation applications in defense, agriculture, urbanization and autonomous vehicles,
- We will increase the accuracy of positioning and timing for our country and our region,
- Our country will acquire the technology of positioning and timing systems.



## 4-Access to Space and Space Port

### Goal

Ensuring access to space and establishing a space port administration

### Strategy

- To determine the most convenient launching area and technology for our country
- To create the launching system infrastructure
- To determine the market for launching small satellites first
- To invest in new generation technologies and ensure competitive advantage
- To search the opportunities for international collaboration means in terms of a convenient launching area

### Achievements

- Our national and domestic rockets will be able to carry heavy payload to earth's orbit
- The needs of our country in terms of space vehicles and launching will be met independently







## 5-Technological Research on Space Weather

### Goal

To increase our competitiveness in space by investing in space weather and meteorology

### Strategy

- Ionosphere research will be supported especially on positioning and system projects
- Space weather research will be integrated with the development of projects on radiation hardened semi-conductors and radiation test infrastructures
- Payload on space weather in satellite projects will be supported
- A department that compiles observations on space weather and runs relevant models will be established and the said department will cooperate with international organizations
- New support mechanisms for universities will be created

### Achievements

- The potential of the adverse effects of the changes in space environment on our habitats and earth-based technological systems will be monitored and modeled
- The operations of our country in the sky and on earth will become more sustainable and safe
- Technical and scientific infrastructure necessary for the safety and sustainability of the space missions needed and contributions will be made in the science.



# 6-Observing and Monitoring Space Objects from the Earth

## Goal

To increase Turkey's efficiency in terms of astronomical observations and follow up space objects from the earth

## Strategy

- TUG and DAG will be integrated and will become one single national research facility
- Data will be collected from a wide geography through maximum cooperation
- Optical systems in Turkey will be established in different regions taking into account different meteorological and atmospheric conditions
- More than one functions will be available in the systems to be established and productivity will be increased
- Small scale projects will be launched to develop the necessary technologies for non-optical systems
- Radio frequency and laser based earth systems will be commissioned in a progressive manner
- Space based systems will be added into the system in the medium term

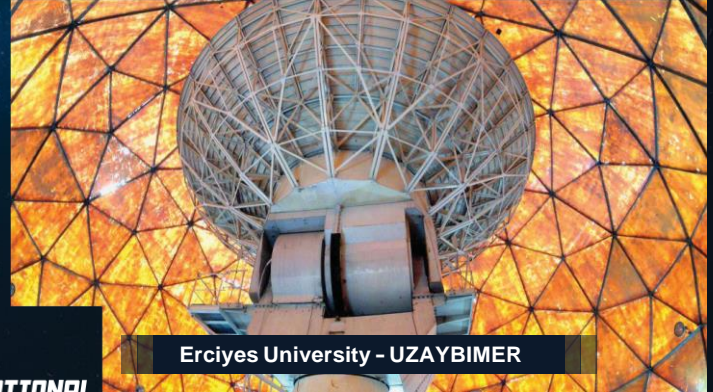
## Achievements

- With the radio telescopes; our scientists will be able to work on the radio waves as well as the mysterious radiological bursts originating from the first moments of the universe
- Our engineers, who will design our radio telescopes, will create the foundation of communications infrastructure of our Deep Space Program
- An awareness on space will be raised through observing the operational satellites, space garbage, planets and space objects from the earth and in the future from the space





TURKISH AEROSPACE

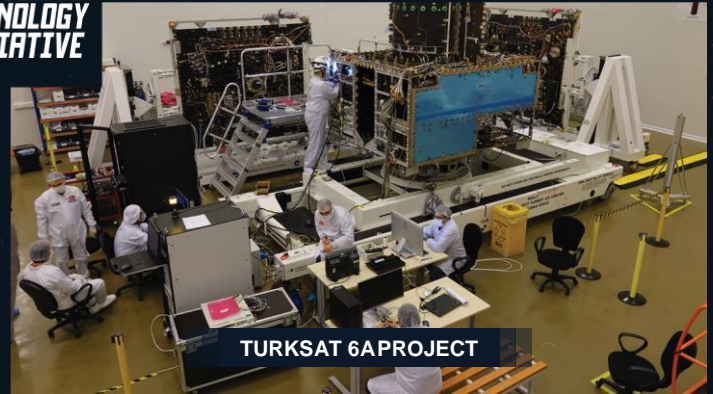


Erciyes University - UZAYBIMER

#  
NATIONAL  
TECHNOLOGY  
INITIATIVE



TURKSAT 6A TEST PREPARATIONS



TURKSAT 6A PROJECT

## 7- Developing Space Economy Industry

### Strategy

- Policies and legislation will be formulated to clarify the roles of users of these technologies, private sector, research institutions and universities
- A balance will be maintained between the work to be done as well as the competition itself; structures that allow competition and create synergy and cooperation will be promoted
- The sustainability of market conditions and products/services will be taken into account while designing the project support mechanisms
- Intellectual property regulations will be made to pave the way for small entrepreneurs and angel investor and venture capital mechanisms will be facilitated.
- By establishing a Space Technology Development Region, the integration and cooperation of the related parties will be facilitated.

### Achievements

- Increasing the efficiency of the Turkish Space Industry will also increase the output of the Agency
- Integrated studies will be carried out with the clusters in space industry
- Space technology products and services will be exported
- Relevant technologies will also be used in other sectors which shall boost the country's prosperity
- Employment will be created for highly qualified human resources

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# 8-Space Technologies Development Region

## Strategy

- A Space Technology Development Region will be established with the Middle East Technical University to welcome domestic and foreign investors.
- With the appropriate incentive mechanisms, SMEs with abilities that can be recruited into the space field will be included in the Space Technologies Development Regions.
- Legislative arrangements will be made to ensure that the space industry benefits from the Space Technologies Development Region at the maximum level.

## Achievements

- Turkey will be able to produce all sub-components of space technologies in a commercially competitive manner.
- The efficiency of the space industry will increase.
- The export capability of the space industry will increase.



TEKNOFEST ROCKET CONTESTS



SKY OBSERVATION FESTIVAL



# 9-Space Awareness and Human Capital Development

## Goal

To develop effective and competent human resources in the field of space

## Strategy

- In order to ensure that the programs within the universities are shaped according to their needs; the requirements are determined and the results are shared.
- To support space-related education; national and international summer schools, short courses and workshops will be organized.
- Scholarships for masters and PhD degrees will be awarded in clearly defined areas of need.
- Scientific and social activities will be encouraged and guided.
- Education and research will be improved by providing project support to universities.
- Children and young people will be encouraged to choose a profession in this field by increasing their interest in space,
- Educators will be provided with necessary information.

## Achievements

- Qualified human resources required by the National Space Program and the space industry will be trained.
- Brain drain will be prevented and reversed.





# 10-Turkish Astronaut and Science Mission

## Goal

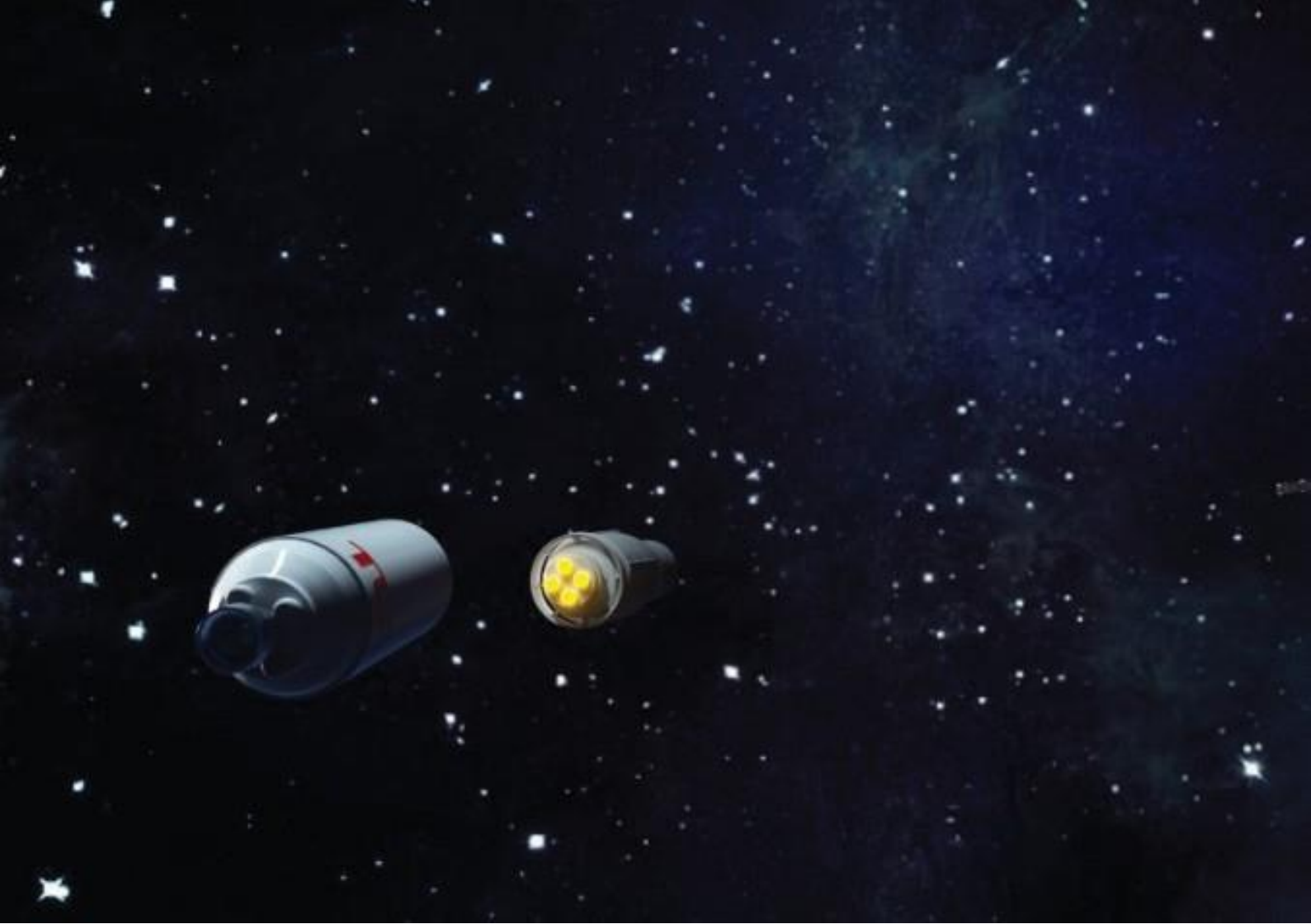
To send Turkish citizens to space with a scientific mission

## Strategy

- The issue of sending a Turkish citizen into space within international collaboration programs will be discussed
- Recommendations will be collected from universities and research institutions for experiments to be conducted in space
- The activities of Turkish astronauts in science and society will be planned in advance

## Achievements

- Our country will benefit from the infrastructure of the International Space Station and scientific experiments will be conducted
- Turkish scientists will enjoy opportunities on research to be conducted in space
- Our visibility on space will increase
- Young generations will have a greater enthusiasm to work on space related issues











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