

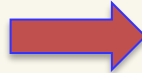
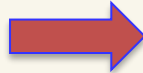
SPACE FOR DEVELOPMENT

Prof. Dr. Elsayed Azzouz

- Member of Radio Regulation Board – ITU; (2018– Now).
- Vice chairman & Chairman of RRB-ITU.
- Former Vice chairman & Chairman of ITU Council.

- Former Vice President of NTRA for Infrastructure & Spectrum.
- Former Media authority Board Member;
- Former Chairman of Spectrum Management Committee of NTRA
- Member of Spectrum Management Committee of NTRA as Expert in ICT Industry since 2021..

- **Space** is no longer reserved exclusively for a limited number of developed countries.
- **Space** technologies are becoming essential infrastructure for economic development and digital transformation.
- There are many Space Applications such as: Communications, National Resilience, Disaster Management, Environmental Protection, Agriculture, Transportation, Scientific Research. These are to improve the life of People.

Initially, “How can we reach space?”  

Currently, “How can we use space to have socioeconomic benefits, and improve the Quality of life on Earth?”

Moving from Exploration to an Engine of Development



The objective is to: Create more development through the use of Space and satellites; not simply by building more satellites.

**In my view, this is the essence of
“Space for Development”**

Space is Becoming an Essential Infrastructure instead of Exploration

Satellite Communications & Broadcasting

Complement terrestrial fixed and mobile networks and connect communities that are difficult to reach. Also, it is essential for Broadcasting

Navigation

Support transportation, logistics, aviation, maritime activities and precision agriculture.

AI & Analytics

Satellite data is becoming a critical input to Artificial Intelligence and advanced analytics.

Space-based Services

Many space-based services and systems is supporting the digital economy, and emergency

Earth Observation

Monitor agriculture, water resources, forests, deserts, coastlines and urban-area development.

Meteorology & Resilience

Support weather forecasting, early warning, disaster management, climate monitoring and emergency response.

Development Infrastructure

Space is increasingly a fundamental component of the modern digital economy.

Transformation from Exploration Phase to an Engine of Development Phase

The new space economy can be achieved from the combination of different components:

- ✓ Smaller and more capable satellites.
- ✓ Mega-constellations.
- ✓ Low-cost satellite manufacturing
- ✓ Reusable launch systems.
- ✓ Artificial intelligence (AI).
- ✓ Cloud computing.
- ✓ High-performance computing.
- ✓ Advanced sensors and IoT.
- ✓ Satellite Broadband Internet.
- ✓ MSS, D2D and D2C access and connectivity
- ✓ Commercial space services



- This transformation creates opportunities to different countries especially, developing ones.
- Any country can select the areas where space technologies can immediately create economic and social value.



This is particularly important for developing economies.

Global Space Economy: 2021–August 2026

Year	Global Space Economy =	Commercial Sector +	Government Sector
2021	\$ 469 B	>\$360 B (~77%)	≈\$105 B
2022	\$ 546 B	\$427.6 B (~78%)	\$118.6 B
2023	\$ 570 B	\$445 B (~78%)	≈\$125 B
2024	\$ 613 B	≈\$478 B (~78%)	≈\$135 B
2025	≈ \$ 613 B+	Dominant	Increasing
2026	≈ \$ 620–650 B		

- The global space economy comprises Commercial sector and Government sector.
- Commercial share is ~78% over the last 5 years, and the Government is gradually increasing.

Space Economy Components

The space economy is larger than Just rocket launches and satellite manufacturing

Upstream sector	Downstream sector	Emerging sector
It includes the physical infrastructure and engineering requirement such as: ✓ Satellite manufacturing ✓ Launch vehicles & services ✓ Ground stations ✓ Space infrastructure ✓ Components & electronics	It takes data from space and turns them into commercial products & services such as: ✓ Satellite Communications & Internet Broadband. ✓ D2D / D2C & IoT ✓ Satellite TV ✓ Navigation & positioning ✓ Earth observation / weather / remote sensing ✓ Maritime & aviation connectivity ✓ Geospatial services	It is driving growth into new fields and brands, such as: ✓ Space tourism ✓ In-space manufacturing ✓ Space-based solar power ✓ Orbital data centers ✓ Space logistics / servicing ✓ Debris removal ✓ Space cybersecurity

Space and Digital Divide (Space is an Essential Tool to Overcome the Limitations of Terrestrial Networks)

- One of the most important Challenge remains the digital divide between developing and developed countries.
- Millions of people around the world still have lack reliable access to high-speed broadband. As of August 2026, there are ~ 73.8% of the world's population is online, leaving about 2.17 billion people completely unconnected.
- Many communities are located in rural, remote, mountains, desert and geographically isolated areas.

In this regard, the terrestrial networks remain essential, but satellite network connectivity can complement terrestrial networks in areas where it is difficult to reach or economically expensive to deploy.

Convergence (Mobile & Fixed/Fiber + FWA + Satellite) Networks **Integrated with** (Cloud + AI) ➡ A more resilient national digital infrastructure

This particularly relevant to many developing countries, especially those in Africa.

Space as a Strategic Development Enabler in Africa

Opportunities

The main **challenges** is the geography & population

A large Geographic Dimensions, with rapidly growing populations **lead to** expanding cities and large rural communities.

Communication & Broadband connectivity

Satellite communications can extend broadband connectivity, and complement the terrestrial coverage.

Agriculture

Earth observation can support African agriculture.

Climate resilience

Meteorological satellites can strengthen climate resilience.

Transport & logistics

GNSS can improve transportation and logistics.

Satellite Navigation GNSS & Disaster management

To improve the safety of life and management the transportation and logistics.

Water resources management

Space-based monitoring can help manage water resources.

Government decision-making

Satellite data combined with AI can provide powerful tools for government decision-making.

Strategic direction

Space should become more accessible to developing countries.

China's Role in the Global Space Development Ecosystem

China has demonstrated its long-term national vision, scientific capability, engineering excellence, industrial capacity and investment in human capital. These can transform the country to good position over the global space sector.

There is Significant potential to strengthen the international cooperation among China, Egypt and African countries in the fields of space for better development and create enormous benefits for different stockholders.

Strategic Importance of Space Technology in Egypt

From my perspective as Egyptian: Space technology has strategic importance.

- Egypt is located at the intersection of Africa, Asia, Europe, Arab States, Mediterranean and Middle East regions.
- Egypt geographical position creates **opportunities for Egypt** to become an important regional hub for communications, digital infrastructure, earth observation, space applications and technological cooperation.
- **Space/Satellite** is important to deliver the services needed to improve the digital transformation. The Climate monitoring by space instrument is an environmental issue, and it is directly connected with:
water security, food security, economic security and Human security.

Space Economic for Egypt: Moving from Buying Satellites to Building a Space Industry

Stage	Model	Egypt's position
1	Buy satellite	Customer
2	Chinese satellite + Egyptian operation	Operator
3	Joint satellite development	Technology partner
4	Egyptian assembly/integration/testing	Manufacturer / Integrator
5	Egyptian satellite design	Space technology developer
6	Egyptian manufacturing	Space industry
7	Export satellites/services to Africa	Regional space economy

I

II

III

Egypt's potential role expands from: **satellite customer and operator** toward **(1) technology partner, (2) manufacturer/integrator/testing** and **(3) Regional space-economy Hub**.

China–Egypt Cooperation in Space & Satellite Fields

- Cooperation has moved from **training and technology assistance** toward **joint satellite development** for Earth observation and Space Research & Science.
- In addition to, **Satellite AIT** (assembly, integration and test) capabilities.
- **Major projects for cooperation:** MisrSat–1&2 / EgyptSat–1&2, AIT Center, Satellite engineering Training, Earth observation, Space surveillance & monitoring / astronomy, space science, satellite manufacturing.
- Additionally, the work is under going for future commercial cooperation and expand the space cooperation with African.

Important Satellite Projects Associated with Egypt & China

Project	Approx. date	Nature	Chinese role
EgyptSat-1	2007	Earth observation	Earlier cooperation; not present China-led model
Horus-1	2023	Earth observation	Chinese-built/launched satellite
Horus-2	2023	Earth observation	Chinese satellite/launch cooperation
MisrSat-2	2023	High-resolution Earth observation	Joint development + Egyptian AIT + Chinese launch
Egypt Space City, and AIT Center	2023-2024	Satellite industrial infrastructure	Chinese grant: equipment, expertise and training
Space surveillance/optical telescope	2020	SSA / astronomy	Chinese technical cooperation
Cooperation to have Gate way in Egypt,	2024-2026	Gate way in Egypt for IoT.	China-Egypt Cooperation and discussion.

Major Space Use Cases Suitable for cooperation between China & Egypt

Space-based Use case	What China does	Suitability for Egypt (Very High)
Precision agriculture	BeiDou + remote sensing + drones + AI	Nile Valley, Delta, New Delta, Land Reclamation.
Water-resource monitoring	EO + hydrological monitoring + GNSS	Nile, irrigation, groundwater
Port & maritime management	GNSS + BeiDou + satellite communications + EO + AI	Suez Canal, Mediterranean, Red Sea
Disaster management	EO + BeiDou positioning + emergency communications	
Urban planning	EO + GIS + GNSS + AI	
Satellite broadband	LEO constellations + Gateways	Particularly underserved and unconnected areas.
D2D / NTN	Satellite-to-mobile-phone connectivity	
Mining / geological survey	EO + GNSS + remote sensing	

Egypt National Space Applications (Program time frame 2027–2035)

Tier 1 — Immediate	Tier 2 — 2–5 years	Tier 3 — Strategic 2030+
1. Space-based water management 2. Precision agriculture 3. Earth observation + AI 4. Suez Canal maritime applications 5. Disaster management 6. Satellite infrastructure monitoring 7. Mining/geological exploration 8. D2D/NTN	9. Smart-city satellite services 10. Satellite-enabled logistics 11. National GNSS augmentation 12. Critical infrastructure timing 13. Low-altitude economy 14. Maritime/off-shore connectivity 15. Space weather services	16. Space-based AI 17. On-orbit servicing 18. Space data centers with AI 19. Space manufacturing 20. African commercial space-services hub

Vision of 2035

Looking toward 2035: Space technology should become an **instrument** to improve the quality of life of people everywhere:

✓ Individuals can access and communicate with everything, everywhere and any time by different means.

✓ Every government can gain from satellite data for better decisions.

✓ Every country can access Earth-observation capabilities.

✓ Every developing country can participate in research and innovations in the satellite technologies era.

✓ Every developing country can participate in the space economy.

✓ Every community can access and communicate using reliable connectivity.

✓ Every major disaster can be monitored rapidly from space.

✓ Every farm can benefit from space-enabled information.

- **The future of humanity** is what we do with space for the benefits on the Earth.
- It is necessary to build the future in which:

Space is not the privilege for a few, but it is an opportunity for all.

Thank You for Your Attention

Dr. Elsayed Azzouz

High-Level Seminar on Space for Development

China, 2026