

SPACE SYSTEM AND ENGINEERING IN AFRICA: NIGERIA AS A CASE STUDY

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“Building a Shared Vision for Space in Africa”



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Presentation Outline

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- **Influence of Space Technology in National Development of Nations**
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Introduction: Nigeria/African Challenge

- **To:** Develop a modern and industrialized economy, which is responsible
 - Create jobs that pay living wages
 - Propel Nigeria into one of the **20 largest economies in the world by 2020**
 - Become a key player in the global economy”.
 - Achieve it by harnessing efficiently and effectively advances in **Space Science** and **Technology** in our developmental effort

Introduction: Nigeria/African Challenge

- **To: Develop a modern and industrialized economy, which is among the 20 largest economies in the world by 2020**
 - Using Space Science and **Technology**
 - **Advanced Technology**
 - **Space Technology**
 - Advanced – Space

Space Technology

- The mechanism for this Advanced-Country status is the acquisition and utilization of Advanced Technology Systems in all aspect of the Nation's industries.

Objectives of the Vision

- Increased industrial productivity
- production of globally competitive quality goods and services
- and at relatively low cost is the critical ingredient for transforming Nigeria into an **Advanced Country** by the year 2020

Space Technology and Development in Nigeria

Space program provides the reference technology for the achievement of Vision 2020-20

- The benefits of space programs are the results of the inherent challenging and technologically demanding nature of the programs.
- There are numerous benefits to be derived from a progressively conceived and well-managed space programme of a nation.
- Space technology and its spin-off is a national asset that can be reused to develop new products and processes, to the benefit of economic growths in new companies, new jobs, and the resulting contribution to the **Gross Domestic Product**

Influence of Space Technology in National Development of Nations

- Experiences of many industrialized nations have shown that space program has contributed to the development of commercial products and services in the fields of
 - Industry
 - ❖ Health,
 - ❖ Consumer goods,
 - ❖ Computer technology,
 - ❖ Machinery and Heavy equipment
 - ❖ ICT,
 - Agriculture
 - Medicine
 - Environment.
- There is a strong relationship between all developed nations' space program and their industrialization.

NIGERIA SPACE ROAD MAP-2005

SPACE AS A PLATFORM FOR INDUSTRIAL OUTPUT

Nigeria Space Road Map-2005

Produce a Nigerian Astronaut by 2015

Launch a Satellite manufactured in Nigeria by 2018

Launch a Satellite manufactured in Nigeria from a Launch Site in Nigeria on a Launch Vehicle manufactured in Nigeria by 2025

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ROAD MAP FOR NIGERIAN SPACE MISSION (2005-2030)

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- **Astronaut Training and Launch to promote**
- Science culture and awareness
- Acquisition and development of allied infrastructure, facilities and skills
-
- **Satellite, Propulsion & Launch Technology Development**
- Development and acquisition of allied skills and Technologies including advanced manufacturing, aeronautics and power generation
- Establishment of local industries for manufacturing of components and parts.
- Spin-offs in the external economy
- Employment generation

- **Basic Space Education, Research and Development to provide** challenges and incentives for our Scientists/Engineers and technical manpower in both public and private sectors
- Modernization and improvement of our educational system

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- The first step is **capacity building in space science and technology**.
- A lot of efforts are geared towards capacity building in space science and technology both locally and outside the country with a view to
 - producing highly trained scientists, engineers and technicians.
 - and transfer the knowledge gained to other sectors of the economy
- NigeriaSat-1, NigComSat-1, NigeriaSat-X
NigeriaSat-2 & NigComSat-1R

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■ **NigeriaSat-Series:**

- The Nigerian Government on 7th November, 2000, signed an Agreement for collaborative work with Surrey Satellite Technology Limited (SSTL) of U.K. (25 trained)

■ **NigComSat-Series**

- As a follow-up to the successful launch of NigeriaSat-1, The Nigerian Communication Satellite (NIGCOMSAT-1) a critical ICT infrastructure for Africa was launched in May 2007.
- The project covers the Know-How Technology Transfer Training of 50 Nigerian Engineers who were involved in the design and building of all subsystems of the NIGCOMSAT-1 for a period of 18 months in China.

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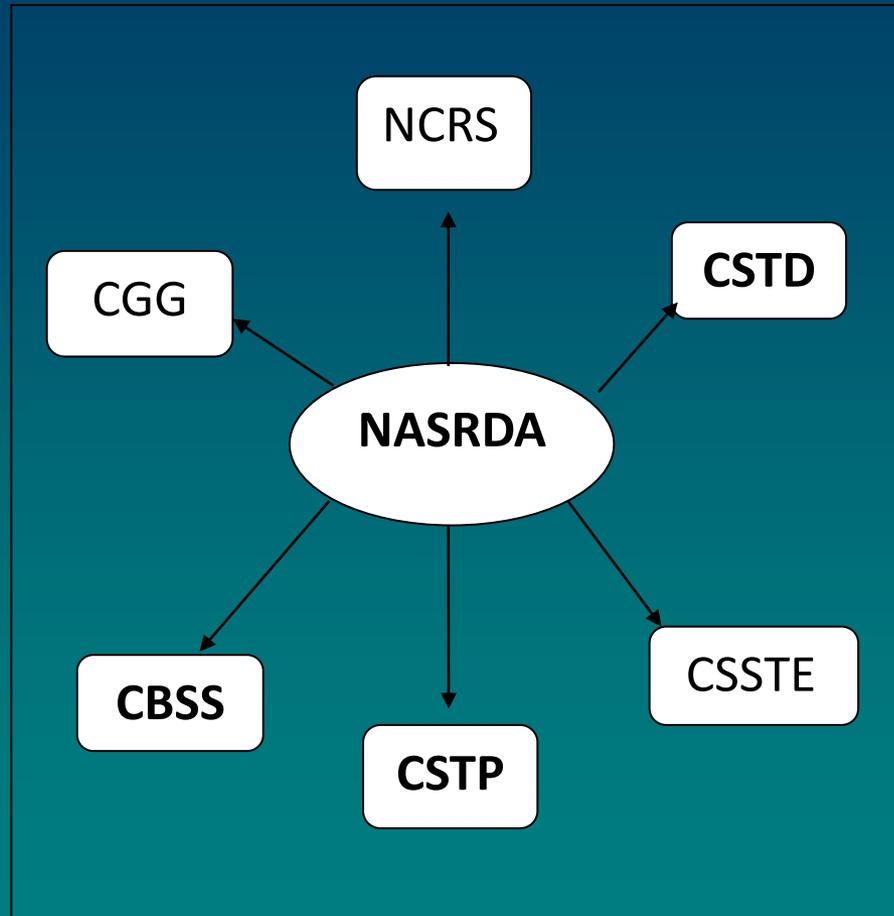
■ STATUS REPORT

- The implementation of the road-map has commenced in bits on stringent budget since the year 2005.
- **Summary of recent activities**
- Training of 50 Engineers in China in the area of Communication Satellite that was launched in May, 2007.
- Hands on training of 25 Engineers in Surrey Satellite Technology Limited (SSTL), UK where 11 of them have undergone a Masters Degree and Technical Know-How for the 2.5 m resolution spacecraft tagged NigeriaSat-2 Project that has been launched in August, 2011
- Ongoing negotiation with CAST and CGW I for the Design and Construction of Assembly Integration and Test (AIT) / Design Centre (DC) for the manufacturing of spacecraft
- Negotiation for the equipping of the AIT/DC
- Ongoing negotiation for the construction of Launch Site and hands on training on rocketry
- Presently training over 43 Scientists and Engineers at the PhD level in relevant space technology and application areas in Russia, United States, United Kingdom, other European countries and China.
- Nigerian Scientist and Engineers have designed and built NigeriaSat-X, the satellite was launched in August, 2011 alongside NigeriaSat-2 using SSTL facilities
- The satellite control ground stations for both communication and remote sensing satellites are manned by Nigerian Scientist and Engineers in Nigerian Capital city Abuja.

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- Space and Associated Research & Development areas
 - ITU Related Issues
 - Advanced Computation and Expert Systems Laboratory
 - Satellite Assembly Integration and Testing/Design Center (AIT/DC)
 - Sounding Rockets
 - Astrophysics
 - Heliophysics
 - ❖ Corona Mass Ejections (CMEs) are millions of Kilograms plumes of solar plasma projected into space and towards earth during solar flares. As the CMEs stream and radiate past our planet, the high energy storms can cause damage to national power grids and communication systems interruption. Therefore, there is a need to be able to predict these high energy activities.
 - ❖ Magnetic Pole Reversal Studies.
- - Global Navigation Satellite Systems (GNSS) and Differential GNSS (DGNSS)
 - Telemedicine
 - Engineering Spin-offs: Low budget, high national impact engineering products.
 - ❖ Embedded System Prototyping kit.
 - ❖ Electronic Voting Systems.
 - ❖ Sensors development
 - ❖ 16 such projects annually were proposed.

SPACE SYSTEMS & ENGINEERING CENTERS OF EXCELLENCE



Conclusions

- It has remained the driving force behind most developed and developing economies that are sustained
- The unique roles of space technology in the achievement of government's development agenda, which includes economic reforms, poverty reduction, security and economic stability cannot be over-emphasized.
- For Africa the establishment of space presence through joint development and capacity building using Know-How-Technology-Training or Know-How-Training & Transfer is a method that has been successful in the Nigerian experience.
- The trainees must also receive advanced degrees concurrently with the know-How training.
- The necessary infrastructure must also be provided for continuity at the end of the Know-How training.
- **A Road-Map must be adopted and followed**

Thank You for your Time



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