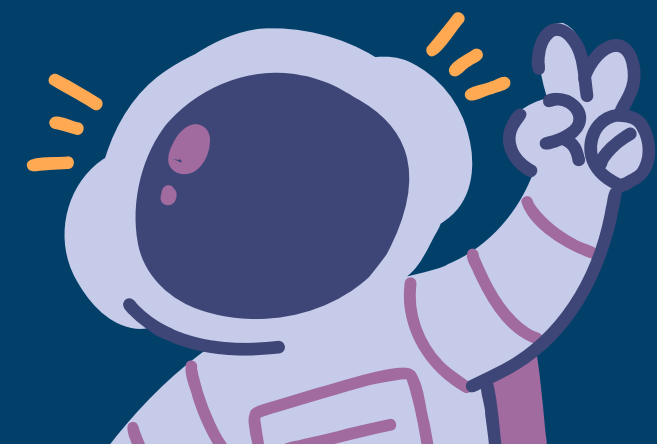


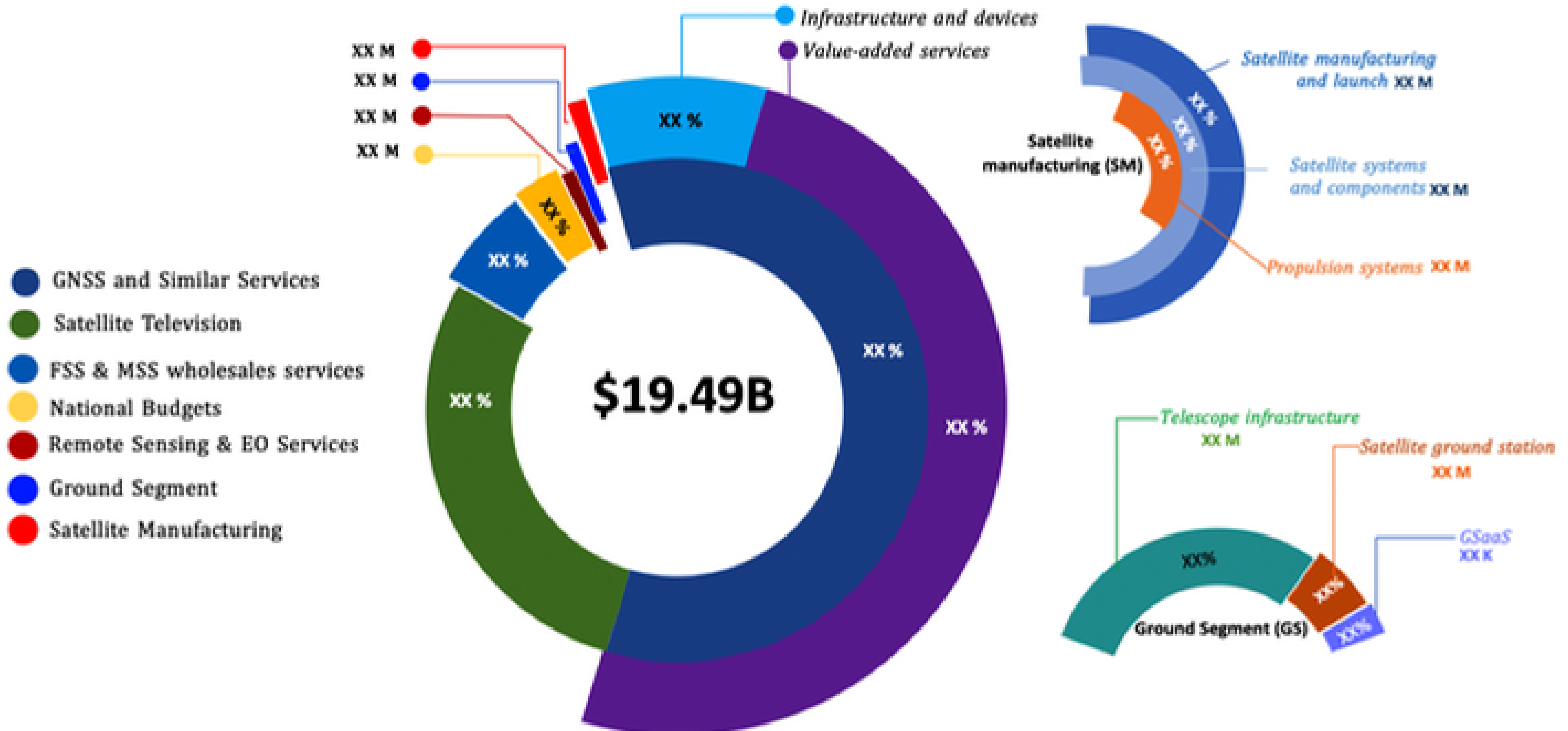


Needs of new space-faring nations to develop an industry and space ecosystem



2021 African Space Industry Valuation

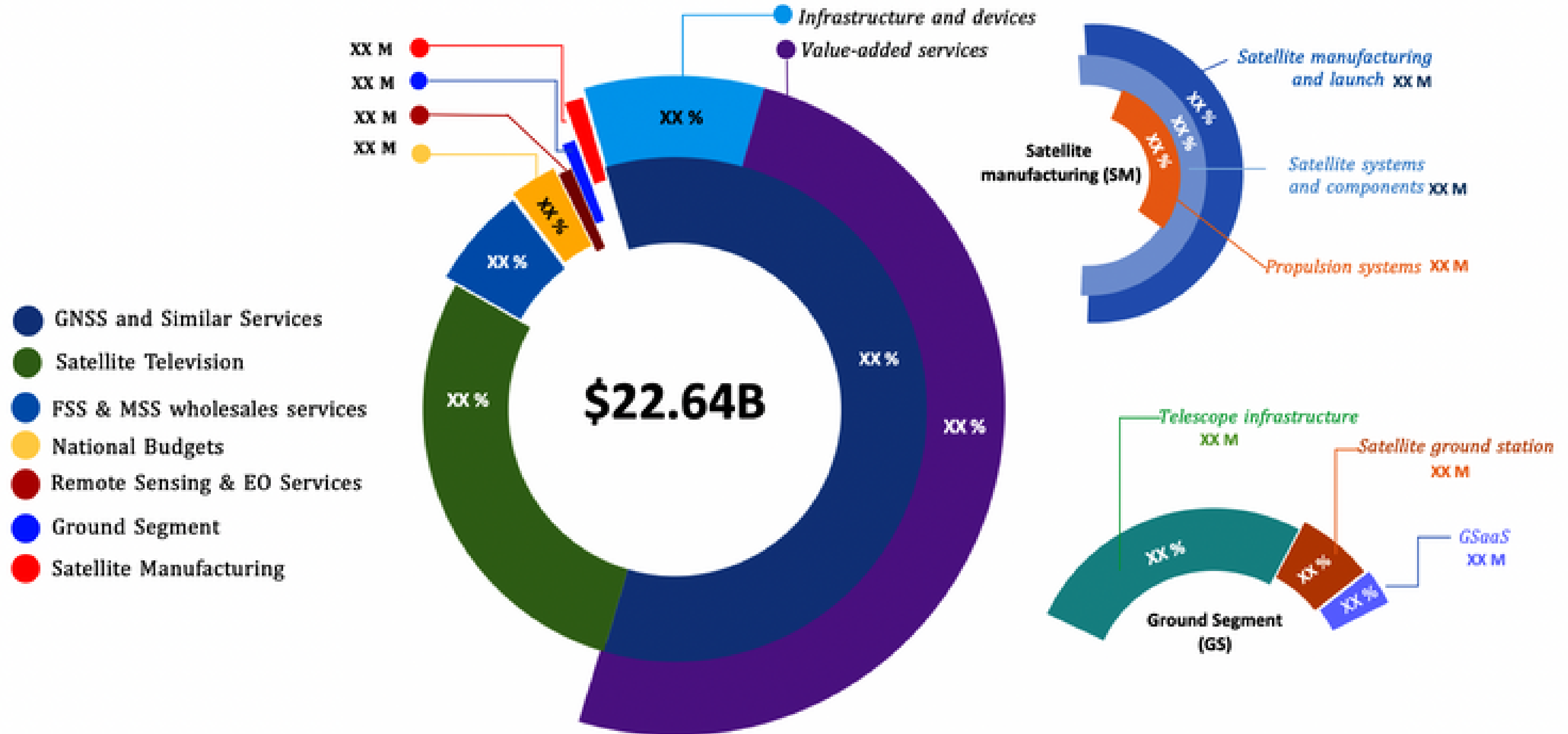
The African space and satellites industry in numbers (U.S. dollars.)



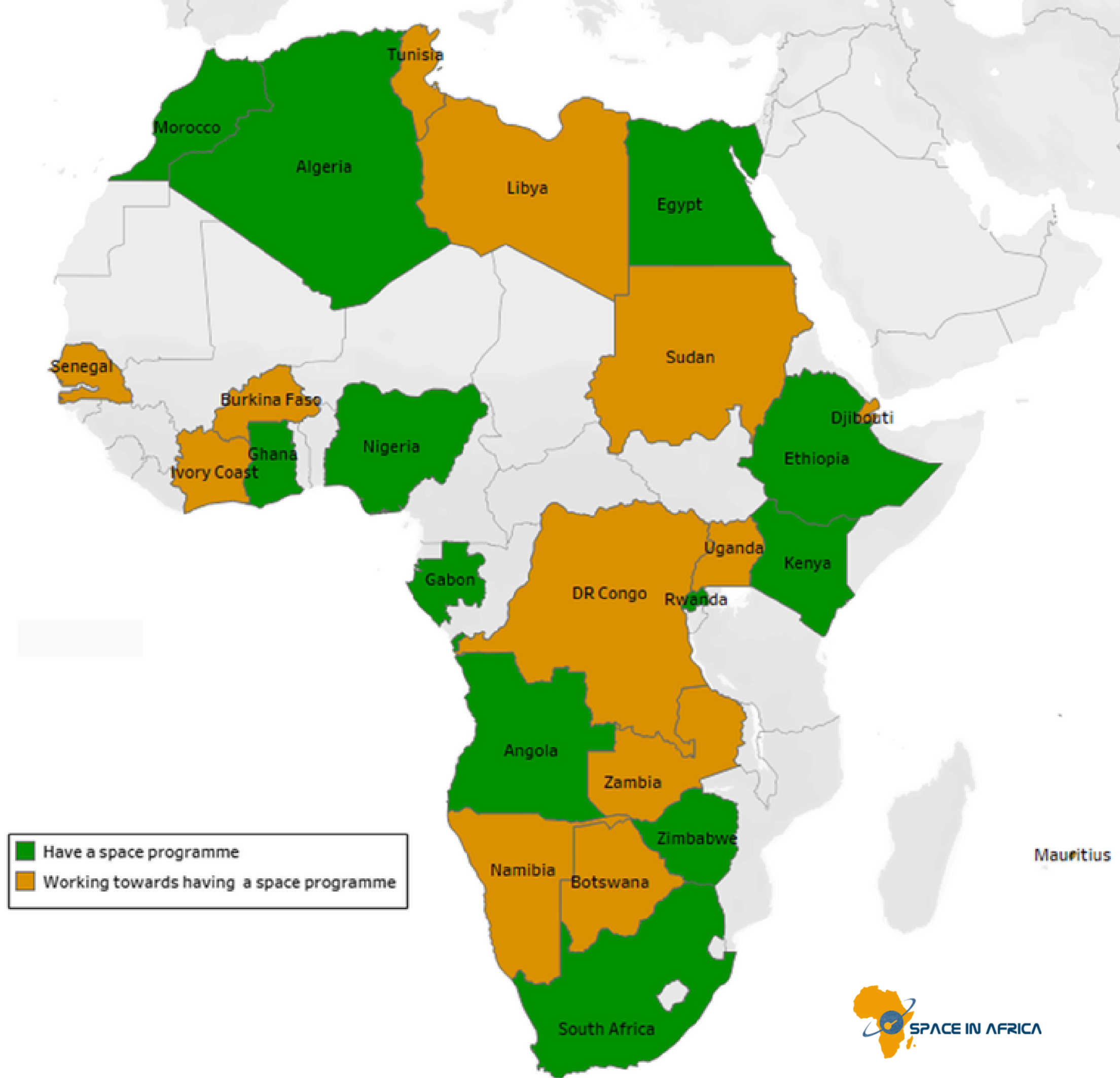
2026 African Space Industry Projection



The African space and satellites industry in numbers (U.S. dollars.)



African countries that have established or are in the process of establishing national space programmes

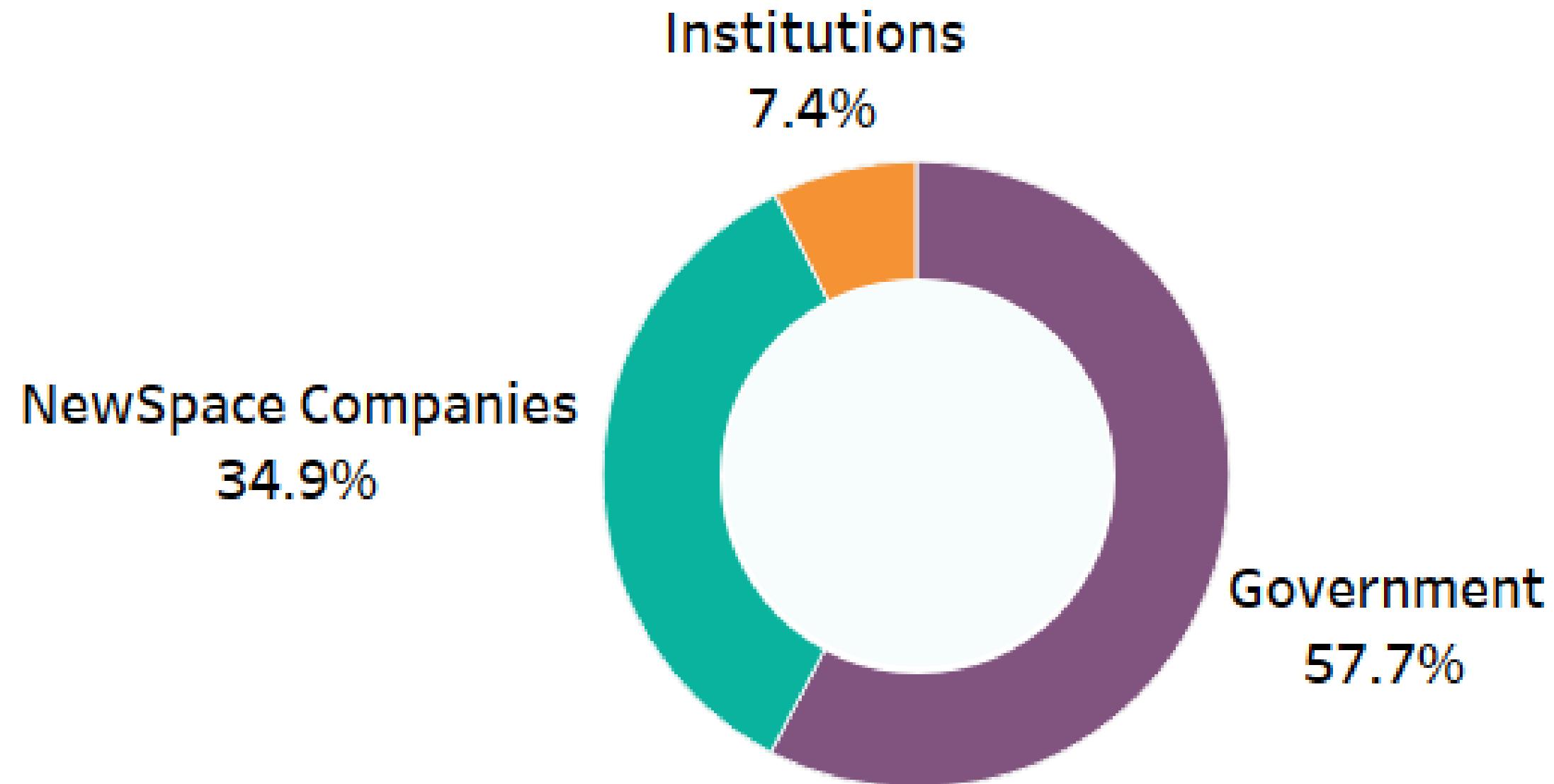




Workforce of Africa's Space Industry

The total workforce in African's space industry is estimated to be over 19,000 employees employed by the government, NewSpace companies and other institutions.

58% of the total workforce of Africa's space industry are employed by the government



The Workforce of the African Space Industry

Capacity Development



Capacity Development

Human capacity development is the bedrock of Africa's space ecosystem development and has prompted considerable investment from several public and private actors in Africa. The long-term goal of any capacity development programme is to bring about a more robust national space ecosystem in African countries.

Capacity building involves the gradual development of local expertise and know-how through personnel training and procured technology transfer.

The level of skilled and technical human capital available in a country determines the type of projects they can independently take on without seeking external help. This need has necessitated the plan of several African countries to enhance their human capacity in space systems development.



Capacity Development in Earth Observation

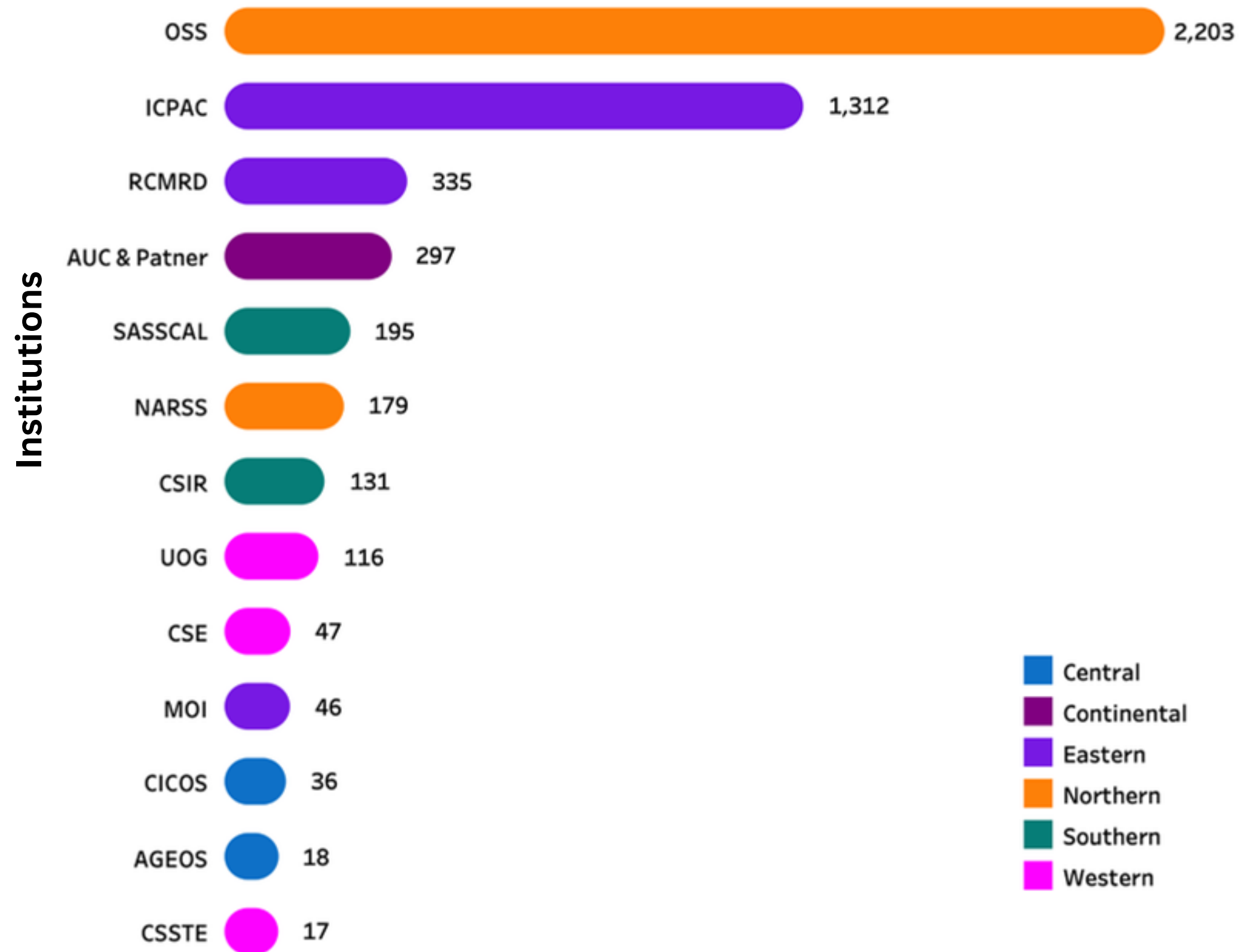
The Global Monitoring for Environmental and Security (GMES) & Africa programme is one of the leading initiatives designed to strengthen capacities in Africa for the optimal exploitation and utilisation of Earth observation systems, data, and technologies towards the continent's sustainable development.

GMES & Africa programme, which started in 2016, has implemented several capacity training programmes across the continent, focusing on developing skills and expertise in Earth observation applications in Africa.



**GMES
AND AFRICA**

Over 4000 people have been trained under the GMES & Africa Programme



Number of participants trained under the GMES & Africa Programme

Capacity Development in Earth Observation

Digital Earth Africa (DEA), an Australian-government-funded organisation, is leveraging its existing capacity to enable the use of Earth observations to address critical challenges across Africa.

In 2020, the DEA launched a six-week training program as part of the transition to Digital Earth Africa's continental-wide infrastructure from the Africa Regional Data Cube (ARDC).

Through the comprehensive training programme, the participants were able to learn about Earth observation, Python programming, the DEA **Africa** Sandbox environment and the use of Jupiter Notebooks.



Digital Earth
AFRICA

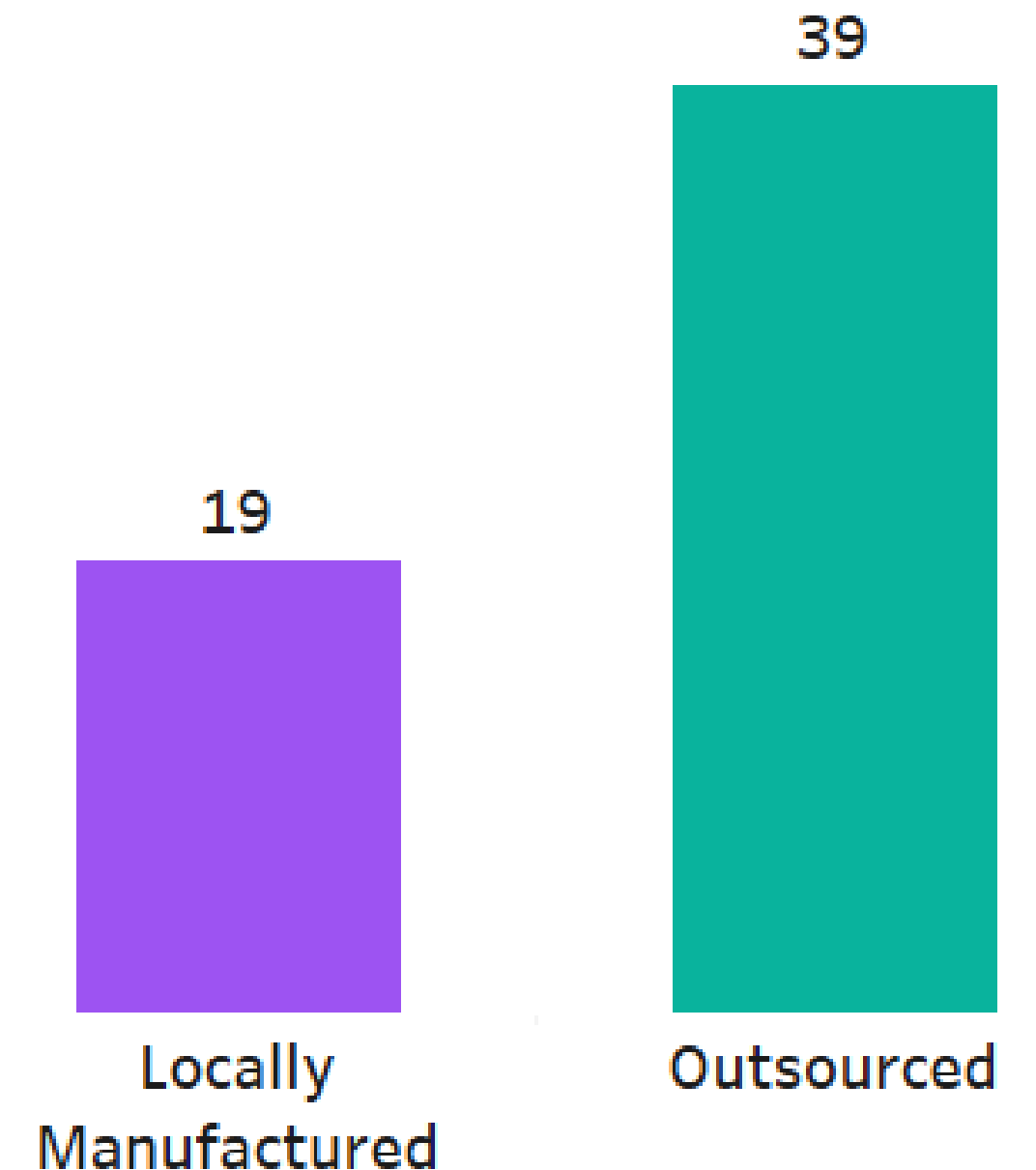
Capacity development efforts in earth observation has largely been successful and the effect can be seen in Africa's newspace ecosystem

Capacity Development in Satellite Development

One way Africa has developed its human capacity is by leveraging satellite development deals to build its human capacity.

Many African states lack the required skilled human resources to solely take charge of satellite development projects. But this is changing as African countries are now investing heavily in training their engineers on satellite mission designs and development.

To put into perspective, of the 58 African satellites, 19 were wholly manufactured on the continent by universities and commercial companies



**Some African Countries utilising
local satellite development
projects as a means of enhancing
their human capital**

South Africa

South Africa has trained **227** local engineers over three satellite projects - Sumbandilasat (107 engineers), ZACUBE-1 (40 engineers) and Sunsat (80 engineers).

These engineers were trained through Stellenbosch University, Cape Peninsula University of Technology (CPUT) and SunSpace (a spinoff company from Stellenbosch University).



Egypt

NARSScube 1 & 2 are Egyptian nanosatellites developed by NARSS (National Authority for Remote Sensing and Space Sciences). With these projects, NARSS provided **23** Egyptian engineers with hands-on research experience in nanosatellite development.

EgyptSat-1 was built by a team of about 65 Egyptian engineers.

NARSS is currently working on a **6U satellite** dedicated to agricultural monitoring. The project is a collaboration between engineers and academic staff in NARSS's space technology division and is expected to be launched in Q4 2024 or Q1 2025



Nigeria

UK-based Surrey Satellite Technology (SSTL) trained 15 Nigerian engineers through the development of **NigeriaSat-1** satellite.

SSTL further trained another 27 Nigerian engineers and awarded 10 M.Sc.s through the University of Surrey during the development of **NigeriaSat-2**.

55 Nigerian engineers were trained in China as part of the human capacity programme for **NigComSat-1** satellite.



Nigeria

The development of the **NigeriaSat-X satellite** provided 12 Nigerian engineers with practical experience as a part of SSTL's Know-How Technology Training (KHTT) program.

For a period of 18 months, these engineers worked at SSTL's facilities in the UK and were involved in the design, manufacture and test phases of the NigeriaSat-X spacecraft in a controlled real project, real engineering environment.

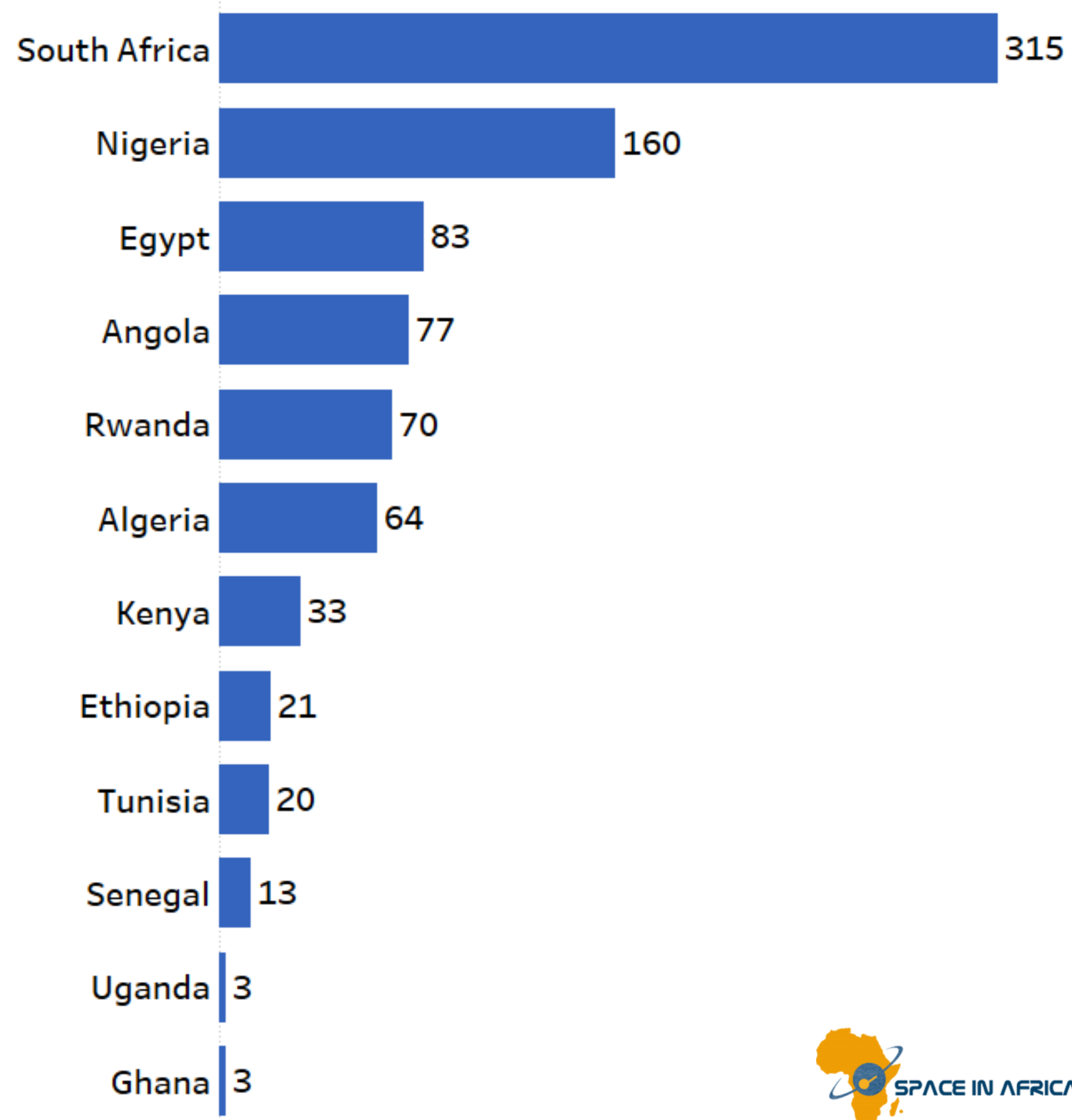


Algeria

Algeria has trained 64 local engineers over 4 satellite projects - ALSAT-1B (18 engineers), ALSAT-1 (11 engineers), ALSAT-2A (30 engineers) and ALSAT-1N (5 engineers).

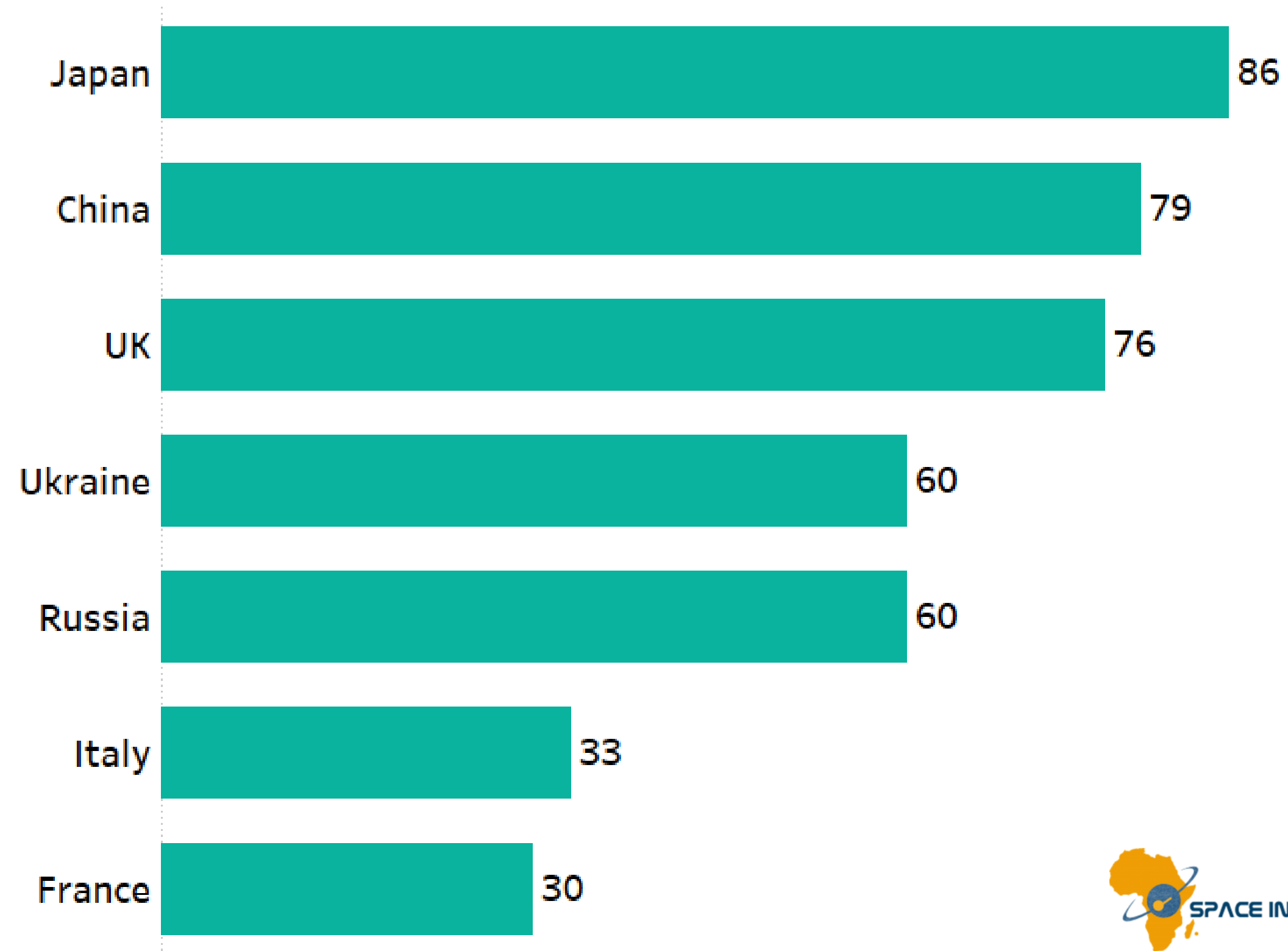
These engineers were trained through Surrey Space Centre and Surrey Satellite Technology (SSTL).





Number of African engineers trained in satellite development programmes

Engineers trained by foreign countries on satellite projects



Some foreign Institutions that have trained African engineers on satellite projects

AIRBUS

SURREY
SATELLITE TECHNOLOGY LTD

ЭНЕРГИЯ



Kyutech
Kyushu Institute of Technology

 **東京大学**
THE UNIVERSITY OF TOKYO

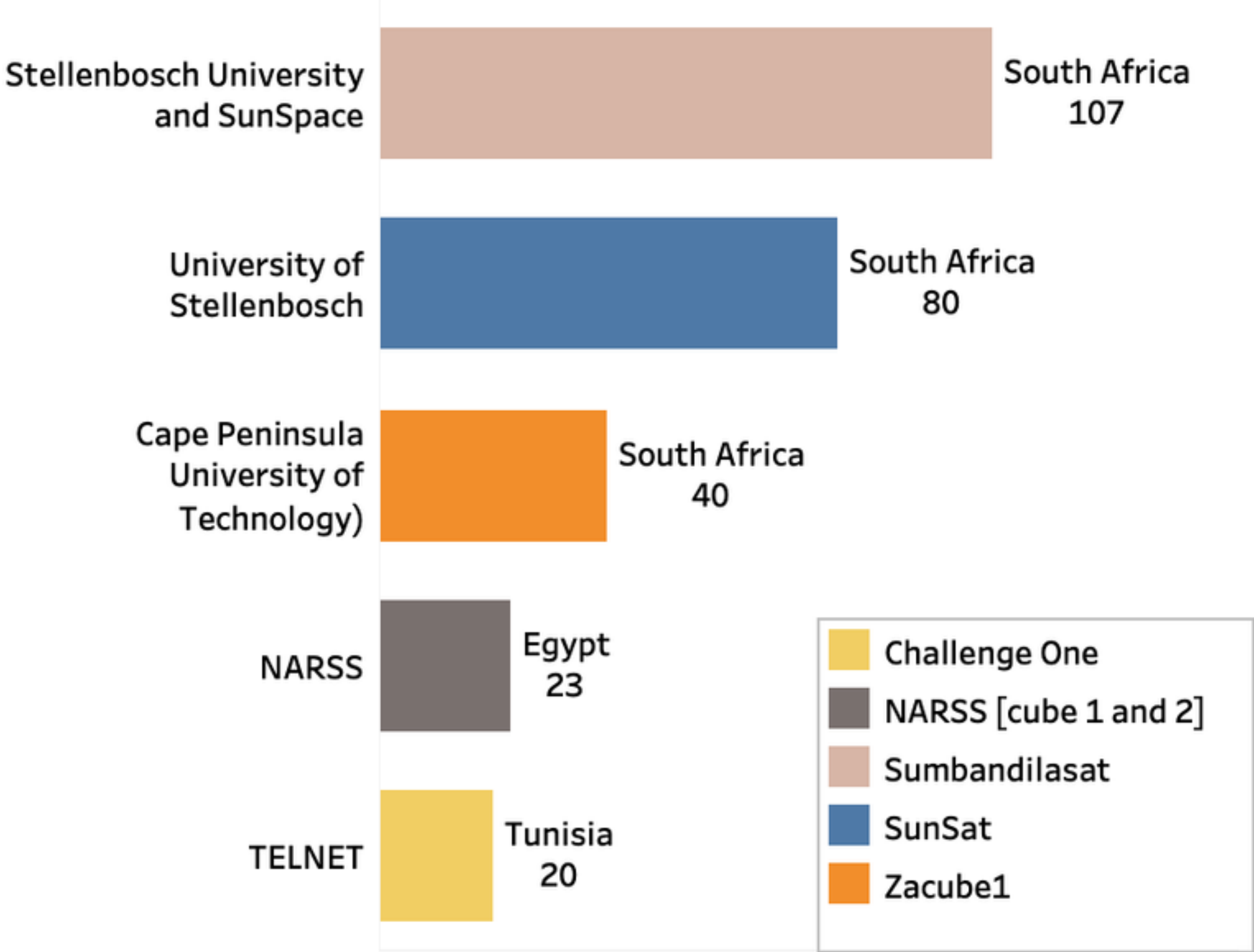
YUZHNOYE
design office

jica

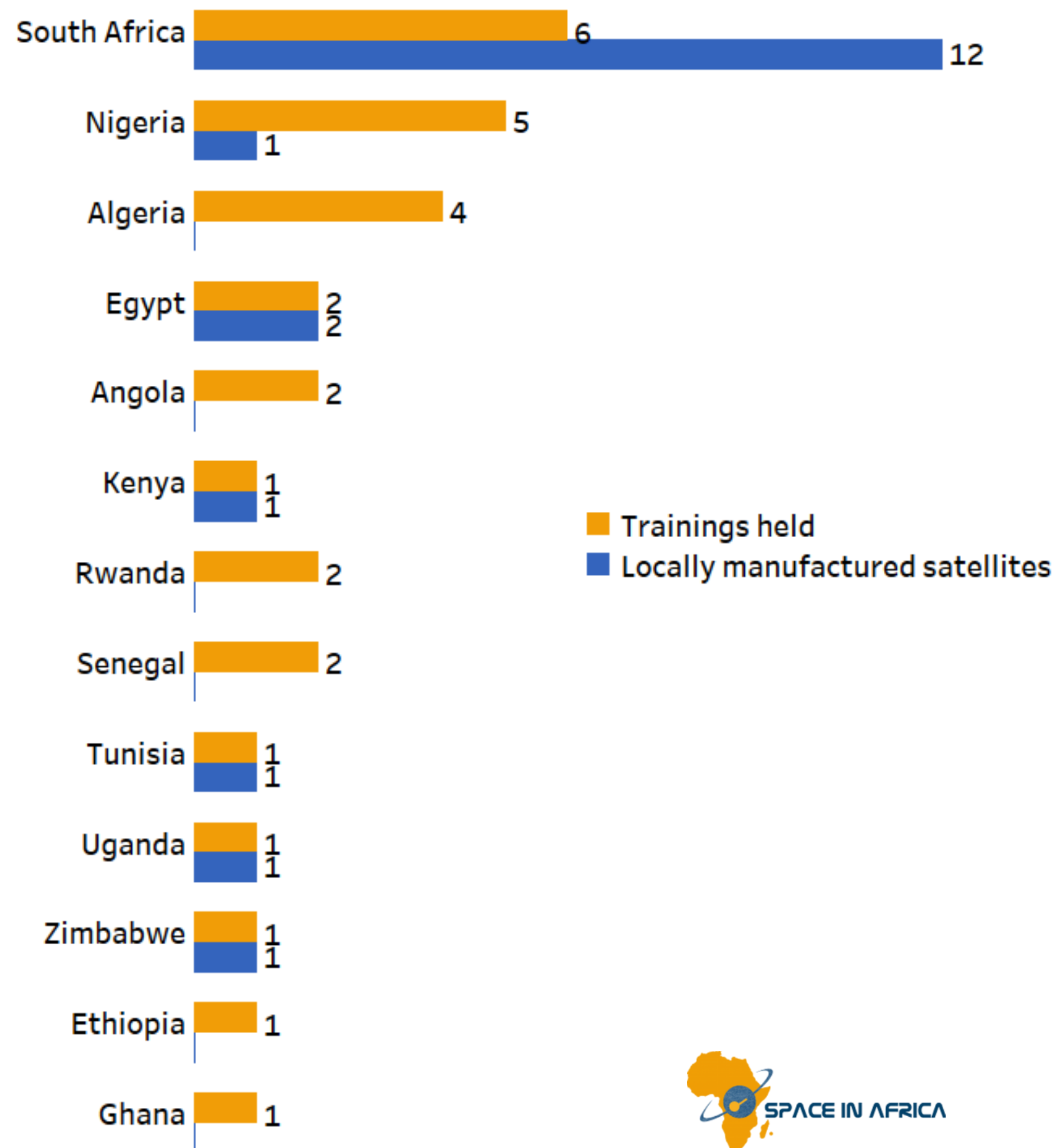

中国航天

CSUM
CIRIYUVE BIRNITIAL UNIVERSITATINE
DE MONTPELLIER

African Institutions that have trained African engineers on satellite projects



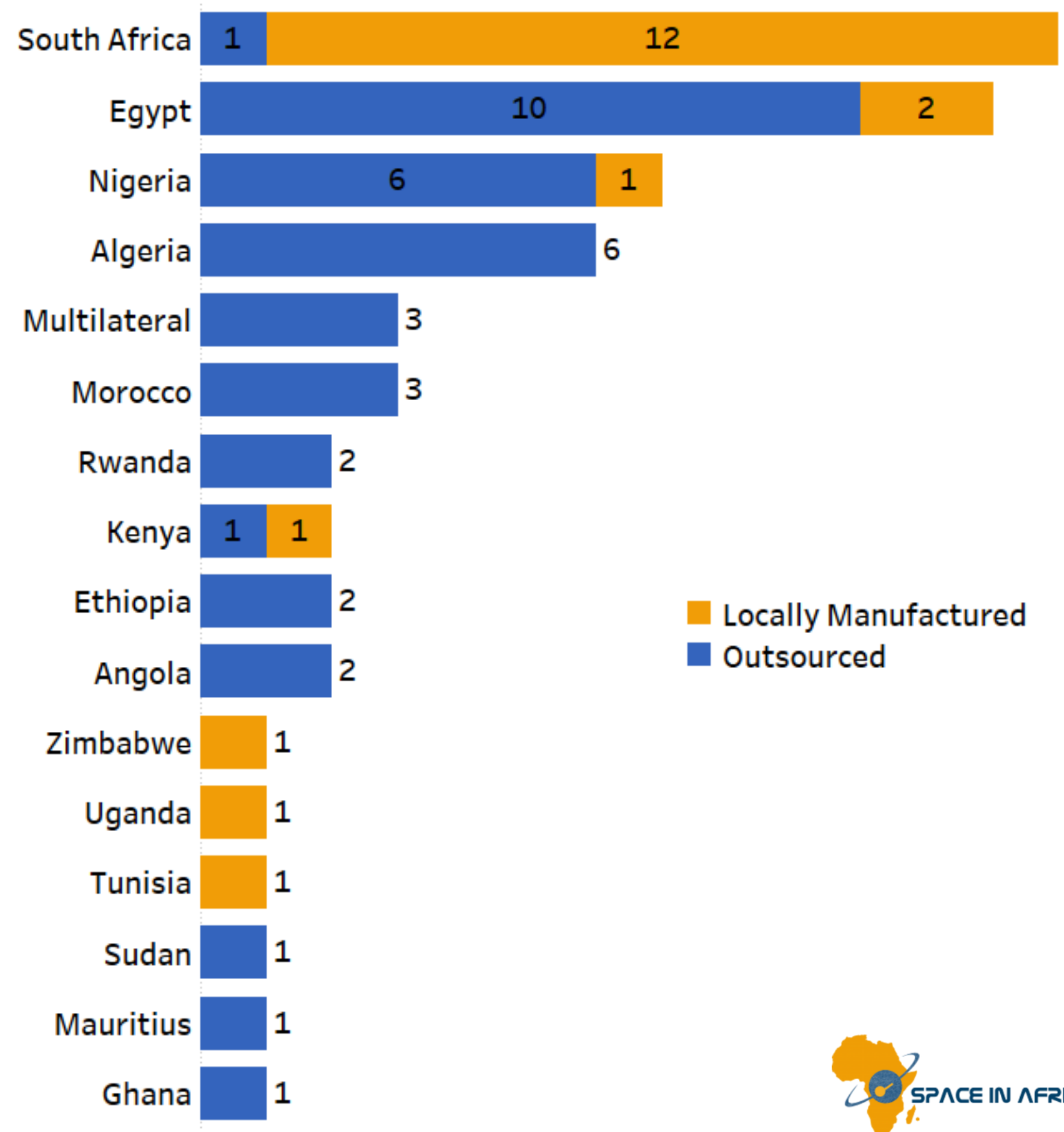
Despite the investment in local satellite development capabilities, only a few African countries have locally manufactured their own satellites.



Trainings held VS locally manufactured satellites



Ratio of Locally manufactured to foreign manufactured satellites in Africa



Limitations

- **Fragmented Approach:** African countries often work in silos. A unified approach could potentially lead to better resource sharing and collaboration.
- **Brain Drain:** Often, talented individuals seek opportunities outside Africa due to the perception of better research facilities, funding, and career growth. This exacerbates the challenge of building a local skilled workforce.
- **Limited Data Utilization:** Even as African countries launch satellites, the ability to use the derived data efficiently for applications like agriculture, disaster management, or urban planning remains limited in some areas.

Limitations

- **Regulatory and Policy Challenges:** Not all African nations have clear policies or regulatory frameworks for space activities, making it challenging for potential collaborations.
- **Public Perception:** Often, the general public and policymakers might perceive space initiatives as less essential compared to immediate challenges faced by the continent. This perception can impact funding and support.

Recommendations

- Investing in the right talent should be the primary goal of every African country – focusing on individuals genuinely eager to learn, rather than merely those available but uninterested in learning.
- Create a central database to consolidate space products and services from African companies/institutions, making them available to all. This approach would ensure knowledge distribution from these organizations and promotes the reuse of their infrastructures for capacity building.

Recommendations

- **Regional Collaboration:** African countries could benefit from pooling resources and knowledge. Regional collaborations could provide a unified approach, allowing countries to share resources, knowledge, and technology.
- **Reverse Brain Drain:** Offer competitive salaries, benefits, and career growth opportunities to retain talent. Creating an enabling environment can also attract African professionals working abroad to return and contribute to local industries.