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A Compact Model For Space Capacity Development

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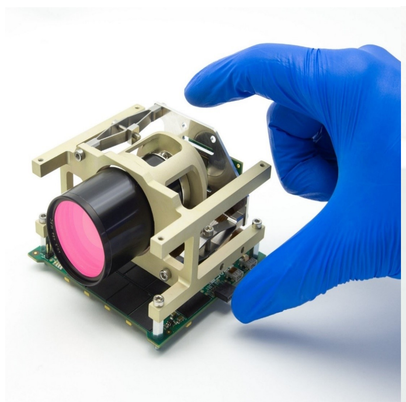
PURPOSE

Using a combination of lessons learned from years of involvement in capacity development programs, as well as our recent success with the development and operation of the nSight satellite, we present a model for space capacity development that is both compact, cost effective and time efficient. The six pillars of the model is outlined below and discussed.



Background - nSIGHT 1 overview

The Satellite

Complete satellite weighs only 2.5 kg
- Part of the international QB50 constellation
- Deployed from the ISS

Payloads:
- SCS "Gecko" imaging payload
  - 30-meter resolution colour RGB "snapshot" camera
  - Integrated data storage
  - Integrated image processing
- FIPEX atmospheric science instrument (supplied by University of Dresden)
- Radiation mitigation VHDL coding experiment (Nelson Mandela University)

The Imager

- Modular design
- Compatible with CubeSats
- High-speed high-capacity mass data storage
- FPGA processor for real-time image processing
- High frame rate capability (for larger optics)

Imager Characteristics	
Form factor	< 1U
Mass	< 480 g
GSD	31 m from ISS orbit
Image Sensor	2.2 Megapixel RGB
Storage	128 GB
Rad. tolerance	Tested to 30 krad TID
Space heritage	2017

1. Advisory Support

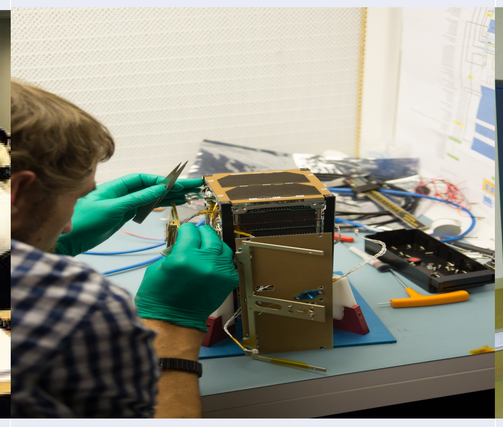
The trusted advisor role is one that will allow the nations to not only succeed in building their own but to also be smart users/buyers of space technologies. However, it is important that this advisory role is carried out to build capacity that allows independence for the nations in future.

2. Theoretical Training

The focus is on equipping a team of engineers with the theoretical knowledge in satellite engineering establishing a solid platform. Teaming up with universities can lead to a qualification, depending on the background of the trainees.

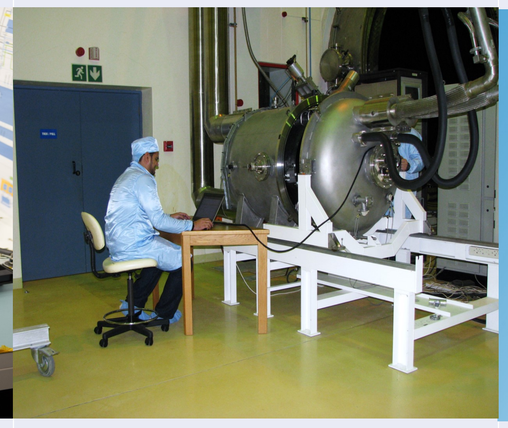
3. Hands-on Training

The nSIGHT satellite, a 2.5kg nano-satellite which was launched as part of the international QB50 constellation, has proven to be a suitable vehicle that can be used to build hands-on skills. The trainee team will build models of the satellite, leading to a ready for flight model.



4. Space Laboratory

The setting up of space laboratory facilities is a major component in the establishment of indigenous satellite capacity. These will facilitate satellite development, integration and testing in-country.

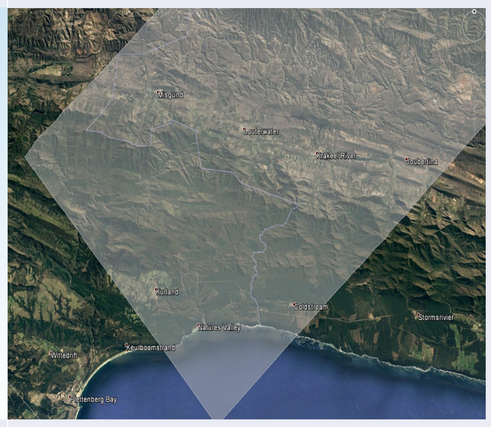


5. Ground Station Facilities

The establishment of ground station facilities is another major component in setting up indigenous satellite capability. The most affordable facility can be set up to allow for personnel activity in this area, which will be expanded depending on the country's future plans.

6. Satellite Data & Processing

Most countries already have fragmented pockets of activity in these areas. The centralisation of resources and coordination of efforts in this regard will prevent duplication, thus resulting in cost savings, while deriving benefits from space assets.



CONCLUSION

It is important to note that since the needs for every country are unique, the above components can be implemented independently or combined depending on the specific needs of a country. This model for space capacity development can be implemented using the variants of the nSIGHT satellite to successfully assist nations with limited space budgets to achieve their goals of being active players in the space sector.

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