

Out of this world

Dr Valanathan Munsami, CEO of the South African National Space Academy (SANSA), talks about igniting the space economy and its collateral benefits

Any national government worth its salt has two key priorities at the highest level. The first is the wellbeing and quality of life of its citizens. The second is around wealth creation. So, when we talk about socioeconomic development, these are the two priorities: quality of life (the social aspect) and wealth creation (the economic aspect).

For more information, go to sansa.org.za. “What government has to do is find a fine balance between these two aspects it needs to focus on from a policy perspective,” says Dr Valanathan Munsami, CEO of the South African National Space Academy (SANSA). “But in so doing, we have to look at reforms or transitioning into different economic spaces.”

South Africa is in the process of transitioning from a resource-based economy – primarily focused on natural resources like mining, agriculture, and so on – towards a knowledge economy. In a resource-based economy, you mine and harvest these resources, but much of that goes out of the country and is then re-imported as finished products. In other words, the value proposition happens outside the country. But in a knowledge economy, the goal is to change that picture by ensuring that the value proposition is done in the country, the capital outflows are minimised, and that the economic rent and the profits are realised locally.

“That fuels the economic and the social aspects that the government is trying to deal with,” Munsami says. “So, when we’re looking at science policy and perspectives in terms of how we’re fuelling, sustaining and supporting research and development in the country, we’re looking at how it connects with and drives the knowledge economy.”

SANSA now has a new five-year strategy. Its vision statement is essentially moving it from a focus at a national level to an African continent perspective in the form of an integrated National Space Capability. That means SANSA is responsible for a space ecosystem, and stimulating, supporting, developing and strengthening that ecosystem.



Priorities named

In 2007, SANSA posed a question to all the government departments: what is it that you want from the space agency if we had to set up a space programme? The outcome was three sets of clusters.

1 Environmental resource management

This includes coastal and marine management; environmental and geospatial monitoring; ocean, land management; rural development and urban planning; topographic mapping; hydrological monitoring; climate



Advantages of satellites

The utility of Earth observation, and the value of satellite platforms, is powerful. There's a whole myriad of applications.

"Most of us have satellite television at home," Munsami says. "Essentially, what's happening is the signal is being broadcasted from one end of the Earth, transmitted to the satellite (a telecommunications satellite is sitting around at around 36,000km above the Earth's surface), and the satellite is transmitting it back towards Earth. This is the value of satellite telecommunications. Its reach is beyond even the cellular networks that we know. For example, you can reach even rural communities with this kind of platform."

How else are satellites useful? Here are three ways that Munsami highlights.

1. They provide a synoptic view

Photography satellites are normally between

400 and 600km above the Earth's surface. So, if you're looking at a land mass, you have a high-level view. You don't see national boundaries. That synoptic view has the potential of viewing problems from a much broader lens, as opposed to just viewing them from the ground perspective. That's important, because climate change, as an example, isn't limited to national boundaries. Also, you cannot monitor climate change without space technology or satellites, because 60% of the essential climate variables come from space.

2. They provide systematic coverage for change detection

Because satellites in orbit come over the Earth at the same time every day, they can provide systematic coverage. This allows you to compare a satellite image today to one tomorrow and another one the day after that. And if you're looking at the

same landscape, you can see changes. That can also allow you to ring alarm bells if you see adverse changes happening. If you go into the actual field itself, and you look at the satellite image, you can also verify. This is why we do field trips: to validate and verify satellite imagery. Once you do a series of these validations, you can even use that in terms of mapping and understanding from an artificial intelligence point of view.

3. They can 'see' what we cannot

On Earth, when the sun illuminates a tree, the blue and the red part of the light is absorbed, and the green part of the spectrum is reflected. That's why we see the tree as being green. But, as a satellite passes by, it picks up the photons that are reflected off the tree's surface – everything in the infrared part of the spectrum that you and I cannot see with the naked eye. This is the kind of information that's used for precision farming.

change mitigation and adaptation; and meteorological monitoring (weather patterns, and so on).

2 Health, safety and security

This includes disaster monitoring and relief; hazards forecasting and early warning (for example, calculating the extent of flooded based on precipitation suggested by satellite technology); cross-border risk (using navigation applications); disease surveillance and health risk; asset monitoring; regulatory enforcement; and defence, peacekeeping and treaty monitoring.

3 Innovation and economic growth

This includes tourism and recreation; communications; and space science and exploration. Also, because a big part of what SANSa does is stimulating the industry, this also includes space technology transfer and spin-offs, as well as the development of the space industry. This is where SANSa, as an agency, is trying to bring the industry into the value chain, specifically by contracting out the industry rather than trying to implement everything in-house.

Text | Eugene Yiga Photography | Andrey Armyagov

Satellites are a useful resource for researchers across a number of disciplines.