ABOVE AND BEYOND IN SPACE

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EWEN LEVICK | SYDNEY

ADELAIDE is fast becoming Australia's space city. The recently-formed Australian Space Agency and its Mission Control Centre are located at the Lot Fourteen Precinct in the city centre; EW satellite start up DEWC Systems resides in the city's north; and launch provider Southern Launch, which recently flew the first Australian commercial space-capable rockets to the edge of space, is headquartered just near Rundle Mall.

Whilst BAE Systems Australia's presence in the city is perhaps most notable for its shipbuilding capability, it is in fact another major contributor to SA's growing space economy. Unrivalled engineering and advanced manufacturing capabilities allow the company to produce a wide variety of space-related components, including electronics and optical systems, support for satellite ground stations, and advanced radio frequency components.

Now that capability is becoming increasingly important to Defence.

"Defence has dissected two key critical areas – space services and space control – in the space domain," Brenton Whitington, Principal Engineer ISR for BAE Systems Australia, said to *ADM*. "The recently released Force Structure Plan has clearly indicated the importance of space as a domain to the ADF, and Defence has also released a couple of requests for proposals (RFPs) and requests for tenders (RFTs) associated with the space domain."

ABOVE: If you ever needed a particular domain that's inspiring, space is it.

Defence and BAE Systems Australia, through Red Ochre Labs, consider the importance of space to lie in two critical areas. The first is space domain awareness, or 'traffic management'.

"The number of spacecraft debris, both natural and manmade, will significantly increase," Whitington said. "Access to space via commercial means will become commonplace. The number of small satellites filling Low Earth Orbit (LEO) to Mid-Earth Orbit (MEO) will ever increase the chance of collision. Awareness and understanding of the skies above will be of paramount importance."

An additional challenge in this area is earthbound supply lines; a global vulnerability that has recently been exposed by the pandemic.

"Whether we look to launch from an international partner, another nation some-

where or whether we look to launch from Australian soil, I think the pandemic has shown us which way we need to look," Whitington said. "Building the Australian ecosystem and industry to support those endeavours will be paramount."

The second critical area is bringing information back down from space, particularly Earth and deep space observation capabilities.

"This refers to the use of space and near space assets to collect, monitor, analyse and disseminate actions and activities," Whitington said. "This will enable us to understand environments faster and with more precision."

To advance Australia's capabilities in space domain awareness and observation, BAE Systems Australia is a partner in a number of cooperative research centres (CRCs), including the increasingly important SmartSat CRC.

"AN ADDITIONAL CHALLENGE IN THIS AREA IS EARTHBOUND SUPPLY LINES; A GLOBAL VULNERABILITY THAT HAS RECENTLY BEEN EXPOSED BY THE PANDEMIC. IN ADDITION, THE FORMATION OF RED OCHRE LABS BUILDS ON THE COMPANY'S ON-GOING EFFORTS TO GET KIDS EXCITED ABOUT SPACE AND STEM DISCIPLINES."

"The research and development that BAE Systems Australia is undertaking through its involvement with several universities and research bodies looks to the development of both ground based, near space and space based space technologies, with a keen interest in the development of secure and trusted AI frameworks to underpin more diverse aware and autonomous sensors," Whitington said. "So our partnerships and discussions with the growing Australian space industry community have been extensive and we recognise the need to develop current and the next-generation thinking and understanding."

Through the SmartSat CRC, the company is cooperating with Adelaide University, UNSW, Latrobe and Sydney University.

"Those four universities are predominantly engaged with us around AI cyber security and the enhancement of a lower swap, so size, weight and power," Whitington said. "So enhancing the processing ability in satellites as payloads."

The joint effort BAE Systems Australia is undertaking through the CRC is ultimately aimed at developing the next generation of space technologies and bringing them to market. It intends to capitalise on the 'Space 2.0' revolution, in which access to the last frontier moves from government to industry.

"The CRC is predominantly there to engage and attempt to foster an Australian ecosystem, to build an Australian ecosystem, not just for research and development but also for industries to come to commercially viable products," Whitington said. "It is about the application enhancement of current technologies, but it's really attempting to go to that next generation of satellites.

"it really will start to change the feel from space from being exclusively zoned for governments and military usage; we'll see commercial and industry playing a far bigger role in those lower orbits."

So how will the formation of Red Ochre Labs facilitate the company's presence in Australia's nascent space industry?

"Red Ochre Labs looks to enhance or deliver the next generation of technologies," Whitington said. "So it's looking at probably not what is clearly apparent or right in front of people's faces right now as technology to prosecute, but what will it look like for the next generation; the 'what ifs'.

"[For example] constellation and autonomous flights, and the development of AI in a multi-modal sensor capability. So near space and space based assets being able to determine courses of action based on their environment."

In addition, the formation of Red Ochre Labs builds on the company's on-going efforts to get kids excited about space and STEM disciplines.

"Even outside of Red Ochre Labs, I'm involved in a number of discussions with BAE Systems Australia to support a lot of STEM activities through high school developments, undergraduates, even Year 9 and 10 students coming out for vocational work," Whitington said. "They come out and learn, see what we're doing, have a look at some of the development activities.

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SIMULATION


DEFENCE

KATHERINE ZIESING | CANBERRA

IN many respects BAE Systems Australia is known for its platform business. But the company also has form when it comes to products. One of the lesser known products that has achieved global export success (in use with 13 navies around the world) is the ship air defence model (SADM).

Beginning life in the early 1990s when simulation tools were still in their relative infancy, SADM was originally designed to showcase how to protect ships from missile attack.

The SADM simulates own-ship and task group protection using guns, missiles, active decoys, chaff and jammers, and includes detailed models of shipboard sensors and their interactions with ship combat systems.