Found in space

Australia's new CRC for Space Environment Management is developing technology to track and manage the growing threat of space debris, writes **Rosslyn Beeby**.

SPACE DEBRIS HAS become "one of the biggest threats to Australia's economy", according to Dr Ben Greene, CEO of the CRC for Space Environment Management. The $150 million CRC, based at Mt Stromlo Observatory near Canberra, was set up in March 2014 to tackle this issue.

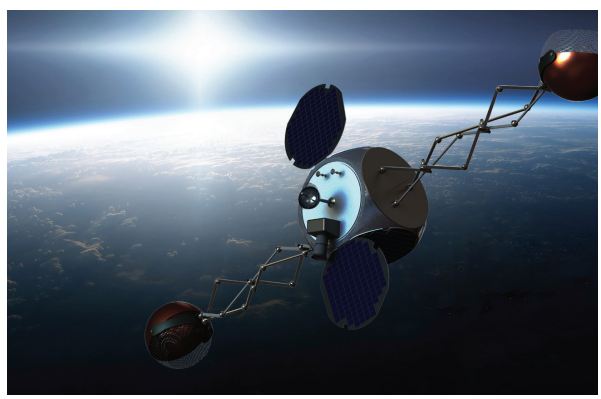
"We depend on satellites to run just about everything in our society, from law enforcement and bushfire management to farming, power stations, mobile phones, computers and ATMs," Greene says.

With its industry and university partners in Australia and overseas, the CRC will develop the world's first technology to track, manoeuvre and remove more than 300,000 pieces of space 'junk' orbiting the Earth.

Only a small portion of known space debris is currently monitored. The majority of space debris objects range from 10 cm to less than 1 cm in size. They travel at high speeds and a collision can cause substantial damage to spacecraft and satellites. In 1983, a fleck of paint chipped the front window of the *Challenger* space shuttle, while in 2006, debris bored a hole in the door of the space shuttle *Endeavour*.

"There is now so much debris in space that these objects are colliding with each other. If we don't manage this problem, space will become unusable within 20 years," says Greene.

In 2009, two satellites collided over Russia, creating an estimated 1000 pieces of debris larger than 10 cm, among many smaller ones. Each piece of 'space shrapnel' has the potential to cause more collisions and, in turn, more space debris.



Space debris threatens the satellites we rely on to gather and transmit data in almost every field.

"If we don't manage this problem, space will become unusable within 20 years."

"We could lose everything – weather information, mobile phone access and aircraft navigation systems," Greene says.

The CRC received $20 million from the federal government, $40 million invested by research partners and $90 million in research infrastructure. Australia is already a world leader in laser and optical debris monitoring technology, chiefly due to research pursued by CRC partner EOS Space Systems in Canberra.

Greene explains that mapping space debris is a complex challenge. "You have to map space debris objects every day, because their movements are unpredictable. After five days, a map is useless," he says.

Australian scientists have developed technology to map space debris in real time, and the next stage to be developed by the CRC is using these maps to plot potential collisions. They'll also be working on laser technology to move debris, and potentially destroy it. The CRC will also find ways to predict the movements of debris, reducing the need for daily tracking and the costs involved. Another aim is to improve predictions to avoid collisions, as well as using high-powered telescopes to track and monitor debris objects and lasers to plot their erratic movements.

"Australia is already seen as a global centre of research excellence for space debris management. We've had a lot of interest in the CRC and we expect that the number of participants will expand over the next two to three years. Although we are based in Australia, this is very much a global research program."

Greene says there are likely to be future commercial opportunities for Australia as a result of this research, as well as "a chance to play a leading role in developing international policy on space environment management."