

DEFENCE WEEK AUSTRALIAN DEFENCE MAGAZINE SERVING THE BUSINESS OF DEFENCE **PREMIUM EDITION**



Over 1,400 female students participated in interactive activities at Melbourne's Luna Park.

AIR4

Young women engage with STEM

Katherine Ziesing | Canberra

The inaugural AIR4 event has taken place in Melbourne with the aim of encouraging young women to see the value in pursuing STEM studies.

More than 1,400 female students and 80 teachers participated in various interactive activities at Melbourne's Luna Park, including learning about driverless cars and experiencing a HoloLens firsthand.

Students at the event also had the opportunity to attend a special screening at St Kilda's Palais Theatre of Jasper, an animation made in partnership with the RAAF and the University of Technology Sydney.

Jasper was made to spark interest in aviation and developed using both traditional techniques and new technologies such as robotics and 3D printing.

Jasper's character is based on Squadron Leader Jacqueline Killian, who voiced the main character and shared her personal story and career achievements at the event. The film was recently awarded Gold at the 2018 Animation Effect Awards and Festival.

According to Minister for Defence Christopher Pyne, the interactive activities offered students the

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“We may have the next aerospace inventor, satellite engineer, or a future fast jet pilot at the AIR4 event”

opportunity to have fun with rides and attractions while exploring the possibilities of STEM-related fields.

“Women represent only 16 per cent of STEM graduates across Australia. In order for Defence, and indeed the country, to get the very best capability, we need to have greater female participation in STEM subjects,” Minister Pyne said. “We may have the next aerospace inventor, satellite engineer, or a future fast jet pilot at the AIR4 event. For these girls, we see their future as limitless, and we would like them to see it that way too.”

“It’s great the students got to engage in exhibitions such as the Augmented and Virtual Reality, where participants could fly or watch a pre-recorded flight, wear protective equipment and helmets used by Defence personnel every day and test new wireless sensing systems,” Minister for Defence Industry Steven Ciobo said.

Also on the STEM education front, Raytheon is set to launch their [MathsAlive!](#) exhibition in Canberra this week. The program aims to make maths practical and fun and let students from primary school through to high school see maths in action. The exhibition has interactive displays that are designed to answer the age-old question: “Will I ever use all this maths they’re teaching us?”

Working across a range of areas from sport and fashion through to engineering and space, the program provides access to experiments and the professionals behind them.

Speaking to *ADM* in the lead up to the launch this week, Jessica Formica, a Raytheon Australia engineering staff executive, shared her engineering journey and what inspired her to choose this path. From primary school interest to working on the Air Warfare Destroyer and Collins Class Submarine programs at Raytheon Australia, Jessica’s journey is just one of the many paths from school to industry.

“My journey started in primary school at a young age. I was always that kid asking why? How? Can you explain this to me?” she said. “From microscopes to magnet kits and everything in between. I loved making things, but was more artsy in my problem solving. In Year 9, there was a science competition to build a motor. I went to my cousin who was an electrical engineer and we spent 6 weekends bringing it together! We still joke that it



Women represent only 16 per cent of STEM graduates across Australia.

MATHSALIVE!

could power a washing machine. I won the comp and it went from there.”

From primary to high school and then into university studies in mechatronics, Jessica’s journey was characterised by both parental and school support, with teachers playing an important role in her journey.

In addition to championing the MathsAlive! program, Raytheon Australia also co-sponsors an initiative with Questacon – known as Engineering is Elementary – which provides teaching materials to teachers who may not have a STEM background themselves.

“Engineering to me was understanding the theory of something and then applying it in a real-world way,” Formica said. “Many engineers are hidden from the public; unless you know one personally it’s not like you would interact with one the way you would a doctor or lawyer. Programs like this let you see that engineers come in all shapes and sizes. Eroding that stereotype around what an engineer should be is really important.

“It can be hard to see what the path looks like when you’re at school and see something like an AWD and think, how can I do that? Engineers get to do some cool stuff and I’m glad I can be an example in this space of what that can look like,” Formica said.

Platform-sharing key to unlocking space

Ewen Levick | Sydney

One of the common talking points in space circles these days is the idea of ‘Space 2.0’ – described as an emphasis on the ‘[small, cheap, and many](#)’.

Where Space 1 might be described as the era of government-run programs, Space 2.0 is commercialisation – the proliferation of small satellites and cost-effective launch capabilities that are lowering commercial barriers to entry and bringing the global economy into low-earth orbit.

This idea is not hypothetical. SpaceX has famously pioneered reusable rockets, and satellites are shrinking from chunky bus-sized blocks to cubes no bigger than



The NovaSAR-1 launching from India.

CSIRO

a two-slice toaster.

Australia is at the forefront of this revolution. BlackSky Aerospace recently became the first Australian company to launch a rocket carrying commercial assets for testing from rural Queensland, Equatorial Launch Australia is looking to build a spaceport in the NT, and other start-ups are investigating the possibility of launching rockets from high-altitude balloons or aircraft.

In the satellite game, UNSW's Australian Centre for Satellite Research (ACSER) became the first Australian entity to build and operate a cubesat in space, Adelaide-based Myriota is developing a nanosatellite constellation that could bring the Internet to the furthest reaches of the continent, and others are exploring new Earth observation capabilities.

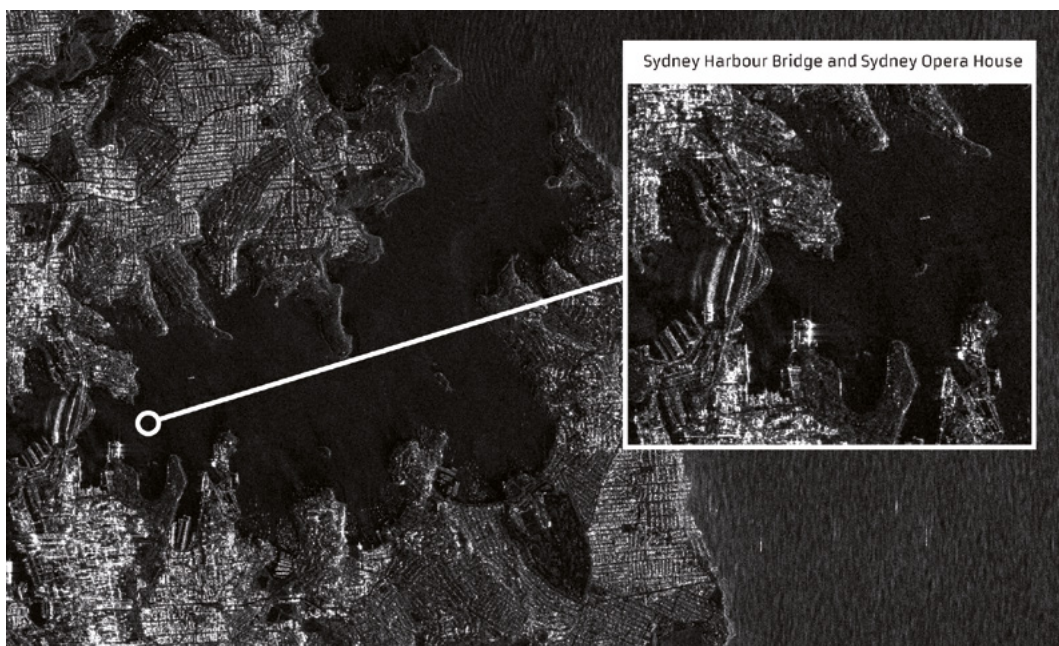
Yet despite the proliferation of small satellite technologies and an overall trend towards lower launch costs, space is still a very expensive place to be.

Whilst launch costs per kilogram have decreased significantly – the space shuttle program needed roughly \$83,000 to take one kilogram into space, but SpaceX's Falcon Heavy has brought that down to under \$2,000 – launch demand currently outstrips supply, leading to long wait times and the financial costs of delay.

Costs are even greater for Australian companies. [Current Australian aerospace regulations](#) require companies to be insured for up to \$750 million for vehicles travelling above 100 kilometres, which represents a rough cost of \$750,000 per launch. In addition, Canberra requires launch companies to own and operate their own launch site, adding further costs that overseas providers don't face.

These costs are one reason why Australian players tend to piggy-back on international and commercial projects. ACSER's cubesats, for example, hitched a lift on a resupply run to the International Space Station. The Commonwealth funded one of the satellites ([WGS-6](#)) that forms the US Wideband Global Satcoms

“Despite the proliferation of small satellite technologies and an overall trend towards lower launch costs, space is still a very expensive place to be”



The first shot of Sydney at night taken by the NovaSAR-1 satellite.

CSIRO

system in exchange for secure military communications. Defence has also partnered with Optus on the C1 satellite, which provides communications capabilities and secures Australia's orbital filing precedence.

Australian space research is also a story of partnerships. An [Australian researcher](#) built the 'mole' sensor aboard the InSight mission, which touched down in the Elysium Planitia region of Mars this week. The CSIRO recently bought a 10 per cent stake in NovaSAR-1, a satellite owned by British company Surrey Satellite Technology that uses S-band Synthetic Aperture Radar to provide high-resolution images of Earth. The satellite launched from India in September.

The funding allows Australian companies to file image requests with the CSIRO for applications including bushfire fuel load management, flood management, earthquake prediction, pollution and oil spill monitoring, land and agricultural practices, geological mapping, and more.

According to Lieutenant Colonel Mick Hose, head of the JP 9102 program, Defence expects to continue using a similar platform-sharing model to minimise costs and build system resilience.

"We've yet to find that balance between commercial satcoms and military satcoms," LT-COL Hose said at the [MilCIS conference](#). "But it's not going to be one or the other – it isn't a binary question."

Of course, there are other cost barriers to overcome for Australian entities hoping to sign up to Space 2.0. Changes to Australian launch laws may also be on the horizon as the new Space Agency finds its regulatory feet, and Australia has significant geographic advantages (namely our proximity to the equator) that will provide a tail-wind as the local industry grows.

For now, however, Australians can expect to keep hitching lifts into the next frontier.

"Defence expects to continue using a platform-sharing model to minimise costs and build system resilience"

UniSA establishes Australia-France professorship

The University of South Australia (UniSA) has secured funding from the Brittany region of France (Région Bretagne) to establish a new co-chair professorship known as the Brittany Region/UniSA Professor of Industry of the Future, a joint academic appointment between UniSA and French academic partners.

The joint academic appointment will be hosted both by UniSA and by IMT Atlantique with the University of Southern Brittany.

The agreement is the first joint Australia-France Professorship of this kind.

The Professor of Industry of the Future position will be the focus of a range of research collaborations between UniSA and institutions in Région Bretagne, particularly on topics relevant to Defence industry and naval shipbuilding.

Industry of the Future (or Industry 4.0) has been dubbed the 'Fourth Industrial



Naval Group's shipyard in Lorient, Brittany.

NAVAL GROUP

“I am certain this initiative will be an important step in developing industry-focused research”

Revolution’; the creation of ‘smart factories’ through the use of automation technologies such as cyber-physical systems, the Internet of Things and cognitive computing.

“Industry 4.0 is a concept of critical importance to Australia but there is a need to develop far greater educational and research expertise in the field than currently exists in this country,” UniSA Vice-Chancellor, Professor David Lloyd said.

“I am certain this initiative will be an important step in developing industry-focused research and educational cooperation between France and Australia.”

Région Bretagne is significant to French naval power, with nuclear submarines based in Brest alongside clearance divers and towed sonar vessels. Major shipyards are located in both Brest and Lorient.

The new Professor of Future Industry will spend half their year at IMT Atlantique and the University of Southern Brittany and half in Adelaide, fostering staff and student exchange and driving innovation interchange between industry and academia in both countries.

The partnership builds on the back of efforts to expand bilateral cooperation announced during President Macron’s visit in May, which included the founding of the annual [Australia-France Defence Industry Symposium](#).

More information on Australian-French industry connections is available in the [November edition](#) of *ADM*.

PEOPLE ON THE MOVE

Airbus has announced that Dominik Asam is taking over from Harald Wilhelm as CFO, effective 1 April 2019. In addition, Michael Shoellhorn will take over as COO from Tom Williams, who is retiring in December. Asam and Shoellhorn will both report to new CEO Guillaume Faury, who will take the helm on 10 April next year.

Defence Innovation Partnership funds SA research

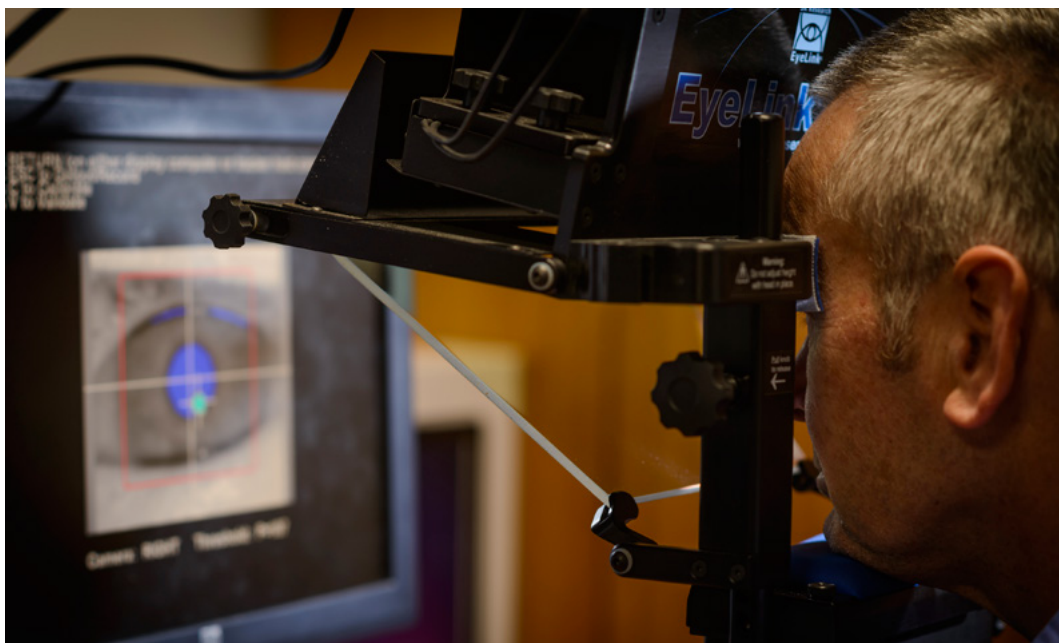
SA researchers have secured nearly \$695,000 in funding from the Defence Innovation Partnership to collaborate on defence research projects.

Five research projects, aimed at enhancing the next-generation ADF [across key priority areas](#), are being funded through the second round of the Collaborative Research Fund program.

The five funded projects include:

- \$150,000 for Human-Machine interfaces for detecting, monitoring and managing psychological stress, led by the University of Adelaide with partners the University of South Australia (UniSA), Flinders University, ElectroAutoMedics and DST;
- \$94,700 for identifying combat and combat-related stigma through the language of a deployed Australian military population, led by UniSA with the University of Adelaide, DST, and The Road Home;
- \$150,000 for AI Enabling Australia's Future Submarine, led by Acacia Systems with the University of Adelaide, Flinders University, DST and Lockheed Martin;
- \$150,000 for Miniaturised Orbital Electronic Warfare Sensor System (MOESS) Phase 1, led by DEWC Systems with partners DST, Flinders University, the University of Adelaide and UniSA;
- \$150,000 for engineering, design and lab-based testing of Vehicle Health Usage Monitoring System (VHUMS) for defence vehicles, led by Dynamic Engineering Solutions with the University of Adelaide, UniSA and Flinders University.

Premier Steven Marshall said that this funding provides the opportunity to



The agreement aims to target priority areas for the ADF.

SIMON CASSON

develop ground-breaking defence capabilities.

"These projects will see researchers from SA's world-class universities collaborate with defence industry leaders from around the globe to solve some of Defence's complex technological challenges," Premier Marshall said.

"Defence research and development is a key priority for SA's broader defence strategy"

"Defence research and development is a key priority for SA's broader defence strategy and is critical to ensure that we maximise the full extent of the Coalition Government's \$90 billion naval ship building commitment.

"Research and development will underpin our nation's future defence projects, and importantly, will enhance our industry capability ahead of major defence projects based in SA."

The Defence Innovation Partnership fosters collaboration across the federal and state governments, DST, industry, and SA's three universities.

"We are extremely pleased by the robust collaborations we have seen through the Collaborative Research Fund program. As part of our charter, the Defence Innovation Partnership will work with all applicants to find pathways to continue their research and development," Chair of the Defence Innovation Partnership Advisory Board Kim Scott said.

Frazer-Nash expands presence in Adelaide

Engineering consultancy Frazer-Nash has trebled the size of its national headquarters in Adelaide in response to increased demand for its services in Australia.

The consultancy now has a network of three Australian offices. SA Premier Steven Marshall officiated at the opening ceremony.



Frazer-Nash Australian Director Jonathan Armstrong and SA Premier Steven Marshall at the opening.

FRAZER-NASH

"We've created 40 high value jobs in SA and our fantastic, enlarged office gives us the space to create the next 40," Frazer-Nash Australian [Director Jonathan Armstrong](#) said. "Our success is founded on being relevant to the future needs of our clients, being the best at what we do and caring deeply about how we do it."

"We align our services to transforming societal trends"

"We align our services to transforming societal trends such as security in a changing world, urbanisation, decarbonising energy supply whilst ensuring reliability and affordability, the increased use of technology in agriculture and the pervasive imperative of innovation."

"We were delighted to be joined by the Premier and so many of our clients on this very special day for our Australian business."

Since opening its first Australian office in 2010 Frazer-Nash has [supported a number of projects in SA](#), including the Future Submarines. The company is helping develop a framework to ensure the seaworthiness of the submarines – focusing on the operational effectiveness, safety and environmental protection aspects of the program.

The company is also providing requirements engineering and modelling support to the Sea 1000 team – articulating the complex requirements of the submarine and devising a model in preparation for the concept design phase.

Frazer-Nash provides lifecycle engineering technical support services for the Collins class and supports all current and planned British submarines.

MOST READ ONLINE AT WWW.AUSTRALIANDEFENCE.COM.AU



1. [Combat systems providers chosen for Hunter class](#)
2. [Austal delivers fast transport ship to US Navy](#)
3. [ANAO report on Hawkei examined again by government](#)
4. [Defence takes delivery of F-35 cabins](#)
5. [RAN's next oiler ship launched in Spain](#)

United Technologies to split after Rockwell acquisition

United Technologies has announced the completion of its acquisition of Rockwell Collins and the company's intention to separate its commercial businesses, Otis and Carrier (formerly CCS), into independent entities.

The separation will result in three companies; United Technologies, elevator manufacturer Otis, and Carrier.

United Technologies is comprised of Collins Aerospace Systems and Pratt & Whitney. Collins Aerospace was formed through the combination of UTC Aerospace Systems and Rockwell Collins, one of the largest acquisitions in aerospace history, whilst Pratt & Whitney [provides the F135 engine](#) used in the F-35 Joint Strike Fighter.

"Our decision to separate United Technologies is a pivotal moment in our history"



Pratt & Whitney make the F135 engine used in the F-35.

DEFENCE

"Collins Aerospace brings together two great companies with unmatched expertise in developing electrical, mechanical and software solutions," United Technologies CEO Gregory Hayes said.

"Our decision to separate United Technologies is a pivotal moment in our history and will best position each independent company to drive sustained growth, lead its industry in innovation and customer focus, and maximize value creation," Hayes said.

"Our products make modern life possible for billions of people. As standalone companies, United Technologies, Otis and Carrier will be ready to solve our customers' biggest challenges, provide rewarding career opportunities, and contribute positively to communities around the world."

The separation is expected to be completed in 2020, with separation activities occurring within the next 18-24 months.

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Forthcoming Events

ADM EVENTS

More detail on **ADM** Events can be found on our dedicated website: admevents.com.au

- [ADM Congress 2019](#) – 13 February 2019
- [ADM Space Summit](#) – 30 April 2019
- [ADM STEM and Defence Summit](#) – August, 2019 (TBA)
- [ADM Defence Estate and Base Services Summit](#) – September, 2019 (TBA)
- [ADM North Australian Defence Summit](#) – 23-24 October 2019

ASOR DORS 2018 Conference

Date 04-06 December

Location Melbourne

Website <https://www.confer.nz/asor-dors2018/>

The 26th Annual Conference ASOR/DORS 2018 brings together research in optimisation, operations planning, informatics, operations research, defence, simulation and modelling of industrial operations, statistics and big data analytics.

BMT's Submarine Design & Engineering Course

Date 10 Dec – 14 Dec, 2018

Location University of South Australia

Website <http://www.bmtdesigntechnology.com.au/training-courses/submarine-design-engineering>

BMT's Submarine Design and Engineering Course presents attendees with the latest thinking and innovations in submarine design and operations. The course provides students with a complete understanding of conventional submarine technology, and our experienced presenters explain how capability requirements and new technologies can impact overall submarine design and management. The course is also accredited by the Royal Institution of Naval Architects.

AIDN National Gala Dinner 2019

Date 13 February 2019

Location: National Gallery of Australia, Canberra

Website <https://consec.eventsair.com/aidn-2019/dinner/Site/Register>

The AIDN National Gala Dinner will be held at the stunning Gandel Hall, National Gallery of Australia on Wednesday 13 February 2019 commencing with pre dinner drinks and networking from 7.00pm. Guests will enjoy an evening of networking, socialising and fun which includes a VIP guest speaker, presentation of the AIDN National Young Achiever Award and Silent Auction with all proceeds donated to Legacy.

Avalon Airshow 2019

Date: 26 February – 3 March 2019

Location: Avalon Airport

Website: <https://www.airshow.com.au/airshow2019/index.asp>

The Australian International Airshow and Aerospace & Defence Exposition is one of Asia-Pacific's most prestigious aviation and aerospace events and the most comprehensive aviation, aerospace and defence exposition in the southern hemisphere. Avalon hosts multiple concurrent conferences and expo streams, across the spectrum of Defence, Airlines, Business and General Aviation, Sport and Recreational Aviation, Airports, MRO, Space, Unmanned Systems, Air Safety and Ground Equipment.

IMDEX Asia 2019

Date 14-16 May

Location Changi Exhibition Centre, Singapore

Website www.imdexasia.com

Coming to its 12th edition, the biennial IMDEX Asia is Asia Pacific's premier international maritime defence show and a must-attend event in the global naval and maritime security calendar. With established conferences and real-time discussions on maritime security, IMDEX Asia draws a plethora of global leaders and distinguished guests.

Paris Air Show

Date 17-23 June 2019

Location Le Bourget

Website <https://www.siae.fr/en/>

The 53rd Paris Air Show will once again bring together all the players in this global industry around the latest technological innovations. The first four days of the Show will be reserved for trade visitors, followed by three days open to the general public.

Pacific 2019

Date 8-10 October 2019

Location Sydney Convention Centre

Website www.pacific2019.com.au

As the only comprehensive international exhibition of its kind in the Indo-Asia-Pacific region, PACIFIC 2019 will again provide the essential showcase for commercial maritime and naval defence industries to promote their capabilities to decision-makers from around the world.

MilCIS 2019

Date 12-14 November 2019

Location Canberra Convention Centre

Website www.milcis.com.au

In November each year, the Defence Chief Information Officer Group (CIOG) partners with the UNSW Canberra and the Institute of Electronic and Electrical Engineers (IEEE) to present MilCIS. The annual Military Communications and Information Systems (MilCIS) Conference welcomes military and government organisations, academia, and defence industries to contribute to the future direction of military communications and information systems.