Physical Sciences Fund 2020

Sydney Startup Hub

9 February 2021

NSW GOVERNMENT

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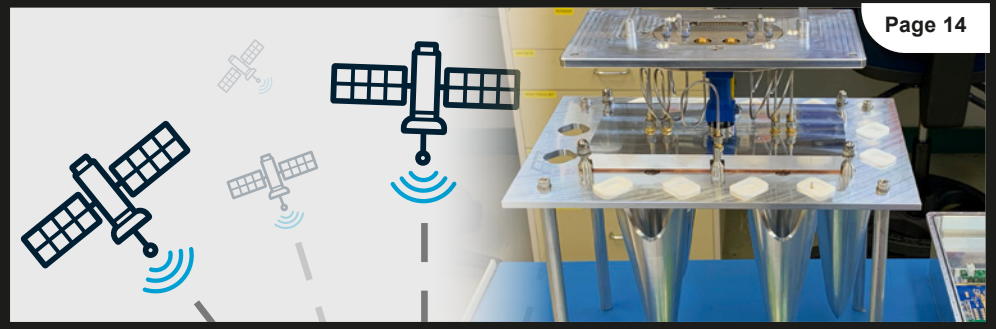

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Physical Sciences Fund 2020

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Professor Hugh Durrant-Whyte

Expert Panel Chair Address
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Physical Sciences Fund 2020 Video

Announcement of Successful 2020 Funding Recipients
Sally-Ann Williams, The Hon. Rob Stokes MP

Discussion with Recipient Panel

Foreword from the NSW Minister for Planning and Public Spaces

New South Wales has faced a series of challenges in the last 12 months. From the devastating bushfires in January 2020 to the life-changing impact of the global pandemic, we are becoming more reliant than ever on science and innovation to address the problems of today and tomorrow.

That is why the NSW Government supports a strong and diverse research sector that can deliver the new ideas, new products and new skills we need to respond to complex issues such as climate change, energy transition and the effective and sustainable management of our valuable natural resources.

NSW is home to some of the most brilliant researchers, innovators and entrepreneurs in the country, working across a range of sectors and disciplines. This collective expertise and dedication is not only important in addressing society's problems, but it can also build and shore up productivity in our major centres and regional locations. Programs such as the Physical Sciences Fund allow Government to enable ecosystem development through the creation of jobs and attraction of investment through its support of emerging companies and local industries.

I am truly excited to endorse the Physical Sciences Fund, a program designed to translate brilliant ideas into tangible outcomes. My wholehearted congratulations go to the successful 2020 applicants and all the best in achieving an innovative and prosperous future.

The Hon. Rob Stokes MP

Foreword from the NSW Chief Scientist & Engineer

A priority for me as the NSW Chief Scientist & Engineer is to see that research and development in the state is supported and commercialised, resulting in viable products and solutions that can improve outcomes for the people of NSW. A vibrant R&D sector is vital to the ongoing economic strength of NSW, through the generation of new products and services, and the creation of jobs.

Ongoing strategic investment in the state's research and development sector has the potential to transform our state into an innovation powerhouse within Australia and the world.

Two weeks ago, the Premier of NSW, the Hon. Gladys Berejiklian MP, delivered the Accelerating R&D in NSW Advisory Council Action Plan, *Turning ideas into jobs: accelerating research and development in NSW*. The plan provides the impetus and strategic direction to attract international investment, build and support a technology-rich industry, deliver benefits to metropolitan and regional precincts and encourage innovative solutions to key government challenges.

The Physical Sciences Fund is a key part of the research translation landscape and will continue to play an increasingly important role in the NSW innovation economy, as it identifies and propels new ideas into commercialisation. The four winners of the 2020 round demonstrate the impacts of R&D across multiple industries, delivering important developments that will improve the efficiency of air and water transportation, provide better connectivity to rural and remote areas, reduce crop disease damage and address the global ground station data congestion challenge.

I sincerely congratulate tonight's winners and thank them for their important contributions to NSW. I look forward to following your projects along the commercialisation pathway.

Professor Hugh Durrant-Whyte FRS

Foreword from the Chair of the NSW Physical Sciences Fund Expert Panel

It has been my pleasure to lead the NSW Physical Sciences Fund Expert Panel over the last two years. In the first year of the program, the Expert Panel and I were excited by and impressed with the range of innovations coming out of the NSW research sector. And in 2020, the program attracted an even larger field of strong and exciting innovations. I am confident that the program will only grow and improve as the R&D industry responds to and benefits from the ongoing support of the NSW Government.

To all of last year's applicants to the program, I would like to say a big thank you. Your vision, ideas and solutions will continue to drive progress in NSW.

My sincere thanks to my fellow Expert Panellists: Professor Rose Amal AC, Martin Duursma, Dr Simon Poole AO and Professor Tony Weiss AM. It is an absolute pleasure to work with you and I truly value the broad range of views and insights that you bring to the table.

I would also like to thank the PSF Sub-Committee for their time and input conducting the initial review of applications. Your generosity and expertise greatly assisted the Expert Panel in our final determinations.

The NSW Chief Scientist & Engineer, Professor Hugh Durrant-Whyte, is an enthusiastic supporter of programs such as the PSF and I thank him for his energy and advocacy. I would also like to thank the team from the Office of the NSW Chief Scientist & Engineer for their critical support administering the program.

Finally, may I congratulate the successful applicants of the 2020 Physical Sciences Fund. I am excited to share and support your outstanding innovations and wish you all the best in bringing these innovative products to market.

Professor Annabelle Duncan

BioScout Automated Airborne Disease Tracking System

"The BioScout system is automating crop disease tracking by providing farmers with real-time, field-based airborne disease data. BioScout's integrated platform allows farmers to be efficient with their fungicide use by optimising the timing and quantity of sprays used, ultimately giving farmers the best chance of increasing their profitability and productivity."

– Lewis Collins

THE BIOSCOUT SYSTEM is an integrated hardware and software platform that uses ground-based data and artificial intelligence to track and analyse the spread of airborne diseases on farm fields. Any crop that is susceptible to fungal disease will benefit, ranging from broadacre crops to horticultural farms and vineyards.

BioScout's proprietary sensors are stationed on cropped land and actively sample the air to detect fungal disease that may threaten the yield output and quality of a farmer's crops. The information gathered from the field is sent to the BioScout cloud servers where the raw data is processed and in the event of a disease outbreak, the farmer is notified.

BioScout's clients receive real-time data about the identity, density and location of pathogens in a crop field. By positioning multiple devices, producers are able to benefit from whole field mapping and receive unprecedented visibility and information about the state of disease in their field, as it happens. Early intervention is a significant advancement over more traditional, manual methods.

Company
BioScout

Public/Private Company
Private

Stage/Category
Early stage/Research and device development

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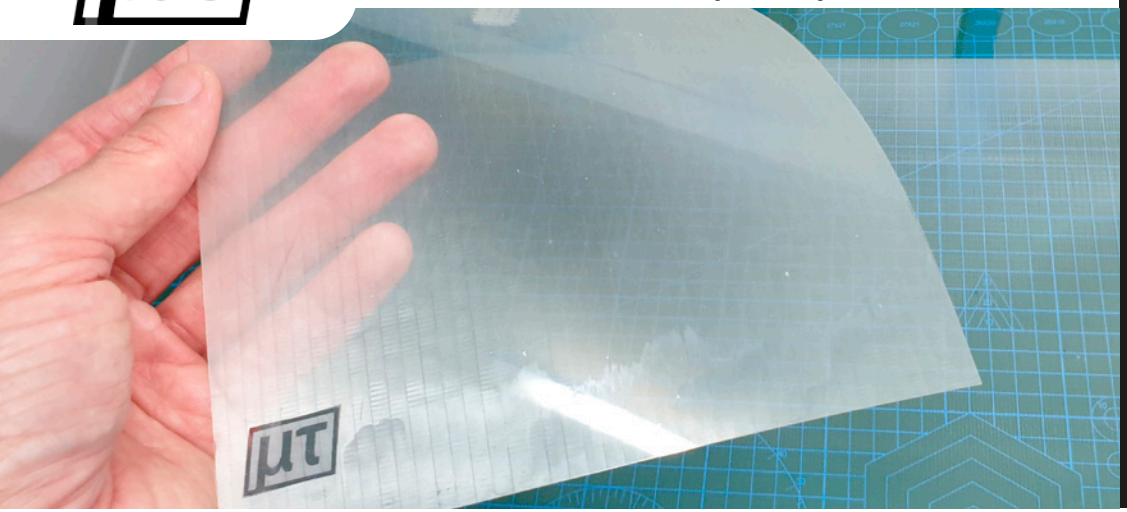
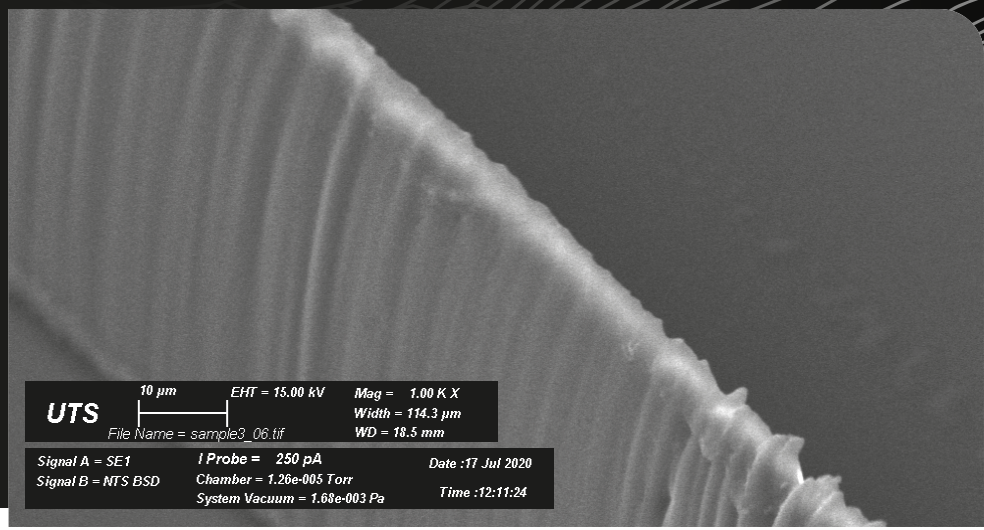
Direct Contactless Microfabrication (DCM) Printer





"MicroTau prints microscopic patterns inspired by nature to produce functional surface properties. Our first 'riblet' shark skin product reduces drag by 7 per cent and will allow unmanned air vehicles to fly further with less power. This product has the potential to save over US$11 billion and 140 million tonnes of carbon annually across commercial aerospace, shipping and wind energy production."

– Henry Bilinsky

MICROTAU PRINTS MICROSCOPIC patterns inspired by nature to reduce drag and produce properties including anti-fouling, antibacterial and self-cleaning effects.

Over millions of years nature has developed microscopic patterned surfaces that impart useful properties. Low-drag shark skin, self-cleaning lotus leaves and antibacterial pitcher plants are all the result of patterns found on the surface of the plant or animal invisible to the naked eye.

MicroTau's Direct Contactless Microfabrication (DCM) technology prints these microscopic patterns with light and is scalable to cover large surfaces. The coatings we print with are used in industries including aerospace, shipping and energy.

MicroTau's shark skin-inspired 'riblet' surfaces reduce drag by 7 per cent and the DCM technology is uniquely capable of optimising riblet designs for different drag-reduction applications. MicroTau is manufacturing riblet film products for application to unmanned air and surface vehicles to improve efficiency, endurance and payload.

This technology can be scaled to improve the efficiency of aircraft, ships and wind turbines with potential annual benefits of:

- US$4 billion in fuel savings and 20 million tonnes of CO_2 for commercial aviation
- US$5.5 billion in fuel savings and 46 million tonnes of CO_2 for commercial shipping
- US$2 billion in additional wind energy output, displacing 74 million tonnes of CO_2 emissions.

Company
MicroTau Pty Ltd

Public/Private Company
Private

Stage/Category
Growth/Advanced manufacturing technology

www.microtau.com.au

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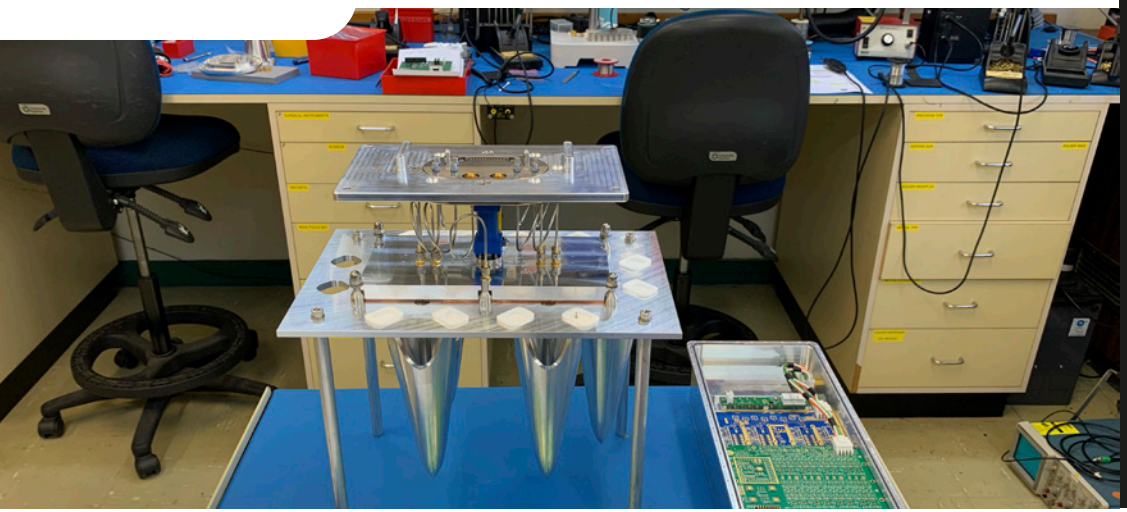
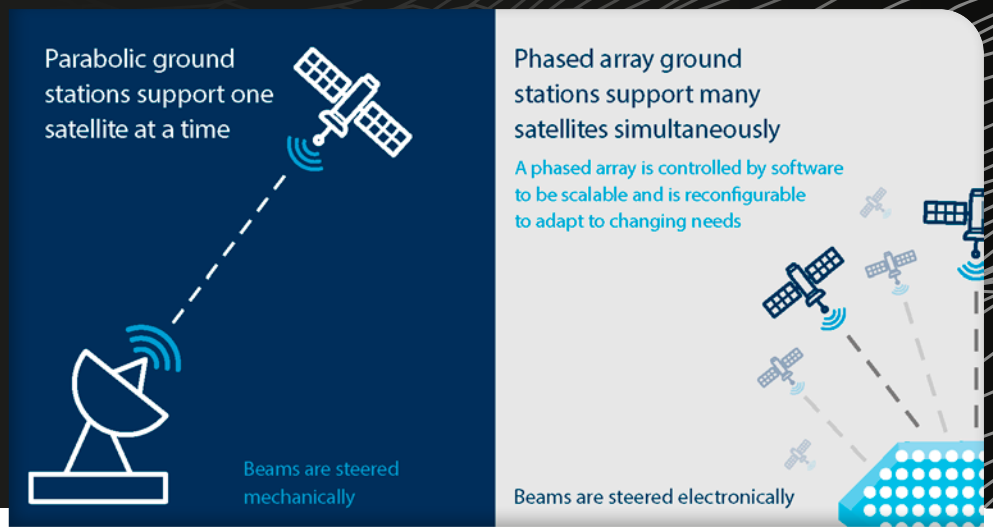
QUASAR SAT

Phased Array Satellite Ground Station as a Service





"In satellite internet communications, this has the potential to enable a platform for space business, yielding an impact as significant as high-speed Wi-Fi's impact on local area internet communications."

– David Skellern AO

SPACE IS BIG business because of the downstream data industry it enables – everything from weather information, to financial transactions, to telehealth consultations, to deliveries to your door during lockdown. But there is a bottleneck getting all that data back to the ground. And the bottleneck is only getting worse.

Tens of thousands of small satellites will be launched over the next few years, and they will all need to communicate vast quantities of information through satellite ground stations on the surface of the earth. The existing ground station technology involves mechanically operated dishes that can only link to one satellite at a time, which is impractical and cost prohibitive as a solution to the impending data congestion problem we face.

Quasar Satellite Technologies' digital phased array technology can potentially link to hundreds of satellites simultaneously using a single installation. This technology, once mature, will provide mission support for multiple satellite constellations at the same time, alleviating the ground station bottleneck and opening the flood gates to enormous downstream information flow for anyone wishing to utilise space-derived data.

The genesis of the technology comes from CSIRO's phased array feeds for radio astronomy.

Company
Quasar Satellite Technologies

Public/Private Company
Public

Stage/Category
Early stage

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ZetiCell and ZetiRover

"Zetifi is bridging the digital divide. Our invention, the ZetiCell, is a solar-powered Wi-Fi small cell that delivers high bandwidth connectivity to rural and remote areas, providing farmers and other residents with significant economic, safety and social benefits."

– Dan Winson

INADEQUATE INTERNET AND phone connectivity remains a significant issue for Australians in rural and remote locations. Zetifi has developed new technology to solve connectivity problems in areas with little or no mobile coverage and is bringing reliable high-bandwidth wireless to farmers to improve productivity, profitability, safety and quality of life.

Zetifi's patent pending 'sleepy network' technology allows its wireless network infrastructure to hibernate when not in use, saving up to 80 per cent of solar and battery costs. This innovation provides a scalable and sustainable model for connecting farms and other low population density locations that are beyond the reach of existing technologies and carriers.

Originally designed to create 'sleepy' solar-powered Wi-Fi repeaters, this technology has now been adapted and applied to a range of complementary connectivity solutions. These products include the ZetiCell – the world's first 'sleepy' long-range Wi-Fi Small Cell – and the ZetiRover, a dual-carrier Wi-Fi repeater for farm machinery and vehicles.

These products work together to provide off-grid, on-demand broadband Wi-Fi connectivity to Zetifi subscribers across farms and regions with inadequate mobile coverage.

Company
Zetifi

Public/Private Company
Private

Stage/Category
Growth/Device development and manufacture

www.zetifi.com

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Physical Sciences Fund Expert Panel

The Expert Panel to oversee and assess the PSF applications is composed of distinguished experts who collectively have skills, experience and expertise in science and engineering, devices and systems commercialisation, venture capital, financial management and consumer advocacy. The Panel composition reflects a strong focus on end-user needs.

The following people were approved by the then-Minister for Trade & Industry, the Hon. Niall Blair MLC, to be members of the PSF Expert Panel:

Professor Annabelle Duncan PSM
Chair

Current Chair of the Sydney School of Entrepreneurship's Board of Directors, Annabelle was formerly the Vice-Chancellor and CEO of the University of New England (UNE). Prior to joining UNE Annabelle spent 16 years at CSIRO, including six as Chief of the Division of Molecular Science.

She has acted as an advisor to the Department of Foreign Affairs and Trade on biological weapons control, representing Australia at international arms control meetings and acting as a biological weapons inspector with the United Nations in Iraq.

Professor Rose Amal AC

Rose is a chemical engineer and the leader of the Particles and Catalysis Research Group. A pioneer in fine particle technology, photo-catalysis and functional nanomaterials, her current research is on solar and chemical energy conversion nanomaterials and engineering solutions for solar-induced processes.

Rose has attracted over $25 million to UNSW in ARC and industry funding.

Rose was recognised as NSW Scientist of the Year at the 2019 NSW Premier's Prizes for Science & Engineering.

Mr Martin Duursma

Martin is a partner at Main Sequence Ventures (CSIRO Innovation Fund) and has over 25 years' experience as a technologist, business founder, angel investor and mentor in Australia and the US.

A senior executive at Citrix, where he built their research arm Citrix Labs, Martin started the Citrix Accelerator and led investment in over 30 new companies. As VP and head of the Global Technology Office, he led due diligence in over 60 transactions totalling $2.5 billion.

Dr Simon Poole AO

Director and VP Business Development at Cylite Pty Ltd, Simon is an engineer with over 30 years' experience in photonics in research, academia and industry.

A leading technologist and entrepreneur in optical communications, he is highly experienced in startups and is renowned for both his contribution to the technology of photonics and the companies he founded (Indx, Engana, Cylite), which have generated over $1.25 billion in revenues to date.

Professor Tony Weiss AM

Professor of Biochemistry & Molecular Biotechnology at The University of Sydney, Tony's research on tropoelastin and elastin, the biological ingredients that give human tissue its elasticity, led to his invention and commercialisation of biological treatments that decrease scarring and accelerate the repair of wounds.

Elastagen, the Sydney spin-out company Tony founded to commercialise tropoelastin, was acquired in February 2019 at a value of USD$260 million by Allergan, one of the world's 20 largest biopharmaceutical companies, with the products rapidly moving to market.

Tony was one of the first recipients of a grant through the NSW Medical Devices Fund.

Physical Sciences Fund Sub-Committee

Erik Aslaksen Director of Gumbooya Pty Ltd

Gumbooya provides systems engineering services to industry and government.
Erik has over 50 years' experience covering fields as diverse as microwave components, power electronics, quantum electronics and communications, ranging from basic research to corporate management. Erik has been at the forefront of developing the system approach to engineering, with an emphasis on life-cycle costing and a design optimisation process based on a holistic definition of cost-effectiveness.

Ellen Gorissen Investment Director, IP Group

Ellen has a wealth of experience in strategy, business development and technology commercialisation spanning more than 25 years. She started her career as a chemical engineer in the oil and gas industry before moving into investment banking, advising on mergers, acquisitions and equity capital market transactions. In her current role with IP Group, Ellen leads investments into deep tech spin outs predominantly from universities and research institutions. Prior to this, Ellen led the Commercialisation Function at the CSIRO, a team responsible for complex licensing and spin-outs across all technology areas from medical devices and biotech, to advanced materials and clean tech. Ellen also managed the organisation's equity portfolio and was a Director on multiple spin-out boards. Before that, Ellen was the COO of CeramiSphere, a spin-out from the Australian Nuclear Science and Technology Organisation (ANSTO).

Associate Professor Maryanne Large Innovation & Commercialisation, The University of Sydney

Maryanne is a physicist, working in optics and materials science. She has research experience in both academia and industry (Canon and her own start-ups). Since 2013 she has been based at The University of Sydney, where a large part of her role is helping postgraduate students develop the skills for research translation. Her "Inventing the Future" program has resulted in students developing a number of highly successful start-up companies, including Flurosat and Earth AI.

Leong Mar Business Development & Global, CSIRO

At CSIRO, Leong manages the commercial engagements and commercialisation of technologies developed by the Missions Program and a number of the business units, and provides mentoring for potential spin-out teams on their entrepreneurial journey.
Previously, Leong spent 10 years with DuPont where he held several roles including leading Corporate Business Growth and Innovation. During this time, he led the development of multi-award-winning product and service solutions for the mining industry. Leong has also worked in a number of technology start-ups.

Alexandra Meldrum Strategy, Transformation, Change Management & Performance Improvement Specialist, Consulting and Training Services

Alexandra is a professional engineer, economist and non-executive director. She consults and teaches strategy at university business schools. She leads the IChemE Digitalisation Project and is establishing an international community of practice for research and innovation. Alexandra was Principal Advisor, Productivity Commission at NSW Treasury and Manager, Strategic Projects for the NSW Department of Industry. She has 20 years' management experience in industry and has worked in manufacturing, energy and fast moving consumer goods. She has led strategy development, managed operations, created processes for delivering innovative new services and products and led transformational change of strategy, governance, structure and culture. She brings expertise in strategy, change management and procurement.

Bernard A Pailthorpe Applied and Computational Physicist

Bernard has built his career on theoretical and computational modelling of materials. He has held numerous research grants in Australia and the US, and served on grant review panels in both countries. He has contributed to advanced computing research infrastructure over two decades and has held two CEO-level positions, in Sydney and Brisbane.

Natasha Rawlings Investment Manager, Uniseed

Natasha is a tech entrepreneur who has led, founded and mentored early and mid-stage tech start-ups, with a particular focus on creating revenue through sales, marketing and product development. Prior to this, Natasha had a successful career in marketing and product development, holding top management positions in Australian and UK companies. Natasha's previous roles include CEO and Founder of StreetHawk, a mobile relationship management platform and CEO of Heads Over Heels – an organisation that helps women entrepreneurs with scalable businesses grow.

Ben Wright Manager of Nanosonics Investments, the strategic investment vehicle for Nanosonics Ltd, a global leader in infection prevention and control

Ben has over 20 years' experience in R&D, clinical trials, operations, financial management and commercialisation within both private and ASX-listed technology businesses. Ben was Program Director for the NSW Medical Device Commercialisation Training Program, an initiative of NSW Health and the Office for Health and Medical Research.

Successful applicants at the Physical Sciences Fund 2019 Announcement Event, The Calyx, Royal Botanic Garden Sydney, 10 December 2019 (left to right):

Professor Hugh Durrant-Whyte, NSW Chief Scientist & Engineer; Professor Behdad Moghtaderi, The University of Newcastle; Dario Valenza, Carbonix; Professor Veena Sahajwalla, UNSW Sydney SMaRT Microfactory Technologies; Dr William Palmer, Hone; Chris Beal, NextOre; the Hon. Rob Stokes MP, Minister for Planning and Public Spaces.


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