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Deep Tech NOW.

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Abstract: The deep tech's visibility around the world increases, it's impact is being felt on a personal level. We have an increasing global appetite for science and technology discovery that is spilling over to the pressing areas we face in health and well being, climate and energy, food security, and materials needed to build the foundations of our modern infrastructure and clothing. Deep technology is facilitating this shift, with 83% of deep tech innovators designing and building physical products. 96% of these products combine the capabilities of emerging technologies across the spectrum like synthetic biology, advanced materials, artificial intelligence and quantum technology, and 70% are creating new patents related to their work. The paper presents global perspective on the deep tech market together with the Australian perspective.

Keywords: deep tech, Australia, startups, economy.

1. Introduction

By some, 2021 has been coined the year of Deep Tech. This, however, comes after a hard battle for the hearts and minds of global governments, investors and entrepreneurs. With all eyes focused on deep tech labs to bring us out of the Covid-19 pandemic, 2020 was a breakthrough year. Globally, News media outlets, savvy governments and investors realised what we here at Cicada have known for many years - Deep Tech is not only a solution for today but it's an opportunity to reinvent tomorrow.

2. Why Deep Tech?

As deep tech's visibility around the world increases, for the first time in my living memory it's impact is being felt on a personal level we eagerly turn our eyes to the science labs of the world to provide a solution and pathway out of the pandemic, and a preventative course of action for the future. We have an increasing global appetite for science and technology discovery that is spilling over to the pressing areas we face in health and well being, climate and energy, food security, and materials needed to build the foundations of our modern infrastructure and

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clothing. We are recognising the possibilities of biotechnology and synthetic biology to completely transform how we think about the basic foundations of our needs as humans. Engineered mycelium from mushrooms is becoming leather. Seaweed is being used to create biodegradable polymers to replace plastics - both rigid and woven in textiles. CRISPR is combating rare diseases, and new proteins are being grown entirely in labs.

Science and Engineering capabilities are now more than ever, producing tangible direct solutions to global challenges. Governments and Investors globally are backing deep tech with both the necessary capital and policy to drive transformation at a level we've not seen in decades.

3. Investment in Deep Tech is growing globally.

We are shifting from a decades-long focus on digital innovation to the creation of physical products. Deep technology is facilitating this shift, with 83% of deep tech innovators designing and building physical products. 96% of these products combine the capabilities of emerging technologies across the spectrum like synthetic biology, advanced materials, artificial intelligence and quantum technology, and 70% are creating new patents related to their work

As the number of deep tech startups globally rose from 29% in 2019 to 44% in 2017, investment trends have followed suit growing by 14 percentage points, from 50 per cent to 64 per cent in the time frame. And according to one BCG and Hello Tomorrow report disclosed funding in deep tech investments grew from \$15 billion in 2016 to more than \$60 billion in 2020.

Government interest investing in all stages of the deep tech life cycle is increasing.

In March this year, the EU unveiled the European Innovation Council with a €10bn budget "to develop and expand breakthrough innovation.

Also in March, Bpifrance, France's public investment arm increased its Deeptech Investment fund from €1.3bn to €2bn.s." Out of Germany's \$10B Future Fund, \$1B is designated for Deep Tech and the UK has pledged over \$1.2B to Future Fund Breakthrough initiatives. The US continues to lead the way with a whopping \$32.8 billion invested in deep tech between 2015-2018 and funding continuing to increase 10% each year. Globally in 2020 deep tech investment grew to over \$60 billion, but it's really just getting started.

It's not hard to see why with data from Dealroom showing that between 2015 and 2020 deep tech startups in France and Germany raised €5bn each and in the UK deeptech startups raised €12bn in VC.

4. Where is Australia at?

It's a well known narrative that Australia outperforms expectations in research outcomes. With 13 universities in the global top 200, rank fourth in the world (on some scales) and punch above our weight when you rank against per head of population. Similarly the Global Innovation Index ranks Australia 13th for innovation inputs, but 31st for innovation outputs. And the Country Complexity Index produced by Harvard University ranks us at 87th in the world.

When it comes to Australian corporations as global R&D leaders we barely make an appearance with only 12 of 2500 leading global R&D firms being Australian. South Korea and Canada which both have similar size economies to Australia have 60 and 28 respectively. Australian corporate leaders also invest far less in R&D than their global counterparts and R&D funding is trending down and less than 1.8% of GDP, South Korea and Israel's are both closer to 5%.

But it's not all doom and gloom. In the midst of this modelling by AlphaBeta shows that if Australian corporate leaders invested in R&D with the same intensity as the top five leading countries, Australia would host five times as many R&D leaders as it does today.

The global pandemic has highlighted weaknesses in our supply chains and has seen a commitment by the federal government to invest \$1.3 billion in the Modern Manufacturing Initiative. The Victorian government has committed to a \$2 billion fund for science & engineering translation & commercialisation. The Queensland government likewise has committed to a \$3.4 billion fund. NSW is focused on programs like the SBIR initiative to connect innovators to government challenges with a goal of procurement. It seems we are starting to make a tangible link to deep tech ventures as being solution providers and an increasingly necessary part of our economy.

Indeed the need to rapidly shift and onshore capabilities in vaccine production, PPE manufacturing, respirator builds demonstrated that when a pressing need arises, policy aligns and capital is invested we are able to rapidly respond with deep tech solutions being created and built locally. What has previously been viewed as both lengthy and risky has been debunked when all the settings in the system align to support its development.

5. Where to from here?

Deep tech can and must become a cornerstone of the Australian economy. Economic growth and development requires us to build more and more complex industries from an accumulation of productive knowledge and is a hallmark of the continued growth of economies such as Israel, the USA, Germany, Japan, South Korea and more.

Where investment in deep tech may have once been seen as a risk, I would argue that not investing in deep tech is a far riskier strategy for governments, industry and investors. The barriers to deep tech ventures are falling as the rate of breakthroughs are rising. No longer are labs only in the domain of elite universities researchers, but we are seeing deep tech incubators like Indibio, Cicada Innovations, DMZ, and Fongit all play a role in making deep tech ventures both accessible and sustainable. A study by the European Commission Enterprise Directorate General showed that incubated ventures have an 85% survival rate compared to 30-50% for stand alone ventures. And another study demonstrated that the annual growth rate was 55% compared to 30%.

By their very nature deep tech ventures that are focused on solving the pressing needs we see in the world are de-risked once the science and engineering challenges have been overcome in the lab. With a focus on solving global challenges in health, environment, food, energy and

resources they align with both market need and opportunity. Defensible IP and lowering production costs align with consumer values is giving deep tech ventures opportunities to enter new markets with demand often outstepping supply in early years.

Australia is well positioned and well able to take advantage of this opportunity but will need to get alignment from government, industry and investors. Focusing translation and commercialisation activity on solving large and challenging global issues, being committed to both investing in and procuring the solutions will both decrease the time to market and decrease the risks of deep tech ventures. Matching talent, finance and market challenges doesn't just allow deep tech ventures to thrive, but creates a growing economy that is both prosperous and resilient.

Australia's future must be founded in a complex economy. An economy of businesses that are both born out of R&D but continue to invest returns in future development, scientific endeavour, discovery and invention.

Deep tech opportunities are the next wave of innovation and it's critical we play our part in delivering this in Australia.

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As the CEO of Cicada Innovations **Sally-Ann Williams** leads Australia's pioneering deep tech incubator building companies solving the world's most pressing problems through science & engineering. Cicada Innovations has nurtured hundreds of visionary deep tech innovators to validate, commercialise and scale high impact technologies globally across MedTech, HealthTech, AgTech, FoodTech, Clean Energy, AI, Manufacturing 4.0 and more.



Prior to joining Cicada Innovations she spent over 12 years at Google as an Executive Program Manager on the engineering team leading work on R&D collaborations with universities, startup and entrepreneurship engagement and pioneering work on CS & STEM education including building world first collaborations delivering national transformation.

Sally-Ann has been involved in driving national engagement and change strategies in innovation & entrepreneurship, Computer Science and STEM education as a member of the COAG STEM Partnership Forum and contributed to the foundation of StartupAUS, a non-profit with a mission to transform Australia through technology entrepreneurship. She has led several cross-sector working groups to drive change both in policy & cultural transformation needed to grow a thriving technology driven economy, and served on 4 University Industry Advisory Boards in the engineering and computer science departments.