

REMARKS BY MR HENG SWEE KEAT,
DEPUTY PRIME MINISTER AND CHAIRMAN OF THE NATIONAL RESEARCH
FOUNDATION AT RIE DEEP TECH DAY 2024, 29 OCTOBER 2024

Mr Lim Boon Heng, Chairman of Temasek,

Ladies and gentlemen,

Good morning and a very warm welcome to all of you to our Research, Innovation and Enterprise Day 2024. RIE encapsulates Singapore's aspirations of harnessing technological advances to build a more innovation-driven economy and society. It is an integral part of our vision to be the pioneers of the next generation. We hope to achieve breakthroughs that unlock new sectors of growth, tackle shared global challenges, and improve the lives of people in Singapore, in the region, and around the world.

Holding RIE day alongside the Singapore Week of Innovation and Technology, or SWITCH, gives us an excellent opportunity to tap on some of the best global minds in the field of innovation. All of you here are from corporates, startups, incubators, accelerators, VCs, and government agencies. It is an excellent platform to learn from and collaborate with one another. So let me join Boon Heng in thanking everyone here, including our speakers, for joining us.

This year's RIE Day is focused on Deep Tech. We know the transformative potential of deep tech to tackle shared global challenges, and to create entirely new industries and value chains. With many complex, interlocking challenges, we can expect the demand for deep tech solutions to grow in the years ahead. For example, in semiconductors, global investment and research into platforms like silicon photonics has grown significantly, to meet surging demand for more productive, powerful and energy-efficient chips. In Singapore, we recently established the National Semiconductor Translation and Innovation Centre. This aims to boost R&D translation outcomes in silicon photonics and flat optics and unlock new possibilities in enhancing the performance and efficiency of semiconductor devices. As part of the global green transition, researchers around the world are seeking to achieve breakthroughs in areas like biofuels, hydrogen and nuclear fusion. You will be hearing from Dr Eric Toone of Breakthrough Energy on this topic later. We also have interesting sessions later covering energy efficient AI infrastructure, AI and robotics, and other aspects of deep tech ventures from launch to scale.

It is interesting how one innovation triggers other innovations. For example, alternative sources of energy are creating new industries. Advancements in battery technology have enabled the growing adoption of electric vehicles (EVs) worldwide. The International Energy Agency estimates that EVs accounted for 18% of all cars sold in 2023, up from just 2% in 2018. A German industrialist whom I met recently told me that one in seven jobs in Germany is linked to the auto industry today. Imagine the disruption if the German car industry doesn't respond to technological change effectively.

We are now standing at a number of technology inflections that are reshaping all fields, including deep tech. Generative artificial intelligence, for example, is revolutionising scientific discovery and accelerating research and technological breakthroughs. Singapore has announced that we are allocating \$120 million for an AI for Science initiative. Quantum technologies are also unlocking unprecedented computing power and problem-solving capabilities.

The theme of this RIE Deep Tech Day 2024 is “**Paradigm Shifts in Deep Tech**”. This is timely and essential. I see familiar faces from yesterday's SWITCH opening. Let me briefly recap the gist of what I said at SWITCH yesterday and add a few other points.

I think some of you would remember that Professor Clayton Christensen from Harvard Business School coined the term “disruptive innovation” in the 1990s. At the time, Christensen spoke about new entrants disrupting incumbents by going into unserved markets or under-served markets, or over-served markets. They provided an offering that was good to have for many segments, and in turn, started to grow their capabilities and move up the value chain. Perhaps the biggest disruptor in this sense was China, because the entry of hundreds of millions of low-cost workers into the global supply chain completely changed globalisation and in turn created huge pressure on everyone. China itself has moved up the value chain as it learned, and is now a tech leader in quite a number of fields. If you look at digital payments, EVs and solar energy, China is a very advanced innovator. If you look at global aviation, low-cost carriers are disrupting the major players. Major airlines have themselves incorporated the low-cost carrier segment to expand their network and stay competitive.

Reflecting on this, the question we should ask ourselves is what the next wave of changes will be. I believe that the next big wave that is going to lead all of us is going to be deep tech. The

biggest change is the energy transition. I am very thankful that we have discussions at SWITCH and RIE Day on the energy transition, renewable and clean energy. Closely related to climate change is the issue of circular economies and how we can reduce the stress we are putting on our planet. Biotech is another big change. Without the mRNA technology behind vaccines, we wouldn't have been able to recover from the COVID pandemic so quickly. Therefore, I think deep tech will shape the trajectory of future human development.

The second point I made yesterday is growing tech is very difficult because science, talent is capital-intensive, with long gestation periods and significant risks. That's why MIT calls it "tough tech" or "hard tech". Three, Singapore is working closely with partners to strengthen our innovation system. With the disruptive changes of deep tech, we must also build our frameworks and governance rules to deepen trust in the use of deep tech to ensure that it is human-centric.

As Boon Heng earlier said that "innovation is fundamentally a team sport", we hope Singapore can play a role in this team sport. Excelling at this team sport means building, and continually strengthening, a compact, nimble, and well-connected ecosystem. Now let me briefly mention Singapore's approach to enabling this more compact system. First, we need to bring our institutions within Singapore closer together. Second, we need to also bring together different sectors. And third, need to work with like-minded partners around the world.

First, on building tighter linkages between stakeholders. This is particularly important for deep tech innovation, because it spans different disciplines. Emerging technologies are increasingly being developed at the intersection of disciplines, for example, AI with robotics and precision medicine. At the National Supercomputing Centre (NSCC) Singapore, for example, teams from different research institutes and public health institutions are using supercomputing resources to tackle topics like quantum technologies, climate modelling, low-carbon solutions, and medical diagnosis. NSCC's computational power is available to our research ecosystem. We hope that it will shorten experimentation cycles, and help achieve breakthroughs faster. Similarly, AI Singapore is anchoring deep national capabilities in AI by bringing together all Singapore-based research institutions, as well as a network of AI startups and companies, to perform use-inspired AI research.

Turning to venture building, this requires bringing together different expertise. Scientists may be very good at leading scientific breakthroughs but may not have the commercial instincts and entrepreneurial know-how to build deep tech startups. Therefore, partnering with venture builders to bring deep tech solutions to market is very important. For a number of years, our universities have been running their own venture building programmes.-NUS has a Graduate Research Innovation Programme, or GRIP and NTU offers the Lean Launchpad – an entrepreneurial education programme that helps researchers turn their findings into commercially viable products. Both platforms have incubated more than 400 startup teams and launched almost 160 spinoffs since 2017. This includes NEU Battery Materials which pioneered the world’s first electrochemical lithium-ion battery recycling technology. NTU’s Lean Launchpad has also spun off an outfit called Zero-Error Systems, which develops high-reliability semiconductor solutions that can be deployed for space and power management applications. These have already been used by several operating satellites.

There is much more we can do together. To take our venture-building efforts further forward, I am pleased to announce today that we will integrate these two successful deep tech programmes into one national venture creation platform. We call it the National Graduate Research Innovation Programme or National GRIP and it will be launched in January 2025. This is a 12-month programme to bridge the gap between scientific research and market application, supporting startups in refining their ideas, validating market needs, and designing their business models. As a national platform, National GRIP will be accessible to aspiring researchers, founders and innovators beyond just NUS and NTU. It will be a place for cross-pollination between our autonomous universities and A*STAR research institutes. The National GRIP programme aims to support around 100 deep tech projects a year, equipping them with founder-ready skillsets and matching them with VCs to have a pathway for commercial viability. I commend NUS and NTU on the good work they have done in venture building over the years and for integrating this together into a national platform. To the many VCs here, you are welcome to work with us to take this even further.

The first level is about bringing partners within Singapore to work closely together with research players. The second level is cross sectoral partnerships to accelerate the growth of our deep-tech ecosystem. In venture building, a number of VCs are collaborating with our universities and research institutes to support the translation of scientific breakthroughs into deep tech ventures. Xora Innovation, which Boon Heng mentioned earlier, is working with NUS, NTU, and with A*STAR, to help commercialise deep tech spinoff. Current NUS GRIP

VC partners such as Legend Capital, SOSV Investments LLC and Vertex Holdings will be closely involved in the new National GRIP programme that we are launching. There are plans to leverage on VC partners to attract more experienced founders to team up with our spinoffs.

Industry has a stake in catalysing greater innovation in deep tech. Large enterprises in Singapore can play a leadership role by building symbiotic relationships with startups and SMEs by accelerating their innovation journey and integrating them into the wider supply chain. For example, the joint lab between Rolls-Royce, Singapore Aero Engine Services Pte Ltd and A*STAR was set up to accelerate the development of automated, digital and adaptive manufacturing solutions for the local aerospace industry. Beyond immediate industry impact, the joint lab has also catalysed partnerships with over 150 SMEs, creating new business opportunities for them as system integrators, engineering service providers, software and hardware suppliers. By catalysing the development of SMEs in their supply chains, large enterprises also enhance their own competitiveness.

And another way that industry can contribute is to encourage greater porosity with public research institutions, such as through Corporate Labs. These enable researchers to engage in commercialisation work and return to academia enhanced by their entrepreneurial experience. This regular exchange between academia and industry can help build more innovative capacity within our ecosystem. Over the years, Temasek portfolio companies like Singapore Airlines, ST Engineering and SingTel have established such Corporate Labs with our universities and A*STAR to do interesting work in interesting areas like robotics, the Internet of Things, and the digitalisation of aviation. Last year, I also launched a Corporate Lab between NTU and Nanofilm – a nanotech materials company spun off from NTU and Singapore's deep tech unicorn!

These Corporate Labs have helped to deepen Singapore's capabilities in areas that offer a competitive advantage to our companies. The tight collaboration between industry and researchers has also strengthened the commercialisation of the research to market. So I encourage more of the corporates to consider establishing such collaborations with our universities, to tap on their resources and talent, grow mutual capabilities, to train your own researchers, and address real-world challenges.

Addressing these real-world challenges often also means developing solutions that can be scaled beyond Singapore, to the rest of the region and even globally. So, the third level of linkages that we must continue to deepen is across ecosystems around the world. Many of the challenges that deep tech solutions are being developed for, in fact, can be shared across borders and regions. Climate change, public health, urban mobility, aging populations – these are common challenges across almost all economies. From my travels this past year to the US, Europe, China and Japan, one thing is clear. Countries everywhere are looking to harness innovation and new technological breakthroughs to tackle similar problems – either problems that they are confronted with today, or problems that they see on the horizon. I was impressed to see some of the innovations being showcased by different countries at SWITCH this year – from Germany, China, Japan, Korea, as well as countries in Southeast Asia.

On the part of the Singapore Government, we are strengthening platforms to support closer collaborations with global partners. For example, as I announced yesterday, we have just launched Innovation Challenges with partners from the Middle East, Japan and the Nordic region. This will help catalyse solutions in areas like sustainability, digitalisation and advanced manufacturing. We are also expanding our Global Innovation Alliance, to connect Singapore-based enterprises with other innovation hubs globally, to 23 nodes across 15 countries, the latest being the Netherlands.

Our research ecosystem is also building stronger linkages with overseas partners. Since 2007, researchers at Singapore's universities have worked with partners at leading global universities through the Campus for Research Excellence and Technological Enterprise or CREATE. In July this year, the National Research Foundation launched a CREATE Thematic Programme in Decarbonisation, to bring together expertise from our universities and international partners to grow research capabilities for clean and green energy solutions. I also encourage corporates, as well as our international partners here to think about how you can help deepen Singapore's connections and connectivity with other innovation ecosystems around the world.

In conclusion, deep tech has the potential to both address today's complex global challenges and unlock the next bound of economic growth – not only here in Singapore but across the region and the world. With the accelerating pace of technological advances, we must be primed and move with agility to capture evolving market opportunities.

I thank the different stakeholders for leaning forward to grow and support our innovation ecosystem over the years, including in deep tech. There is always more that we can do. So let us continue to work together to nurture deep tech, spur corporate innovation and rally our compact and deep ecosystem. By doing so, we can drive collaborative innovation to address shared global challenges and create and capture value for Singapore as a Global-Asia node. I wish all of you a very productive RIE Deep Tech Day and many inspiring discussions and actions thereafter. Thank you.