Research, Innovation and Enterprise 2025 Report

NATIONAL RESEARCH FOUNDATION
PRIME MINISTER'S OFFICE
SINGAPORE

Contents

Foreword by RIEC Chairman

Singapore has invested steadily in research and innovation for more than three decades. We have done this to support our economy, strengthen our resilience, and open up new possibilities for Singapore and Singaporeans.

RIE2025 was the latest five-year plan in this national effort. Through successive plans, we have developed strong research institutions, deep scientific and technological capabilities, and trusted partnerships with leading institutions and global companies. These investments have helped our economy to develop, absorb and apply new technologies and advanced solutions to our nation's strategic challenges.

This report details the progress and achievements made under RIE2025. Yet the payoffs of RIE2025 extend beyond the economic contributions within this five-year period. Each phase of investment strengthens the foundations for the next. Practical applications of fundamental research often take years to emerge, often in unforeseeable forms. The talent, capabilities and ecosystems that we have developed are also valuable in their own right. COVID-19 was a good example. Singapore was able to draw on the wide range of scientific capabilities we had built over many years, to respond decisively to a national crisis. Similarly, our investments in quantum science since 2007 have developed world-class expertise where practical possibilities are only now becoming visible.

As technology advances and the external environment becomes more uncertain, we must continue to invest steadily, make careful choices, and translate good research into economic and social value. This is the way to keep Singapore resilient and competitive, and create new possibilities for future generations.

LEE HSIEN LOONG

CHAIRMAN,
RESEARCH, INNOVATION AND ENTERPRISE COUNCIL

Foreword by NRF Chairman

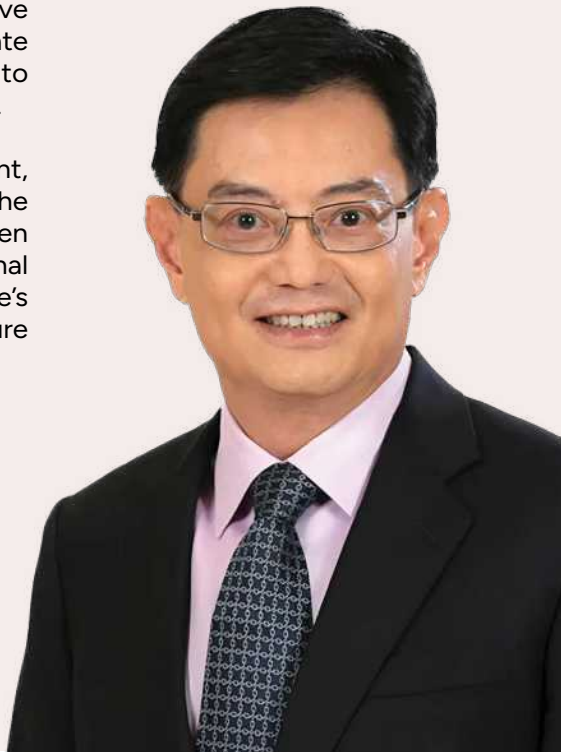
Five years ago, we launched RIE2025 as the next phase of Singapore's long-term investment in research, innovation and enterprise. Building on earlier RIE plans, it set out how we would deepen our research capabilities, forge closer partnerships among researchers, industry and public agencies, and translate research discoveries to support our economy and address national strategic challenges. As RIE2025 concludes, this report takes stock of the progress made and the foundations established for the next phase.

Over the past five years, Singapore's research and innovation ecosystem has become stronger and more connected. Collaboration among our universities, public research institutions and companies has deepened. These partnerships have attracted corporate R&D investments, supported the growth of our deep-tech sector, and developed solutions for industry transformation and areas of national importance.

This progress has been enabled by sustained investment in talent and research excellence, alongside a sharper focus on translation and impact. We have also strengthened Singapore's connections with leading institutions, companies and researchers from around the world.

The progress and achievements presented in this report reflect the dedication and collective efforts of our research and innovation community. Together, they have strengthened Singapore's ability not only to generate new knowledge, but also to translate discoveries into applications that deliver economic and societal value.

As we embark on RIE2030, we will build on the talent, capabilities and partnerships developed over the preceding periods. We aim to significantly strengthen the RIE contributions to economic growth and national priorities. In doing so, we can enhance Singapore's resilience and competitiveness, and create and capture new opportunities in the years ahead.

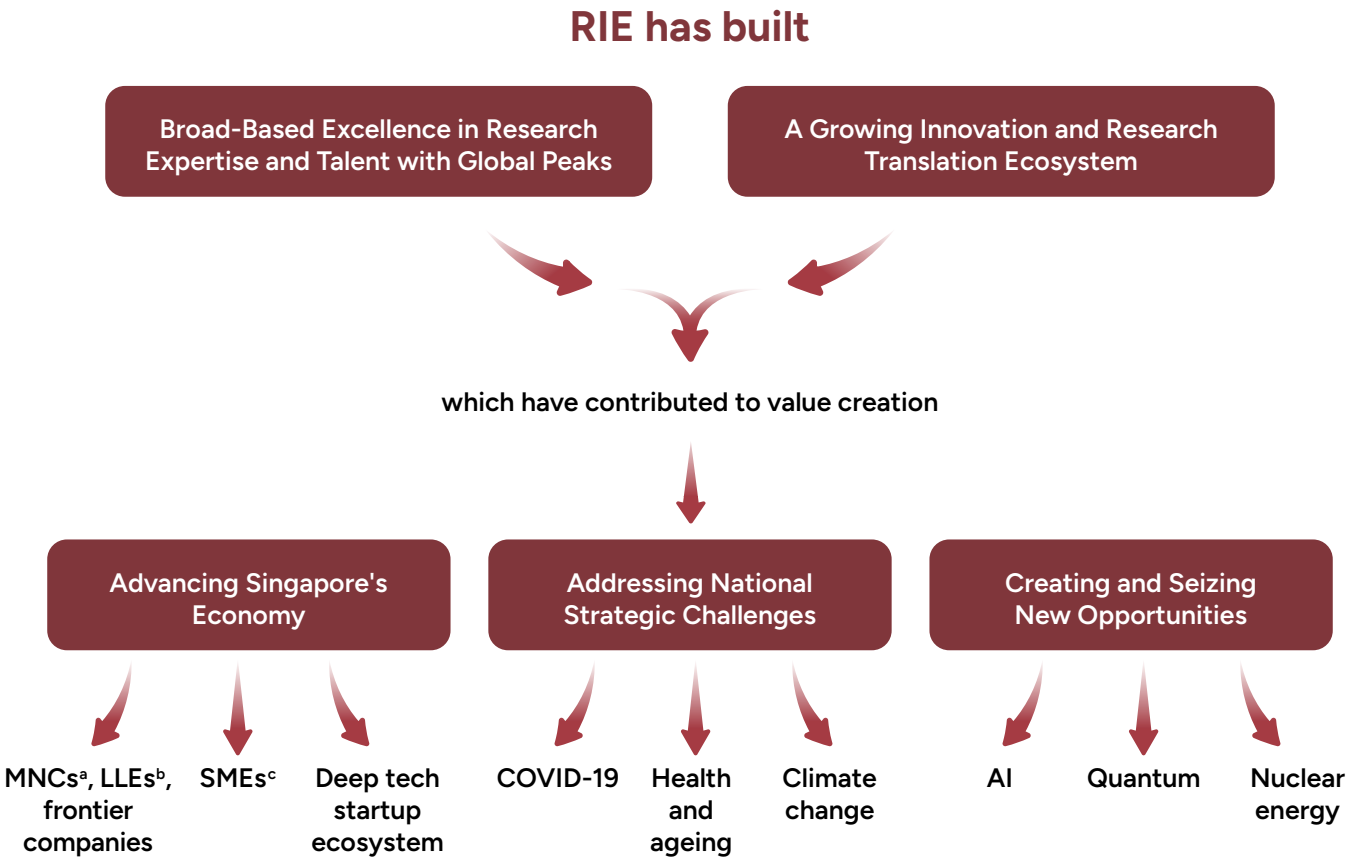


HENG SWEE KEAT

CHAIRMAN,
NATIONAL RESEARCH FOUNDATION

Introduction

Since 1991, Singapore has implemented successive national Science and Technology masterplans. These masterplans evolved into the first integrated five-year Research, Innovation and Enterprise (RIE) plan which was launched in 2010, and Singapore has consistently committed around 1% of Gross Domestic Product (GDP) to support RIE through successive RIE plans. These sustained investments have built broad-based excellence in research expertise and talent, and a growing translational ecosystem.



[a] Multinational Companies [b] Large Local Enterprises [c] Small and Medium Enterprises

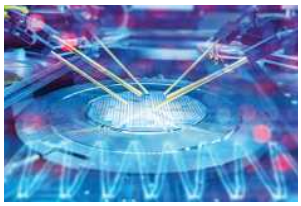
Our RIE capabilities have contributed to our national economic and strategic priorities. Research capabilities, talent and Intellectual Property (IP), developed through RIE, contribute to the economy through (i) partnerships with Multinational Companies (MNCs) and large local enterprises to expand their research and development (R&D), product and services development, and other economic activities in Singapore; (ii) fostering tech startups and a vibrant innovation ecosystem; and (iii) supporting the technological upgrading of Small and Medium Enterprises (SMEs) to increase their global competitiveness. At the same time, public agencies harness RIE to address national strategic priorities such as population health and ageing, climate change adaptation, and decarbonisation. Aside from directly addressing our economic and strategic priorities, our sustained commitment to RIE also plays a critical role in nurturing and attracting the talent needed.

The progress and outcomes that have been achieved in the RIE2025 reporting period reflect the combined effect of contributions from RIE2025 and previous RIE tranches, as well as the broader base of government policies, measures and initiatives.

RIE2025 built on strong foundations from earlier RIE tranches

RIE2025 (covering the period from April 2021 to March 2026) was organised around four thematic Domains, supported by three cross-cutting Horizontals. Each Domain was co-led by relevant ministries, to create stronger linkages between research priorities and broader national policy objectives and strengthen the pathway from research findings to real-world applications.

Manufacturing, Trade and Connectivity (MTC)



Strengthen Singapore as a global business and innovation hub for advanced manufacturing and connectivity (Led by MTI and MOT)

Human Health and Potential (HHP)

Enable Singapore's next bound in healthcare with genomics and AI, keep Singaporeans healthier for longer, and strengthen Singapore as a global hub in biomedtech and biomanufacturing (Led by MOH and MOE)

Urban Solutions and Sustainability (USS)

Advance decarbonisation, strengthen climate resilience, and build a sustainable, liveable Singapore (Led by MSE and MND)

Smart Nation and Digital Economy (SNDE)

A trusted smart nation with AI, quantum, and digital trust and security (Led by MDDI)

Academic Research

Build a robust base of research capabilities and peaks of international excellence (Led by MOE and NRF)

Manpower

Nurture a strong research and innovation talent pipeline (Led by MOE and NRF)

Innovation and Enterprise

Accelerate enterprise innovation (Led by MTI and NRF)

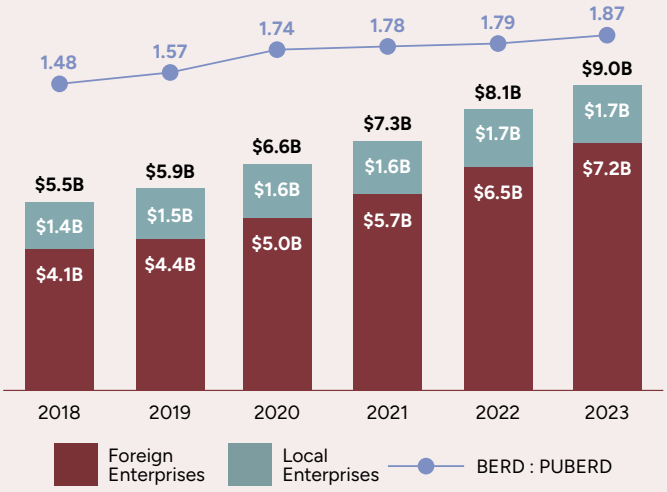
Key progress or enhancements in these areas in RIE2025 included the launch of the National AI R&D plan; intensified enhancements to our semiconductor research and industry partnerships; expansion of nucleic acid therapeutics capabilities, and establishment of new platforms to strengthen Singapore's pandemic preparedness; the elevation of the Singapore Nuclear Research and Safety Initiative (SNRSI) to a full research institute; and the rapid maturation of quantum technologies from a long-term research bet into deployed national infrastructure. These and other advances are elaborated upon later in this report.

Note: The statistics and data presented in this report reflect the most recent information available at the time of compilation. Due to data collection cycles, some figures may not represent the most current period as certain datasets, including survey results, may have inherent reporting lags. Where applicable, indicators are compared with a reference point five years prior to the latest available data.

Overview of RIE2025 Indicators

Contributions to Singapore's Economy and R&D Intensity

Business Expenditure on R&D (BERD); BERD-PUBERD ratio

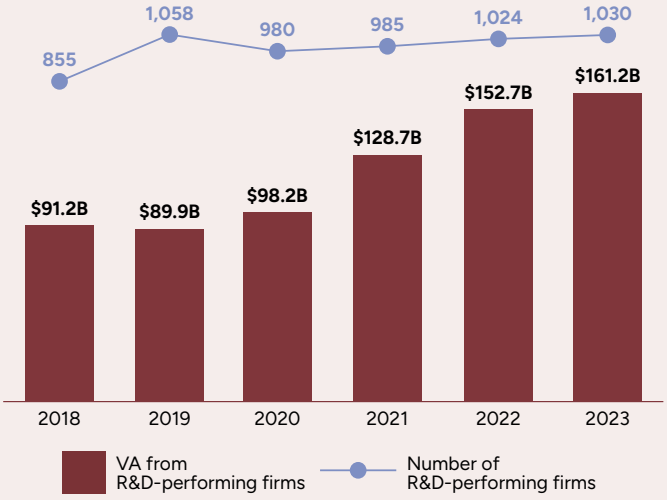


The research-intensity of our economy has risen, with increasing private-sector participation in Singapore's R&D ecosystem. Business expenditure on R&D (BERD) has grown steadily, from $5.5 billion in 2018 to $9.0 billion in 2023 — an increase of about 64%. Comparing this to public expenditure on R&D (PUBERD), for each dollar spent on public research, industry spent $1.87 in 2023, up from $1.48 in 2018 (representing an increase of 26%). BERD of local enterprises remained relatively low, growing by about 20% from $1.4 billion in 2018 to $1.7 billion in 2023.

Note: Due to rounding, individual amounts may not sum to the final total.

(Source: National RIE Survey)

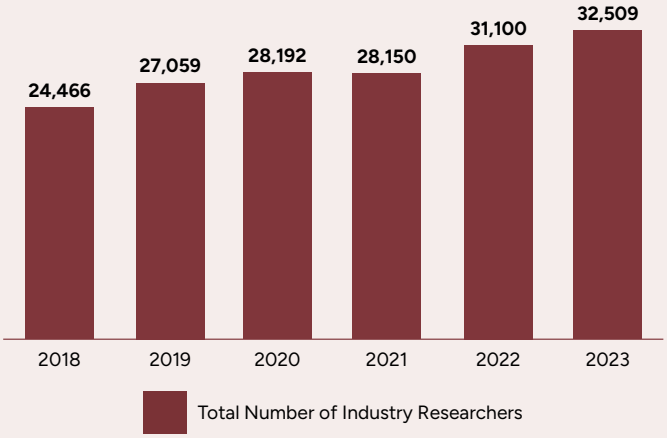
R&D-Performing Firms and Value-Added (VA) Contribution



There were more firms performing R&D in Singapore, and these were associated with higher Value-Added (VA). The number of firms performing R&D in Singapore grew from 855 in 2018 to 1,030 in 2023, an increase of about 20%. VA generated by these firms grew far more substantially over the same period, from $91.2 billion in 2018 to $161.2 billion in 2023 — an increase of over 75%, with a brief dip in 2019 amid a steady rise thereafter.

(Source: National RIE Survey and Singapore Department of Statistics)

Industry R&D Jobs



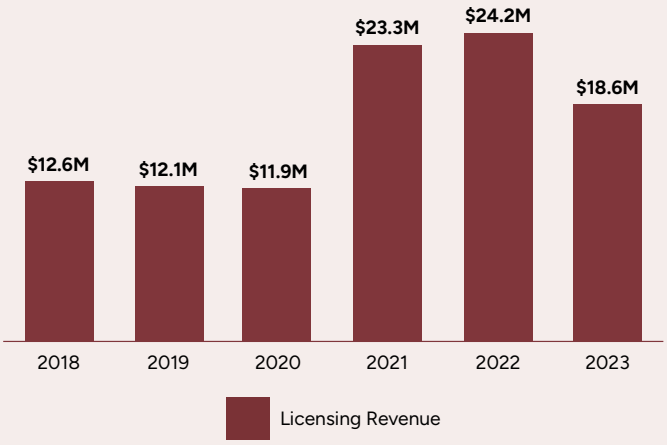
There has been a steady rise in the number of industry R&D jobs[1], from 24,466 in 2018 to 32,509 in 2023 — an average annual growth of about 5.8%. More than 70% of these jobs were filled by Singapore residents. Total industry R&D jobs plateaued between 2020 and 2021, likely reflecting pandemic-related disruptions, followed by increases in 2022 and 2023. Beyond industry R&D jobs, RIE investments have also contributed to the creation of non-R&D jobs through the growth of R&D-intensive sectors such as semiconductors, aerospace and biopharmaceuticals, as described in later chapters.

(Source: National RIE Survey)

[1] Proxied by R&D manpower employed by R&D-performing private sector entities.

A Growing Innovation and Research Translation Ecosystem

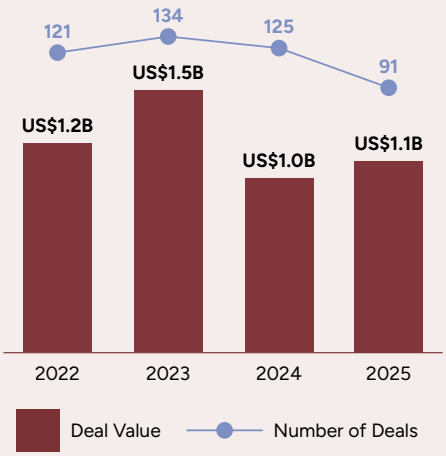
Licensing Revenue Generated by Public Research Institutions



(Source: National RIE Survey)

Licensing revenue generated from public sector IP has generally risen since 2020. However, the licensing revenues of autonomous universities (AUs) in Singapore were significantly below that of top United States (US) institutions like Harvard, Massachusetts Institute of Technology (MIT), and Stanford. This gap is partly attributable to the deeper absorptive capacity of innovation hotbeds such as Boston and San Francisco, where large communities of deep tech venture capital firms and industry players actively drive demand for university IP. Our public research institutions also commercialise their IP through industry partnerships, and the formation of technology-based startups, to create and capture value for Singapore. Nevertheless, there is a need to increase the commercialisation of IP from our public research institutions through licensing, tech spin-offs and industry partnerships, and there will be a strengthened focus on this in RIE2030.

Deep Tech Startup[2] Ecosystem



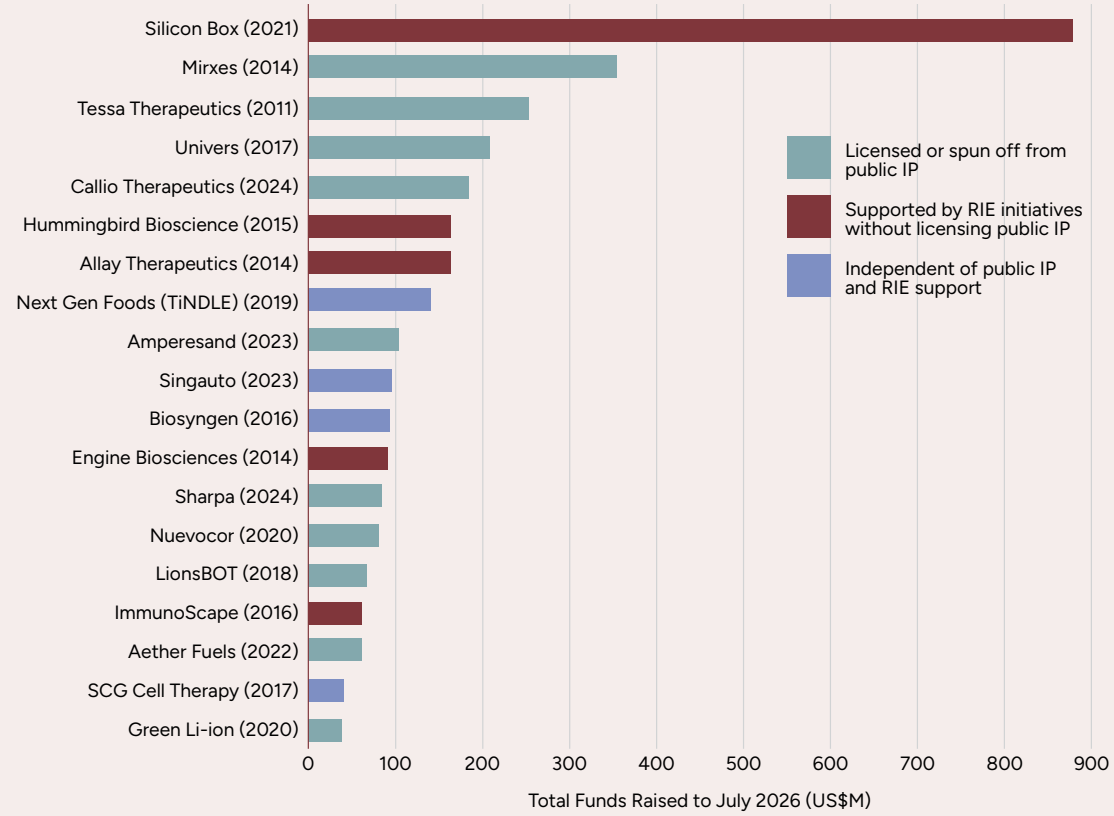
(Source: Singapore Venture Funding Landscape Report 2025)

In the past four years, Singapore's deep tech startups have attracted at least $1 billion of venture funding annually, but there has been a decline in the number of deals since 2023. This mirrored broader global trends driven by macroeconomic uncertainty, higher borrowing costs and tighter financial conditions. This has led to the contraction of deal value across many startup ecosystems including Singapore. Amidst this prolonged funding challenge, additional steps will be taken in RIE2030 to enhance access to capital for deep tech startups in Singapore. More public-private funding partnerships will be forged to ensure adequate capital for our pipeline of deep tech startups, particularly at the growth stage.

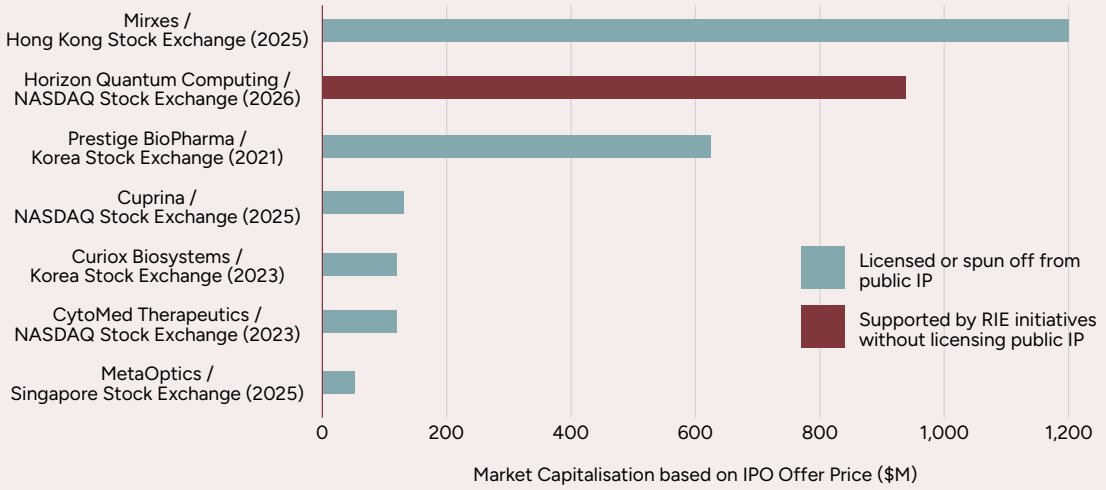
Note: Methodologically consistent venture funding data is not available before 2022.

[2] Deep tech startups own, or hold exclusive rights to, research-based Intellectual Property (such as patents, know-how, or trade secrets) in an advanced/specialised scientific or engineering field, where that IP is differentiated or proprietary and can be translated into new products, processes, or technologies.

Notable deep tech startups by fundraising quantum



Notable deep tech startup exits



Note: Another notable exit is Advanced Micro Foundry, a silicon photonics foundry spun off from A*STAR in 2017, which was acquired by GlobalFoundries in November 2025. It is not represented in the chart above as the deal terms were undisclosed.

(Source: Pitchbook, as of end July 2026)

Overall, the number of promising deep tech startups is growing with some notable successes. These included startups that were attracted and supported to set up or grow in Singapore, in addition to startups based on local public IP. While the majority of deep tech startups that listed did so in foreign stock exchanges, many of them continue to maintain a strong business presence in Singapore. For instance, Mirxes operates in over eight countries, with Singapore serving as the site for its integrated R&D hub, industry 4.0 manufacturing activities, clinical testing laboratories and data/AI capabilities. 60% of its global staff are based in Singapore and comprise largely locals.

Nevertheless, Singapore's deep tech startup ecosystem is still relatively nascent. In RIE2030, there will be continued emphasis on addressing key bottlenecks in our deep tech startup ecosystem to increase the pipeline of startups, and support a higher number of growth-stage companies and successful exits.

Contributions to National Strategic Priorities

Wide-ranging R&D findings and solutions for COVID-19 response

Diagnostic kits such as Fortitude (above) supported COVID-19 testing, a key part of Singapore's pandemic response alongside contact tracing and vaccination.

Photo credit: A*STAR

Development of diagnostic tests; modelling & simulation informed public health measures; understanding of immune response underpinned vaccination policies; enabled access to experimental treatments

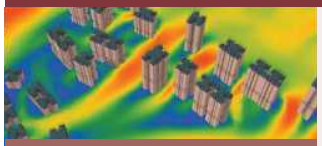
Boosted alternative energy generation

Floating solar panels have been deployed on Singapore's reservoirs, contributing to harnessing clean and renewable energy.

Photo credit: PUB, Singapore's National Water Agency

426 MWp of floating solar farms in operation or in the works — equivalent to powering more than 100,000 four-room HDB flats

Up to 15% improvement in wind flow for thermal comfort



URA's in-house ePlanner 3D web-based geospatial platform enables urban planners to model and optimise development scenarios for better planning outcomes such as wind flow.

Photo credit: URA

By modelling and optimising wind flow in new residential precincts

>250 Research findings

An external workplace organisation participated in Dispatcher-Assisted first REsponder (DARE) training, with some participants also trained to use the Phase I CPRcard.

Photo credit: UPEC/SGH

Resulting in improved clinical care and outcomes, new or changed local or international clinical guidelines, and healthcare policies (from 2021 to 2024)

100,000 Genomes sequenced

A biobanker from the HELIOS team, at the sample processing lab cross-checking that the labels are correctly coded.

Photo credit: CRIS and PRECISE

Enabling earlier detection and prevention of inherited diseases in the Singaporean population

RIE capabilities have contributed significantly to national strategic priorities, from healthcare and pandemic response, to climate change adaptation and sustainability.

Translating research into insights and solutions, these capabilities support whole-of-nation responses to challenges that directly affect the lives of Singaporeans. The examples above are illustrative, with more detailed accounts in the 'Addressing National Strategic Challenges' chapter.

Unlike R&D targeted at economic and commercial outcomes, the RIE investments addressing national strategic priorities have a primary focus on improving health and quality of life, enhancing Singapore's infrastructure and resilience, and supporting our ability to manage longer-term challenges such as energy and decarbonisation, and climate change. While doing so, the RIE programmes would still pursue opportunities to also develop exportable commercial products and services, and contribute to economic outcomes.

Broad-based Excellence in Research Capabilities & Talent

Research citations 77% above global average

In 2025, comparable to 76% above global average in 2020

19 subjects within top 10 globally

NUS and NTU STEM subjects ranked amongst the top 10 in the world, based on 2026 QS World University Subject Rankings

20.2% of Singapore publications most cited

Amongst top 10% most cited globally in 2025 (Comparable to 2020)

Singapore research institutions among top 25 globally

Singapore RIE institutions ranked strongly in 2026 with NUS, NTU, A*STAR and SGH achieving top 25 placements across various established ranking indices

8 in 10 STEM PhDs supporting RIE2025 research priorities

Anchoring Singapore's PhD pipeline to national priorities. Providing a strong talent pipeline supporting wider RIE effort

RIE investments have enabled the development of broad-based strengths in research expertise and talent, with peaks of global excellence in selected areas.

Apart from sustained RIE investments, the establishment of the Agency for Science, Technology and Research (A*STAR) in 2001, the corporatisation of the National University of Singapore (NUS) and the Nanyang Technological University (NTU) in 2006, the initiation of Research Centres of Excellence (RCEs) from 2007 and the launch of the Campus for Research Excellence and Technological Enterprise (CREATE)[3] programme in 2006 have established key institutional and ecosystem drivers of research excellence over the long term. This is reflected in several established global measures and external international comparisons, as illustrated above and described more fully in the 'Broad-Based Excellence in Research Expertise and Talent with Global Peaks' chapter.

[3] RCEs are designed to grow peaks of excellence in long-term, investigator-led fundamental research. CREATE is an international collaboratory that houses research centres set up by top universities in Singapore, to support cutting-edge research in strategic areas of interest, for translation into practical applications that can lead to positive economic and societal outcomes for Singapore.

Contributing to Singapore's Economy and R&D Intensity

Contributing to Singapore's Economy and R&D Intensity

As a small, open economy, Singapore must remain globally competitive and relevant in high-value activities and strategic industries. Our RIE capabilities have contributed to this in leading-edge technology areas which include the following:

Advanced manufacturing, especially in strategic sectors such as semiconductors and aerospace

Maritime, aviation and connectivity

Biotech and medtech

Strong research and translational partnerships have also been forged with global companies to grow their R&D and associated economic activities in Singapore.

Key Contributions

Furthering Singapore's Leadership in Advanced Manufacturing

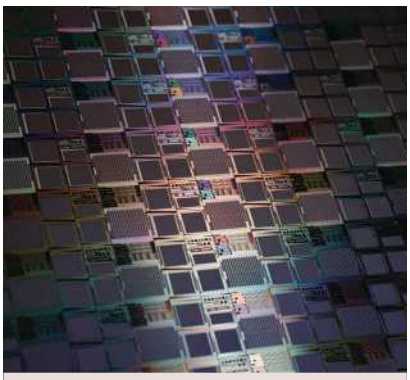
Researchers at work in the NUS E6NanoFab Class 100 cleanroom.
Photo credit: Prof Aaron Thean, Director of SHINE Centre.

Advanced manufacturing is a major economic sector contributing over $135 billion in annual manufacturing value in 2024. RIE capabilities, particularly in AI, additive manufacturing, and robotics, contributed significantly to the growth of this sector.

The advances made in the semiconductors and aerospace sectors exemplify the contributory roles that RIE2025 efforts played, spanning research, industry partnerships, and translational platforms.

Semiconductors

The total output of manufacturing establishments of Singapore's semiconductor sector increased by 58% from $101.3 billion in 2020 to $160.2 billion in 2025, sustaining a workforce of over 34,000 workers throughout this period.

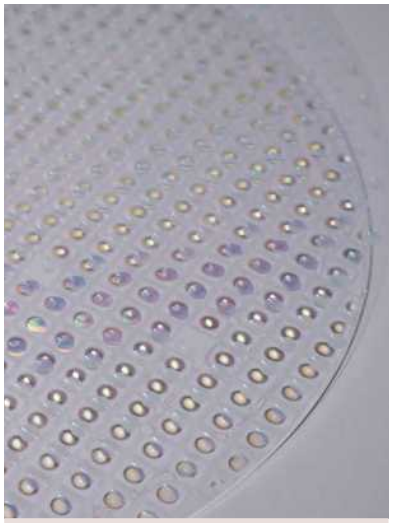


8-inch Photonics Heterogeneous Integration (PHI) wafer with TFLN[4] dies fusion bonded on silicon photonics wafer.
Photo credit: NSTIC (Advanced Photonics)

In RIE2025, Singapore invested strongly in several critical technology areas for the global semiconductor industry, such as silicon photonics, flat optics, gallium nitride and silicon carbide. A*STAR established the National Semiconductor Translation and Innovation Centre (NSTIC) — national R&D centres for advanced photonics, radio frequency gallium nitride and power electronics.

NSTIC brings together researchers and capabilities from A*STAR and local universities to bridge research and industrial-scale production, helping companies shorten development timelines and reduce the risks of bringing new technologies to market. In 2025, NSTIC (Advanced Photonics) established Singapore's first 200-mm thin-film lithium niobate platform capable of supporting future ultra-high-speed ≥400 gigabit per second per wavelength optical communication systems. In flat optics, it developed a titanium dioxide-on-glass platform for thinner, lighter metalenses. Among the companies it supported was MetaOptics, a semiconductor optics spin-off from A*STAR, in fabricating metalenses on 300mm wafers. This enabled MetaOptics to successfully commercialise products like 3D biometric sensors and become the world's first pure-play metalens company to be publicly listed. To date, NSTIC (Advanced Photonics) has attracted over 10 industry partners and built a strong commercialisation pipeline.

NSTIC works with academic research centres such as the Singapore Hybrid-Integrated Next-Generation micro-Electronics (SHINE) Centre at NUS and the National Centre for Advanced Integrated Photonics (NCAIP) at NTU to achieve market-relevant research deliverables and outcomes.



The world's first TiO_2 metalens fabricated on a 12-inch glass wafer platform, establishing a scalable manufacturing route for high-performance flat optics for visible wavelengths for next-generation imaging, sensing, and AR/VR applications.
Photo credit: NSTIC (Advanced Photonics)

Professor Aaron Thean, RSSS awardee.
Photo credit: NUS

Singapore's semiconductor research is anchored by internationally recognised scientific leaders with extensive industry experience. Professor Yeo Yee Chia (A*STAR, RSSS[5] awardee) is a globally-renowned researcher with deep expertise spanning transistor architecture, device modelling and simulation, materials, and processing technologies — and has brought new materials and devices from concept to high volume manufacturing. Professor Aaron Thean (NUS, RSSS awardee) is a global opinion leader in microelectronics and a prolific inventor with more than 50 US patents, whose work spans the device and systems levels that underpin Singapore's photonics and next-generation chip research.

[4] Thin Film Lithium Niobate.

[5] The Returning Singaporean Scientists Scheme (RSSS) seeks to attract outstanding overseas-based Singaporean research leaders back to Singapore to take up leadership positions in Singapore's autonomous universities and publicly-funded research institutes.

Positioning Singapore to be a Key Node in the Semiconductor Supply Chain

Singapore today accounts for 10% of worldwide chip production and 20% of global semiconductor manufacturing equipment production. The semiconductor industry contributes to approximately 6% of GDP. More than $30 billion in investments from semiconductor companies have been anchored over the past four years. While global supply chain diversification has been a factor in these decisions, Singapore's semiconductor R&D capabilities, infrastructure, and talent have helped make it a node of choice for global players.

GlobalFoundries operates one of its most advanced fabrication facilities here, producing differentiated chip solutions for smart mobile, automotive, AI data centre and communications infrastructure applications, with its 300mm fab recognised by the Global Lighthouse Network in 2025 for manufacturing excellence. Applied Materials, a world-leading supplier of semiconductor equipment, has anchored significant R&D and engineering operations in Singapore, collaborating with local research institutions to develop next-generation materials and processes. Micron has made Singapore the global centre of its NAND manufacturing excellence and is investing approximately $40.5 billion over the coming decade in High-Bandwidth Memory advanced packaging and a new double-storey wafer fabrication facility. Visionpower Semiconductor Manufacturing Company, Siltronic AG, and United Microelectronics Corporation have similarly deepened their Singapore footprints, collectively reinforcing the country's role as a key node for global supply chains.

Looking forward, a key priority is to build on this momentum by developing leading-edge research expertise that can help the industry remain at the forefront of emerging technologies, particularly those that power the next generation of AI workloads. Hence, the RIE2030 focus is on growing leading research and translational expertise in critical areas such as advanced packaging and silicon photonics.

GlobalFoundries' semiconductor manufacturing site in Woodlands.
Photo credit: GlobalFoundries

Aerospace

Singapore's aerospace sector has grown significantly. From 2004 to 2025, total manufacturing output rose more than five-fold from $4.4 billion to $24.0 billion, while the workforce expanded from 14,000 to over 23,000 workers. The sector is poised for strong growth in the next few decades, driven by substantial aircraft delivery backlogs, sustained demand for Maintenance, Repair and Overhaul (MRO) and aftermarket services, and Asia Pacific's emergence as the world's largest aviation market.

Singapore is a significant aerospace MRO hub, accounting for about 10% of global MRO output and almost 20% of engine MRO. Singapore has over 130 aerospace companies across R&D, manufacturing, MRO and aftermarket services, as well as local SME suppliers. RIE strengthens this sector by enabling partnerships between local enterprises and MNCs to develop advanced aerospace solutions that meet the industry's evolving needs.

Advancing Aerospace Maintenance, Repair and Overhaul through Partnerships

The Smart Manufacturing Joint Lab (SMJL), launched in 2017 by Rolls-Royce, Singapore Aero Engine Services Private Limited (SAESL) and A*STAR, has yielded 18 breakthrough technologies that have improved fan blade manufacturing and repair. One key achievement was an automated coating process that raised productivity, reduced scrap, and improved workplace safety. Improvements such as these contributed to a 20% productivity increase at Rolls-Royce between 2017 and 2024, without an expansion of Rolls-Royce's factory footprint. For SAESL, a joint venture between Rolls-Royce and SIA Engineering Company, the automated technologies delivered similarly significant productivity gains. More than 200 local SMEs were engaged through SMJL, generating over $4.5 million in new business opportunities, with eight local SMEs added to Rolls-Royce and SAESL's approved vendor list.

Phase Two of SMJL, launched in 2025, will build on these successes to strengthen Singapore as a hub for next-generation aerospace manufacturing and servicing. Its innovations will complement SAESL's $242 million investment to double MRO output and create 500 high-value jobs over the next five years, further reinforcing SAESL's standing as the world's largest Rolls-Royce Trent Engine MRO facility supporting Airbus and Boeing aircraft for airlines such as SIA.

Automated boron nitride spray system developed through the Smart Manufacturing Joint Lab for Rolls-Royce's Seletar facility.

Photo credit: A*STAR

Enhancing Singapore's Position as a Global Transportation and Connectivity Hub

Singapore's aviation and maritime sectors together contribute over 11% of GDP and support over 200,000 jobs, underpinning Singapore's role as a global connectivity hub. Sustaining this position requires continuous innovation. In aviation, managing growing airspace complexity and integrating new classes of aircraft are central challenges. In the maritime sector, Singapore's status as the world's busiest container transhipment hub and top bunkering port depends on its ability to respond to shifts in digitalisation, the energy transition, and the reconfiguration of global supply chains. With over 80% of global trade carried by sea, strengthening maritime competitiveness is a strategic priority for Singapore. In these sectors, RIE has played a key role in supporting operational transformation and future-readiness.

R&D Enabling Aviation Digitalisation and Collaboration

CAAS is advancing research and technology initiatives under the Aviation Transformation Programme (ATP) for Air Traffic Management.
Photo credit: CAAS

Smarter air traffic management is delivering benefits across the region. Through the Aviation Transformation Programme (ATP), the Civil Aviation Authority of Singapore (CAAS) and the International Centre for Aviation Innovation (ICAI) established the Regional Collaboration Platform (RCP) to test new Air Traffic Management concepts with stakeholders including Air Navigation Services Providers (ANSPs).

In July 2025, the first joint regional laboratory demonstration of Trajectory-Based Operations (TBO) was successfully conducted using the RCP. By enabling end-to-end planning and optimisation of aircraft trajectories across multiple Flight Information Regions, TBO will help improve operational efficiency, reduce flight delays and disruptions, and cut fuel burn and emissions.

As of May 2026, the RCP has supported active collaboration among nine ANSPs and around 30 users across the region, reinforcing Singapore's value proposition as a leading air transport hub through the convening and test-bedding of interoperable, cross-border digital workflows. Complementing these efforts, AI applications developed under the ATP are further maximising capacity and operational efficiency within the Terminal Manoeuvring Area, including AI-assisted decision-making tools for Air Traffic Control Officers and AI-enabled turnaround operations.

Strengthening Maritime Safety, Decarbonisation and Port Efficiency through R&D

As the shipping industry decarbonises, Singapore is ensuring that alternative fuels can be handled and delivered safely and efficiently. Under the Maritime Transformation Programme in RIE2025, the Maritime and Port Authority of Singapore (MPA) and the Singapore Maritime Institute (SMI) worked with the then A*STAR Institute of High Performance Computing (A*STAR IHPC); A*STAR Institute of Sustainability for Chemicals, Energy and Environment (A*STAR ISCE²); A*STAR National Metrology Centre (A*STAR NMC); CNRS@CREATE; the Technology Centre for Offshore and Marine, Singapore (TCOMS); and the Tropical Marine Science Institute (TMSI) on the Dispersion Analysis and Simulation for Handling of Future Fuels programme, modelling ammonia and methanol dispersion during potential leaks.

The predictive planning tool from this research was integrated into MPA's Maritime Digital Twin and has supported MPA's Chemical Spill Exercise in July 2025. The tool improved situational awareness and supported decisions on mitigation measures. This underpins MPA's development of the operational standards and safety protocols for alternative fuels bunkering, which will be essential for a future-ready bunkering hub.

Beyond safety, AI applications were developed to enhance simulation, risk assessment, and operational decision-making across port and maritime environments, spanning shipping disruption evaluation, vessel traffic management, predictive maintenance, and harbour craft operations optimisation.

R&D efforts have also helped strengthen the safety and efficiency of Singapore's ports, which are among the busiest in the world.

A*STAR and PSA Marine co-developed AI-powered digital solutions to narrow maritime operational and risk management gaps to enhance safety at sea. Across these studies, the tool identified substantially more near-miss incidents than manual reporting alone, providing the PSA Marine harbour pilots with a more comprehensive understanding of navigational risks and strengthening safety management.

Beyond maritime safety, A*STAR has also contributed to the future of port automation through the development of a novel methodology for decentralised Automated Guided Vehicle (AGV) fleet management system. Drawing on its expertise in advanced computational systems architectures and leveraging its decentralised and high-performance computing capability, A*STAR and PSA Singapore explored alternative approaches to coordinating large fleets of autonomous vehicles without reliance on centralised control. This research lays the foundation for more scalable, resilient and adaptive AGV operations, supporting PSA Singapore's vision for Tuas Port — the world's largest fully automated container terminal, which will have an annual handling capacity of 65 million TEUs when completed in the 2040s.

Strengthening Singapore's Position as a Pharmbio and Medtech Hub

Singapore's biomedical science sector has expanded significantly over the past two decades, supported by a combination of deliberate economic development strategies and sustained public RIE investments.

Singapore's biomedical industry generated an output of over $32 billion in 2024, an 87% increase from two decades before. Employment nearly tripled over the same period to more than 26,000 workers. Local biotech, medtech, and digital health startups closed 266 deals from 2022 to 2025, raising US$2.56 billion. While our ecosystem has yet to mature, it has gained momentum. A 2022 Nature Biotechnology study ranked Singapore 7th globally among biotech ecosystems, supported by sustained investments in research, talent and governance over successive RIE tranches.

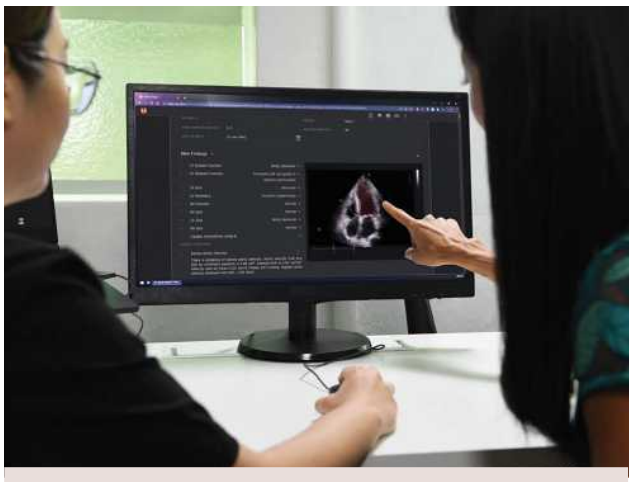
The pipeline of Singapore-based therapeutic startups has increased, with some of these startups having attracted global funding. In RIE2025, the number of active local biotech startups doubled to around 70, closing a total of 51 fundraising deals and raising a total of US$1.4 billion within the five-year period. 26 of these biotech startups went on to raise more than $10 million each (a recognised fundraising milestone for early-stage Seed-Series A biotech companies), with five of these securing deal sizes above US$50 million. Further, 14 of the 26 companies progressed to the clinical development stage — a critical milestone for value inflection on the pathway towards a market-ready product.

It is well recognised that the path from early-stage assets to market-ready products is long, difficult and uncertain. Many of our biotech startups and therapeutic assets are still at the preclinical development stage. Within this context, however, there are encouraging signs of progress and examples of early success.

Nuevocor is a biotech company spun out from A*STAR's research on novel cardiac gene therapies for cardiomyopathies. It was initially supported by RIE funding[6], and subsequently raised multiple rounds of funding, including a US$24 million Series A in 2021 and a US$45 million Series B in 2025. Other notable fund raises include Paratus Sciences (US$100 million), a cardiometabolic and inflammation-focused drug discovery and development platform whose lead asset was developed through collaboration with Duke-NUS Medical School and Callio Therapeutics (US$187 million), a dual-payload cancer antibody-drug conjugate spin-off from local clinical-stage biotech Hummingbird Biosciences.

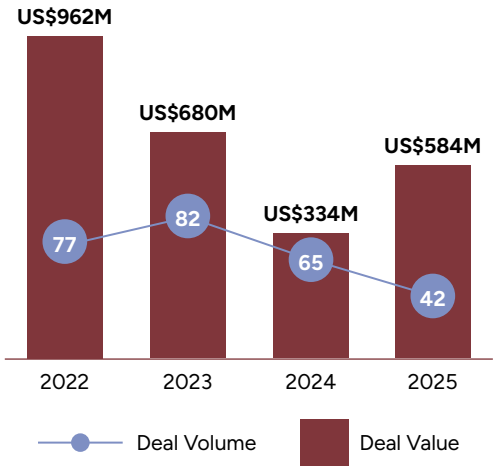
Several therapeutic assets of Singapore origin have also achieved regulatory approval in major markets. In 2015, finafloxacin, developed by MerLion Pharmaceuticals, a company spun out of A*STAR Institute of Molecular and Cell Biology (A*STAR IMCB), became the first novel drug from a Singapore company to receive FDA approval for the treatment of acute otitis externa. SBio, a Singaporean biotech company formed in 2000, out-licensed Pacritinib (Vonjo) to Cell Therapeutics Inc. (CTI) in 2012, earning US$30 million upfront in cash and equity. Pacritinib (Vonjo) subsequently obtained FDA approval in 2022. The Singapore Eye Research Institute (SERI) has led over two decades of research on low-dose atropine for childhood myopia. This work underpinned the development of a low-dose atropine which has secured regulatory approvals in China and Malaysia, the first approval for myopia therapy in major markets. Most recently, SERI's collaboration with Santen produced a new formulation approved in Japan.

[6] Central Gap Fund and Startup SG Equity.



Us2.ai's AI-powered software automates the analysis and reporting of echocardiograms to support cardiac assessment.

Photo credit: Us2.ai



Venture funding deal volume and value for Singapore's biomedtech sector
(Source: Singapore Venture Funding Landscape 2025 report)

RIE2025 saw the advancement of medtech innovations towards clinical implementation, with several spin-offs achieving regulatory approvals, global partnerships, and successful fundraising. The total number of local medtech and digital health companies grew to more than 400 in 2025, and raised a total of US$1.8 billion (207 deals) within the five-year period, with 15 medtech companies with deal sizes of more than US$20 million.

Medical technologies developed in Singapore are helping patients globally. Us2.ai, an AI-powered echocardiography software company that emerged from the cross-institutional Asian neTwork for Translational Research and Cardiovascular Trials (ATTRaCT) programme, achieved FDA clearance in 2021 for the world's first fully-automated solution capable of measuring both 2D and Doppler cardiac ultrasound images. The company is currently partnering with AstraZeneca and Fujifilm to scale globally, and is regulatory-cleared in 30 countries. Aevice Health, a spinout from NTU, received FDA 510(k) clearance in 2025 for its AeviceMD wearable stethoscope for paediatric monitoring, and there are plans to deploy the product at Cedars-Sinai Guerin Children's, a non-profit academic healthcare institution in Los Angeles, California, US. Biobot Surgical, a surgical robotics venture from SingHealth, received FDA approval in 2022 and CE marking in 2025 for its Mona Lisa robotic system, and closed a $24 million Series B in March 2024 to accelerate global expansion.

Despite the progress in therapeutic and medtech innovations, Singapore's biomedtech startup ecosystem has been impacted by the broader global pullback in venture capital. As noted in the Singapore Venture Funding Landscape 2025 Report, this global shift has led to the contraction of deal value across many startup ecosystems including Singapore. These dynamics are particularly pronounced in the biomedtech sector, where investors and major pharmaceuticals have become more selective in their investments, and demand validated platform technologies and/or later-stage clinical data before they invest. Consequently, venture funding deal volume into Singapore-based biomedtech startups saw a steady decline between 2022 and 2025[7].

To continue to grow and mature the base of biomedtech startups in this challenging environment, government support will be important to help promising startups progress past the early risky stages, so they can attract private capital. For biotech startups, this requires clinical validation of their IPs, and for medtech startups, this requires evidence of adoption and commercialisation. Under RIE2030, proposed new public-private partnership initiatives will engage experienced and globally successful venture builders to co-create and advance biotech companies anchored on Singapore IP, with the goal of bringing them to the clinical milestones and commercial readiness that investors require.

[7] Deal value recorded a modest recovery in 2025, in part due to large lumpy deals including Mirxes' IPO which raised US$140 million and Callio's US$187 million fundraise.

Advancing Translational Research and Precision Medicine Through Ecosystem Partnerships: Roche in Singapore

Roche, a global leader in precision medicine, has been at the forefront of advancing data-driven and biomarker-guided approaches to disease prevention, diagnosis and treatment. Singapore's national focus on precision medicine — reflected in our investment in the National Precision Medicine (NPM) programme — closely aligns with Roche's vision, making Singapore a natural partner to advance its precision medicine ambitions in the region.

The ceremonial signing of the core alliance agreement between STCC and Roche was witnessed by Guest-of-Honour Prof Tan Chorh Chuan, Permanent Secretary (National Research and Development), Prime Minister's Office, and Chairman MOH Office for Healthcare Transformation (MOHT) on 24 July 2024.
Photo credit: Singapore Translational Cancer Consortium (STCC) and Roche Singapore

In 2022, Roche selected Singapore as a pilot site for its Shining Tower initiative — a global initiative that aims to develop and scale collaborations across healthcare ecosystems to accelerate adoption of precision medicine in oncology. The factors leading to our selection included Singapore's strong local research and clinical capabilities, and ability to convene multi-disciplinary partners to develop and demonstrate innovative healthcare models that can serve as examples for other markets.

The partnership between Roche, the National Cancer Centre Singapore (NCCS), National University Cancer Institute, Singapore (NCIS), and Singapore Translational Cancer Consortium (STCC) — a coalition of Singapore's public healthcare and research institutions to drive translational cancer research — led to comprehensive genomic profiling (CGP) being extended to more than 2,500 cancer patients. This has laid the foundation for a national dataset integrating genomic, clinical, and real-world patient outcomes, advancing the application of precision oncology in Singapore. The dataset has enabled the identification of clinically relevant mutations across this patient cohort, supporting the real-world translation of genomic insights into informed treatment decisions.

Building on the Shining Tower partnership, in 2024, STCC became the first Southeast Asian member of the prestigious international multidisciplinary Centers of Oncology Research Excellence (imCORE) network led by Roche and its subsidiary Genentech. imCORE is a global alliance of scientific and clinical experts from leading cancer research institutions dedicated to advancing oncology and haematology treatments. As a member of imCORE, STCC can participate in the network's collaborative initiatives and competitive grants. These collaborations bring together clinicians, researchers and Roche researchers to generate new insights into cancer biology, treatment response and mechanisms of resistance, while strengthening Singapore's participation in the global cancer research ecosystem.

Anchoring Companies' Innovation Mandate[8] in Singapore

Mr Gan Kim Yong, Minister for Trade and Industry, touring the Centre of Excellence in Advanced Packaging in Singapore in 2021.
Photo credit: A*STAR

In RIE2025, Singapore continued to attract MNCs to anchor their R&D and innovation activities here, while realising greater local value from existing MNCs through the establishment of regional R&D centres and deeper partnerships with local public research performers. These developments have contributed to growth in key economic sectors, created jobs for Singaporeans, and generated business opportunities for local enterprises.

A notable example is the Centre of Excellence in Advanced Packaging, a Joint Lab between Applied Materials and A*STAR Institute of Microelectronics (A*STAR IME), which brings together firms from across Singapore's semiconductor industry to develop advanced semiconductor packaging technologies promising more energy-efficient system performance. Applied Materials has expanded and deepened its footprint in Singapore, placing Singapore on the global map for advanced packaging R&D. The third phase of the Joint Lab was established in 2021. Since then, over 30 projects involving 50 companies have been initiated and 300 individuals have been trained in Singapore. In particular, more than 40 SMEs have been involved with the Joint Lab, either in developing new capabilities, processes and products, or in supporting these development efforts. Complementing this, Applied Materials and NUS expanded their Advanced Materials Corporate Lab in 2024 with state-of-the-art semiconductor process equipment and talent development programmes to strengthen Singapore's semiconductor pipeline.

Beyond these partnerships with public research performers, Applied Materials has also expanded its manufacturing capacity in Singapore through a US$600 million investment that will create an additional 1,000 jobs.

[8] Companies with Innovation Mandate are those with key decision-making and control functions to drive product strategy, development and commercialisation in Singapore.

Supporting the Growth of Innovative SMEs

A*STAR SIMTech providing technology transfer and training to ATC staff.
Photo credit: ATC

Deepened industry-research partnerships — through RIE programmes such as corporate laboratories and centres of excellence — generated over 1,400 technology licences for local SMEs and startups, supporting their participation in global value chains.

Local SMEs were supported in their technological upgrading through key RIE2025 programmes, notably Enterprise Singapore's Technology for Enterprise Capability Upgrading (T-Up) programme[9], as well as A*STAR Singapore Institute of Manufacturing Technology's (A*STAR SIMTech)[10] industry engagement initiatives.

An MTI analysis of the T-Up programme found that participating firms recorded on average 65.4% higher R&D expenditure, 44.3% higher revenue, and 21.9% higher employment than comparable non-participating firms. A total of 160 SMEs and startups were supported through the T-Up programme in RIE2025.

A*STAR SIMTech supports companies in the manufacturing sector through industry assistance such as technology transfer, knowledge transfer and manpower development.

A notable example is A*STAR SIMTech's collaboration with local SME ATC Globe Holdings (ATC), which successfully localised Singapore Airlines (SIA)'s cabin component trim repair work. A*STAR SIMTech developed repair process methodologies to recoat surface-damaged trims on SIA's business class seats, speeding up the replacement process and reducing wastage of the materials used. More than 15,000 refurbished parts have since been delivered to SIA. The programme generated an estimated $2.8 million in revenue for ATC over three and a half years and allowed it to qualify as a vendor to Singapore's national carrier.

Building on this success, ATC launched a joint lab with A*STAR to develop advanced surface engineering solutions that can achieve the high purity and uniform coatings required for parts with complex shapes. The new solutions are expected to generate multiple technology transfers, which could result in a projected 20% growth in business alongside cost savings. It will also broaden ATC's customer base to industries such as semiconductors, finery, aerospace, medtech, and precision engineering, and help position ATC as one of Singapore's few but critical local surface treatment specialists.

[9] The T-Up programme supports local SMEs by seconding qualified talent from A*STAR and AISG to develop and implement innovative processes into R&D projects.

[10] SIMTech is a research institute of A*STAR. It carries out applied R&D to help companies transform and innovate for Industry 5.0 to enhance the competitiveness of Singapore's manufacturing industry.

Enabling Deep Tech Startups

Singapore's deep tech startup ecosystem has continued to mature throughout RIE2025, supported by sustained efforts to translate research into venture-based companies.

Deep tech startups are characterised by higher technological complexity, longer development timelines, more complex regulatory and market-entry pathways, and consequently, greater capital intensity. They require deep experience and sustained support to achieve commercial success but can potentially lead to transformative changes creating new products, processes, or technologies.

Quantum computing is one such frontier. Once a purely theoretical domain, it is now attracting serious commercial investment as its potential to solve problems beyond the reach of classical computers becomes increasingly tangible.

Sustained Support for Deep Tech Startups: Horizon Quantum

Horizon Quantum is a deep tech startup that develops tools for non-quantum software developers to build quantum software applications. SGInnovate (SGI), a government-backed venture builder, identified this as a market opportunity given that programming quantum machines is highly complex and requires highly skilled physicists. SGI identified a core technology developed by Dr Joe Fitzsimons, an Associate Professor at the Singapore University of Technology and Design (SUTD) and a Principal Investigator at the Centre for Quantum Technologies, that could address this. Dr Fitzsimons and his postdoctoral research fellow, Dr Tan Si-Hui, incorporated Horizon Quantum in 2018. SGI also syndicated the first institutional fundraising round in November 2018, bringing in investors from US and Japan, which closed at a post-money valuation of US$4.1 million.

SGI played a key role throughout Horizon Quantum's growth journey, including providing advice on company structure and hiring strategy, and profiling the company in media. On the business front, they helped Horizon Quantum secure industry contracts and facilitated introductions to other investors, some of whom subsequently participated in Horizon Quantum's Series A fundraising round in 2023. Horizon Quantum also became a key node in the National Quantum Safe Network, and commissioned Singapore's first commercial quantum system in 2025.

On 23 March 2026, Horizon Quantum was listed on NASDAQ at US$11 per share and a market capitalisation of US$567 million.

Horizon Quantum completed the assembly and integration of a first quantum computer at its Singapore headquarters in 2025.
Photo credit: Horizon Quantum

VFlowTech was selected to pilot the first vanadium redox flow battery (VRFB) using existing storage tank infrastructure, with electrolytes produced from recycled industrial waste to enhance circularity, supported by Energy Market Authority (EMA), JTC, and Enterprise Singapore under a clean energy innovation grant. The 400 kW/1,600 kWh (1.6MWh) VRFB is located at Advario's site on Jurong Island.

Photo credit: VFlowTech

Deep tech startups also require smart, patient capital to support technology development and scaling. To address these financing needs, the Startup SG Equity (SSGE) scheme was strengthened under RIE2025 with a $440 million top-up, and an expanded mandate to catalyse venture capital (VC) funding into Singapore-based deep tech startups in the early-growth stages. SSGE has helped de-risk early-stage investments and crowd in additional private sector funding by co-investing alongside VC firms and institutional investors.

Across RIE2020 and RIE2025, SSGE has supported over 260 startups, with more than $500 million in government investments catalysing over $2.6 billion in private sector capital, while anchoring 19 deep tech VCs. With a maturing crop of deep tech startups, SSGE will further extend its support under RIE2030 to enable startups to expand and scale, while remaining anchored in Singapore.

An example of a startup that benefited from SSGE is VFlowTech, a deep tech spin-off from NTU specialising in vanadium flow batteries for long-duration energy storage and grid applications. Government equity investments from SG Growth Capital helped to crowd in strategic private investors, enabling VFlowTech to raise US$20.5 million in its latest funding round in 2025, led by prominent VC firm Granite Asia. This capital will allow the startup to scale manufacturing and deployment of its proprietary vanadium flow batteries and develop critical supply chains.

Beyond financing, another challenge faced by deep tech startups is the shortage of innovation and enterprise (I&E) talent — individuals who have the experience and expertise to translate research into commercially viable ventures and take on operational and leadership roles as deep tech companies grow and scale. While several initiatives have been implemented to grow the pipeline of such talent through various deep tech entrepreneurship programmes, more needs to be done to ensure that deep tech startups across different stages of maturity have access to the necessary talent required for them to scale. This will be a key focus area in RIE2030.

Addressing National Strategic Challenges

Addressing National Strategic Challenges

Singapore's RIE investments have been directed not only at economic outcomes, but also at addressing important national challenges and opportunities — from population health and ageing to climate resilience and sustainability. RIE funding has built R&D capabilities in these critical areas that have contributed to whole-of-nation responses to complex challenges that directly affect the lives of Singaporeans.

Key Contributions

R&D Played a Critical Role in Singapore's COVID-19 Response

COVID-19 — Singapore's Pandemic Preparedness and Response Capabilities

Following the SARS epidemic in 2003, Singapore invested systematically to strengthen our capabilities to respond to infectious disease threats. This included building a critical mass of scientists and clinician-scientists, developing strong research and translational capabilities in key infectious diseases, and establishing platforms and enablers for diagnostics and therapeutics.

When the COVID-19 pandemic started in 2020, Singapore's researchers worked quickly and collaboratively on critical R&D essential for our national pandemic response and planning. Singapore's scientists were among the first in the world to successfully culture the SARS-CoV-2 virus — a foundational step that unlocked downstream translational research on transmission, therapeutics, and vaccine development globally. Advanced genomic sequencing capabilities, built up through earlier RIE investments, enabled Singapore to rapidly deploy whole-genome sequencing of COVID-19 infections from the outset of the pandemic, giving public health authorities near-real-time information on transmission chains and emerging variants to guide response measures.

Infectious disease and healthcare experts briefing the media on Singapore's coordinated early response to COVID-19.
Photo credit: A*STAR

A*STAR's researchers worked with clinician-scientists at Tan Tock Seng Hospital (TTSH) to develop a diagnostic test that was subsequently productised by Diagnostics Development Hub (DxD Hub) and scaled up for commercial manufacturing as the Fortitude™ test kit in February 2020, just one month after the novel coronavirus genome sequence was shared internationally. Fortitude was also the first locally developed COVID-19 diagnostic test to receive Health Sciences Authority (HSA) Provisional Authorisation for clinical use. At a time when global testing capacity was severely constrained, the test enabled Singapore to rapidly identify and isolate COVID-19 cases. Separately, scientists from Duke-NUS, NCID, DxD Hub and other Singapore research institutes developed the world's first neutralising antibody serological test (cPass™) for SARS-CoV-2 within 70 days. The test supported contact tracing efforts, enabled population-level monitoring of immunity and contributed to global vaccine development.

Members of the A*STAR, DxD Hub and TTSH team behind the development of the Fortitude™ test kit.
Photo credit: A*STAR

Environmental transmission studies carried out by researchers in NUS, NEA and A*STAR, as well as modelling studies by A*STAR on aerosol spread, provided essential data that informed public health policies over the course of the pandemic — generating scientific evidence that informed Singapore's safe distancing measures, ventilation and air quality standards and guided Singapore's phased reopening.

Research on the range of immune responses in our local population to COVID-19 infection and vaccination produced important insights which informed our national vaccination policies and programmes. Through our clinical research Key Opinion Leaders, Singapore was selected to participate in a number of major clinical therapeutic trials. These gave Singaporeans early access to then-investigational COVID-19 treatments such as Remdesivir.

These contributions extended beyond Singapore's borders. Leading researchers from Singapore served as members of key international fora, platforms and advisory committees. Research outputs from Singapore's scientific community were published in leading international journals and contributed to the global body of knowledge on COVID-19 pathogenesis, transmission dynamics, and immune response. Researchers from A*STAR also contributed to global COVID-19 surveillance by helping to set up and maintain the GISAID global data science initiative, enabling researchers and public health authorities worldwide to track emerging variants and mutations.

As part of RIE2025, additional steps were taken to integrate and augment existing R&D capabilities into dedicated national platforms for pandemic preparedness and RNA therapeutics. Even as the COVID-19 pandemic drew to a close, RIE funding continued to support Singapore's preparedness through two national R&D programmes — PREPARE (Programme for Research in Epidemic Preparedness and REsponse) and PrepVax (Pathogen/Pathway to Vaccine Development to Enhance Singapore's Pandemic Resilience) — to maintain research and translational readiness between health emergencies, working closely with MOH and CDA to align scientific capacity with public health needs.

Professor Wang Linfa and his team present their invention — cPASS™, the first surrogate viral neutralising antibody test, developed for COVID-19.

Photo credit: Duke-NUS

RIE2025 also invested in building Singapore's RNA therapeutics development and manufacturing capabilities, which serve broader therapeutic applications as well as contribute to pandemic preparedness. For instance, the Nucleic Acid Therapeutics Initiative (NATi) mRNA BioFoundry — launched in 2024 as the first-of-its-kind non-GMP facility in Asia — uses automation to enable rapid development and scale-up manufacturing of RNA-based vaccines and therapeutics. Towards the end of the RIE2025 tranche, R3 Global SG (R3G-SG), a collaboration with Wellcome Leap and CEPI, was funded to establish multi-scale, end-to-end RNA manufacturing capabilities in Singapore expeditiously and cost-effectively. The R3G-SG programme leverages mRNA BioFoundry capabilities for research material, with a partner identified to support the GMP-compliant manufacturing of clinical assets.

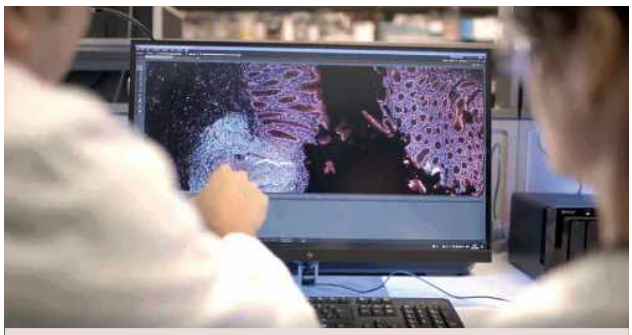
Collectively, these initiatives are building critical expertise and know-how which can be rapidly drawn upon if future pandemic threats emerge.

Translating Research into Improved Clinical Care and Outcomes, New or Changed Clinical Guidelines and Healthcare Policies

Over the period from 2021 to 2024, 251 research findings from RIE-supported centres, programmes and projects resulted in new or updated local and international clinical guidelines, healthcare policies, and clinical practices — an average of over 60 per year.

RIE-supported translational research has enhanced how care is delivered to local patients. For example, research by the Singapore Gastric Cancer Consortium (SGCC) has enabled earlier detection of stomach cancer at its most treatable stages. Predictive AI algorithms developed by A*STAR and our national cancer centres enable clinicians to better tailor treatment regimes to the specific clinical and tumour profiles of patients with cancer. These include the Tumour Immune Microenvironment Spatial (TIMES) score, developed by A*STAR IMCB, Singapore General Hospital (SGH) and Duke-NUS, which uses AI-powered spatial profiling of histopathology images to predict liver cancer recurrence after surgery, to support more personalised care strategies. Another example is Fragle, an AI algorithm developed by A*STAR Genome Institute of Singapore (A*STAR GIS), NCCS, NUS and SGH that analyses circulating tumour DNA from blood samples to monitor treatment response and detect relapse earlier.

Research has also been translated into treatments and products that benefit patients. The National Skin Centre (NSC) developed Suu Balm® for safe and effective itch relief and this product is now available in over 13 markets worldwide. The Programme for Research in Epidemic Preparedness and REsponse (PREPARE) has developed a national infectious disease R&D plan and strengthened Singapore's capabilities in diagnostics, vaccines and therapeutics to enable a faster coordinated response to future outbreaks. These advances have been supported by a growing pool of nationally-funded clinician-scientists who bridge research and care delivery.



Multiplex immunohistochemistry (mIHC) image showing the spatial distribution of immune cell populations within the tumour microenvironment.

Photo credit: A*STAR

Translating Science into Hope for Ovarian Cancer Patients

While ovarian cancer is less common in Singapore, it remains one of the deadliest gynaecological cancers. Many patients initially respond to surgery and chemotherapy but 70% to 80% suffer relapses. RIE-funded translational research and drug development is providing patients access to promising new therapies.

In one instance, Patient A was diagnosed with ovarian cancer. Unfortunately, despite going through seven lines of treatment, she suffered multiple recurrences. Subsequently, a scan showed that a growth had recurred near her liver. Her attending physician, Associate Professor David Tan, Senior Consultant at NCIS, recommended that she enrol in a Phase 1B clinical trial that was evaluating the safety and efficacy of ETC-159 — a made-in-Singapore experimental cancer drug jointly developed by Duke-NUS and the Experimental Drug Development Centre (EDDC), and trialled at NCIS as well as the NCCS. ETC-159 is a small molecule drug that targets a range of solid tumours, including ovarian, colorectal, endometrial cancers, with a subset of these cancers being caused by hyperactivity in a specific cell signalling pathway[11].

Patient A responded very well to the treatment during the trial with significant improvements in her quality of life. Through RIE support for ETC-159, from discovery and development to first-in-human testing, she gained access to a treatment option that would not have been available otherwise.

[11] https://www.eddc.sg/the-wnting-way-fighting-cancer-with-etc-159/

Rewriting the Odds for Treatment-Resistant Leukaemia in Singapore

T-cell acute lymphoblastic leukaemia (T-ALL) is an aggressive blood and bone marrow cancer. Although 80% of children are cured with intensive and prolonged chemotherapy, the cure rate in adults remains below 60%.

Researchers and clinicians from the NUS Yong Loo Lin School of Medicine (NUS Medicine) and the National University Health System (NUHS) developed a new anti-CD7 CAR T-cell treatment for T-ALL patients who have exhausted treatment options. The patient's own immune cells are genetically reprogrammed so that they can seek out and destroy leukaemia cells using a technology developed in Professor Dario Campana's laboratory in NUS Medicine. The therapy was developed and clinically applied by a team led by Professor Allen Yeoh, Dr Bernice Oh, Dr Esther Chan and Dr Elaine Coustan-Smith. The research was made possible in large part through sustained RIE funding.

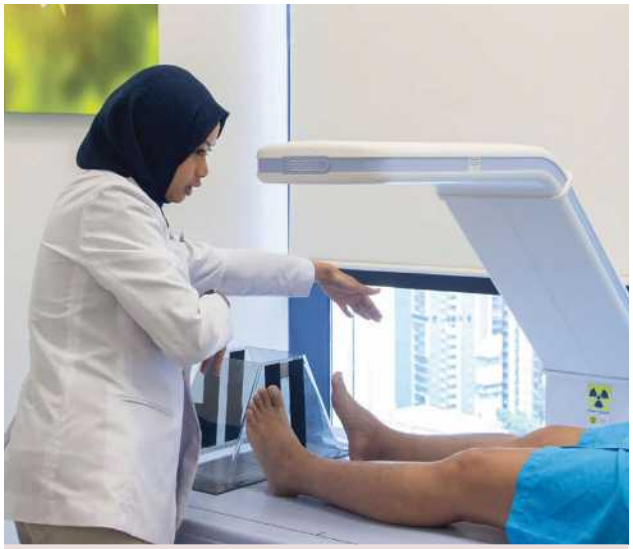
The findings from the trial, published in the prestigious journal Nature Medicine, were transformational. 16 of the 17 patients whose cancer was persistent or which had relapsed after conventional treatment, achieved complete remission within one month. Surprisingly, despite the advanced stage of disease, the treatment was well-tolerated and side effects were mild. Behind these statistics are real lives transformed — for example, an Australian lady with T-ALL in 2022 had rounds of chemotherapy and a bone marrow transplant but her cancer soon returned. Referred to NUH after running out of options in Australia, she received an infusion of anti-CD7 CAR T-cells in December 2023, and went into remission. She received a second transplant, remained in remission and was probably cured.

For the team behind this breakthrough, each patient who achieves remission has a second chance for cure. This represents not just a clinical milestone, but a life reclaimed.

NUHS and NUS developed an anti-CD7 Chimeric Antigen Receptor (CAR) T-cell therapy, giving a potentially effective treatment for patients who have run out of standard options. From left to right: Dr Esther Chan, Dr Bernice Oh, and Professor Allen Yeoh from the NUHS clinical team.

Photo credit: NUHS

National Precision Medicine (NPM) Programme



A HELIOS team member preparing a participant for a bone densitometry scan.

Photo credit: Consortium for Clinical Research and Innovation, Singapore (CRIS) and Precision Health Research, Singapore (PRECISE)

The NPM programme launched in 2017 is a globally-recognised RIE-funded initiative that has advanced precision medicine research and its applications in Singapore. At its core is one of the world's largest multi-ethnic Asian genomic databases, comprising more than 100,000 whole genome sequences as of 2025, which has enabled novel research and informed changes in national healthcare policies. For example, NPM showed how individuals with familial hypercholesterolaemia (FH) could be detected much earlier.

An estimated 20,000 people in Singapore have FH, an inherited condition that raises their risk of heart attacks by up to 20 times, often at a young age. This research directly informed the rollout of Singapore's national FH genetic testing programme in June 2025 to identify affected individuals and their at-risk family members early and to start treatment which reduces their risks of premature heart attacks.

GUSTO and Grow Well SG

GUSTO mock participant performing one of the School Readiness Tests.
Photo credit: GUSTO

The Growing Up in Singapore Towards Healthy Outcomes (GUSTO) programme is an internationally recognised flagship birth cohort study. Launched in 2009, it has followed over 1,000 mother-child pairs for more than a decade, producing 443 journal articles and attracting over $32 million in industry funding from major nutrition and consumer health companies including Abbott, Nestlé, dsm-firmenich, Danone, Haleon, L'Oréal and Kyowa Hakko Bio (KHB).

GUSTO's findings have had direct impact on national health policy. Its research led Singapore to institute national screening for gestational diabetes, prompted clinical guidelines on perinatal mental health screening, and informed evidence-based guidelines on screen time and diet for young children. These findings were incorporated into the national Grow Well SG initiative launched in 2025.

Now in its second decade, the study has continued to follow its participants as they entered adolescence under the Integrative Adolescence Research Programme.

A 10-fold Improvement in the Survival Rate for Out-of-Hospital Cardiac Arrest (OHCA)

Approximately 3,000 OHCA occur in Singapore each year, and survival rates drop by 10% every minute after collapse. This makes the speed and quality of bystander response critical.

Two decades ago, survival was only 2% to 4%. Closing that gap required not just clinical insight but a long-term commitment to translating research into coordinated action across emergency services, public training programmes, and digital infrastructure.

A study led by Professor Marcus Ong from SGH found that investing in Automated External Defibrillators (AEDs) provided the most gain in survival. This and other research findings led to sustained efforts which reshaped pre-hospital emergency care through three interlocking interventions: widespread public CPR training, expanded AED deployment, and the myResponder app, which together strengthened every link in the "chain of survival". The results compounded over time. Between 2011 and 2018, bystander CPR rates rose from around 20% to over 60%, and bystander AED application increased from 1.8% to approximately 7%. Over the same period, survival rates more than doubled from 11% to 26%, with an additional 150–200 lives saved annually.

This public health success story is the result of over a decade of sustained research, community engagement, and system-level intervention.

The Dispatcher-Assisted first REsponder (DARE) team conducted DARE training and Phase I CPRcard with SGH staff.
Photo credit: UPEC/SGH

Building a Low-Carbon, Resilient, and Resource-Efficient Singapore

Singapore faces distinct sustainability pressures, due to our small land area, limited natural resources, high urban density, and vulnerability to rising sea levels and ambient temperatures from climate change. RIE investments have supported Singapore's response across decarbonisation, adaptation, and urban sustainability, and moved research from laboratory findings into deployed infrastructure and national planning standards.

Deploying Solar and Growing Renewable Energies

In 2016, PUB, Singapore's National Water Agency, the Economic Development Board (EDB) and the Solar Energy Research Institute of Singapore (SERIS) jointly launched a 1 megawatt-peak (MWp) test-bed at Tengeh Reservoir, a first-of-its-kind R&D facility for floating solar photovoltaic (PV) systems. The test-bed demonstrated not only that a floating solar farm was technically feasible and posed no harm to surrounding wildlife or water quality, but also that it outperformed conventional rooftop solar power systems by 15%.

These results paved the way for the Sembcorp Tengeh Floating Solar Farm, Singapore's first large-scale floating solar PV system. It was one of the largest floating solar farms in the world at the time of its deployment in 2021, with a capacity of 60 MWp. In a world-first for utility-scale PV systems, the project partnered with Quantified Energy (QE), an NUS spin-off of the SERIS, to deploy drone-based electroluminescence imaging that pinpointed panel defects and kept the farm running at optimal performance. By accurately detecting defects arising from manufacturing to installation, faulty panels could be identified and replaced from the outset. This ensured that operations began in optimal condition, maximising energy yield and safeguarding long-term performance and reliability.

1 MWp floating solar testbed on Tengeh Reservoir.
Photo credit: Solar Energy Research Institute of Singapore (SERIS), NUS.

Building on this, Singapore is expanding its floating solar capacity further. A new floating solar farm at Kranji Reservoir is expected to generate 150 MWp of clean energy, a 130 MWp solar farm will be built at Lower Seletar Reservoir, and another 86 MWp facility is planned for Pandan Reservoir. This brings the total floating solar capacity in operation or in the works to 426 MWp.

Decarbonisation of Construction with Carbon-capturing Concrete

The Singapore Institute of Technology (SIT), Woh Hup, and Concrete AI have developed a low-carbon concrete that uses recycled aggregates and captures carbon dioxide, cutting embodied emissions by 57.5% compared to conventional ready-mixed concrete and achieving comparable strength more quickly when tested in laboratory conditions. About 350m^3 of the concrete has been deployed at the Copen Grand and Lumina Grand executive condominium developments. The innovation has earned multiple engineering awards such as the IES Prestigious Engineering Achievement Awards in 2024 and first prize at the 2024 Annual Cement and Concrete Science Conference. As Singapore uses 13.4 million tonnes of ready-mixed concrete annually, widespread adoption could potentially reduce sectoral emissions by up to 3 $MtCO_2e$ each year.

Strengthening Resilience: Coastal Protection

Members of the NUS research team with a full-scale geotextile tube after infilling, secured within the lifting frame specially developed for controlled lifting and underwater installation.

Photo credit: NUS Project Research Team.

Climate adaptation research has strengthened both the scientific foundations of Singapore's coastal planning and the material toolkit available to engineers, providing solutions that address coastal vulnerability in two ways — improved modelling that informs planning standards, and new construction materials that reduce dependence on imported resources, with AI enhancing simulations and improving assessment of coastal extremes, flood solution design, operations and maintenance.

Researchers created Singapore's first comprehensive 10,000-year sea level record, comparing historical baselines against modern rates of sea level rise. This showed a long-term average rise of 1.4mm per year against a more recent rate of 4.05mm per year, indicating that past sea levels were relatively stable before the accelerating rise observed today. This baseline data together with improved modelling of the physical mechanisms driving sea level change and its variability has directly informed coastal planning efforts. Complementing this, PUB-led coastal protection research has deepened understanding of storm surge extremes, currents, and wave behaviour, enabling locally-tailored planning parameters that have contributed to the coastal protection standards for Singapore. The research-informed standards guide adaptable coastal protection design to future climate projections, establishing clear protection levels and standards for coastal protection and regular inspection and maintenance of coastal protection infrastructure.

Advances have also been made in material innovation. In 2023, NUS researchers developed a breakthrough seawall solution using locally excavated soft soils, demonstrating through field trials that geotextile tubes perform as effectively as conventional sand-and-rock seawalls. This could potentially enable the recycling of thousands of tonnes of construction waste that would otherwise require disposal, while reducing Singapore's dependence on sand imports.

Building Climate Resilience and Adapting to Heat

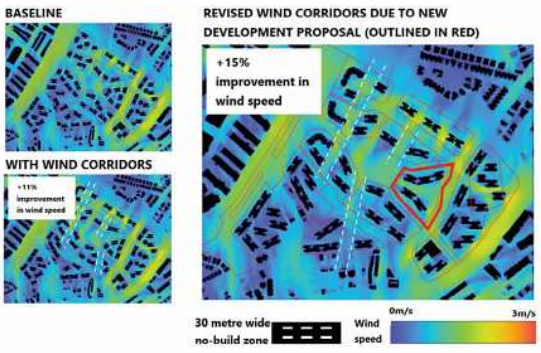
Harnessing Simulation to Enhance Singapore's Urban Planning

Urban planners need to consider how development plans will affect temperatures and air flow, to minimise hot spots in the city. This is increasingly important with rising temperatures due to climate change.

Planners can now use Modelling and Simulation (M&S) tools to study the impact of new developments on the environment and to identify appropriate climate-sensitive urban design strategies for each site. Such strategies include optimising spacing between buildings, varying building heights, and safeguarding wind corridors to facilitate good wind flow.

At Lentor Hills Estate, a 30-hectare planned residential precinct on a greenfield site in the north-east of Singapore, the Urban Redevelopment Authority (URA)[12] used M&S tools for wind simulations on 3D urban models to determine no-build zones, so as to enhance wind flow through the neighbourhood by up to 15%. Through studying multiple scenarios, planners could identify more optimal schemes that achieved better wind flow and thermal comfort.

URA continues to collaborate with research institutes and Institutes of Higher Learning (IHL) to advance M&S capabilities for such needs, as well as integrate these M&S capabilities into URA's ePlanner[13] platform for planners to conduct Multi-Objective site simulation studies more easily.



Wind simulations were used in the planning for Lentor Hills Estate to inform the block layout, no-build zones, and wind corridors.

Photo credit: URA

Developing Infrastructural Solutions to Urban Heat

With cities like Singapore growing hotter as we tackle both urban heat islands and climate change, researchers from NTU are developing paints that cool buildings and streets without using any electricity. These specially-engineered coatings work by reflecting sunlight, 'sweating like skin', and releasing heat as infrared waves directly into the upper atmosphere.

The results from real-world tests are promising. In Singapore, coating an entire street canyon of an industrial estate — roofs, walls, and road pavement — reduced heat release from surfaces by up to 30% and lowered air temperatures by up to 2°C, as compared to an adjacent untreated street canyon. Applied to a large factory building, the same approach cut roof surface temperatures by 15.5°C and reduced heat flowing into the building by nearly 70%, translating to projected annual energy savings of 75 gigajoules — roughly equivalent to the annual electricity consumption of around 20 average Housing and Development Board (HDB) flats.

Researchers have also developed coatings for windows that block over 75% of ultraviolet light and more than 80% of heat-causing infrared radiation, while remaining clear enough for everyday use. Other innovations include paints that cool through evaporation as well as radiation — effective even on vertical walls — and water-based formulations that eliminate the air-polluting chemicals found in conventional paints.

For tropical cities like Singapore where cooling is a year-round necessity, these paints offer a practical, low-cost tool to reduce energy use and make urban spaces more liveable.

[12] URA is Singapore's National Land Use Planning Authority, and the Government's Centre of Excellence for Urban Planning and Design Technology (URBEX).

[13] ePlanner is a web-based Geospatial Information System (GIS) platform that enables planners across government agencies to perform visualisation, analytics, modelling & simulation on 2D and 3D GIS data.

Building Singapore's capabilities in nuclear safety

Singapore's journey in nuclear safety began in 2012, when a pre-feasibility study concluded then that conventional nuclear power plants were not suitable for Singapore. Rather than closing the door on nuclear energy entirely, Singapore made the deliberate decision to build capabilities in nuclear science and safety — both to be able to evaluate emerging options as technology evolves, and to respond effectively should a regional emergency arise. To this end, the Singapore Nuclear Research and Safety Initiative (SNRSI) was launched in 2014, with a mandate to develop expertise in nuclear science and safety research and grow scientific talent in Singapore. In RIE2025, SNRSI deepened its capabilities by expanding its research focus to include areas such as modelling simulation of nuclear reactor designs and enhanced radio nuclide detection. In July 2025, SNRSI was upgraded from an "Initiative" to an "Institute", reflecting Singapore's strengthened commitment to nuclear safety research and building long-term national capability in this area.

Chairman of the National Research Foundation Mr Heng Swee Keat (third from left) officially launched the Singapore Nuclear Research and Safety Institute at the National University of Singapore on 11 July 2025.

Photo credit: SNRSI

Deepening our Nuclear Safety Expertise

Given the potential diversity of nuclear technologies that may be deployed, the expertise we develop in areas such as nuclear safety, impact analysis, emergency preparedness and response, and nuclear governance will help Singapore make scientifically grounded assessments of the feasibility of nuclear energy. We would also be better able to contribute to regional efforts in building robust, safe and secure frameworks and norms.

Over the past decade, SNRSI has established collaborations with research partners around the world. A notable RIE2025 milestone was the establishment of a Joint Laboratory Agreement with the French Authority for Nuclear Safety and Radiation Protection (ASNR) in 2024, covering a broad spectrum of areas including reactor safety analysis with emphasis on Small Modular Reactors (SMR), radiochemistry and radiobiology. SNRSI also collaborates with international organisations like the International Atomic Energy Agency (IAEA) to build up its technical capabilities.

Within the Association of Southeast Asian Nations (ASEAN), SNRSI is an active member of the ASEAN Network on Nuclear Power Safety Research, engaging regional counterparts in research exchanges to promote cooperation on safety research on small modular reactors. SNRSI will be expanding and deepening its research focus to include areas such as modelling and simulation of advanced nuclear reactor designs, probabilistic safety analysis, severe accident analyses, atmospheric and hydrological dispersion modelling, and enhanced radionuclide detection techniques.

The achievements cited in this chapter — from pandemic response to coastal resilience — reflect sustained capability development and coordination supported by RIE investments. But they also point to the scale of what remains to be done. Singapore's strategic challenges — from an ageing population to decarbonisation — demand sustained, systematic effort. Hence, in RIE2030, large-scale Longevity and Decarbonisation Grand Challenges will be launched to drive research in targeted areas and to pull research through to impact, facilitated by deeper cross-agency collaboration.

Creating and Seizing New Opportunities

Creating and Seizing New Opportunities

As a result of long-term investments in basic research in promising scientific fields, Singapore has established strengths in areas such as artificial intelligence (AI) and quantum technologies, which today position us to capture emergent global opportunities.

Key Contributions

Building AI Capabilities for Economic and Societal Impact

AI represents a critical opportunity to unlock new possibilities for economic growth, and to augment Singapore's manpower and capabilities.

RIE has supported the recruitment and nurturing of top AI talent through talent schemes spanning frontier research to applied capability building. At the research frontier, the Singapore Global AI Visiting Professorship has, since 2024, brought nine internationally renowned researchers into sustained collaboration with local institutions, deepening capabilities in national priority areas such as AI security and embodied AI.

Since 2020, the NRF Fellowships and Investigatorships in AI have attracted and anchored four outstanding early- to mid-career faculty members, while the AI Singapore (AISG) PhD Fellowships have supported more than 60 PhD candidates. Complementing these efforts, the AI Apprenticeship Programme (AIAP) has trained over 500 AI practitioners since 2018 through hands-on training on industry and national AI projects.

Beyond these dedicated AI talent schemes, in RIE2025, 150 individuals received scholarships and awards supporting AI-related training and research. This includes the A*STAR Graduate Scholarship (AGS), Singapore International Graduate Award (SINGA), A*STAR Research Attachment Programme (ARAP), National Science Scholarship (NSS) and A*STAR International Fellowship (AIF).

Singapore's AI research capabilities have strengthened significantly in recent years. In 2026, NUS and NTU were ranked 4th and 9th globally in computer science and information systems (which includes AI), in the QS rankings respectively. Additionally, Singapore is ranked 1st or 2nd globally in AI research impact, when measured by Field-Weighted Citation Impact (FWCI) from 2020 to 2025.

To promote and accelerate the application of AI to transform research and innovation, NRF launched the AI for Science initiative in 2024. The initiative brings together teams of AI researchers and scientific domain experts from Singapore and top international institutions, with the goal of nurturing a new generation of researchers proficient in both AI and the sciences.

Research has also enabled AI to be applied in key sectors. In healthcare, the Singapore Integrated Diabetic Retinopathy Programme (SiDRP) demonstrates how applied AI can improve both clinical outcomes and system efficiency. SiDRP screens 120,000–200,000 individuals with diabetes each year across 23 primary care clinics, using the Singapore Eye LEsioN Analyser (SELENA+) — a deep learning system developed by NUS and Singapore National Eye Centre (SNEC)/SERI that analyses retinal images to detect diabetic retinopathy and other age-related eye diseases. In its current phase of deployment — where SELENA+ provides its assessment to support human graders in their reporting, with reports continuing to undergo human review — the reporting turnaround time is within one day, with the majority of reports completed within one hour. Moving forward, the plan is to enhance the process so that SELENA+ will automatically report non-referrable cases, and only referrable cases will be routed to human graders. This is projected to reduce human reading workload by 50%, freeing up time to support other areas such as formulating personalised care plans for patients.

In manufacturing, Mencast Marine, a Singapore-based marine and offshore engineering SME, began its additive manufacturing journey in 2019 through a National Additive Manufacturing Innovation Cluster (NAMIC)-supported feasibility study with SUTD to leverage wire arc additive manufacturing (WAAM) for ship propeller production. In 2023, Mencast established a joint lab with A*STAR SIMTech to scale its in-house robotic WAAM capabilities and use AI models to speed up the design of its propellers.

The joint lab produced a propeller for marine applications using only additive manufacturing, cutting production time by nearly half and reducing each propeller's carbon footprint by 36% compared to conventional casting. The propeller achieved full certification from the American Bureau of Shipping (ABS) and Lloyd's Register (LR), marking a significant milestone for additive manufacturing in the maritime sector.

To support broader industry adoption, NAMIC, MPA, ABS, and A*STAR SIMTech have co-developed a model-based framework to accelerate the certification of additively-manufactured parts for maritime use, with Mencast providing the industrial use cases. Beyond the successful fabrication and certification of the world's first fully additively-manufactured propeller, the collaborations enabled Mencast to build in-house capabilities in computational fluid dynamics, AI-assisted generative design optimised propeller design and robotic additive manufacturing. While the AI-assisted design optimisation continues to mature, the additive manufacturing processes continue to be refined through pilot production as the company prepares for large-scale industrial deployment, supporting Mencast's "From Carbon to Silicon" transformation and strengthening Singapore's position in advanced maritime manufacturing.

Home-grown firm Mencast Marine partnered with A*STAR and the National Additive Manufacturing Innovation Cluster (NAMIC) to produce Singapore's first additively manufactured marine propeller in 2023.

Photo credit: Mencast Marine

Accelerating AI Adoption and Application

A*STAR's Sectoral AI Centre of Excellence for Manufacturing (AIMfg), established in 2024, is the national centre driving the adoption of AI in the manufacturing sector. AIMfg brings together industry leaders, technology partners, and ecosystem stakeholders to accelerate innovation, co-develop scalable AI solutions, and build sector-wide capabilities such as in shop floor intelligence, quality assurance, operations optimisation and sustainability, predictive maintenance, product and process design, and industrial automation. AIMfg has supported close to 30 firms.

This includes Sunningdale, a Singapore-based MNC and a manufacturer of precision plastic components, which partnered AIMfg to develop an AI-powered defect detection and inspection system, with early trials showing expected annual cost savings of over $150,000.

Launch of the Sectoral AI Centre of Excellence for Manufacturing (AIMfg), jointly established by A*STAR and MTI under the National AI Strategy 2.0.
Photo credit: A*STAR

<u>AI Singapore (AISG) 100 Experiments programme</u>

Launched in July 2017, the AISG 100 Experiments programme accelerates AI adoption by partnering with local companies to solve real-world industry challenges in sectors such as advanced manufacturing, connectivity and health. It has since supported close to 300 AI projects spanning insurance fraud detection, medical diagnostics, and education — extending the breadth of AI applications across multiple sectors.

<u>AI-for-Science (AI4S)</u>

The AI4S grant scheme, launched in 2024, provides substantial multi-year support and fosters deep collaborations between AI and scientific domain researchers to pursue cutting-edge basic research that advances both AI methods and scientific understanding. It encourages interdisciplinary teams to tackle problems that would otherwise be prohibitively complex or slow using traditional approaches, and to achieve "transformative step-change" outcomes — such as orders-of-magnitude acceleration in discovery, expansion of hypothesis spaces, or enabling previously unattainable discoveries. To date, eight Challenge grants for larger-scale projects and 11 Catalytic grants for smaller-scale exploratory projects have been awarded, though it is too early to report results.

Scaling Singapore AI Innovation — Selected talent highlights

Dr Harry Yu is part of a new generation of deep tech entrepreneurs translating frontier AI research into globally competitive companies. An A*STAR scholar trained in intelligent systems and machine learning, he has built a career applying advanced AI to real-world business and operational challenges.

Dr Yu started his career at then A*STAR Institute for Infocomm Research (A*STAR I²R), where his research focused on large-scale information retrieval, graph analytics and hashing algorithms, and delivered various AI models for scheduling, optimisation and predictive analysis, building his expertise in intelligent systems and machine learning.

"Turning research into a company requires a willingness to take risks, build beyond the technology and keep pushing an idea towards real-world use. My training through the A*STAR scholarship gave me the technical grounding to do that, while Singapore's deep tech ecosystem provided the networks and opportunities to take the next step. This combination of research strength and entrepreneurial support can help create new technologies, companies, and industries for Singapore."

Photo credit: Dr Harry Yu

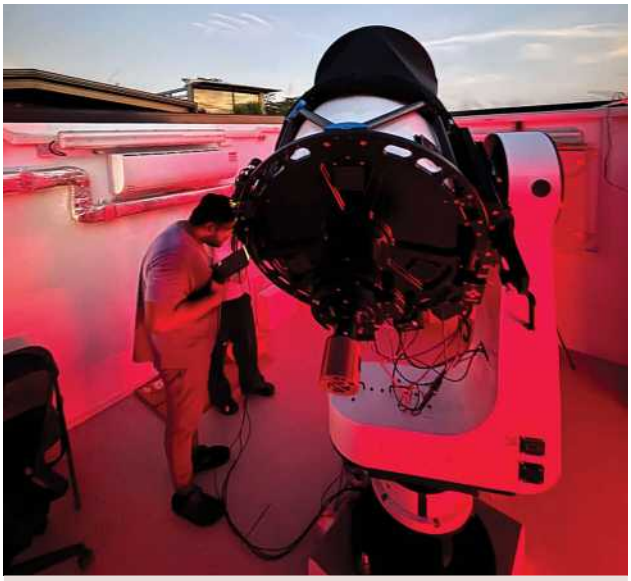
Dr Yu transitioned to translating AI innovations into real-world impact. He applied advanced AI technologies to address practical challenges in mobility, customer experience, and enterprise operations. As Co-Founder and Chief Technology Officer of Neuron Mobility, he developed the company's smart geofencing and computer vision technologies for its shared e-scooter and e-bike platform. These capabilities helped improve fleet management, rider safety and compliance with local transport rules, supporting the growth of this Singapore-founded mobility venture into international markets like Australia, New Zealand, and the United Kingdom.

Today, as Co-Founder and CEO of Level3AI, Dr Yu is building for enterprise adoption of AI agents, one of the fastest-moving opportunities in AI. The Singapore headquartered company develops sophisticated AI agents for customer engagement across voice, email and chat, helping high-volume consumer platforms automate interactions while maintaining human-quality service. Its customers include prominent regional brands like Carousell, GetGo and Carsome, and the company raised US$13 million in seed funding in early 2026.

Vibrant Quantum Ecosystem

Quantum technologies have the potential to transform how we communicate, compute, and sense the world, and offer capabilities in processing power and precision measurements that classical technologies cannot match. Singapore started investing in quantum research two decades ago when the prospects for application were still very uncertain. The Centre for Quantum Technologies (CQT), established in 2007, was ranked 6th globally in 2025 by h-index among other quantum centres. A major milestone in RIE2025 was the establishment of a coordinated national strategy and effort to establish Singapore as a key player in the global quantum supply chain and ecosystem.

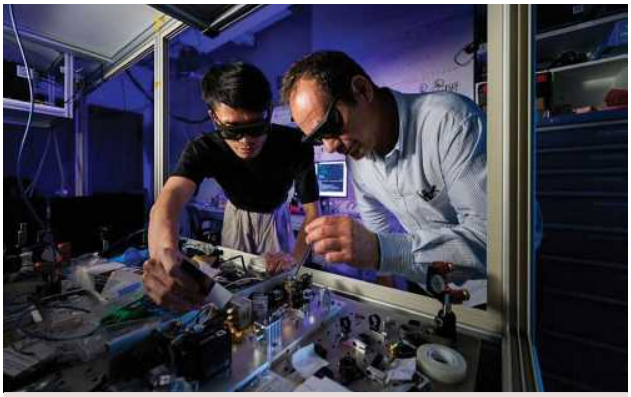
Five national quantum programmes have been set up. The National Quantum-Safe Network (NQSN) provides a testbed for quantum-safe communication technologies. The National Quantum Computing Hub (NQCH) connects researchers and industry to explore quantum computing use cases in key sectors such as finance, drug discovery, and logistics. The National Quantum Processor Initiative (NQPI) is developing Singapore's own quantum processor capability. The National Quantum Sensor Programme (NQSP) advances quantum sensing technologies with applications in Positioning, Navigation, and Timing (PNT), biomedical sensing and imaging, and remote sensing. At the device level, the National Quantum Federated Foundry (NQFF) provides capabilities for design, fabrication and testing of essential quantum components. The National Quantum Office (NQO) coordinates efforts across all five programmes, overseeing Singapore's National Quantum Strategy and brokering public-private partnerships to accelerate the ecosystem's growth.



CQT researchers have commissioned an optical ground station in Singapore to receive quantum signals from the satellite SpeQtre and other future missions.

Photo credit: CQT

These programmes have facilitated progress in the application of quantum technologies. Under the NQSN, government agencies and industry partners have been able to evaluate and deploy quantum-safe communications technologies[14]. Singapore has also developed notable capabilities in satellite quantum communications. Through collaborations involving Science and Technology Facilities Council (STFC) Ral Space, CQT, and SpeQtral, Singapore-developed quantum communication technologies have been demonstrated in space, laying the groundwork for future global quantum-secure networks. These efforts have also contributed to the growth of local quantum startups such as SpeQtral, which is commercialising satellite-based quantum-secure communication technologies internationally.



Singapore's National Quantum Processor Initiative supports development of different technologies for quantum computing. This lab pursues an approach where quantum bits are stored in atoms that are cooled and controlled by lasers.

Photo credit: CQT

[14] See examples: https://nqsn.sg/activities/usecases/

In quantum sensing, Singapore researchers and startups are developing technologies for applications such as PNT, biomedical sensing and imaging, and remote sensing. For example, Atomionics, a local startup, has developed quantum gravimetry technologies for subsurface mapping and navigation applications, which are applicable to areas such as resource exploration. At the same time, local startup Horizon Quantum deployed Singapore's first commercial-grade quantum computer in December 2025, a significant milestone.

These RIE investments in quantum science and technology have continued to attract top global talent, including quantum stochastic processes expert Professor Kavan Modi, and Professor Lo Hoi Kwong, inventor of Measurement Device Independent Quantum Key Distribution (MDI-QKD) protocol. Since the launch of the National Quantum Strategy in 2024, NQO has established collaborations with leading global companies including Quantinuum, Nvidia, Amazon Web Services (AWS), Quobly and Pasqal — bringing in foreign investment, high-value jobs, and opportunities for local companies to plug into global quantum supply chains.

SpeQtre was developed by SpeQtral, a company spun off from CQT, in collaboration with the UK Science and Technology Facilities Council's (STFC) RAL Space. The SpeQtre satellite carries advanced quantum hardware designed by SpeQtral to explore secure space-based quantum communications. It aims to demonstrate the exchange of quantum information from a CubeSat roughly the size of a microwave oven.

Photo credit: STFC RAL Space

Bringing Cutting-Edge Quantum Computing to Singapore through the first Quantinuum Helios System in Asia

In 2025, NQO and Quantinuum, a leading quantum computing company, announced a strategic partnership to accelerate quantum computing in Singapore. As part of this partnership, Singapore will be the first country outside of the US to host Quantinuum's Helios System, with installation expected to be completed in 2026. This will give local researchers and industry players access to state-of-the-art quantum computing capabilities, opening new possibilities for breakthrough research in pharmaceuticals, materials science, and finance while deepening local quantum capabilities. For example, researchers from CQT and Qubit Pharmaceuticals are developing quantum algorithms for molecular discovery on Quantinuum quantum computers to improve molecular simulations and accelerate drug discovery. The collaboration has successfully demonstrated one of the first implementations of a quantum Markov Chain Monte Carlo (qMCMC) algorithm on Quantinuum's quantum system, advancing the use of quantum computing for pharmaceutical research and strengthening the ability of Singapore's quantum ecosystem to translate research into potential real-world applications.

Quantinuum is also establishing a new R&D and Operations Centre in Singapore, bringing together its own staff with local researchers and industry partners to co-develop end-to-end middleware and applications that bridge classical and quantum systems. The centre aims to accelerate the translation of quantum technologies into commercially relevant solutions, while building long-term R&D capabilities in Singapore.

Rendering of a Deployed Quantinuum Helios System.
Photo credit: Quantinuum

Nuclear Fusion Energy

Dr Wang Shi Jie (centre), Senior Principal Scientist at A*STAR IMRE, holds a sample of a tungsten-coated tile developed for use in plasma-facing components of nuclear fusion reactors.

Photo credit: A*STAR

Given the advances in the global nuclear fusion energy sector, Singapore is positioning itself to be a key node for critical components in the supply chain by leveraging its capabilities in materials science research, as well as the monitoring and control of plasma.

For instance, in 2023, A*STAR developed a tungsten coating technology for plasma-facing components — the materials that line the interior walls of nuclear fusion reactors and which must be able to withstand extreme heat. This technology was selected by Commonwealth Fusion Systems (CFS), a leading global nuclear fusion company spun out of MIT, for use in its SPARC reactor, a major global pilot project aimed at demonstrating commercially viable fusion energy. The technology has since been licensed to ST Engineering, enabling it to manufacture and supply tungsten-coated components to fusion reactors. This creates new business opportunities for Singapore firms in a frontier energy sector with anticipated high growth.

Broad-Based Excellence in Research Expertise and Talent with Global Peaks

Broad-Based Excellence in Research Expertise and Talent with Global Peaks

RIE2025 continued to advance broad-based scientific capabilities and peaks of excellence in selected fields. The funding portfolio spanned competitive investigator-led research grants, larger collaborative grants bringing together cross-disciplinary expertise across institutions to create more globally competitive programmes, to strategic programmes in national priority areas. These ran alongside the range of RIE schemes to attract, nurture and retain research and innovation talent.

The results are reflected in Singapore's universities and research institutions' consistently high international rankings, with significant global influence and leadership in several research domains. Singaporean students today have access to world-class Science, Technology, Engineering and Mathematics (STEM) education at home, taught by leading researchers and experts who are at the frontier of their fields.

Key Contributions

Singapore's Research Capabilities and Global Standing

Singapore's universities, A*STAR, and academic medical centres (AMCs) continue to be recognised among the world's leading research institutions. NUS was ranked 8th globally in the QS World University Rankings 2025 and 2026, while NTU was ranked 15th in 2025 and improved to 12th in 2026. Together, NUS and NTU had 19 STEM subjects ranked in the global top 10 in 2025 and 2026 including Chemistry, Materials Science, Computer Science & Information Systems.

A*STAR was ranked 15th and 23rd amongst global government institutions in the Nature Index in 2025 and 2026 respectively, with 22.2% and 19.7% of its publications being among the world's top 10% cited papers respectively.

Singapore's public healthcare clusters are similarly well-regarded — in 2026, SGH was ranked 10th and NUHS 14th in the Brand Finance Global Top 100 AMC Hospitals, reflecting Singapore's strong reputation in clinical excellence, education and research. Singapore's researcher pool has grown from 10.7 to 12.8 per 1,000 labour force between 2018 and 2023[15].

The quality of research output has remained high; Singapore's FWCI, a commonly used indicator, stood at 1.77 in 2025 (indicating that Singapore's research was cited), broadly unchanged from 1.76 in 2020. The proportion of Singapore publications in the world's top 10% most cited has similarly held steady at 20.2% across the same period. The number of Singapore-based researchers on Clarivate's Highly-Cited Researchers list has grown from 81 in 2020 to 86 in 2025, while 1,363 Singapore-based scientists appeared in the Stanford/Elsevier Top 2% Scientists list in 2025, up from 967 in 2020.

[15] These figures are calculated based on full-time equivalent (FTE).

Talent

The RIE talent strategy covers the development, recruitment, and retention of research and innovation talent — both local and international — needed for our ecosystem across different career stages.

Young Talent

Singapore invests significantly in nurturing young research talent. Government funding support, through tuition fee subsidies and stipends, covers around 90% of approximately 6,000 PhD students enrolled in STEM courses in the AUs. Around 80% of these students conduct research in areas aligned to RIE2025 priority areas, such as semiconductors, digital technologies, precision medicine, and sustainable built environment. Targeted programmes such as the Industrial Postgraduate Programme and A*STAR Scholarships further build a strong local core of industry-ready and scientifically-trained researchers.

Singapore also attracted young talent globally through programmes including ARAP, SINGA and the Singapore International Pre-Graduate Award (SIPGA). In RIE2025, these programmes drew participants from over 80 countries. Notable alumni who continue to contribute to Singapore include Dr Albert Dashi, Co-Founder and Chief Scientific Officer of Sequential, and Dr Astrid Irwanto, Co-founder and Chief Operating Officer of NalaGenetics.

Early and Mid-career Research Talent

NRF Research Talent initiatives such as the NRF Fellowship (NRFF), NRF Investigatorship (NRFI), Returning Singaporean Scientists Scheme (RSSS), and NRF Professorship (NRFP) schemes are prestigious national-level talent programmes that have been progressively introduced over the years to attract and retain global top research talent in Singapore. More than 300 researchers have been supported across these schemes, contributing to the steady accumulation of talent in our universities and research institutes. In RIE2025, 120 researchers were attracted to or retained in Singapore via the NRFF and NRFI, and six top scientists were attracted under the RSSS and NRFP, the latter being a new scheme launched in 2024.

Global Talent, Rooted in Singapore

The Returning Singaporean Scientists Scheme (RSSS) has drawn senior Singaporean scientists back from overseas to lead research in Singapore, with awardees advancing programmes in clinical imaging, nature-based carbon credit systems, and multinational research collaborations in healthcare and climate science. Awardees include Professor Ho Teck Hua (President of NTU), Professor Khong Pek-Lan (Head of the Department of Diagnostic Radiology at NUS Yong Loo Lin School of Medicine), Professor Koh Lian Pin (Vice President of Sustainability and Resilience at NUS, Professor Aaron Thean (Provost of NUS), and Professor Yeo Yee Chia (Deputy Chief Executive for Innovation & Enterprise at A*STAR).

Professor Yeo Yee Chia leads Singapore's first RIE Flagship in Semiconductors and is A*STAR's Deputy Chief Executive (Innovation & Enterprise), helping to shape the future of one of Singapore's most strategically important industries. He is also Professor of Electrical Engineering at NUS. An award-winning, internationally recognised semiconductor researcher, Professor Yeo has published over 700 research papers and is an inventor of over 400 US patents. More than 40 PhD students have graduated under his tutelage.

Recognised with the Singapore Young Scientist Award (YSA) in 2006 for his research in nanoelectronics and semiconductor devices, Professor Yeo went on to receive the NRFF in 2008. The Fellowship enabled him to establish an independent research programme at NUS, where he pursued research in strain engineering for next-generation semiconductor manufacturing, deepening his work on transistor technologies aimed at enabling faster and more energy-efficient chips.

His research leadership later took him to Taiwan Semiconductor Manufacturing Company (TSMC), where he served as Director of Research and Development. Working at the forefront of semiconductor innovation, he co-developed TSMC's industry-leading 7nm, 5nm, and 3nm technologies, which have impacted the world in areas such as high-performance computing, AI, and consumer electronics.

Supported under the RSSS, Professor Yeo returned to Singapore and joined A*STAR, bringing with him the experience of translating cutting-edge research into industrial innovation at global scale. Drawing on experience across academia, industry and national R&D, he now leads efforts to deepen Singapore's semiconductor capabilities, accelerate research translation, strengthen industry partnerships and nurture the next generation of scientific talent.

"Returning to Singapore has allowed me to contribute to its growing R&D landscape. I appreciate the opportunity to lead Singapore's semiconductor R&D ecosystem and bring together partners across research, industry and the public sector to strengthen our capabilities and advance innovation. It has been an exciting journey transforming our culture, raising our collective ambition, and delivering outcomes with economic impact. We are making big moves, such as setting up NSTIC to accelerate translation and bring competitive technology solutions to market, to significantly strengthen Singapore's strategic importance and value proposition within the global semiconductor supply chain."

Photo credit: A*STAR

Professor Khong Pek-Lan (NUS) returned to Singapore to lead a programme advancing the development and clinical translation of Quantitative Imaging Biomarkers (QIBs). Through the building of infrastructure and human capital, the programme has established a platform for biomarker discovery and validation across MRI, molecular imaging and novel radiotracers.

To date, the programme has supported 25 active or completed projects in collaboration with institutions across Singapore, with eight further investigator-initiated trials in the pipeline. The programme has attracted collaborations with global pharmaceutical and radiopharmaceutical companies, as well as leading imaging technology industry partners. It has also successfully completed Phase I clinical trials involving novel molecular imaging and radiopharmaceutical therapeutics, strengthening Singapore's capabilities in precision oncology and translational imaging research.

"Beyond being closer to my family, I was drawn by Singapore's RIE ecosystem and its clear strategic vision.

The breadth and coherence of the RIE ecosystem address a wide spectrum of national needs while maintaining a strategic focus on areas of national importance, including precision medicine and healthy ageing. The close integration between universities, healthcare institutions, industry, and government agencies provides a uniquely collaborative environment for multidisciplinary research, investigator-initiated clinical trials, and the development of national research capabilities.

The opportunity to contribute to this ecosystem by developing research infrastructure, nurturing clinician-scientists, and advancing precision medicine made Singapore the ideal place to build and accelerate the translation of imaging innovations into clinical practice."

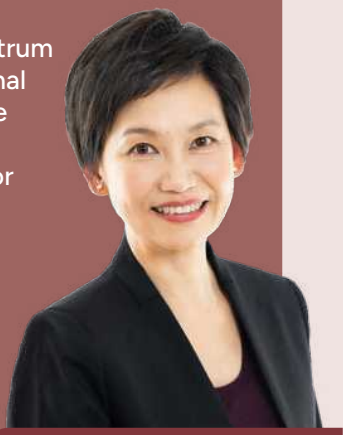


Photo credit: NUS

The NRF Professorship (NRFP) has attracted leading foreign research talent to Singapore, with awardees advancing programmes in antimicrobial resistance, large-scale deep learning and semiconductor scaling. Awardees include **Professor Tao Dacheng** (Distinguished University Professor, NTU), **Professor Lain-Jong (Lance) Li** (Distinguished Professor, NUS) and **Professor Stephen Baker** (Senior Principal Investigator, A*STAR). Singapore's sustained commitment to research and its vibrant innovation ecosystem were highlighted as key factors in their decision to base themselves here.

In **Professor Tao Dacheng's** words,

"My decision to base this programme in Singapore is grounded in the close alignment between the research mission and Singapore's long-term commitment to responsible, impactful, and foundational AI. Theoretical deep learning requires sustained support for fundamental research, rigorous talent training, strong links between theory and real-world deployment, and a broad environment that values reliability, accountability, and public trust. These are precisely the conditions needed to advance the scientific foundations of large-scale AI systems.

From my personal perspective, Singapore provides a highly constructive environment in which fundamental AI research can be developed with solid societal relevance. The goal of this programme is to understand why large models learn, when they fail, how they memorise, and how they can become more reliable, efficient, fair, and trustworthy. I hope the deliverables from the programme will contribute to Singapore's AI research ecosystem by training young talents, advancing frontier theory, and building AI capabilities that can benefit Singapore, the region, and the wider international community."

Photo credit: NTU

According to **Professor Lain-Jong (Lance) Li**,

"Singapore's strong emphasis on science and technology development, combined with its vibrant innovation and startup ecosystem, makes it an ideal place to pursue impactful research and translate discoveries into advanced technologies."

Photo credit: NUS

NRF Fellows and Investigators

NRFF and NRF Investigatorship (NRFI) researchers have produced research cited two to three times more than their institutional peers across fields including AI, robotics, materials science, energy, and biomedical sciences. Beyond publications, awardees have generated dozens of patents and technology disclosures, launched spin-offs, and attracted significant competitive research funding.

The NRFF targets early-stage researchers — typically postdoctoral researchers or junior faculty — providing resources to establish independent research careers in Singapore, and grow over time into research leaders. **Associate Professor Benjamin Tee** (NUS), supported by an NRFF awarded in 2017, built an internationally recognised programme in electronic skin technologies, including the world's first repeatably self-healing electronic sensor skin, while rising to the position of Vice President (Innovation and Enterprise, Ecosystems) at NUS. His work has yielded multiple patents, industry collaborations including with Clarins, and international recognition including the World Economic Forum (WEF) Young Scientist Award (2019) and the James Dyson Foundation International Award (2021).

The NRFI backs established Principal Investigators in pursuing ambitious research. NRFI recipient **Professor Goto Atsushi** (NTU) developed a more precise method for manufacturing specialised polymers, with novel catalysts and nano-carriers significantly advancing organocatalysed controlled radical polymerisation. This work yielded 10 industry collaborations, including a partnership with Dainichiseika Color & Chemicals in Japan for commercial industrial-scale manufacture of printer inks.

Professor Goto Atsushi
Photo credit: NTU

A*STAR Scholarships

Dr Lisa Ooi: Bridging Research, Biotech and National Strategy

A homegrown A*STAR scholar, Dr Lisa Ooi's career spans biomedical research, industry translation and national strategy.

Today, as Assistant Chief Executive of A*STAR's Biomedical Research Council (BMRC), she oversees Singapore's mission-oriented biomedical research portfolio across nine research institutes, shaping priorities in areas such as cell and gene therapies, precision medicine, and AI for healthcare to strengthen Singapore's long-term biomedical capabilities and translate research into health and economic impact.

Prior to this, Dr Ooi was Vice President of Strategy and then Chief Operating Officer at local biotech Hummingbird. She shaped the company's preclinical, clinical pipeline and commercial strategy, including a landmark licensing agreement with US biotech Endeavor BioMedicines for Hummingbird's next-generation HER3-targeted antibody-drug conjugate programme. The therapy is designed to target HER3-expressing tumour cells and deliver anti-cancer drugs more precisely to cancer cells. Worth up to US$430 million, the deal was among the largest biotechnology licensing agreements involving a Singapore-developed therapeutic. Dr Ooi was also involved in the formation of Callio Therapeutics led by Frazier Healthcare with a US$187 million Series A raised in 2025.

Dr Ooi's experience spans the biomedical innovation value chain. She has led drug discovery and development projects, worked with international experts and regulators through her roles at ASLAN Pharmaceuticals and the Biomedical Sciences Industry Partnership Office (BMSIPO), where she helped to catalyse academic-industry biomedical research and clinical partnerships across Singapore's ecosystem. She also worked with leading global biopharmaceutical and medtech companies to strengthen Singapore's biomedical sector during her time at the Economic Development Board (EDB).

During the COVID-19 pandemic, Dr Ooi also contributed to Singapore's national response through MOH's Expert Committee on COVID-19 Vaccination and the COVID-19 Therapeutics and Vaccines review panel.

Her career is a good example of how Singapore's investment in scientific talent has nurtured leaders who bridge research, industry and government to translate biomedical innovation into national impact.

"The A*STAR scholarship gave me the foundation to begin a career in science, while the opportunities within Singapore's biomedical sciences ecosystem shaped my journey. Moving across research, industry and policy has shown me how talent, excellent science, clinical needs and enterprise must come together to translate discoveries into meaningful outcomes. Singapore's sustained investment in people and partnerships has made these pathways possible, and remains one of the ecosystem's greatest strengths."

Photo credit: A*STAR

Recipients of the 2026 PSTA Awards

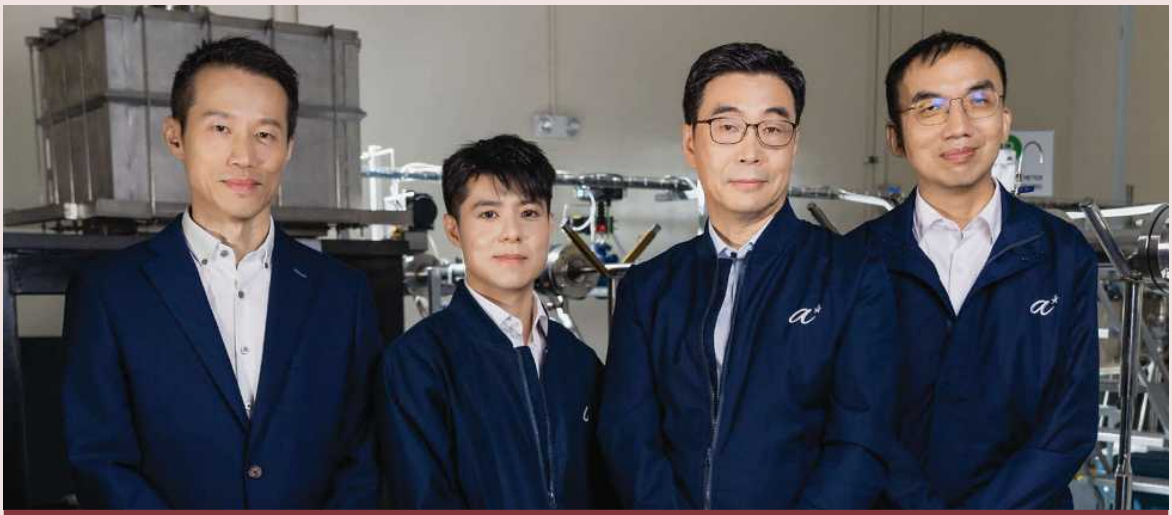
The President's Science and Technology Awards (PSTA) are Singapore's top honours for research scientists and engineers in the country, recognising individuals and teams that have made exceptional contributions in pushing the boundaries of science and technology in Singapore.

Er. Lee Chuan Seng, recipient of the 2026 President's Science and Technology Medal.

Professor Wu Jishan, recipient of the 2026 President's Science Award.

The **President's Science and Technology Medal** (PSTM) honours individuals who have made distinguished, sustained and exceptional contributions, and played a strategic role in advancing Singapore's development through the promotion and management of science and technology. In 2026, **Er. Lee Chuan Seng** received the PSTM award for his contributions to strengthening Singapore's science, technology and engineering ecosystem through the integration of policy, engineering and environmental science across government, industry and academia. He played a key role in building national engineering capabilities and implementing system-of-system approaches that enhanced cross-agency synergies in programmes addressing complex national challenges.

The **President's Science Award** (PSA) recognises accomplishments acknowledged as being significant and impactful to their field. **Professor Wu Jishan** from **NUS** was awarded the PSA in 2026 for his contributions to molecular carbon science through the development of open shell and topologically complex molecules as designable systems, enabling new approaches to control properties for future electronic, magnetic, photonic and quantum technologies.



2026 President's Technology Award recipients, from left to right: Mr Ting Cheng Heong, Thomas, Mr Tan Ren Kai, Mr Wu Jian, and Dr Yu Shengkai.

The **President's Technology Award** (PTA) recognises accomplishments that have led to transformative changes in the use or potential of technology in Singapore and beyond. **Mr Wu Jian** and a team comprising individuals from the **A*STAR National Metrology Centre** and **MPA** received the PTA in 2026 for their contributions to advancing the integration of measurement science, digital integrity assurance and standards-based regulatory frameworks to transform marine fuel custody transfer in Singapore's bunkering ecosystem, setting a new global and local standard for accuracy, transparency and data assurance, while reinforcing Singapore's position as the world's leading bunkering hub.

Promoting interest in STEM

Grooming the next generation of scientists and innovators is a key part of Singapore's long-term research strategy. Over the years, RIE funding has supported a range of programmes to spark interest in STEM and inspire students to pursue further studies and careers in these fields. A*STAR's STAR Ambassadors programme connected students with STEM role models and provided experiential learning opportunities, reaching over 100,000 students over the course of RIE2025. The Science Centre Board's Tan Kah Kee Young Inventors' Award nurtured creative problem-solving and inventive thinking among young students by recognising and celebrating youth innovation, with an outreach of over 170,000 participants in FY25.

The annual Global Young Scientists Summit (GYSS), organised by NRF since 2013, brings together around 20 Nobel Prize, Fields Medal, Turing Award, and Millennium Technology Award winners each year, alongside 350 international and local participants for a five-day immersive experience in Singapore. At GYSS 2026, participants of 57 nationalities from 32 countries convened to exchange ideas on global challenges, research directions and the latest frontiers in science. Since its inception, GYSS has grown into a pioneer international platform that brings distinguished laureates and leading scientific minds to Singapore to inspire and nurture the next generation of researchers from around the world.

I&E Talent

Koh See Wee, Co-founder and CEO of Entropy Lab and a participant in National GRIP, showcases his technology to investors at Echelon Singapore 2026.
Photo credit: National GRIP x Echelon

Creating successful deep tech ventures requires more than scientific excellence — it demands structured venture creation, market validation, commercialisation capability and the ability to translate breakthrough research into scalable businesses that address real market needs. Recognising that few researchers arrive with business acumen or commercial experience, several structured deep-tech venture programmes have been established to bridge that gap.

Launched in January 2025, the National Graduate Research Innovation Programme (National GRIP) is a $25 million, five-year collaboration between NRF, NUS and NTU. It consolidates two established incubator programmes — NUS GRIP 2.0 and NTU's Lean Launchpad — which together supported over 400 teams and produced close to 160 spin-offs since their inception.

The 12-month programme supports founders, innovators and researchers from all autonomous universities and A*STAR to form interdisciplinary teams and draw on the combined IP pool across Singapore's research institutions to create deep tech ventures. National GRIP aims to train up to 1,000 aspiring scientist-entrepreneurs by 2028.

In 2025, the programme engaged 240 participants across 88 teams through immersion in entrepreneurial activities. One example is Entropy Lab, a startup that progressed through the programme and became a recipient of the Breakthrough Energy Fellows — Southeast Asia programme. The company specialises in passive thermal management solutions for urban resilience and has successfully secured seven paid pilots across three countries, validating their technology in real-world applications.

Singapore Biodesign has grown from a fellowship programme into a national-level platform for training and capability development in health and medtech innovation, strengthening Singapore's broader healthtech ecosystem. It has trained innovators, catalysed translational projects, and fostered strong cross-border collaborations with the clinical, industry, and academic partners to accelerate healthcare innovation. It is one of only two programmes worldwide that was officially conferred the Global Affiliate status by the Stanford Mussallem Center for Biodesign. In RIE2025, 1,203 talents were trained and 59 projects and seven spin-offs were launched. Over the years, Singapore Biodesign's programmes have enabled over 60 startups and supported over 750 alumni projects. A notable example is Antigen Rapid Test (ART) Buddy, which provided low-resource testing support to 1.6 million users during the COVID-19 pandemic.

The I&E Fellowship Programme (IFP) is a 12- to 18-month training programme equipping local mid-career professionals with industry-relevant and applied I&E competencies through structured modular and on-the-job training in Singapore-based incubators, accelerators and deep tech startups. Graduates from the programme are expected to take on roles such as founding deep tech startups, contributing to tech commercialisation in deep tech companies, or mentoring other deep tech startups in commercialisation or scaling up. As at 31 January 2026, 163 trainees had graduated from IFP, and 71 out of the 72 emplaced graduates held full-time positions in deep tech companies.

Singapore Biodesign Graduation Ceremony 2025 with the CEOs of NRF and A*STAR, together with the leadership team from Stanford Biodesign.

Photo credit: Singapore Biodesign

The Summation programme complements IFP and targets fresh graduates and students. Trainees undergo three- to six-month apprenticeships in deep tech startups. In RIE2025, 428 trainees were onboarded as at 31 January 2026. Since inception, 318 trainees have completed Summation. Of these, 285 secured I&E roles, with about a third of them in startups. Collectively, IFP and Summation have supported over 250 deep tech startups and helped them to overcome talent shortages in an intensely competitive environment.

Sustaining Our Research Excellence and Talent Pipeline

Over the past two decades, Singapore has made good progress in building strong basic research capabilities and a deep R&D talent base, through various schemes and initiatives to develop and attract talent across different stages of their careers, sustained funding for basic research, access to world-class research infrastructure, and extensive networks of international partners.

Looking ahead, Singapore will invest concertedly in growing further peaks of excellence in key sectors where it has established strengths, including semiconductors, biopharma, aerospace, quantum, and AI. To be able to attract and retain talent despite growing global competition, we must continue to strengthen Singapore's attractiveness as a global R&D destination, including enhancing access to critical research enablers such as data, AI, and compute, which is a key focus in RIE2030.

Another key priority is to foster convergence science, which integrates concepts, approaches, and techniques across disciplines to address complex problems. Many transformative innovations, from advancements in semiconductors to precision medicine, arise from the integration of insights from physics, materials science, biology, data analytics, and engineering. Continued support for convergence science through funding, collaborative platforms and policies that break down traditional academic silos will help accelerate breakthrough research and innovation in Singapore.

A further area of focus will be to grow the pool of translational talent in our R&D ecosystem. Creating successful deep tech ventures requires not only scientific excellence but also structured venture creation, market validation and commercialisation capabilities, as well as the ability to translate breakthrough research into scalable businesses that address real market needs. Singapore will need to work closely with the AUs and A*STAR to develop the talent, capabilities, and incentives needed to sustain a vibrant innovation and enterprise ecosystem.

A Growing Innovation and Research Translation Ecosystem

A Growing Innovation and Research Translation Ecosystem

In RIE2025, we maintained a strong focus on increasing the vibrancy of our innovation and research translation ecosystem. Translating research into commercial and societal impact requires much more than just excellent science; it also depends on experienced translational and entrepreneurial talent, productisation capabilities, infrastructure, and access to capital to bridge the multiple gaps between discovery, development and deployment. In RIE2025, several coordinated thrusts were introduced or strengthened, including the following.

First, concerted efforts were made to "pull through" public research discoveries from proof-of-concept to commercialisable assets. These involved "gap funding" and support to de-risk early stage technologies developed by public research performers, and bring them to a stage which is attractive to investors and industry partners. These efforts were complemented by access to national translational platforms that provide shared infrastructure and specialist expertise including regulatory guidance.

Second, RIE2025 supported corporate laboratories and consortial partnerships that brought MNCs, LLEs, SMEs, and startups together with local research institutions to co-develop innovative solutions.

Third, Centres of Innovation (COIs) were funded to provide innovation support to SMEs.

Fourth, initiatives to connect local innovators to global markets were strengthened.

These efforts have contributed to a stronger and increasingly vibrant innovation and enterprise ecosystem. Singapore was ranked 5th in the 2025 World Intellectual Property Organisation (WIPO) Global Innovation Index (GII) and 4th in the 2026 Global Startup Ecosystem Index, reflecting the combined effect of RIE investments, Singapore's regulatory environment, and broader economic policies. The number of patents awarded from R&D conducted in Singapore more than doubled, rising from 1,356 in 2018 to 3,116 in 2023.

Key Achievements

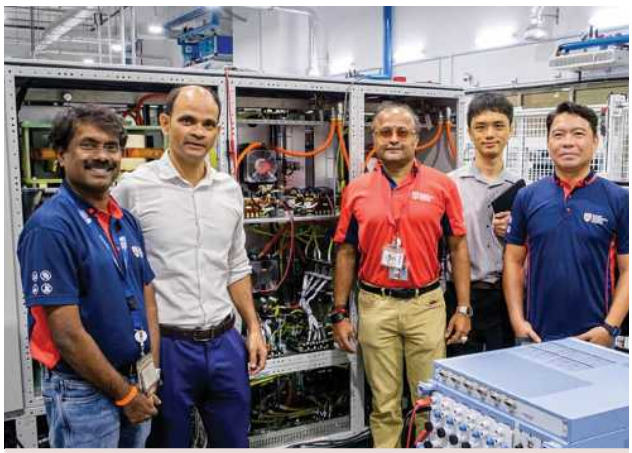
Funding to Develop Research Breakthroughs into Investible IP and Assets

Singapore's universities and research institutes have developed strong capabilities in many science and technology areas. However, early-stage laboratory breakthroughs typically require further development before they can attract commercial interest.

Funding is provided to support researchers to translate their research discoveries into market-ready products. The I&E Offices in our universities and A*STAR support the earliest stages of this effort, funding the translation of public research discovery into proof-of-concept and subsequently commercial adoption. For promising technologies that remain insufficiently mature to gain commercial traction following initial translational efforts, NRF's Central Gap Fund provides supplementary support to further validate and mature the technology, enabling it to attract third-party investment or licensing opportunities. More than 110 spin-offs from our universities and A*STAR raised third-party financing, and more than 1,400 licensing deals were completed within the RIE2025 tranche.

Recognising that the deep technical expertise of researchers needs to be augmented by strong business insights to be able to commercialise technologies successfully, NRF has also worked with a number of venture builders to provide these researchers with active commercial guidance throughout the technology development process, and bring in investors to the resulting spin-off to increase the chances of commercial success.

Xora Innovation is one such venture builder that scaled NTU spin-off Amperesand into a category leader in next-generation power infrastructure for AI data centres and other critical applications. Through Xora's venture-building support, Amperesand secured over US$120 million in financing within three years of incorporation, as well as industry pilot trials with PSA International and hyperscale data centre customers that demonstrated their solutions' commercial viability.



Members of NTU deep tech spin-off Amperesand. From left to right: Senior Research Engineer Mr Madasamy Palavesha Thevar; Senior Programme Director, Future Mobility Solutions & Advanced Power Electronics Dr Anshuman Tripathi; Principal Research Fellow Dr Vaisambhayana Brihadeeswara Sriram, Senior Research Engineer Mr Yeo Howe Li; and Programme Director, Future Mobility Solutions, Mr Gil Opina Jr, with the solid state transformer prototype at the Energy Research Institute @ NTU.

Photo credit: NTU

Specialised Platforms to Support Sector-specific Translation

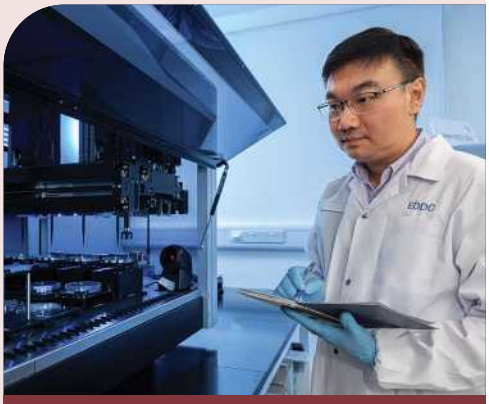
In a number of sectors, taking an early-stage prototype to industry-ready product requires access to specialised equipment, regulatory expertise, and sector-specific know-how that most research teams cannot maintain in-house. The cost and complexity of this stage can be prohibitive, particularly for small companies and early-stage spin-offs, and can delay or derail commercialisation even where the underlying science is strong.

National platforms provide sector-specific, state-of-the-art equipment and prototyping facilities that enable early-stage startups to de-risk and productise their technologies. They also offer compliance-ready environments and catalyse public-private partnerships, lowering adoption risks for industry and accelerating commercialisation. In bridging the gap between research discovery and industry-ready assets, these platforms facilitate downstream development and attract follow-on investment from private sector partners. Examples of such platforms include NSTIC for semiconductors, EDDC for drug discovery and development, and DxD Hub for medical diagnostics and digital health.

Bridging the Drug Development Gap

Launched in 2019, EDDC is a national translational platform that supports Singapore's biotech ecosystem by bridging the drug development gap and building a pipeline of therapeutic assets for licensing, spin-off, or industry development. EDDC has supported local biotechs such as AUM Biosciences, Nuevocor and Engine Biosciences, and also closed multiple licensing deals.

One major deal was with global pharmaceutical company Boehringer Ingelheim. Researchers from A*STAR generated initial antibodies against a unique tumour target originally identified with the SGCC. EDDC then humanised and optimised these antibodies, and demonstrated their applicability across multiple solid cancers and in different therapeutic modalities. Boehringer Ingelheim subsequently entered into a licensing agreement with A*STAR for the global rights to further develop these antibodies into targeted cancer therapies. Under this agreement, A*STAR could potentially receive payments totalling more than €100 million in upfront and success-based development and commercialisation milestone payments.



EDDC staff planning the automation of an antibody engineering process.

Photo credit: EDDC

Bridging Medtech from Lab to Market

The DxD Hub, a national platform hosted by A*STAR, addresses productisation gaps across *in vitro* diagnostics (IVDs), point-of-care connected devices, digital diagnostics, and digital therapeutics by translating IPs into clinically validated, market-ready solutions. Leveraging its end-to-end, ISO 13485-compliant productisation engine, DxD Hub provides multidisciplinary capabilities spanning product design and development, regulatory strategies, manufacturing and a College of American Pathologists (CAP) accredited clinical lab. DxD Hub has supported over 70 medtech companies, been linked to more than $1 billion in follow-on investment, and enabled products serving over 18 million patients globally.

A notable example is UNITED™, a tissue-based clinical grade cancer profiling test, which was co-developed by Lucence (a local precision health startup spun out from A*STAR, which completed its Series A funding round), NCCS, SGH and DxD Hub. Through DxD Hub's support in assay design and development, clinical validation, and access to public healthcare partners, UNITED™ progressed from a research-stage assay to a clinically-deployable diagnostic used to guide treatment decisions for cancer patients.

DxD Hub researchers enhancing urine sample processing workflows for a urine-based multi-cancer test developed in collaboration with SGH and Lucence.
Photo credit: DxD Hub

Building a Vibrant Innovation Ecosystem by Fostering Industry-Research Collaboration

Collaborations with MNCs and large enterprises play a distinctive role in Singapore's translational ecosystem. Beyond industry's co-funding of research, these partnerships bring market insights and industry demands directly into the research process, focusing public R&D on problems with commercial relevance. When research outcomes are taken up and scaled by global companies operating in Singapore, the benefits extend beyond the collaborating parties. Technology and know-how flow to local SMEs through supply chain engagement, and researchers accumulate valuable experience in working with industry to solve difficult technical challenges. Deepening the quality and density of these collaborations has therefore been a central focus of RIE2025's translational strategy.

Under RIE2025, Singapore hosted 18 corporate laboratories, where industry leaders partnered with local universities and research institutes to co-develop innovative solutions. The Smart Manufacturing Joint Lab between A*STAR, Rolls-Royce, and SAESL is a prime example, having deployed 18 breakthrough manufacturing technologies, engaged more than 200 local SMEs, and contributed to a 20% productivity improvement at Rolls-Royce.

The Centre of Excellence in Advanced Packaging — a joint lab between Applied Materials and A*STAR IME — shows how a corporate laboratory can serve as an anchor for broader sectoral development. More than 40 SMEs have been involved with the joint lab, either in developing new capabilities, processes, and product, or in supporting these development efforts, and four industry-funded consortia have been formed.

Nozzle Guide Vane (NGV) and Stator Dimensional inspection system developed through the Smart Manufacturing Joint Lab, deployed at SAESL's MRO facility.
Photo credit: A*STAR

Through the BioPIPS consortium, leading industry specialists and the research ecosystem of Singapore will join forces to boost manufacturing productivity.
Photo credit: A*STAR

Beyond corporate laboratories, consortia partnerships play a valuable role in bringing MNCs, LLEs, SMEs, and startups together with local research institutions to collaborate on pre-competitive research projects. Examples include the A*STAR Advanced Remanufacturing and Technology Centre (ARTC), the Singapore Aerospace Programme consortium, the Pharma Innovation Programme Singapore (PIPS), and the Biologics Pharma Innovation Programme Singapore (BioPIPS).

COIs extend this collaborative infrastructure to SMEs that may lack the scale or resources to engage with research institutions directly. Operating as one-stop innovation hubs, COIs work with SMEs to develop new products, services, or solutions, offering access to specialised equipment, laboratories, training for product and process innovation, as well as access to expertise in the polytechnics and research institutes across a range of industry sectors. In RIE2025, four new COIs were launched to cover new sectors in Built Environment, Urban Agriculture, and Consumer Products. These added to existing COIs in Advanced Manufacturing, Aquaculture, Supply Chain Management, Energy, Environmental Sustainability, and Food Manufacturing. Collectively, these COIs supported over 525 industry projects with SMEs in RIE2025.

COI Partnership for Product Development in Heritage Conservation

FranzWood, a consultancy and engineering firm specialising in built heritage conservation, recognised a gap in the local industry, which often relied on generic solutions unsuitable for Singapore's tropical climate. To address this challenge, FranzWood partnered with the Centre of Innovation for Built Environment — Advanced Materials (COI BE-AM) to co-develop a specialised patination solution for heritage buildings. Leveraging COI BE-AM's expertise in chemical formulation and materials science, the team worked closely with FranzWood's engineers and architectural conservation practitioners to optimise the patination process and develop a locally blended solution tailored for the hot, humid and high-UV conditions of the tropics.

Through iterative testing and refinement of the formulation, the collaboration successfully achieved the desired patina colour and durability for copper domes and architectural features. It also enabled FranzWood to expand into artificial copper patination, a new and complementary business area in the industry. Building on this capability, FranzWood aims to expand its conservation services beyond Singapore into regional markets such as Cambodia and Indonesia, where demand for specialised heritage restoration expertise is growing.

These efforts to foster industry-research collaborations have increased industry R&D spending on partnerships between companies and public research institutions from $1 billion over 2016–2020 to $1.6 billion over 2021–2025.

While most of our schemes to promote industry-research collaborations have catalysed good industry interest, one scheme (the Industry Alignment Fund — Pre-Positioning (IAF-PP) Programme)[16] that sought to develop technologies in anticipation of future industry demand saw mixed results. For such medium-term projects, companies found it challenging to have a clear line of sight of the value from the projects, while public research collaborators often did not sufficiently prioritise the longer-term commercial outcomes and industry needs.

In RIE2030, two new funding schemes will be introduced in its place — the Manufacturing, Trade and Connectivity (MTC) MISSION and Human Health and Potential (HHP) MISSION schemes will take a more mission-oriented approach, guided by industry-relevant problem statements in manufacturing and connectivity, and medtech and biotech respectively. Projects will also be actively managed, including frequent technical reviews and external benchmarking, to drive stronger translation outcomes.

Connecting Singaporean Innovators to Global Markets

Successful innovation ecosystems must be well connected with global innovation hubs to enable strong bidirectional flows of ideas, talent, and capital. This is particularly critical for Singapore-based startups given the constraints of our small domestic market.

The Global Innovation Alliance (GIA) supports the internationalisation of enterprises by facilitating innovation and market access in more than 50 countries. Through partnerships with government bodies, corporates and innovation leaders, GIA has empowered over 700 startups and tech SMEs to forge new networks, accelerate R&D, and grow internationally.

GIA as a Launchpad from Singapore to the World

Quantified Energy (QE) is an NUS spin-off specialising in advanced photovoltaic health analytics and electroluminescence inspection technologies. Through GIA-supported partnerships, QE co-developed field-deployable evaluation systems for distributed solar assets in China, leading to the first integration of its technology into an insurance risk-engineering framework with a Chinese insurer. Building on this, QE expanded into India in 2025 through GIA-enabled pilot projects, demonstrating measurable improvements in solar farm inspection efficiency. This multi-market engagement accelerated the startup's growth, enabling QE to establish reference customers and build commercial credibility across diverse international markets. By connecting Singapore-based deep tech ventures such as QE to key international innovation hubs, markets, and partner networks, GIA supports their commercial expansion and growth of international revenues. This complements the broader ecosystem of incentives that anchor these ventures' headquarters and IP base in Singapore, while serving as a launchpad for globally-competitive deep tech startups.

Quantified Energy's team with its autonomous drone technology for solar photovoltaic inspection.
Photo credit: Quantified Energy

[16] The IAF-PP Programme aimed to develop industry-ready capabilities and deepen alignment of public sector research through multidisciplinary and integrated programmes with early industry involvement. Programmes supported should lead to industry participation within three to five years.

Budget

Budget

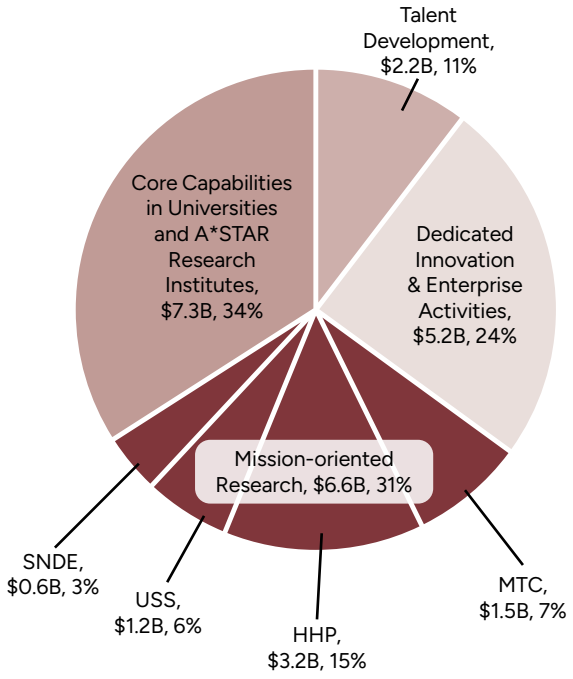
The RIE2025 plan was initially allocated $25 billion for the five-year period from 1 April 2021 to 31 March 2026, but received a top-up in 2024 that raised the total budget to $28 billion, in line with Singapore's long-standing commitment to invest approximately 1% of GDP in public sector R&D. This stable, long-term investment approach is essential for building and sustaining capabilities, and progressively capturing the value of our research in strategic areas.

Over the course of the RIE2025 tranche, allocations were adjusted as warranted — based on regular programme monitoring and the RIE Mid-Term Review — to shift funds towards areas showing strong progress or promise. At the outset, about 15% of the total budget was held back as White Space funding — a reserve that allowed the Government to respond nimbly to new or enhanced opportunities as they emerged. This White Space fund was fully utilised by the end of the tranche, and its flexibility proved particularly valuable in supporting significant step-ups in high-potential emergent areas — including increased investments in AI and quantum technologies, and enhanced support for the semiconductor sector. Core capabilities in universities and A*STAR were also strengthened, including the progressive replacement of ageing facilities with state-of-the-art infrastructure.

Across the RIE2025 tranche, excluding funding for dedicated talent schemes, spending remained broadly balanced across core capabilities, mission-driven research, and dedicated I&E activities, at about one-third, one-third and one-quarter of the overall RIE budget respectively. 7% of the overall RIE2025 budget was spent on AI, including key programmes such as the National AI R&D Plan, the AI-for-Science initiative, and the Singapore Medical Foundation AI Model (SIMFONI). This reflects the balance struck between long-term capability development and nearer-term value-realisation for Singapore.

Start-Tranche Allocation ($25B)

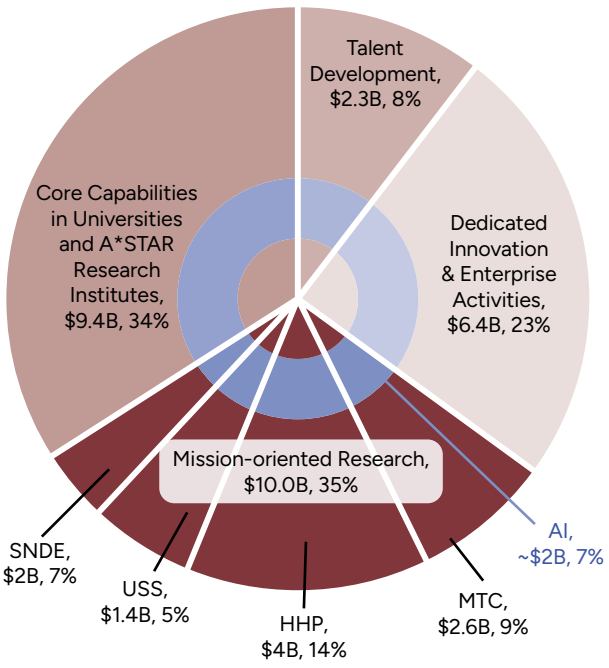
Comprising $21.3B of funds allocated to sectors and $3.7B of RIE White Space[a]



Note: · Budget pie chart illustrates budget allocation across the sectors.
· RIE White Space was committed over course of the tranche, and not included in this budget pie chart.

Estimated RIE2025 Spending ($28B)

Including $3B top-up in 2024



Note: · Budget pie chart illustrates the total budget spending across the sectors, including additional RIE White Space funding allocated to the respective sectors over the tranche.
· While the National AI R&D Plan is accounted for in SNDE, AI is also embedded within RIE programmes and projects across all the RIE Domains and Horizontals[b]. For instance, the AI4S initiative would be accounted for under Core Capabilities in Universities and A*STAR Research Institutes, and SIMFONI would come under HHP. In total, an estimated 7% of the overall RIE2025 budget was spent on initiatives explicitly linked to AI. The actual expenditure tied to the use of AI in research would be higher.

[a] White Space funding was set aside to support new and emergent priorities. Funding was subsequently awarded to meritorious proposals that addressed key national priorities and economic needs over RIE2025.

[b] For other cross-cutting enablers, such as talent and infrastructure, sector-specific investments are similarly embedded within individual domains, in addition to being represented within the dedicated categories (e.g. Talent Development, and Core Capabilities in Universities and A*STAR Research Institutes).

Conclusion

Conclusion

The capabilities, ecosystems, and talent base built or strengthened under RIE2025 have been important in positioning Singapore for the next phase of our RIE journey. Singapore enters RIE2030 with world-class universities and research institutions, strong and expanding partnerships with industry, a growing deep tech startup ecosystem, and cutting-edge capabilities in key technology areas, including AI, quantum, semiconductors, biomedical sciences, and sustainable systems. At the same time, RIE2025 has surfaced persisting gaps in translational and entrepreneurial talent, venture-building capital, and commercialisation exits, which RIE2030 must focus on addressing.

The progress made reflects the systematic development of interlocking building blocks and enablers. These include targeted support and specialised translation platforms that help laboratory breakthroughs become market-ready products, coordinated programmes to attract and develop entrepreneurial talent to lead and grow deep tech startups, patient capital mechanisms that crowd in private investment, large corporate partnerships that anchor solutions to real-world demand and expand their R&D and economic activities in Singapore, and platforms to connect Singapore-based innovators to global markets.

However, RIE2025 also yielded important learning points, including the following:

First, it is critical to sustain RIE investments over long timeframes, as translational outcomes from R&D require long gestation periods, and are iterative and non-linear in nature. Singapore's ability to rapidly pull together a diverse range of R&D to support our national COVID-19 response, and our ability to advance our semiconductor sector through world-class research expertise in advanced packaging and photonics, are good examples of this. Each of these was possible because of research capabilities progressively built and accumulated across multiple preceding RIE tranches. In the same way, our strengths in AI and quantum technologies today rest on decades of prior investment.

Second, Singapore has strong research talent and capabilities, with global peaks in selected areas. However, more remains to be done to increase the commercialisation of local research breakthroughs and IP.

Third, AI, data, and leading-edge computational capabilities are transforming research and innovation globally. For this reason, RIE2030 will significantly extend the work done in RIE2025, with a specific strong focus on developing well-coordinated, cutting-edge capabilities in AI, data, and compute. AI has demonstrated particularly significant and broad-based potential, and hence in RIE2030, there will be a strengthened emphasis on developing our capabilities in AI further, both as a frontier research and application domain in its own right, and as a powerful cross-cutting enabler of transformative innovation in many domains.

Fourth, RIE has contributed to our economy and its increasing research intensity, in significant part through research and translational partnerships with MNCs and LLEs. The deep tech and biomedtech ecosystems have grown significantly, but access to entrepreneurial talent and venture-building capital remains a significant and persistent bottleneck. There will therefore be redoubled efforts in RIE2030 to increase the pool of experienced entrepreneurial and business talent, and access to venture-building capital and expertise, as well as markets.

Fifth, for I&E, demand-shaping and strong translational pathways have proved critical. In RIE2030, the I&E portfolio will place greater emphasis on demand-shaped innovation through the new MTC and HHP MISSION schemes.

Sixth, RIE has contributed to significant advancements in key sectors such as healthcare, climate change adaptation, and liveable cities. However, addressing complex sectoral issues requires more demand informed research programmes and clear translational pathways.

To deliver more consequential impact, our research portfolio must encompass initiatives of greater scale and higher levels of ambition, executed with speed, coordination, and agility. The RIE Flagships and Grand Challenges in RIE2030 will help drive this shift by concentrating resources and aligning efforts across research institutions and agencies to deliver more consequential outcomes. Each of these RIE Flagships and Grand Challenges will also bring existing programmes more synergistically together under one governance structure, to collectively achieve higher impact than the individual programmes would likely be able to deliver by themselves.

Glossary of Acronyms

A*STAR — Agency for Science, Technology and Research
ABS — American Bureau of Shipping
AED — Automated External Defibrillators
AGS — A*STAR Graduate Scholarship
AGV — Automated Guided Vehicle
AI — Artificial Intelligence
AI4S — AI-for-Science
AIAP — AI Apprenticeship Programme
AIF — A*STAR International Fellowship
AIMfg — AI Centre of Excellence for Manufacturing
AISG — AI Singapore
AMC — Academic Medical Centre
ANSPs — Air Navigation Services Providers
ARAP — A*STAR Research Attachment Programme
ART — Antigen Rapid Test
ARTC — Advanced Remanufacturing and Technology Centre
ASEAN — Association of Southeast Asian Nations
ASNR — French Authority for Nuclear Safety and Radiation Protection
ATC — Applied Total Control Treatment Pte Ltd
ATP — Aviation Transformation Programme
ATTRaCT — Asian neTwork for Translational Research and Cardiovascular Trials
AU — Autonomous Universities
AWS — Amazon Web Services
BE-AM — Built Environment - Advanced Materials
BERD — Business Expenditure on R&D
BioPIPS — Biologics Pharma Innovation Programme Singapore
BMRC — Biomedical Research Council
BMSIPO — Biomedical Sciences Industry Partnership Office
CAAS — Civil Aviation Authority of Singapore
CAP — College of American Pathologists
CDA — Communicable Diseases Agency
CE — Conformité Européenne
CFS — Commonwealth Fusion Systems
CGP — Comprehensive Genomic Profiling
COI — Centres of Innovation
COVID-19 — Coronavirus Disease 2019
CPR — Cardiopulmonary Resuscitation
CQT — Centre for Quantum Technologies
CTI — Cell Therapeutics Inc.
DNA — Deoxyribonucleic Acid
DxD Hub — Diagnostics Development Hub
EDB — Economic Development Board
EDDC — Experimental Drug Development Centre
FDA — Food and Drug Administration
FH — Familial Hypercholesterolemia
FWCI — Field-Weighted Citation Impact
GaN — Gallium Nitride
GDP — Gross Domestic Product
GIA — Global Innovation Alliance
GII — Global Innovation Index
GIS — Genome Institute of Singapore
GISAID — GISAID Global Data Science Initiative
GMP — Good Manufacturing Practice
GUSTO — Growing Up in Singapore Towards Healthy Outcomes
GYSS — Global Young Scientists Summit
HDB — Housing and Development Board
HHP — Human Health and Potential
HSA — Health Sciences Authority
I&E — Innovation and Enterprise
I²R — Institute for Infocomm Research
IAEA — International Atomic Energy Agency
ICAI — International Centre for Aviation Innovation
IFP — I&E Fellowship Programme
IHL — Institutes of Higher Learning
IHPC — Institute of High Performance Computing
IMCB — Institute of Molecular and Cell Biology
imCORE — international multidisciplinary Centers of Oncology Research Excellence
IME — Institute of Microelectronics
IP — Intellectual Property
KHB — Kyowa Hakko Bio
LLE — Local Large Enterprise
LR — Lloyd's Register
M&S — Modelling & Simulation
MDDI — Ministry of Digital Development and Information
MDI-QKD — Measurement Device Independent Quantum Key Distribution
MIT — Massachusetts Institute of Technology
MNC — Multinational Corporation
MND — Ministry of National Development
MOE — Ministry of Education
MOH — Ministry of Health
MOT — Ministry of Transport
MPA — Maritime and Port Authority of Singapore
MRO — Maintenance, Repair and Overhaul
MSE — Ministry of Sustainability and the Environment
MTC — Manufacturing, Trade and Connectivity
MTI — Ministry of Trade and Industry
MWp — Megawatt-peak
NAMIC — National Additive Manufacturing Innovation Cluster
NAND — NOT AND flash memory
NATi — Nucleic Acid Therapeutics Initiative
National GRIP- National Graduate Research Innovation Programme
NCAIP — National Centre for Advanced Integrated Photonics
NCCS — National Cancer Centre Singapore
NCID — National Centre for Infectious Diseases
NCIS — National University Cancer Institute, Singapore

NEA — National Environment Agency
NPM — National Precision Medicine
NQCH — National Quantum Computing Hub
NQFF — National Quantum Federated Foundry
NQO — National Quantum Office
NQPI — National Quantum Processor Initiative
NQSN — National Quantum-Safe Network
NQSP — National Quantum Sensor Programme
NRF — National Research Foundation
NRFF — NRF Fellowship
NRFI — NRF Investigatorship
NRFP — NRF Professorship
NSC — National Skin Centre
NSS — National Science Scholarship
NSTIC — National Semiconductor Translation and Innovation Centre
NTU — Nanyang Technological University
NUHS — National University Health System
NUS — National University of Singapore
OHCA — Out-of-Hospital Cardiac Arrest
PhD — Doctor of Philosophy
PI — Principal Investigator
PIPS — Pharma Innovation Programme Singapore
PNT — Positioning, Navigation, and Timing
PREPARE — Programme for Research in Epidemic Preparedness and REsponse
PrepVax — Pathogen/Pathway to Vaccine Development to Enhance Singapore's Pandemic Resilience
PSA — President's Science Award
PSTA — President's Science and Technology Awards
PSTM — President's Science and Technology Medal
PUBERD — Public Expenditure on R&D
PV — Photovoltaic
QE — Quantified Energy
QIBs — Quantitative Imaging Biomarkers
qMCMC — quantum Markov Chain Monte Carlo
QS — Quacquarelli Symonds
R&D — Research and Development
RCP — Regional Collaboration Platform
RI — Research Institute
RIE — Research, Innovation and Enterprise
RIEC — Research, Innovation and Enterprise Council
RNA — Ribonucleic Acid
RSSS — Returning Singaporean Scientists Scheme
S&T — Science & Technology
SAESL — Singapore Aero Engine Services Private Limited
SARS — Severe Acute Respiratory Syndrome
SELENA+ — Singapore Eye Lesion Analyser
SERI — Singapore Eye Research Institute
SERIS — Solar Energy Research Institute of Singapore
SGI — SGInnovate
SGH — Singapore General Hospital
SGX — Singapore Exchange
SHINE — Singapore Hybrid-Integrated Next-Generation micro-Electronics Centre
SIA — Singapore Airlines
SiDRP — Singapore Integrated Diabetic Retinopathy Programme
SIMTech — Singapore Institute of Manufacturing Technology
SIMFONI — Singapore Medical Foundation AI Model
SINGA — Singapore International Graduate Award
SIT — Singapore Institute of Technology
SME — Small & Medium Enterprise
SMI — Singapore Maritime Institute
SMJL — Smart Manufacturing Joint Lab
SMR — Small Modular Reactor
SNDE — Smart Nation and Digital Economy
SNEC — Singapore National Eye Centre
SNRSI — Singapore Nuclear Research and Safety Institute
SIPGA — Singapore International Pre-Graduate Award
SSGE — Startup SG Equity
STCC — Singapore Translational Cancer Consortium
STEM — Science, Technology, Engineering, and Mathematics
STFC — Science and Technology Facilities Council
SUTD — Singapore University of Technology and Design
T-ALL — T-cell acute lymphoblastic leukaemia
T-Up — Technology for Enterprise Capability Upgrading
TBO — Trajectory-Based Operations
TCOMS — Technology Centre for Offshore and Marine, Singapore
TEUs — Twenty-foot Equivalent Units
TIMES — Tumour Immune Microenvironment Spatial
TMSI — Tropical Marine Science Institute
TSMC — Taiwan Semiconductor Manufacturing Company
URA — Urban Redevelopment Authority
URBEX — Urban Planning and Design Technology
US — United States
USS — Urban Solutions and Sustainability
UV — Ultra-violet
VA — Value-added
VC — Venture Capital
WAAM — Wire Arc Additive Manufacturing
WEF — World Economic Forum
WIPO — World Intellectual Property Organisation
YSA — Singapore Young Scientist Award

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