AGENCY FOR SCIENCE, TECHNOLOGY AND RESEARCH

ANNUAL REPORT
APR 2013 – MAR 2014

AGENCY FOR SCIENCE, TECHNOLOGY AND RESEARCH

ANNUAL REPORT FOR THE YEAR ENDED 31 MARCH 2014

In the opinion of the directors, the annual report of the Agency for Science, Technology and Research (A*STAR) is drawn up so as to present fairly the state of affairs of A*STAR as at 31 March 2014.

On behalf of the Board of Directors,

Lim Chuan Poh

Chairman

31 Jul 2014

Raj Thampuran

Managing Director

31 Jul 2014

ORGANISATION DETAILS

Board Secretary	Ms Emily Liew Director Planning & Policy Department Agency for Science, Technology and Research
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Contents

Introduction to Agency for Science, Technology and Research (A*STAR)

The Agency for Science, Technology and Research (A*STAR) is an economic agency responsible for spearheading mission-oriented research in Singapore. Tasked with **Creating an Innovation Economy,** A*STAR fosters world-class scientific research and talent to create and capture new economic opportunities, improve the lives of Singaporeans and help establish Singapore as one of the most research intensive, innovative and entrepreneurial economies in the world.

Board Members

Chairman

Mr Lim Chuan Poh
Chairman, A*STAR

Deputy Chairman

Prof Tan Chorh Chuan
Deputy Chairman, A*STAR
President, National University of Singapore

Members

Prof Raj. Thampuran
Managing Director, A*STAR

Prof Bertil Andersson
President, Nanyang Technological University

Prof Isaac Ben-Israel
Chairman, Israel Space Agency
Chairman, Israel National Council for R&D

Mr Bruce Brown
Officer on Special Assignment, Procter & Gamble Company

Dr William W. Chin
Executive Vice President, Science and Regulatory Affairs
Pharmaceutical Research and Manufacturers of America (PhRMA)

Prof Jonathan Knowles
Finnish Distinguished Professor,
Institute for Molecular Medicine Finland FIMM
Nordic EMBL Partnership for Molecular Medicine

Mr Lam Yi Young
Deputy Secretary (Policy), Ministry of Education

Mr Ng Wai Choong
Deputy Secretary (Policy), Ministry of Finance

Prof Sir Keith O'Nions
President & Rector, Imperial College

Prof Sir John O'Reilly
Chairman, Science and Engineering Research Council, A*STAR
Director General for Knowledge and Innovation
Department for Business, Innovation and Skills

Mr Ong Boon Hwee
Chief Executive Officer
Stewardship and Corporate Governance Centre (SCGC)
Wef 16 April 2014

Mr Quek Tong Boon
Chief Defence Scientist, Ministry of Defence

Prof Sir George Radda
Chairman, Biomedical Research Council, A*STAR
Emeritus Professor of Molecular Cardiology, University of Oxford

Dr Sun Shih-Wei
Vice Chairman, United Microelectronics Corporation

Prof Tan Eng Chye
Deputy President (Academic Affairs) and Provost, National University of Singapore

Mr Tan Kok Kiong Andrew
Deputy Secretary (Special Duties), Ministry of Transport

Dr Patrick Vallance
President, Pharmaceuticals R&D, GlaxoSmithKline

Dr Tadataka Yamada
Chief Medical & Scientific Officer (CMSO),
Executive Vice President & Board Member,
Takeda Pharmaceuticals

Mr Yeoh Keat Chuan
Managing Director, Economic Development Board

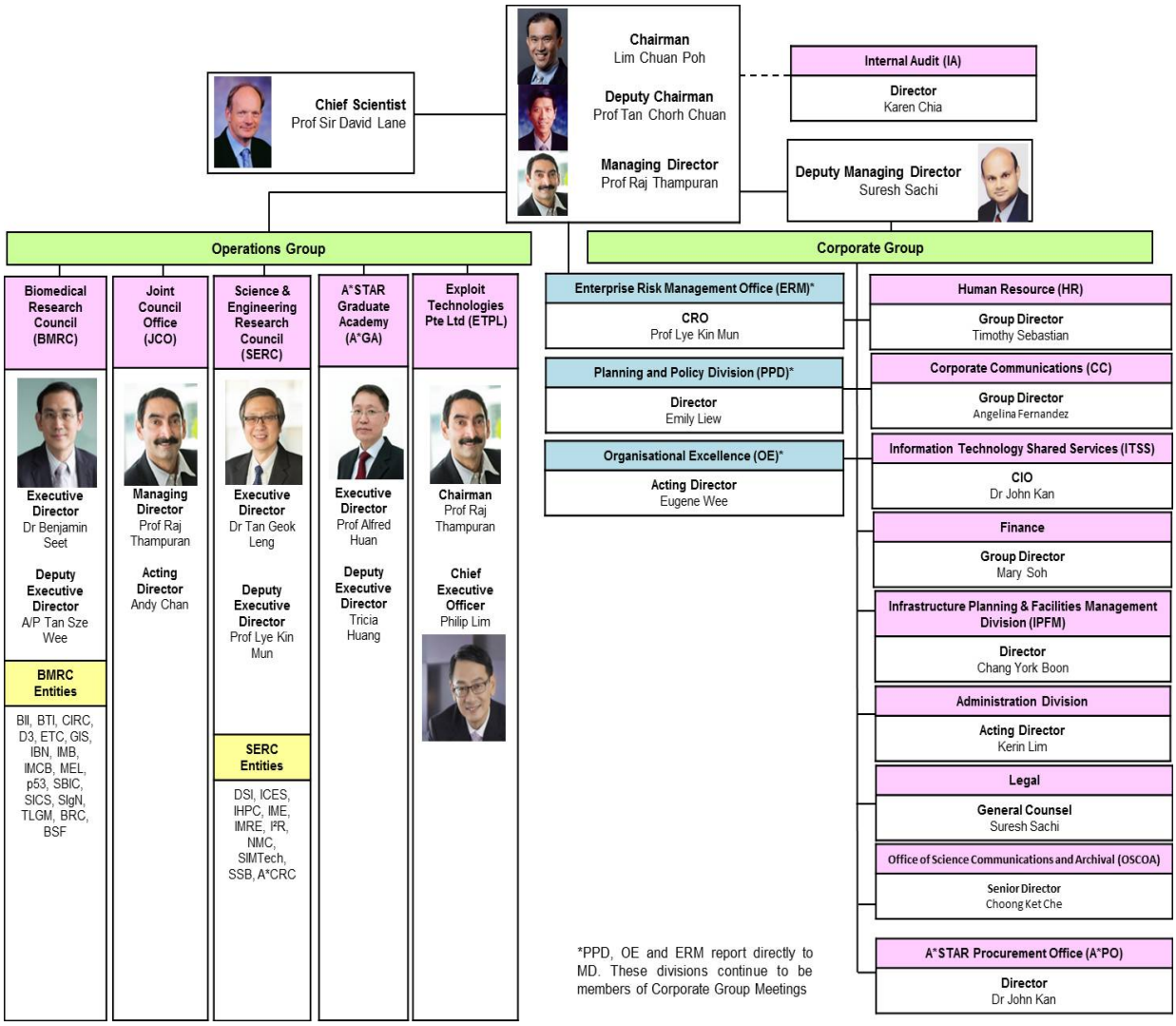
One board member, Mr Ng Cher Pong, Deputy Secretary (Policy), Ministry of Education, relinquished his ex-officio appointment on the Board on 31 October 2013. Mr Lam Yi Young has since taken over with effect from 1 March 2014.

We thank Mr Ng for his service to the A*STAR Board.

Key Management Personnel

Chairman, A*STAR	Mr Lim Chuan Poh
Deputy Chairman, A*STAR	Prof Tan Chorh Chuan
Managing Director, A*STAR	Prof Raj. Thampuran
Scientific Advisor to A*STAR Chairman	Dr Sydney Brenner
Chairman, Biomedical Research Council (BMRC)	Prof Sir George Radda
Chairman, Science and Engineering Research Council (SERC)	Prof Sir John O'Reilly
Chief Scientist, A*STAR	Prof Sir David Lane
Deputy Managing Director (Corporate & Legal), A*STAR and General-Counsel	Mr Suresh Sachi
Deputy Chairman, Translational and Clinical Sciences (BMRC)	Prof Edward Holmes
Executive Director, Biomedical Research Council, A*STAR	Dr Benjamin Seet
Executive Director, Science and Engineering Research Council, A*STAR	Dr Tan Geok Leng
Chief Executive, Exploit Technologies Pte Ltd (ETPL), A*STAR	Mr Philip Lim
Executive Director, A*STAR Graduate Academy, A*STAR	Prof Alfred Huan

A*STAR Organisation Chart



Updated as at 1 July 2014

Major Shareholder of Subsidiary Companies

Name of subsidiary company:	Exploit Technologies Pte Ltd
% shareholdings in company:	100%

Exploit Technologies Pte Ltd (ETPL)

ETPL is the technology transfer arm of the Agency for Science, Technology and Research (A*STAR), Singapore's lead agency for fostering world-class scientific research and talent. A*STAR oversees 18 biomedical sciences, physical sciences and engineering research institutes and consortia. As a one-stop resource, ETPL supports A*STAR in transforming the economy through driving innovation and commercializing its research outcomes.

ETPL enhances the research output of A*STAR scientists by translating their inventions into marketable products or processes. Through shaping and facilitating licensing deals and spin-offs, ETPL actively engages industry leaders and players to commercialise A*STAR's technologies and apply them to building ecosystems that benefit business, industry and economy.

For more information, please visit http://etpl.sg

List of A*STAR Research Institutes and Consortia

A*STAR has 18 research institutes and consortia, spanning a broad range of research areas from the biomedical sciences, to the physical sciences and engineering.

Biomedical Research Institutes and Consortia
Bioinformatics Institute (BII)
Bioprocessing Technology Institute (BTI)
Experimental Therapeutics Centre – Drug Development and Discovery (ETC-D3)
Genome Institute of Singapore (GIS)
Institute of Bioengineering and Nanotechnology (IBN)
Institute of Medical Biology (IMB)
Institute of Molecular and Cell Biology (IMCB)
Singapore Bioimaging Consortium – Clinical Imaging Research Centre (SBIC-CIRC)
Singapore Institute for Clinical Sciences (SICS)
Singapore Immunology Network (SIgN)

Science and Engineering Research Institutes and Consortia
Data Storage Institute (DSI)
Institute of Chemical and Engineering Sciences (ICES)
Institute of High Performance Computing (IHPC)
Institute for Infocomm Research (I^2R)
Institute of Materials Research and Engineering (IMRE)
Institute of Microelectronics (IME)
National Metrology Centre (NMC)
Singapore Institute of Manufacturing Technology (SIMTech)

Staff Strength in A*STAR

The total strength of the A*STAR community, including scientists and researchers, technical and non-technical staff, and industry development and commercialisation staff was 5,330 as at 31 March 2014.

Overview of FY2013 Achievements

1. Singapore's R&D landscape has grown considerably since A*STAR was formed in 2001. In 2012, Singapore's gross expenditure on R&D was S$7.2 billion and R&D products contributed over S$21.3 billion to the economy. The number of Research, Scientists and Engineers (RSEs) employed has doubled from 15,000 in 2002 to 30,000 in 2012, as investments in R&D continue to create high-value jobs in Singapore. The growing stature of our research efforts is also reflected in Singapore's performance in innovation reports. Singapore was ranked 7th in INSEAD's 2014 Global Innovation Index, and was the most productive in Asia-Pacific for the publication of research articles on the Nature Publishing Index 2013.

2. Beyond the rankings, A*STAR has been pursuing its mission with success. A*STAR RIs have continued to forge significant public-private partnerships across a range of industries including partnerships with Nestle S.A., Lloyd's Register, L'Oreal, Coca-Cola and DBS Bank, as well as expanding R&D collaborations with companies such as Applied Materials and P&G. From 1 Apr 2011 to 31 March 2014, A*STAR has undertaken more than 4,500 industry projects which catalysed more than S$600 million in industry R&D investments in Singapore.

3. We have achieved greater commercialisation outcomes and have already matched the achievements of the last five-year tranche in licensing (510 licences with an RICV value of $250 million from 1 Apr 2011 to 31 Mar 2014). Start-ups harnessing A*STAR technologies are also gaining international recognition. For example, VeriStem Technologies (BTI) won the Biospectrum APAC Emerging Coy of the Year Award 2013, and EyeFly3D (I^2R) won the ASEAN Outstanding Engineering Achievement 2013.

4. 2013 also marked a significant year for Biopolis. Biopolis commemorated its 10th anniversary on 16 Oct 2013 in a ceremony graced by President Tony Tan, Chairman A*STAR, Chairman EDB and Chairman JTC. Through the past 10 years, Biopolis has been a catalyst of Singapore's BMS Initiative and a symbol of Singapore's commitment to anchor BMS as the fourth pillar Singapore's economy. A*STAR continues to leverage on the infrastructure at Biopolis, which allows research institutes to benefit from the co-location of private companies with on-going collaboration across different fields of biomedical research.

5. On talent, A*STAR has a vibrant, dynamic and cosmopolitan community of more than 5,300 staff from 59 different countries. Of the more than 4,100 researchers, engineers and technical support staff, 54% are PhDs, of which 38% are Singaporeans. This year, within the scientific community, Prof Boris Luk'yanchuk (DSI), Prof Jackie Ying (IBN), Prof Li Haizhou (I^2R), Dr Patrick Tan (GIS), and Dr Desmond Heng (ICES), among others, have won prestigious scientific awards. We are starting to see our young scientists excelling and winning recognition on the global stage, thereby auguring well for the future of research in Singapore. Dr

Patrick Tan (GIS) and Dr Florent Ginhoux (SIgN) were among early-career researchers who were recognised internationally for their scientific contributions.

6. A*STAR had a productive year in 2013. We are well on track to achieving our Key Performance Indicators (KPIs) into the third year of the Research, Innovation and Enterprise (RIE) 2015 tranche. In a number of KPIs, we have already surpassed the 5-year target.

7. KPI achievements for FY2013 are summarised below.

Category	RIE 2015 KPIs	FY2013 Achievement Cumulative (% achieved)	RIE2015 Target
Public R&D	Industry funding received ($mil)	$171 mil (67%)	$255 mil
	No. of industry projects	4486 (272%)	1,651
	No. of Translational and Clinical Research (TCR) projects	178 (76%)	234
	IAF Industry R&D spending ($mil)	$620 mil (124%)	$500 mil
	IAF Industry projects	177 (236%)	75
Innovation & Enterprise	No. of RSEs from RIs seconded to industry (GET-Up only)	183 (67%)	275
	No. of licenses (overall)	510 (194%)	263
	No. of licenses or spin-offs arising from completed Gap Funded projects	167 (167%)	100
Talent	No. of PhD postgraduates trained or being trained by the RIE2015 talent budget	497 (64%)	780
	No. of PhD postgraduates who work in Singapore upon graduation	*Lag KPIs. Data will only be provided towards the end of the RIE2015 tranche.*	399
	No. of PhD postgraduates who work in Singapore within a 5-year window upon graduation		399

Information as at 31 March 2014, rounded to the nearest whole number

Industry Engagements

Partnerships with Companies

8. In FY2013, A*STAR made strides in forging strategic partnerships with many companies that have brought in significant investments into Singapore and created high-value jobs. Notable industry deals include:

Procter & Gamble (P&G). DPM Tharman officially opened the Singapore Innovation Centre (SgIC) on 28 Mar 2014. The new $250 mil centre, employing 500 people, is the largest private research facility in Singapore and it will house research for hair, skin, home care and personal health and grooming products. P&G has also signed a $60 mil Master Research Collaboration Agreement (MRCA) with A*STAR. There are also ongoing discussion to expand the MRCA to include other public sector organizations such as NTU, NUH and NUS.

Nestlé S.A. A*STAR signed a 3-year Framework Research Agreement with Nestlé S.A. on 22 Jan 2014. The umbrella agreement that involves the participation of all 18 A*STAR research institutes will allow opportunities for collaboration with Nestlé's affiliates globally. It will foster collaborations in the area of packaged food and beverages, food ingredients, nutrition, food manufacturing processes, food science and technology, and biotransformation. This partnership has generated global interest, with local and international media releases from Bloomberg, Reuters, NASDAQ and others. Nestlé has also set-up a scouting office in Biopolis to tap on A*STAR's research expertise.

Lloyd's Register. Lloyd's Register has established a world-class Group Technology Centre (GTC) in Singapore to deliver innovation and solutions to the energy and maritime sectors. The capabilities and resources of the new centre will be scaled up over five years to enable Lloyd's Register and A*STAR to pursue mutually identified projects under the new research agreement. Investment in this new centre is expected to reach US$35 million, and it will employ up to 150 full-time engineers, researchers and doctoral students.

The Coca-Cola Company. A three-year agreement for a joint collaboration funding programme for research was signed between The Coca-Cola Company (TCCC) and A*STAR on 18 Feb 2014. Under this agreement, both A*STAR and TCCC will co-invest US$2 mil each (i.e. US$4 mil in cash in total) to fund research projects that may involve any of A*STAR's RIs. The partnership may explore research collaboration in areas such as packaging, analytics, materials, simulation, and nutrition. As one of Coca-Cola's external partners, A*STAR will complement Coca-Cola's existing R&D centres in Asia. The partnership with A*STAR will tap onto both parties' expertise in a range of advanced technologies and research fields that will

help Coca-Cola to optimise its production processes, as well as gain new insights into consumer needs and preferences. By providing opportunities for researchers at A*STAR to embark on collaborations with Coca-Cola's R&D centres globally, this partnership will also boost A*STAR's research activities in food and nutrition research.

GlaxoSmithKline. ICES and GSK signed a five-year strategic agreement to develop new evidence based formulations (EBFs) specifically for emerging markets. EBFs are medicines which are reformulated to provide additional patient benefit. ICES has a long standing relationship with GSK since 2003, and the development of EBFs will further strengthen the relationship between both parties. The collaboration will enhance ICES' technical expertise and know-how in drug product formulation, analytical techniques, development and scale up. It will build a pool of local expertise in specialised formulation for pharmaceutical development in Singapore.

Rolls Royce. SIMTech signed an RCA with Rolls Royce to study the architecture of adaptive robotic polishing and deburring capabilities, involving the use of force control functions coupled with non-contact inspection technique. This project advances the technology readiness of this process and prepares the technology transfer back to supply chain units.

Arkray. In Mar 2013, IBN finalised an MOU to establish an R&D partnership with Arkray, the world's largest independent in vitro diagnostics (IVD) company (10th-largest including other non-independent IVD businesses). Under the MOU, Arkray will establish a new R&D centre in Biopolis (co-located with IBN), which will hire 21 research staff over five years and represent a projected total investment of S$8.6 mil. This lab-in-RI arrangement facilitates Arkray's R&D centre operations, as well as access to research expertise and support on specific projects currently under discussion.

Industry Consortia

Aerospace Programme. The A*STAR Aerospace Programme is currently in its 6th cycle and the research consortium has a total of 16 members. The consortium drives innovation critical to the development of Singapore's aerospace industry. Pre-competitive research carried out through the consortium builds Singapore's mindshare with leading aerospace original equipment manufacturers (OEM) and enhances Singapore's standing as a global aviation hub. This strengthens Singapore's value proposition for aerospace engineering, manufacturing, and MRO (Maintenance, Repair and Overhaul) activities.

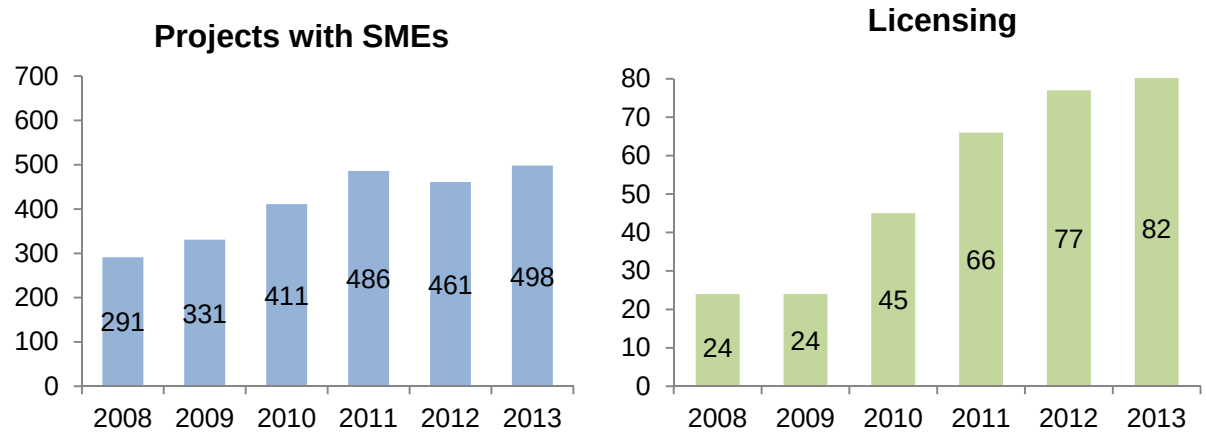
Nanoimprint Foundry Initiative. The new Nanoimprint Foundry was established to bridge the gap between laboratory-based nanotechnologies and real-world products, and will allow industry partners to use this cutting edge technology, in collaboration with A*STAR, to develop, test-bed and prototype specially nano-engineered plastics and surfaces for the specific purpose of manufacturing and commercialising new or enhanced products. Letters of Intent have been signed with eight industry partners including Toshiba Machines Co Ltd, EV Group, NTT Advanced Technology Corporation, NIL Technology ApS, Kyodo International Inc., micro resist technology GmbH, Nanoveu Pte Ltd and Solves Innovative Technology Pte Ltd.

Singapore Centre for Nutritional Sciences, Metabolic Diseases and Human Development (SiNMeD). A*STAR and NUS jointly established the S$148 million SiNMeD in October 2013. This centre focuses on the union between scientific research, translational initiatives and clinical practice. The collaboration between the NUS Yong Loo Lin School of Medicine and A*STAR's Singapore Institute for Clinical Sciences (SICS) is set to become the leading centre in Asia for research in the nexus between nutritional sciences, metabolic diseases and human development. SiNMeD will focus on fundamental, clinical and translational research to understand the role of nutrition and early development in the onset and progression of obesity and metabolic diseases like diabetes. The key research programmes are significant to Singapore as it addresses the rising incidence of obesity and diabetes in an Asian context.

Skin Research Institute of Singapore (SRIS). Riding on the Skin Biology Cluster Platform and the Clinical Research Unit for Skin Allergy and Regeneration (CRUSAR) in IMB, the National Skin Centre (NSC), NTU and IMB are jointly developing an integrated and internationally competitive research programme on skin biology in Singapore through a new joint Skin Research Institute of Singapore (SRIS). All three parties entered into a MOU in April 2013. SRIS was announced on 26 Sep 2013, with a commitment of close to S$100 million to skin research. The SRIS aims to establish Singapore as a leading regional player in basic and translational skin research which has been identified as a strategic research area for A*STAR and Singapore. The economic potential is significant given the strong industry interest and unmet needs. This facility will capitalize on interest of companies already in Singapore, e.g. P&G and L'Oreal, and is well positioned to attract other companies in the health and beauty industries.

Working with SMEs

9. A*STAR uses multiple platforms to engage SMEs. Over the past six years, A*STAR has engaged about 700 SMEs in more than 2,400 projects. Licenses to SMEs more than tripled.



Helping SMEs adopt technology

10. In the past few years, the momentum with SMEs has been building up through increased industry collaborations and licensing deals. SMEs continue to be crucial to the growth of the economy and it is paramount to continue to ride on this momentum and push technology adoption rate in SMEs higher. Through the "Headstart" scheme, A*STAR would extend SMEs' runway to market by offering favourable licensing terms and reducing the complexity of licensing agreements. This would add more certainty and clarity to deals with SMEs, making it easier for them to try out new technologies. A*STAR would also continue to incubate the technologies through our Gap Funding program to push up the readiness of the technologies for SMEs to develop and productize.

Creating Platforms – Productivity Suite

11. Technology holds the key to improve productivity, resulting in savings in man-hours and costs. A suite of technologies from SIMTech has been profiled to help companies cope with productivity and operation challenges. Together with ETPL, many SMEs across different industries have leveraged on these technologies to solve their production related issues. The technologies include radio frequency identification, production planning and shop-floor tracking system and Operations Management Innovation (OMNI) programme. These technologies drive productivity improvements and operational excellence.

Growing Enterprises for Technology Upgrade (GET-Up).

12. Over the past 11 years, A*STAR's GET-Up programme has helped more than 432 companies. Apart from providing technical advice and technology road-mapping services, A*STAR has also seconded 479 researchers to 270 SMEs. These seconded researchers worked on innovation projects to develop new products and services, which have helped our SMEs to expand their businesses.

13. The T-Up scheme has been growing in popularity with our SMEs. Last year saw the highest take-up rate with 66 researchers seconded to 59 companies. SERC RIs had collectively exceeded the FY13 T-Up target (64 RSEs) despite an 8.5% increase in target from FY12 (59 RSEs). The FY13 accomplishment in T-Up was a new record number in the history of this scheme. Over the past 3 years, 13 researchers have also received the T-up Excellence Awards, for spurring growth in technical, innovation and R&D activities, and generating intellectual property (IP) and commercialisation opportunities. This year's T-Up Excellence Award winners, Ms Joanne Teoh, Dr Li Qiming and Dr Keni Wu, have made excellent contributions to their host companies.

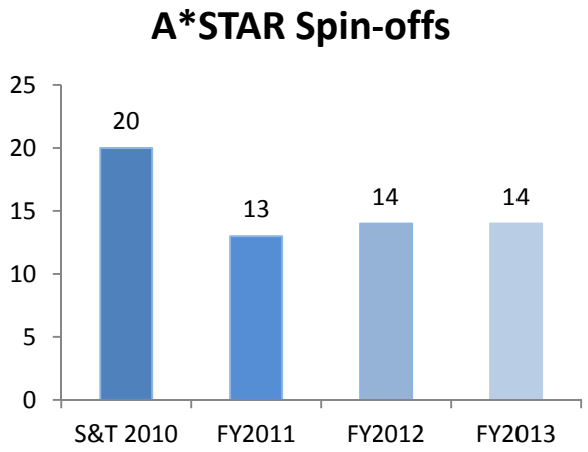
14. <u>Technology Adoption Programme (TAP).</u> A*STAR officially launched the Technology Adoption Programme (TAP) on 12 Nov 2013, with Second Minister for Trade and Industry S Iswaran as the Guest-of-Honour. This initiative aims to enable SMEs to gain easier access to practical and affordable technology solutions to boost productivity. Since July 2013, the $51 mil programme has been piloted in six sectors including Construction, Food Manufacturing, Precision Engineering, Marine, Aerospace as well as Retail. To deepen collaboration in the Retail sector, A*STAR signed two agreements to promote technology development and increase productivity – one between I2R and Paragon Shopping Mall and the other between A*STAR's science and engineering RIs and the Singapore Institute of Retail Studies.

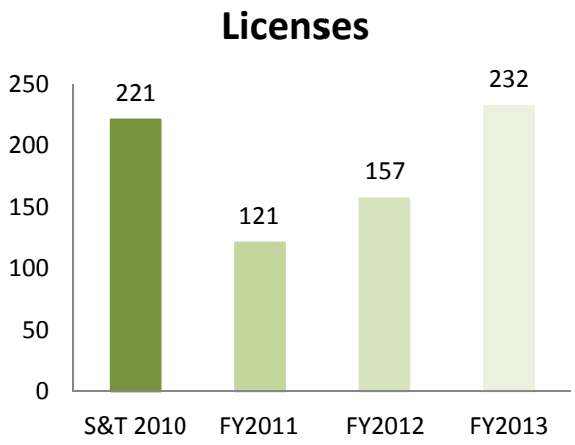
15. TAP has reached out to 817 companies and facilitated 110 technology adoptions so far. It aims to achieve at least 1,150 technology adoptions by companies over 3 years to increase their productivity levels by an average of 20%.

16. <u>Materials Centre of Innovation (MCOI)</u>. Jointly supported by A*STAR and SPRING, MCOI was set up with the mission to help local SMEs better utilize technology innovation to increase their productivity and to boost material capabilities in Singapore. MCOI focuses on translating projects ready for further co-development with SMEs. It will seek out, develop and push technologies for translation to industry, and build a library of innovative materials-based applications ready for adoption. The core capabilities of MCOI will be horizontal in nature, cutting across multiple industries such as Construction, Maritime, Biomedical, Electronics, Aerospace, Chemicals, and Packaging. The scope of work includes proof-of-value, product prototyping and scaling for commercialisation.

Commercialisation Activity

17. A*STAR has seen greater commercialisation activity in FY2013 when compared to previous tranche.





Start-ups. A*STAR is part of an integrated ecosystem that provides funding and advice at various stages: Research Grants, Gap Funding, POC Funding, POV Funding, Angel & VC Investment. Examples of A*STAR start-ups as follows:

Company Name	Technology	RI	Remarks
HISTOINDEX™ New Standard | New Life	Breakthrough technology in endoscopic imaging that enables clinical diagnosis to occur through virtual biopsy	IBN	Special Award of IBM SmartCamp Global Finals, Red Herring's Top 100 Asia award, Red Herring's Top 100 Global award
SIMLAB Technologies	A leading provider of high-end simulation-based decision support solutions for Aerospace and Semiconductor Manufacturing Industry.	SIMTech	"Born Global" Company by International Commercialization Alliance
acm BIOLABS	A Singapore-based synthetic biology company providing customized membrane protein products, services and expertise for drug discovery, diagnostics, and biomedical applications.	IMRE	First ever artificial cell membranes to be used in drug screening that mimic processes occurring naturally in live cells. A finalist in the Asian Innovation Awards

Impacting Singaporeans' Lives

18. Over the years, A*STAR has impacted Singaporeans' lives through R&D capabilities developed in various areas. The following are highlights of A*STAR's impact:

GUSTO (Growing Up in Singapore Towards Healthy Outcomes). GUSTO is one of the world's most comprehensive birth cohort studies involving over 1200 families, where women were recruited during pregnancy and followed until their infants are at least three years of age. The programme involves SICS, NUS, NUH and KKH, and focuses on epigenetics, which studies how environmental factors can lead to chemical changes in her baby's DNA, that can in turn affect the child's development and health. This gives us deep insights into early childhood development and the subsequent links to diseases like obesity and diabetes. It also allows A*STAR researchers to work with companies like Nestle, Abbott and Danone, on nutrition products for young children.

Dengue Research Adopted as Educational Tool. GIS and IHPC are jointly studying the nature of dengue spread in Singapore by building mathematical and data mining models to monitor viral spread; and optimize assays to determine mosquito species and virus serotypes. The research has since been used by the Singapore Science Centre as an educational exhibit tool to raise awareness amongst the public.

Speech and Language Technologies. A*STAR has gained international recognition in our speech and language technologies in the last 7 years, building up sizeable capabilities in this domain. This has helped anchor Baidu's Research Centre in Speech Technologies in Singapore as well as a collaboration between Sogou and I2R. Numerous licensing deals have also resulted and notable ones included licensing to Beijing Baidu Netcom Science Technology Co Ltd for I^2R's Thai Language Resources and Processing Software to further develop and enhance the company's online language translation services and most recently to Beijing Samsung Telecom R&D Centre I^2R's Vietnamese language resources for the adaptation and development of the company's language processing software.

Mobile Interactive Multimedia Access System (MIMAS). MIMAS is an on-device advanced mobile image recognition and augmented reality technology platform that does not require an Internet connection. It recognises the content of the image or scene using patent-pending image recognition methods and returns the relevant information in an augmented reality view on mobile phones and tablets. MIMAS is faster and uses less memory in recognising images and provides more accurate view tracking for image/video overlays when the mobile device is moved or rotated, compared to what is currently available. Sidestepping latency and stability issues caused by patchy mobile and Internet connections, MIMAS enables developers to create apps that can truly be used anytime, anywhere.

Awards Won by A*STAR

19. A*STAR's scientists won several international and local awards in FY2013.

International awards

- Prof Jackie Ying was elected as a **2013 Materials Research Society (MRS) Fellow** for her distinguished contributions to the synthesis of advanced nanostructured materials with unique functionalities for catalytic and biomaterial applications and for her distinguished service to the materials community.

- Prof Alex Matter was awarded the **8th Annual Szent-Györgyi Prize** for Progress in Cancer Research by the National Foundation for Cancer Research (NFCR) for his contributions to the development of the first drug specifically targeting a molecular lesion in cancer at the National Press Club in Washington, DC on 5 Apr 2013.

- Dr Florent Ginhoux, Principal Investigator at the Singapore Immunology Network (SIgN), has been awarded the prestigious **EMBO Young Investigator 2013 award**. The European Molecular Biology Organization (EMBO) Young Investigator Programme (YIP) recognises young, promising researchers who are less than forty years of age and who have established their first laboratories in Europe and EMBO cooperation partner countries in the past four years. Dr Ginhoux is the second scientist in Singapore to win this award, after Dr Bruno Reversade, Principal Investigator, Institute of Medical Biology, won it in 2012.

- Dr Patrick Tan received **The Chen New Investigator Award 2013** from the international Human Genome Organisation (HUGO) for his significant contributions to the research on genomic profiles of Asian cancers. This award was given to scientists who had made significant contributions to their respective fields of human genetic and genomic research during their early career years.The Award Review Committee which comprises an international make-up of acclaimed scientists from countries including Canada, India, Japan, Switzerland and the USA commended Dr Tan for his outstanding education background and excellent publication record. They recognized his significant contributions through his research on genomic profiles of Asian cancers,, and commented that his momentum appeared to be on an impressive upward trajectory.

- ICES Scientist, Dr Desmond Heng, won the Merit Award for the Medical Innovation category at the **Junior Chamber International Ten Outstanding Young Persons of the World (JCI TOYP)** Singapore 2013 Award. The annual TOYP award recognises young people under 40 who have made significant contributions in various fields and exemplify the best attributes of the world's young people. Dr Heng's research interests include inhalation aerosol drug delivery, oral drug delivery, dissolution technologies, and nanomedicine.

- Two IMCB researchers, Professor Dmitry Bulavin and Dr Jonathan Loh were among the top 8 finalists for the **World Technology Award (WTA)** in Biotechnology. The WTA has been presented by the World Technology Network since 2000 as a way to honour individuals in 20 different categories of Science & Technology and related fields doing "the innovative work of the greatest likely long-term significance."

Local awards

- Boris Luk'yanchuk of DSI won the **2013 President Science Award**. Acknowledged internationally for his exceptional work, Professor Luk'yanchuk is viewed as a thought leader in various sub-fields of optics and photonics and has been recognized for placing Singapore on the map for modern plasmonics and meta-materials research.

- The **2013 President's Technology Award** was presented to the team from I^2R led by Professor Li Haizhou. Professor Li and his team developed a suite of speech and language technologies, such as the "Abacus engine", which can break down language barriers for Asian languages. The team also previously came in 1st in accuracy ranking at the National Institute for Standards and Technology (NIST) Speaker Recognition Evaluation international benchmarking 2012. The team's technology has set industry standards and attracted up to approximately S$14 million of R&D funding and licensing from industry as at Apr 2013.

- Dr Juliana Chan, NSS (BS-PhD) Scholar and Founder and Editor-in-Chief of the Asian Scientist Magazine, was conferred the nation's highest accolade for youth, the **Singapore Youth Award** (SYA) on 27 Jun 2013. The SYA committee cited Dr. Chan's scientific achievements and contributions to the Asian scientific community by raising the profile of scientists in Asia as reasons for her award.

- A*STAR scholars Dr Melissa Fullwood (NSS BS-PhD), Dr Quek Su Ying (NSS PhD), and Dr Karen Crasta (AIF) were the only Singaporeans amongst 16 bright young scientists from around the world to receive the **2013 Singapore NRF Fellowship Award**. They each received research funding of up to S$3 million on top of salary support over five years to pursue cutting-edge research in Singapore.

- Dr Khor Chiea Chuen, NSS (MBBS-PhD) Scholar and Senior Investigator, GIS, was awarded the Young Scientist Award (YSA) by the Singapore National Academy of Science (SNAS) for his outstanding research work in the areas of genomics and heredity, particularly in eye-related traits and infectious diseases. He received the award at the President's Science and Technology Awards (PSTA) 2013 ceremony held at Gardens by the Bay on 25 September 2013.

Outlook for the Next Fiscal Year

Looking towards FY2014, global competition for trade, investments and talent is intensifying. In particular, major cities in the developing world, such as Mumbai, Shanghai, Sao Paulo and Moscow, are rapidly improving their competitiveness to catch up with the developed ones. This has led a World Economic Forum report to assert that the more useful distinction between countries will no longer be "developed" or "developing", but "innovation rich" or "innovation poor". Those that fail to innovate will be left behind. This is seen most evidently in the business sector, in companies such as Nokia and Blackberry.

Against this backdrop, Singapore is maintaining its commitment to R&D and innovation to raise productivity levels, position itself for sustainable and inclusive growth, and remain competitive and relevant in today's hyper-connected global economy. GERD in 2012 was S$7.2 billion, with PUBERD reaching S$2.8 billion. Their Compound Annual Growth Rates (CAGR) over the last 10 years were 7.8% and 8% respectively. The number of Research, Scientists and Engineers (RSEs) employed has doubled from 15,000 in 2002 to 30,000 in 2012, as investments in R&D continue to create high-value jobs in Singapore. Moreover, the RSEs' CAGR over the last 10 years (6.8%) has significantly outpaced that of total labour force CAGR in Singapore (3.8%).

In the year ahead, A*STAR will continue to emphasise industry engagement to attract and anchor R&D investments in Singapore for economic outcomes. A*STAR's major focus areas will be its efforts in initiatives that develop and locally entrench Future of Manufacturing (FoM) capabilities. The Advanced Remanufacturing & Technology Centre (ARTC) and Additive Manufacturing (AM) are two examples. The ARTC, first centre of its kind in Asia, will focus on translating 3D printing methods to industry partners by developing leading edge remanufacturing and advanced manufacturing technologies including technology themes of Repair & Restoration; Surface Enhancement; and Product Verification. A*STAR's Additive Manufacturing Programme aims to support growing sectors – such as Aerospace, Automotive, Oil & Gas, Precision Engineering, and Marine & Offshore, among others.

In the clinical community, A*STAR will continue to foster stronger collaborations with all players in the ecosystem. Industry engagement plans have been crafted to enhance MNC collaborations in order to develop new growth sectors. Following the inauguration of SiNMeD, A*STAR will continue to work hand-in-hand with EDB and SPRING to strengthen our food science and technology R&D capabilities in order to position Singapore as the research collaborator-of-choice in Asia for the Food and Nutrition industry. Efforts are also underway to develop the food science value chain and measures to enhance food manufacturing, packaging, ingredients etc. are being explored to increase the productivity and competitiveness of food SMEs.

A*STAR will pursue R&D in cutting-edge programmes that strengthen Singapore's capabilities in industry-relevant technologies. Examples of such programmes include the Data Analytics Programme, which seeks to help companies gain insight and solve problems through the application of analytics and machine learning techniques to large amounts of data; the Marine & Offshore Initiative, which

aims to maintain Singapore's strong position in the global Marine & Offshore industry by building on our capabilities in shipyard operations and growing our Oil & Gas equipment and services sectors; the Urban Systems Initiative, which seeks to address real-life urban challenges through active partnerships with public agencies (e.g. URA) and private sector players; and the newly established Skin Research Institute of Singapore (SRIS), where IMB, together with the National Skin Centre (NSC) and NTU, aim to establish Singapore as a leading regional player in basic and translational skin research.

A*STAR will also continue its focus on developing a strong Singaporean core, a fundamental principle that has undergirded A*STAR's talent strategy since the inception of its scholarships initiative in 2001. This is critical to anchor R&D capabilities in Singapore and to develop a pipeline of local scientific leaders. A*STAR will maintain an active scholarships programme to groom indigenous talent, and intensify science outreach and promotion efforts, to raise awareness and interest in STEM careers, aimed at creating a strong pipeline of young students with the interest and aptitude to pursue careers in science and engineering research.