

MEDIA RELEASE

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DIAGNOSTICS DEVELOPMENT HUB TO COMPLEMENT BIOMED RESEARCH LAUNCHED

Hub will leverage strategic public-public and public-private partnerships to accelerate market readiness of locally developed diagnostic products

Singapore—Singapore's biomedical research push received a major boost with the launch of the new Diagnostics Development (DxD) Hub to cater to the fast growing demand for devices that will make it faster and easier for healthcare professionals to make quicker diagnosis and deliver a better treatment outcome for patients.

Launched today by Mr S. Iswaran, Minister in Prime Minister's Office, Second Minister for Home Affairs and Trade & Industry at Biopolis, the DxD Hub aims to develop medical diagnostics as one part of the medical technologies industry, improve healthcare through development of diagnostic solutions and accelerate productisation of new diagnostics devices. Diagnostics is one of four innovation clusters shortlisted to be funded under the \$200 million Innovation Cluster Programme (ICP)¹ which was announced by PM in October 2013.

Led by the Agency for Science and Technology Research (A*STAR), through its commercialisation division ETPL, the DxD Hub will bring together clinicians, researchers, innovators, entrepreneurs and industry professionals onto a common platform to fast track the development of clinically-validated, market-ready diagnostic tools and solutions. Through their participation, diagnostics ecosystem partners will gain experience and acquire the knowledge of taking diagnostic products through the process of validation, testing, regulation and, finally marketing and commercialisation.

¹ The programme is led by SPRING Singapore and NRF, under the Research, Innovation & Enterprise 2015 (RIE2015) Sub-committee on Innovation & Enterprise.

The DxD Hub marked its opening with the unveiling of multiple partnerships across both public and private sectors. These include collaborations with the healthcare and academic medical community including SingHealth, National University Health System, National Healthcare Group, as well as academic research organisations like the Singapore Clinical Research Institute. Multinationals such as Johnson & Johnson Innovation and Thermo Fisher Scientific along with SMEs and start-ups such as AITbiotech, Gencurix, HistoIndex, iPtec, InvitroCue, and MiRXES are also among the early supporters of the DxD Hub. (See **Annex A** for list of partners).

Accelerating Diagnostics Innovation for Economic and Healthcare Benefits

The DxD Hub serves as a cauldron to integrate expertise across various segments in the diagnostics and medical device ecosystem with the goal to accelerate the time to market for diagnostic devices and solutions.

Institutions such as A*STAR, local universities, polytechnics, SMEs and start-ups can be partners with the DxD Hub by contributing technologies and intellectual property and clinicians can provide ideas and the requisite validation and trials prior to the transfer to the market. The DxD Hub will also involve companies at the earliest possible stage in the product development process.

For example, local start-up MiRXES, spun out from technologies developed in NUS and A*STAR, will access the DxD Hub to expedite the productisation of its devices. Professor Too Heng-Phon, Founder of MiRXES said: "DxD Hub is an essential enabler for MiRXES' pipeline of microRNA diagnostic assays to reach the market. The expertise in the Hub will greatly aid the local and global medical community to productise diagnostic assays in an acceptable standard globally."

Joydeep Goswami, Asia Pacific and Japan President for the Life Sciences Solutions, Thermo Fisher Scientific said, "Thermo Fisher Scientific and the DxD Hub have concluded a Memorandum of Understanding for the co-development of molecular diagnostics tests for global diseases with a focus on Asian phenotype and Asian specific diseases. The collaboration with the DxD Hub will look to offer expanded product development capabilities and resources, including access to assay content, clinical samples and regulatory assistance. Combined with Thermo Fisher Scientific's molecular biology, genetic analysis technologies and its diverse R&D capacity (of the Life Sciences Solutions Group) the collaboration is expected to lead to novel assays targeting diseases prevalent that leverage the latest developments in Thermo Fisher Scientific's platforms such as the

Quant Studio family of Real-Time PCR instruments and the Ion Torrent next-generation sequencing systems. Such a synergistic relationship is expected to accelerate research that will open the path to development and commercialization in Singapore, and address Asia and global needs."

Already, DxD Hub is attracting overseas SMEs to be part of the ecosystem. Mr Lorenzo Kim, Managing Director of Gencurix, a Korean-based SME which has leveraged on the DxD Hub, shared that, "With great help from the DxD Hub and its team of highly experienced global and local industry and regulatory experts, Gencurix is successfully taking the first step by establishing a diagnostics R&D and service centre in Singapore."

Projects in the DxD Hub's pipeline include breast and gastric cancer early detection tests, imaging tests and devices to differentiate and identify the stages of various clinical indications such as liver fibrosis.

"The unique feature of DxD Hub is its intimate and early involvement of the clinicians in its product developmental process. Such a forward thinking step enhances subsequent introduction of the product into the healthcare system. The partnership with Academic Medical Centres such as the SingHealth Duke-NUS AMC permits such possibilities. Surgeons, doctors, nurses will collaborate to add 'clinical' value to their projects," said Dr Henry Ho, Director, Medical Technology Office, SingHealth and Senior Consultant, Department of Urology, Singapore General Hospital.

"The DxD Hub is committed to embrace a borderless One-Singapore approach to catalyse the growth of the industry so as to establish Singapore as a global hub for diagnostics innovation and development. Singapore is both a gateway to the rest of Asia, as well as a channel to access the international markets," said Dr Sidney Yee, Chief Executive Officer of the DxD Hub.

"AITbiotech is pleased to work with DxD Hub to jointly commercialise molecular diagnostic technologies. DxD Hub has all the research and development capabilities that SMEs like us lack. Speed and access to local and global markets are critical for our SMEs to build sustainable businesses. Such private public partnerships enable us to leverage on each other's strengths to improve our chances of success," said Mr Alex Thian, CEO of AITbiotech.

Enclosed:

ANNEX A – List of DxD Hub partners

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About the Agency for Science, Technology and Research (A*STAR)

The Agency for Science, Technology and Research (A*STAR) is Singapore's lead public sector agency that fosters world-class scientific research and talent to drive economic growth and transform Singapore into a vibrant knowledge-based and innovation driven economy.

In line with its mission-oriented mandate, A*STAR spearheads research and development in fields that are essential to growing Singapore's manufacturing sector and catalysing new growth industries. A*STAR supports these economic clusters by providing intellectual, human and industrial capital to its partners in industry.

A*STAR oversees 18 biomedical sciences and physical sciences and engineering research entities, located in Biopolis and Fusionopolis, as well as their vicinity. These two R&D hubs house a bustling and diverse community of local and international research scientists and engineers from A*STAR's research entities as well as a growing number of corporate laboratories.

For more information on A*STAR, please visit www.a-star.edu.sg.

LIST OF DxD HUB PARTNERS

I) HEALTHCARE AND ACADEMIC MEDICAL COMMUNITY & ACADEMIC RESEARCH ORGANISATIONS

1. National Healthcare Group

The National Healthcare Group (NHG) is a leader in public healthcare in Singapore, recognised at home and abroad for the quality of its medical expertise and facilities. Care is provided through an integrated network of nine primary healthcare polyclinics, acute care hospital, national specialty centres, and business divisions. Together they bring a rich legacy of medical expertise to our philosophy of patient-centric care.

NHG's vision of "Adding years of healthy life" is more than just about healing the sick. It encompasses the more difficult but infinitely more rewarding task of preventing illness and preserving health and quality of life. With some 13,000 staff, NHG aims to provide care that is patient-centric, accessible, seamless, comprehensive, appropriate and cost-effective.

As the Regional Health System (RHS) for Central Singapore, it is vital for NHG to partner and collaborate with other stakeholders, community advisors, volunteer welfare organisations and others in this Care Network together with our patients, their families and caregivers to deliver integrated healthcare services and programmes that help in Adding Years of Healthy Life to all concerned.

For more information, please visit www.nhg.com.sg

National Archives of Singapore

2. National University Health System

The National University Health System (NUHS) groups the National University Hospital (NUH), the NUS Yong Loo Lin School of Medicine, the NUS Faculty of Dentistry and the NUS Saw Swee Hock School of Public Health under a common governance structure to create synergies for the advancement of health by integrating clinical care, research and education.

The enhanced capabilities and capacity enable the NUHS to deliver better patient care, train future generations of doctors more effectively and bring

innovative treatments to patients through groundbreaking research. For more information about the NUHS, please visit www.nuhs.edu.sg

3. Singapore Clinical Research Institute

Singapore Clinical Research Institute (SCRI), a wholly-owned subsidiary of MOH Holdings, is a National Academic Research Organisation dedicated to enhance the standards of human clinical research. Its vision is to develop SCRI and Singapore Clinician Scientists as an ASEAN hub for clinical research excellence. SCRI is a national clinical trials coordination centre that works with National Medical Research Council (NMRC) to assist the Ministry of Health in implementing clinical trials policy and strategic initiatives to support and develop clinical research capabilities in Singapore.

SCRI strives to improve patient care through the design and conduct of high-quality, cutting-edge clinical studies. SCRI supports academic, public-sector and industry-sponsored studies ranging from proof-of-concept to late-phase clinical trials and epidemiological studies. In its efforts to enhance clinical research capacity building in Singapore and the region, SCRI also spearheads the planning and delivery of educational and training programs on various aspects of clinical research.

In driving towards its vision, SCRI collaborates with clinicians to enhance Singapore's clinical research capabilities and strengthen its expertise in executing multi-site, multi-national research and the development of regional clinical research networks.

Our Areas of Expertise

- Study Design / Protocol Development
 - Project Management
 - Site Management
 - Quality Assurance
 - Data Management
 - Research Informatics
 - Primary & Secondary Analyses
 - Study Report/Medical Writing/Publication
 - Clinical Research Networks Development & Management
 - Training & Education

For further information, please email contact@scri.edu.sg or visit the SCRI website at www.scri.edu.sg

4. SingHealth

The SingHealth Duke-NUS Academic Medical Centre draws on the collective strengths of SingHealth and Duke-NUS Graduate Medical School to drive the transformation of healthcare and provide affordable, accessible, quality healthcare. With 42 clinical specialties, a network of two hospitals, five national specialty centres, nine polyclinics and a community hospital, it delivers comprehensive, multi-disciplinary and integrated care. Sengkang Health, a new healthcare system to deliver patient-centric care to the community in the north-east of Singapore is currently being developed. Sengkang General and Community Hospitals are expected to be fully operational in 2018.

For more information, please visit www.singhealth.com.sg

Members of the SingHealth group:

Hospitals (Tertiary Specialty Care):

Singapore General Hospital, KK Women's and Children's Hospital

National Specialty Centres (Tertiary Specialty Care):

National Cancer Centre Singapore, National Dental Centre of Singapore, National Heart Centre Singapore, National Neuroscience Institute, and Singapore National Eye Centre

SingHealth Polyclinics (Primary Care):

Bedok, Bukit Merah, Geylang, Marine Parade, Outram, Pasir Ris, Queenstown, Sengkang, and Tampines

Community Hospital (Intermediate and Long-term Care):

Bright Vision Hospital

II) MULTINATIONAL CORPORATIONS

5. BGI

BGI is the world's largest genomic organization, with headquarters in Shenzhen, China and branches in Europe, Americas and Asia-Pacific regions. Based on the cutting-edge sequencing technology and the highly efficient data analysis capability, BGI is dedicated to providing innovative support for global communities, novel opportunities for researchers, and tailored application services in the fields of healthcare, agriculture and the environment.

BGI-Diagnostics (BGI-Dx), as a subsidiary unit of BGI, aims to apply the high genetic research capacity and well-developed global network to solve current health issues worldwide, especially birth defects and other genetic diseases.

6. Johnson & Johnson Innovation

Johnson & Johnson Innovation was established to advance healthcare by catalysing collaborations between regional innovators and the Johnson & Johnson Family of Companies with the ultimate aim of improving healthcare for patients. Through Johnson & Johnson Innovation, scientists, entrepreneurs and emerging companies have one-stop access to science and technology experts who can facilitate collaborations across the Johnson & Johnson Family of Companies. Four individuals from the Asia Pacific Innovation Center whose roles are to look for new collaborations locally and across the region are based here in Singapore. For more information, please visit www.jnjinnovation.com

7. Thermo Fisher Scientific

Thermo Fisher Scientific Inc. (TMO) is the world leader in serving science, with revenues of \$17 billion and 50,000 employees in 50 countries. Our mission is to enable our customers to make the world healthier, cleaner and safer. We help our customers accelerate life sciences research, solve complex analytical challenges, improve patient diagnostics and increase laboratory productivity. Through our four premier brands – Thermo Scientific, Life Technologies, Fisher Scientific and Unity Lab Services – we offer an unmatched combination of innovative technologies, purchasing convenience and comprehensive support. For more information, please visit www.thermofisher.com

III) SMEs and START-UPS

8. AITbiotech

AITbiotech is a leading Genomic Services and MDx company based in Singapore. Founded by Alex Thian in 2008, it has a core molecular services and R&D laboratory in Singapore managed by a team of experienced biotechnologists. It provides a complete suite of Genomic Services including Oligonucleotides Synthesis, Capillary Sequencing, Next-generation Sequencing Services, Bioinformatics Services and customized molecular services to the research, healthcare and biomedical industries in Singapore and Asia. AITbiotech is also an ISO 13485 certified company which manufactures and distributes its own line of real-time PCR pathogen detection assays branded as abTESTM in the Asian Middle East and European markets. For more information, please visit our website: www.aitbiotech.com

9. Gencurix

Gencurix, established in 2011, is rapidly growing in providing key diagnostic solutions for personalized medicine especially in oncology by molecular level prognosis and companion diagnostics. Gencurix's core strengths came from its open innovation network including The Center for Anti-Cancer Companion Diagnostics (National program under Korea Ministry of Science, ICT and Future Planning) and successful development of its commercial product and service pipeline: GenesWell Dx BCT (Prognosis diagnosis for breast cancer patients) and GenesWell CDx LCT/CCT (Companion diagnostics for lung and colorectal cancer patients).

Gencurix is also focusing on in vitro diagnostic (IVD) technology development with global technology partners for applying Automated Quantification System (AQS) to molecular level analysis of cancer tissue (FFPE), developing Circulating Tumor Cell (CTC) detection and diagnosis platform and new IVD products using Next Generation Sequencing (NGS) technology.

For more information, please contact info@gencurix.com and visit www.gencurix.com

10. HistoIndex

HistoIndex is a medical technology spin-off company from the Institute of Bioengineering and Nanotechnology (IBN) in the Agency for Science, Technology and Research (A*STAR), Singapore. Funded initially by SPRING Startup Enterprise Development Scheme (SPRING SEEDS) and angel investors,

the company has now grown to include other institutional and corporate investors as shareholders. HistoIndex is involved in the development, manufacture and sales of its proprietary optical medical imaging equipment worldwide with offices in Singapore (headquarters), Beijing (China), Hangzhou (China), London (UK) and Frankfurt (Germany) for the diagnosis and treatment of more than 20 types of fibrosis and cancers. Based on revolutionary imaging solutions, its paradigm-shifting products have opened doors to new medical standards that benefit clinical R&D, speed up pharmaceutical drug and treatment development as well as aiding clinical diagnosis. HistoIndex currently has more than 30 customers and partners worldwide and is the fastest growing Medtech company in Singapore reaching a revenue of close to \$1 million at just two years after incorporation. For more information, please visit www.histoindex.com

11. InvitroCue

InvitroCue provides innovative products and services in the fields of *in vitro* DMPK, *in vitro* toxicology and digital pathology utilizing cell-based models and image analytics. InvitroCue's technologies have been developed and validated together with leading pharmaceutical companies and scientific collaborators, such as the Agency for Science, Technology and Research (A*STAR), National University of Singapore, Massachusetts Institute of Technology and renowned pathologists. The company uses these technologies and assays to support better decision making in preclinical studies, clinical trials and diagnostics. InvitroCue's solutions can be applied in the realms of drug testing as well as the research and development of cosmeceuticals and medical devices. InvitroCue was established in 2012 as a spin-off from A*STAR and is based in Singapore.

12. iPtec

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iPtec, also known as Intellectual Property Translation & Engineering Centre, was incorporated on 2 July 2013 to focus on IP translation activities including prototyping and product development.

We are a wholly owned subsidiary of Sys-Mac Automation Engineering Pte Ltd (Sys-Mac), a precision engineering and technology company with more than 20 years experience in the engineering and manufacturing of equipment and devices for the medtech, pharmaceutical, consumer electronics, and semi-con industries. The ultimate holding company of iPtec and Sys-Mac is Zicom Group Limited, a diversified engineering group listed on the Australian Stock Exchange.

We have been granted Private Sector Translator status by SPRING in recognition of our all-round engineering and manufacturing capabilities.

For more information, please visit www.iptec.com.sg

13. MiRXES

MiRXES is a start-up company founded with the vision of creating accurate, affordable and non-invasive molecular diagnostic tests to improve healthcare. The team has developed robust patented qPCR technologies and workflows that measure microRNA with unparalleled performance. The company aims to empower researchers around the world with the sensitivity and precision needed to truly understand and exploit the unique functions of microRNA. MiRXES partners with leading clinical consortia and multinational pharmaceutical companies worldwide to discover novel microRNA biomarkers and develop cutting edge clinical applications to enable early detection and personalized management of life threatening and chronic diseases.

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