









WE WILL MAKE SINGAPORE A SMART NATION: ENABLING SAFER, CLEANER AND GREENER URBAN LIVING, MORE TRANSPORT OPTIONS, BETTER CARE FOR THE ELDERLY AT HOME; MORE RESPONSIVE PUBLIC SERVICES AND MORE OPPORTUNITIES FOR CITIZEN ENGAGEMENT.

President Tony Tan, Address at the Opening of Parliament, May 2014

Possibilities in a Smart Nation

HEALTHCARE

BUSINESSES

Tele-monitoring using wearable devices, assistive technologies for the disabled and elderly

GOVERNMENT



INTEGRATED PUBLIC SERVICES

Unified mobile app for feedback and incident reporting



INTEGRATED CITY PLANNING

Analytics-driven provisioning of facilities and services



URBAN LIVING

Smart home technologies to reduce utility bills, environmental monitoring for outdoor public spaces



URBAN MOBILITY

Demand-responsive public transport system, self-driving vehicles



SAFETY AND SECURITY

Real-time video surveillance and analytics for improved public safety, early flood warning, faster emergency response



ingapore's Smart Nation ICM ecosystem will feature various government agencies as lead users driving technological requirements. I²R will be collaborating with local and foreign institutes of higher learning (IHLs) and research entities to invent and innovate enabling technologies, while working together with industry partners – multinational corporations (MNCs), large local enterprises (LLEs), small and medium enterprises (SMEs) and startups – to effect economic and societal impact.

ICM ECOSYSTEM FOR SMART NATION







Partner for Inventions and Innovations

Lead Users

Partner for Economic Impact

Institute for Infocomm Research (I²R) and Infocomm Development Authority of Singapore (IDA)

KEY THRUSTS

















Sensor Networks

I²R has developed strong capabilities in creating unified architectures for large-scale and diverse sensor networks, to collect and make sense of data for city-centric applications.





Heterogeneous Network (HetNet)

IDA will design, build and implement a nationwide HetNet in partnership with I²R and other research institutes, IHLs and industry partners. I²R is developing technologies to achieve seamless connectivity with a high quality of experience for users roaming anywhere, anytime, and on any device.





Cyber Security

I²R has developed core competencies in the areas of cyber forensics and cyber-physical security for a variety of application domains.





A*STAR Data Analytics and Exchange Platform (A*DAX)

A*DAX is able to dynamically fuse data from large-scale unpredictable sources, and overcome integration problems to facilitate downstream data analytics.

COMPREHEND



Data Analytics and Visual Anaytics

 I^2R has extensive capabilities in processing and analysing big data. Innovating with new approaches and techniques for analytics, the key objectives are to devise automatic means to uncover patterns and rules, and translate them into actionable insights.

CREATE



New Services and Products to Improve Lives

Government agencies and businesses can act on the collected and comprehended information to provide new and enhanced services and products, improving the quality of life in our nation.

PUBLIC SECTOR INITIATIVES AND **PARTNERSHIPS**

ingapore's government agencies are developing and employing strategies, policies and cutting-edge solutions to help them fulfil their missions more effectively. I²R is focused on strengthening Public-Public Partnerships and driving ICM inventions and innovations for these Smart Nation efforts.

Maritime and Port Authority of Singapore



URA is collaborating with I²R and the Institute of High Performance Computing (IHPC) to develop an Integrated City Planning (ICP) model. The ICP model will comprise a suite of planning tools that will help us better understand the dynamics between different interacting factors and trends in a city. This will enable us to provision for different scenarios, and draw up strategies and plans to guide future developments.



WE BELIEVE THAT A SMART NATION CAN BECOME A REALITY IF WE SUCCESSFULLY COMBINE POLICY, PEOPLE AND TECHNOLOGY IN A CONCERTED FASHION.

Dr Yaacob Ibrahim, Minister for Communications and Information, Speech at the Opening Ceremony of imbX 2014

SPRING Singapore

A Smart Nation is powered by smart enterprises. Products and services in the interconnected future not only need to be sustainable and safe, but also intelligent and user-centric. SMEs and startups, by virtue of their agility, can capitalise on these evolving needs and work together to introduce innovative products and services to transform the way we live. As the enterprise development agency, SPRING Singapore has in place programmes to catalyse innovation in SMEs and startups in order to take advantage of the growing opportunities in this space. Together, we can transform Singapore into a true Smart Nation.

SPRING

EDB

Economic Development Board

In line with the global urbanisation megatrend, the Smart Nation initiative represents a new economic opportunity and generator of good jobs in the space of "Smart-Sustainable Cities", which includes the domains of built environment, energy, mobility, environment & water, security and ICT. EDB is working with the relevant agencies to position Singapore as a Living Lab where companies, both foreign and local, would find it convenient to develop, test and commercialise innovative urban solutions in Singapore, before scaling up in overseas markets.

JURONG LAKE DISTRICT

PROVING GROUND FOR SMART NATION CAPABILITIES urong Lake District (JLD) is a new growth area identified in URA's Master Plan to support Singapore's economic growth for the next 10 to 15 years, and to decentralise commercial activities out of the city centre. Located in western Singapore, JLD will be the largest commercial and regional centre outside the city centre when fully developed.

The vision for JLD is to be a leading model for developing a mixed-used urban area that is sustainable, smart and connected. The ongoing Smart and Connected JLD Pilots and Trials initiative, launched by IDA in collaboration with URA, EDB and other agencies such as BCA, HDB, JTC, LTA, NEA, NLB, NParks and SLA, will demonstrate how residents and businesses can benefit from a variety of Smart Nation solutions providing real-time sensing and analytics.

ST Electronics (Info-Software Systems) is and support the shared sensor network test bed infrastructure for JLD, which will comprise over 150 multimodal sensor nodes, cameras and relay gateways. Through the A*DAX data exchange portal and repository, test bed users will be able to access real-time and historical environmental data collected by the sensors, as well as video analytics from the camera streams. ST Electronics (Info-Comm Systems) is working with I²R to develop a common traffic simulation platform for evaluating different traffic control algorithms. This system traffic signals, so as to increase the traffic handling capacity of road networks in JLD **URBAN** REDEVELOPMENT AUTHORITY

@2014 URA All Rights Reserved



THERE ARE MANY APPLICATIONS, MANY GADGETS IN OUR PLANS TO MAKE SINGAPORE A SMART NATION – NOT JUST TO RUN THE PLACE BETTER, BUT SO THAT IT CAN MAKE A DIFFERENCE TO PEOPLE'S LIVES.

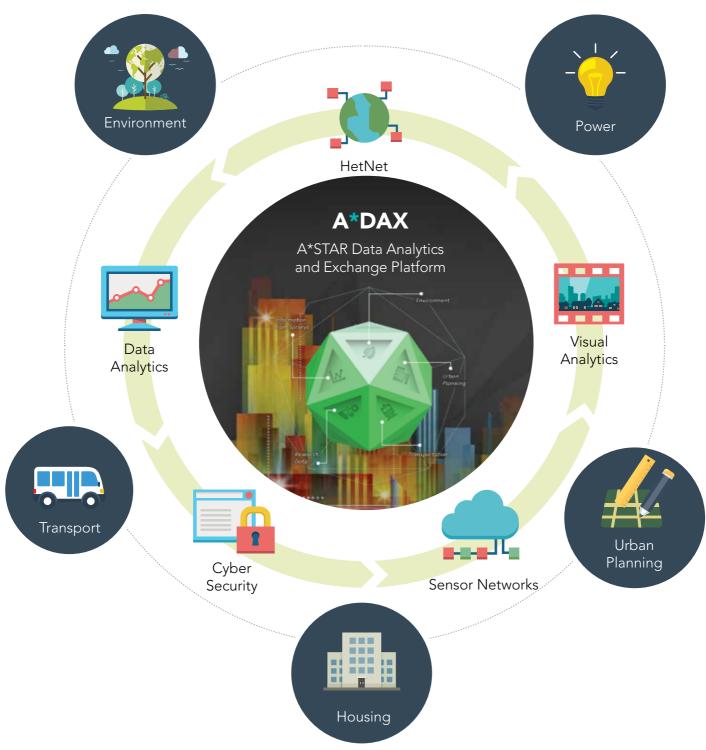
Prime Minister Lee Hsien Loong, National Day Rally 2014



SMART NATION CITY DASHBOARD

he A*STAR Data Analytics and Exchange Platform (A*DAX) is I²R's leading research project in the Urban Systems Initiative, a key component of A*STAR's Smart Nation efforts. A*DAX seeks to aggregate information from various government agencies, conduct analytics to derive insights and outcomes, and at the same time facilitate the sharing of information among different agencies.

The vision is to create a City Dashboard with which government agencies, businesses and people are able to make informed decisions and respond to dynamic conditions in the city based on real-time sensing and data analytics, to meet the evolving needs of a Smart Nation.



STRENGTHENING lose industry engagement is crucial in the development of technological solutions for the Smart Nation marketplace. To maximise the impact of **PRIVATE** these innovations, I²R has set up the REsearch And Commercialisation Hub, or REACH@I²R, in collaboration with industry partners. REACH@I²R **SECTOR** currently boasts numerous joint labs in diverse business domains ranging from telecommunications and banking to transportation and healthcare. **PARTNERSHIPS** ST Electronics NCS LLEs The I2R - McLaren **Applied Technologies Joint** Laboratory partnership will explore predictive analytics, DBS - I²R Joint Laboratory, modelling and simulation for the transportation, engage customers through energy, healthcare and wellness industries. The I²R - Singapore **Power Joint Laboratory** is MNCs I²R spin-off **Knorex** is licensing its Established in 2012 as Baidu's first overseas research laboratory, the an award-winning image recognition technology Baidu – I²R Research Centre (BIRC) focuses on natural developed by I²R language processing. SMEs and Startups **HutCabb Consulting** has licensed I²R's wireless to develop a remote healthcare tool that BYD NEC supports the rehabilitation FOSTA of post-stroke patients. Reachfield IT Solutions

I²R RESEARCH CENTRES SUPPORTING PUBLIC-PRIVATE PARTNERSHIPS



URBAN MOBILITY RESEARCH CENTRE

The **Urban Mobility Research Centre** strives to synergise I²R's multidisciplinary R&D efforts for the urban mobility domain, focussing on intelligent transport systems and autonomous vehicles to improve productivity and to create a smoother and safer commuting experience.

The centre will also coordinate strategic partnerships with businesses, government agencies and IHLs, to achieve greater impact in the urban mobility ecosystem.

CYBER SECURITY RESEARCH CENTRE

The **Cyber Security Research Centre** brings together various R&D efforts on cyber-physical security and cyber forensics at I²R. Working with I²R's infocomm and media departments and with industry partners, the centre seeks to develop secure and robust systems-level architectures and solutions for business and government applications.

INDUSTRY PARTNERS

The I²R – BYD Joint
Laboratory leverages on
I²R's expertise in visual and
automotive technologies and
BYD's state-of-the-art capabilities in electric
vehicles to develop solutions for taxi fleet
management, advanced 3D mapping and driveby-wire systems.

GOVERNMENT PARTNERS

A*STAR is working with LTA

on autonomous vehicles.
Through the **I**²**R** – **LTA Joint Laboratory**, I²R is working with LTA to use data analytics to forge a deeper understanding of Singapore's road transport systems, and provide high-quality realtime information to help commuters and operators make better decisions.

IHL PARTNERS

Besides working with local IHLs, I²R is also collaborating with TUM, through the

Continental – I²R – TUM Joint Laboratory, to research, study and test a broad range of communications, information and automotive technologies, to improve the safety and performance of transport systems in Singapore.

ready pool of research talent is essential for a vibrant and sustainable ICM ecosystem. I²R believes in the importance of nurturing a diverse team of research scientists and engineers to spearhead Singapore's efforts towards becoming the world's first Smart Nation.

RESEARCH TALENT FOR SMART NATION

Dr Ng See-Kiong

See-Kiong is the programme director of A*STAR's Urban Systems Initiative, looking into ICT R&D innovations for Smart Nation. As a graduate student at Carnegie Mellon University, he developed advanced machine learning algorithms to analyse human DNA data for understanding the biology of the human body. Now, See-Kiong is using big data approaches to understand the systems biology of complex human cities.



Dr Vrizlynn Thing

Vrizlynn leads I²R's Cyber Security & Intelligence Department in preventing, detecting and mitigating cyber-crimes and attacks. She is also an adjunct associate professor at NUS and SMU. Vrizlynn is driven not just by pure scientific curiosity, but also by a sense of justice: to uncover the truth to protect the law-abiding, and to institute accountability for wrongdoing.



Dr Oh Ser Wah

Ser Wah is the head of I²R's TV White Spaces Department and the co-director of the I²R – Singapore Power Joint Lab. As a top Nanyang MBA graduate, he is appointed to lead the Strategic Planning Office for Smart Nation innovations. He sits in the Infocomm Media Masterplan 2025 Working Committee 2 on Infrastructure, tasked with anticipating and defining Singapore's future ICM infrastructure needs. Ser Wah is currently developing a platform for next-generation communication technologies, to meet the challenges of a Smart Nation.



Mr Han Boon Siew

Boon Siew is the head of I²R's Autonomous Vehicle Department, leading the development of driverless technologies to improve operational productivity in Singapore. His research interests include intelligent sensor fusion, robotic control, perception and humanoid systems. Among Boon Siew's creations are a life-size robotic lion dance system, featured in MIT Technology Review, and the robot receptionist Olivia, profiled in IEEE Spectrum's app on the world's most amazing robots.





I^2R

Institute for Infocomm Research

1 Fusionopolis Way #21-01 Connexis (South Tower) Singapore 138632

+65 6408 2000

+65 6776 1378

www.i2r.a-star.edu.sg

www.facebook.com/i2r.research



IDA

Infocomm Development Authority of Singapore

♠ 10 Pasir Panjang Road #10-01 Mapletree Business City Singapore 117438

+65 6211 0888

+65 6211 2222

www.ida.gov.sg

www.facebook.com/IDA.Singapore

