

# experience SINGAPORE



ELEVATION  
THROUGH  
INNOVATION

focus

How Singapore taps on technology to take its connectivity and transport system to new heights

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# ED'S NOTE

Dear readers,

We live in a world today that is "interconnected". Thanks to advances in everything from internet technology to satellite transmissions, the resulting ease of communication and sharing of information has made our world a 'smaller' place. The growth and development of the transportation industry has further contributed to this phenomenon. In this issue, we look at the initiatives that Singapore has rolled out in both the aviation and maritime sectors, which have facilitated the international flow of goods, services and people. Our **Focus** story ("Bigger, Bolder and Better", pages 3-5) examines the ongoing work in the building of Changi Airport Terminal 5 and the Tuas Terminal mega port, which will cater to unprecedented passenger and cargo volumes. These efforts would not have been possible without advances in technology. Such 'smart' elements are also found in Singapore's internal transport network, with plans in motion for features such as a GPS-enabled Electronic Road Pricing technology to ensure smooth traffic flow on the country's streets and highways.

Behind such ambitious efforts are dedicated individuals whose work is often carried out behind-the-scenes. We give these men and women their due recognition in our **In Singapore** article ("Connecting for the Future", pages 10-11), where we speak to experts who ensure the future success of the nation's maritime and road networks. Given the interconnected nature of today's world, improvements in connectivity cannot truly be effective unless they are implemented on a transnational level. Our **Joining Hands** feature ("Links that Enrich", pages 8-9) sheds light on how Singapore has been sharing its best practices and expertise in transport management with other countries. Lastly, this issue's **Reflections** piece ("Learning through Sharing", pages 6-7) provides a recap of the Singapore Cooperation Programme's recent knowledge-sharing initiatives for officials from around the world.



**Director**  
**Strategic Communications Directorate**  
**Ministry of Foreign Affairs, Singapore**

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## experience SINGAPORE

A NEWSLETTER OF THE  
SINGAPORE COOPERATION  
PROGRAMME



MINISTRY OF FOREIGN AFFAIRS  
SINGAPORE

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focus

# BIGGER, BETTER

## and BOLDER

Technology has always driven advancements in transportation and connectivity, but Singapore's new projects in these areas take this relationship to new heights.

**Passengers** recently departing from the easternmost runway of Singapore's Changi Airport would have noticed a clearing on the facility's eastern border, as work gets underway for the construction of the airport's fifth terminal. With an initial capacity of up to 50 million passengers per year — more than twice the size of any of the existing terminals — it will be Changi Airport's largest yet since it opened in 1981. By the time construction and other works are completed around 2030, the air hub will almost double in size to cover more than 2,000 hectares.

The planned terminal is part of a major development in Singapore's aviation sector. It comes on the heels of other significant improvements to the nearly-40-year-old air hub such as Jewel Changi Airport which was unveiled to the public in April

this year. This 10-storey retail complex also offers check-in facilities for travellers as well as innovative tech solutions.

These new airport developments are not the only mega-projects to be unveiled in Singapore in the coming decades. Works are also in full swing at the future Tuas mega port, which will be able to handle up to 65 million twenty-foot equivalent units (TEUs) of cargo a year when it fully opens by 2040. That is more than double what

the Singapore port handled last year. The new port will open progressively in four phases starting from 2021.

These mega projects will allow Singapore to retain its status as a favoured aviation and maritime hub. However, despite their benefits, each project poses unique challenges which the authorities have tapped on technology to tackle. *Experience Singapore* explores some of these novel solutions.



● AUTOMATIC SELF CHECK-IN KIOSKS FOR PASSENGERS CURRENTLY IN USE AT CHANGI AIRPORT TERMINAL 4.

# DRIVEN BY TECH

## TECHNOLOGY HAS ALWAYS DRIVEN ADVANCEMENTS IN TRANSPORT

— from the invention of the wheel that fundamentally birthed the transport sector as we know it, to the Wright Brothers' first flight in 1903 that revolutionised travel. In early days, such advancements were often pioneered elsewhere, but Singapore has increasingly developed its own solutions to contribute to the global transport ecosystem.

Here are some examples of these innovations:

### KEEPING THE SKIES SAFE

Having a massive construction project on the border of one of the world's busiest air hubs poses a considerable security threat. The Changi Airport Group (CAG) has implemented the following measures to ensure that airport security is not compromised:

- **CENTRALISED ENTRY:** Last year, CAG opened a dedicated entry point for all vehicles and personnel into the construction site. Dubbed the Changi East Checkpoint, it can handle up to 500 vehicles and 8,000 workers per hour. Provisions are also included to double the capacity when needed.
- **EYES ON THE GROUND:** A surveillance centre provides round-the-clock monitoring of works within the airfield at Changi East. A digital map provides an overview of all ongoing works and key information such as the contact details of each project's supervisor. Information can also be retrieved off-site or on the ground via mobile devices.
- **GEOFENCING:** Workers entering the airfield are issued transponders daily. These must be returned when they leave the area. Virtual fences have also been pre-programmed into a system. An alarm is triggered if a worker crosses the fence into a restricted area.



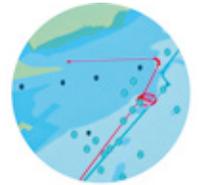
#### MTech FeverScan S3000

Although not travel technology per se, the introduction of this device during the Severe Acute Respiratory Syndrome (SARS) crisis in 2003 eased global travel processes considerably. At a time when airports and public health offices were grappling with the outbreak of a highly contagious disease, the device's ability to detect passengers running a fever was a crucial breakthrough.



#### Electronic Road Pricing (ERP)

Singaporeans passing through an ERP gantry are familiar with the "beep" that indicates a toll has been paid – electronically. Its introduction in 1998 made Singapore the first city in the world to implement an electronic road toll collection system for purposes of congestion pricing. Plans are afoot to improve this system, with the new Global Navigation Satellite System-based ERP model expected to kick in next year.



#### Maritime Innovation Lab

The shipping sector is far from new, but the industry can look forward to a bevy of fresh ideas and innovations, thanks to this initiative by the Maritime and Port Authority of Singapore. Launched in April this year, the lab will foster an environment that enables experimentation and the test-bedding of innovative port services and intelligent ship operations.

### PRIORITISING STAFF SAFETY

At its peak, the construction site for Changi Airport's fifth terminal will be a hive of activity, with some 20,000 workers expected. To keep these men and women safe, CAG is experimenting with smart glasses. These will complement existing closed-circuit television cameras, which are limited by their static nature. With smart glasses, ground inspectors can stream real-time video footage to a command centre. Inspectors can also communicate hands-free with the centre.

### KEEPING WATER OUT

While construction on land is anything but easy, building maritime structures poses even more challenges. To overcome these, the construction team of the new Tuas mega port is tapping on new engineering methods, namely caissons. These large watertight chambers keep water out by air pressure, allowing construction work to be carried out with ease. Caissons will form the foundation of the new port's first phase.

## DIRECT

### FROM AIR TO SEA

The future Changi Airport Terminal 5 could be linked to the existing Tanah Merah Ferry Terminal. This would make fly-ferry services a reality in Singapore, just as they are in Hong Kong, which offers a ferry service to Macau from the bustling Hong Kong International Airport.





SEVERAL ONGOING INITIATIVES ARE BEING CARRIED OUT TO ENSURE THE FUTURE-READINESS OF SINGAPORE'S MARITIME AND AVIATION SECTORS.

These structures are massive — each weighs up to 15,000 tonnes and measures up to 28 metres tall. Using caissons to build the wharf structure is faster than traditional methods such as piling. A total of 222 caissons will form the permanent wharf structure of the work-in-progress mega port, with 30 caissons already built.

PHOTOS: GETTY IMAGES



## THE PORT OF THE FUTURE

Here are some highlights you can expect from the Tuas mega port:

- **SEAMLESS TRANSFERS:** Today, ships entering local ports have to submit documents to at least three state agencies. However, a new portal will be implemented at the mega port to streamline the process, enabling ship captains to file such documents just once.
- **UP, UP AND DELIVERED:** Drones may be used for shore-ship deliveries, or to inspect vessels for damage.
- **AUTOMATIC SHIPPING:** Quay cranes, yard cranes and guided vehicles will be automated, while computers, sensors and cameras will be used to ensure safety and security.
- **GREEN AMID THE BLUE:** Sustainability will be a key principle of the mega port. Cranes and automated guided vehicles will be fully electric, while solar energy will be harvested to power operations as well.

“

With an initial capacity of up to 50 million passengers per year — more than twice the size of any of the existing terminals — Terminal 5 will be Changi Airport's largest yet.

PETER THE ROBOT HAS BEEN DEPLOYED TO ENHANCE SECURITY AND TRAFFIC FLOW OPERATIONS AT JEWEL.



## TECH NOW

Tech solutions aren't just being used for future developments — they are also being tapped on to enhance existing ones. At Jewel, a robot enhances security and traffic management. Known as Peter (Patrol and Traffic Enforcement Robot), the robot is deployed at the entrance of Jewel's second level. Operating autonomously, it is able to detect vehicles that break traffic rules, or impede traffic flow by parking or waiting at the kerbside. It also alerts enforcement officers if further action is needed. Peter can run for more than eight hours without recharging.

# LEARNING THROUGH

A recap of some of the courses organised by the Singapore Cooperation Programme in recent months.



## Global Food Safety Partnership (GFSP): Insights to Singapore's Food Safety Regulatory Systems 1-5 JULY

The Singapore Food Agency and the National Environment Agency gave participants insights into Singapore's food safety regulations, food processing and food import control. Participants also visited aquaculture and agriculture farms, and experienced a local market and hawker (cooked food) centre.

### DID YOU KNOW?

The GFSP is a public-private partnership led by the World Bank which focuses on improving food safety worldwide, while promoting food security and economic development.

# SHARING

## Japan-Singapore Partnership Programme for the 21<sup>st</sup> Century (JSPP21): Maritime Safety Management

29 JULY – 2 AUGUST

In partnership with the Japan International Cooperation Agency (JICA), trainers from Singapore's MPA Academy and the Japan Coast Guard shared their knowledge on maritime safety policies, as well as international conventions and regulations with participants from Southeast Asia, South Asia and the Pacific. Participants also had the opportunity to visit the Port of Singapore and toured various landmarks rooted in Singapore's maritime heritage.



### DID YOU KNOW?

The SCM, which was adopted by the UN General Assembly in December 2018, is the first United Nations treaty to be named after Singapore and opened for signature in Singapore on 7 August 2019.

## International Trade Law 10–14 JUNE

In this course organised by the Singapore Judicial College, participants interacted with speakers from Singapore's Attorney-General's Chambers, Ministry of Law and the Singapore International Arbitration Centre. Various topics discussed included international economic law, in particular the role of the United Nations Commission on International Trade Law (UNCITRAL), and the Singapore Convention on Mediation (SCM).

## Singapore-Turkey Third Country Training Programme: SME Development and Entrepreneurship

8–12 JULY

SCP partnered the Turkish Cooperation and Coordination Agency in this course where experts from Singapore and Turkey shared their countries' initiatives for facilitating the growth of Small and Medium-sized Enterprises (SMEs), innovation and technopreneurship. Singaporean business owners also shared their entrepreneurial journeys with the participants, who visited Block 71, Singapore's start-up hub, and successful SMEs.



## UPCOMING COURSES

More opportunities for knowledge broadening and expansion

— **DIGITAL ECONOMY: BIG DATA AND ANALYTICS**  
2-6 DEC 2019  
NOMINATION DEADLINE: 18 NOV 2019

— **CRISIS MANAGEMENT**  
9-12 DEC 2019

— **THE ENTREPRENEURIAL ECOSYSTEM: SUPPORTING START-UPS AND COMMUNITIES**  
9-13 DEC 2019

— **SOCIAL COHESION AND RACIAL HARMONY**  
6-10 JAN 2020  
NOMINATION DEADLINE: 25 NOV 2019



## Empowering Persons with Disabilities and Special Needs 27–31 MAY

Singapore's Civil Service College shared with participants Singapore's philosophy and multi-stakeholder approach to empower persons with disabilities and special needs for a more inclusive society. Participants also interacted with members of various organisations such as the National Design Centre, Rainbow Centre Singapore, SPD Ability Centre and the Enabling Village.

PLEASE VISIT [HTTP://SPSCATALOG.WIXSITE.COM/SCP2019](http://spscatalog.wixsite.com/scp2019) FOR THE LATEST DETAILS ON THESE COURSES AND THE APPLICATION PROCESS.



joining hands

Since 2001, more than 1,000 aviation professionals from developing countries have had a chance to shore up their expertise at specialist programmes conducted by the Singapore Aviation Academy (SAA), the training arm of the Civil Aviation Authority of Singapore. Their training was sponsored by the Singapore Government, as part of the Developing Countries Training Programme (DCTP), jointly initiated by the Republic and the International Civil Aviation Organization (ICAO).

Due to overwhelming response, the programme has been extended and expanded, most recently in April this year, as announced at the gala dinner of the World Civil Aviation Chief Executives Forum 2019. Under this latest extension, the programme will run for another three years till 2022, offering some 330 fellowships and 10 scholarships.

The number of fellowships has increased by 10 percent since the last expansion, a reflection of the surging demand from developing countries for more training places. Recipients of the fellowships can choose from a suite of training programmes conducted at SAA, which range from aviation management to aviation safety and security management.

Such programmes equip participants with an appreciation of how the various integral elements in the aviation industry interface with one another. Graduands are also armed with the skills to manage the diverse challenges of a dynamic civil aviation environment. Participants enjoy more than just classroom training; they are also taken on informative and enriching learning journeys to sites such as Changi Airport, where they can observe the hub's operations in detail.

### JOINT ACTION

While transport brings the world together, it can also pose a great threat to the planet's sustainability. As a transport hub, Singapore is aware of the environmental costs of its transport activities and has sought to mitigate them. However, problems like pollution and carbon emissions are often transboundary issues, requiring the cooperation and action of multiple countries.

Take the issue of marine waste. While the International Maritime Organization states that shipping is a comparatively minor contributor to marine pollution compared to land-based industries, it is nonetheless still a contributor. Besides oil spills

# LINKS THAT ENRICH

Singapore's transport ecosystem doesn't just connect people and move goods; it also shares expertise and best practices with global counterparts.



Source: Civil Aviation Authority of Singapore



AN AERIAL VIEW OF THE PERHENTIAN ISLANDS, MALAYSIA, AS SEEN FROM A SINGAPORE AIRLINES FLIGHT FLYING BETWEEN SINGAPORE AND BANGKOK, THAILAND.

and pollutants, improper waste disposal from ships can also cause the build-up of marine debris in the world's waters. It is estimated that in some seas, up to 40 percent of marine litter comes from the maritime sector. Marine debris poses a grave threat to the world's aquatic ecosystems and can also affect public health and tourism. "In Singapore, marine debris washes onto our shores regularly," noted Prime Minister Lee Hsien Loong at the 34<sup>th</sup> Association of South East Asian Nations (ASEAN) Summit in Bangkok on 22 June 2019. "There are so many beautiful beaches in Southeast Asia, and they are at risk of being polluted if we don't bring the problem under control," he added.

At the Summit, ASEAN leaders pledged to tackle the issue by adopting the Bangkok Declaration on Combating Marine Debris, reaffirming their



Source: International Maritime Organization

commitment to conserve the marine environment and strengthen regional cooperation in addressing marine debris issues. ASEAN Member States also agreed to strengthen national laws and regulations on marine debris and change local behaviours to prevent and reduce marine debris.



SINGAPORE'S TRANSPORT MINISTER DR KHAW BOON WAN AND DR OLUMUYIWA BENARD ALIU, PRESIDENT OF THE INTERNATIONAL CIVIL AVIATION ORGANIZATION, AT THE SIGNING OF A MEMORANDUM OF UNDERSTANDING EXTENDING SINGAPORE'S SUPPORT OF THE SINGAPORE-ICAO DEVELOPING COUNTRIES TRAINING PROGRAMME.



## EXPORTING EXPERTISE

In 2017, Changi Airport set up a fund worth more than US\$1 billion to invest in and establish a strong foothold in emerging aviation markets. Such projects offer huge potential, said Changi Airport Group chairman Mr Liew Mun Leong. "We see a lot of airports that need not just funding, but expertise. It's an infrastructure business

that is very promising given the growth of the aviation industry."

But Mr Liew, a doyen of public infrastructure projects, stresses that exporting expertise also helps the local team learn. "We know (first-hand) what's happening in Brazil, Abu Dhabi, China, India, because we are there, working with them. We see

how they operate, how they are growing, the challenges they face," Mr Liew told *The Straits Times* in 2017. He added that such ventures also provide a good opportunity for Changi to work directly with foreign airlines and to promote flights to Singapore.



# CONNECTING FOR THE FUTURE

*Experience Singapore* meets the men and women who work to ensure the future success of Singapore's transport system.

## INFINITE POSSIBILITIES

Dr Song Tiancheng, 57, remembers his first project at the Maritime and Port Authority of Singapore (MPA). It was the late 1990s and he was tasked to carry out a feasibility study on the development of a single, mega-container port in Tuas, a precinct on Singapore's western tip. This project aimed to consolidate Singapore's various ports in a centralised location to improve efficiency and expand capacity. "The challenge (back then) was to develop an optimal port layout within a limited sea space," Dr Song explains. "It also had to enable various container ships, large or small, to navigate and berth at the port safely and efficiently, and at the same time, to create enough land space for container operations," he adds. Given these challenges, the plans were reviewed regularly.

Fast forward 20 years and Dr Song is helping to build that port he envisioned. Now, as Deputy Director (Engineering) at MPA, he manages a team of some 10 engineers to undertake its most ambitious project yet. "Tuas Port is really a *mega*, mega-project," he says. "There's a lot of planning that goes into every aspect, be it in regards to site safety, project timelines or



Dr Song  
Tiancheng

DEPUTY DIRECTOR  
(ENGINEERING),  
MPA

environmental protection."

A lot of planning also goes into the technologies that will help Tuas Port become a port for the future — one that leverages new innovations to be more efficient, safe and sustainable. "I keep an eye out for new technologies and port operation concepts that might work in our port," he shares, adding that he learns of these innovations through visits to major ports and technology

companies. He also gains insights from research and development projects with various institutes of higher learning.

New technologies will not only be used at the new port; they also help Dr Song in his daily work. Equipped with the latest modelling software, he works with his colleagues to devise marine traffic and anchorage capacity simulations. With these, the team ensures that the fairways and anchorage space in Singapore are planned adequately to support future port traffic. The use of simulation software



## DID YOU KNOW?

The Green Man Plus initiative has been introduced at about 1,000 crossings around Singapore. The locations are selected based on the proximity of the crossings to healthcare facilities and transport nodes.

Grace Ong

DIRECTOR,  
TRANSPORTATION  
TECHNOLOGY,  
LTA



also helps MPA draw up contingency plans should unforeseen events, like oil spills and collisions, occur.

Being in the thick of these projects has kept Dr Song abreast of the global maritime industry — a far cry from when he joined MPA in 1997. “Back then, I was not familiar with the maritime world at all,” he recalls. “I applied to be a civil engineer at MPA because it dealt with hydraulic simulation and sediment transport, which were my research areas.” But he quickly found opportunities to learn and expand his professional expertise in port planning. “I think that is natural when you are part of a fast-changing industry like the maritime sector. Winds of change come, but you need to keep an open mind and adapt accordingly.”



**Winds of change come, but you need to keep an open mind and adapt accordingly.**

Dr Song Tiancheng

## A SENSE OF SATISFACTION

Friday mornings are routine for Mdm Mary Josephine Pereira. The 79-year-old retiree starts her day with Mass at church, after which she stocks up on groceries at Little India. During this journey, Mdm Pereira crosses at least six traffic junctions — some at the island’s busiest intersections.

For seniors like her, crossing these junctions have become much more convenient thanks to the Land Transport Authority (LTA)’s Green Man Plus initiative, which addresses the needs of elderly pedestrians and those with disabilities. One of these needs relates to the time needed to cross busy intersections. “I cannot walk as fast as I used to, so I tap my senior citizens’ card and the crossing stays green for longer,” explains Mdm Pereira, referring to a scheme that gives seniors up to 30 seconds longer to cross a road.

Hearing such stories gives Ms Grace Ong a great sense of satisfaction. As the Director of LTA’s Transportation Technology arm, Ms Ong explores ways that technology can be leveraged to make journeys more convenient and accessible for all Singaporeans. “I have seniors in my family as well and I understand that for many of them, having longer green lights is very important,” shares Ms Ong, who has been with the agency for 20 years. “By making it easier for seniors to travel and move about, we can ensure they remain active members of the community.”

To Ms Ong, the experience highlights how important technology is in building a more inclusive public transport system in Singapore. But as she reminds her team, which oversees the intelligent transport innovations in LTA, technology never remains static, and neither should they. “Staying at the forefront of technology allows us to spearhead sustainable and novel transport solutions,” she explains, adding that future solutions for transport would involve working with other agencies. “This helps us see things from different perspectives and offer unique solutions to transport woes,” she adds.

These innovations will contribute to LTA’s Land Transport Master Plan, which charts out the long-term vision, policies and targets to shape the Republic’s land transport system. “My role is a meaningful one that gives me a unique opportunity to make public service even better. It’s one of a kind,” says Ms Ong.

A NEWSLETTER OF THE  
SINGAPORE COOPERATION PROGRAMME

**SKY  
HIGH**

Some 65.6 million  
visitors pass through  
Changi Airport  
each year



*joining hands*

Courses conducted by the Singapore Aviation Academy have seen more than 1,000 aviation professionals from developing countries shore up their expertise.