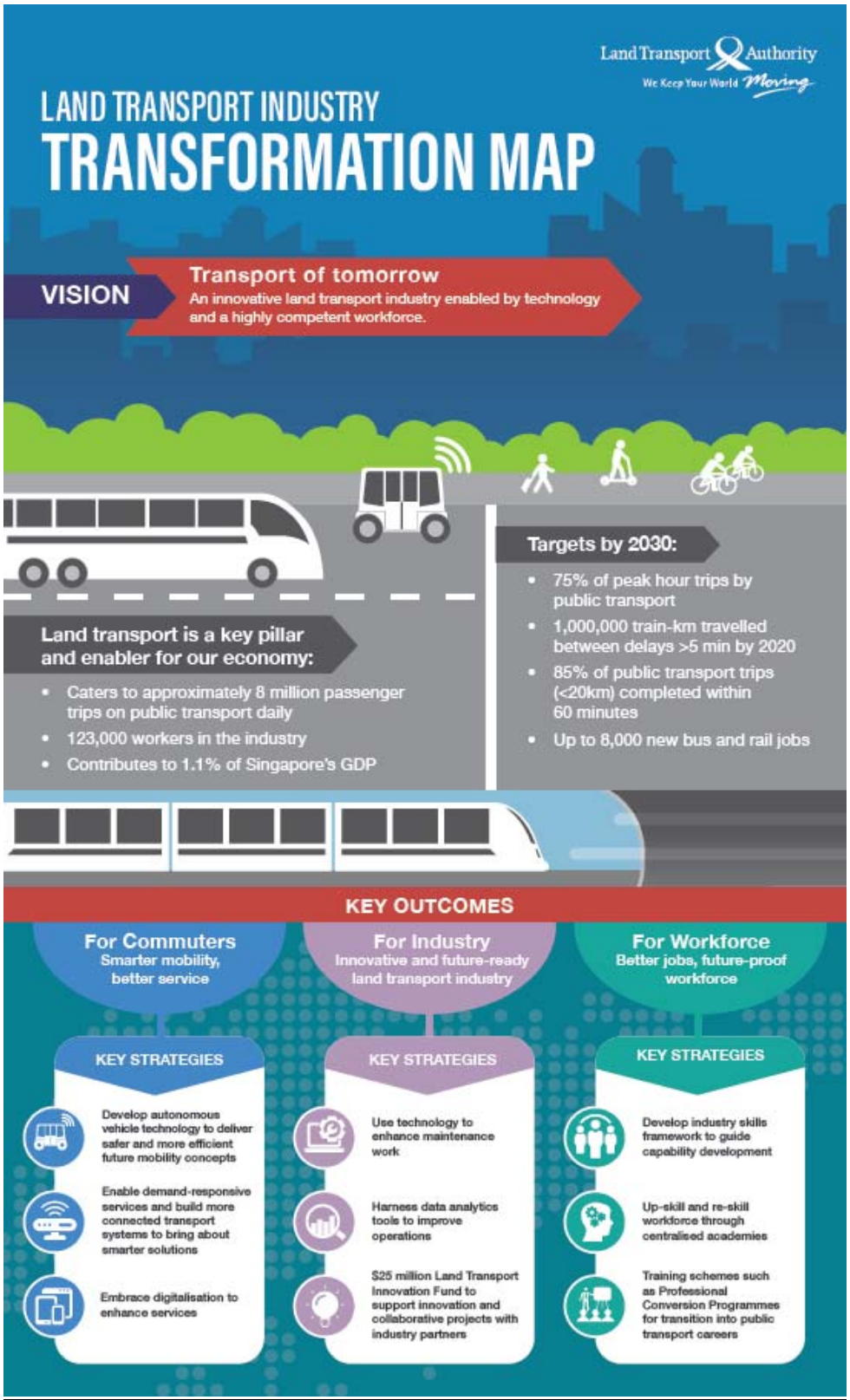
Annex A

Land Transport Industry Transformation Map (ITM) Infographics



Annex B

Land Transport Industry Transformation Map Initiatives

A. BETTER JOBS, FUTURE PROOF WORKFORCE

a) Public Transport Skills Framework (PTSF): Technological advancement has created areas of new and emerging skills. LTA, SkillsFuture Singapore (SSG) and the industry have jointly developed the PTSF to identify current and emerging skillsets, and map these against possible career pathways. The framework will help identify training gaps as well as guide the development of programmes to professionalise public transport workers and help them meet the changing demands of the workforce.

b) Professionalising the workforce: To help the workforce up-skill and re-skill to take on new and better jobs as the industry evolves, the government has set up specialised academies to cater opportunities for continuous learning and mastery.

i. Singapore Rail Academy
To meet the rail industry's long-term manpower needs, we launched the Singapore Rail Academy (SGRA) in February 2017 to build and deepen local rail engineering and research capacities. SGRA works with the industry and academia to build up research capabilities, certify the proficiencies of railway professionals, and promote careers in the rail industry.

ii. Singapore Bus Academy
The Singapore Bus Academy (SGBA) was launched in October 2016 to offer enhanced training through foundational, refresher and advanced modules for all bus professionals to support continual learning to deepening of skillsets.

c) Close collaboration with National Transport Workers' Union (NTWU): The future is not just about tapping on the latest technologies to find innovative and integrated solutions for land transport. It is also about nurturing the sustainable and mutually beneficial growth of the industry and the workers. Over the years, the NTWU has worked closely with the industry to engage workers and to enhance their employability through structured training and development programmes. To prepare the workforce for the next lap, LTA will continue to work closely with the NTWU to further develop worker's capabilities and help open doors to new and exciting career opportunities.

B. INDUSTRY UPGRADING AND PARTNERSHIP

a) Research & Development: To build up a critical mass of research capabilities and provide a platform to facilitate collaborative research, LTA has established a number of Transport Research Centres (TRCs). Currently, four TRCs have been established with NTU, NUS, SIT and SUTD to foster collaborative research and develop transport solutions.

b) Building Local Enterprise Capabilities: To develop local Small and Medium Enterprise (SME) capabilities, LTA will encourage SME participation in Government projects through the Government-Partnership for Capability Transformation (Gov-PACT) programme. This programme positions Government agencies as the lead organisations for SMEs and start-ups to work with to test-bed innovative solutions that have not yet reached market maturity.

C. SMARTER MOBILITY, BETTER SERVICE

a) **Rail Condition Monitoring:** Equipped with condition monitoring tools and advanced analytics, our rail systems will collect more extensive data to monitor the condition of the rail network in real-time. This will help to guide maintenance and repairs to address faults before they can impact operations.

b) **Automatic Track Inspection System:** Imaging sensors and laser scanners will be installed below train carriages to monitor track conditions in real-time, making it easier for the maintenance team identify track defects and rectify these quickly.

c) **Rail Enterprise Asset Management System (REAMS):** To facilitate condition monitoring, REAMS will consolidate and integrate information collected from all trains to better assess and predict the condition of the entire network and its components.

d) **Common Fleet Management System (CFMS):** CFMS allows bus operators track bus fleets in real-time. This empowers bus operators to better monitor and manage the efficient operations of all public buses across Singapore.

e) **Next-generation ERP:** With our next-generation ERP system, real-time, targeted traffic updates will be pushed to vehicles' on-board units, recommending alternative routes that are less congested in order to optimise road usage.

D. AUTOMATION

Autonomous vehicle (AV) technology has the potential to dramatically improve public transport. Singapore is exploring how AV technology can be applied to bring about new efficiencies and forms of shared mobility. Autonomous buses and dynamically-routed, on-demand shuttles will be deployed to enhance existing transport solutions.

E. SUSTAINABLE TRANSPORT

a) **Electric Car-Sharing Programme:** Launched in 2017, BlueSG is the largest electric car sharing service in Singapore. Each vehicle can travel up to 200km on a fully charged battery, and the cars are equipped with on-board information and GPS navigation systems.

b) **Electric Buses:** We will continue to explore the feasibility of electric bus deployments in Singapore. This follows LTA and the Energy Research Institute at Nanyang Technological University earlier assessment that the electrification of the public bus fleet offers the highest carbon abatement potential amongst the different vehicle fleets in Singapore.

F. INNOVATIVE & FUTURE-READY LAND TRANSPORT INDUSTRY

a) **Drones:** In the future, inspection of MRT tunnels will be faster and safer with the use of drones. Using such technology will free up engineers' time so they can focus on analysing the data collected to identify and address potential problems sooner.

b) **Planning for Land Transport Network (PLANET):** This data warehouse was developed by LTA to carry out advanced data analytics on travel patterns by car, bus and train. PLANET enables more accurate prediction of commuter travel patterns, which supports the development and fine-tuning of land transport models so that our transport planners can develop better transport policies.

c) **Digitalisation of Vehicle Services:** To provide the public with seamless and convenient access to vehicle-related services, LTA intends to provide more self-help services on its digital platforms in the coming years. This will allow vehicle owners to complete transactions securely, anytime and anywhere.