

WES 2025 Opening Ceremony Programme

Morning Session

Date	22 October 2025 (Wed)
Time	9.00am - 12.30pm
Venue	Grand Ballroom (Level 3) Orchard Hotel Singapore

Date	Time	Programme
22 October 2025 (Wed)	8.00am	Registration
	8.45am	Guests to be seated
	9.00am	Arrival of Guest-of-Honour Mr Desmond Tan Senior Minister of State, Prime Minister's Office Deputy Secretary-General, National Trade Union Congress
	9.05am	Welcome Address by WES 2025 Conference Chair Ms Jasmine Foo
	9.10am	Speech by IES President , Er. Chan Ewe Jin
	9.15am	Speech by Guest-of-Honour , Mr Desmond Tan
	9.25am	Launch of World Engineers Summit (WES) 2025
	9.30am	Presentation 1 by His Excellency Hiroshi Ishikawa Ambassador Extraordinary and Plenipotentiary of Japan to Singapore
	9.50am	Engineering the Archipelago: Indonesia's Perspective on Smart Sustainable Cities by Mr Thomas Ardian Siregar Deputy Chief of Mission Embassy of the Republic of Indonesia in Singapore
	10.10am	Morning Tea Break
	10.30am	Engineering Urban Systems by Mr Richard Lim Cherng Yih Deputy Chairman, Land Transport Authority Immediate Past Chairman, Energy Market Authority
	10.50am	Navigating the Future: How Maritime Digital Twins Can Enable Innovation in Sustainable Port Operations by Mr David Foo Deputy Chief Executive (Operations & Technology) / Chief Data Officer Maritime and Port Authority of Singapore
	11.10am	Presentation 5 by Prof Liu Bin Deputy President (Research and Technology) Tan Chin Tuan Centennial Professor National University of Singapore
	11.30am	Panel Discussion Moderator: Prof Lee Poh Seng Head of Department NUS Mechanical Engineering College of Design and Engineering National University of Singapore Panelists: 1. His Excellency Hiroshi Ishikawa 2. Mr Thomas Ardian Siregar 3. Mr Richard Lim Cherng Yih 4. Mr David Foo 5. Prof Liu Bin
	12.30pm	Networking Lunch

Please note that the programme may be adjusted as necessary.

Ballroom 1 (Level 3)				
Track 1 - Technological Solutions for a Climate-Resilient and Greener Future				
Track	Timing	Author	Synopsis	
1	2.00pm – 2.20pm	Keynote Presentation 1: <i>Climate Change Adaptation of Maritime Sector in Singapore</i> by Er. Tham Wai Wah Senior Director / Chief Engineer (Engineering & Project Management) Maritime and Port Authority of Singapore	As a small island state vulnerable to the impacts of global climate change, Singapore takes climate change seriously. The maritime industry in Singapore contributes 7% of Singapore's Gross Domestic Product (GDP) and employs over 170,000 people. Since 1986, Singapore has been the busiest port in the world in terms of shipping tonnage, with an annual average of 140,000 vessel calls. It is the focal point for some 200 shipping lines with links to more than 600 ports worldwide. Singapore's port will face significant risks from rising sea levels, extreme weather events and increasing temperatures. Climate hazards not only jeopardise our port's physical infrastructure and operations, but also disrupts global supply chains, impacting industries, livelihoods and national economy. The Maritime and Port Authority of Singapore (MPA) has taken steps to enhance our port's climate resilience for the long term.	
1	2.20pm – 2.35pm	Paper Presentation 1: <i>Assessment of Wave Climate Variability in Singapore and Its Role in the Design of Coastal Adaptation Measures</i> by Murtia Jain and Liew Meng Jie DHI Water & Environment (S) Pte Ltd	DHI assessed wave climate variability along Singapore's coast, focusing on the south and west to support Tuas Port design. Multi-year measurements show Southwest Monsoon waves are highly variable, with heights often exceeding 12 m and periods of 4-6 seconds, driven by monsoonal winds. The west coast is more exposed due to long fetches from the Sumatra sector, producing extreme waves. High-resolution modelling is required to capture nearshore processes like refraction, shoaling, and wave-current interactions, while accounting for climate change impact. Using joint probability analysis, the study defines realistic multi-hazard design conditions critical for resilient, long-lived coastal infrastructure.	
1	2.35pm – 2.50pm	Paper Presentation 2: <i>Revisiting Rainfall IDF Estimates in a Changing Climate: A Regional GEV Approach for Singapore</i> by Dr. Das Santanu University of Glasgow Singapore	Extreme rainfall events are intensifying with climate change, posing challenges for urban water system resilience, particularly in tropical regions like Singapore. This study assesses future changes in daily extreme rainfall using observations and climate simulations under three emission scenarios: SSP1-2.6, SSP2-4.5, and SSP5-8.5. Annual maximum daily rainfall is modelled with the Generalized Extreme Value distribution in a regional frequency framework, improving return level reliability and enabling updated, non-stationary IDF curves. Results show significant increases under high emissions, indicating current stationary-based designs may underestimate risks. Findings support revising hydrological standards to strengthen climate-resilient infrastructure in Singapore and similar tropical environments.	
1	2.50pm – 3.05pm	Paper Presentation 3: <i>Integrating Advanced Technologies for Climate Risk Assessment of Eco-Tourism in SIDS</i> by Ismail Welliang Haskoning	This study introduces a Climate Risk Assessment (CRA) framework for eco-tourism in Small Island Developing States (SIDS), integrating advanced tools for hazard evaluation and mitigation. Aligned with ISO 13000 and TCO, it assesses physical and transition risks under SSP2-4.5 and SSP5-8.5 scenarios. Flood risks are quantified using Haskoning's Global Flood Risk Tool, while coastal erosion is evaluated with CoastalS. A SIDS case study highlights risks such as flooding, erosion, and reef degradation. The framework proposes technological and nature-based solutions, including flood defenses, erosion control, beach restoration, and reef restoration, forming a Resilient Climate Resilience Roadmap for sustainable eco-tourism.	
1	3.05pm – 3.45pm	Panel Discussion Moderator: Mr. Ho Chai Teck (Deputy Director (Capability Building) Coastal Protection Department PUB, Singapore's National Water Agency		
1	3.45pm – 4.00pm	Tea Break		
1	4.00pm – 4.15pm	Paper Presentation 4: <i>Modelling of a floating turbine to harvest tidal energy in the coastal environment</i> by Lin Xiangfeng, Dr. Yuzhu Pearl Li and Na Na National University of Singapore	Floating tidal stream turbines offer a promising renewable energy solution. This study develops an integrated computational fluid dynamics (CFD) model to simulate a floating turbine under wave current conditions. The model combines hydrodynamics, mooring systems, platform motion, and turbine dynamics, using waveFoam, MoorDyn, and an actuator line method for rotor representation. A new six-degree-of-freedom motion library accounts for turbine-platform interactions. Each module is validated against experimental data, showing good agreement. Two case studies reveal that wave current loading causes platform re-positioning, periodic motions, increased mooring tension, and turbine performance fluctuations. The model provides a reliable tool for turbine design and safety assessment.	
1	4.15pm – 4.30pm	Paper Presentation 5: <i>Sludge Treatment with Continuous Thermal Hydrolysis (CH)-Pyrolysis for Biochar Production</i> by Dr. Miao He and Dr. Cai Qingping PUB, Singapore's National Water Agency	PUB is piloting a combined CH-pyrolysis process in a 5 tpd facility to evaluate its technical and economic viability for producing biochar from dewatered anaerobic digested (dAD) sludge. In the CH process, high temperature and pressure break down the cellular structure of dewatered sludge, the subsequent filter press system can increase sludge solids content from 20% to 30%. The filter pressed sludge cake then undergoes pyrolysis at 500-600°C to produce biochar, achieving an overall 90% mass reduction. Studies on biochar applications was also carried out to assess biochar's potential use as a fuel supplement, activated carbon for odor control, and construction material.	
1	4.30pm – 4.45pm	Paper Presentation 6: <i>Microgrid Essential To Incorporating Green And Future Technology To End Consumer</i> by Chua Han Koon, Teh Siaw Peng, Lim Jun Rong, and Nicholas Foo Chang Jun (Defence Science and Technology Agency (DSTA) Singapore), Ho See Fong, and Chua Pei Qi (HY M&E Consultancy Services Pte Ltd) and Chua Lin Meng (Singapore Polytechnic)	Microgrids reduce reliance on the national grid by enabling developments to be self-sufficient, climate-resilient, and powered by green technologies. Integrating distributed energy resources (DER) such as renewables, generation, and energy storage systems, microgrids can meet daily needs and operate independently during emergencies. A new project interlinks emergency generation, ESS, and backup power across a development, enabling load sharing without grid dependence. Careful design ensures optimal microgrid controller placement, electrical safety, and reliable operation. This paper explores green microgrid development, including design, testing, commissioning, and challenges such as managing transformer inrush currents, with operational best-practices presented for load sharing in microgrid mode.	
1	4.45pm – 5.00pm	Paper Presentation 7: <i>Biogas Upgrading Optimisation for Renewable Energy Storage and Energy Recovery Enhancement</i> by Dr. Victor Sim and Ms Chan Hui Ling Conny Tech Pte Ltd	The global shift to renewable energy highlights the need for efficient storage to manage solar and wind intermittency. Hydrogen offers high gravimetric energy density (120MJ/kg) and clean production via water electrolysis but faces low volumetric density and costly compression and transport. Converting hydrogen into synthetic methane via CO ₂ methanation enhances volumetric energy density (23.9MJ/m ³) and uses existing gas infrastructure. Biological in-situ upgrading in anaerobic digesters, aided by a novel ceramic membrane contactor, improves H ₂ dissolution, achieves 70-90% CH ₄ and >100% increased production. Methanobacterium spp. dominate, enabling scalable, low-energy green biomethane production for decarbonation.	

Ballroom 2 (Level 3)				
Track 2 - Urban Mobility Innovations for Sustainable Cities (Road and Traffic Innovations)				
Track	Timing	Author	Synopsis	
2	2.00pm – 2.35pm	Keynote Presentation 1: <i>Title</i> by Mr. Lam Wee Shann Deputy Chief Executive (Technology) Land Transport Authority		
2	2.35pm – 2.50pm	Q&A Moderator: Dr. Raymond Ong Dean's Chair, Associate Professor Deputy Head (Research & Enterprise) Group Head (Geotechnical Engineering, Transportation Engineering and Project Management) Department of Civil and Environmental Engineering National University of Singapore		
2	2.50pm – 3.10pm	Paper Presentation 1: <i>Transportation to Mobility - Navigating the Changes and the Challenges</i> by Dr. Chin Kian Keong ST Engineering	Transportation engineering as a science, has been around for centuries, with innovations dating as far back as when Roman roads were being built. What used to be infrastructure-focused, the science of transportation has evolved over time. Today, the term mobility is used to describe the many facets of the science that keeps us moving safely and efficiently. How should engineers keep abreast of these and other changes and continue innovating?	
2	3.10pm – 3.30pm	Paper Presentation 2: <i>Innovations in Road Works and Maintenance to Enhance Productivity and Sustainability</i> by Dr. Low Boon Hee and Vincent Gwe Highway International Pte Ltd	This presentation highlights innovations in road maintenance that boost productivity and sustainability through advanced materials and digital solutions. An asphaltic tile overlay system for rigid pavements after trenching avoids full depth reconstruction, reducing waste, noise, dust, and road closures while using high performance asphalt for durability and resistance to damage. Sustainable materials include recycled plastic asphalt, incorporating processed local waste to improve performance and cut carbon footprint. AI-based road inspection enables timely defect detection, reducing manual inspections and optimizing maintenance. These integrated approaches advance smarter, greener, and more resilient road infrastructure, supporting productivity and environmental sustainability goals.	
2	3.30pm – 4.00pm	Tea Break		
2	4.00pm – 4.20pm	Paper Presentation 3: <i>Green Pavement: A Journey of Material Innovation</i> by Dr. Than Than Nyunt, Anggraini Zulaiti, Kapil's S and Chandrasekar Palaniyam Land Transport Authority	This presentation reviews a decade of innovation in sustainable pavement materials, tracking the journey from lab development to real-world application in Singapore's tropical climate. It evaluates recycled and eco-friendly materials such as warm mix asphalt and steel slag porous asphalt through extensive testing and field trials. Case studies benchmarked against international standards assess skid resistance, ride comfort, and durability under live traffic. Insights from implementation and maintenance have shaped current material selection and asset management practices. While eco-friendly options are standard, challenges in climate resilience and long-term performance remain, guiding future sustainable urban pavement strategies.	
2	4.20pm – 4.40pm	Paper Presentation 4: <i>Moving More with Less: The Surprising Efficiency of People-First Streets</i> by Prof Yap Fook Fah Nanyang Technological University	Our cities stand at a critical juncture, choked by traffic congestion that stifles economic activity and burdens transportation systems that deepen social inequality. This presentation examines how redistributing finite urban street space from inefficient, single-occupancy vehicles to high-capacity transit, cycling, and pedestrian use can simultaneously address two critical urban challenges: traffic congestion and transport inequality. Drawing on global case studies, fundamental principles of traffic science, and emerging technologies, this talk will demonstrate that realigning street space is not about restricting mobility, but about optimizing it for everyone. By prioritising space-efficient modes, we can move more people more reliably, create safer and more livable communities, and build a more equitable urban future where access to opportunity is not contingent on owning a car.	
2	4.40pm – 5.00pm	Paper Presentation 5: <i>Harvesting Technologies in Path Safety Assessments</i> by Dr. Koh Puay Ping, Yap Hui Jin, Yeong Wylie Kwak and Chandrasekar Palaniyam Land Transport Authority	As Singapore aims to expand its cycling network from 730km (2020) to 1300km by 2030, this paper presents a technological approach to proactively enhance cycling infrastructure safety. Integrating an AI-enabled Path Safety Assessment Tool, adapted from CycliAR, with a digital platform analysing 3D infrastructure attributes, the system overcomes limitations of sparse crash data. A 'heatmap' dashboard and computer vision automate risk assessment across bicycle, pedestrian, and vehicle interactions, generating prioritised risk scores for targeted interventions. This scalable, data-driven approach advances proactive, evidence-based urban mobility planning, supporting safe, sustainable, and future-ready cycling networks in dense city environments.	
2	5.00pm – 5.20pm	Paper Presentation 6: <i>The Singapore Road Safety Observatory (1960-2024)</i> by Dr. Koh Puay Ping, Loh Kok Fah, Jelphine Goh and Chandrasekar Palaniyam Land Transport Authority	This study examines the evolution of road safety globally and in Singapore from the 1960s to 2024, reviewing interventions and policies that reduced traffic fatalities. Key initiatives include the Road Design System (1983), mandatory motorcycle helmet laws, strict vehicle import regulations, Silver Zones (2014), and Vision Zero principles (2019). Singapore achieved a 50% reduction in fatalities per 100,000 population despite rising vehicle numbers. The study highlights the integration of engineering, enforcement, data-driven policies, and public education, evolving from traditional measures to proactive, technology-enabled solutions. Insights guide planners and policymakers in preparing for future mobility technologies and safety system implementation.	
2	5.20pm – 5.40pm	Paper Presentation 7: <i>Bikeability Index for Singapore</i> by Dr. Liyu Yang, Kum Yung Juan, Tan Chek Hien (Singapore Institute of Technology), and Yap Hui Jun (Land Transport Authority)	This study develops a multidimensional bikeability index for Singapore by integrating subjective user experiences with objective environmental data to support sustainable transport planning. Six key dimensions—cycling infrastructure, comfort, land use, directions, traffic environment, and security—were identified via literature review and validated with 30 local experts. A survey of 658 participants captured perceptions of environmental conditions and cycling behavior. Factor analysis, regression, and structural equation modelling constructed the index, linking the built environment to cycling activity. Future work will incorporate larger questionnaire datasets and machine learning to enhance predictive capabilities, guiding infrastructure investments and evidence-based urban design.	
2	5.40pm – 5.55pm	Panel Discussion		

Ballroom 3 (Level 3)				
Track 3 - Designing for Sustainability in Green Building Practices				
Track	Timing	Author	Synopsis	
3	2.00pm – 2.30pm	Keynote Presentation 1: <i>Innovative Cooling and Dehumidification Strategies for Sustainable and Resilient Green Buildings</i> by Dr. Chua Kian Jon Ernest Associate Professor National University of Singapore	This presentation presents innovative cooling and dehumidification strategies that enhance the sustainability and resilience of green buildings. It highlights the use of membrane-based dehumidification systems for energy-efficient moisture control, and heat-driven chillers that leverage low-grade thermal energy to minimize electrical demand. The integration of high-performance superabsorbent desiccants, offering superior moisture uptake and low regeneration temperatures, is also examined. Collectively, these technologies address both sensible and latent cooling loads with reduced environmental impact, supporting the design of low-carbon, climate-responsive buildings—particularly in warm and humid regions where conventional HVAC systems are energy-intensive and less efficient.	
3	2.30pm – 2.50pm	Paper Presentation 1: <i>SafeAir: A Smart IEQ Solution for Health-Centric Building Compliance and Automated Remediation</i> by KT Wu Vidal Solution Pte Ltd	This paper presents SafeAir, a smart indoor Environmental Quality (IEQ) system that ensures health-centric compliance with international building standards while enabling automated environmental remediation. SafeAir integrates real-time pollutant sensing (PM2.5, CO2, TVOCs, humidity, temperature, sound, light) with AI-driven analytics and compliance verification. Remediation mechanisms, such as Direct Control Ventilation and air filtration, activate automatically when thresholds are exceeded. A digital twin-based Command Center enables centralized monitoring, predictive maintenance, and executive insights. Field deployments in Singapore healthcare and education facilities demonstrate SafeAir's ability to detect mold, reduce airborne transmission risks, and enhance occupant comfort, health, and productivity.	
3	2.50pm – 3.10pm	Paper Presentation 2: <i>Cooling the Future: Brownfield District Cooling for Sustainable Urban Renewal</i> by Goh Lee Peng SP Group	As part of Singapore's journey towards net zero by 2050, brownfield district cooling is emerging as a powerful solution to cut carbon, enhance energy efficiency in existing developments, and build long-term resilience. This session draws on insights from the Tampines Distributed District Cooling (DDC) network – Singapore's first district cooling system in a brownfield setting. It will examine key design considerations, deployment challenges, and optimisation strategies, while highlighting outcomes such as carbon abatement and energy savings. The session will also explore the role of policy incentives, including BCA's Green Mark scheme and URA's GRA benefits, in enabling adoption, and how Singapore's brownfield DDC model can be scaled across the region.	
3	3.10pm – 3.40pm	Panel Discussion Moderator: Dr. Aaron Sham Senior Engineer Enforcement and Structural Inspection Department Building Resilience Group Building and Construction Authority		
3	3.40pm – 4.00pm	Tea Break		
3	4.00pm – 4.20pm	Keynote Presentation 2: <i>Title</i> by Dr. Kim Yongmin Assistant Professor University of Glasgow		
3	4.20pm – 4.40pm	Keynote Presentation 3: <i>Title</i> by Mr. David Xu Director, AI HVAC Unvers		
3	4.40pm – 5.00pm	Paper Presentation 3: <i>Slope erosion impact assessment using fuzzy analytical hierarchical process: A case study in Singapore</i> by A/Prof Robert Tiong, He Renfei, Zhou Xiaoling (Nanyang Technological University) and Alex Shao (Urban Dot Solution Pte. Ltd.)	Slope erosion from extreme rainfall threatens infrastructure and public safety, making systematic assessment vital for resilient city planning. This study introduces a framework using the fuzzy analytical hierarchical process (FAHP). Impact ranges are estimated via an energy-friction model, with infrastructure classified into four categories and 13 sub-factors. Expert-derived weights from eight questionnaire address uncertainty. Applied to 104 rainfall slopes across Singapore, results show road impacts dominate, while park impacts are rare. The composite impact index is right-skewed, mostly 0.2-0.3. A Mitokom Road case demonstrates application. The framework delivers practical, transparent insights to guide infrastructure resilience and policy decisions.	
3	5.00pm – 5.20pm	Paper Presentation 4: <i>Nature-based Green Buildings for a Resilient Future</i> by A/Prof Charles Lee University of Newcastle (Australia)	Nature-based approaches in green building design are gaining traction for achieving sustainability goals such as reducing CO ₂ emissions. By integrating ecological processes—like natural ventilation, rainwater harvesting, green roofs, and biodiversity enhancement—these designs lower energy use, boost resilience, and create healthier workplaces. Examples include Singapore's Parkway Collection Pickering Hotel with cascading gardens and rainwater systems; Melbourne's Council House 2 with passive cooling and rooftop gardens; Milan's Bosco Verticale's vertical greenery; and China's Nanjing Green Towers' self-sustaining ecosystems. These case studies highlight the commercial, environmental, and health benefits of nature-based design, offering a roadmap toward regenerative, low-carbon, and resilient cities.	
3	5.20pm – 5.50pm	Panel Discussion Moderator: Dr. Aaron Sham Senior Engineer Enforcement and Structural Inspection Department Building Resilience Group Building and Construction Authority		

Lavender Room (Level 3)				
Special Session 1 - Systems Engineering in the Age of Complexity: Challenges and Solutions				
Special Session	Timing	Author	Synopsis	
SS1	2.00pm – 2.20pm	Keynote Presentation: <i>Digital Standard with SysML and LLMs</i> by Mr. Robert Ong President INCOSI (Singapore Chapter)	The integration of Artificial Intelligence (AI) into Systems Engineering (SE) has accelerated with Large Language Models (LLMs) like ChatGPT and GEM, 2.0 advancements. AI for Systems Engineering (AI4SE) leverages LLMs and prompt engineering to automate tasks such as requirements generation and system architecture modeling. However, adoption faces challenges including model bias, hallucinations, and security concerns, raising questions about reliability. This presentation introduces an AI agent-based methodology for certification planning, enhancing traceability and semantic links between certification rules, system requirements, and architecture. A reference implementation demonstrates its practical applicability in real-world certification planning scenarios.	
SS1	2.20pm – 2.40pm	Paper Presentation 1: <i>Managing the Water Sources through System Thinking</i> by Bernard Koh PUB, Singapore's National Water Agency	Singapore, a small island city-state with limited natural water resources, is classified as highly water-stressed despite abundant rainfall, due to insufficient land for storage. As the national water agency, PUB manages the entire water loop through the Four National Tap: Catchment Water, Imported Water, Wastewater, and Desalinated Water. Developed in phases, this system integrates engineering, technology, and innovation to ensure sustainability and resilience. However, climate change—through sea level rise and extreme weather—adds new complexities. To secure Singapore's water future, system thinking and integrated management remain crucial in addressing evolving challenges and safeguarding long-term water resilience.	
SS1	2.40pm – 3.00pm	Paper Presentation 2: <i>Integrating Nature-positive approach into System Engineering: Resilience in complex urban and coastal environments</i> by Carlyn van der Sluis, Jari Smits, and Joost Noordermeer Witteveen+Bos South-East Asia	The nature-positive approach is emerging globally as a framework for infrastructure that works with natural systems. Witteveen+Bos applies this through its Nature+ methodology, integrating systems engineering to align ecological, social, and technical systems. The approach emphasizes early system analysis, scenario planning, and identifying leverage points where ecological restoration delivers co-benefits such as resilience, biodiversity, and socio-economic value. A key example is the Brijuni Resilient Horizons project, linking small scale restoration to community development. While challenges like time, limited funding, and short-term planning persist, embedding Nature+ early fosters more adaptive, resilient, and collaborative urban planning across Southeast Asia.	
SS1	3.00pm – 3.20pm	Paper Presentation 3: <i>Navigating complexity in Rapid Transit System development with Systems Engineering – Our Rail Story</i> by Dr. Samuel Chan, Joyce Hong and Mok Ji Wei Land Transport Authority	Delivering sustainable urban mobility remains a major challenge for city developers. Beyond moving people, transport shapes quality of life, with rapid transit networks forming the backbone supported by over 20 integrated systems. Designing and integrating these requires a robust systems engineering approach to meet current and future stakeholder needs. To enhance collaboration, generic systems requirements were captured using model-based systems engineering, organized from high-level operational to detailed physical allocations. Applying models early and throughout the lifecycle delivers significant benefits. This presentation highlights the advantages of this transformation, along with lessons learned and future opportunities for sustainable mobility.	
SS1	3.20pm – 3.40pm	Paper Presentation 4: <i>Transforming Army Logistics: Leveraging ORSA for Decisive Action in Complex Environments</i> by M6E Lee Chee Kiang MINDEF / SAF	Army logistics today face increasing complexity from contested environments, limited resources, and dynamic missions. Operations Research and Systems Analysis (ORSA) provide data-driven frameworks to enhance efficiency and sustainability. By applying optimization, simulation, and decision modeling, ORSA enables informed logistics decisions, streamlining supply chains, reducing redundancy, and optimizing resource allocation—from fuel and maintenance to transport networks. Modeling tools anticipate demands, identify bottlenecks, and test resilient architectures. ORSA also drives innovation, supporting new technologies, reducing carbon footprint, and promoting long-term sustainability. As a strategic enabler, ORSA transforms data into action, ensuring responsive, cost-effective, and effective logistics support and future operations.	
SS1	3.40pm – 4.00pm	Tea Break		
SS1	4.00pm – 4.20pm	Paper Presentation 5: <i>Systems Engineering in AI Systems</i> by Dr. Jonathan Pan Home Team Science & Technology Agency (HTX), Singapore	This talk explores the vital role of systems engineering in the development and deployment of AI systems. With the ever-growing adoption of AI, systems engineering principles would help manage the associated risks such as emergent behaviors, bias, and unpredictable outputs. While challenges like the "black box" nature of AI models and distributed risks pose significant hurdles, there are opportunities to establish frameworks in the use of AI in systems to ensure safety and resilience.	
SS1	4.20pm – 4.40pm	Paper Presentation 6: <i>The Applications of SCADA and IoT from a Systems Engineering Approach</i> by Yao Shih Jih PingComm Pte Ltd	The Internet of Things (IoT) is reshaping traditional SCADA systems, especially in remote telemetry, monitoring, and control. This paper examines whether IoT will replace or augment SCADA, exploring their convergence through a systems engineering lens. Key comparisons include architecture, control, lifecycle, testing, integration, and cybersecurity. IoT offers flexibility, scalability, and cloud connectivity, while SCADA provides deterministic control and high reliability. Real-world cases in utilities, facilities automation, and security illustrate independent and hybrid deployments. The study highlights how systems engineering guides design, integration, and operation, ensuring reliable, secure, and maintainable control systems while informing modernization decisions without compromising core operational requirements.	
SS1	4.40pm – 5.00pm	Paper Presentation 7: <i>The Importance of System Engineering from Art of War Perspective</i> by Dr. Lee Kar Heng TBSS Group	This paper attempts to explore the Sun Tzu's Art of War in terms of system engineering and operational test and evaluation. The objective is to demonstrate the importance of system engineering that is practiced in all engineering applications. In this paper, system engineering will be discussed in terms of Sun Tzu's Art of War. The illustration of system engineering, a multi-discipline practices, will be discussed in terms of a radar design. Finally, this paper attempts to illustrate system engineering which is cross-discipline between engineering, business, management, using the well-known Art of War.	
SS1	5.00pm – 5.30pm	Panel Discussion		

World Engineers Summit (WES) 2025

Full Day Session

Date 23 October 2025 (Thu)

Time 9.00am - 5.30pm

Venue Orchard Hotel Singapore

Ballroom 1 (Level 3)			
Track 1 - Technological Solutions for a Climate-Resilient and Greener Future			
Track	Timing	Author	Synopsis
1	9.00am – 9.20am	Keynote Presentation 2: Title by Mr Robert Chan Vice President, Water, Asia AECOM	
1	9.20am – 9.40am	Paper Presentation 1: Resilient and sustainable outcomes through digitalisation and the ISO22372 standard by Prof Liz Varga (University College London), Tang Yuchun and Goh Yang Miang (National University of Singapore)	Resilient infrastructure is vital for societal well-being and environmental sustainability, with assurance increasingly reliant on automated technologies due to the scale of urban systems. While digitalisation delivers timely service data, many smart cities overlook interdependencies between sub-systems, risking disruption and environmental harm. ISO 22372, developed since 2022 with global input and UNDRR collaboration, provides principles to guide cities, governments, and organisations toward integrated, climate-resilient solutions. Adoption supports system-wide resilience assessment, hazard exposure analysis, and proactive adaptation of essential services. Leveraging cloud computing, AI, IoT, and 5G, ISO 22372 enables forward-thinking policies for greener, more sustainable, and disruption-resilient infrastructure.
1	9.40am – 10.00am	Paper Presentation 2: A Building Ahead of its Time: Super Low Energy Today, Net Zero Always by Er. Tham Wai Wah, Cheng Sai Keong Albert, Chua Wee Liang and Ng Junjie Maritime and Port Authority of Singapore	MPA's new building aims to set benchmarks in sustainability, architecture, and engineering, proving that innovation can enhance comfort while advancing modern technology. The design prioritised energy modelling, occupancy patterns, and site-specific factors over aesthetics, using an optimisation framework to align energy use with on-site renewable capacity for Net-Zero Energy goals. Passive cooling is enabled by a tapered northern opening creating a Venturi effect. Efficiency features include advanced water-cooled chillers, Distributed Pumping, and Passive Displacement Cooling. Extensive solar panels, battery storage, demand response, and smart automation enhance resilience. Currently under construction, the building targets Net-Zero Energy and potentially energy-positive performance.
1	10.00am – 10.20am	Paper Presentation 3: A Resilient and Interpretable Predictive Control Framework for Intelligent Building Operations: Integrating MPC, PCEI, and Agentic AI by Teo Seow Hian Ngee Ann Polytechnic	This paper presents a hybrid predictive control framework combining Model Predictive Control (MPC) with Physically Consistent Ensemble Learning (PCEI) and agentic AI to enhance energy-efficient, safe, and intelligent building operations. MPC provides multivariable optimization but is limited by computational demands and model accuracy. PCEI improves predictive reliability through physics-consistent constraints across ensemble models, while agentic AI enables autonomous reasoning and dynamic adaptation. Guardians ensure compliance and risk mitigation. Validated via simulations and at Ngee Ann Polytechnic's Integrated Facilities Management Lab, the system demonstrates superior energy efficiency, robustness, and regulation-aligned decision-making, supporting scalable, trustworthy smart building control.
1	10.20am – 10.40am	Tea Break	
1	10.40am – 11.00am	Paper Presentation 4: Gasification of Sewage Sludge with the Aim for Reducing Waste to Landfill by Dr Cai Qingqing PUB, Singapore's National Water Agency	PUB manages about 300,000 tons of used water sludge annually from four water reclamation plants, incinerated at two facilities to produce 30,000 tons of ash. This ash is sent to Singapore's only offshore landfill, which mainly receives incineration ash and non-incinerable waste. With limited land, the landfill is projected to be full by 2035, while sludge production is expected to double by 2065. To address this, PUB is prioritizing innovative sludge reuse technologies. One approach under study is mono-sludge gasification, which converts sludge into slag—a material with potential applications in the construction industry—helping reduce reliance on landfill disposal.
1	11.00am – 11.20am	Paper Presentation 5: Integrated Biofouling Management: Coatings, Cleaning, and Compliance Across the Vessel Lifecycle by Marta Santiago Redondo (Pinturas Hempel SAU), Viktor Avlonitis, and Francisco Aprile (Hempel A/S) and Anna Pasiou (Hempel Coatings)	With maritime decarbonization and biosecurity compliance accelerating, biofouling management is now strategic. Antifouling coatings form the foundation of control systems, influencing performance for over five years. This paper reviews advances in self-polishing, foul-release, and hybrid coatings, stressing alignment with vessel profiles, service intervals, and environmental conditions. It examines in-water cleaning methods—brush, cavitation, water jetting—with or without debris capture, noting compatibility challenges that affect coating lifespan and compliance. Performance monitoring, inspection tools, and dry docking practices are also discussed. Antifouling coatings are positioned as strategic enablers of efficient, compliant, and sustainable operations, requiring integration with in-service technologies for optimal lifecycle performance.
1	11.20am – 11.40am	Paper Presentation 6: Agent-Based Navigational Risk Modeling as a Tool for Climate-Resilient Maritime Traffic and Infrastructure Planning by Derek Eden, Shubhneet Singh and Tom Foster DHI Water & Environment, Inc.	Climate change is increasing navigational risks for maritime traffic and infrastructure. This paper introduces SIREN, an agent-based modelling framework integrating AIS traffic data with environmental forcings—winds, waves, currents, sedimentation, and visibility—to assess evolving grounding, collision, and allision risks. SIREN evaluates climate stressors like sea level rise, storms, and shifting meteorcean conditions in open and constrained waters, including vessel failures and drifting. A Papua, Indonesia case study applies SIREN to a proposed LNG FSRU, analysing safety during approach, berthing, and sediment-affected channels. By identifying risk hot spots, SIREN supports climate-resilient navigation planning, reducing environmental, operational, and safety risks in sensitive marine environments.
1	12.30pm - 1.30pm	Networking Lunch	

Ballroom 1 (Level 3)			
Special Session 2 - Asset Management for Innovation and Sustainability			
Special Session	Timing	Author	Synopsis
SS2	1.30pm – 2.00pm	Keynote Presentation: Asset Management for Innovation and Sustainability: Building Resilient Value for the Future by A/Prof Ng Bor Kiat Associate Professor Singapore Institute of Technology	In today's era of rapid technological disruption, climate change, and shifting stakeholder expectations, asset management must evolve beyond cost and uptime. This presentation introduces a framework integrating innovation and sustainability into strategy. The speaker will show how IoT, AI, and digital twins can predict outcomes, enhance efficiency, reduce environmental impact, and extend lifecycles—transforming assets into drivers of value and resilience. Participants will learn to align asset management with ESG principles, turning compliance into innovation. With examples and a roadmap, this presentation equips leaders to future-proof operations, achieve sustainability targets, and create long-term, responsible value.

Ballroom 2 (Level 3)			
Track 2 - Urban Mobility Innovations for Sustainable Cities (Smart and Green Railway)			
Track	Timing	Author	Synopsis
2	9.00am – 9.35am	Keynote Presentation 2: Sustaining a World Class Metro Network in Singapore by Mr Jeffrey Sim Vee Ming Group Chief Executive Officer SBS Transit Ltd	His presentation, Sustaining a World Class Metro Network in Singapore, reveals the fundamental principles that underpin SBS Transit Rail's ability to sustain two decades of operational excellence, in the areas of safety, reliability, customer experience, sustainability, and innovation. He will also share insights of how the team at SBS Transit continues to push boundaries and incubate innovative solutions for Urban Mobility Systems, including a glimpse into recently implemented technologies to deliver safe, reliable, and inclusive journeys for all.
2	9.35am – 9.50am	Q&A Moderator: A/Prof Ng Bor Kiat Associate Professor Singapore Institute of Technology	
2	9.50am – 10.10am	Paper Presentation 1: Bridging new frontier: Smart and Green Innovations in Singapore Rail Systems by Melvyn Thong, Joyce Hong and Mok Ji Wei Land Transport Authority	Singapore's Rapid Transit System is vital to daily mobility, with smart and green technologies key to enhancing resilience, overcoming legacy constraints, and advancing sustainability. Beyond redundancies and asset upgrades, AI-driven condition monitoring enables fault prediction and faster recovery. Smart systems modernise fare collection, employ AV/RV for design, and digitalise depots for automated maintenance. In line with the SG Green Plan 2030, initiatives include energy recovery, eco-materials, recyclability, modular design, and AI-optimised operations. Success depends on close collaboration between operations and technology teams, coordinated governance, and structured rollouts—building a resilient, intelligent, and sustainable MRT system for the future.
2	10.10am – 10.30am	Paper Presentation 2: Harnessing the Value of Data: Redefine Rail Asset Management for Sustainable Cities by Tang Yu Feng Hitachi Rail GTS Singapore	Global cities face rising mobility demand, climate goals, and infrastructure renewal needs. Asset management must evolve into integrated ecosystems leveraging data. Hitachi Rail's HMAX platform unifies data from trains, signalling, and infrastructure, giving operators a holistic view for smarter, sustainable decisions. Results include 20% fewer delays, 15% lower maintenance costs, 30% energy savings, and 30% longer asset lifespans via AI forecasting, optimization, and proactive monitoring. With its open architecture, HMAX fosters collaboration among operators, OEMs, and asset owners. Aligned with Singapore's smart mobility vision, it enables industry partners to unify rail data and collectively achieve sustainability and reliability goals.
2	10.30am – 11.00am	Tea Break	
2	11.00am – 11.20am	Paper Presentation 3: MaaS as a Catalyst for Sustainable Mobility: Insights from Deutsche Telekom's GoodRide Project by Silas Wong Siemens Mobility Pte Ltd	This presentation will explore the multi-stakeholder dynamics, key lessons learned, and critical success factors in driving behavioural change through MaaS. By drawing parallels between Telekom's experience and South East Asia's unique mobility landscape, actionable insights to accelerate the region's transition towards an integrated and sustainable MaaS ecosystem will be provided.
2	11.20am – 11.40am	Paper Presentation 4: DFAM as a Catalyst for Railway Innovation and Sustainability by A/Prof Gan Hiong Yap Singapore Institute of Technology	What if the railways of tomorrow could be designed to be smarter, greener, and more resilient—right from the start? Additive Manufacturing (AM) is no longer limited to prototyping; it is transforming how we design, build, and maintain railway systems. This talk examines how Design for Additive Manufacturing (DFAM) acts as a driver for innovation and sustainability, from hybrid LPBF precision parts that push the boundaries of performance, to digital passports that offer complete traceability and lifecycle insights. To DFAM-enabled sensors that turn assets into intelligent systems. By reducing waste, speeding up development, and enabling bold new designs, DFAM can keep railways on course toward a smarter and more sustainable future.
2	11.40am – 12.00pm	Paper Presentation 5: Urban Mobility Innovations for Sustainable Cities: A Data-Driven Approach on the Mutiara LRT Project in Penang by Yeap Beow Heng (AIS-Hill Pte Ltd), Rezani Ramlia (Asia Infrastructure Solutions Singapore Pte Ltd) and Poh Seng Tiok (Asia Infrasolutions Sdn Bhd)	The Mutiara LRT (MTL), Penang's first metro system, spans 24.8km with 20 stations, enhancing connectivity, reducing congestion, and supporting sustainable urban growth. AIS serves as Lead Designer for Package V7, covering an elevated station and depot facilities, coordinating multidisciplinary design under an accelerated timeline. Autodesk Construction Cloud (ACC) is the project's central data platform, while AIS integrates Bentley ProjectWise and iTwin for seamless file management, 3D/4D modeling, geospatial and train alignment simulations. These digital workflows enable informed decision-making, optimize depot design and operations, and demonstrate how integrated design and real-time collaboration can advance efficient, sustainable urban mobility infrastructure.
2	12.00pm - 12.20pm	Panel Discussion	
2	12.20pm - 1.30pm	Networking Lunch	

Ballroom 2 (Level 3)			
Special Session 3 - Vision Zero for a Sustainable and Safer Future			
Special Session	Timing	Author	Synopsis
SS3	1.30pm – 2.15pm	Keynote Presentation: Vision Zero: How Infrastructure Resilience achieves Workplace Safety by Prof Liz Varga Professor of Complex Systems Dept of Civil, Environmental & Geomatic Engineering University College London	In 2015, safety thinking shifted from Safety I (preventing things from going wrong) to Safety II (ensuring things go right). Vision Zero aligns with Safety II through proactive measures that prevent, absorb, and adapt to hazards. ISO 22372 on resilient infrastructure emphasises protecting people amid growing interdependencies. Principle 2, Proactively Protected, supports this by embedding higher safety requirements via risk management, planning, stress testing, and safe-to-fail design. Approaches like secured by design and digitalisation enable early warnings, risk assessments, and rapid mitigation. This holistic, collaborative approach strengthens organisational resilience, safeguards connected networks, and ensures safe, high-quality service delivery.

Ballroom 3 (Level 3)			
Track 4 - Future-Proofing Engineers Through Educational Technology and Skill Development			
Track	Timing	Author	Synopsis
4	9.00am – 9.30am	Keynote Presentation 1: Developing Future-Proof Engineers by Fostering Solution-Mindedness with Human and Digital Skills by Mr Toh Ser Khoon Senior Director, Engineering Singapore Polytechnic	SP Engineering cultivates solution-minded engineers through the CDIO (Conceive, Design, Implement, Operate) approach. In partnership with industry and community, SP engineering students solve authentic problems in workplace and community settings throughout their polytechnic education. Students integrate technical expertise with professional, communication and teamwork skills. These experiences foster creativity, empathy and adaptability, preparing future engineers to thrive in a rapidly evolving landscape and contribute meaningfully to society through innovative and sustainable solutions.
4	9.30am – 9.50am	Paper Presentation 1: Evolution in Drafting for Civil Infrastructure Works - Will the Skillsets Today Still Be Relevant Tomorrow? by Ridwan Ramli and Vincent Lo Land Transport Authority	Civil engineering has evolved from meticulous 2D hardcopy drafting to Digital Engineering and BIM, easing errors and editing. However, fewer engineers now enter the workforce with strong skills to produce clear, accurate technical plans, and reliance on advanced software can create a false sense of security. This paper explores ways to retain and cultivate essential drafting competencies during the transition from 2D/3D CAD to BIM. A roadmap is proposed to align expectations and training for new engineers, fostering appreciation for conveying design intent effectively and recognizing those who maintain strong foundational drafting skills in the digital era.
4	9.50am – 10.10am	Paper Presentation 2: Authentic Learning and Skill Development in Carbon Management Education by Dr Yang Yi National University of Singapore	Engineering education is vital in equipping future professionals to tackle climate change and sustainable urbanisation. This paper introduces <i>Carbon Management in the Built Environment</i> , a new course at the National University of Singapore that blends theory with practice through authentic learning and industry-informed content. Students engage in simulations, debates, and case-based learning, culminating in an authentic project as Sustainability Managers enhancing NUS's carbon strategies. Feedback-driven assessment fosters continuous improvement, with notable learning gains and career impact—students secured sustainability internships in consulting and public agencies. The course demonstrates a scalable model for future-proofing engineers in a rapidly decarbonising world.
4	10.10am – 10.30am	Paper Presentation 3: Future-Proofing Engineers through AI-Human Collaboration in Biomedical Engineering Education by Leo Chen Huei, Luqman Naqib Mohd Azhar, Leo Hua Liang and Rai Bina National University of Singapore	The rapid rise of generative AI compels engineering educators to prepare students for AI-integrated workplaces. While AI is reshaping engineering, current biomedical engineering assignments often overlook question formulation, aligning with constructivist and inquiry-based learning frameworks. Engaging higher levels of Bloom's taxonomy, SGOs enhance learning but are often limited to multiple-choice questions. To extend impact, we developed CLEAR—Contextualised Learning via Enquiring, Answering, and Reflecting—which emphasises open-ended, industry-based questions for authentic learning and assessment. Implementations across courses and institutions show CLEAR enhances exam performance, engagement, and educator motivation. Evidence includes assessment scores, feedback, and student artefacts. Case studies in andragogy and interdisciplinary teaching highlight CLEAR's role in future-proofing engineers through technology-enhanced, skill-focused education.
4	10.30am – 11.00am	Tea Break	
4	11.00am – 11.20am	Paper Presentation 4: Contextualised Learning via Enquiring, Answering, and Reflecting (CLEAR) – Lessons Learnt From a Five-Year Journey Across Subjects and Institutes of Higher Learning by A/Prof Tay En Rong, Stephen National University of Singapore	Student-Generated Questions (SGQs) support comprehension by requiring content understanding before question formulation, aligning with constructivist and inquiry-based learning frameworks. Engaging higher levels of Bloom's taxonomy, SGOs enhance learning but are often limited to multiple-choice questions. To extend impact, we developed CLEAR—Contextualised Learning via Enquiring, Answering, and Reflecting—which emphasises open-ended, industry-based questions for authentic learning and assessment. Implementations across courses and institutions show CLEAR enhances exam performance, engagement, and educator motivation. Evidence includes assessment scores, feedback, and student artefacts. Case studies in andragogy and interdisciplinary teaching highlight CLEAR's role in future-proofing engineers through technology-enhanced, skill-focused education.
4	11.20am – 11.40am	Paper Presentation 5: Equipping Equipping Engineers with key skills for Technology Entrepreneurs by Andy Wee IES-INCA	In today's fast-paced technological landscape, engineers need more than technical expertise—they require technology entrepreneurship skills to transform ideas into marketable products and services. Technopreneurial engineers drive innovation, create economic growth, and gain competitive advantage. Key skills include design thinking for user-centered solutions, business acumen to navigate markets, networking with stakeholders and investors, and adaptability to iterate ideas under uncertainty. By combining technical knowledge with entrepreneurial spirit, engineers can develop novel solutions, lead in competitive environments, and contribute to job creation. Cultivating these skills enables engineers to unlock their full potential and thrive in a technology-driven world.
4	11.40am – 12.00pm	Paper Presentation 6: Energy Literacy and the Six Pillars of Deep Decarbonisation by Dr Goh Tian and Prof Ang Beng Wah National University of Singapore	Education on climate change is closely tied to energy literacy, yet this link is often overlooked in sustainability education. Since energy use accounts for about 75% of global GHG emissions, addressing energy production and consumption is essential for climate solutions. However, energy literacy often remains peripheral due to sustainability's multidisciplinary scope. Engineering disciplines are well placed to highlight this relationship, as many mitigation strategies involve technological systems. We propose the Six Pillars of Deep Decarbonisation framework, which helps students systematically analyse energy-related climate solutions, from efficiency to policy and technology, through case studies, scenario analysis, and sustainability applications.
4	12.00pm - 12.20pm	Paper Presentation 7: Scaffolding Project-Based Learning in Embedded Systems through Simulation and Templates by Dr Rajesh Chandrasekhara Panicker National University of Singapore	Project-based learning equips future engineers with both foundational knowledge and higher-order thinking skills by engaging students across Bloom's taxonomy. In computer architecture and embedded systems, hardware testing often poses barriers; simulation environments address this by enabling iterative design, debugging, and refinement with immediate feedback. Code templates offer scaffolding that diminishes as students gain independence, preparing them for complex designs. Our approach has improved project success, achievement, and learning outcomes, enabling implementations like processors and neural accelerators. Building on this, we now extend the pedagogy with large language models to accelerate testbench design and foster rapid prototyping skills.
4	12.20pm - 1.30pm	Networking Lunch	

Ballroom 3 (Level 3)			
Track 4 - Future-Proofing Engineers Through Educational Technology and Skill Development			
Track	Timing	Author	Synopsis
4	1.30pm – 2.00pm	Keynote Presentation 2: Title by Prof Pang Sze Dai Dean's Chair, Associate Professor Deputy Head (UG and Student Life, BTEch) Department of Civil and Environmental Engineering National University of Singapore	

SS2	2.00pm – 2.20pm	Paper Presentation 1: Engineering Resilience with Smart Asset Intelligence by Mr Domenic Fonte (AssetFuture) and Mr Chee Kit Ho (Cushman & Wakefield)	As Asia Pacific faces increasing climate risks, aging infrastructure, and rising ESG expectations, engineering must evolve beyond traditional roles. This session explores how predictive asset intelligence is transforming asset management—enabling smarter, data-driven decisions that reduce lifecycle costs, carbon emissions, and operational risk. By integrating platforms like AssetFuture with systems thinking, engineering leadership, and global frameworks such as ISO 55001 and the UN SDGs, organizations can shift from reactive maintenance to proactive, sustainable stewardship. Featuring a real-world case study, this presentation reveals how smart asset strategies future-proof infrastructure and position engineers as strategic enablers of resilient, intelligent systems.
SS2	2.20pm – 2.40pm	Paper Presentation 2: Bridging Asset Management Standards and Sustainability: The Strategic Role of Engineers in Enabling Circular and ESG-Aligned Systems by Mr Chee Kit Ho Cushman & Wakefield	This presentation examines how asset management can strategically support sustainability and ESG goals, emphasizing the role of engineers in aligning technical systems with global standards such as ISO 55001 and the UN Sustainable Development Goals (SDGs). It presents structured frameworks and maturity models to guide the integration of lifecycle thinking, circular economy principles, and social impact considerations into asset strategies. The paper highlights the evolution from compliance-based to regenerative asset management, supported by predictive technologies and performance indicators. Ultimately, it advocates for a systems-based approach where engineers lead in transforming assets into catalysts for sustainable, resilient, and socially aligned outcomes.
SS2	2.40pm – 3.10pm	Panel Discussion	
SS2	3.10pm – 3.30pm	Tea Break	
SS2	3.30pm - 3.50pm	Paper Presentation 3: AI-Assisted Periodic Structural Inspection for Buildings by Dr Marcus Chen (Vebits AI), and Koh Hui Yi, and Er. Tang Pei Luen (JTC Corporation)	Periodic Structural Inspections (PSI) in Singapore face challenges from a shortage of qualified civil/structural PEs and labour-intensive processes. This paper introduces an AI-assisted system to digitalise and streamline PSI, improving accuracy and efficiency. Using a mobile app and optional 360° camera, high-resolution images are analysed in real time to detect defects with over 90% accuracy. Defects are automatically tagged to digital floor plans, enabling instant report generation and eliminating manual referencing. Field trials showed a 75% reduction in inspection time, allowing same-day reports. By minimising human error, the system boosts safety, prevents structural failures, and delivers significant productivity gains.
SS2	3.50pm – 4.10pm	Paper Presentation 4: Asset Management for Innovation and Sustainability through Green CBTC Project by Leow Wee Lee (SMRT Trains Ltd) and Carrie Zhang (Hitachi Rail GTS Singapore)	The Green CBTC Next Gen Project, led by SMRT with Hitachi Rail, advances urban transit decarbonisation through data-driven, systems-level innovation. Combining advanced Communications-Based Train Control with real-time analytics, it enables precise movement control, energy-efficient driving, and seamless trainborne-wayside coordination. Optimised operations—smoother acceleration, extended coasting, reduced braking—deliver measurable traction energy savings. Piloted on Singapore's North-South and East-West Lines, Green CBTC demonstrates how digital signalling upgrades can enhance efficiency while cutting emissions. Aligning with national and global net-zero goals, it offers a replicable model for low-emission transit. Embedding sustainability in signalling, it sets a benchmark for modern, resilient, eco-conscious rail networks.
SS2	4.10pm – 4.30pm	Paper Presentation 5: A New Generation of Asset Management Standards by Er. Seow Kang Seng IES Asset Management Technical Committee	The ISO 55000 family of Asset Management standards, first published in 2014, defines good practices and requirements for Asset Management Systems. On 3 July 2024, ISO launched updated editions of ISO 55000 and ISO 55001, along with new guidance. Most were adopted as Singapore Standards by Enterprise Singapore in July 2025. This new generation of standards strengthens alignment with organisational objectives and addresses today's growing asset management complexity. This presentation will highlight key enhancements and guidance supporting a shift from reactive to proactive, data-driven asset management to deliver sustainable value integrating financial, environmental, and social considerations.
SS2	4.30pm – 4.50pm	Paper Presentation 6: Reliability-Centred-Maintenance for Cost-Effective Rail Asset Management by Pang Yeow Wei (SBS Transit Rail) and Loo Jang Wei (JW Consultancy)	Effective asset management is vital for sustaining reliable rail systems, where performance, safety, and public confidence depend on critical infrastructure availability. Reliability-Centred Maintenance (RCM) provides a proven framework to optimize asset management by identifying key functions, analyzing potential failures, and aligning maintenance with operational risks. This presentation will share how SBS Transit applies RCM in its rail systems and collaborates with JW Consultancy to train engineers. It will also highlight the training pedagogy and showcase maintenance reviews conducted by SBS Transit using the RCM methodology.
SS2	4.50pm – 5.20pm	Panel Discussion	

SS3	2.15pm – 3.00pm	Paper Presentation 1: Vision Zero and Design for Safety: The Role of Engineers in Achieving Safer Outcomes by Mr Chan Yew Kwong Workplace Safety & Health Council	Vision Zero (VZ), launched in Sweden in 1997, seeks to eliminate fatalities and serious injuries through a safe system approach, placing responsibility on designers rather than users. In Singapore, the Workplace Safety and Health (Design for Safety) Regulations, introduced in 2015, require designers to address risks early in construction projects. Design for Safety (DFS) aims to "design out" hazards, improving safety across all industries. Engineers, with their technical expertise, can embed WSH considerations into designs, enhancing safety, health, and quality of life. This presentation explores how adopting DFS principles and a VZ mindset can achieve safer outcomes and advance VZ goals.
SS3	3.00pm – 3.30pm	Tea Break	
SS3	3.30pm – 4.00pm	Paper Presentation 2: From Hazard to Zero Harm: Vision Zero in the Process Industry by Er. Lucas Ng Jurong Island Vision Zero Cluster	The process industry faces high risks from complex systems, hazardous materials, and potential catastrophic incidents. Vision Zero, first implemented in Sweden in 1997 for road safety and expanded to workplace safety by ISSA in 2017, aims to eliminate all fatalities and serious injuries. Singapore adopted Vision Zero in 2015, with the Jurong Island Vision Zero Cluster launched in 2018 to unite industry stakeholders. This presentation examines hazards, lessons from major incidents, and strategies for operationalising Vision Zero—leadership, worker engagement, hazard elimination, safe design, and digital tools. It advocates a proactive safety culture where no level of workplace harm is acceptable.
SS3	4.00pm - 4.30pm	Paper Presentation 3: Safety in Equipment Design by Ms Clare Chay Ministry of Manpower	Through the use of accident case studies, the presentation will illustrate how incorporating safety into an equipment's design is more effective in managing risks to users, as compared to the addition of risks controls as an afterthought.
SS3	4.30pm – 5.00pm	Paper Presentation 4: Battery Storage Systems - How could we make it safer? by Mr Felipe Ong BS&B Safety Systems	Battery Energy Storage Systems (BESS) support renewable integration and grid stability, but safety gaps have led to severe deflagration incidents. Notable cases include the 2019 Arizona explosion injuring firefighters, the 2020 Liverpool blast scattering debris 70 ft, and the 2021 China incident killing two firefighters. Common causes include thermal runaway, inadequate gas detection, poor ventilation, and ineffective fire suppression, compounded by inconsistent standards and limited regulation. This abstract highlights critical BESS safety deficiencies and calls for comprehensive risk assessments, improved monitoring, explosion protection, and harmonised safety regulations to prevent future incidents and ensure safe, reliable operation of energy storage systems.
SS3	5.00pm – 5.30pm	Paper Presentation 5: Perception AI for Human-Robot Collaboration in the Building and Construction Sector by Mr William Lee Stealth AI Startup	The building and construction sector, long reliant on manual labour, is poised for transformation through Perception AI—combining visual sensing, spatial understanding, and context-aware cognition in collaborative robots (cobots). Unlike factory robots, construction cobots must navigate unstructured, unpredictable sites with humans, variable materials, and environmental noise. Perception AI enables real-time 3D mapping, object recognition, gesture interpretation, and semantic scene analysis for safe, adaptive teamwork. Applications include autonomous inspection, visual-based material handling, and learning by demonstration. Using Singapore as a model, this framework outlines a roadmap toward Industry 5.0, enhancing safety, precision, and human-centric autonomy in construction through scalable, AI-enabled robotics.
SS3	5.30pm – 6.00pm	Panel Discussion Moderator: Prof Loh Tzu Yang Associate Professor (Practice) National University of Singapore	

4	2.00pm – 2.20pm	Paper Presentation 8: GuidES (Guided Inquiry and Dialogue Education System): Leveraging Large Language Models to Advance Critical Thinking and Skill Development in Engineering Students by Shi Anqi, Wang Hanmo, Luo Jihao, Christian Pecaut, Low Kaizen, A/Prof Tay En Rong, Stephen, and Dr Alexander Lin	Preparing future engineers requires blending disciplinary knowledge with critical thinking, adaptability, and responsible use of emerging technologies. This study introduces the Guided Inquiry and Dialogue Education System (GuidES), a Large Language Model (LLM)-enabled platform integrated into PE2203: Quality and Productivity Management at NUS. Unlike conventional web research or ad hoc ChatGPT use, GuidES scaffolds three tasks: prompt design, LLM-facilitated analysis, and verification with feedback and reflection. Comparative analysis shows GuidES raised presentation scores by 22.6% and quiz performance by 20.2%, while enhancing engagement, integration, and reflection. GuidES demonstrates how structured AI integration can future-proof engineering education.
4	2.20pm – 2.40pm	Paper Presentation 9: Equipping students with sustainability mindset and competencies by Dr Cindy Lee National University of Singapore	Chemical engineers are vital in building a sustainable world through science, systems thinking and digital tools. To prepare students for this role, our department has embedded sustainability throughout the curriculum, including two new courses: <i>Circular Economy in the Chemical Industry</i> and <i>Green Chemical Process and Technology</i> . These cover LCA, RCN, IS, green chemistry and PI, equipping students with practical industry skills. Using problem-based learning, group projects, active learning, case studies and industry engagement, the courses foster problem-solving, collaboration and motivation while bridging theory with real-world applications for both undergraduate and postgraduate students.
4	2.40pm – 3.00pm	Paper Presentation 10: Training the Future using Open Protocol BMS to Elevate Facilities Management in Educational Institutions by Teo Seow Hian, Xie Yushan and Pang Ka Rong Ngee Ann Polytechnic	Tertiary campuses in Singapore rely on decades-old proprietary Building Management Systems (BMS), limiting interoperability and modern functionality. This paper explores a gradual migration to Open-Protocol BMS (OPB), enabling cost savings, adaptability, and integration with AI analytics, predictive maintenance, and IoT. Paired with Digital Twin technology and advanced data analytics, OPB can modernize educational facilities, supporting national sustainability goals like the Singapore Green Plan and creating living laboratories for future built environment professionals. The research is informed by three sequential surveys, prototyping at Ngee Ann Polytechnic, and stakeholder engagement with JTC Corporation, demonstrating the feasibility and benefits of this transition.
4	3.00pm – 3.30pm	Tea Break	
4	3.30pm - 3.50pm	Paper Presentation 11: Triangulated Learning Framework to Enhance Conceptual Understanding and Competency Development in Mechanics by Dr Christian Della (University of Glasgow Singapore), and Zhang Linyun, Vincent Chan, Jake Low, and Muhammad Nur Hakim Bin Roslan (Singapore Institute of Technology)	This paper presents a Triangulated Learning Framework to enhance conceptual understanding and core competencies in undergraduate Engineering Mechanics and Mechanics of Solids. Integrating analytical modelling, real experimentation, and virtual simulation, the framework unifies three complementary learning modalities. Students solve problems using first principles, verify results with finite element analysis, and validate outcomes through hands-on testing. Simulation tools further explore system behavior. Aligned learning activities, including problem-solving, labs, simulations, and project-based learning, foster technical proficiency, critical thinking, and self-directed learning. This scalable, competency-focused approach promotes verification and validation, metacognitive reflection, deeper engagement, and prepares students for real-world engineering practice.
4	3.50pm – 4.10pm	Paper Presentation 12: Teaching Soft Robotics at Large-Scale Class with Blended Learning by Dr Zhang Hongying National University of Singapore	In engineering education - particularly soft robotics - it is vital to balance rigorous theory with practical skills that foster innovation. Managing classes of over 150 students poses challenges in delivering equitable hands-on experiences, so I adopt a blended learning approach to create an inclusive, interactive environment. One topic focuses on origami-inspired soft robots. Students first learn through tutorials and videos, then apply digital tools such as SolidWorks, Grasshopper, and MATLAB for modeling and simulations. In-person sessions emphasize theory, discussion, and problem-solving. This integration of digital resources with face-to-face learning empowers students to take ownership while ensuring continuous support.
4	4.10pm – 4.30pm	Paper Presentation 13: Capstone Learning in Action: Ten Years of the Systems Design Project at ISEM by Dr Vincent Kuo National University of Singapore	The Systems Design Project (SDP) course (IE3100R) at the National University of Singapore has been the flagship capstone for industrial and systems engineering undergraduates for over a decade. Reviewing more than 200 projects (2014-2025), this study examines evolving themes, industry collaborations, and technologies. Projects span healthcare, logistics, finance, manufacturing, and sustainability, with topics such as supply chain optimization and carbon reduction. Methods progressed from optimization to machine learning and digital twins, using MATLAB, Python, R, and specialized platforms. Findings show strong alignment with accreditation outcomes and highlight SDP as a replicable model linking academia, industry, and applied innovation.
4	4.30pm – 4.50pm	Paper Presentation 14: System Engineering for all Engineering Courses by Dr Lee Kar Heng TBSS Group	University engineering courses include specialized modules from various domains such as business, law, management and humanities. Engineers must not only master technical depth but also develop the right attitude, as they are involved across the system lifecycle - from mission planning and acquisition to operation and retirement. Effective solutions must deliver suitability and effectiveness in real-world environments, a key challenge in mission-critical applications. This paper highlights the need to introduce systems engineering early in engineering education, discusses course objectives, contents and case studies, and examines the benefits and challenges of implementing such a module during foundation years.
4	4.50pm - 5.20pm	Panel Discussion	

World Engineers Summit (WES) 2025
Technical Site Visits

Technical Tour 1: Punggol Digital District <i>A Smart District for a Smart Future</i>											
Date	24 October 2025 (Fri)										
Time	9.30am to 11.30am										
Address	88 Punggol Way, Singapore 829913										
Description of Guided Tour	<p>Guided Tour of Punggol Digital District</p> <p>Punggol Digital District, master planned and developed by JTC, is a 50-hectare business park where innovation, education, and community converge. The district serves as a hub for emerging technologies, including cybersecurity, artificial intelligence, robotics, and fintech companies.</p> <p>Designed to integrate with Singapore Institute of Technology (SIT)'s campus, the district creates opportunities for partnership between industry and academia. This collaborative ecosystem enables businesses to ideate, test, and develop new solutions and products.</p> <p>Learn about Punggol Digital District (link: https://www.jtc.gov.sg/punggoldigitaldistrict/about)</p>										
Pick-up and Drop-off Location	Orchard Hotel Singapore <i>To meet and depart at 8.45am</i>										
Registration Fee	S\$45 (subject to 9% GST)										
Target Audience	Engineers, Professional and Public										
Itinerary	<table border="1"> <thead> <tr> <th>Time</th> <th>Programme</th> </tr> </thead> <tbody> <tr> <td>9.30am</td> <td>Delegation to gather at Meeting Point (In front of Bread Talk) <i>Address: 88 Punggol Way, Singapore 829913</i></td> </tr> <tr> <td>9.30am to 10.30am</td> <td> Topics: Punggol Digital District – The vision of the future Presenter: Er. Gina Foo Director, New Estates Division 2 </td> </tr> <tr> <td>10.45am</td> <td>Q&A Session</td> </tr> <tr> <td>11.15am</td> <td>End of Tour</td> </tr> </tbody> </table>	Time	Programme	9.30am	Delegation to gather at Meeting Point (In front of Bread Talk) <i>Address: 88 Punggol Way, Singapore 829913</i>	9.30am to 10.30am	Topics: Punggol Digital District – The vision of the future Presenter: Er. Gina Foo Director, New Estates Division 2	10.45am	Q&A Session	11.15am	End of Tour
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10.45am	Q&A Session										
11.15am	End of Tour										

Technical Tour 2: c <i>Introduction of SingSpring Desalination Plant background, processes, operation & maintenance</i>									
Date	24 October 2025 (Fri)								
Time	2.00pm to 4.00pm								
Address	90 Tuas South Ave 1, Singapore 637493								
Description of Guided Tour	<p>Owned by Keppel Infrastructure Trust, SingSpring Desalination Plant is Singapore's first large-scale seawater desalination plant, which commenced commercial operations in December 2005. SingSpring Desalination Plant is capable of supplying up to 136,380 m3 of desalinated potable water per day, which represents approximately 7% of Singapore's water needs.</p> <p>SingSpring Desalination Plant utilises cost and energy-efficient reverse osmosis technology. At the time of its completion, it was the largest membrane-based seawater desalination plant in the world with one of the largest reverse osmosis trains.</p> <p>The SingSpring Plant contributes to one of the "Four National Taps" in PUB's strategy to meet Singapore's water needs. The "Four National Taps" are local catchment water, imported water from Johor, NEWater and desalinated water. The SingSpring Plant continues to be an important facility for PUB to ensure sufficient water resources for Singapore, especially during periods of low rainfall.</p>								
Pick-up and Drop-off Location	Orchard Hotel Singapore <i>To meet and depart at 1.00pm</i>								
Registration Fee	S\$45 (subject to 9% GST)								
Target Audience	Engineers, Professional and Public								
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