



*Southern African
Transport Conference*

**20
23**

THE 41ST ANNUAL
**SOUTHERN
AFRICAN
TRANSPORT
CONFERENCE**

Report to Minister of Transport

**Rethinking transportation:
Planning and building resilient systems
to meet global externalities.**

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SATC 2023

REPORT TO MINISTER OF TRANSPORT

Philip Hendricks – ATC Board Chair
Dr Mathetha Mokonyama – SATC Chairman
Jacqui Oosthuizen – SATC Secretariat

BACKGROUND

Established in 1982, the Southern African Transport Conference (SATC) arose from a need to transfer knowledge and build capacity within the transport sector. Originally known as the Annual Transport Conference (ATC), the SATC has always had strong support from the Department of Transport, with the Minister of Transport being the Conference's honoured patron.

It is mainly characterised by the delivery of papers that reveal the progress of transport research and its subsequent implementation in South Africa. A call to submit an expression of interest is announced at the previous SATC. The review process that follows ends up with the top papers being selected to feature at this prestigious conference. Essentially, subjects presented at the SATC are mainly based on research papers that are strictly reviewed and selected by the Technical Committee.

SATC 2023

The 41st annual SATC was held from 10 to 13 July 2023 at the CSIR International Convention Centre (ICC) in Pretoria, South Africa, under the theme "Rethinking transportation: planning and building resilient systems to meet global externalities".

A total of 612 delegates attended the 41st conference, of which 544 were in-person delegates and 68 were virtual attendees.

Each year, the organising committee invites students from tertiary institutions to submit essays related to the theme of the conference. This year, six winning students and lecturers attended the conference and presented their essays. Two students participating from China presented and attended virtually. Other students attended from the University of Namibia, Stellenbosch University, University of Venda and the University of Pretoria.

One post-graduate bursary student from Stellenbosch University was supported.

Papers are invited and are subjected to a blind review process, from which good quality papers are selected. Of these papers, 33 were from young professionals in the industry.

An exhibition was held over the four days of conference, with 21 exhibitors.

Delegates from 17 countries attended the conference.

In-person attendees earned 1 Continuous Professional Development (CPD) point per day of attendance.

The conference is endorsed by the International Road Federation, Geneva. They merged with the SATC for this year in celebration of their 75th year.

TABLE 1: GENERAL PROGRAMME

DATE	SESSION NO.	EVENT
Monday 10 July		Opening Session
	1A	Infrastructure
	1B	Treasury Workshop - Public Transport and Spatial Transformation
	1C	Traffic Engineering
	1D	Rural Development/ Capacity Building and The International Road Federation (Special session)
Tuesday 11 July	2A	Infrastructure
	2B	Public Transport
	2C	Traffic Management, Safety and Security
	2D	Freight and Logistics and Student Essay Winner Presentations (Combined session)
	2E	Rail
Wednesday 12 July	3A	Engineering for Safe Systems Forum
	3B	Smart and e-Mobility
	3C	10 th China-Africa Transport Co-operation Forum and Maglev /High Speed Trains Applications
	3D	Maritime
	3E	Aviation Workshop
Thursday 13 July	4A	Integrated Public Transport Networks
	4B	Urban Mobility
	4C	Women in Transport Workshop
	4D	Public Private Partnership Workshop

SATC ORGANISING COMMITTEE

Bean, Dr Wilna	University of Pretoria
Behrens, Prof Roger (Deputy Chair)	University of Cape Town
Bruwer, Dr Megan	Stellenbosch University
De Beer, Mr Gerhard	AIH Econogistics
Dimitrov, Ms Laverne	Development Bank SA
Jennings, Ms Gail	Research Consultant
Komba, Dr Julius	University of Pretoria
Marutla, Mr Fana	PRASA
Mashiri, Mr Mac	Gwarajena Transport Research and Development
Mhlanga-Mochadibane, Ms Mavis	Tshwane Women in Transport
Mojafi, Mr Tebogo	South African Maritime Safety Authority
Mokonyama, Dr Mathetha (Chairperson)	CSIR
Moselakgomo, Mr Madumetja	University of Johannesburg
Nordengen, Dr Paul	Heavy Vehicle Transport Technology Africa
Oosthuyzen, Ms Jacqui	Secretariat
Pretorius, Dr Pieter	Innovative Transport Solutions
Ribbens, Dr Hubrecht	Consultant
Ssamula, Dr Bridget	Engineering Council of South Africa
Steyn, Prof Wynand	University of Pretoria
Venter, Dr Karien	CSIR
Visser, Prof Alex	University of Pretoria
Wang, Mr Yuchen	SACTCC
Zammataro, Ms Susanna	International Road Federation

ATC COMPANY DIRECTORS

Hendricks, Mr. Philip (Chairperson)
Kistan, Mr. Kenny (Advisor)
Mabece, Mr. Lungile
Maina, Prof James
Matete, Mr. Matete
Mokonyama, Dr. Mathetha
Steyn, Prof Wynand
Udoyen, Ms. Ivandra
Van Niekerk, Mr. Pieter
Verhaeghe, Mr. Benoit

SATC TECHNICAL COMMITTEE

Adams, Prof Charles	Kwame Nkrumah University of Science & Technology, Ghana
Ölçer, Prof Dr Aykut	World Maritime University, Sweden
Prozzi, Prof Jorge	The University of Texas, USA
Wegman, Prof Fred	Delft University of Technology, The Netherlands

OPENING AND PLENARY SESSIONS

Monday 10 July 2023:

- **Dr Mathetha Mokonyama, Organising Committee Chairperson**, welcomed delegates.
- **Mr Philip Hendricks, ATC Board chairperson**, officially opened the conference.
- **Hon. Sindisiwe Lydia Chikunga, Minister of the Department of Transport**, delivered the opening address.
- **Ms Karla González Carvajal, World Bank**, delivered the plenary address.

Tuesday 11 July 2023:

- **Prof André Roux, Stellenbosch University Business School**, delivered the plenary address.

Wednesday 12 July 2023:

- **Dr Kevin Trenberth, National Centre for Atmospheric Research – New Zealand**, delivered the plenary address.

Thursday 13 July 2023:

- **Ms Logashri Sewnarain, SMEC South Africa**, delivered the keynote address for the Women in Transport session.

HIGHLIGHTS FROM SESSIONS AND WORKSHOPS

INFRASTRUCTURE

Session 1A, Monday, 10 July 2023

Session chair: Dr Emile Horak, Kubu Consultancy

Convenors: Dr Julius Komba / Prof. Wynand Steyn, University of Pretoria

The session consisted of seven presentations. Six presentations were part of published full papers, whereas one presentation was based on the progress of the ongoing work of MEng students registered at the University of Pretoria. The topics covered included an update on the condition of South Africa's transport fixed infrastructure, waterproofing and restoration of the surfaced road network, modelling flexible pavements, use of sea water in road construction, advancing asphalt materials using nonconventional materials and analysis of flexible pavement deflection data.

1. CONDITION OF SOUTH AFRICA'S TRANSPORT FIXED INFRASTRUCTURE – THE FOURTH JOURNEY ALONG THIS ROAD – K Wall, University of Pretoria.

- . The presentation reported the findings of the 2022 SAICE Infrastructure Report Card (IRC), focusing on the transport fixed infrastructure (i.e., roads, airports, commercial harbours, fishing harbours and rail). The infrastructure's condition was rated as A (world class), B (fit for the future), C (satisfactory for now), D (at risk of failure) and E (unfit for purpose). The presentation reviewed the ratings given in 2022, as well as infrastructures condition trends from 2011 to 2022, followed by the identifications of the main drivers of infrastructures and key factors influencing the condition. It was reported that, the overall grading varied from D+ in 2006, to C- in 2011, back to D+ in 2017 and in 2022 dropped to a straightforward D. Similar to the previous IRC, lack of skills, limited funding, the limitation of existing systems and procedures, and institutional weakness were identified to be the key drivers of the current trend.

2. SAVING OUR SURFACED ROAD NETWORK THROUGH LABOUR INTENSIVE WATERPROOFING AND RESTORATION – GJ Jordaan, Jordaan Professional Services, University of Pretoria, and WJ vdM Steyn, University of Pretoria

- . The focus of the presentation was to demonstrate the applicability and practicality of Nano Modified Emulsion (NME), incorporating Nano-Polymer Nano-Silane (NPNS) technologies to protect and restore the existing surfaced road network. Various treatment applications were demonstrated and a combination of the labor-intensive options that may be viable to safeguard and restore numerous roads while presenting opportunities for rapid employment as a relief to social problems were presented.

3. MECHANISTIC RESPONSE OF CONVENTIONAL VS PERPETUAL FLEXIBLE PAVEMENTS UNDER SIMILAR LOADING CONDITION: A 3-D FINITE ELEMENT ANALYSIS – L Sogayise, I Aivinheno and S Mfengu, University of the Witwatersrand

- . The presentation focused on demonstrating the application of a Three-Dimensional Finite Element Method (FEM) for the mechanistic analysis of flexible pavements, due to amongst others, its ability to model dynamic loading and complex material behaviour (i.e., viscoelasticity, anisotropy, and non-linear). The results of mechanistic response analysis of flexible pavements that have been designed using the traditional empirical approach as well as the mechanistic-empirical pavement design approach were presented and discussed. One of the notable points raised during discussions was the importance of realist modelling assumptions. The presenter responded that their future work would consider the comments made.

4. THE USE OF SEAWATER IN ROAD CONSTRUCTION: 1 THE SWARTKLIP AND LAMBERT'S BAY EXPERIMENTS – F Netterberg, Pavement Material & Geotechnical Specialist

- . South Africa, like many other countries world-wide is increasingly facing shortage of fresh water. On the other hand, the construction of roads requires a significant amount of fresh water. The presentation reported the outcomes of the monitoring of the performance of the Swartklip experimental road that was constructed using seawater in 1975. The primary objective of the experiment was to demonstrate how to use seawater for the compaction of graded crushed stone bases without incurring damage to the base during construction or compromising its long-term performance. Based on the outcomes of up to 30 years of performance monitoring, it is demonstrated that seawater can successfully be used in all layers of a flexible pavement with a graded crushed stone base, provided that certain precautions are taken in the design and during construction.

5. THE USE OF SEAWATER IN ROAD CONSTRUCTION: 2 THE LÜDERITZ EXPERIMENT - F Netterberg, Pavement Materials & Geotechnical Specialist

- . This was the second presentation on the use of seawater for road construction, which focused on presenting the outcomes Lüderitz experiment where freshwater is extremely scarce along the desert coast of Namibia. To address water scarcity challenge, ten experimental sections of graded crushed stone base compacted either with seawater or with fresh water as controls were constructed in 1979 at Lüderitz. After 35 years of performance monitoring, it was demonstrated that no significant salt damage occurred to the primed base or to the surfacing during or after construction, indicating that under conditions like those at Lüderitz seawater can be used in all layers including a G3 base under a 19 mm Cape seal provided that certain precautions are taken. The discussion at the end of the presentation commended the presenter, especially for the effort made to monitor the experimental sections for 35 years, which very rare to find in the field of pavement engineering.

6. ADVANCING ASPHALT MIXTURES IN SOUTH AFRICA: UNCOVERING SUITABLE NONCONVENTIONAL MATERIALS AND DESIGN METHODOLOGIES / PROCEDURE R Lutchminarian and MMH Mostafa, University of KwaZulu-Natal

- . The presentation highlighted the outcomes of a study that geared towards investigating the current and proposed non-conventional materials used, as well as state of readiness of the industry to implement the modified asphalt mixtures. The main objective of the study was to gain an in-depth understanding of the identification of current and proposed non-conventional materials that can be used in asphalt mixtures, within a South African context, using qualitative data. It was concluded that there has been an interest in the use of non-conventional materials in asphalt mixtures, by the South African civil engineering field. However, further research is needed to establish the most appropriate types of non-conventional materials that can be used in asphalt mixtures.

7. COMPARING THE FWD AND TSD CALCULATED INDICES USING THE LIMIT OF AGREEMENT (LOA) METHOD – O Sengwane, SANRAL

- . This presentation was not a full-published paper. It was a presentation which highlighted the progress of the work of one MEng research student registered at the University of Pretoria. The focus of the presentation was to use of the limit of agreement (LOA) methodology to compare the deflection bowl parameters measured using the falling weight deflectometer (FWD) and the traffic speed deflectometer (TSD), which are two devices commonly used to evaluate the structural condition of pavements. It was shown that the deflection bowl parameters measured using the two devices are statistically different and should not be used interchangeably. Delegates who contributed during the discussions at the end of the presentation stressed the need to understand the basic principles of the two devices, and that future work should consider the influence of other parameters such as temperature during the deflection surveys.

TREASURY SESSION – PUBLIC TRANSPORT AND SPATIAL TRANSFORMATION

Session 1B, Monday, 10 July 2023

Session chair and convenor: Mr Madumetja Moselakgomo, University of Johannesburg

The session is convened annually on behalf of the National Treasury Cities Support Programme and aimed at nuanced information sharing to the community of practice on approaches to the use of public transport to transform spaces. The session was well attended, with several interactive time slots. The attendees were greatly inspired by the session, particularly Advocate Tembeka Ngcukaitobi's presentation on Land Matters concerning spatial transformation.

The presentations were delivered by a group of invited thought leaders, renowned authors, and practitioners from diverse backgrounds, representing the intricate nature of the topic.

1. LAUNCH OF THE PUBLIC TRANSPORT CAPACITY BUILDING PEER LEARNING PROGRAMME FOR CITIES IN PARTNERSHIP WITH THE SOUTH AFRICAN CITIES NETWORK - Ms H Gaibe, National Treasury

- . The Cities Support Programme for Public Transport and Spatial Transformation found that metros need capacity building in intergovernmental coordination, IPTN operations, traffic engineering, devolution of transport functions, and integrated transport and spatial planning. The lack of skilled human resources is a significant reason for the lack of implementation of travel demand management plans. To address these issues, a six-month peer-to-peer learning programme for cities commenced on 25 August 2023, with the eThekweni Transport Authority serving as the host under the theme of "Intergovernmental Coordination".

2. CSP SPATIAL TRANSFORMATION PROGRAMME: KEY FINDINGS - Dr M Mokonyama, CSIR

- . Integrated Public Transport Networks (IPTNs) can positively impact spatial transformation, as shown by a systems dynamic model used to examine three cities: Ekurhuleni, Nelson Mandela Bay, and Buffalo City. However, obstacles were identified, including a tendency to prioritise individual projects over the overall system, an overreliance on national grants, a lack of explicit goals for spatial transformation within institutions, and assumptions about interventions' cause and effect. As part of a solution, it is suggested that project management and transport planning be separated, with transport planning recognised as the crucial function in delivering transport services.

3. SPATIAL TRANSFORMATION IN SOUTH AFRICA: A PIPE DREAM? - Prof. A Todes, University of Witwatersrand

- . Despite 29 years of democracy in South Africa, signs of apartheid still exist in cities. Unequal spatial distribution has worsened due to conflicting government agendas, lack of skills and resources in local government, and political power dynamics. Positive developments include densification, racial and spatial pattern changes, urban renewal, informal economies and spaces, transit-oriented development, mixed land use, and economic growth in townships and new commercial areas. However, these improvements need better support and management.

4. LAND MATTERS: THE ROAD AHEAD – Adv. T Ngcukaitobi, SC

Apartheid spatial planning and related transportation issues are rooted in oppressive labour systems from colonial times. They cause economic, cultural, and social disintegration. Empathy and understanding are crucial in finding solutions.

The government can use land expropriation to provide transportation infrastructure, housing, and spatial transformation for public interest. The Constitution allows for three tools to achieve this goal.

- Land expropriation: The government can expropriate land for public use without compensation or with fair compensation, even if disputes are settled later.
- Land redistribution: Land redistribution based on people's needs is necessary. The current approach of the RDP is insufficient. Market-driven approaches won't work in developing economies like South Africa. Land pricing must not be controlled by a small group, and the private sector can't be solely relied upon.
- Land tenure: The Property Act should include third-party rights and be updated to serve the poor. Banks' lending system needs to help the poor's access to formal dwellings and land, as more people live in informal leasing arrangements.

Land expropriation and redistribution is a better solution for our developmental needs than land restitution, which only benefits a few. We should follow the example of Germany, which successfully used land expropriation and redistribution to move on from 1945.

5. STATE OF THE CITIES FINANCES – CAN CITIES AFFORD SPATIAL TRANSFORMATION? - Ms Pingo, SA Cities Network

- Funding spatial transformation is challenging for municipalities. Greenfield development generates more revenue, but compact cities are needed for increased access to opportunities. Land regulation, taxing private transport, and changing regulatory spaces can help. Not funding transformation could lead to a declining economy, high unemployment, poverty, and political failures.

6. ECONOMY ON YOUR DOORSTEP – Mr A Cawe, Xesibe Holdings

- Rural provinces in South Africa remain underdeveloped, which causes migration to urban areas. Investment in transport infrastructure like all-weather roads can drive social and economic reproduction in rural areas. Connecting road networks between villages can enhance trade and social reproduction. Traditional land ownership by authorities needs to be reviewed to allow people to develop land in their way.

Key inputs from participants were as follows:

- Implementing a peer-to-peer learning programme for cities is a positive step towards improving transportation development in urban areas.
- Systems dynamic is a valuable tool for transport planning. It measures performance indicators for the entire city system, resulting in a more comprehensive approach to transportation planning.
- Townships were not meant for living standards but as dormitories, so the idea of a township economy doesn't work. They need land uses that can provide jobs.
- We must develop successful strategies to convince NIMBYs and conservationists to support inclusionary housing fully.
- Informal development is happening rapidly, but bulk infrastructure services are not keeping up with this trend. The prevalence of informality is surpassing that of formality.
- Promote vertical densification and discourage informal settlements. Be culturally prepared to embrace vertical densification.
- Rural provinces and municipalities need training and resources for economic development and community improvement.
- It is essential to establish a professional organisation for transport planners to provide recognition and regulation for its members. Currently, there is no formal recognition system for transport planners, and anyone can claim to be a transport planner.
- Railways have driven development, as seen in high-density hostels near train stations in black townships. Public transport can still influence land-use development today.
- The government must review price regulation, specifically in the transportation sector.
- The regulatory framework permits spatial transformation, but the government needs to increase its implementation rate. Currently, the implementation is insufficient.
- Renting out spaces at public transport facilities could be a viable option to generate income.
- The existing system of traditional land ownership may be impeding economic progress.
- Regular infrastructure maintenance is crucial to avoid constant rebuilding and extend asset lifespan.
- Transnet must utilise its unused land to contribute to rural development.
- The transport infrastructure in towns like Mthatha requires attention to unleash the region's economic potential.

TRAFFIC ENGINEERING

Session 1C, Monday, 10 July 2023

Session chair: Mr Justice Chauke, SANRAL

Convenor: Dr Pieter Pretorius, Innovative Transport Solutions

In the traffic engineering session, several interesting papers were presented during the morning session. These papers, with the following titles, originated from various ongoing SANRAL as well as postgraduate research projects:

- 1. GUIDELINES FOR THE PROVISION OF BYPASS ROADS AND THROUGH-WAYS AT CITIES AND TOWNS - PA Pienaar, Mintirho Engineering Services, M Mokonyama, CSIR, DK Das, University of KwaZulu Natal, WJ Pienaar, Stellenbosch University, HJ Stander, SC van As and A Robinson, SANRAL**
 - . Despite the adoption of the concept of bypass roads, the provision of these roads remains a controversial issue. The perceived benefits of through traffic to the city or town need to be weighted up against the benefit of a bypass to long-distance traffic - in terms of travel time and cost, as well as road safety considerations. The aim of the paper was to provide guidelines for the planning and management of bypass roads and through-ways.

- 2. UTILIZING UAVS AND AI SOFTWARE FOR DATA COLLECTION AT ROUNDABOUTS - I van Tonder and JT Arries, Stellenbosch University, JC Krogscheepers, Innovative Transport Solutions Global and SC van As, SC van As Traffic Engineer CC and MM Bruwer, Stellenbosch University, as well as the ACCURACY OF VIDEO ANALYTICS AND ON-BOARD GPS DEVICES FOR DATA COLLECTION AT ROUNDABOUTS - JT Arries and I van Tonder, Stellenbosch University, JC Krogscheepers, Innovative Transport Solutions Global, SC van As, SC van As Traffic Engineer CC and MM Bruwer, Stellenbosch University**
 - . These two papers focused on the use of drones and various other technology options to assist with the analyses of data at more than 100 roundabouts across four regions in South Africa. The papers illustrated the use of the latest technology in traffic engineering research efforts. The paper addressing the use of onboard GPS devices was awarded the "Best Paper" at the 2023 conference.

- 3. OPERATIONAL CONCEPT FOR CONNECTED AND AUTONOMOUS VEHICLES IN AN URBAN ENVIRONMENT - A van Straten and SJ Andersen, Stellenbosch University**
 - . This paper also ventured into the future, with the network performance of Connected and Autonomous Vehicles (CAV's) being analysed. Lately, there is increased automation as well as improved connectivity between vehicles and roadside infrastructure. A microscopic simulation model, namely PTV VISSIM, was used, and it was concluded that it was a valuable first step in gaining a better understanding of the potential traffic flow advantages of these vehicles, subject to a sufficiently high enough rate of penetration in the vehicle mix.

4. STATE OF TRAFFIC SIGNALS AND INTELLIGENT TRANSPORT SYSTEMS IN SOUTH AFRICA – J Coetzee, Innovative Transport Solutions

- . The review and update of technical guidelines was identified as an important need by various role-players. Firstly, the state of traffic signals in the country was discussed in a workshop session, with the following suggestions:
 - The effective implementation of traffic signals proves to be challenging to the local authorities, due to various factors such as increasing vandalism of traffic signal infrastructure. Various options were being considered by authorities throughout the country to manage these challenges.
 - A review of the SARTSM Volume 3 guidelines for the implementation of traffic signals might lead to significant cost savings. It appears that there is support from a number of metros for a review of the guidelines, and this will be discussed further with the National Department of Transport.

5. THE NEED FOR SOUTH AFRICA TO ADOPT STANDARD SIGNAGE AND SYMBOLS FOR LOW AND ZERO EMISSION VEHICLES (LZEVs) - L Monyatsi, Road Traffic Management Corporation, and University of Cape Town Centre for Transport Studies

- . Also, the need for South Africa to adopt standard signage and symbols for low and zero emission vehicles (LZEV's) was motivated in a paper based on research being conducted at the University of Cape Town.

6. HOW STANDARD (AND VALID) ARE SOUTH AFRICAN PARKING STANDARDS? - MM Bruwer and M Geldenhuys, Stellenbosch University

- . Furthermore, the need for updated guidelines on Parking Standards was presented. A comparison of different approaches by various local authorities was undertaken, which proved very insightful.
- . The current guidelines in the above-mentioned fields are potentially outdated as it originates from as far back as the 1980's. Various developments during the past 30 years, including the introduction of new technologies, need to be incorporated in updated guidelines, which should include a review of international best practise.

7. PERFORMANCE ASSESSMENT OF SIGNALISED INTERSECTION USING UAV VIDEOGRAPHY – A CASE STUDY OF THE JORISSEN-BERTHA STREET INTERSECTION IN JOHANNESBURG - I Aivinhenyo, I Mokgalaka and T Monareng, University of the Witwatersrand

- . The session concluded with a technical paper on a case study at a signalised intersection in Johannesburg. UAV videography was used to assist with the performance assessment of traffic flow at this urban intersection. It emphasised the emergency of these new technologies, like some of the earlier papers in the traffic engineering session.
- . The traffic engineering session stimulated some very interesting debate on the various topics, with sufficient provision being made for input by delegates.

In summary, it was concluded that:

- New technologies should be embraced by traffic engineering professionals in research and project related work.
- There is a dire need to update outdated guidelines, such as:
 - SARTSM Volume 3, dated 2004.
 - Parking Standards, dated 1985.
 - Potentially other SARTSM volumes.

CAPACITY BUILDING/ TRANSPORT FOR RURAL DEVELOPMENT COMBINED SESSION WITH THE INTERNATIONAL ROAD FEDERATION

Session 1D, Monday, 10 July 2023

Session chair: Prof James Chakwizira, University of Venda

Convenor: Mr Mac Mashiri, Gwarajena TRD

INTERNATIONAL ROAD FEDERATION AFTERNOON SESSION: INNOVATION AND DIGITALISATION FOR A SUSTAINABLE FUTURE

IRF Director General, Susanna Zammataro, led the discussion at the IRF Special Session “Innovation and Digitalisation for a Sustainable Future”. The session addressed the pivotal role of digitalisation in revolutionising transportation and welcomed as speakers: Nicolas Miravalls (Oris), Subu Kamal (TRL), Marianne Vanderschuren (University of Cape Town), and Justin Coetzee (GoMetro). More specifically, speakers discussed the potential of data from diverse sources and tools to expedite the transition towards safe, efficient, inclusive and more sustainable mobility.

Opening the session, Mr Nicolas Miravalls from ORIS introduced the “**Roads4People Fund**” a new initiative from ORIS, UNIDO and IRF to help address critical lack of funds for **rural roads. 68% of the world’s rural population still does not have all-season access to road networks.** The Roads4People Fund builds on the benefits generated by digitalisation in project planning and delivery to sustain rural roads investments. The programme aims at facilitating investment promotion but also technology transfer. By digitally connecting all data of a project in one single platform ORIS can provide a holistic analysis for the best design, stimulate value engineering, identify, validate, and implement financially sound and sustainable solution for all projects. The savings generated on major projects can then be transferred to the Fund that will support projects on rural roads. The initiative builds on the extensive experience of UNIDO in mobilising technical, financial, managerial, and other resources for the implementation of industrial investment and technology promotion projects in developing countries and countries with economies in transition. It also benefits from the International Road Federation and its network in over 130 countries.

Subu Kamal (TRL) illustrated how to unlock the power of open data with the Developer Portal in the **iROADS digital road asset management system.** The presentation provided a step by step explanation of what features are included in iROADS, how it helps in decision making – from strategic to tactical and operational - and the value proposition the different capabilities iROADS provides across investment planning, performance management and RAM.

Prof. Marianne Vanderschuren’s presentation offered a detailed overview of the importance of data in addressing the intricacies of gender issues in transport. Her presentation specifically focused on **Gender-based travel data collection and related sexual-harassment in Sub-Saharan Africa and the SHE-CAN tool** specifically developed for the African continent. The talk evidenced that there is still a lack of understanding of female needs when travelling and how improved data collection practices will enable better legislation, education, design, infrastructure, management and enforcement. Tools, such as SHE-CAN, specific to the African continent, enable major improvements. The filtering system can identify the quickest, most (resource) efficient, easy to implement interventions. The final recommendation was for foundation and elevation interventions to be implemented before empowerment is considered.

The session concluded with a presentation from Justin Coetzee (Go Metro) about the **Africa Urban Mobility Observatory**, a project of the HVT programme funded by UK Aid aiming to address the following questions:

- What are the main levers for transport mode share and what is the role of data? What cities have achieved high or low transit ridership, cycling, etc, and what factors/policies explain their differences?
- What are the opportunities and risks of big data applications in Global South cities?
- What is role of informal transport in the global South, and how to enable a transition towards clean, affordable, and efficient transport solutions?

The objective being to:

1. **Promote** inclusive, low-carbon mobility in African LIC cities
2. **Pilot** Big Data applications to generate data, benchmark performance, and draw policy insights in six African cities
3. **Co-develop** action plans in two of the six cities
4. **Catalyse** broader uptake via web data platform, workshops & research.

The cities in which the pilots have been conducted are the following: Blantyre (Malawi), Gaborone (Botswana), Kigali (Rwanda), Kinshasa (DR Congo), Lagos (Nigeria), Maseru (Lesotho). The indicators being monitored: Travel Time, Travel Distance, Period of Travel Driver Behaviour Vehicle Occupancy PT Vehicle Condition PT Vehicle Comfort PT Vehicle Reliability Sexual Harassment Modal Split CO2 Congestion Fatalities Affordability Accessibility, # Transfers, Crime. Data collection methodologies used in this innovative project : UMA ; USSD, Whatsapp, web, face-to-face, 3rd party data.

INFRASTRUCTURE

Session 2A, Monday, 11 July 2023

Session chair: Dr Lubinda Walubita, TTI - The Texas A&M University System

Convenors: Dr Julius Komba / Prof. Wynand Steyn, University of Pretoria

The session consisted of seven published papers, and a workshop on portable Weigh-In-Motion (WIM) Technology. The topic covered included innovative solutions for bridge inspections and assessment, application of innovative technologies including WIM, Building Information Modelling (BIM) and Digital Twins in road infrastructures, guidelines for use of sea water in road construction and greening road construction.

1. TECHNOLOGY SOLUTIONS FOR STRATEGIC BRIDGE INSPECTIONS IN SOUTH AFRICA - L Kemp, CSIR/ University of Pretoria, R Matchett, Zutari, MP Roux, CSIR and L de Klerk, Zutari

- . The presentation reported on the outcomes of a study to investigate the practicality of replacing the use of an Under-bridge Inspection Unit (UBIU) for strategic bridges and alternatively capture image data with an Unmanned Aerial Vehicle (UAV) and performing inspections using the new proposed inspection methodology. It also included the comparison of the cost and time components of the new inspection methodology versus traditional TMH19 visual inspections. It was concluded that the new methodology could replace the use of an UBIU and capture images with an UAV, reducing the cost of strategic inspections and ensuring the safety of bridge inspectors. Several other aspects to be considered in future studies were recommended.

2. INNOVATIVE BRIDGE ASSESSMENT FOR DEVELOPING COUNTRIES - PF van der Spuy, Zutari and Stellenbosch University

- . Application of innovative assessment methods which have been developed elsewhere with the aim to expose local bridge engineers to the available techniques and to motivate how they can be applied locally was the subject of this presentation. The presenter stressed that bridge assessment in South Africa is currently performed using a tier 1 approach, which means that structures are assessed as if they are new, even though some concrete bridges were constructed in the 1950's or even earlier. It was further indicated that the current approach is conservative which often leads to costly strengthening and repair measures, or even reconstruction, hence the need for a new innovative method. A case study to demonstrate the proposed innovative bridge assessment method was demonstrated.

3. IDENTIFYING ABNORMAL VEHICLE SUBCLASSES FROM WIM DATA FOR THE STRUCTURAL DESIGN OF HIGHWAY BRIDGES IN SOUTH AFRICA - J van Rooyen and PF van der Spuy, Zutari

- . This presentation was aimed at demonstrating an innovative approach to identify and characterise subclasses of abnormal vehicle types from weigh-in-motion (WIM) data, by employing Gaussian Mixture Modelling to the load effects. It was stressed that a clear traffic loading description can be developed once abnormal vehicles are properly characterised, which increases the understanding of the load effects (LEs) associated with them and leads to reduced uncertainties. The ultimate goal was to improve abnormal traffic description and deeper understanding of their statistical properties enables for more advanced probabilistic LE modelling, increasing the resulting characteristic, and reliability-based partial factors (PFs) for the calibration of traffic load models.

4. INNOVATIVE ROAD DESIGN WITH BIM TECHNOLOGIES - DIGITALLY TRANSFORMING THE WAY WE CREATE ROAD INFRASTRUCTURE - S Yunos, Baker Baynes and D Allopi, Durban University of Technology

- . The presentation provided a high-level overview of the innovation derived from wielding Building Information Modelling (BIM) technologies, workflows, and processes in the road infrastructure industry. It defined BIM in the context of road industry, its benefits and demonstrated typical application on road projects. Amongst others, aspects such as scalability issues, skills shortages, lack of BIM mandate were identified be some of the factors hindering BIM adoption in most developing countries.

5. TOWARDS GREENER TRANSPORTATION INFRASTRUCTURE THROUGH INNOVATIVE DIGITAL TWINS ASSESSMENT; STUDY CASE IN UZBEKISTAN - N Miravalls and H Pley Leclercq, Oris FRANCE

- . Using a real case study located in Uzbekistan, the presentation evaluated the use digital due diligence in infrastructure projects. It included demonstrating the use of ORIS construction materials platform to analyse the project environment and design constraints, including local sourcing, traffic and weather conditions; to evaluate several design options and maintenance scenarios with a multi-objective optimization of the structure performance as to cost, carbon emissions, material consumption and resilience to climate change and to assess road safety performance based on the proposed designs.

6. WORKSHOP: PORTABLE WIM TECHNOLOGY – THE TEXAS EXPERIENCE – L Walubita, TTI - The Texas A&M University System

- . This was a one-hour workshop on the use portable Weigh-In Motion (WIM) technology to measure traffic data (weight and classification), for use during pavement design. The presentation was based on Texas experience, where portable WIM technology has been widely implemented. The key points from the workshop included the need for a proper installation, calibration of the equipment, and performing regular checks to ensure reliability and the accuracy of the traffic data. During discussions, it was stressed that portable WIM technology is potentially a viable alternative to the costly permanent WIM. It was further stresses that the current state of the portable WIM technology does not all allow for use in legal axle load enforcement, but could be used for screening purposes to complement the existing static weighbridges.

7. THE USE OF SEAWATER IN ROAD CONSTRUCTION: 3; A QUICK GUIDE TO AN ACCELERATED CONSTRUCTION METHOD - F Netterberg, Pavement Material & Geotechnical Specialist

- . This paper, on which this presentation was based, was awarded the best practical paper at the conference. It presented a quick guide for use of sea water in road construction. The presenter pointed out that presented design and accelerated construction method was developed from experience and research to enable the use of both inherently saline materials and waters with a salinity up to about that of seawater for compaction with little risk of salt damage. It was stressed that seawater and other chloride-sulphate waters up to at least the salinity of seawater (about 3,5 %) and relative composition can be successfully used for the compaction of all layers of a flexible pavement including a lime or cement stabilised base but should not be used for curing such a layer. Delegates commented on the efforts what went into putting together the quick guide.

8. GREENING OUR ROAD CONSTRUCTION – VIEWS FROM THE TRANSPORTATION INDUSTRY IN SOUTH AFRICA – M Heyns, M Sinclair and R Combrinck, Stellenbosch University

- . The presentation provided the research outcomes aimed at investigating technical feasibility of replacing standard cement mix with greener alternatives. The presentation was based on an online survey that was carried out among transport engineers in South Africa. The research work was motivated by the climate change which is currently quite possibly the biggest challenge that the global population has had to face. The presentation reflected on some practical concerns, as well as a sense that the problem of climate change is not necessarily viewed as a priority for the industry. It was indicated that the main barrier of greener alternative implementation was the cost of the production.

PUBLIC TRANSPORT

Session 2B, Tuesday, 11 July 2023

Session chair: Prof Roger Behrens, University of Cape Town

Convenors: Prof Roger Behrens, University of Cape Town and Dr Megan Bruwer, Stellenbosch University

In 2023, the session normally titled 'Urban and Public Transport' received so many papers that it needed to be sub-divided into three individual sessions spread over three days. These three sessions were titled 'Public Transport', 'Smart and e-Mobility', and 'Urban Mobility'.

Prof Roger Behrens from the University of Cape Town, and Dr Megan Bruwer from Stellenbosch University shared responsibility for convening and chairing these conference sessions.

The Public Transport session on Day 2 of the conference included a number of papers that reviewed the experiences of innovative projects aimed at the improvement of minibus-taxi services (with a particular focus on the Western Cape province). Other papers covered an array of topics, ranging from measuring passenger preferences, the role of passenger transport in the economy, travel time reliability assessment, and public transport system design principles.

TRAFFIC MANAGEMENT, SAFETY AND SECURITY

Session 2C, Tuesday, 11 July 2023

Session chair: Prof Marianne Vanderschuren, University of Cape Town

Convenor: Dr Hubrecht Ribbens

Several important subjects were discussed in the session such as the implementation of the Safe Systems approach, impact of Covid-19 on road safety and challenges to analyse data, the regulation of e-scooters, infrastructure and educational road safety interventions, progress with a dedicated transport research facility and new technologies in support of autonomous vehicles. The highlights of each topic are given below:

1. IMPLEMENTATION OF THE SAFE SYSTEM APPROACH IN SOUTH AFRICA: OVERVIEW OF THE LIMPOPO ROAD SAFETY PROGRAMME - K Venter, CSIR, J James, F Ahmed, N Greyling, S Mavuso, C Malan, M Romijn, C Harding and R Baker

- Two papers were presented to demonstrate the implementation of the Safe Systems approach on a provincial level and on the metro level. These interventions are in support of the Second United Nations Decade of Action and Global Road Safety Plans, as well as the National Road Safety Strategy 2030.

1. 1. Limpopo Province – The Limpopo Road Safety Programme

The paper provides a blueprint about how the Safe Systems Approach can be implemented on a provincial level, showcasing the methodology followed in the Limpopo Province. The Limpopo Road Safety Programme is premised on the Safe Systems Approach. It aims to implement road safety actions and interventions in a targeted manner. It is a three-year initiative to, through public and private partnerships, support communities in reducing the number of deaths and injuries from road traffic accidents (Sustainable Development Goal 3.6). The programme is rooted in successful public and private partnerships and the coordination of targeted interventions and actions aimed at reducing the carnage on Limpopo roads. The programme enables inter-sectoral discussion and aim to improve decision-making coordination at the operational level which needs to include both private stakeholders and government, facilitating the dialogue regarding road safety actions and interventions.

1. 2. eThekweni Metro – Improving road safety in the CBD

The city of eThekweni has recorded more than 50 000 road crashes per year, with more than 500 deaths each year. To respond to these challenges, The city of eThekweni has commenced with a project of improving road safety in the central business district by implementing some engineering interventions such as: raised intersections to reduce speeds approaching the intersection area, raised pedestrian crossings to slow down vehicles and allow safe crossing by pedestrians; and extended kerbs to increase pedestrian refuge space and decrease crossing distance. With these interventions, the city hopes to be an advocate of the Safe System principles that admit that humans make mistakes, and in design, ensures that (amongst others), the road transport system is forgiving, and that forces in collision do not exceed the limits of human tolerance.

2. ROAD FATALITIES: DID COVID-19 IMPACT TREND IN CAPE TOWN? - M Vanderschuren, University of Cape Town

- . The paper states that during 2020, the year that lockdowns were implemented to reduce the spread of Covid-19, South Africa saw a reduction in road fatalities. Unfortunately, this trend was not sustained after Covid-19. A missed opportunity to combat the carnage on the country's roads.
- . The paper shows that the availability of proper accident data is hampering efforts to analyse accident trends as in the above case. It is recommended that the RTMC identifies ways to improve the data collection and, hence, any findings and recommendations drawn from the information. This will require buy-in from police stations, provinces and the staff at the RTMC.

3. CYCLING IN THE 15-MINUTE CITY: STRATEGIES TO REDEFINE OUR URBAN ENVIRONMENTS, AND MOBILITY WITHIN IT - AM Wheeldon, Bicycle Cities/ Car Free Cities Alliance

- . The paper explores current measures to promote cycling in all its forms, and the strategies required to shift the balance in the urban environment from car dominance to active mobility. Land use, road design, greening the city, universal access, an understanding of human behavioural choices, and the dismantling of barriers to safe and active travel – all require interrogation. The paper recommends a shift to a compact, fifteen-minute city to make communities more sufficient in providing in their needs and reduce car dependence. Better coordination of transport and land use planning as contemplated in the NLTSF 2023- 2028 can be a useful tool to achieve this objective.

4. REGULATION OF E-SCOOTERS IN SOUTH-AFRICA - SJ de Villiers and M Sinclair, Stellenbosch University

- . This paper was presented within the Mini Workshop on Micro Mobility in Session 2D. It explores the current provisions for e-scooters in transport legislation in the South-African context and identifies certain shortcomings. There are several legal challenges to address:
 - The National Road Traffic Act and Regulations do not effectively define e-scooters to allow legal operations.
 - Limitations of the available road signs and markings to effectively regulate the mode.
 - E-scooters be included in a collective term (low powered-vehicles) in traffic legislation.
 - Regulations must be developed for e-scooters categories primarily based on the vehicle speed and weight.
 - Road safety must be the central theme when developing regulations, informed by relevant studies and other literature.

5. THE EFFECT OF INFRASTRUCTURE AND EDUCATIONAL ROAD SAFETY INTERVENTIONS IN KHAYELITSHA, CAPE TOWN - M Vanderschuren, University of Cape Town and P Muchaka, ChildSafe South Africa

- . To address the vulnerability of children, a situational analysis in one of Cape Town's neighbourhoods, Khayelitsha, was conducted, followed by an innovative pilot project to protect school children, while walking to and from school. Combining infrastructure changes with road safety training and education for children, teachers, and the wider community, the project aims to create a safe school zone at the project site. This paper describes a situational analysis, implemented measures, as well as measurable effects of road safety interventions of this project. The learning from this project could be useful to implement similar programmes in other residential areas.

6. TOWARDS A DEDICATED TRANSPORT SAFETY RESEARCH FACILITY FOR SOUTH AFRICA - B Marole, K Venter, I Sallie, K Muronga, L Kemp, M Kemp, V de Franca, P Binda, M Dube, T Matsaung, K Bosilong, R Malope, T Mogae, P Mashaba, B Kwange, L Kwange, C Maraga and M Feikie

- . The establishment of a dedicated CSIR research facility for transport safety has been a topic of discussion for several years. In 2020, the CSIR embarked on a process to establish a facility dedicated to transport safety research to be known as the Transport Safety Lab. The aim is to address transport unsafety by conducting experimental projects that provide insight into the mechanisms and contributory factors that cause risk and incidents in the transport environment.
- . The paper provides feedback regarding progress made with the Transport Safety Lab project to address the Research Development and Innovation (RD&I) gap by enabling experimental research (evidence based and data driven), promoting, and advancing initiatives and opportunities that encourage the use of local data and methodologies in support of local transport safety solutions. In addition, the article provides a review of current experimental projects that support capability development and the building of a portfolio of evidence to be used to display the type of work that the Transport Safety Lab can do.

7. HIGH PERFORMANCE PAVEMENT MARKINGS ENHANCING HUMAN, CAMERA AND LIDAR DETECTION - V Tshabangu, 3M South Africa and R Nuyttens, 3M Belgium

- . More recently the adaptation of the road to machine vision has become relevant due to the developments in advanced driver-assistance systems (ADAS) and autonomous vehicles (AV). Better road markings are required to improve the confidence of ADAS, and secondly to lay the base for higher levels of vehicle automation. The General Safety Regulation in the EU already mandates ADAS in new vehicle models. In 2024 all new registered vehicles need to be equipped with several ADAS, including Lane Keeping Assist (LKA) or Lane Departure Warning (LDW) systems.
- . The human eyes and cameras are the sensors currently used have limitations in detecting road markings under certain conditions e.g., glare from sunlight or oncoming vehicles, rain, fog, low light nighttime conditions.
- . It has been determined that high performance ($RI > 1,7$) road markings help to increase the level of detection by both camera and LiDAR sensors, as well as human eyes. Particularly an All-Weather performing road marking tape was detected from significantly longer distances in wet and rainy conditions compared to traditional markings.

FREIGHT AND LOGISTICS

Session 2D, Tuesday, 11 July 2023

Session chair: Dr Paul Nordengen, Heavy Vehicle Transport Technology Africa

Convenors: Dr Paul Nordengen, Heavy Vehicle Transport Technology Africa and Prof Wilna Bean, University of Pretoria

This year's freight and logistics session covered a range of topics related to logistics and road freight transportation. One of the topics of particular interest focused on decarbonising road freight, while another topic focused on the use of artificial intelligence to improve overload control efficiency. A summary of the presented papers' findings is provided below.

1. CLIMATE CHANGE MITIGATION IS THE SOUTH AFRICAN TRANSPORT SECTOR READY FOR CHANGE - LA Grimett, Moses Kotane Institute

- . This paper evaluated the readiness of the South African transport sector to address challenges because of global logistics and legislative changes related to climate change. The readiness of the South African economy to adapt and the possible impacts of delayed reaction to global economic logistics and legislative undertakings were also unpacked. Results indicate that the impacts of climate change on the various subsectors are known and have already been experienced, and that proactive action by the Department of Transport will ensure that these impacts are reduced. This can be achieved with the appropriate mix of subsidies, penalties and incentives.

2. DECARBONIZING ROAD FREIGHT: TOWARDS NET ZERO EMISSIONS – AK Kamdar, KDG Logistics

- . This paper provided insights into the process of decarbonisation, technology options, and considerations for a sustainable and environmentally friendly future in the road freight sector. It also addressed some challenges and factors delaying progress in achieving emission reduction targets.

3. APPLICATION OF ARTIFICIAL INTELLIGENCE TO OVERLOAD CONTROL - A de Coning and AJ Hoffman, North-West University

- . This presentation investigated the use of an intelligent weigh-in-motion algorithm to decrease the static weighing of vehicles and enhance the ability to differentiate between legal and overloaded vehicles travelling on freight corridors. The authors evaluated various AI models in terms of their ability to decrease the static weighing of vehicles, whilst avoiding increases in the number of overloaded vehicles on the corridor. The results indicate that Artificial Neural Networks and Random Forest Tree based AI classification models can improve the performance of the current rule-based method and that the implementation of these methods could have a significant positive impact for all stakeholders (road authorities and transport operators) involved in the freight movement process as well as the travelling public.

4. IoT-ENABLED SUPPLY CHAIN MANAGEMENT AND LOGISTICS - D Chauke, G Gama, R Sebetoa, L Marimuthu, and T Mavhona, CSIR

- . In this paper, the authors present a Smart Warehousing Management System and Fleet Management System that can assist in improving asset tracking and tracing in supply chains. The system uses the Internet of Things (IoT) to integrate sensors to track assets and improve warehouse operations, which can facilitate improved supply chain management and tracking throughout the supply chain. This shows that IoT platforms show promise in improving the supply chain and logistics management.

5. EFFECT OF THE ADOPTION OF TECHNOLOGY INNOVATIONS IN THE AIR CARGO LOGISTICS INDUSTRY IN SOUTH AFRICA - AJ Adenigbo, J Mageto and R Luke, University of Johannesburg

- . This paper examined the potential effects of implementing emerging technology applications in the air cargo logistics industry in South Africa. The authors used a questionnaire to collect data from 373 stakeholders in industry. Analysis of this data indicates that applying technology developments in the air cargo logistics industry promotes efficient operations and enhances cargo delivery services resulting in improved customer satisfaction. This highlights the need to improve the responsiveness of adopting emerging technology applications in the air cargo logistics industry in South Africa.

RAIL

Session 2E, Tuesday, 11 July 2023

Session chair and convenor: Mr Fana Marutla, PRASA

The future of South Africa cannot be defined without the inclusion of a railway system as its backbone of public transport. With increasing traffic patterns and congestion on the roads network the railway system is the remedy that the country can rely on. The African continent's sustainable development is enshrined within its Agenda 2063 plan, which is a strategic framework promoting socio-economic transformation for the African continent up to the year 2063. Agenda 2063 envisions: "a prosperous continent where the citizens have a high standard of living, are well educated with a skilled labour force, transformed economies, productive agriculture and healthy ecosystems, with the well-preserved environment and a continent resilient to climate change", (African Union Commission, 2015).

With the above in mind, below is an overview of the topics shared by the speakers at the conference:

1. KEYNOTE ADDRESS - N Makaepa, Department of Transport

- As the DDG Rail (Department of Transport), Mr Makaepa emphasised the need of integrating policies and relevant legislation as we execute developmental projects in our country. This includes the much-anticipated high speed passenger rail system which is still at concept and initiation phase.

2. APPLICATION OF THE LIFE CYCLE COSTS ANALYSIS TECHNIQUE TO EXPLORE DESIGN AND MAINTENANCE SOLUTIONS FOR RAILWAY LINES IN WINDBLOWN SANDY DESERTS - R Ambunda, University of Namibia

- The total life cycle costs of an asset need to be assessed under all environmental conditions. Windblown sandy desserts present their own unique characteristics and challenges which must be studied and understood in order to maintain the railway assets in efficient and cost-effective manner.

3. RECOVERY OF RAILWAY PASSENGER CORRIDORS IN GAUTENG AND WESTERN CAPE - A Nkgabutle, PRASA

- Due to theft and vandalism of railway infrastructure and assets during the 2020 hard lockdown caused by the covid-19 pandemic, PRASA has embarked upon a bold plan to recover the priority corridors throughout the country and ensure that communities struggling with expensive public transport costs can have access to an affordable, reliable and safe rail passenger service. 16 priority lines are targeted for recovery during the 2023/24 financial year.

4. HIGH SPEED RAIL IN SOUTH AFRICA - G de Beer, AIG

- . The desire and dream of a high speed rail system in the country is growing daily. It was started by President Ramaphosa in his 2019 SONA address. Based on lessons from other countries around the globe, cognisant of the fact that high speed train passenger system is a business based on mass movement of passengers, there are corridors in South Africa where the system can be considered.
- . The pillars of an economy that works includes, among others, quality education, availability of funds for projects, investments in economic infrastructure, production of exportable goods and good health of the working class. As a reminder, in his policy discussion document released in August 2019, the then Minister of Finance, Mr Tito Mboweni reiterated that network industries such as energy (read Eskom, etc), transport (read Transnet, PRASA, etc) and telecommunications (read Telecom, SABC, etc), provide essential services that underpin the growth, productivity, and competitiveness of the economy. These network industries are facing challenges of poor infrastructure maintenance and delayed capital investment to support the developmental nature of our economy. A lot of professionals in the STEM environment have already raised their hands and are simply waiting for government to provide policy certainty to drive this developmental agenda. Our country has a huge potential which is currently heavily under-utilized.

ENGINEERING FOR SAFE SYSTEMS FORUM (ESSF 2023 – IMPLEMENTATION OF SARSAM 2022 AND SARRSM 2022)

Session 3A, Wednesday, 12 July 2023

Session chair: Mr Jason Lowe, SANRAL

Convenor: Dr Karien Venter, CSIR

For a third consecutive year at the Southern African Transport Conference 2023 (SATC 2023), the Engineering for a Safe Systems Forum (ESSF), chaired by Mr. Jason Lowe from SANRAL, was hosted on 12 July 2023 by the South African Road Federation (SARF).

The SARF Road Safety Committee initiated the ESSF in 2020 to create an opportunity to elevate the discussion around road safety engineering and to provide a forum to promote the adoption of the Safe System Approach (SSA) to address and improve road safety engineering in South Africa.

The SATC 2022 ESSF showcased the new South African Road Safety Assessment Methods Manual (SARSAM 2022) as well as South African Road Restraint Systems Manual (SARRSM 2022). These were published as draft guidelines by the Road Traffic Management Corporation (RTMC), both currently under review by the Committee of Transport Officials (COTO).

The SATC 2023 ESSF embraced the momentum from the previous two years to host another successful session. The application of SARSAM 2022 as well as SARRSM 2022 were illustrated. The SATC 2023 ESSF brought together academic and industry experts, sparking interesting discussion and debate. To promote the Safe System principles, and to maintain momentum regarding the implementation of Safe System initiatives, this seminar has become a valuable platform where road safety engineering and traffic management practitioners share experiences and challenges. Resolutions are reached and peer-to-peer engineering solutions devised, facilitating interaction and serving as a knowledge dissemination platform.

ROAD SAFETY ASSESSMENT METHODS

Practical application of the SARSAM 2022 was illustrated by Watze Hepkema and Melissa Groenewald (Zutari). Mr. Khutso Nkoana (RAL) provided an overview of how road safety assessments now form part of the Roads Agency Limpopo Road Asset Management programme using the COLTO SARSAM 1999 methodology.

KEY POINTS FOR CONSIDERATION

The following themes emerged from this year's ESSF:

- Transport authorities and industry need to proactively address road safety from a traffic engineering perspective.
- We need to work towards a uniform approach for quantifying road safety risk.
- System wide interventions are needed for safer roads and roads environments.
- Traffic engineering alone cannot solve all the safety problems - there is a need for collaboration across disciplines. It is crucial that members of the state and industry collaborate to benefit the travelling public.

SAFER ROADSIDES AND ADDRESSING ROADSIDE RISK

Safer roadsides are internationally gaining importance as a Safe System principle, with a focus on providing roadsides that are clear from hazards and dangerous objects, in protecting errant road users from serious injury.

Christo Barnard (Delta Bloc) and Dr. Karien Venter (CSIR) provided an overview of the importance of road restraint systems for vulnerable road users.

The South African Road Restraint Systems Manual (SARRSM 2022) has been developed as part of a series of guidelines to assess road safety conditions, identify improvement measures and provide guidance to improve road safety on the South African road network, including the installation of performance-based road restraint systems (RRS).

Dr. Louis Roodt reflected on lessons learnt with regards to the unquestioned implementation of the guidelines. Participation from industry (through engagement, and reporting on road safety engineering project cases, methods and issues), was again encouraged.

An overview and practical demonstration of the Risk Assessment Procedure (RAPSA), which is the practical application of the SARRSM, is currently being evaluated by SANRAL to assess roadside risks. Three presentations were made:

- Mr. Todd Thomas delved into the RAPSA methodology, including background theory and a report on his experience with the tool on a segment of national road. He demonstrated input requirements for roadside risk assessment.
- Mr. Andrew van Gruting, senior mentor at the SANRAL Technical Excellence Academy (TEA) provided an overview of why assessing roadside risk in South African is becoming increasingly important and that road verge design should not be considered as it has been in the past.
- Mr. Lutho Msutwana, a SANRAL candidate engineer, tied up the theory and application by illustrating the value of the RAPSA methodology by conducting a live demonstration of the input and output as applied to a rolling segment of the N10 north of Paterson (near to the Olifantskop Pass in the Eastern Cape, as a case study. This session conveyed the economic value of certain measures, but also stressed the need for engineering judgement when devising solutions around road restraint systems (RRS).

KEY POINTS FOR CONSIDERATION:

Road restraint systems should be a consideration to actively aid in the protection of vulnerable road users. The RAPSA methodology is premised on the NETSAFE crash prediction model. SANRAL currently uses NETSAFE in the South African Road Design System (SARDS) for the estimation of crash rates on existing roads utilising the specific roads and road reserves characteristics.

RAPSA is a uniform approach, using traffic estimation data, to:

- at a network level, identify and prioritise hazardous locations where road safety improvements are likely to be most beneficial.
- assess proposed geometric designs to identify potentially hazardous locations.
- conduct a cost-benefit analysis of road improvement alternatives.

SMART AND E-MOBILITY

Session 3B, Wednesday, 12 July 2023

Session chair: Prof Roger Behrens, University of Cape Town

Convenors: Prof Roger Behrens, University of Cape Town and Dr Megan Bruwer, Stellenbosch University

The Smart and e-Mobility session, on Day 3 of the conference, was sponsored by EGIS. Smart mobility is the application of technology and systems engineering principles to transport infrastructure to improve operations, with papers considering micro-transit, automated fare collection systems, and innovative vehicle tracking technologies and resulting datasets. E-Mobility (electric propulsion vehicles) and hydrogen power are another important discussion point included in this session with various papers considering the need for and challenges facing E-Mobility in the load-shedding era. The session closed with a discussion on the use of technology applications for the minibus taxi industry, with our session sponsors, EGIS, giving background to topical solutions, followed by a panel discussion on smart solutions that encouraged purposeful integration of paratransit.

10TH CHINA AFRICA TRANSPORT CO-OPERATION FORUM AND MAGLEV TRAINS APPLICATIONS

Session 3C, Wednesday, 12 July 2023

Session chair – China Africa: Prof Kevin Wall, SACTCC

Convenor – China Africa: Mr Yuchen Wang, SACTCC

Session chair – Maglev: Mr William Dachs, Gautrain

Convenor – Maglev: Mr Gerhard de Beer, AIH Econogistics

1. THE LATEST FRAMEWORK WITH THE INNOVATIVE FRAMEWORK OF THE CHINA-AFRICA TRANSPORT STRATEGY RESEARCH INSTITUTE (CATSRI) UNDER UNIVERSITY OF PRETORIA (UP), CHANG'AN UNIVERSITY (CAU) AND SOUTH AFRICA-CHINA TRANSPORT CO-OPERATION CENTER(SACTCC) – Y Wang, SACTCC

- He presented the history of the CATSRI and its development. Prof. Alex Visser and Yuchen Wang drove its innovation. On 15 July 2016, China-Africa Transport Strategy Research Institute was established in Chang'an University, Xi'an, China. It organised research initiatives between South Africa and China. It supports the World Transport Convention (WTC) since 2017. Every year it contributed the student essay winners for the SATC. Chang'an University and the University of Pretoria with the SACT will be working from 2022 to 2027.

2. CHINA-AFRICA COOPERATION IN THE TRANSPORT SECTOR UNDER THE BRI - Y He, Zhejiang Normal University China

- She presented the status of the BRI (Belt and Road Initiative) and its development in Africa. The Chinese government and the African Union (AU) are driving the BRI for infrastructure development in the whole Africa. To help African countries in operating social activities and increasing the country's economic growth, China put great efforts into meeting the needs of the transport infrastructure in African countries. This study mainly explores China-Africa cooperation in the transport sector under the BRI. After presenting the current situation of China's investment in Africa's transportation infrastructure, she analysed the existing challenges faced by the two countries and then addressed the possible suggestions for China and Africa to have better cooperation in the future.

3. Simulation on the thermal contraction coordination behavior between asphalt mixture overlay and graded gravel base layer - T Wan, Chang'an University China

- He presented that the thermal contraction performance of asphaltic pavement structure is affected by the interaction between the bituminous layer and the granular layer underneath. The constraint action of the graded gravel base layer plays an important role in affecting the temperature strains in the top asphalt layer. The focus of his presentation is to investigate the interactive thermal contraction mechanisms between the asphalt and granular base layers from a novel perspective. He suggested a type of composite structure and the dynamic and static strain acquisition system (DSSAS) to conduct the indoor thermal contraction tests. Combining the discrete properties of graded gravel materials (UAM) and the continuous characteristic of asphalt mixtures, the Finite Difference Method and Discrete Element Method (FDM-DEM) coupling models were established and calibrated. And the linear elastic and elastoplastic models of graded gravel layer were compared. His results show that the continuous-discrete coupling model has higher consistency with the laboratory test than the continuum model, and the relative error of thermal contraction coefficient is no more than 8.1%. The thermal strain-time curves of asphalt mixture and its composited specimens exhibit a nonlinear change law of first fast and then slow. And the asphalt mixture types, and cooling temperature differences have little effect on the constraint action of unbound aggregate layer. The coordinated deformation between unbound aggregate base layer and asphalt mixture overlay can be realised by particle contact recombination, the inwardly extruded movement, loose on both ends and the middle compaction. Theoretical support for the research of low temperature crack resistance of graded macadam base asphalt pavement was recommended by him.

4. AN EXPOSE OF THE STATE OF CYCLING IN SOUTHAFRICAN CITIES: INSIGHTS FROM THE CITY OF JOHANNESBURG - B Risimati, University of Venda

- He presented that cycling has received increased attention around the world in recent decades due to its environmental, economic, social, and health benefits. Cities, such as Johannesburg, have started to promote cycling as a smart and green mode of transport and are adopting policies to encourage cycling as a daily mode of transport. In his study, the state of infrastructure, and the promotion of accessibility and mobility for cycling in the City of Johannesburg were investigated. Interviews were held with various experts in transportation in the City of Johannesburg. Records from Strava Metro derived spatial patterns, and trends and GPS tracked the spatial and temporal coverage of cycling activities. The ArcGIS Pro was used to spatially analyse the geographical location information. Geospatial modelling Environment applications jointly with map algebra and spatial analyst functions were used to calculate the descriptive statistics of cycling patterns and trends. The results indicate that the locations with no cycling infrastructure have limited to no cycling activities. In the inner-city area, the existing cycling lanes are cold zones for cycling and as a result, motorised transport modes are currently using the cycling lanes. Spatial observations reveal an increase in the number of cycling activities in townships. The results of his study could be beneficial to policymakers in identifying the main barriers and motivators for the public to promote cycling. His study concludes that the City of Johannesburg has many opportunities to improve infrastructure for non-motorised transport, following the recommended coherent efforts of planning for sustainable and stimulant non-motorised transport. He presented his topic and challenges that he is facing in the study. The audience gave him good advice on where to source information. The University of Pretoria have access to different platforms to assist him.

5. WIN-WIN ACHIEVEMENTS ON TRANSPORT AND INFRASTRUCTURE DEVELOPMENT HAND BY HAND ON CHINA-AFRICA COLLABORATIONS – Y Wang, SACTCC

- He presented that for technologic development and applications between South Africa and China, the most important issue is to mutually understand to achieve the win-win circumstance for two sides. The effective mode was to hold the technical seminars and co-operative forum.
- From July 2002 Presenter and his team organized the 1st South Africa-China Transport Infrastructure Technology Forum during the SATC. Then for the 2nd to 5th the South Africa-China Transport Technology Forum were held under the SATC which was guided by Prof. Alex Visser of the University of Pretoria.
- Between 2007 and 2013, the SACTCC mainly promoted the MLS in the Chinese Transport Technology Forum held in Beijing, Shanghai, Shenyang, Nanjing, Changsha, Xi'an, Taiyuan, Jinan, etc. The technical activities strengthened the understandings from the Chinese research institutes, universities and consulting forms.
- The Chinese authorities realised the South African advantages on APT and MLS gradually. The above relationship on academic and commercial aspects made obvious achievement between South Africa and China.
- In 2013, the African Union announced the African Development Agenda 2063. It directed the new movement for the African continent. In the meantime, it was a good opportunity to promote the technologic relationship between Africa and China.
- In 2014, Prof. Wynand Steyn of the University of Pretoria invited the SACTCC to host the China-Africa Transport Co-operation Forum at the SATC 2014, which focused on the North-South Corridor Development in Africa with the Chinese partners.
- In 2015, the China-Africa Transport Co-operation Forum themed as the three priority transport networks' development hosted by the South Africa-China Transport Co-operation Centre (SACTCC) based in Pretoria, South Africa under the SATC. From the deep and close interactions, African institutions and Chinese partners had achieved the successful relationship for the academic and business co-operations.
- In 2016, Prof. James Maina of the University of Pretoria chaired the SATC. The 3rd China-Africa Transport Co-operation Forum was held under the SATC. The Forum promoted the Johannesburg Summit and the Action Plan (2016-2018) of the Forum of China-Africa Co-operation (FOCAC) which was organised by the African Union and the Chinese government.
- Then from 2017 to 2019, the 4th to 6th China-Africa Transport Co-operation Forum, continued to hold under the SATC, which were led by Prof. James Maina. The number of the Chinese delegates and speakers attended the forums and achieved the tangible achievements between Africa and China, especially the China-Africa Transport Strategy Research Institute (CATSRI) has been knotted between the University of Pretoria, SA and Chang'an University, China which published papers, student essays and bi-lateral programmes.
- During the same period, 2017 to 2019, the presenter with the South African and the African colleagues travelled to China and attended the 1st to 3rd African Transport Infrastructure Forums held in Beijing, which were under the World Transport Convention (WTC).
- In 2020, Covid-19 interrupted the normal ways for face-to-face communications. The 7th China-Africa Transport Co-operation Forum was held virtually with the Annual Conference on SETMI co-hosted by the SETEA (Southern Africa-China SET and Education Association) and the SAAE (South African Academy of Engineering).
- In 2021, the SATC used online mode. The 8th China-Africa Transport Co-operation Forum followed the SATC's rule to communicate with the African and Chinese attendees virtually.

- . In 2022, the 9th China-Africa Transport Co-operation Forum adopted the hybrid mode which the representatives from South Africa and Mozambique attended in person. The Chinese delegates used online and pre-recording backup. It was successful for establishing the further relationship under the win-win principle.
- . In 2023, the 10th China-Africa Transport Forum and Maglev/High-Speed Trains at the SATC 2023.
- . The SATC is a win-win platform for the transport and infrastructure fields. It has been a professional flagship between Africa and China.

Afternoon session – Maglev & High-speed trains
Session Chair Mr William Dachs - CEO of Gautrain

6. HIGH-SPEED RAIL STUDIES IN SOUTH AFRICA - G de Beer, AIH Econogistics

- . Mr de Beer gave feedback on the latest developments in the Gauteng to Moloto high-speed line and Gauteng to Limpopo High-speed line. No progress has been made in recent years. The Gauteng to Limpopo high-speed corridor might be a more viable option if it can be linked to the North-South corridor. The presentation was concluded with a video where China is set to test a 1000km/h ultra-high-speed-maglev train under a controlled environment. The train combines maglev technology with low-vacuum technology. One of the key benefits of high-speed trains is the impact that it has in reducing emissions on a large scale.

7. THE FUTURE OF HIGH-SPEED RAIL IN SOUTH AFRICA - T Kgobe, Gautrain

- . Mr. Kgobe presented the future expansion programmes of Gautrain in Gauteng. The expansion could include the corridor from Gauteng to Limpopo up to SADC via Musina. The Gautrain stretches into areas with no train infrastructure and improve public transport for the people of South Africa.

8. PROPULSION ENERGY CONSIDERATIONS FOR RAIL APPLICATIONS IN SOUTH AFRICA - C Snyman, Electric Vehicles & Solar Energy

- . Mr Snyman illustrated the impact of hydro energy on the transport market. It was clear that it is an expensive option, and that Hydrogen is highly explosive. On the rail, Hydrogen tanks need to be positioned on the locomotives. It might be an option to investigate corridors with various kV lines and high theft activities.

9. HIGH-SPEED RAIL DEVELOPMENTS - Mr G Me, China Railway Rolling Stock Corporation (CRRC)

- Mr. Me highlighted the importance of high-speed trains in China and the benefits thereof. High-speed trains have the 40 000 km and are currently ranked number one in the world. The key advantages of high-speed trains are:
 - Large transport capacity
 - High safety
 - Punctuality of trains
 - Limited land utilisation
 - Lower energy conception
 - Lower emissions
 - Latest technologies
 - Different configurations of passenger units

Conclusion

- The session was well structured, and all presentations were completed in the allowable time
- It is clear from the High-speed presentations that there is a need for young professionals to get involved.
- The sessions create a platform to open a platform for new innovations to take South Africa forward.

Recommendation

- Establish a small research group at the Universities.
- Allow students to do research on high-speed train infrastructure (Civil Engineering, Mechanical Engineering and Electric Engineering).
- Call for papers on high-speed trains.

MARITIME

Session 3D, Wednesday, 12 July 2023

Session chair and convenor: Mr. Tebogo Mojafi, SAMSA

The session had diverse maritime presenters from public and private institutions like SAMSA, Transnet National Port Authority, Port Regulator South Africa. This also included participants from the maritime industry such as Heron Marine, Sustainable Seas Trust Africa, Moses Kotane and Mnambithi Group. International presenters came from institutions such as the Intergovernmental Standing Committee on Shipping (ISCOS), Dublin City University in Ireland and United Nations Conference on Trade and Development (UNCTAD). Six of the presenters were female. It is also worth noting that five of the participants (four presenters plus chair) are alumni of the World Maritime University.

1. MARITIME INDUSTRY REGULATED FOR SUSTAINABILITY - K Selokane -Maja, Heron Marine

- . The crux of Ms Selokane-Maja presentation was on the sustainable development of the maritime sector, highlighting the need for transformation and increased black participation in the maritime industry. The engagement highlighted the need for the country to recognise that presence of competition, the need to address the long-standing tax regime challenges including the need for a comprehensive maritime strategy.

2. SOUTH AFRICAN SHIPS REGISTER PROMOTION - S. Bhengu & L Mudau, SAMSA

- . The presentation detailed the legislation on Ship Registration and various initiatives that are being considered and introduced by the Republic to encourage ship owners to register their vessels under the South African Ship register. SAMSA will be launching the South African Ship Register Strategy with a detailed Promotion Plan aimed at promoting the country's ship register with the intent of achieving economic growth and job creation for South Africans. The presenters also highlighted incentives such as income tax exemption and Port Dues discounts being offered to South African registered ships, concluding that more work still needs to be done to grow the Ship register.

3. MARITIME GAME CHANGERS IN SOUTH AFRICA - K Ngubane, Mnambithi Group

- . The presentation highlighted the developments and vision of the Mnambithi group, a wholly black owned group with a focus on Mining, Terminals and Maritime. The presenter highlighted the funding, the rationale on the technical and project consisting of two vessels, including their contribution to the country's infrastructure development and job creation. With their motto of source, ship and storage, the company aims to be a meaningful contributor to the country's maritime industry.

4. TNPA PORT DEVELOPMENT PLANS - K Khumalo, Transnet

- . The presenter highlighted the CAPEX projects estimated at approx. R13bn over the next five years that TNPA is pursuing through the Port Development Framework Plans (PDFP) including renewable energy and desalination plants. This ranged from the provision of LNG import facilities for Richards Bay, Ngqura and Saldanha Bay in the Short and medium term, optimisation of land usage for maritime commercial activities such as waterfront development, developing the Port of Durban into a regional container hub as well the relocation of the SA Navy. Other changes are related to upgrades to road and rail infrastructure to address the port efficiency challenges.

5. RETHINKING TRANSPORTATION, PLANNING AND BUILDING RESILIENT SYSTEMS TO MEET GLOBAL EXTERNALITIES - N Nkowane, Ports Regulator of South Africa

- . This presenter highlighted the mandate of the Ports Regulator which included providing a balance between reducing the cost of doing business and ensuring a sustainable Port Authority. Acknowledging the challenges faced by the port community such as operational inefficiencies and competition, the presenter argued that there is a need for collaborative and intentional approach to ensure that the South African ports can meet current and future challenges. There is also a need to communicate positive messages based on the work that is being done in the port environment.

6. THE IMPLEMENTATION OF TRADE SINGLE WINDOW SYSTEM, THE CASE OF KENYA - M I Mwajita, The Intergovernmental Standing Committee on Shipping ISCOS

- . With the IMO having announced that the single window system is coming into effect in January 2024, the presenter shared lessons learnt from implementing the KENTRADE single window system. The challenges experienced by the Kenyan port and shipping community and the applicable solutions that were developed were shared with the conference.

7. THE PLIGHT OF THE SOUTH AFRICAN SEAFARER - L Grimett, Moses Kotane Institute

- . The presenter highlighted that lack of training berths and ships to provide employment opportunities are some of the challenges facing seafarers. For nations to place their seafarers, they need to offer the shipping sector more than skilled labour. The presenter argued for the need for an integrated maritime development plan, with collaborative stakeholders. This would need increased investment in training and government understanding and meeting the needs of shipping companies.

8. BEST PRACTICES FOR ABANDONED, LOST AND DISCARDED FISHING GEAR IN AFRICA - D Marlin, Sustainable Seas Trust Africa

- . The presentation highlighted the impact of fishing gear on the sea ecosystem which gets disturbed by human actions. There is a need for human intervention to deal with lost and ghost gear. To further analyse and develop solutions, there is a need for data, which is a huge challenge for African studies. The presenter also highlighted some of the work done at various levels to try address the issue, as well as making a plea to organisations and countries to participate and focus on this subject.

9. MARKET-BASED MEASURES FOR INTERNATIONAL SHIPPING: SUPPORTING AN EFFECTIVE AND EQUITABLE TRANSITION - G Dominioni, Dublin City University

- . The presentation dealt with the potential of market-based measures to assist in shipping decarbonisation and potential carbon revenues from shipping. The presenter focused on the use of market-based instruments highlighting the benefits thereof, including how the revenues that can be collected could be potentially used to support equitable transition. This also included discussions on whether these revenues could be used in or out of the maritime sector.

10. THE POTENTIAL IMPACT ON STATES OF TECHNICAL AND ECONOMIC MEASURES ON IMPLEMENTING THE IMO GHG STRATEGY - J Hoffmann, UNCTAD

- . The presentation provided a comprehensive methodology followed in modelling the economic impact on States. The presenter highlighted the need to decarbonise shipping and that this will come at a cost which impacts States differently. There are opportunities brought by decarbonisation and the investors need certainty to unlock the required investments. When adopting technical measures, there is also a need to assess the impact on States and to note that insufficient investment in decarbonisation will lead to greater cost impact.

Recommendations

1. Development and implementation of a comprehensive maritime strategy incorporating collaborative stakeholder participation, investment, capacity building and transformation.
2. There is a need for collaborative focus on maritime decarbonisation and environmental pollution.

The maritime session featured speakers from government departments like SAMSA, Department of Forestry Fisheries and the Environment (DFFE) and Moses Kotane Institute (MKI), as well as International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), universities, independent experts, and international companies from countries like Kenya, the United Kingdom, Madagascar, and Europe.

The maritime session was streamed live, with online presentations, as well as face-to-face. Representing academia, government and industry, females constituted 60% of the presenters. As such, the maritime section presentations were interesting, diverse, and highlighted the current issues in the maritime industry.

AVIATION WORKSHOP

Session 3E, Wednesday, 12 July 2023

Session chair: Mr Jon Heeger, GWI Aviation

Convenor: Dr Bridget Ssamula, ECSA

Civil Aviation Institutional Framework

- The Chicago Convention of 1944 - ICAO, IATA, and national CAA's
- Freedoms of the Air and Bi/Multi-lateral air service agreements
- African Aviation: The Yamoussoukro Decision and the 2018 SAATM:
- Civil Aviation Structures in SA
- National Policy: National Transportation Policy and The Draft White Paper on Civil Aviation Policy, 2017 - ***What is the Current Status of the White Paper and the NADP?***

Discussion outputs:

South African aviation policy should look at how it can promote SAATM and foster an environment where the aviation industry can compete fairly. The Domestic market is crucial. How do we deregulate the South African Aviation space

Industry Trends, Technologies, and Challenges that the white paper policy should address:

- Adoption of New Technologies – Aircraft, ATC, Systems.
- Airport Infrastructure to support New Technologies: Power generation /re-charging, Lower carbon footprints and RPAS support.
- Growing Emphasis on Environmental and Socially sustainability: ICAO 2050 Zero -Carbon footprint for aviation.
- Effective Regulation of Remotely Piloted Aircraft.
- Integrating Public and Private Sector Airport Services.
- Acknowledging new approaches to Spatial Integration: Aerotropolis, Airport City and Airport Urbanism models.
- Inter airline co-operation and multiple designation of rights.

Disruptors in aviation that need to be planned better:

- Resilience of the aviation industry - Post Covid-19
 - Impact on Tourism, public sector, and business travel (remote working).
 - Impact on infrastructure development plans.
- New technologies: E-commerce, drones, compact cities, new generation freight forwarders, etc.
- Demand side disruptors
 - Higher demand price elasticity, convenience, demand for point-to-point services and schedule flexibility.
- Supply side disruptors:
 - Shortage of seats, regional airlines dominating the market, drone commercialisation and small cargo aircraft.

The Challenges and opportunities for airport development summarised:

1. ACSA	<ul style="list-style-type: none"> • ACSA represents the State's primary investment in airport infrastructure. • ACSA dominates the airport space in SA (95 % scheduled traffic, 80% coverage).
2. Municipal Jurisdiction	<ul style="list-style-type: none"> • Constitution devolved functional authority for non-ACSA airport to Municipalities. • Municipal Systems Act does not classify airports as Basic Municipal Services. • They are therefore 'institutional low priority' assets and struggle for funding.
3. Specialized Function	<ul style="list-style-type: none"> • Municipalities do not have the resource skills and experience to sustainably run airports. • Low scale of operations in relation to high life cycle costs is challenging.
4. Quo Vadis GA?	<ul style="list-style-type: none"> • ACSA increasingly less accommodating of GA (various reasons) – noncore, especially at the larger airports.
5. Covid & Other Lessons	<ul style="list-style-type: none"> • Covid-19 and other recent crises show that GA Airports play a key role in regional sustainability. They provide important connectivity, help law enforcement and emergency services, and stimulate growth through integration at an effective scale.
6. New Institutional Models	<ul style="list-style-type: none"> • New models are being implemented that allow effective private sector participation in development and operation of municipal airports. • Risk transfers compliant with MSA, MFMA and Treasury regulations. • Effective integration into local spatial plans and community projects. • Environmental compliance. • Economic and Financial sustainability through optimal aerodrome planning and accommodation of mixed land-use strategies.

Airports as a sustainable business case financial performance

- Income sources for most airports
 - Aeronautical: Passenger service charges, landing fees and parking fees.
 - Non-aeronautical: Retail, parking, advertising, freight and logistics developments, and commercial property development/development leases.
- ACSA: Aeronautical: Non-Aeronautical – about 50:50 and small regional airports: not as high (80:20 usually).
- Non-aeronautical revenues difficult to sustain at low traffic airports (often location driven).
- High operating/compliance costs even at small volumes (compliance).
- Because ACSA charges are regulated – establishes the market for other airports.

Overall discussion and concern areas for government to consider:

1. Capacity building within the aviation industry to cover gaps.

- Airport design and operations planning courses at tertiary universities don't exist except for one or two course units that covers overview.
- ATNS training academy to sell services more broadly to attract more individuals interested in the more specialised form of aviation training.
- Brain drain taking place as the domestic market struggled during Covid-19, and SAA and Comair shut down requires reinvestment of a pipeline.

2. National Department of transport considerations

- Build a database of the aviation professionals to assist and engage with during the policy development process.
- Finalise the development of more resilient aviation policies that will guide air transport development in South Africa in a more competitive way.
- Recognise the role and growth of regional carriers over international carriers.

INTEGRATED PUBLIC TRANSPORT NETWORKS

Session 4A, Thursday, 13 July 2023

Session chair and convenor: Mr Madumetja Moselakgomo, University of Johannesburg

The annual session for the National Treasury Cities Support Programme focused on sharing information about public transport. It covered topics like operations, finance, and legal issues, and had local and international attendees. Presentations were given by speakers who submitted papers and invited speakers.

1. A TOTAL SOCIAL COST APPROACH TO PUBLIC TRANSPORT PLANNING IN SOUTH AFRICA - M Nkosi, SMEC South Africa

- When planning transport infrastructure and service, it's important to consider social, environmental, and financial factors. The Total Social Cost (TSC) approach considers all of these, resulting in a more sustainable public transport mode, even if it's not the cheapest option. Choosing based on direct costs alone can lead to unsustainable cities, so TSC offers a more inclusive approach.

2. FUNDING OPTIONS FOR IPTN INFRASTRUCTURE AND SERVICES - N Matebese, DBSA

- Public transport systems often struggle to generate income to cover operating and capital costs, creating a financing challenge for many cities. The DBSA can finance public transport infrastructure projects, while government institutions provide funding. Public-private partnerships can help finance public transportation while mitigating demand risks. Revenue guarantees and caps are necessary for success. PPPs have worked for Bus Rapid Transit projects and should be extended to other modes, such as minibus taxis. The DBSA's Transforming Transit South Africa project aims to transform the taxi industry's business model - stakeholders can partner with DBSA to create a success story for the future.

3. PROPOSED METHODOLOGY FOR OPTIMISING THE SECONDARY NETWORK OF A CITY IN DEMAND – A Singano, CSIR

- This paper discussed the use of the travelling salesperson problem (TSP) method to design a secondary public transport network by minimising the total distance travelled. Despite its limitations, the paper has shown that it is essential for planners and researchers to investigate novel approaches to optimise public transportation.

4. RUSTENBURG RAPID TRANSPORT: PROGRESS, CHALLENGES, AND INNOVATIONS ON THE IMPLEMENTATION OF THE IPTN - O Moleele, Rustenburg Local Municipality

- The Rustenburg Rapid Transport operations finally kicked off after some lengthy delays. The IPTN project implemented new ideas, such as using surrendered mini-bus taxis as part of compensation, fitted with automated fare collection. The city also conducted marketing campaigns to promote the project, and a new ticketing system was commissioned in partnership with SANRAL to track unscheduled MBTs and improve route design.

5. INTEGRATION OF MIDI-BUSES INTO THE GAUTRAIN SERVICES: GAUTRAIN PARTNERSHIP WITH THE MINIBUS TAXI INDUSTRY – L Mathebula, Gautrain Management Agency

- Through partnerships with the taxi industry, the Minibus Feeder and Distribution Service (MFDS) offers first-and-last-mile transport services for Gautrain passengers. Its nine routes, covering a 5-10km radius from stations, have made a remarkable impact socially, environmentally, and economically. With close to 600k passengers transported in 2022, MFDS is a powerful force for the success of the Gautrain system.

6. LESSONS LEARNED FROM EVALUATING OPTIONS USING MULTI-CRITERIA ANALYSIS IN TWO CORRIDORS WITH THE CITY OF JOHANNESBURG - M Nkosi, SMEC South Africa

- This paper discussed the use of Multicriteria Decision Analysis (MCDA) to evaluate Integrated Corridor Management options for transport corridors in Johannesburg. The main lesson is that when creating criteria, it is important to consider unique challenges in the study area. The MCDA helps evaluate trade-offs between options for each corridor.

7. NLTA AMENDMENT BILL: LEGAL ASPECTS OF THE NLTA - M Mabece, Bulumko Law Advisors

- The presentation highlighted the Integrated Public Transport Network (IPTN) definition change from the National Land Transport Act to the National Land Transport Amendment Bill. The new definition clarifies what makes up an IPTN and expands the requirements for transport infrastructure.

8. MANAGING THE TRANSITION FROM NEGOTIATED VEHICLE OPERATOR CONTRACTS TO COMPETITIVE BIDDING PROCESSES - P Grey, Pegasys Strategy and Development

- The paper reflected on possible outcomes after 12-year contracts end and identified critical factors for managing the transition. A worst-case scenario is discontinuing services due to grievances, leading to violence and unaffordable public transport. This scenario should be avoided by, for example, training the incumbent in tendering for government contracts.

Key inputs from participants were as follows:

- Cities should use the total social cost approach in planning IPTNs for sustainable and cost-effective public transport systems.
- Include the taxi industry in transport financing discussions and develop taxi ranks into economic hubs.
- TSP is not ideal for optimising public transport routes as it doesn't consider important factors like traffic, distance, and accessibility. Collaboration was suggested to improve TSP and account for these factors.
- Participants praised Rustenburg IPTN's progress at the conference and suggested that all cities attend the SATC IPTN workshop. The multi-modality of the IPTN was also appreciated.
- Gautrain's partnership with mini-bus operators was successful, but it's unclear how. A detailed report on their website and peer-learning platform could help share the model with other metros.
- The success of the MCA hinges solely on the expertise and proficiency of the working team and city officials, as they are the exclusive parties involved.
- Transport professionals and officials should understand the NLTA Amendment Bill and related laws. More workshops and training should be offered, possibly by the Department of Transport, as part of capacity building.
- The government is taking too long to enact the Amendment Bill. The Bill needs to be prioritised by Parliament to address current issues.
- Incumbent operators must participate in the tendering process for government contracts. The process can incorporate the incumbency factor to avoid disrupting services, which would hurt lower-income users who rely on them. The city does not provide training for this.
- General comment by a participant: The future of transportation planning can be significantly enhanced by establishing a specialised bachelor's programme and a professional body for registration. We must work together to make this a reality.
- The ministry should encourage all cities to participate in this annual peer learning workshop for IPTNs. This event presents a fantastic opportunity to share knowledge and gain valuable insights from one another.
- The NLTA Amendment Bill promises to offer legal solutions to some challenges facing public transportation. The parliament is encouraged to fast-track and prioritise its approval to address the most pressing issues effectively.

URBAN MOBILITY

Session 4B, Thursday, 13 July 2023

Session chairs and convenors: Dr Megan Bruwer, Stellenbosch University and Prof Roger Behrens, University of Cape Town

The Urban Mobility session, on Day 4 of the conference, started with a set of papers that explored the impacts of COVID-19 on travel behaviour patterns and transport operations. The weight evidence reported indicates that COVID-19 has had a lasting impact on travel behaviour, but this impact is small, and smaller than many predictions. These papers were followed by papers concerned with travel behaviour and travel choices, and the measurement of accessibility. The session concluded with a set of papers that explored the prevalence and role of bicycle transport in a selection of Sub-Saharan African countries.

WOMEN IN TRANSPORT

Session 4C, Thursday, 13 July 2023

Session chair: Ms Nqobile Mhlanga

Convenor: Ms Mavis Mhlanga-Mochadibane,

This session was the fourth annual SATC Women In Transport workshop, due to high demand. Women In Transport is dedicated to women who are involved in the transport sector. The aim is to create a platform for sharing the experiences of women, specifically those who are leaders in transport operations, management, and research in the public and private sectors. The purpose of the discussions was to highlight gender-specific issues in the sector and celebrate women who are emerging as disruptors, those who dare to break the mould and serve as beacons of inspiration in the transport sector.

Keynote speaker: Logashri Sewnarain

Logashri Sewnarain is a senior level Professional Engineer and Project and Construction Management Executive with over 25 years' experience in the management of high-level infrastructure projects in South Africa and abroad. Logashri is the first female to hold the titles of CEO and Functional General Manager of Roads and Highways within SMEC South Africa and was the first female in the positions of President of the South African Road Federation and Regional Manager for SANRAL.

**Nine presentations were delivered at the workshop.
A summary of each presentation is provided in the following sections:**

1. PIONEERING REGIONAL CHANGE - N Moloto, Tsa Afrika

- Ngwakwana Moloto is an advocate for positive social change and risk lead at Tsa Afrika Resources and Projects. The presentation focused on risk management for SMMEs and the different mechanisms required to assist entrepreneurs with their day-to-day functions. Questions from the workshop were related to the risks that the government faced in providing public transport and assisting women. Multi-level governance, the inability to plan across all tiers of government and limited budgets were mentioned as risks for women empowerment and service delivery improvements.

2. DIALOGUES FOR GENDER-INCLUSIVE MOBILITY IN CAPE TOWN **- AG Newlands, FB Grosse-Weischede and MJWA Vanderschuren, University of Cape Town**

- . FB Grosse-Weischede and MJWA Vanderschuren both co-presented the paper. In both developed and developing countries, the mobility and freedom of movement of women is significantly affected by the design and layout of the public spaces they utilise and travel through. It is within these spaces that a large amount of, often unreported and unaddressed, sexual harassment occurs. The engineers responsible for developing these public spaces are often unable to adequately include a gender perspective in their designs.

3. THE UPSKILLING OF FEMALE CIVIL ENGINEERS AT 8 SOUTH AFRICAN METROS **- B Jonsson, SA Road Federation**

- . Basil Jonsson is the current Operations Director of the South African Road Federation which is a Non-Profit Company. He has worked in various technical roles in the Southern African Road Construction and Civil Engineering industry since 1980. Basil has served as a director of the Global Road Safety Partnership South Africa as well as the South African Bitumen Association, and the Road Safety Partnership South Africa. He was awarded the South Africa Road Federation President's award for 2022 for outstanding service to the Road Sector in South Africa.

4. TRANSPORTES LALGY IN SOUTH AFRICA - C Lalgy, Transportes Lalgy

- . Transportes Lalgy is a leading Mozambican company specialising in transportation services across the SADC region. With over 30 years of experience, we excel in sectors such as mining, earthmoving, transport, warehousing, and projects. Our strategic locations in Mozambique enable efficient operations and secure cargo delivery. Mr Cassamo painted a picture of how Lalgy supports women in their organisation. The session attendees were willing to hear and learn about young women in business.

5. SHE CAN: A TOOL TO EMPOWER DECISION MAKERS TO ADDRESS SEXUAL HARASSMENT IN PUBLIC TRANSPORT IN SUB-SAHARAN AFRICA **- TE Lane-Visser and MJWA Vanderschuren, University of Cape Town**

- . Dr Tanya Lane-Visser is currently a Postdoctoral Fellow at the Centre for Transport Studies at the University of Cape Town. Her research centres around the development and application of decision support tools and systems. Data analytics is a core competency and passion of hers. The paper they presented was inspirational and video clips were exceptional. The SHE CAN tool is the final output of the EMPOWER project, a two-year long coordinated research programme engaging with passengers and stakeholders across Africa to understand the prevalence of harassment in formal and informal public transport networks. This approach has successfully developed an evidence base that justifies acting and assists policymakers to develop an informed approach.

6. HOW WOMEN USE SOCIAL NETWORKS TO NAVIGATE “INFORMAL” PUBLIC TRANSPORT SYSTEMS: A COMPARATIVE CASE STUDY OF TSHWANE AND KAMPALA - G Ankunda, S Harvett and L Mokoma, University of Pretoria

- . Genevieve Ankunda is an advanced master’s student at the University of Pretoria and a transportation, climate change, and sustainable development researcher at the Partnership on Sustainable Low Carbon Transport. Her research interests include transportation and environmental justice, transport modal integration, public transport user satisfaction, and novel transport data collection tools. What they identified as the problem; is that in the face of the above challenges and limitations; Women and men experience travel differently and should therefore transport planning should be intentional to accommodate the needs of both genders.

7. CROSS-BORDER ROAD TRANSPORT AGENCY - Z Msibi, CBRTA

- . Zamasibi Msibi works for the Cross-Border Road Transport Agency also known as CBRTA. She presented the externalities and market failures of doing business across borders and to explain the projects that the Agency is doing to empower women, youth, and differently-abled individuals in this uncertain economic market. Cross-border Road Transport Agency facilitates connectivity and logistical movement from South Africa to the other Member States.

8. HOW TO BUILD RESILIENCE BY CREATING A STRONG BRAND AND IMPLEMENTING A PRO-ACTIVE COMMUNICATION PLAN - C Larkin, CVLC Communications

- . Catherine Larkin is an accredited public relations professional (APR) and a Chartered Member of the Chartered Institute of Logistics and Transport (CIMLT), The world has changed. Crises and disruptions are becoming part of our daily lives. Natural disasters, conflicts and wars, economic downturns and supply chain disruptions.
- . Her presentation was focused on organisations who weather this constant onslaught on our resilience – and grow stronger? The answer is simple: Communicate - consistently and often, reaching the hearts and minds of your stakeholders. Communication is a strategy, and when done correctly, it can shift behaviours and mindsets and help keep us at our best.

PUBLIC PRIVATE PARTNERSHIPS WORKSHOP

Session 4D, Thursday, 13 July 2023

Session chair and Convenor: Ms Laverne Dimitrov, DBSA

This was the 3rd session on Public Private Partnerships and the focus was two-fold. Firstly, panel discussions were held to obtain a view on showcasing the business models that were developed and implemented between the minibus taxi (MBT) industry, commerce and the public sector and proposals on digitisation of the paratransit sector. Secondly papers were delivered on innovative funding mechanisms for large public transport projects.

Panel 1:

South Africa is about to have a first minibus that will be electrically charged. The aim is not only to grow a sustainable or green economy, but to stimulate growth in the informal as well as informal sectors. The electric minibus taxi will have a driving range of 200 kilometers, with slow and fast charging facilities. The seating capacity of the vehicle is about 15 passengers, and a major benefit of this vehicle is a saving of 45% in operating costs.

In tandem there will be the development of the world's first public electric minibus taxi charging facilities in Bergzicht Taxi rank.

This facility will:

- Be the first of its kind
- Support the operation of 60-80 e-MBTs
- Facilitate clean public transport in Stellenbosch
- Catalyze the development of more charging facilities
- Create job opportunities for the local population
- Be powered by surplus solar energy

More followed on the regulatory reform and the ethics of rolling out a government supported QR code system in the minibus taxi sector. It involves the design, implementation and maintenance of a Regulatory Data System (i.e., an Integrated Analytical Toolbox and Data Warehouse), with a supplemental data collection survey component, in support of the three major Planning Authorities within the Gauteng Province, as well as to guide regulatory change in support of minibus taxi (MBT) transformation.

The discussion on presentation on South Africa's minibus-taxis - a collaboration between government and private sector broadened our understanding of the work currently in hand. In 2021, the Industrial Development Corporation of South Africa (IDC) formulated and executed its Automotive and New Energy Vehicle (NEV) Value Chain Strategy. The strategy aimed to facilitate the industry's shift towards NEVs, promote decarbonization in the automotive and transport sectors, and identify prospects for localized production and value addition throughout the supply chain, including components and battery minerals. The South African Just Energy Transition Investment Plan (JET IP) also recognizes the significance of decarbonizing the transport sector to meet nationally determined climate (NDC) targets while sustaining the local manufacturing base for automotive and transport equipment.

The NEV transition encompasses various segments such as the traditional OEM supply chain, Machinery & Equipment, Last Mile Delivery, Public Transport, associated infrastructure, and the battery value chain. Each segment has unique drivers for adoption, such as EU legislation prohibiting internal combustion engine vehicle (ICEV) sales from 2035 or considerations of ESG and shareholder value. Some segments require upfront investments in infrastructure, while others follow project/business development pathways to introduce vehicles and infrastructure. Additionally, certain segments will witness the convergence of Green Hydrogen Fuel Cells, battery technology, and renewable energy. For financiers, this emerging growth sector offers short, medium, and long-term opportunities and linkages to other value chains, but it also poses challenges related to adoption, investment in infrastructure, building new capacities, and valuation models.

SIYAPHAMBILI, pre-paid taxi system, a reflection of a successful case study

Developed from the ground up, the overarching cashless fare collection system involves no vehicle adaptations and is essentially a cloud hosted ABT system based on QR code technology, and the use of an Android supported mobile phone app (i.e., the Siyaphambili App) – the 11MB App, which is typically downloaded and installed via the Google Play Store onto the mobile phone. It is instructive that the design of the Siyaphambili App ('the App') has been optimized to enable its use even on one of the lowest-priced mobile phones available at PEP Stores. For the system to function properly, the MBT owners are required to use the Siyaphambili website to onboard themselves along with all the relevant information in relation to their respective vehicles and drivers. Once completed, the system generates a unique QR code for each vehicle, which is printed on four stickers that are issued.

Innovative funding mechanisms for public transport

Public transport (PT) projects drive economic development through improved labour mobility and development opportunities. However, the costs of these projects can be substantial and usually rely on national grant funding. This paper explores mechanisms for leveraging the benefits of PT projects to unlock innovative funding sources and alleviate pressure on grant funding. PT infrastructure improves the accessibility of land, which increases its rental and capital values. These increases usually accrue to existing owners / developers, but government can share in the profit through partnership with the private sector. International and local examples demonstrate how this land value capture (LVC), or Transit Oriented Development (TOD) can be used towards the costs of PT projects. Hong Kong's Mass Transit Railway demonstrates LVC's potential to subsidise and even turn a profit on PT investments. Despite the difference in context, there is potential for LVC in South Africa. Property values in Gautrain-served nodes have increased more than those in unserved areas, indicating the potential for LVC in future station development. Similarly, PRASA and MyCiTi have partnered with developers to build their stations in exchange for development rights in station precincts. While the income from LVC initiatives will not replace grant funding, it can alleviate pressure on the fiscus.

Road funding options: a case study of how Gauteng can cover the 14.1 billion Rand e-toll debt

The announcement of the scrapping of e-tolls on the roads of Gauteng is celebrated by most motorists. Most media houses labelled this scrapping of e-tolls a victory for SANRAL debt sage. The decision taken left the Gauteng provincial government and national government with a debt of 47 billion, which will be split into a proportion of 30/70. Moreover, the decision also means that the Gauteng provincial government will cover the cost of maintaining its 201km and associated interchanges of roads. This is a scholarly research paper that examines possible ways that the Gauteng provincial government can exercise to cover off the 14.1 billion rand and continue to maintain good roads. During his speech, the Minister of Finance, Godongwana, posited a possible solution of existing tolling and new tolling. The researcher in this scholarly paper examines the solution given and looks at other road funding options such as private partnership, donation, fuel levies, overloading fines, and road advertisements used all over the world.



SATC 2024

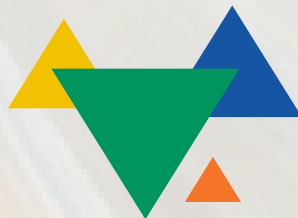
The 42nd annual SATC will take place at the CSIR ICC in Pretoria from 8 to 11 July 2024.

The theme of the conference will be:

“Upskilling and reskilling the transport industry for current and future challenges”.

The Minister of Transport is the patron of the annual SATC.

As patron, the Minister is invited to open the conference on Monday, 8 July 2024.





*Southern African
Transport Conference*

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THE 42ND ANNUAL
**SOUTHERN
AFRICAN
TRANSPORT
CONFERENCE**

Report to Minister of Transport

**Upskilling and reskilling
the transport industry for
current and future challenges**