CSIR SMART MOBILITY

The CSIR's Smart Mobility cluster addresses challenges and opportunities associated with transport and freight logistics; transport equipment; transport infrastructure; and passenger transport services in support of different industrial clusters.

science & innovation
Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA

CSIR
Touching lives through innovation

ABOUT THE CSIR

The Council for Scientific and Industrial Research (CSIR) is a leading scientific and technology research organisation that researches and develops transformative technologies to accelerate socioeconomic prosperity in South Africa.

The organisation's work contributes to industrial development and supports a capable state. The CSIR is an entity of the Department of Science and Innovation.

The organisation plays a key role in supporting the public and private sectors through directed research that is aligned with the country's priorities, the organisation's mandate and its science, engineering and technology competences.

Industry advancement clusters

- Advanced Agriculture and Food
- Next Generation Health
- Future Production: Chemicals
- Future Production: Mining
- Future Production: Manufacturing
- Defence and Security

Industry and society enabling clusters

- Smart Places
- Smart Mobility
- Next Generation Enterprises and Institutions

CSIR SMART MOBILITY **OVERVIEW**

CSIR Smart Mobility addresses challenges and opportunities associated with transport systems and operations, transport infrastructure engineering and smart logistics in support of industrial and sustainable development.

CSIR SMART MOBILITY **STRATEGIC INTENT**

The CSIR, through its Smart Mobility cluster, seeks to improve the efficiency, safety, cost and reliability of transport networks to minimise the cost of doing business and to improve quality of life. This is done through modelling, experimental designs, development of digitalisation solutions and laboratory tests. The cluster also works with other role players to contribute towards increased local content in the tools and infrastructure used along the transport value chain, such as road building materials, rail and port infrastructure and vehicles.

CSIR Smart Mobility solutions can add value to South Africa's transport system, which is ordinarily characterised by structural backlogs that include excessively high transport costs, and backlogs in infrastructure provision and maintenance. The digitalisation of the transport system can improve the life-cycle management of assets such as public transport vehicles, ports, railways and roadways. This is especially effective when supplemented with improved measurement of decision drivers for households, passengers, various state actors, shippers and investors.

CSIR Smart Mobility provides the following offerings:

1. **Experimental work** to assist with the appropriate measurement of various mobility concepts and business models such as mobility-as-a-service, travel demand management and collaborative logistics. The CSIR is investing in a fully fledged transport safety laboratory to help improve the management of transport safety risks. These investments are over and above the already world-class laboratories for road building materials and the physical modelling of port infrastructure.

2. **Road, rail and port or coastal engineering** to optimise the use of limited resources to support the establishment of effective, efficient and sustainable transport networks to support socio-economic development.

3. **Development of technical capacity with partner organisations** in the form of appropriate norms and standards, customised training, staff exchange programmes and dissemination of information.

ENVISAGED **IMPACT**

CSIR Smart Mobility measures its impact through the market adoption of its models, technologies, materials and various methodologies within the transport value chain. The cluster evaluates its contribution toward a capable state as well as industrial development.

Enabling an efficient, effective and integrated transport and logistics sector

- High-performance sustainable, safe transport infrastructure
- Efficient transport networks
- Freight transport (integrated logistics)
- Passenger transport
- Smart roads and port infrastructure
- Digital transport networks

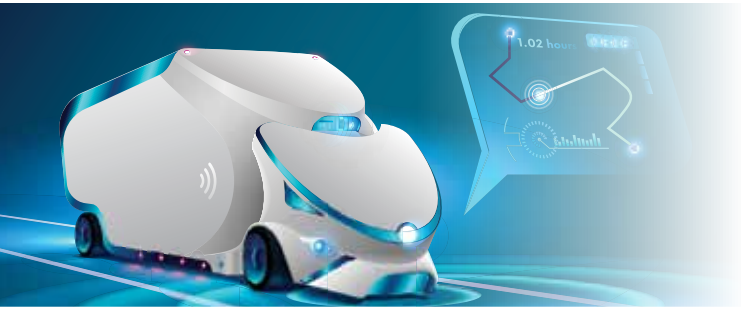
CSIR CAPABILITIES IN SMART MOBILITY

The organisation acts as a source for smart mobility technologies with applications aimed at growing the economy. The building blocks of the cluster are transport systems and operations, and transport infrastructure engineering.

Transport systems and operations focuses on transport asset management systems, public transport systems design, road safety, and freight logistics operations management.

Transport infrastructure engineering research focuses its research activities on developing engineering solutions for the design, construction, maintenance, and management of transport infrastructure assets.

SMART MOBILITY **RESEARCH AREAS**



SMART ROADS

The CSIR is contributing to the development of sensor technology and context-appropriate road building materials to reduce the life-cycle costs of roads. In this regard, the CSIR has invested in world-class laboratory infrastructure and personnel.

Work is also being carried out to improve the climate resilience of road infrastructure.

END-TO-END LOGISTICS

The CSIR invests in the development of methods and technologies to enhance the measurement, prediction and management of the multimodal flow of consignments and associated decisions in the supply chain.

EFFICIENT AND SAFE PASSENGER TRANSPORT

The CSIR invests in the development of methods and technologies to facilitate efficient and safe movement of people and goods in the transport network.

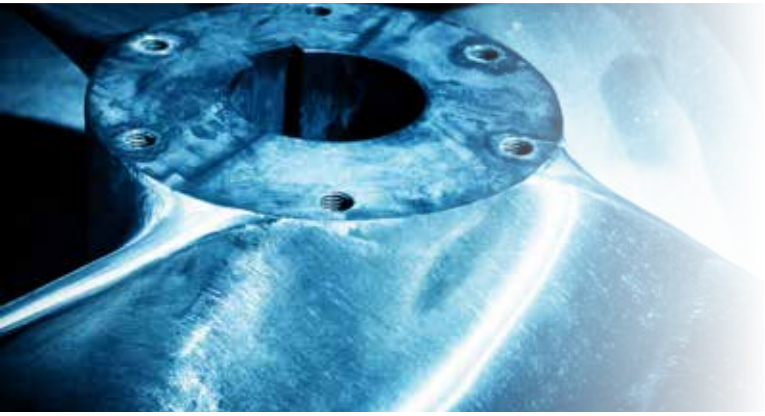
SMART TRUCKS

The CSIR's work in this area of specialisation supports the freight transport industry by providing electro-mechanical and digital analytical solutions for productive operation of heavy vehicles.

INTELLIGENT PORTS

The CSIR's work focuses on transforming port terminals into 'intelligent ports', a process in which operational technology and information technology are integrated to model operational and infrastructure design alternatives.

This includes the development of systems that enable real-time recommendations and control for optimum berthing, planning, landside operations as well as the scheduling of manpower and quayside equipment.



COASTAL ENGINEERING AND PORT INFRASTRUCTURE

The CSIR's coastal engineering and port infrastructure group, situated in Stellenbosch, focuses on research in the marine and coastal domain. This includes port layout and ship manoeuvring optimisation through physical and numerical modelling, the assessment of structures (breakwaters, quays, revetments and groynes) using the latest techniques and the development of decision-support systems to aid ports in operations and safety. The group also has the capability to undertake marine surveys and data collection in support of projects related to marine construction (ports and harbours, marinas and pipelines). The group manages and operates the largest physical hydraulic modelling facility in Africa, enabling physical model tests of marine structures, as well as ship motions and ship manoeuvring to be conducted using innovative technology developed by the group.

SMART MOBILITY **RESOURCES AND CAPABILITIES**

ADVANCED ROAD MATERIAL TESTING LABORATORIES

The Advanced Road Material Testing Laboratories is fully equipped with resources and capabilities to improve road design and construction that contribute to longer lasting durable smart roads.

CSIR Smart Mobility laboratories are well renowned for conducting tests on road-building materials and engineering needs whilst impacting the design and development of sustainable roads.

Our laboratories

- Bituminous Binders Laboratory
- Asphalt Preparation Laboratory
- Dynamic Testing Laboratory
- Granular and Cementitious Laboratory
- Mechanical Workshop

HEAVY VEHICLE SIMULATOR

The CSIR's heavy vehicle simulator (HVS) is a mobile laboratory used by decision-makers and road builders to apply and monitor the effect of 20 years of simulated traffic to a road section in a few months. It supports the validation and fast-tracking of novel technologies, and improves our understanding on how road construction materials and road structures respond when subjected to environmental and traffic loads. HVS testing is used both locally and internationally to support the development of new design standards and specifications for road infrastructure.

TRANSPORT SAFETY LABORATORY

Driving is an ordinary task, undertaken by ordinary people every day. A driving license constitutes a symbol of freedom. But with this freedom comes a risk and a responsibility to manage that risk for the driver, passengers and other road users. Human error is the most significant contributor to road traffic crashes in South Africa. The CSIR is addressing this problem by establishing a transport safety laboratory that uses naturalistic driving studies, amongst others, to digitally model human factors contributing to the carnage on South African roads.

COASTAL AND HYDRAULICS LABORATORY

The laboratory has been serving South Africa's ports and coastal engineers for over 50 years, through:

- Modelling of the environmental impact on ports and coastal structures.
- Modelling of rivers, estuaries and dams.
- Modelling of moored and manoeuvring ships.
- Wave fore- and hindcasting, wave diffraction, refraction and reflection modelling.

MOBILITY DATA COLLATION

Our collected and collated datasets are used to improve the planning and management of transport networks. We also continue to invest in more cost effective ways of collecting mobility data.

OUR **FOOTPRINT**

Projects are undertaken locally and internationally. CSIR experts frequently participate in projects and initiatives **continentally**.

- Botswana
- Ethiopia
- Ghana
- Kenya
- Malawi
- Mozambique
- Namibia
- Rwanda
- South Sudan
- Tanzania
- Uganda
- Zambia

Internationally with:

- Argentina
- Australia
- Bangladesh
- Chile
- India
- Myanmar
- Nepal
- United Arab Emirates
- United States of America

and with **multilateral organisations**:

- European Commission
- UK Aid
- United Nations

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