STRIA Roadmap on Connected and Automated Transport (CAT)
Road, Rail and Waterborne

December 2020

Connected and automated transport (CAT) technologies can contribute to increasing the efficiency and safety of the transport system. They can improve traffic flows, optimise infrastructure and public transport use, and foster multimodal transport solutions.

In general, CAT can support the competitiveness of European transport manufacturing, telecom and IT industries in international markets, and enable the development of new passenger and freight services.

CAT poses a number of challenges for all transport modes. These include the development of technologies of hardware and software, vehicle infrastructure, data communication and decision-making levels, as well as validation of these technologies and the real-world testing in individual mobility, passenger and freight transport.

In road transport, the interaction of drivers, passengers and other road users with automated vehicles has to be understood and addressed in the engineering process. The long life-expectancy of rail rolling stock and infrastructure, the differences in legacy systems and the diversity of operational rules in various European countries may slow down the speed of deploying connected and automated systems.

While there has been an upsurge in automated, remote control technologies in waterborne transport, activities have mostly concerned testing, there has been few vessel deliveries using these technologies.

The Strategic Transport Research and Innovation Agenda (STRIA) Roadmap on Connected and Automated Transport 2019 builds on and further develops the research and innovation initiatives outlined in the 2017 STRIA CAT Roadmap. It explains the actions needed to overcome the challenges and gaps in CAT in the European transport sector.

These factsheets are available on the TRIMIS portal (https://trimis.ec.europa.eu), and aim at providing a summary of the main features and targets identified in each of the seven STRIA Roadmaps.
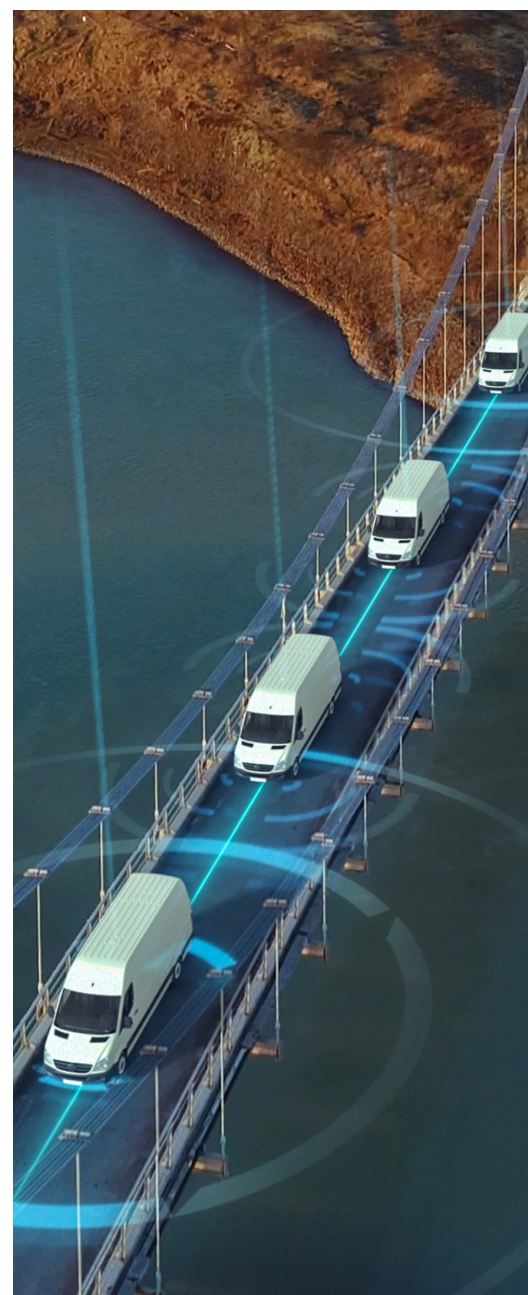
Current Developments

Many car and truck manufacturers are developing and rolling out vehicles with higher automation. An increasing number of European cars are already equipped with partial automation technologies, and the next step is the introduction of vehicles where the driver can choose whether to drive or not.

Automated trucks and truck platooning are being tested on motorways in Europe. User-friendly automated public transport concepts have been demonstrated. Connectivity enables and will further expand automated vehicle performance by making distributed information and big data accessible.

CAT technologies are already embedded in rail-bound transport such as metro systems, in some cities also automated driverless rail-bound systems can be found. However, due to a diversified European rail sector the implementation of CAT technologies is slow and lowers competitiveness.

The Strategic Rail Research and Innovation Agenda and related roadmaps for various parts of rail-bound systems as well as the multi-annual action plan of the Shift2Rail initiative address several aspects of automation and connectivity.

Ship automation is well advanced with most modern ships and vessels being equipped with systems such as target detecting radars, autopilots and track pilots using satellite positioning. Some autonomous ship demonstrations have been made, but technology is still on a low readiness level. Safety is a main area where automation is expected to provide improvements, such as further addressing the human factor.

Better data integration and improved monitoring will allow CAT to contribute to a competitive European shipping industry and improve security in the transport systems. However, digital connectivity is a prerequisite for further improvements to increase capacity and coverage.

Key Research and Innovation Pathways

The CAT roadmap focuses on actions that will develop technologies and support their swift deployment while ensuring the competitiveness of the European industry and enable potentially disruptive innovation that may lead to new transport services. This will provide a framework that contributes to the decarbonisation of the European transport sector allowing EU energy and climate targets to be met.

The roadmap indicates what needs to be done to close the gaps and seize the opportunities for CAT in Europe. The three modes considered in this roadmap, road, rail and waterborne transport, do not only have different spatial dimensions but also different technologies, physical infrastructures and human interaction, business and legal frameworks.

The concepts and approaches for the introduction of CAT, therefore, differ according to the mode. These differences are reflected in the thematic areas for each mode in the roadmap. The aviation is not explicitly covered, however it is taken into account for what regards cross-modal collaboration.

ROAD TRANSPORT

There are eight thematic fields for road transport:
1. In-Vehicle Enablers
2. Vehicle Validation
3. Large scale demonstration pilots to enable deployment
4. Shared, connected and automated mobility services for people and goods
5. Socio-economic impacts and user/public acceptance
6. Human factors
7. Physical and digital infrastructure and secure connectivity
8. Big data, artificial intelligence and their applications

RAIL TRANSPORT

1. Rolling stock enablers for remote control of train operation and autonomous train operation
2. Environment and operating monitoring
3. Large scale demonstrations to enable EU-wide deployment
4. Railway network information, management, maintenance and control
5. Socio-economic and environmental impacts – user/public acceptance
6. Human factors
7. Physical and digital infrastructure and secure connectivity
8. Big data, artificial intelligence and their applications
9. Safety

WATERBORNE
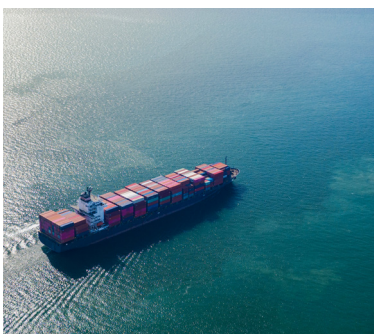
1. In-vessel enablers
2. Condition and operational monitoring
3. Validation and large-scale demonstration to enable deployment
4. Electronic information exchange and certification
5. Socio-economic impact of CAT
6. Changed working conditions
7. Physical and digital infrastructure
8. Big data, artificial intelligence and their applications
9. Secure connectivity

Strategic Transport Research and Innovation Agenda

The Strategic Transport Research and Innovation Agenda (STRIA) outlines future transport research and innovation priorities to decarbonise the European transport sector.

STRIA is one of five interlocking dimensions set out in the Energy Union strategy that provides a framework to achieve EU energy and climate goals. It supports the vision of a clean, connected and competitive European transport system.

In coordination with Member States and transport stakeholders, STRIA aims to set out common priorities to support and speed-up the research, innovation and deployment process leading to radical technology changes in transport.

STRIA builds on and integrates seven thematic transport research areas:

- Connected and automated transport (CAT);
- Transport electrification (ELT);
- Vehicle design and manufacturing (VDM);
- Low-emission alternative energy for transport (ALT);
- Network and traffic management systems (NTM);
- Smart mobility and services (SMO); and
- Transport infrastructure (INF).

STRIA is also the interface between other relevant sectors such as energy and information and communication technology.

About TRIMIS

The Transport Research and Innovation Monitoring and Information System (TRIMIS) supports the implementation and monitoring of STRIA and its seven roadmaps.
TRIMIS is the analytical support tool for the establishment and implementation of STRIA, and the Commission's instrument for mapping technology trends and research and innovation capacities in the transport field, as well as monitoring progress against the targets set for all the transport sectors.
TRIMIS is an open-access information system to map and analyse technology trends, research and innovation capacities, as well as monitor progress in the transport sector.

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