> Moving people and goods

Developing integrated mobility and logistics to promote quality of life and prosperity

acatech POSITION PAPER – SUMMARY AND RECOMMENDATIONS

acatech
NATIONAL ACADEMY OF SCIENCE AND ENGINEERING

Mobility is one of our basic needs as human beings. It provides us with independence, allows us to express our individuality and enables us to enjoy a full social life and participate actively in society. We need mobility to do our shopping, for example, and it is therefore essential for trade and supplying people with the goods they buy. Goods transport, production and trade are also facilitated by logistics. Efficient logistics networks are key to securing economic growth and enabling Germany's export trade to do business on the international market. The German logistics industry is worth 222 billion euros and employs 2.8 million people, making it the country's third largest industry. Logistics is also a high-tech business with enormous market potential both nationally and internationally.

Mobility and logistics promote prosperity and quality of life

Mobility facilitates the physical movement of people between places. Logistics encompasses the planning, management, optimisation and implementation of material, energy and information flows in systems, networks and processes. It supplies manufacturing facilities with the materials they need and disposes of their waste products whilst playing an equally important role in distributing goods for the retail and service industries. In addition to the transport, transfer and storage of commodities, goods and information, logistics is increasingly also providing value-added services such as customer-specific packaging, installation or information management.

Quality, reliability and efficiency in mobility and logistics

Mobility and trade inevitably give rise to traffic and it is important to ensure that this traffic flows freely. For many years now, the volume of passenger and freight traffic in Germany has been on the increase, partly because of trends such as urbanisation, but also as a result of the rise in global trade. In addition, the rapid growth of e-commerce is generating a huge rise in the volume of individual deliveries and this is placing new demands on the logistic chain. In today's world, mobility and logistics also need to respond to new challenges such as the protection of our natural resources, energy efficiency and climate protection.

Mobility and logistics services and transport infrastructure should be judged on how well they meet society's requirements. Some of the criteria we use to do this include the quality of the service, the reliability of the service even when the transport infrastructure is overloaded or affected by disruption, efficiency of service provision, the extent to which the service is sustainable and eco-friendly and its land use impact. Technological developments and political action are needed to ensure that we can continue to benefit from reliable and sustainable logistics and mobility in the future.

Adequate and reliable transport infrastructure is indispensable for securing quality of life and facilitating economic activity. Investment in the maintenance and expansion of infrastructure is therefore essential for the development of mobility and logistics going forward.

The need for technological developments

It is possible to provide individual services without sacrificing the economic advantages of economies of scope and scale, indeed this is becoming a requirement in order to protect the environment and save natural resources. The principles of the Internet of things and services are one of the keys to achieving efficiency in the delivery of individual orders, supplier relationships and mobility service provision.

As a result, more and more "smart logistics" and "smart mobility" systems are emerging, comprising networks of several small-scale

entities. These enable efficient and reliable organisation of transport between different locations ("door-to-door transport") and throughout the entire life cycle of goods (production-transport-storage-consumption-disposal).

The shift away from centrally controlled processes towards decentralised structures and decentralised processes that are adapted to these structures makes it possible to manage increasingly large and complex systems in logistics and especially in private and commercial transport. In order to deliver more efficient logistics and mobility, these processes need to be combined with new transport technologies that consume fewer natural resources, such as electric vehicles in urban settings. Other approaches include shared use of transport and logistics infrastructure (e. g. transshipment facilities, delivery journeys and goods collection systems) by businesses and service providers, as well as more effective traffic management. All of this requires both operational networking of everyone involved at the process level and collaborative business processes.

It is also necessary to make logistics and transport systems more robust, so that they are better able to cope with disruption, and more flexible so that they can be modified in the medium to long term. Real-time systems capable of recording events and status using Auto-ID and sensor technologies will allow early detection and location of any disruption to the system, thereby enabling a rapid response. Adaptable logistics infrastructure can be built using flexible and scalable material handling and storage technologies.

The need for political action

In order to achieve sustainable development of mobility, logistics and passenger and freight traffic, it is important to ensure close coordination with urban and spatial development and the development of industrial sites, commerce and trade locations, leisure facilities and social infrastructure. This will allow citizens to participate fully in society and businesses to continue operating whilst using fewer natural resources and causing less harm to the environment.

A shared approach to passenger and freight transport requirements is also essential in terms of the planning and operation of transport infrastructure. In order to ensure that tomorrow's needs will be met, integrated transport planning models are required that include both passenger and freight transport. Today's long-term planning procedures must be adapted to respond more flexibly and faster to new requirements with regard to public involvement and public-private design processes.

Different spatial structures require different logistics systems, services and infrastructure. Quality of supply, the range of logistics and mobility services and logistics and transport infrastructure therefore need to be analysed based on the specific characteristics of each location, taking into account all the relevant design alternatives. For this to be possible, we would need a publicly accessible or at least publicly run data platform that would provide the basis for the logistics and mobility infrastructure design process. The digital data platform would need to involve both public bodies and private providers or investors in the field of logistics and mobility. Consequently, acatech recommends the development of a new data collection and analysis tool that would enable integrated assessment of logistics and mobility both in towns and cities and at regional level. The key component of this analysis and management tool would be a digital logistics and mobility atlas. The idea is to create a comprehensive system of distinct indicators that could be used to gather information about the requirements, current status and impact of logistics and mobility services in different locations.

At a glance

- The key indicators for the future development of transport and mobility are quality, reliability, efficiency, eco-friendliness and land use impact.
- Passenger and freight transport requirements must be considered in an integrated manner in the planning, scaling, operation and management of transport infrastructure.
- acatech recommends incorporating logistics and freight transport development into regional and spatial planning processes in order to establish regional transport development goals and strategies.
- acatech recommends the introduction of a digital logistics and mobility atlas.
- Logistics businesses should increase the amount they invest in internal and external R&D.

RECOMMENDATIONS

> Better planning instruments

1. It is necessary to optimise specific capacities for passenger and freight transport. This is particularly important as far as rail transport is concerned.

2. Different modes of transport currently receive different treatment. The technical, regulatory and fiscal regimes should cover all the different modes of transport together in order to harmonise their treatment.

3. Regional transport development planning should take account of logistics and freight transport as well as passenger transport.

4. Future plans for transport policy measures should be complemented by incentives to introduce mobility and logistics innovations.

5. Better networking is required between public and private decision makers in the fields of mobility and logistics in order to realise the solutions that will be needed in the future, such as public automated parcel deposit and pick-up stations.

6. acatech recommends the introduction of a digital logistics and mobility atlas for towns and cities and at regional level. The federal government should support the design and development of this tool and facilitate the institutional and financial means needed to ensure comprehensive data collection, for example by forming an alliance with industrial enterprises. The digital logistics and mobility atlas initiative should be linked into existing initiatives such as the Freight Transport and Logistics Network (*Netzwerk Güterverkehr und Logistik*) or the Advisory Council on Spatial Development (*Beirat für Raumentwicklung*).

> Market/business models

7. Collaborative business processes and cooperation platforms should be promoted through incentive systems or model projects.

8. Local, regional and central government should create management tools to facilitate rapid implementation of innovative solutions in cities and municipalities (e. g. autonomous vehicles or underground transport).

9. Support should be provided for the export of logistics technologies and services, transport system solutions and traffic management strategies to Europe and the rest of the world.

> Promoting research and developing new technologies

10. Businesses involved in the logistics industry should make a significant and measurable contribution to internal and external research and development and pursue an active R&D strategy.

11. "Smart logistics" and "smart mobility" should receive greater priority in terms of government research funding. The key enabling technologies as well as integration and interoperability standards need to be developed as soon as possible. Qualification, professional education and training are important for the further development of the logistics and mobility sector.

12. It is necessary to promote the development and harmonisation of standards for information and communication processes and the standardisation of the technical components in logistics and passenger transport chains.

13. Model projects featuring innovative logistics and mobility solutions should be launched. They should aim to reach the widest possible audience.

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