France’s transport sector is the country’s second largest energy consumer and the biggest emitter of carbon dioxide (33% of the national total), with 80% of these emissions due to road transport. Cars account for 60% of urban journeys and 90% of journeys in peri-urban and rural areas. As for freight, 80% is transported by road. This system of mobility and of wealth production is based largely on private cars and trucks, with some public transport, and almost exclusively a single energy source, oil. It is highly effective in terms of accessibility and freedom, but less and less compatible with current challenges, particularly factor 4 (dividing French greenhouse gas emissions by four by 2050 in relation to 1990 levels), but also with the predictable evolution of our natural resources, our environment and our private and public budgets.

An integrated, multimodal approach to transporting people and goods

Following an initial roadmap focusing on daily passenger transport in urban and peri-urban areas and the last-mile routing of goods, this roadmap offers an integrated approach to logistics chains and passenger and freight transport systems in which the problems relating to both passenger and freight transport can converge, particularly in terms of information sharing and governance, together with better use of existing infrastructure. For travellers, it looks at occasional rather than daily transport, such as accessing health services and leisure and travelling on business. These systemic innovations will be based on existing infrastructure, making it more intelligent with better communication, improving the interfaces between modes of transport (for both passengers and freight) and developing new tools and methods for managing the system better from the viewpoint of citizens, businesses, local authorities and central government.

The group of experts assembled to work on the roadmap has incorporated international, European, French and local examples to illustrate different cases. A key interdisciplinary issue concerns the development of new forms of governance, as current methods for both freight and passengers do not meet the requirements. Four other issues have been identified: the logistics performance of a territory with its mobility and transport systems, universal access to services (health, leisure etc.) and to goods, exchanges of experience between stakeholders and managing demand for mobility for passengers and freight.

The experts identified two key parameters: the degree of consistency between different levels of governance (at institutional level and between institutional levels within a single territory), and the match between mobility options and needs (to enable people to access goods and services and to enable shippers to meet specifications in terms of economic performance and respect for the environment).

In the medium term (2020), the experts propose combining existing solutions (car sharing1, car pooling2, transferring freight to river and rail etc.) while transforming the activities of businesses (pooling logistics chains, developing management methods to access new mobility options such as telecommuting) and households (telecommuting, reorganising timetables, car pooling and sharing). Personal mobility assistants3 facilitate multimodal transport (using a series of different modes of transport) and enable the best mode of transport to be chosen in real time. These digital tools use public and private databases. The data covers the availability of different modes of transport, their occupancy rates, journey times, comfort, weather forecasts, locations of warehouses and delivery areas, pollution emissions etc. Different interfaces are designed for households, businesses and transport organising authorities.

More or less shared governance

The experts offer four contrasting visions of the situation in 2050 for long-distance passenger and freight transport. In the first, economic actors (transport authorities4, logisticians, shippers5 and transporters) influence transport systems for passengers and freight, with no consideration for the needs of other actors, citizens or professionals, who, along with public bodies, have no access to performance indicators (incorporating data such as cost, travel time, environmental performance etc.) and cannot optimise their choices. Multimodality is partial or total in certain dense urban territories but weak in neighbouring rural areas, with no coordination or shared governance. Manufacturers offer custom solutions, logistics chains are not pooled and land use planning is not optimised. The use of private vehicles and heavy goods vehicles remains dominant. France’s logistics performance has regressed. An energy crisis would have a major impact on the tourism and leisure sectors but also on vulnerable households.

Conversely, in a second scenario, the public transport authorities and private logistics players have built a mobility system that is consistent from the local to the European scale and between urban and rural territories for both freight and passengers. A united logistics structure has emerged. However, this system takes little account of users’ needs. Consequently, interoperability is high but not necessarily very attractive, solutions are not necessarily suitable for requirements and are rarely optimised and business models are not necessarily profitable. Private vehicles remain very widely used. Similarly, data is shared at the level of the system’s governance but users do not have access to it.

Data more or less accessible

In the third scenario, full account is taken of users’ needs but there is little consistency between different territorial levels and between players, who do not coordinate their activities. The system is not optimised, especially at national level. Transport solutions are diverse, effective and interoperable
within certain territories, but not between territories. Public and private data is accessible in many towns, sub-regional divisions (départements), regions and at national level. Many performance indicators are available both for passengers and for shippers or manufacturers. Users and non-governmental organisations develop tools to optimise the system. Citizens offer services suited to their needs and even try to give structure to standards and arbitrate in certain choices. The lack of overall governance penalises major investment, arbitration, infrastructure modernisation and global performance.

Finally, the last vision of the future incorporates wide access to public and private data and consistent, coordinated governance taking account of mobility and logistics needs. Authorities are set up to organise transport, limiting the use of cars, promoting alternative solutions and informing users about their environmental characteristics to minimise impact. They also arbitrate in decisions between freight and passenger transport. The solutions available meet the majority of citizens’ and businesses’ needs, even in the least densely populated regions; they consist of robust and flexible multimodal services. Some manufacturers build transport ecosystems (e.g. electric), managing the vehicle fleet, charging infrastructure and energy networks. Logistics companies work together, pooling their infrastructure and building a national structure. Citizens have all the information they need about the true performance and cost of the various mobility solutions, using them wisely and making well-informed product choices thanks to personal consumption assistants who inform them about products, making comparisons.

**Towards digital decision-making tools**

Modifying our mobility systems and logistics chains requires us to overcome several obstacles in terms of technology (shortage of tools to help make the best choices, lack of methods to optimise the operation of infrastructure, materials handling solutions for transferring freight between different modes of transport, the need for a global approach to standardisation), organisation (to facilitate access to data, guarantee services, ensure that databases and tools are consistent, develop multi-criteria tools), socio-economics and culture (to innovate, respond to consumers’ sometimes contradictory requirements, pilot innovative systems in particular areas etc.).

The group of experts has identified eight research priorities, from applied research into logistics chains to experimental research into how actors exploit new information. They cover:

- data access and interoperability,
- developing and piloting digital expert tools,
- optimising the operation of logistics platforms,
- developing new mobility (or immobility\(^6\)) solutions,
- developing optimisation tools for households and businesses,
- improving the rules of governance,
- developing personal mobility, consumption and delivery assistants,
- developing collaborative platforms.

The needs for research, demonstrators, platforms and trials involve four key steps:

- access to and use of multimodal data to manage infrastructure, traffic and flows,
- the development of support tools suited to the needs of different actors (mobility centres, personal mobility assistants, urban management and consumption tools, delivery assistants, intermediary tools etc.),
- the development of new mobility solutions (car sharing, carpooling, transport on demand\(^7\), self-service vehicles, teleworking centres, grouped deliveries, multimodal logistics platforms etc.),
- grouping these elements into an integrated multimodal mobility system with high energy and environmental performance.

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6. Immobility includes contact via social networks such as Facebook, telecommuting, dedicated workspaces for use between meetings, flexible-use centres or third places.  
7. Public transport service where passengers are generally picked up at their home, subject to booking.