



Put innovation first

Innovation management at
Die Autobahn GmbH des Bundes

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1. Summary

Die Autobahn GmbH des Bundes (Die Autobahn of the German Federal Government, in short: Die Autobahn) assumed overall responsibility for the planning, construction, operation, traffic management, maintenance, financing and asset management of all motorways in Germany on 1 January 2021. This means that decades of experience from the 16 federal states are being combined, while new technological developments will be used to shape a modern and innovative company. This will lead to even safer, more efficient and more sustainable transport routes.

A significant contribution to this goal is to be made by the development, testing and rapid implementation of new as well as proven technologies and business models with an innovative character for our motorways.

Die Autobahn has set itself the goal of further increasing the usability, safety and sustainability of the motorway network, motivated by advanced developments in the fields of renewable energy, digitalisation and climate protection. The innovation strategy of Die Autobahn provides the basis for this work.

In order to bring our founding principles – faster and more efficient planning, building, operation and maintenance – to life, we support innovative approaches in road surfaces, structural engineering, intelligent traffic systems and efficient operation. We want to design an infrastructure of the future that enables the use of new forms of mobility and renewable energies, offers greater safety for employees and users and supports the introduction of new business models. We are innovative when we modernise our products and processes or introduce completely new procedures.

We want to take advantage of these new opportunities, seize any resulting challenges and create a 'pro innovation' environment in cooperation with our employees and the economic, science and political sectors. To do this, we must be equally transparent with positive and negative findings.

With a wide range of innovations, we offer comprehensive solutions for the motorway of the future, because efficiency, safety, climate protection and sustainability are our top priorities.



2. Megatrends affecting Die Autobahn

As one of the largest infrastructure operators in Germany, Die Autobahn's strategic development takes into account global sustainability trends, the increasing demand for individual mobility and digitalisation.

We recognise the opportunities presented by changes in climate protection as well as in the transport and energy sectors. We want to use technologies of the future to contribute the ongoing improvement of our core tasks.

Our goals and ambitions go beyond current state-of-the-art technologies. In cooperation with scientific findings, we can enter new areas and thus fulfill our social responsibility.

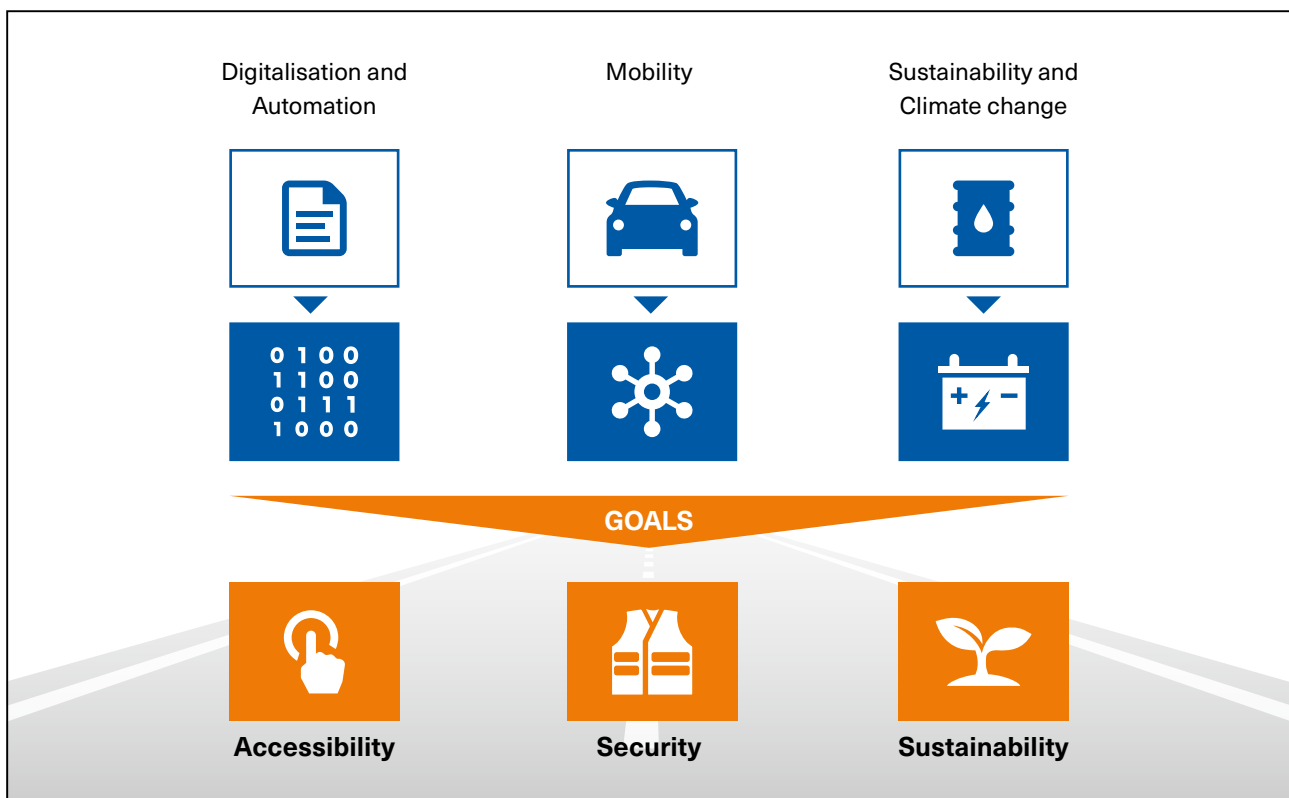


Figure 1: relevant megatrends for Die Autobahn

3. Guidelines

Improvements can only be achieved through trusting, transparent and cooperative interaction. In addition to the ability to innovate, strategically relevant concepts are cornerstones for a modern, sustainable and safe motorways. In addition to creativity, development and testing, innovative capacity includes their rapid implementation in our key tasks. To achieve this, we take three approaches:

- At the centre of our focus are the users and employees, who can expect an efficient and safe infrastructure with uniform quality standards nationwide. In addition to the realisation of the goals of the federal highway reform – faster and more efficient planning, construction, operation and maintenance – uniform nationwide business management tools are to be implemented.

- On the basis of a comprehensive technical and economic evaluation, we decide on the implementation of innovations for the entire network. In doing so, we use reproducible, transparent and fair evaluation methods, taking into account various regional experiences.
- Applicable innovations reach us through targeted internal and external cooperation as well as through active network management. After a technical review, we make our nationwide and long-standing expertise, as well as existing infrastructure, available for the further development of innovative approaches.

A successful interaction of these factors creates an optimal framework for the identification and implementation of innovative projects.

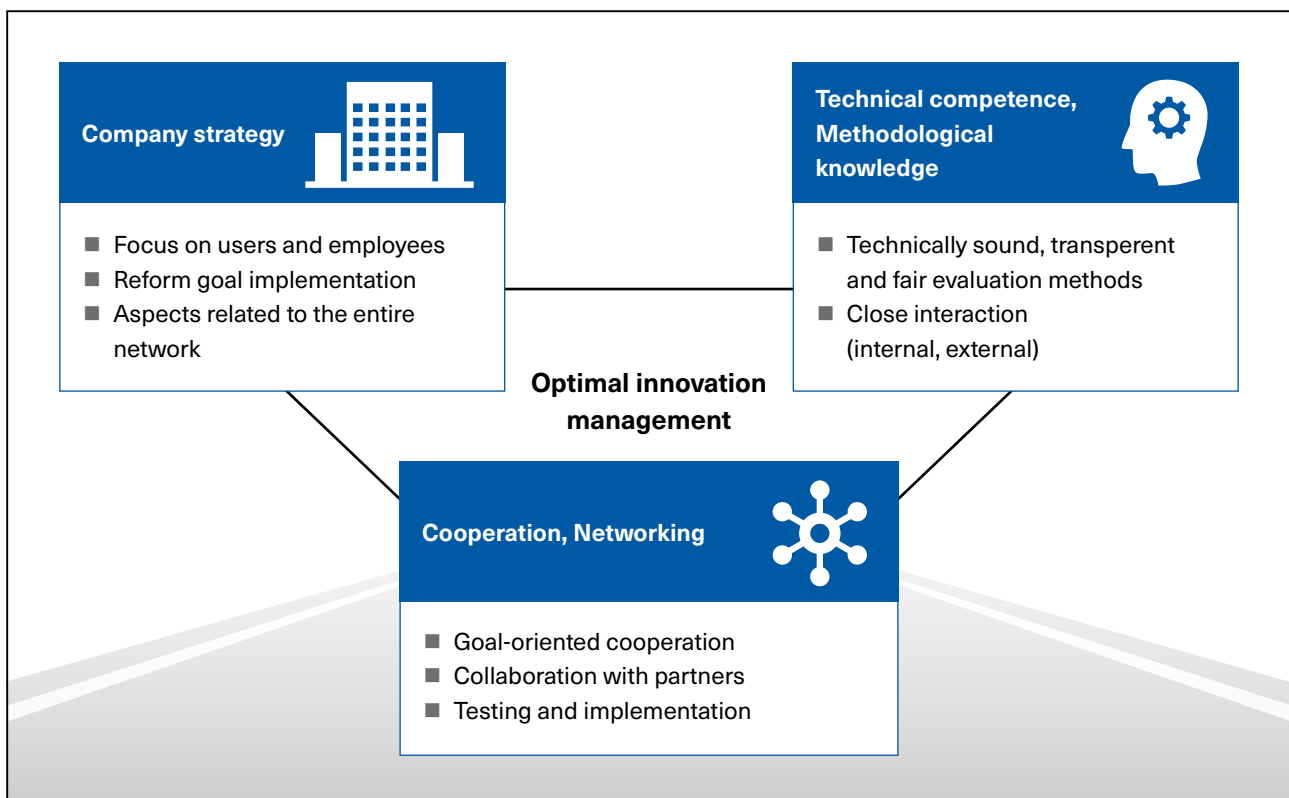
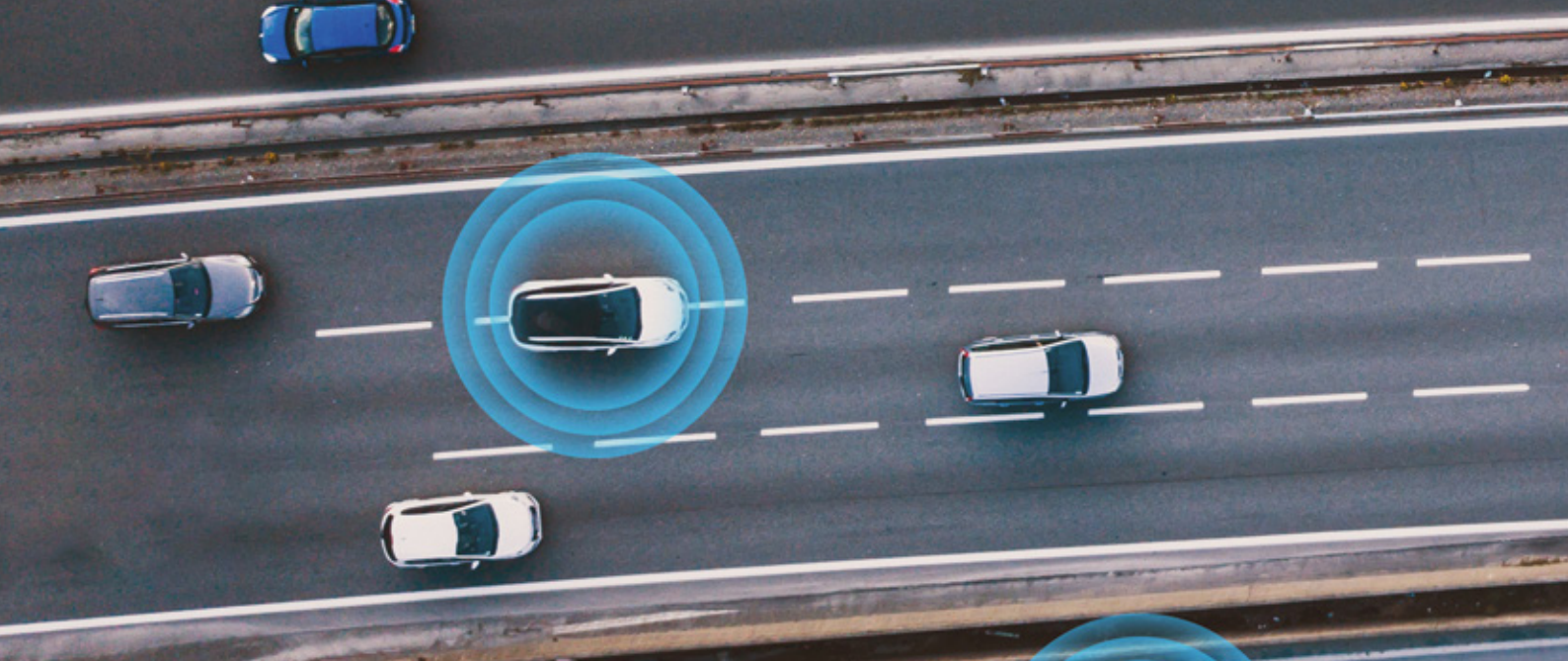


Figure 2: Guidelines for the promotion of innovation



4. Innovation strategy

Cooperation within and outside the organisation enables a constructive selection and outside the organisation of innovations. To this aim, we want to establish interfaces and a structured network. Existing knowledge, the experience and maximal interconnectedness of our employees and the resulting bundled skills enable the achievement of our long-term goals. Innovative ideas

are to be jointly designed, developed and evaluated at Die Autobahn and actively promoted in innovation projects.

4.1 Innovation goals

Forward-looking ideas can be developed, pursued and implemented in many different ways. An important requirement is the definition of clear goals that enable measurable improvements in different areas.

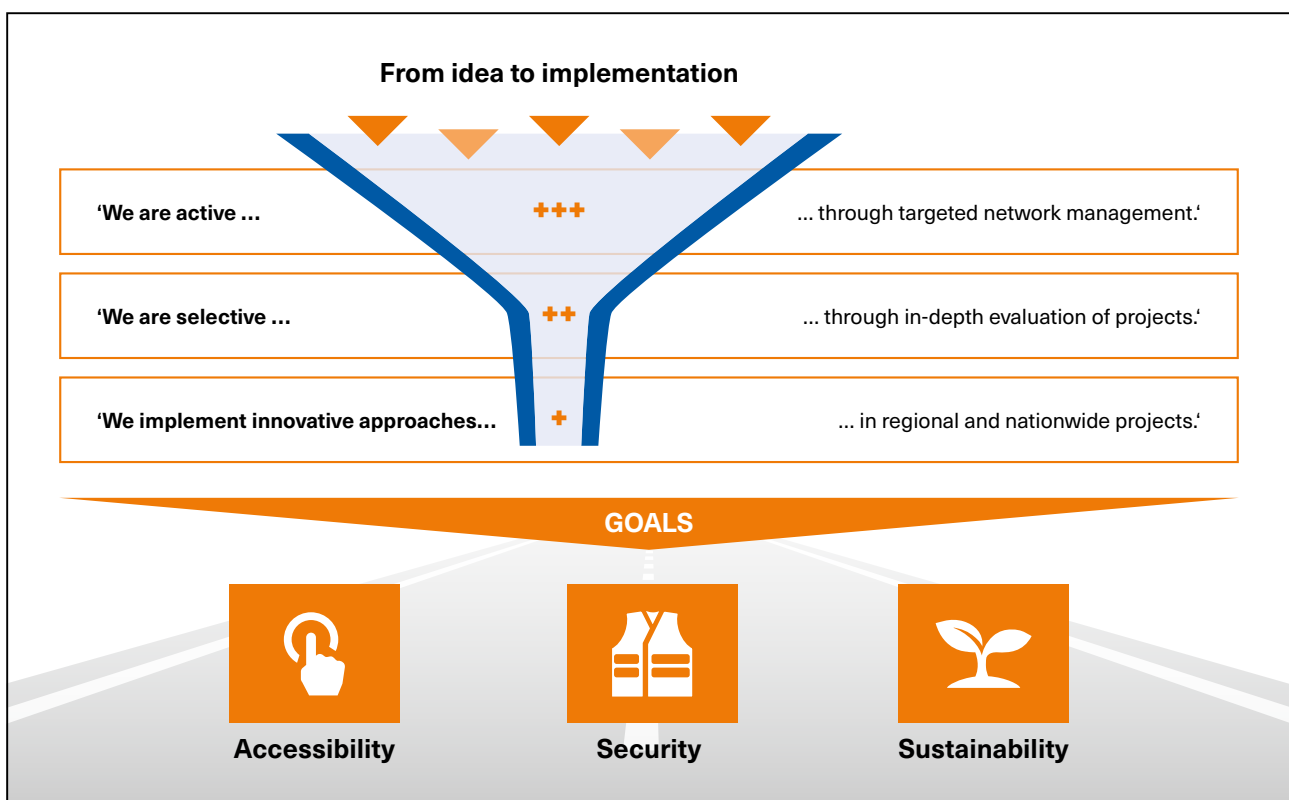
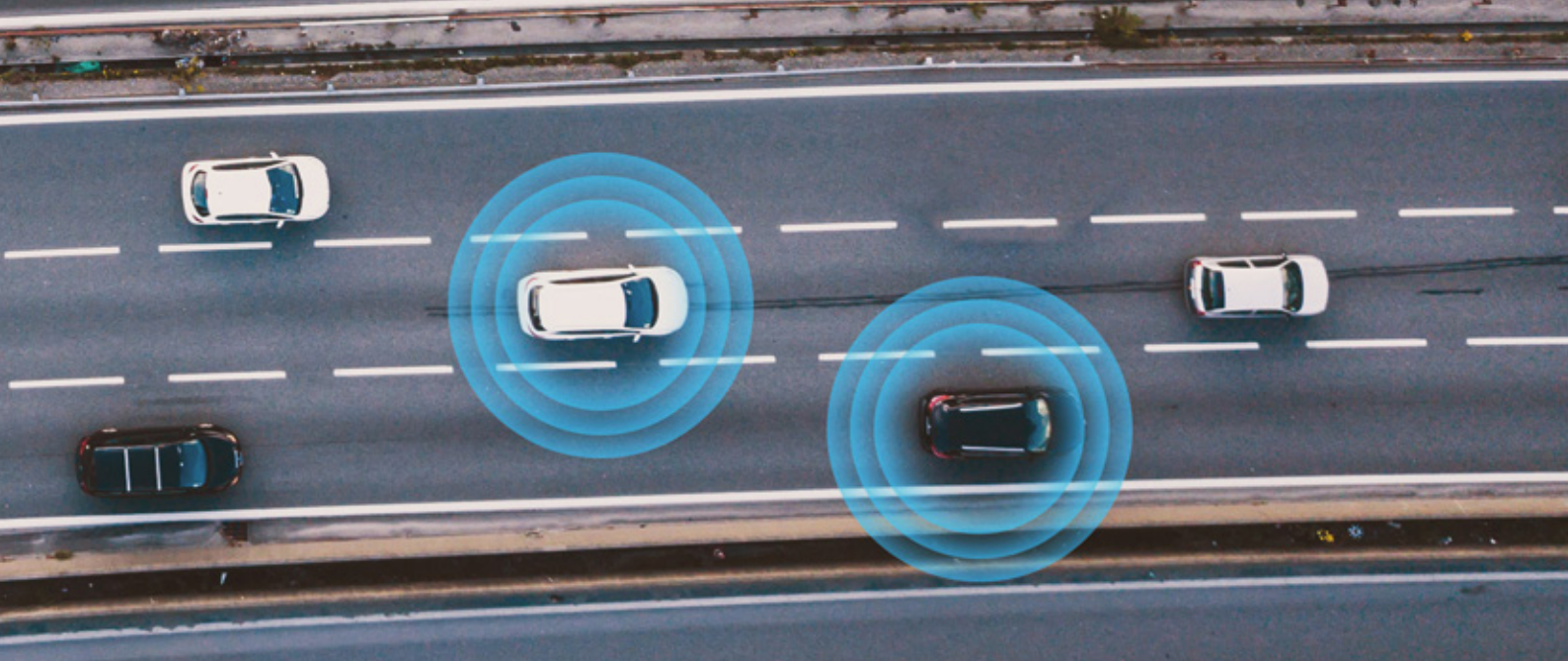


Figure 3: Innovation strategy



Digital technologies can improve the quality of planning and construction processes, as well as optimise operational procedures.

- A sound and modern infrastructure is imperative for the accessibility of the motorway network in order to guarantee users the best possible mobility and performance.

- Safety will continue to be our top priority in the future. Efficient traffic control in potentially dangerous situations will be expanded in order to increase road safety.

- Building autobahns in a more resource-efficient way as well as creating a general framework to minimise impact on the climate and environment is in line with our social responsibility as a company to increase sustainability.

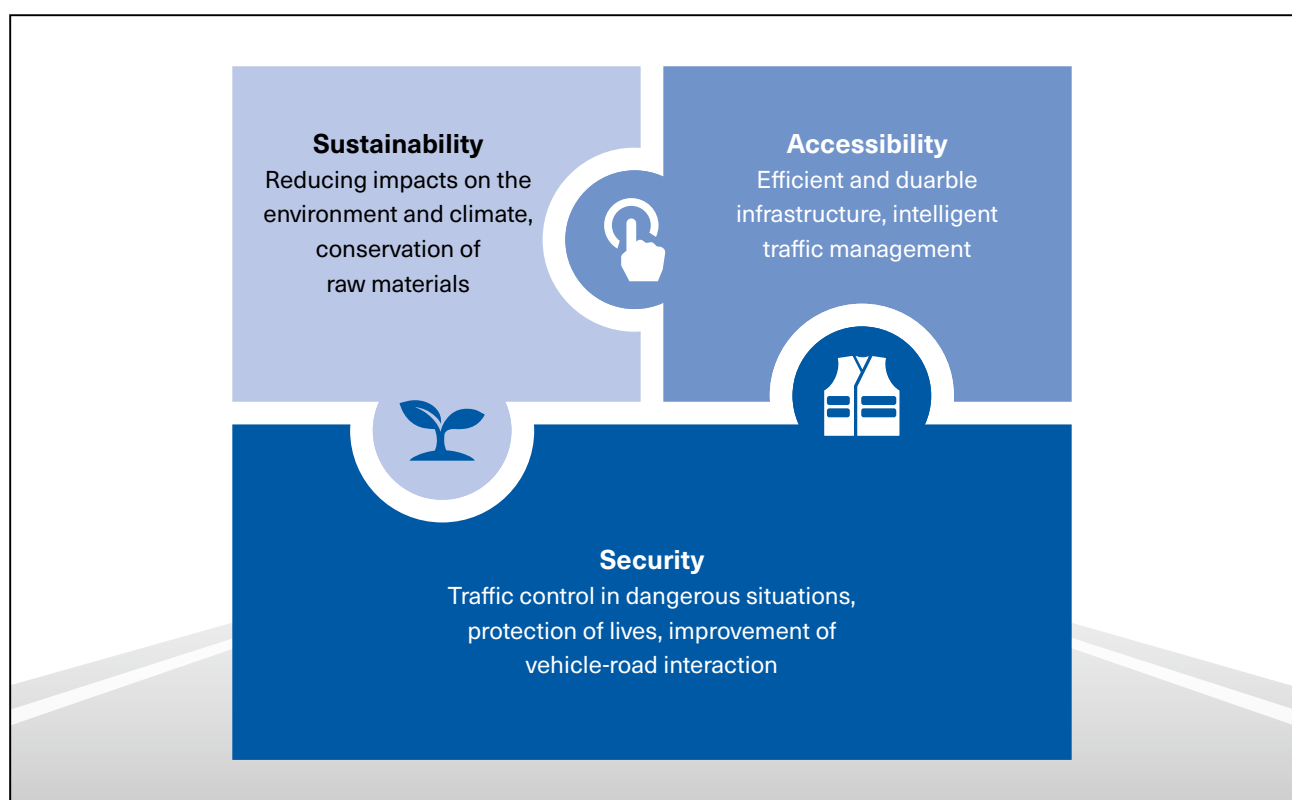


Figure 4: Innovation goals

4.2 Innovation key topics

At the intersection between our key activities and the relevant megatrends in the area of infrastructure, we focus on the following eight key topics in the innovation process:

Construction techniques

New production methods and construction processes and the use of alternative raw and building materials, as well as recycled materials, enable us to build more durable and low-maintenance structures that have a positive impact on accessibility:

- We want to use more innovative building materials, e.g., low-temperature asphalt and low-maintenance concrete pavements.
- We want to preserve resources, e.g., with recycled materials or new types of construction materials.
- In bridge and road construction, we want to accelerate construction and improve quality through the increased use of prefabricated and hybrid construction methods.

Smart Data

Networking using big data approaches as well as the application of the digital trans-European transport network will provide us with additional opportunities in the future:

- Using the autobahn's digital twin, we will be able to create meaningful prediction models for intelligent traffic management.
- A company-wide geodata infrastructure will be created that will enable us to establish a common data environment.
- We want to achieve full-scale digitalisation of planning, construction and maintenance projects through BIM (Building Information Modeling).

Intelligent Traffic Systems

The systematic use of innovative technologies serves to optimally utilise the existing infrastructure and to continuously increase the accessibility of the autobahn network:

- To increase road safety and avoid disruptions, we want to enable the networking of vehicles with the infrastructure.

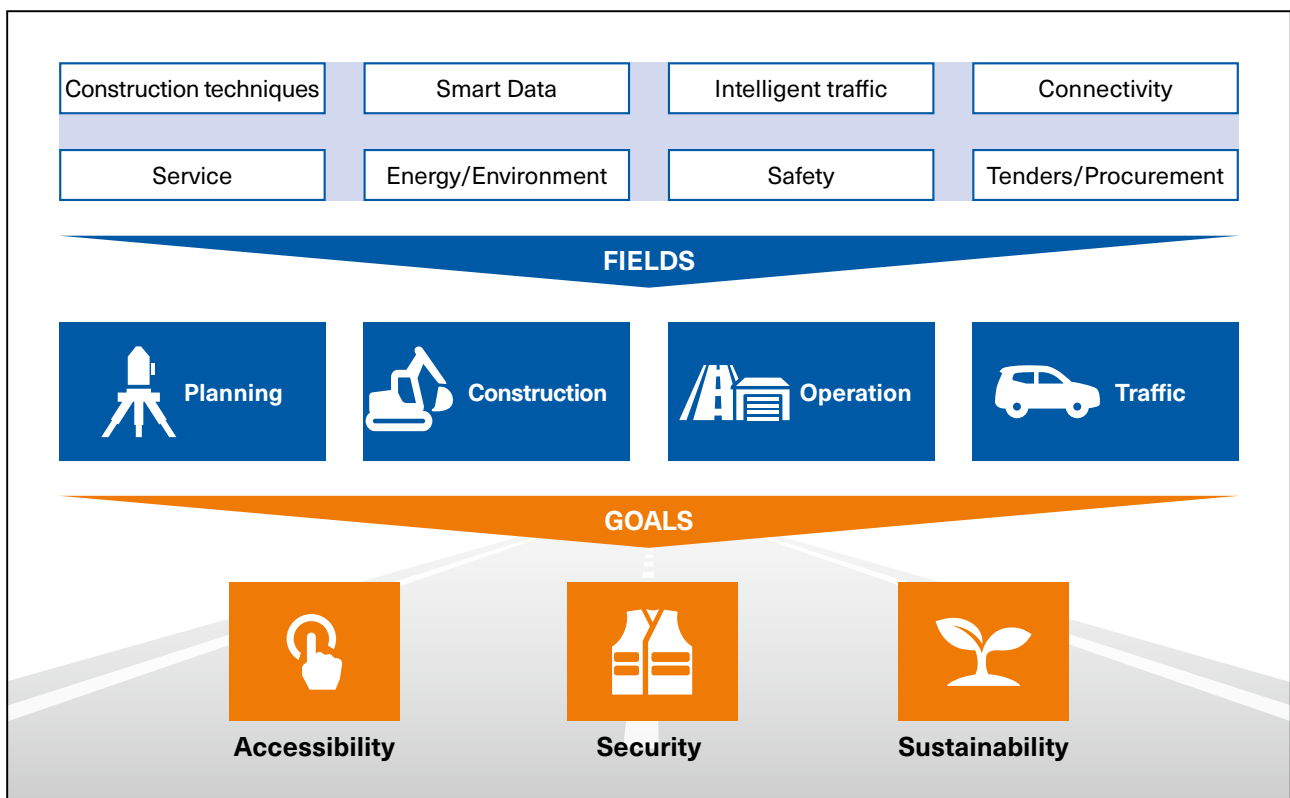


Figure 5: Innovation key topics



- Traffic restrictions can be reduced through intelligent roadworks management. By opening up and intelligently linking new digital data sources, we want to manage traffic in a predictive manner.

Connectivity

The motorways must become a communication platform and offer the possibility of digital networking between all involved parties:

- We want to gain experience with the use of fully automated vehicles on test routes.
- By combining different modes of transport, we expect to be able to offer new services.
- We want to use digital communication (e.g. Autobahn App) to contact users directly and provide information from a single source.

Service

Operations maintain the infrastructure for the users. It remains our goal to create the best conditions for them to do so:

- With the motorway maintenance facility of the future, we want to equip our operations with the most modern, energy-efficient and climate-neutral technology possible.
- Family and user-friendly rest and parking areas of the future will increase the range of recreation and service offers.

Energy and Environment

To achieve climate targets, it is necessary to enable the use of alternative drives and to generate energy from renewable sources:

- We will do our part to establish alternative drive systems by expanding the charging infrastructure (e.g. e-charging stations, inductive charging, hydrogen filling stations).
- We will promote sustainable energy generation (photovoltaics, wind energy and others) on our property.
- We want to quickly implement noise reduction for those affected.
- We strive to link living spaces that were previously separated by routes.

Safety

Technological developments enable us to increase safety on and around the autobahn for the benefit of our employees and users:

- We want to develop and expand intelligent parking systems.
- With the help of future-oriented and even safer road equipment, including markings and machine-readable signage, we will increase safety for all users.
- Self-driving security vehicles will provide an additional level of safety.

Procurement

With modern framework conditions, sustainable, proven and innovative measures are to be put into practice more quickly:

- Modernised procurement procedures will focus on quality improvements, construction acceleration and environmental protection.

5. Innovation process

Structured and well-controlled innovation management is the basic requirement for successful innovation implementation.

Our innovation process is based on interdisciplinary and goal-oriented interaction between internal and external players.

When selecting and deciding for or against innovation projects, we use a structured and transparent procedure consisting of three phases.

5.1 Collecting ideas and identifying needs

There are many good developments and products that could be used to design the motorway of the future. These are developed both by our employees as well as by external partners. We have designed a structured network management, creating diverse opportunities to generate ideas from the most varied of areas. Through discourse with and between the relevant players, we learn more about market-ready applications, products and projects. Internal and external communication formats enable us to identify and substantiate needs and requirements. Close cooperation, transparent exchange of ideas and intensive technical discussion help us to do this. Requirements and ideas are collected, documented, communicated and examined in a further step.

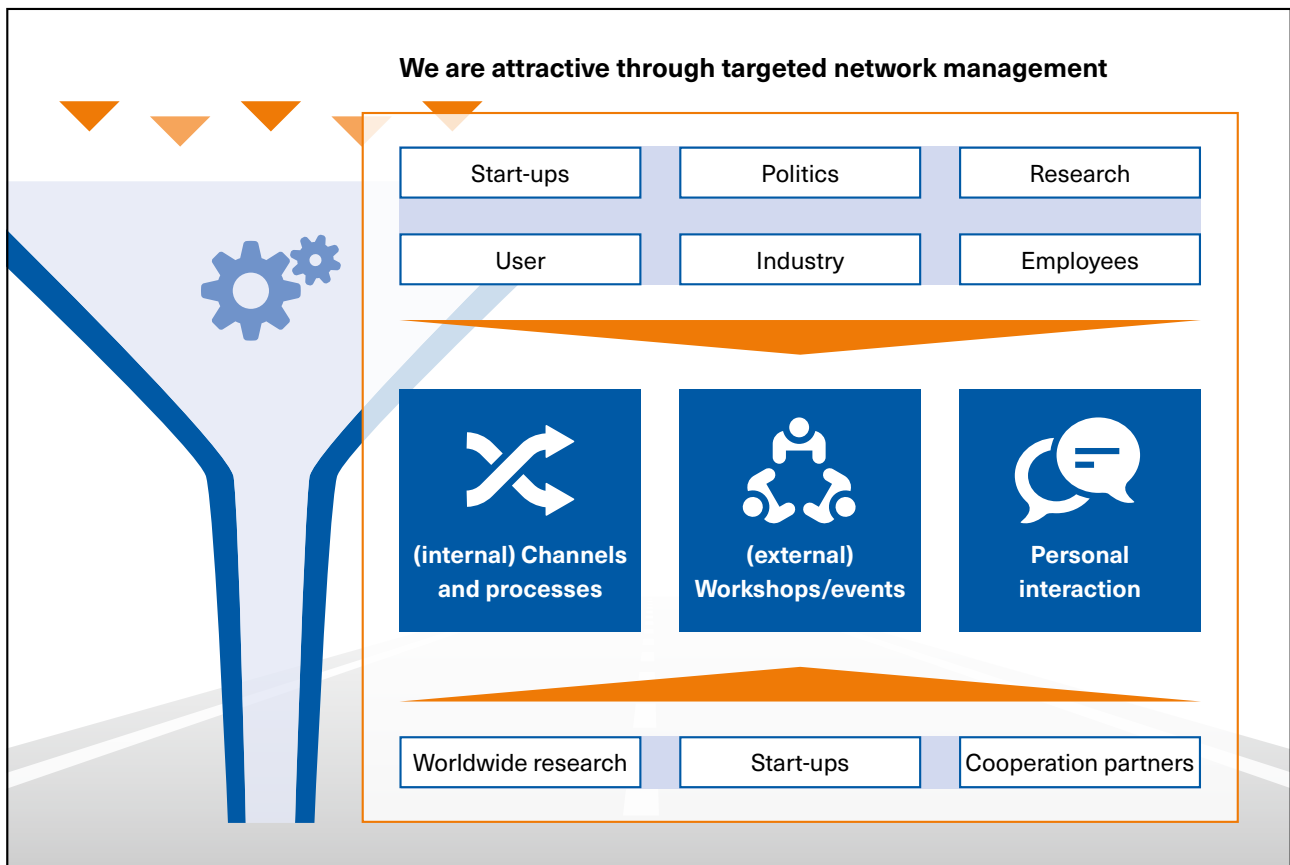


Figure 6: Innovation process phase 1 – generation of ideas and needs





5.2 Selection and evaluation

Above all, Die Autobahn wants to make application-ready innovations usable and make them available to all users and employees, as well as to external partners. For this purpose, we employ a structured selection process that, in addition to a transparent and participatory approach, also incorporates regional expertise as one of our strengths. Benefits, cost-effectiveness, safety and

sustainability all play an important role in the decision-making process. At each stage, we decide whether an idea is to be used for the next step, whether a revision is necessary or whether this idea is to be excluded from the current process. This identifies the most promising approaches and allows us to use the expertise of our employees as efficiently as possible.

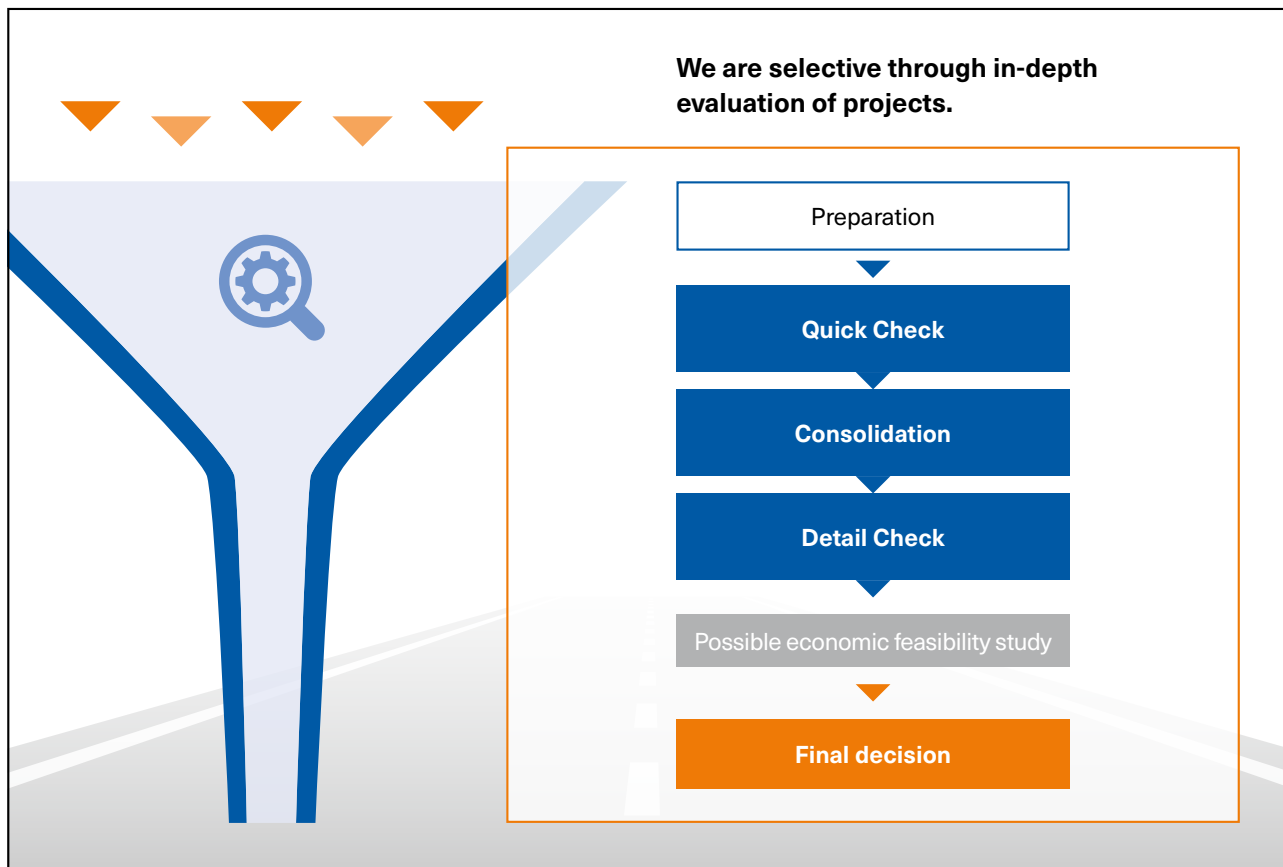


Figure 7: Innovation process phase 2 – selection and evaluation process



5.3 Implementation of innovation projects

Following the selection of ideas, their implementation takes place in corresponding innovation projects. To this end, we primarily start, supervise and support pilot and rollout projects in order to be able to assess innovations and changes in everyday use. As part of development

and research projects, we make our expertise and infrastructure available to external partners. Here too, we follow the individual steps and evaluate whether improvements are achievable in the medium to long term.

5.4 Project monitoring

Organisation-wide communication is required beyond the innovation process. For this purpose current experiences and findings from individual projects are reported at dedicated internal round table meetings. At the same time, definitive and trend-setting decisions are made by the innovation committee which consists of management, internal business unit managers and regional branch representatives.

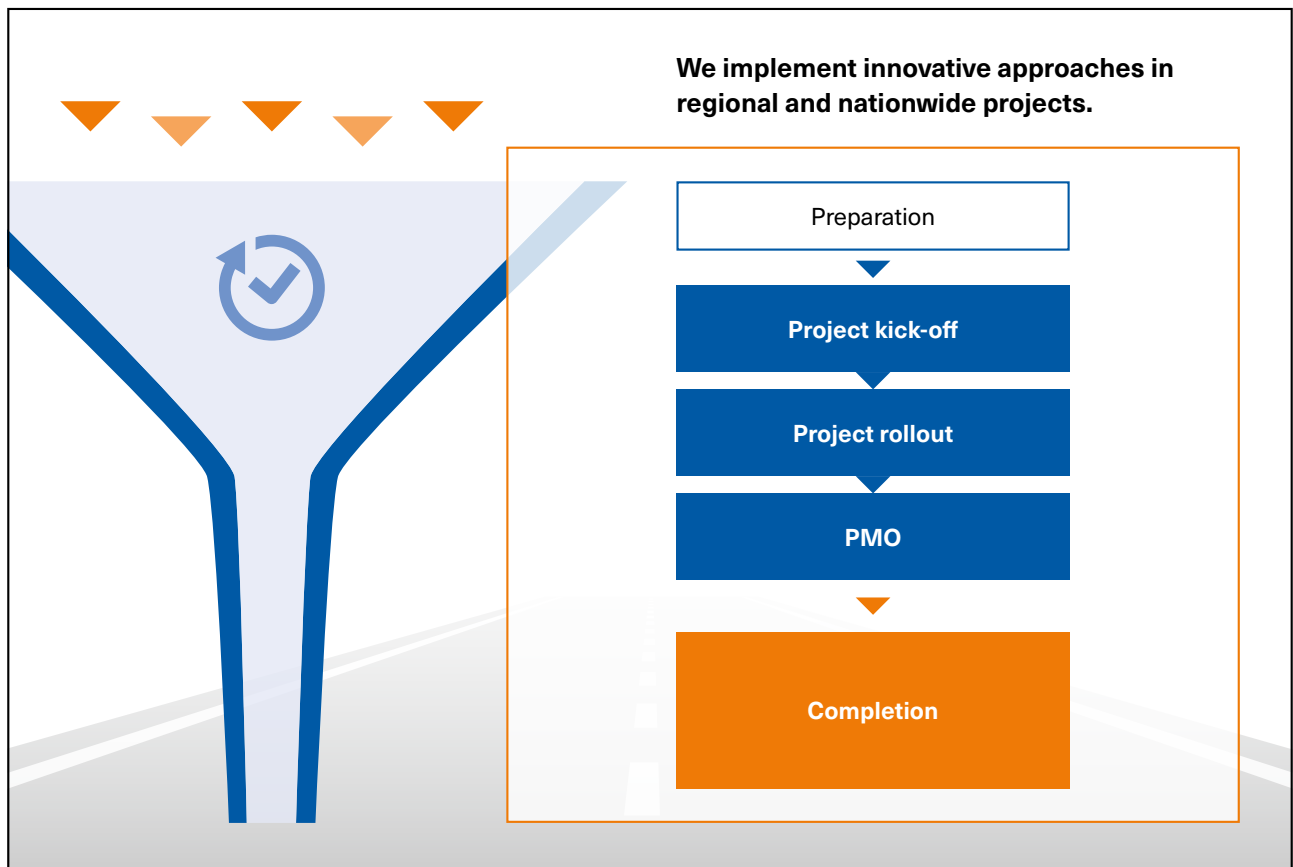


Figure 8: Innovation process phase 3 – implementation

6. What is important to us

Our mission is to promote and encourage innovation! Clearly documenting and communicating our goals, taking into account the strategic orientation of the company and creating an atmosphere of creativity and motivation and an open innovation culture are among the soft factors in the innovation process. Our structured innovation management serves to identify and introduce new ideas and provides clarity and accountability for processes.

The main task of innovation management is to facilitate close, productive cooperation between all regions as well as with external players and stakeholders. Clear structures are used to effectively manage projects and achieve the best possible results. The involvement of various specialists and a technically justified selection of innovations achieve a high degree of transparency and the identification of all partners with the respective innovation projects.

6.1 Innovation culture at Die Autobahn

The goal of building competitive economic structures can only be achieved through intensive cooperation between a wide variety of groups from our company, various associations and the economic, science and political sectors. The existing competencies are bundled and, through their inclusion in Die Autobahn's innovation process, used for the significant benefit of the entire company and the motorway network. This promotes the exchange of ideas, and allows new opportunities to be utilised, while allowing risks to be identified and managed. To this end, Die Autobahn intends to introduce formats that enable internal networking (e.g. innovation award, workshops, innovation newsletter) as well as external networking (e.g. innovation conference, Autobahn Lab).

6.2 Stakeholders

We want to create an atmosphere of progress and forward thinking throughout the organisation. For this reason, we enable all employees as well as all external partners to actively participate in the process.

We want to be fit for the future and bring innovations to the autobahns quickly - we want to demonstrate a common way to increase the uninterrupted accessibility and safety of the autobahn network and its sustainable development. We utilise the expertise of external partners, consult with them and thus create new solutions.

Internally, regular dialogue between the head office and all regions and business units is necessary and encouraged. This regular discourse serves on the one hand to generate common ideas, but above all to manage innovation projects in a transparent manner. We coordinate open points, such as the provision of resources or infrastructure elements, with each other and by consensus.

We want to facilitate cooperation with our external partners, such as research institutions, industry partners, construction companies, start-ups and users, by means of cooperation, joint projects and, in individual cases, by awarding contracts. In doing so, we continually rely on trusting cooperation in order to implement technological innovations and innovation projects in a goal-oriented, fast and sustainable manner.



Contact

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