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Re-inventing the wheel: the Strategic Dialogue for the Automotive Sector Baden-Württemberg (SDA BW) as key element of an innovation and transformation strategy of the automotive region Baden-Württemberg

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Summary

The State of Baden-Württemberg, situated in the south-west of Germany, has taken different measures and steps to shape the transformation process towards new mobility solutions for its automotive and mobility industry. One key element of an innovation and transformation strategy is the Strategic Dialogue for the Automotive Sector Baden-Württemberg (SDA BW). As an intersectoral approach of political and economic change management, the SDA BW aims at a dual strategy of fostering a regional innovation process as well of scaling up new mobility solutions. An important point is the design of the legal and political framework of the change process.

Keywords: government, policy, car, electric drive, digitalization

1 Introduction: Transforming the automotive region Baden-Württemberg

The sustainable and future mobility will be automated, connected and electric. These technological changes will bring a profound transformation of the mobility system that comes along with a disruptive change to different branches and stakeholders. The coalition agreement of the state government of Baden-Württemberg from 2016 postulates the goal of supporting the automotive industry as a leading industry in the region on its way to the "future of sustainable and intelligent mobility".[1]

This objective points to two fundamental processes of change in the automotive industry and, more broadly, in the mobility industry: Efforts to curb the negative consequences of climate change have been manifested in various climate policy regulations for several years, e.g. the CO2 fleet regulations of the European Union. In order to comply with these requirements, automobile manufacturers are increasingly being forced to switch to alternative, low-emission or locally emission-free drives. In addition to this trend of increasing electrification of mobility, there is also the trend towards digitalization, the increasing automation of vehicles and the likewise increasing networking of vehicles with the infrastructure and with each other (Car2X). The production of these vehicles is also becoming increasingly automated and connected.

The development path towards this mobility of the future is characterized by a complex, far-reaching process of change that poses major challenges to a large number of actors from politics, business, science and society. This transformation has several dimensions:

- **Technology change:** The increasing electrification of the powertrain (48V, hybrid systems, plug-in hybrids (PHEV), battery electric vehicles (BEV), fuel cell vehicles (FCV)), the increasing connectivity of vehicles with each other and with the infrastructure (Car2X, Car2Car) as well as the ever faster advancing automation (SAE Level 1-5) bring a fundamental change in the products, production and application processes.
- **Structural change:** This also confronts companies in the automotive and supplier industry with the challenge of a dual structural change in the entire automotive sector. At the same time, companies are facing changes in mobility products, digitalization and rationalization of manufacturing processes (smart industry/Industry 4.0), internationalization of development and manufacturing sites as well as possible downward trends in free trade and disruptions in international supply chains that have occurred as a result of the corona pandemic. This will fundamentally change established value chains and cooperation structures, especially in a region like Baden-Württemberg, and will require the affected companies and organizations to make massive efforts to adapt their own structures and business models (product, process and system innovation).
- **Change in the transportation and mobility system:** The new technologies offer the chance to redesign and optimize the entire transportation and mobility system (increasing connectivity, intermodality and sharing economy), which, given the pressure to act as a result of climate and environmental policy objectives is absolutely necessary. New mobility solutions also focus on the user and lead to a change in the perception and use of public space.
- **Change in infrastructure:** The change towards electric mobility only makes sense if the energy supply is restructured towards renewable energies and is therefore part of the energy transition (sector coupling). There are also major challenges in energy distribution (grids, storage). In addition, in the course of connectivity and automation, additional new infrastructure requirements arise, which can probably only be solved on the basis of integrated approaches at municipal and regional level.

In order to manage these different dimensions of change, the State of Baden-Württemberg, the cradle of the modern automotive industry, has taken different measures and steps to shape the change towards new mobility solutions and the transformation of its automotive and mobility industry. One key element is the Strategic Dialogue for the Automotive Sector Baden-Württemberg (SDA BW), which is an intersectoral approach of political and economic change management. SDA BW is coordinated by the State Agency for New Mobility Solutions and Automotive Baden-Württemberg e-mobil BW.

2 The Transformation of the Automotive Sector: automated, connected and electric

The electrification of the powertrain is gaining momentum. Globally, new registrations and stock of electric vehicles are increasing. According to an analysis by the Center for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW), the global fleet of electric vehicles is 10.9 million in 2020, up by more than three million from the previous year. China remains the leading market, followed by the U.S., while Germany moved up three places and is now third overall with nearly 570,000 vehicles on the road. According to the ZSW's data, three German automakers figure prominently among the top six brands of newly registered electric vehicles. [2] In Germany, the coalition agreement of the new elected Federal Government sets a target for 2030 of "at least 15 million fully electric passenger cars", which refers to battery and fuel cell electric vehicles and will soon exclude most combustion engine hybrids. [3]

In addition, different studies show that many companies in the automotive industry are on the way to develop from a classic vehicle manufacturer to a mobility service provider. [4] The mobility as a service market is expected to value at 451 billion U.S. Dollar by 2030. [5]

This has a major impact on regions with a focus on vehicle and component production. e-mobil BW investigated the effects of electrification and digitalization of mobility on the location of Baden-Württemberg in the Structural Study BW^{e} mobil 2019.[6] The systemic relevance of the automotive industry in Baden-Württemberg as a leading industry and one of the leading automotive economic ecosystems in the world can be illustrated using a few key facts:

- Around 470,000 people - this corresponds to around 11 percent of employees subject to social security contributions in Baden-Württemberg - work directly or indirectly in the automotive industry.
- In addition to a high export rate of usually more than 75 percent per year, the research and development intensity is a defining characteristic of the region as an automotive cluster: more than a third of the total of 30.3 billion euros that was spent on research and development in Baden-Württemberg in 2019 was invested in vehicle construction. This makes Baden-Württemberg the frontrunner among the German federal states in terms of R&D intensity.[7]

If you look at the industry at the level of the individual stakeholders, the region is particularly characterized by a high concentration of globally successful automobile manufacturers, leading global system suppliers, numerous small and medium-sized automotive suppliers, highly specialized machine and plant manufacturers, production equipment suppliers and service providers as well as excellent universities and research institutions. This unique cooperation structure in an industrial innovation cluster is the basis for the innovative strength and the global success of the development and production location in the south-west of Germany. Especially for the small and medium-sized companies, the challenges are high and initiatives like the following are relevant and necessary to be prepared for upcoming technologies and markets.

3 The Strategic Dialogue for the Automotive Sector in Baden-Württemberg (SDA BW): an approach of political and economic change management

3.1 SDA BW as an approach of intersectoral governance

The biggest challenge is not just the introduction of new technologies, products and services, but the temporal parallelism of change requirements and the complexity and dynamics of the transformation process. This requires a systemic approach that brings together actors from business, science, society and politics in close intersectoral cooperation and connects them across the boundaries of industries and technologies. SDA BW pursues a holistic approach that aims to open innovation potential across industry boundaries. In the close collaboration of politics, business, science, employee associations, consumer organizations, environmental associations and civil society, projects, measures and concepts are to be developed over a period of seven years in order to successfully shape the transformation process of the Baden-Württemberg automotive sector.

The goal of the Strategic Dialogue is

- to identify areas of action that are particularly important for the ongoing transformation process from a national, federal and European political point of view,
- to identify instruments that are suitable to support the transformation process of the automotive industry as well as the shift towards automated, connected and electric mobility of the future, as well as
- to derive recommendations for politics and industry.

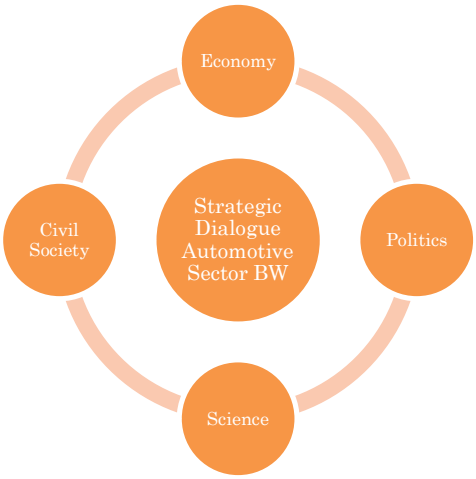

Fig. 1 SDA BW as intersectoral approach

There is no published list of the stakeholders, organizations and companies involved in the SDA. On the part of the state government, the Strategic Dialogue in the Automotive Industry Baden-Württemberg is not conducted as a firmly established organizational form with a permanent membership. The number of participating organizations has obviously increased over the years, the first progress report 2018 names 150 participating companies and institutions, the second 2019 already 290, the third 2020 and the fourth report 2021 count about 300 stakeholders involved. [8]

Intersectoral governance basically describes social control and coordination with the participation of the state, economy, civil society and in some cases science as different sectors, particularly in cross-sectoral issues in the case of sectoral interdependencies. This is based on the assumption based on systems theory that modern societies are functionally differentiated. Each functional system consists of different institutions that follow specific functional logics and are each based on central values. If you look at the organizations named in the annual progress reports of SDA BW, it can be stated that the strategy dialogue in the automotive industry in Baden-Württemberg can be described as intersectoral. Various ministries of the state of Baden-Württemberg and individual municipalities (function system state), numerous companies in the automotive and supplier industry as well as other industries such as the energy sector or the IT industry (function system economy) as well as various associations and trade unions are involved. In addition, SDA BW is supplemented by participatory elements in the direction of society (function system of civil society). The involvement of representatives of universities, colleges and non-university research institutions (functional system science) underlines the character of the SDA, which is geared towards innovation as a solution and design path for the transformation.

3.2 Structure and Working Method

The cooperation during the year was organized from 2017 to 2021 in six strategic subject areas. The subject areas are designed along the entire value chain and also take important framework processes into account:

- Topic I – Research and Development, Production and Suppliers
- Topic II – Sales and Aftersales
- Topic III – Energy
- Topic IV – Digitialization
- Topic V – Traffic Solutions
- Topic VI – Research and Innovation Environment

- Interdisciplinary field of society and mobility (Topic VII)

Each subject area is managed by the relevant ministry of the state of Baden-Württemberg (lead), the co-lead lies with industry or social actors. The specific activities are organized differently within the subject areas; there is usually a steering committee within the subject area, under which temporary working groups develop specific work results (often recorded in theses, position papers or result papers).

After the re-formation of the Baden-Württemberg state government following the state elections in March 2021 and the annual event of the SDA in October 2021, it was announced that the SDA would continue to work in the tried and tested way, but from 2022 on with cooperation along the new three focus areas Vehicles, Data and Energy. According to the progress report 2021, the aim of this tighter and more agile work structure is "to focus the topics more closely, where it makes sense to link them with each other and to process them in a more flexible and agile approach". [9]

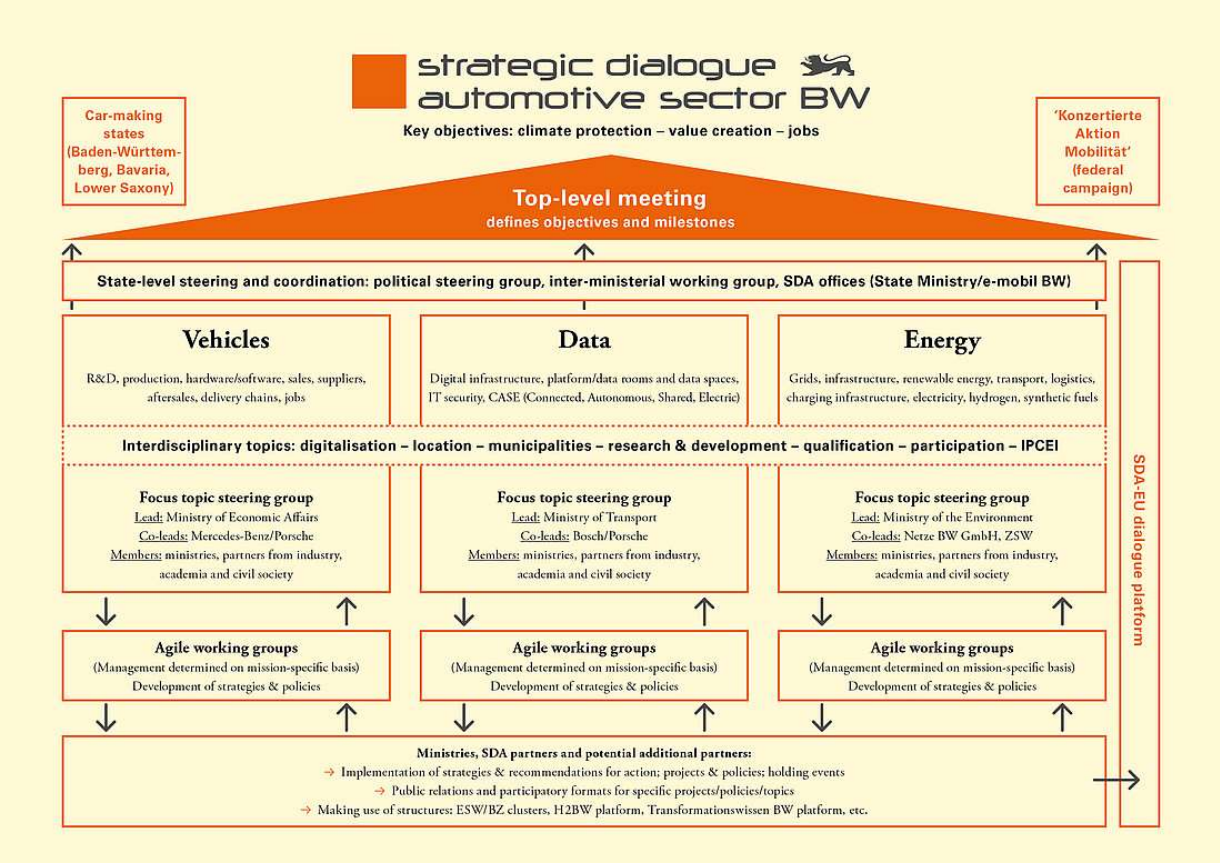

Fig. 2 The New Structure of the Strategic Dialogue for the Automotive Sector in Baden-Württemberg [10]

The structural elements top-level meeting, state-level steering and coordination committee, inter-ministerial working group and the SDA offices, which were established in the beginning of SDA BW in 2017, remained unchanged. Within the three new focus areas, steering committees are formed and goals and missions are defined, which are processed in so-called ad hoc working groups over a defined period of time and should result in concrete recommendations for action, projects and measures. Cross-cutting issues such as digitalzation, qualification, research and development are no longer dealt with in their own subject areas and should be considered in every focus area and worked on within the framework of missions. Furthermore, the participation

of the citizens of the state in all three priority areas in questions of transformation relevant to them, such as automated and connected driving, is sought.

3.3 Timeline

The SDA BW was initiated in 2017 and is scheduled to run for seven years. The first start and project planning phase in 2017 and 2018 focused on setting up the cooperation structures in the various committees and working groups, and the first activities and measures were discussed and initiated. In the summer of 2018, after an initial inventory of the steps taken to date, the first project phase began, described as a "ramp-up phase" with the aim of defining and initiating further projects, carrying out various work and event formats and identifying needs and recommendations for action for the governments on state, federal and European level.

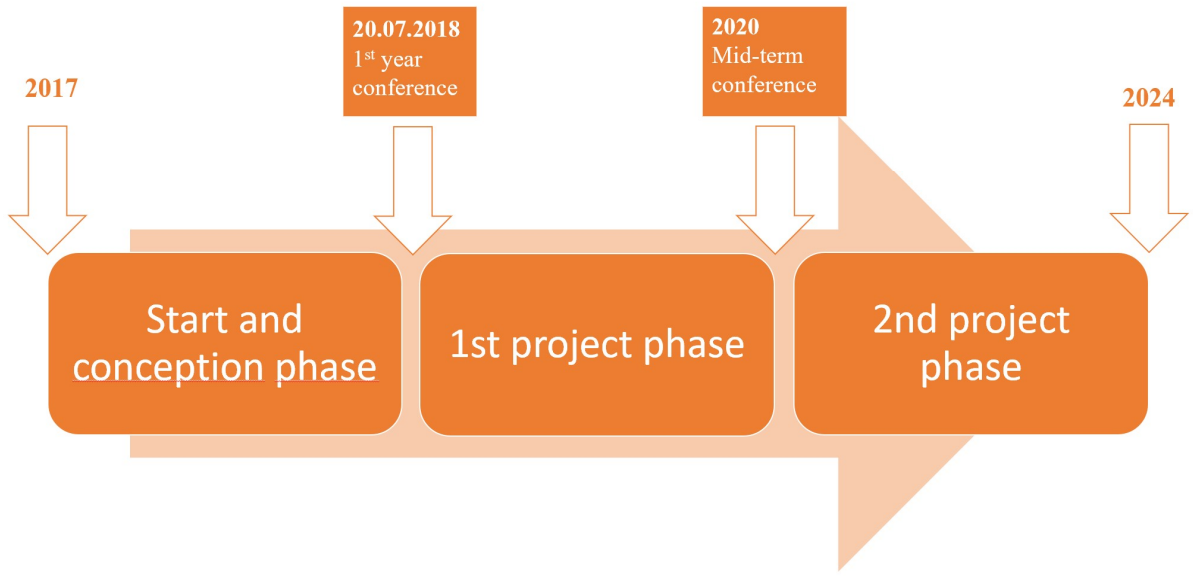

Fig. 3 Project phases of SDA BW

The results of the 1st project phase were presented at the mid-term conference in 2020 and formed the basis for a 2nd project phase, which follows a dual strategy of fostering further innovation and of scaling up new technologies in a parallel process. This "Visibility Phase" deals with scaling up new mobility solutions and finding suitable framework conditions for a rollout of new technologies. Especially the right next steps after the end of the 2nd project phase in 2025 have to be identified and discussed and therefore the modified collaboration structure has been introduced [11]. The strategic framework for the 2nd project phase of the SDA was set out in the "Roadmap for a Successful Transformation" presented 2021 at the mid-term conference. The aim is to achieve the goal of largely climate-neutral transport with targeted and effective measures in the decade between 2030 and 2040. For the coming years, the roadmap sets the following goals [12]:

- Driving electrification – scaling up SDA projects
- Continue to drive digitalization forward
- Supporting and accompanying the transformation process with special focus in SMEs

3.4 Projects

The claim of the SDA is to be not only a strategic dialogue but also a cooperation platform with a working character. This is proven by the large number of projects that are funded by the state government of Baden-Württemberg in the context of the SDA. In the fourth progress report of the SDA, for the years 2018 to 2021 the figure of more than 300 million euros is given that was spent by the state government to promote projects in the SDA. The third progress report names 46, the fourth 52 individual project activities, since 2020 the reports have included an overview of the ongoing projects in the form of project profiles, a website containing all current project activities of SDA BW is in preparation and will be launched in autumn 2022. A detailed consideration of individual projects will not be undertaken here due to the limited scope of this paper. Roughly categorized, these individual funding measures by the state ministries include research and development projects in the field of technology (e.g. on individual components such as electric motors, batteries or fuel cells, manufacturing techniques and research factories for batteries and fuel cells), measures for the development and roll-out of charging infrastructure, real-world laboratories, e.g. for automated driving, research infrastructures, studies and feasibility studies, new forms of cooperation and collaboration or transfer measures/platforms.

Highlighted projects in the SDA BW are [13]:

Spotlight 1: Research and development projects in the field of technology

- The project ***AgiloDrive*** aims at a new, agile production system for electric motors based on modular product and production kits as well as fully digital process chains, which has a demand-oriented adaptability. In the future, it should be possible to produce a wide variety of variants, technologies and quantities economically, as well as to use cost-reducing economies of scale across different product series and manufacturing technologies.
- The aim of the project ***DigiBattPro 4.0*** is the holistic digitalization of battery cell production. The digitalization of the entire process should make a significant contribution to increasing and stabilizing the product quality of lithium-ion battery cells.
- ***HyFaB Baden-Württemberg: Research factory for fuel cells and hydrogen*** is a joint project with the aim of researching the processes for manufacturing fuel cell stacks in large quantities, supporting the establishment of an industrial basis and applying them.
- The project ***U-Shift*** focuses on the urban vehicle of the future. The driverless, electrically powered vehicle concept defines a new type of mobility by separating the driving module and the transport capsule. In combination with various capsule types, the driving module can be used to transport both people and goods. The capsule change takes place quietly, automatically and is not tied to changing stations. Different business models and applications are made possible with special capsules – from on-demand buses to parcel delivery services. For high cost and resource efficiency, expensive systems such as the complex technology for driverless driving are mainly housed in the driveboard.

Spotlight 2: Development and roll-out of charging infrastructure

- With the aim of counteracting range anxiety, the state of Baden-Württemberg was the first state in Germany to promote the development of a regionwide charging infrastructure in Baden-Württemberg as part of the ***SAFE BW funding program*** (SAFE BW: A safe charging network for all of Baden-Württemberg). A consortium of energy suppliers and municipalities built at least one charging station with a charging capacity of 22 kilowatts or more in a grid of 10 x 10 kilometers and at least one fast charging station in a grid of 20 x 20 kilometers with a charging capacity of at least 50 kilowatts. The grid of 20 x 20 kilometers was integrated into the grid of 10 x 10 kilometers.

In total, a network of around 400 charging stations has been created across the country. Follow-up projects for the consolidation and further expansion of the charging infrastructure are currently underway.

- In the ***INPUT funding program*** (intelligent network connection of parking garages and underground garages), pilot projects for the intelligent connection of parking garages have been carried out since 2019, which advance the construction of charging stations for electric vehicles in multi-storey car parks, parking lots and underground car parks, show an intelligent grid connection and keep the load on the power grid low by avoiding peak loads.
- In the projects entitled ***NETZlabore***, the network operator Netze BW is investigating under real conditions how the integration of electric vehicles into the power grid can be successful. After the project E-Mobility-Allee with a focus on the suburban area, the follow-up project E-Mobility-Carré was completed two years later. With 58 charging points in an underground car park, a large number of simultaneously charging vehicles were successfully integrated into the power grid in an apartment building. Two other NETZlabor projects followed: the E-Mobility-Chaussee investigated the rural network topology, while the NETZlabor Intelligent Home Charging developped a scalable ability to control charging processes via the intelligent measuring system in a way that serves the needs of the grid.

Spotlight 3: Real laboratories and demonstration projects

- With the projects ***H2Rivers*** and ***H2Rhein-Neckar*** a showcase for fuel cell mobility has emerged in the Rhine-Neckar metropolitan region in the cities of Mannheim, Heidelberg and Ludwigshafen as well as in the central Neckar region from Neckarsulm to Esslingen: The aim is the long-term and sustainable development of a local chain regenerative hydrogen production, distribution and consumption. With the comprehensive approach, which can also become the blueprint for a self-sustaining hydrogen economy for other cities and regions, the two federal and state-funded projects complement each other to form a showcase that involves many regional partners in order to generate visibility in the short term and to help fuel cell technology to gain market maturity in the near future.
- As part of the project "***RABus*** - real laboratory for automated bus operation in public transport in the city and in the country", the development towards automated driving SAE Level 4 is being researched with electrically operated bus shuttles and tested in real life in Mannheim and Friedrichshafen.
- The Testing Field Autonomous Driving Baden-Württemberg (***TAF BW***) is a real laboratory for applications of automated and networked driving, which was set up in Karlsruhe, Heilbronn and Bruchsal. Companies and research institutes can test future-oriented technologies and services in everyday traffic on more than 200 km of public roads.

Spotlight 4: Research infrastructure, transfer measures and platforms

- In the **InnovationsCampus Mobility of the Future**, the University of Stuttgart and the Karlsruhe Institute (KIT), in cooperation with other research partners from Baden-Württemberg, are pooling their expertise to develop new mobility products as well as production technologies and systems for sustainable and digital mobility of tomorrow.
- To support medium-sized companies in Baden-Württemberg, the information centre for the transformation of the automotive sector in Baden-Württemberg (***Landeslotsenstelle Transformationswissen BW***) offers a new platform that provides orientation in the transformation process of the automotive industry. The state agency for new mobility solutions and automotive, e-mobil BW, coordinates this pilot office that was created as part of the SDA BW. The pilot office is currently working with 40 partners, whose offers in the areas of qualification, networking and knowledge transfer are clearly presented on the online platform www.transformationswissen-bw.de. In personal discussions, the team at the pilot office goes into the situation of the companies

individually and explains the relevant developments and trends as well as suitable funding opportunities. The thematic events with regional partners as part of the "Automotive in Motion" series of events and the publication of various topic-specific short studies in the "Wissen Kompakt" (“Knowledge in a nutshell”) series of publications also contribute to the development and transfer of knowledge in the regionale industry. Since January 2021, the "Transformation Automotive Industry" advisory voucher from the Baden-Württemberg Ministry of Economics, Labor and Tourism has been offering companies support with individual advice.

4 Outlook: Economical and political change management

To sum it up: Baden-Württemberg as an important and traditional automotive region is aware of the profound effects on the mobility and the automotive sector which come along with electrification, digitalization, and automatization. The SDA BW can be interpreted as an approach to economic and political change management. According to common definitions, change management includes all tasks, measures, and activities for the implementation of new strategies, structures, systems, processes, or behaviours that are intended to bring about a comprehensive, cross-departmental and far-reaching change in an organization. Change management is a planned process that begins with a (justified) reason and ends with concrete goals or results. In this sense, change management means designing change processes.

This is also the objective pursued by the Strategic Dialogue for the Automotive Sector Baden-Württemberg, not on an organizational level, but on a regional, political and economic level: In order to shape the transformation process of an industrial branch of central economic importance, a stakeholder analysis was carried out at the beginning of the process, a working structure has been established with more than 300 organizations and companies from politics, industry, science and civil society involved.

The classic three-phase model according to Lewin (1947) defines three phases of a change process: Unfreeze - Move – Refreeze. [14] Following this point of view, in the first phase of the SDA was primarily about creating a common (problem) understanding and thus working towards favourable framework conditions for the change process. Due to the great importance of the automotive industry for the region, the SDA is not limited to those directly involved; the citizens of Baden-Württemberg are involved through various forms of dialogue and citizen participation. In the second phase from 2018 - based on Lewin's "Move" phase - the goal was to go beyond the dialogue and enter into cooperation between the participants and concrete projects that go beyond a successful design of the transformation process. The second project phase of the SDA, which was initiated after the 2020 mid-term conference, is essentially about scaling up and implementing the projects, processes and activities that have been initiated - formulated in the roadmap presented at the mid-term conference.

Whether it will be possible to achieve a “refreeze” in the sense of a positively and successfully transformed automotive sector at the end of the SDA in 2024, following Lewin’s model, appears at least questionable. It can be assumed that follow-up processes must be designed and defined. Above all, it seems important to develop a positive vision of the future in the sense of a leading narrative - here the activities of the research and innovation environment as well as the elements of participation (previously topic VI and interdisciplinary of field society and mobility) play an important role. For this reason, the mid-term conference was opened to the public and citizens were invited to participate. Due to the pandemic, this participation had to be done via digital forums and rooms.

On the basis of the analysis carried out, the Strategic Dialogue for the Automotive Sector Baden-Württemberg can be described as an approach to intersectoral governance. The aim of the state government lies in the coordination of the transformation of the automotive industry, which is important for the future of the region, with the participation of the sectors state, economy, science and civil society. The state government expects the stakeholders involved to identify and develop action needs and recommendations from the SDA. In this sense, the SDA is to be seen as a "governance" instrument that gives the state government impetus for its own state

policy, but also for activities in the federal German and European political framework. In this context, an EU dialogue platform planned for 2022 can also be seen as an exemplary measure.

Beyond the status of a "governance" instrument, the SDA BW is also a platform for intersectoral cooperation. The work results and projects that have emerged from the SDA so far bear witness to this. The extent to which these are really suited to support the individual actors involved in coping with and shaping the transformation in terms of economic change management can probably only be assessed ex post at a later point in time.

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Presenter Biography

Dr. Wolfgang Fischer studied history, rhetoric, political and economic sciences and holds a PhD in History. Since 2011 he works for e-mobil BW - State Agency for New Mobility Solutions and Automotive Baden-Württemberg, an innovation agency and competence center for the transition towards automated, connected and electric mobility in a sustainable energy system. As Divisional Head he is responsible for projects and cluster activities, especially the management of the networks Cluster Electric Mobility South-West and Cluster Fuel Cell BW, but also the close cooperation with municipalities. Especially in recent years, a special focus of his work is the transformation of the automotive industry, especially helping small and medium-sized enterprises to cope with structural change. In 2017 the state government of Baden-Württemberg initiated a Strategic Dialogue for the Automotive Sector, in which e-mobil BW plays a coordinating role. General information about e-mobil BW and its activities can be found at: https://www.e-mobilbw.de/en/.

Katja Gicklhorn studied German Literature, Economics and European Studies at the Universities of Konstanz and Leipzig in Germany and Wroclaw in Poland. In her professional career she dealt with different aspects of electric mobility and new mobility solutions. Since 2015 she is working for the State Agency for New Mobility Solutions and Automotive Baden-Württemberg e-mobil BW GmbH. On behalf of e-mobil BW, she was responsible for the realisation of EVS30 in Stuttgart. Her actual focus as Director of Industrialisation is on the transformation of the automotive sector, the management of the Cluster Electric Mobility South-West and of the Information Centre for the transformation of the automotive sector in Baden-Württemberg..