State Chancellery of Hessen

Minister for
Digital Strategy and Innovation

HESSEN

Digital Hesse

Where the future begins

digitales.hessen

Digital Hesse – Where the future begins

Strategy update 2030

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Digital Hesse – Where the future begins

Dear citizens,

Digitalisation enriches our lives and makes daily life easier. 15 years ago, we made calls using push-button mobile phones, went shopping in brick-and-mortar stores and pushed around the vacuum cleaner by hand. Today, we shop conveniently online and order our robot vacuum cleaners around by tapping on our smartphone. And that is only a small part of digitalisation. It is constantly accelerating and transforming almost all aspects of our lives: communication and education, economy and administration, mobility and transport, workplaces and health, urban and rural spaces.

We must ensure that these developments take place in our interest. Digitalisation must serve people – not the other way around.

What does this mean? For example, that it makes our jobs easier – and does not endanger them. That it allows participation – and does not result in isolation. That it makes our regions more liveable – and not less attractive. That it reinforces learning and education – and does not replace them. That it secures the future of the region and creates jobs – and does not cause a brain drain. That it makes companies more innovative – and not dependent. That it provides equal opportunities for rural areas – and not only for smart cities.

The opportunities for all are vast. But to make the most of them, we need to set a course. The state government's digital strategy does just that. It is the roadmap for the vision of Hesse in 2030 where every citizen confidently uses the latest digital technologies at work and in everyday life, where Hessian companies develop and produce these innovations, where Hessian scientists research at the forefront of digital progress, formulate ethical guidelines and act accordingly. And where state-of-the-art high-speed networks provide the infrastructure for all of this. In short: Where the future begins.

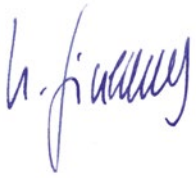
Our goals are defined and concrete measures for achieving them are identified in two cornerstones and six action areas. In Hesse, we are not just letting digitalisation happen, we are shaping, guiding and fostering it. We are taking digitalisation into our own hands. Putting people front and centre.

Our participation process, in which many citizens took part, also demonstrated this. Thank you very much for your ideas, your energy and your advice! We will continue this dialogue. The digital strategy is not an administrative regulation. It is a participatory initiative that brings together all Hessian stakeholders – business and society, science and culture, clubs and associations, and all Hessian citizens.

The prerequisite for this is a responsible approach to data and technologies. We are cautious when things are moving too fast. We are courageous where it is possible. And we protect when it is necessary. By doing so, we aim to establish trust and acceptance.

It is our conviction that the digital strategy will make Hesse an even better place to live, more innovative and imaginative, stronger and safer. We want a digital Hesse where the future begins.

Volker Bouffier
Minister-President of Hesse



Prof. Dr. Kristina Sinemus
Hessian Minister for
Digital Strategy and Innovation

A new day begins in Hesse …

THURSDAY, 28TH MARCH 2030

Sophia, 50, has grown a small online shop for medical supplies into a company with five employees that ships globally. Her business focuses mainly on AI-assisted exoprostheses. Sophia herself has multiple sclerosis.

Sophia Petrescu

6:00 am

Karben. **Sophia Petrescu** is still sleeping. Messages arrive on her smartwatch: A cyberattack on the server that runs her online shop has been successfully repelled.

The digital assistant integrated into the smartwatch decides that Sophia can continue sleeping. The AI has been analysing her decisions and communication for years. She can be sure that there is no danger to her business.

5:30 am

One and a half hours until sunrise in Ober-Ramstadt. The sky is clear. Temperature: three degrees Celsius. **Tobias Haag** will be up soon. His smart house is already starting the day.

It plans energy management based on the latest weather forecast. It's going to be sunny today! For the house, this means: Reduce the heat in the house while creating space in the photovoltaic storage system.

Tobias Haag

59 years old, managing director of an IT company. He lives in Ober-Ramstadt with his family and uses everyday digital helpers both at work and at home.

7:50 am

Tobias is about to leave for his first customer appointment and calls a robo-taxi via voice commands. He hasn't had his own car for three years. On the way to Frankfurt, the electric car picks up two more passengers who have the same destination.

On the lane reserved for vehicles with multiple passengers, Tobias gets to the city centre without any major obstacles. Morning traffic jams on the motorway are rare because the lanes can be adjusted virtually depending on the volume of traffic. They are clearly visible to the vehicle systems.

8:10 am

Classes have begun. **Mia Nolte** activates her computer. Today, she is taking part in the lessons from home. Biology and history are her strengths. That's why Mia is particularly looking forward to the virtual visit to the Egyptian pyramids guided by a digital history narrator today.

For a long time now, mobile devices are not the only aids they are using at school. Spatial internet technologies are increasingly replacing smartphones and tablets with their high-sensitivity displays. Images and content are now simply projected onto suitable surfaces in the environment or special smart glasses. Mia immerses herself in the world of ancient Egypt…

Mia Nolte

12 years old, lives in Nieste and attends the Astrid Lindgren School in Kassel. She likes to read animated e-books and chats with her friends. She aspires to become an archaeologist or a doctor.

10:10 am

Meanwhile, **Tobias** has arrived at his first client's home: **Sophia Petrescu.** He helps her improve the customer processes in her online shop. Thanks to AI-supported automation, many communication and ordering steps run automatically. She can also personally carry out any necessary work from home when her illness slows her down in her day-to-day life. Thanks to AI-supported diagnostics and targeted treatment methods, this happens less and less often.

Maria Hoffmann

90 years old, former postal employee from Fechenheim. Lives in a social neighbourhood project with senior-friendly flats and infrastructure after the death of her husband six years ago.

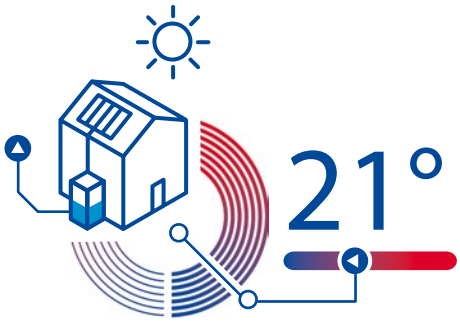
Karim Khalil

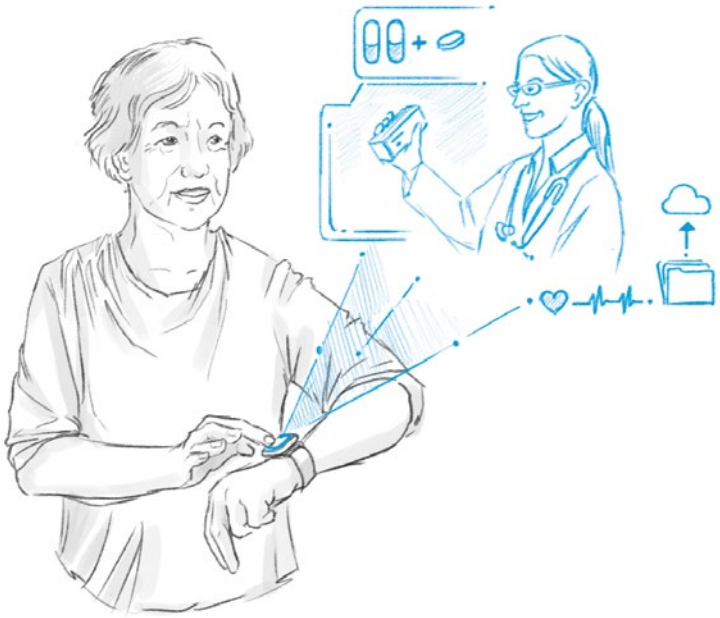
29 years old, electronics technician, born in Syria. He has been living in Germany with his parents for 15 years and has made Rasdorf in the Rhön region his home.

10:00 am

Karim Khalil has arrived at Tobias Haags' residential complex in Ober-Ramstadt for maintenance work. He has been interested in environmental and climate protection since he was a teenager. After graduating from secondary school, he began an apprenticeship as an electronics technician for heating and air conditioning systems.

He was attracted to the profession after noticing that qualified personnel were increasingly needed for the implementation of renewable energy and electricity storage and network solutions. He enjoys maintaining the digital control technology of Tobias' home system and is fascinated by its energy efficiency.





11:00 am

Maria Hoffmann is having a health check-up today – with the help of her smartwatch. After a robot-assisted heart valve surgery, she regularly reviews her vital signs with the medical assistant in her health app. For this purpose, her smartwatch has uploaded them to her electronic patient file. It turns out that the dosage of her heart medication needs to be adjusted to the new values.

The e-prescription is automatically sent to the pharmacy, which will deliver it the same day. Her doctor explains the new dosage to her in a video call. The reminder function is activated automatically: She will talk to Maria about her experience in a week.

11:45 am

Tina Schäfer is a member of a working group that evaluates practical experience from the logistics sector with networked sensor technology in production systems. The resulting data saves time and resources for industrial companies as well as improving traffic management and reducing CO2 emissions. However, it must also be ensured that no company data is misappropriated.

Tina discusses her results in the team. In her opinion, an open data approach should be pursued in this field with anonymised values. She feels that the potential for this has not been fully exploited. A colleague from her working group has written a scientific blog article on the topic. Tina proofreads it one last time before publishing it in her virtual professional world.

Tina Schäfer

30 years old, business information expert and Junior Fellow for Computer Science at hessian.AI. She used to commute from Darmstadt to Frankfurt, now she is on the move between various institutes or works from home.

Costas Nikolaidis

From Wiesbaden, 64 years old, married, has two grown children. A trained logistics specialist, he works in the warehouse of a chemical company.

1:15 pm

During his lunch break, **Costas Nikolaidis** applies for an extension of his identity card at the digital town hall. A talking chatbot and the citizen-friendly user interface developed by Julius guide him through the electronic application process.

Costas used to find it difficult to operate IT systems. Thanks to various further training courses, he now monitors the digital consignment of goods and stock changes. The smart glasses used for this are now his constant companion. He has »his« warehouse and logistics fully under control. He looks forward to the video chat in the evening with his granddaughter Mia. She wants to tell him about her new, virtual voyages of discovery through history.

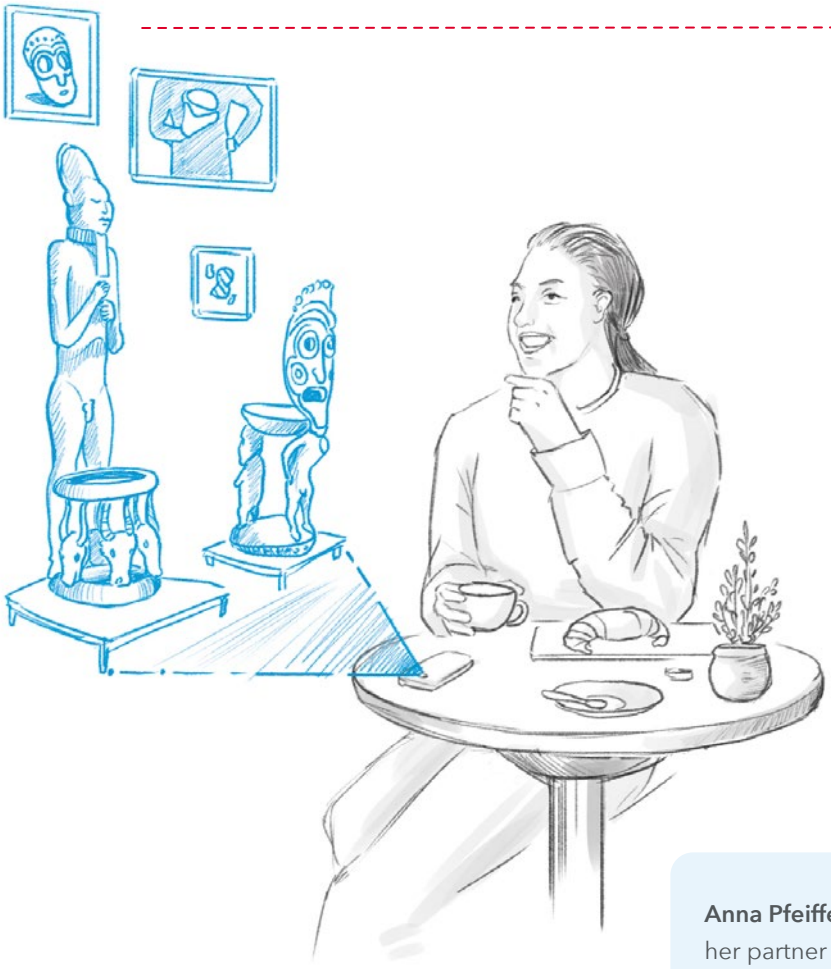
12:30 pm

Julius Gärtner shares the post from the research blog in his professional network. Like him, many users here support and advocate open data. He and his colleagues in his agency began marketing their comic drawings and online games together while they were still students.

Today, they design user-friendly apps and digital user interfaces for home robots for software manufacturers. Since Julius and his colleagues are spread across the whole region, they find it convenient to work together remotely as a team. They alternate between creative face-to-face meetings and agile coordination discussions in a virtual world. Many companies and organisations are now using this type of coworking.

Julius Gärtner

From Kassel, 39 years old, self-employed. He works in his agency as a specialist for user experience design, and focuses on the user-oriented design of interactive systems.



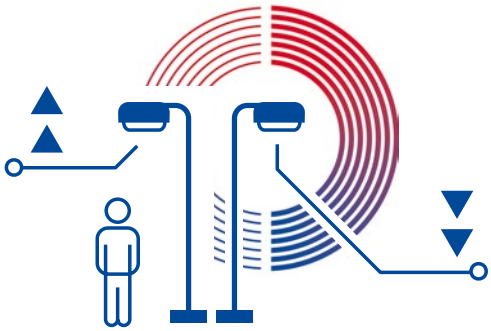
Anna Pfeiffer

35 years old, nurse on the cardiac ward at Marburg University Hospital. Digital assistants on the ward have significantly eased her workload in recent years. She has more time for personal contact.

3:10 pm

Anna Pfeiffer has the afternoon off. She and her partner have appreciated the flexibility of digital working arrangements even more since the birth of their daughter. Both work in care, both on the ward and from home in care management. Anna also gives digital lessons to trainees.

Using a non-commercial neighbourhood app, she has just done the weekly shopping at the grocer around the corner. Now she is enjoying her free time by viewing a special exhibition at Frankfurt's Weltkulturen Museum – in an online tour. Thanks to the free Wi-Fi, she can enjoy the afternoon in a street café and tell Maria Hoffmann about it via a chat app at the same time. The two have known each other since Maria was in her ward two years ago.



10:30 pm

In Hesse – from Bad Karlshafen to Hirschhorn – the lights are slowly being dimmed. Central squares and traffic routes remain bright. In the residential areas and smaller towns, however, where people are going to bed, it gets dark. Only in areas where individual cars, cyclists or pedestrians are still on the move, the street is illuminated as if by magic and accompanies them safely on their way.

7:30 pm

Sophia Petrescu goes to the theatre with her French partner in real life. The two are using complimentary tickets they received for their contributions as »digital mentors« at a special school in Karben. A contemporary version of »Woyzeck« is playing. Her companion hears an AI-based simultaneous interpretation through her headset. To the delight of the growing audience, the analogue theatre experience has not changed in the past ten years.

INTRODUCTION

Introduction

Hesse's digital offensive

1. Looking to the future

Around 30 years ago, the World Wide Web was born. Almost 25 years ago the smartphone appeared, and ten years ago artificial intelligence (AI) began advancing rapidly. Today, smartphones are indispensable for navigating in traffic, purchasing tickets for buses and trains, authentication for online banking, or receiving warnings from a COVID app. And the applications are increasingly AI-based.

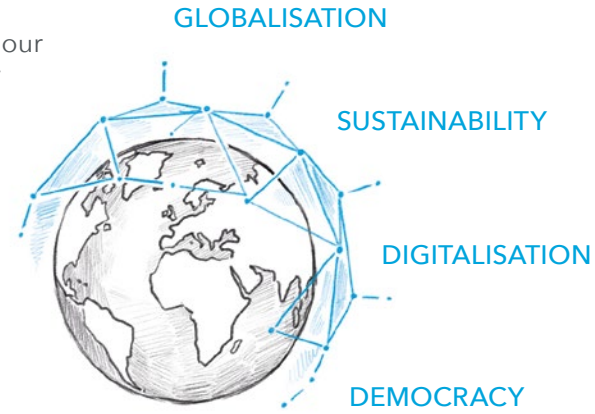
No one could have foreseen all this 15 years ago. Today, we speak of a »digitalisation megatrend«, but we cannot forecast exactly where the future will take it. However: With high-performance networks and processors, a world of new technologies and applications is emerging, in the private sector as well as in business, services, medicine, education, administration and much more. »A Day in Hesse 2030« demonstrates the possibilities that arise when we work together to successfully shape digitalisation for our state.

This is not science fiction. As a result of fibre optics and 5G technology, data can already be transmitted virtually in real time with minimal delay. These key technologies provide the foundation for the Internet of Things and all its potential applications for smart homes, smart cities, autonomous driving, and Industry 4.0. Furthermore, with the 6th generation of mobile communications already underway, we will experience significantly higher transmission speeds in the 2030s, accompanied by greater device density and AI integration on a comprehensive level. We need to anticipate tomorrow's potential today and set the right course – because we want a digital Hesse where the future begins!

One thing is of particular importance: Digitalisation does not only take place in the cloud or on the screens of our computers and mobile devices but is something we do together. It is tangible. In interactions with others. At school and university. In the office and company. With friends, acquaintances or strangers. Digitalisation can overcome distances and help people to lead a self-determined life.

It provides almost unlimited access to information and can inspire creativity. However, it also raises concerns and reservations where risks and undesirable trends become apparent, or people feel overwhelmed by new technologies. In order to ensure responsible digitalisation, we need appropriate knowledge and skills, access to devices and the internet, as well as rules and guidelines which could range from unspoken agreements to binding laws.

The digital transformation is having a significant impact on our lives and on the world at large. Just like the protection of natural resources and the climate, globalisation, and the future of freedom and democracy, it is one of the great challenges of our time. At the same time, digitalisation holds an enormous potential for economic, ecological and socially sustainable development. As a prerequisite for a responsible digitalisation offensive, we want to make use of this potential in order to drive forward the Sustainable Development Goals of the United Nations' 2030 Agenda in Hesse.



2. Channelling and actively shaping digital policy

Our state of Hesse is one of the strongest and most liveable regions in Europe. Our goal is to maintain and build on these advantages in the digital age. In 2016, the Hessian state government adopted the digital strategy to take the challenges of digitalisation into consideration. Furthermore, the present strategy update clearly illustrates our commitment to not only being followers who use the digital transformation, but also to actively shape it. Hence, the coalition agreement for the 20th legislative period pursues the goal of utilising and capitalising on the opportunities offered by the digital transformation in order to best prepare Hesse for the future.

Two points are crucial for the success of the Hessian digitalisation offensive: Firstly, all areas of responsibility of the Hessian state administration must work together in a targeted way. In Hesse, digital policy is therefore understood cross-sectionally and beyond departmental boundaries. Through their technical expertise and work, subordinate authorities and networks, the ministries strive to achieve consistent digitalisation in all areas of government and its integration into all state functions.

Secondly, for digitalisation to be successful, as with all other topics of outstanding strategic importance, it is essential to consolidate core competencies centrally in order to achieve the desired success. For this reason, a new department for the Minister for Digital Strategy and Innovation was created in Hesse. Her responsibilities not only include the development of the digital infrastructure, digitalisation of administration, promoting digitalisation in municipalities and smart regions, coordination of artificial intelligence activities, and promotion of digital innovations, but also the targeted orientation of the state government's digital policy and the continuing development of the strategy.

Furthermore, the Minister for Digital Strategy and Innovation is responsible for managing the financial resources allocated by the State of Hesse for the digitalisation offensive. To ensure the appropriate use of funds and to track progress in the implementation of digitalisation measures, a controlling system was developed. Apart from this budgetary monitoring, the state of Hesse will also develop a custom digitalisation index that identifies important indicators for digital transformation in Hesse and review them regularly.

With its digital strategy, the state government provides a reliable framework for implementing the necessary measures and processes. Despite all the dynamics of digital change, there is a clear, value-based orientation framework for policy-making:

GOALS →

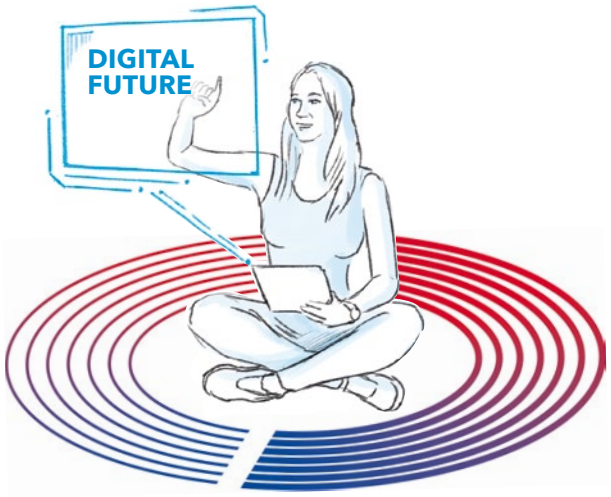
- We want to harness the potential of digitalisation for our citizens, their quality of life and opportunities for development.
- It is important for us to sustainably strengthen the economic and innovative power in Hesse in order to foster the emergence of digital innovations, products, and services and to overcome the threshold to market entry in the interest of the people.
- It is our objective to enable participation in the digital future and avert risks through active security measures to protect citizens, companies and the administration.
- The free democratic basic order provides the unshakeable foundation and guides all other actions. We are shaping the future landscape of digitalisation in line with these values and for cohesion in our society.

3. Putting people front and centre

Saying that people are at the centre of Hesse's digital strategy is more than just a well-crafted maxim: In other words, it represents the attitude and approach of the Hessian state government to shape the digital transformation in the state. Digitalisation is conceived consistently from the perspective of how it benefits our citizens, and we asked ourselves the following when updating the strategy:

What do creative minds in science and research need to be able to develop their potential for digital innovations? What do founders require to take new digital products and processes out of the laboratories and turn them into practical applications? What do self-employed individuals and companies need for a successful digital transformation and to strengthen their competitive advantage? What do young people in the digital world need for their lives and careers? What potential does digitalisation hold for senior citizens or people with disabilities? How can people in urban and rural areas benefit from digital innovations?

It is important to us that people, along with their needs, expectations and opportunities be at the forefront of all strategic considerations. Technology must serve them – not the other way around. We want to make digitalisation a success for everyone, not just for the particularly agile or technologically savvy. To accomplish this, we need to ensure that digitalisation is accessible to everyone, both locally and globally, and that the digital divide between online and offline does not deepen but is instead bridged. We want to make digitalisation inclusive and strengthen digital opportunities and skills.



As part of the strategy process, we have chosen three approaches to help us gain a deeper understanding of the different spheres of life, perspectives, and requirements of digitalisation:

- Firstly, in 2019, at the recommendation of the Digital Ethics Council of the Hessian state government, we developed a set of idealised typical persons (»personas«) for digitalisation in Hesse. With their respective needs, attitudes, and user profiles, they represent the different target groups in Hesse which were identified as part of a scientific study through citizen surveys and study evaluations. Based on these personas, strategy development will focus on the actual added value of digitalisation for citizens, on the necessary foundations and accompanying digital policy measures, and on their impact.

- A second approach was to involve a variety of interest groups and to obtain the expertise of associations, digitalisation initiatives, companies, science, and politics, such as the invited digital policy spokespersons from the state parliamentary groups. In their statements, these groups outlined many points for action and real-world approaches and solutions.

- Thirdly, we received input from interested citizens, both from our website and through our participation formats for the strategy update. In response to the pandemic, we have established many open channels in virtual spaces as part of the strategy process.

4. Strategy in dialogue

More than 700 Hessians got involved in our participation process in 2020, both at a strategy conference in late August with live streaming and in seven thematic online forums. Apart from the aforementioned contributions from social, economic and scientific institutions, we received a large amount of input via the accompanying website and a participation platform.

For us, this is the beginning of the dialogue, but not the end. We are open to hear everyone's wishes and needs, as well as hard facts and assessments of experts. For us, a scientific foundation and a culture of participation form the cornerstones of an evidence-based understanding of policy that remains open to consultation, and which constantly evaluates its own course in light of technological, economic and social developments. We can establish an

orientation framework here and now and implement measures to generate the necessary impetus for digitalisation. At the same time, we will ensure that our digitalisation strategy remains open for adjustments at all times.

As we have already done in the past, we would like to continue to involve citizens, experts and other stakeholders in updating the digitalisation strategy and the conception of individual offerings and measures. This is accomplished through regular citizen discussions, in thematic advisory rounds and think tanks, in IT networks and digitalisation committees, and last but not least, in the Digital Ethics Council, which was established in 2018.

The digital transformation with its technological developments will continue to raise new questions and challenges in the future that will broaden our current horizon. New technological possibilities always need to be assessed in terms of digital potential, opportunities and risks. We therefore understand the strategy conception for Digital Hesse as an agile and dynamic process and will continue to identify future trends, digital innovations and resulting political tasks and take them into account in sub-strategies and action plans.

5. Hesse 2030: Cornerstones and action areas

There is an interaction between the political levels with regard to digital policy, but it is primarily the responsibility of the state. Hessian companies benefit from good digital infrastructure, subsidies and consulting services for their digital transformation. Education and research, which are among the core tasks of the state, are drivers of the digital transformation and as such create skills and innovations. The promotion of knowledge and technology transfer, regional networks and digitalisation in the municipalities ensure dynamism in the evolution towards smart cities and regions. Innovations in public services and in the areas of health, life and work should have a positive impact on people's everyday lives.

The state is responsible for a sustainable digital transformation process as well as cybersecurity and data protection, although many measures can only be accomplished in cooperation with the federal government and the European Union. Therefore, we are seeking meaningful links and are utilising synergies with the digital strategies of the federal government and the European Union. Through the Federal Council, the State of Hesse continues to actively shape legislation on digital policy at the federal level and makes use of its opportunities to participate in European projects in digitalisation. The goals set out in the EU Commission's strategy paper »2030 Digital Compass« are congruent with our digitalisation priorities in key areas.

Digitalisation permeates all areas of life, and inevitably politics as well. Hence, all departments have contributed to the present update of the digital strategy with their specialist expertise and corresponding areas of responsibility. They have also helped to shape the following action areas to ensure that the Hessian state government's digitalisation offensive achieves a particular impact and effect. The focus was on the central question of the future of digitalisation:

How can the tremendous advances in digital networks and data transmission rates, as well as the exponential growth in computing power, be used for digital innovations and applications in business, science, and society?

At the same time, we keep in mind that technological progress will only be beneficial to the people of Hesse if the digital transformation is successful in the action areas described below and digital skills are developed in the process.

Two essential cornerstones have an impact on all action areas and provide the prerequisites for the success of digitalisation in Hesse. The update of the Digital Hesse Strategy therefore devotes considerable attention to them. They are:

Digital infrastructure:
Comprehensive, powerful, innovative

Digital rules of play:
For a safe, secure and fair society

Additionally, the digital strategy outlines six action fields that describe important success factors for digital transformation as well as the potential our state hopes to realise by successfully driving digital progress. They are covered in the following chapters:

Digital innovations:
Responsible science and research

Economy and Work 4.0:
Successful and high performing through digital transformation

Digital education:
Strengthening skills, discovering innovations

Digital society:
Furthering health, enabling participation, promoting access to culture

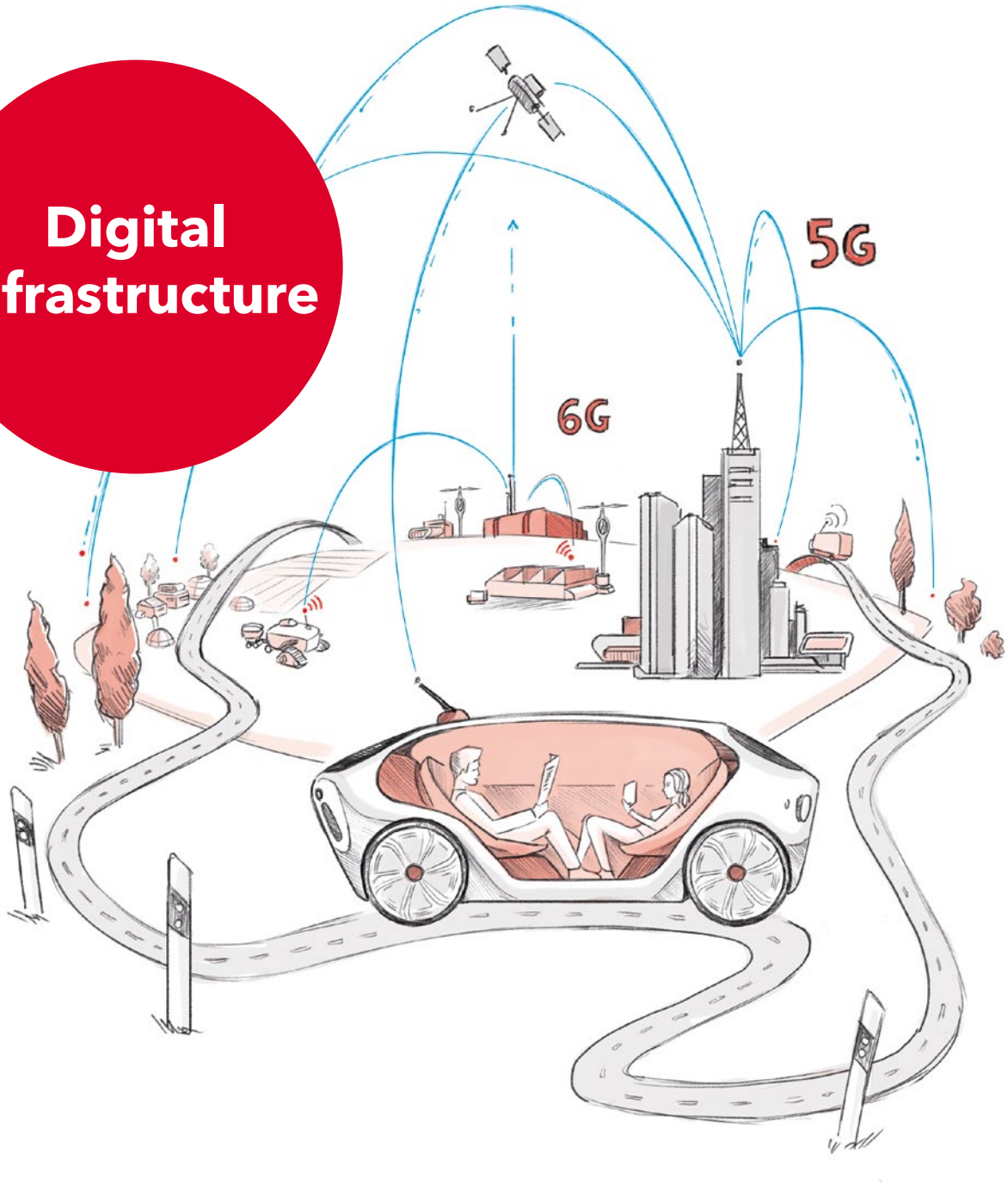
Smart region:
Intelligent solutions for urban and rural areas

e-government:
Close to the people, customer friendly and secure

As part of this digital strategy, we continue the efforts begun in the past years for the purpose of pursuing a long-term, measured and forward-looking digitalisation policy for the years up to 2030.

CORNERSTONES

Digital infrastructure



Comprehensive,
powerful, innovative

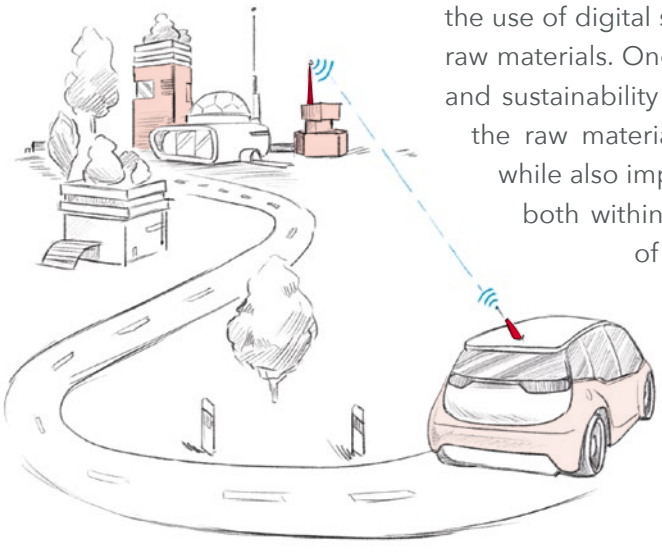
1. Digital infrastructure

Comprehensive, powerful, innovative

VISION 2030

Thanks to extensive coverage with networks, data centres and data storage facilities, we can work worldwide, control machines or regulate building technology in an energy-efficient manner from any location in Hesse. We drive autonomously and accident-free on urban and rural routes. We share our vital signs with the doctor's office in real time and receive prompt assistance in an online consultation. Hesse is committed to sustainability.

The basic prerequisite for innovative business models in the digital economy, smart solutions in the municipalities, digital education in schools and universities, as well as for the digitalisation of the administration is the widespread availability of gigabit-capable subscriber networks and high-performance mobile networks. These networks serve as the backbone of the Internet of Things and other digital technologies and applications that contribute significantly to sustainability and energy savings. In addition, high-performance computing power and high data availability are among the factors driving digital innovation, since only in this manner can the potential of digitalisation be realised, particularly for businesses and scientific research.



Hardware production, the operation of servers and digital infrastructure, and the use of digital services all contribute to the consumption of energy and raw materials. One challenge is to systematically exploit the opportunities and sustainability potential of digitalisation and at the same time reduce the raw material consumption of digital hardware and infrastructure, while also improving the carbon footprint. We are vigorously pursuing both within the framework of the digital strategy. Hence, in terms of digital infrastructure, we focus on the various facets of network expansion **(a)** and on powerful and sustainable computing and data infrastructure **(b)**.

a. High-performance networks thanks to the Hessian Gigabit Strategy

GOAL

- Our goal for 2030 is an extensive gigabit network coverage and 5G for high-performance and fast data transmission – from anywhere. Hesse is optimally prepared for digital applications utilising 5G and the introduction of 6G.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

The provision of digital fixed and mobile networks in Germany is the responsibility of the private sector. With new players on the market, competition to roll out modern networks is picking up speed in large parts of the country without state support.

To create equal living conditions in all parts of the state and make modern networks for digital innovations everywhere accessible, we continue to promote and support the expansion of fixed and mobile networks in areas where the market does not provide coverage. For this purpose, we advocate fair and easily implementable regulations at the European and federal level.

The Gigabit Strategy for Hesse marks the steps towards the super-fast networks that the constantly growing data traffic demands – demand-oriented, implementation-oriented and comprehensible. Its goal is to get all citizens to use digital technologies and tap into their potential. By consolidating all digitalisation projects under one single department, the expansion of digital infrastructure can be swiftly advanced in a targeted fashion. This is proven not only by our successes in a nationwide comparison, but also our ambitious goal for the future.

In the participation process for the digital strategy, high-performance digital infrastructure was one of the key demands:

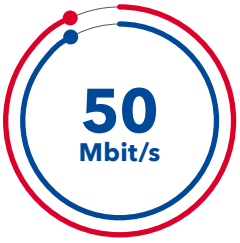
»Gigabit networks are the backbone of the digital transformation.«

✔ Fibre optic roll-out:

As part of our Gigabit Strategy, we are working with municipalities to provide gigabit connections throughout the state by the end of 2025, and fibre optic connections with in-house cabling by 2030.

In the gigabit roll-out, socially or economically relevant facilities, such as business parks, educational institutions and health facilities, will be prioritised and connected by the end of 2022. In the pandemic year of 2020, it was an advantage for distance learning that 61 percent of schools already had gigabit-capable connections in July.

Broadband coverage in Hesse at the end of 2020: **96,5 % of households and 96,0 % of business locations**



The simplification of building and planning law and allocated funds of around 270 million euros for the years 2020 to 2024 clearly demonstrate that the Hessian state government is giving high priority to the gigabit expansion. 100 million euros alone are available to upgrade commercial areas with fibre optics in order to make Hessian companies fit for 5G. One focus of the programme is the provision of services in rural areas. By doing so, we ensure that coverage is improved in these regions and bring it in line with standards in urban areas.

For the small number of remote locations that cannot be connected via underground cables for economic reasons, numerous satellites already enable the transmission of internet data in Hesse from space. We support the use of satellite technology for providing extensive high-speed internet coverage.

GigaMaP:

Successor to the Hessian broadband information portal hesbis, the GigaMaP portal is the central digital online control and information platform for gigabit expansion in Hesse. It assists municipalities, districts and participating companies with implementing the gigabit strategy. In this way, we are giving the Hessian municipalities a tool to better meet the challenges of the expansion.

More information on the GigaMaP-Portal:
www.gigamap-hessen.de

In the public sector, the platform provides citizens, businesses and companies with important broadband coverage data, among other information. Registered users will also be able to evaluate infrastructure data in the future. With the tools provided, they can plan network expansion measures and carry out approval procedures. Thanks to regular updates and functional enhancements, GigaMaP can be used to advance the expansion of broadband and mobile communications even more rapidly.

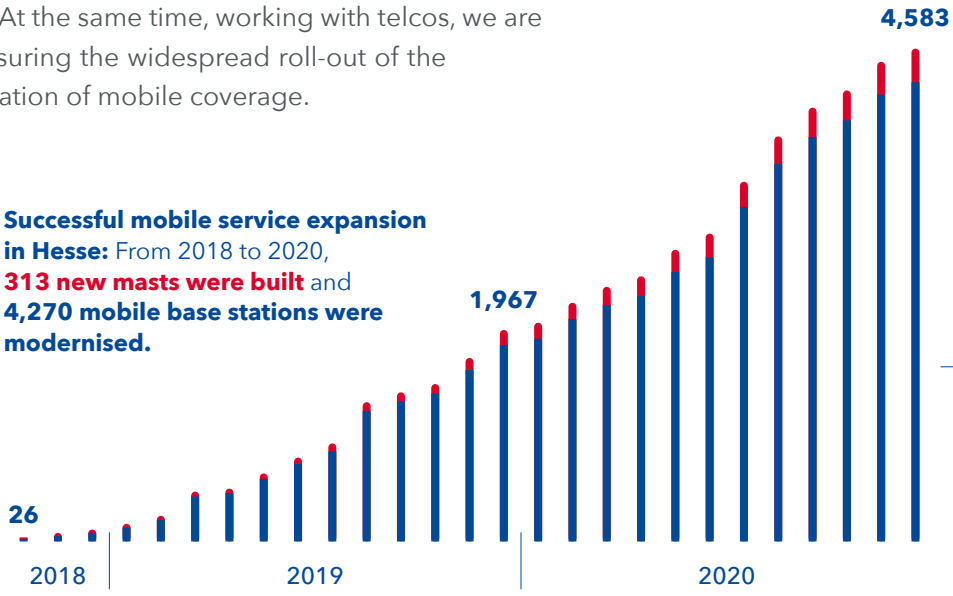
Mobile communications pact:

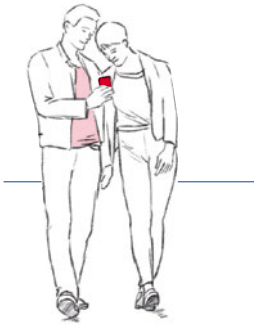
With 4G LTE coverage reaching 99.8 per cent of households, the state of Hesse is one of the best-served territorial states in Germany in the mobile communications sector. We want to take this even further: Together with telecommunications companies, we are working full steam on expanding capacity within the framework of the mobile communications pact. The modernisation of 4,270 mobile phone masts and the construction of 313 new ones by the end of 2020 have already noticeably improved mobile phone coverage for citizens.

More interesting facts about mobile services in Hesse:
www.mobilfunk-hessen.de

In November 2020, Hesse became the second federal state to launch a specially designed funding programme for the expansion of mobile telecommunications that will eliminate the very last few remaining white spots. The state is allocating 50 million euros to fund the construction of up to 300 additional mobile base stations. Rural areas in particular will benefit from this. In addition, Hesse was the first federal state to amend its building regulations, simplify the search for sites and shorten approval procedures. Our firm commitment to this strategy continues. At the same time, working with telcos, we are already ensuring the widespread roll-out of the next generation of mobile coverage.

Successful mobile service expansion in Hesse: From 2018 to 2020, **313 new masts were built** and **4,270 mobile base stations were modernised.**





5G expansion:

The next evolutionary stage in mobile communications, 5G technology, creates the basis for the large-scale intelligent networking of machines, devices, and people through higher data transmission capacities and increased network speeds. It is this technology which will make the visions of Industry 4.0 and autonomous driving possible.

Mobile network operators started the 5G roll-out in 2019 and since then have put numerous 5G base stations into operation. A future-proof expansion of capacity is essential to further advance digital technologies and the Internet of Things in an everyday use. We strongly support this expansion. This applies in particular to rural areas and possible applications in smart regions, which we are fostering in testing grounds and model projects.

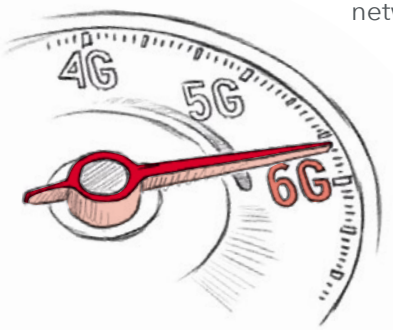
The expansion of mobile telecommunications cannot be achieved through funding and technology alone. Transparency in the expansion projects and acceptance among the population are other essential factors for success. That is why another priority of the Hessian state government is to assist local authorities with initiating a dialogue on the ground. We aid them with answering the diverse questions concerning the expansion of mobile telecommunications and by providing scientifically sound information, especially regarding mobile communications and health.

✔ The new generation 6G:

With 6G, the next mobile network standard is already on the horizon and is currently in the basic research stage – a launch is expected by the end of this decade. The standard will enable mobile communications in the terahertz range for the first time, thereby ensuring much higher bandwidths, even faster transmission speed and better coverage for end devices. Use cases go far beyond autonomous driving and will open up new possibilities in the field of AI.

Thus, the integrity and security of digital infrastructure will become even more important. Hesse will strive to ensure that standards developed on the basis of European values but with a Hessian signature generate added value in our state, on both the software and hardware sides, and in particular, promote use cases that are »Made in Hesse«. The special Hessian expertise in the field of cybersecurity at the Hesse CyberCompetenceCenter (Hessen3C) is expected to be a focus of our activities.

The expansion of the fixed and mobile network infrastructure, which is already underway, plays a central role in the comprehensive roll-out of the network. We will ensure that Hesse is optimally prepared and plays a leading role in the launch of 6G.



Wi-Fi in Hesse:

Public Wi-Fi is an integral part of digital municipalities and regions in Hesse – be it at educational institutions or state authorities, in places with public traffic, or at tourist locations. Expanding freely accessible public Wi-Fi infrastructure is therefore an important goal in the state's Gigabit Strategy. With the successful and ongoing project *Digitale Dorflinde*, 1,295 publicly accessible Wi-Fi hotspots have been created in the municipalities, and 602 more have been commissioned or are already being implemented (as of: 28 April 2021). They are already contributing to neighbourhood development, attractive city centres and the promotion of tourism. We will continue to follow this successful path.

More about the project *Digitale Dorflinde*:
www.hessen-wlan.de

b. High-performance computing and data infrastructure as a calling card

GOAL

- We aim to strengthen the high-performance computing infrastructure in Hesse and become a pioneer in the field of energy-efficient, sustainable data centres and green IT. We combine this with a data ecosystem that can unleash its enormous application potential for the benefit of business, research and society.

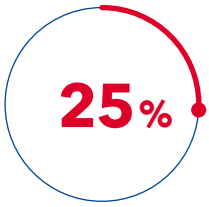
WHAT'S IN PLACE & WHAT WE'RE PLANNING

A central element and driver of digitalisation is, on the one hand, the exponential growth in the computing power of processors, which brings with it unimaginable increases in efficiency and technological advancements. Meanwhile, the collection, availability, linking, and evaluation of vast amounts of data presents new opportunities for research and application. Our vision is to expand and strengthen both of these as a calling card for Hesse, while maintaining a responsible governance approach.

However, data centres also account for a large share of total energy consumption. A study conducted by the European Commission indicates that this is expected to rise from 2.7 per cent of electricity consumption in 2018 to 3.2 per cent by 2030 in the EU member states – without taking into account consumption by end devices. This is being reinforced by the trend towards cloud computing.

In the past, efficiency-enhancing measures have led to a reduction in energy consumption from the processing and transmission of data. Increasing efficiency, however, allows for ever more intensive data use, a phenomenon known as the boomerang or rebound effect. This explains why, from 2010 to 2020, the amount of data transmitted worldwide increased by a factor of almost 20, but the energy demand for data centres in Europe only increased by 55 percent – all thanks to sustainable digital technology. Despite this, the figures indicate that there will be an even greater rise in energy demand on account of enhanced digitalisation, even though digital services are being delivered in an increasingly efficient manner. We intend to counter this via suitable measures.

Data centres as a calling card:



A quarter of all data centre capacity in Germany is located in Hesse.

Hesse is currently home to approximately a quarter of Germany's total data centre capacity. In the case of colocation data centres, in which operators provide space for various companies, as well as large-scale data centres, Hesse accounts for over 40 percent – and this figure is rising. In recent years, particularly Frankfurt am Main has emerged as the data centre capital of Europe.

One of the reasons for this is the world's largest internet node in terms of data throughput being located here, DE-CIX. The second reason is the strong financial and banking sector in the Rhine-Main metropolis with its high demand for large data centres that store and process personal data within the EU rapidly, securely and in compliance with EU law.

All major data centre providers have announced that they will be investing large sums in the further expansion of data centres in the Rhine-Main region. In addition to maintain this competitive advantage of our region, we want to support the further expansion of IT hubs in Hesse, and enhance their energy efficiency, among other things, by establishing and consulting on a new data centre office in Hesse from 2022 forward.

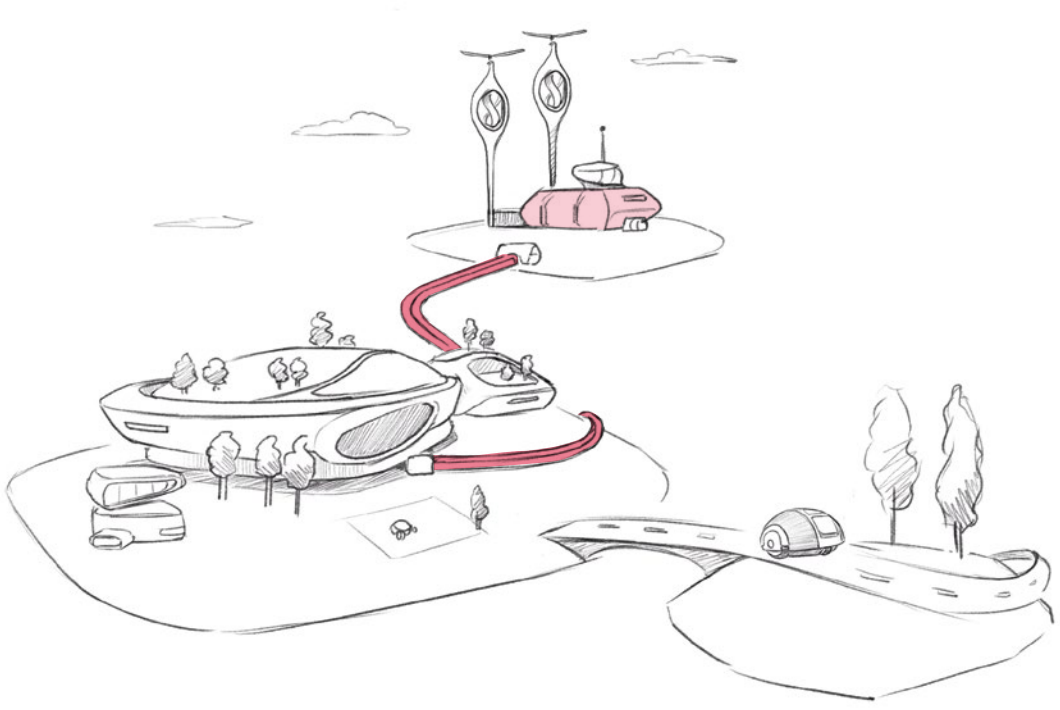
Efficient, sustainable data centres:

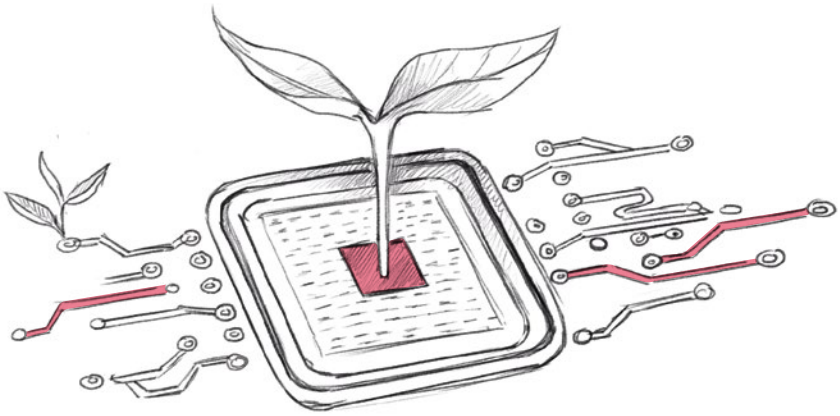
For the development of more sustainable data centres, we are focusing on three key technologies: First, covering 100% of demand using renewable energy, second, the rationalisation of computing processes, and third, more efficient ways of cooling data centres. The state of Hesse is increasingly focusing on projects to enhance efficiency and reuse of its waste heat, such as for surrounding commercial or residential areas.

Via suitable measures, we promote close collaboration between all stakeholders – from data centre operators, energy suppliers, grid operators, and urban planning offices to science and industry – so that energy-efficient data centres, load flexibilisation and energy efficiency networks are realised. The House of Energy supports this process with its funding consultations, as does the State Energy Agency.

The aim is to advance the sustainability and climate goals around digital infrastructure, to connect stakeholders, and to increase the visibility of best-practice examples. Hesse already has flagship projects for energy-efficient and sustainable supercomputing and technologies which are in demand worldwide. We plan to launch further model projects and become a leader in energy-efficient, sustainable data centres and green IT by utilising the research expertise within the state and the commitment of funding.

More about sustainability in Hesse:
www.hessen-nachhaltig.de





Green IT:

Apart from energy efficiency, the environmentally friendly and resource-saving use of information and communication technology (ICT) throughout the entire life cycle of devices – from production and operation to disposal – is one of the core tenets of digital sustainability. We have committed ourselves to the following: As part of the »CO2-Neutral State Administration« project of the Hesse sustainability strategy, we want to focus on the climate neutrality and energy efficiency of IT infrastructure, ensure sustainable procurement, longevity and environmentally friendly disposal of IT systems and equipment, as well as harness the sustainability potential of digital working methods and processes in the state administration.

Furthermore, we will be devoting particular attention to the topic of green IT in the context of research funding and technology transfer in the state. The aim is to develop ground-breaking and resource-saving digital products and applications that can be used in companies, municipalities and private households.

Data platforms:

Platforms that systematically capture data, store and make it accessible over the long term play a central role in the success of the digital transformation. The Hessian state government supports the creation of such data platforms in a variety of ways, be it the Financial Big Data Cluster (FBDC) as part of the European cloud initiative GAIA-X in Frankfurt (see action field »Digital innovations«), the envisaged health data hub (see the action area »Digital

society«), or the data platforms for smart region applications, such as those to be made available to municipalities via ekom21. We will support the establishment of data platforms in all fields of application in which they recognisably provide added value for society, and we will take appropriate measures to meet the requirements for data protection and the data sovereignty of citizens.

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Whether in research, companies or municipalities – access to data is mentioned as a decisive factor in the comments on the digital strategy:

»Artificial intelligence only works on the basis of comprehensive data. This requires joint initiatives – in the state, on the federal level and in the EU. The GAIA-X project is one of them.«

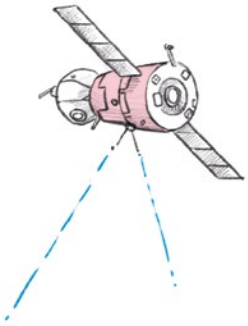
Now that the State of Hesse has joined the nationwide open data association GovData, all Hessian authorities, municipalities and institutions can use this portal to offer open data in a standardised format and on a voluntary basis worldwide. The Hessian geodata portal is already part of these open data offerings. These initiatives pursue our intention to be able to better utilise and further process collected data from the administration to gain new insight and explore fields of application through their evaluation.

We want to offer these opportunities, but at the same time also focus on a regulatory framework that protects public data from misuse and undesirable usage.

✓ Satellite technology:

In addition to internet access from space for remote inhabited areas, satellite technology also opens a variety of other data access and application possibilities. For example, the use of satellites in Agriculture 4.0 provides considerable potential for network connectivity, machine communication, sensor networks and applications on the Internet of Things. We will continue to expand the use of satellite technology in agriculture, promote the implementation of pilot projects and support targeted research projects.

In the utilisation of geodata, the satellite-controlled European earth observation programme Copernicus harnesses the world's most powerful infrastructure for the provision of global environmental information. The data generated by this programme holds great potential. The state wants to enhance the possibilities for using geodata and will make them available to a greater extent than before. We particularly support pilot projects aimed at transforming Copernicus data into user-oriented applications.



Digital rules of play

For a safe, secure and fair society

2. Digital rules of play

For a safe, secure and fair society

VISION 2030

Hesse stands for a safe and secure environment and fair play in the digital world. Our data provision and use are optimally aligned with the common good, individual data sovereignty, and economic interests. Businesses and the population are protected from data monopolies and distortions of competition, and data is used and shared responsibly. Hesse is a role model for cybersecurity and digital consumer protection.

We are experiencing a digital transformation in every aspect of our lives. There are positive and negative sides to this. It includes technological possibilities that can undermine our democratic constitutional state's protections and rules. Therefore, digitalisation requires a modern regulatory law for society and the economy and a digital agenda for the law, as was initiated at an early stage by the Hessian state government on the federal level.

In this regard, the commensurate provision and use of data **(a)**, protection against cyberattacks and new forms of cybercrime **(b)**, the expertise in and strengthening of cybersecurity **(c)** and the digital adaptation and enforcement of our rule of law and consumer protection **(d)** constitute key aspects of our digital strategy.

a. Responsible data provision and data use

GOAL

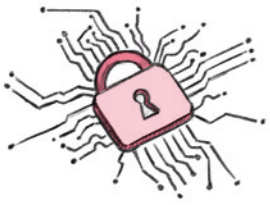
We will develop the legal and regulatory framework to ensure the commensurate provision and use of data. By pursuing a custom data strategy, the State of Hesse supports the creation of a single European data market that is in line with our fundamental democratic values and constitutional order.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

Hesse celebrated a memorable anniversary in 2020: Fifty years ago – on 13th October 1970 – the Hessian Data Protection Act came into force as the first data protection law in the world. It has long since ceased to be about restricting data in the hands of the state, as it was back then. Platforms and apps have now turned the use of personal data into a business model for placing personally tailored advertising. For this reason, the State of Hesse is continuously working to develop its data protection laws, both now and in the future, most recently by enacting the Hessian Data Protection and Freedom of Information Act in 2018.

OVER 50 YEARS AGO: THE **FIRST DATA PROTECTION LAW IN THE WORLD** COMES FROM HESSE!

Data is a crucial basis for tangible benefits and value creation in the digital sphere. Hessian companies benefit from an increased use of data, particularly in developments for Industry 4.0, the Internet of Things and the application of AI. In science and research, AI-supported data evaluation creates innovations for sustainable growth, prosperity and quality of life.



We are committed to ensuring that data can be made available responsibly and put to meaningful use for civil society, research and development, commercial enterprises, as well as administrations, in a way that its processing can yield insights and be used to develop business models that ultimately serve society as a whole. In doing so, we pay attention to the protection of personal data as well as particularly sensitive data, such as company and trade secrets.

Data strategy for Hesse:

Digital networking and services generate a large amount of data that can be used for other meaningful purposes in addition to their actual purpose of collection. We must ask ourselves how we can make these troves of data available to research institutes and companies for individual or societal benefit without compromising citizens' data sovereignty and their right to informational self-determination. For this reason, as part of its digital strategy, the Hessian state government will develop a data strategy which benefits from the added societal value that arises from the use of data, while protecting against data misuse.

The statements on the digital strategy frequently focus on data:

»Access to data is a factor for success in the digital world. Its use must be legal and responsible.«

Through dialogue with science, business and social institutions, we will develop and implement solutions for independent trust bodies between data providers and data users (data trust models) to enable data-based evaluations which benefit people. In doing so, we also rely on the expertise in the Digital Ethics Council and the Centre Responsible Digitality (ZEVEDI).

Together with the Federal Government and the European Union, we support the creation of a single European data market with common EU data spaces and standards within the framework of the GAIA-X initiative. We will support meaningful areas of application for responsible, innovation-oriented data provision and data use – for business, research, society and public administration. The digital strategy has already defined specific priorities in the areas of digital innovation, Economy 4.0, health, and smart cities and regions.

Open data:

Part of a responsible data strategy for Hesse is a commitment to open data as a core element of the digital future. Open data enables new business models, allows access to new scientific findings, and can be used profitably

in research and development. Citizens, science and research, economy, the media and the administration should be able to access previously unavailable public administration data quickly and easily. At the same time, data protection and other reasons that prevent publication are considered.

The administration itself can also benefit from open data and make better decisions based on it. State authorities and municipalities are expected to increasingly provide data in the GovData portal on a benefits-oriented scale and make it accessible to the public. The State of Hesse will resolutely tackle these challenges in the interest of the common good, and create the necessary legal basis for doing so.

More about the GovData portal:
www.govdata.de

Limiting data monopolies:

Data is the raw material of the 21st century, and having power over data usually also results in a strong position on the market. Therefore, a fair legal framework for the requirements of the platform economy is urgently needed. The two proposed regulations presented by the EU Commission in December 2020, the Digital Services Act (DSA) and the Digital Markets Act (DMA), are intended to make large platforms more accountable and ensure fair competition. Hesse is actively contributing to the debate regarding this modernisation of the EU legal framework.

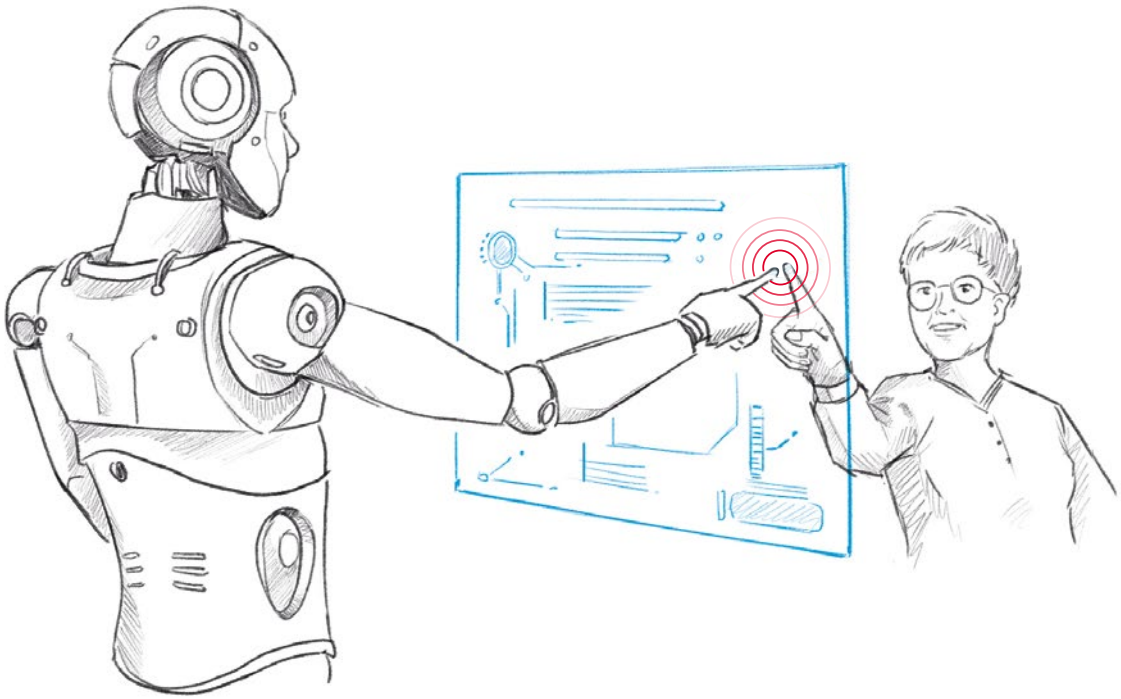
The many small and medium-sized enterprises (SMEs) and start-ups in our ICT-rich region should be able to benefit more from the platform economy, especially in the business-to-business (B2B) and business-to-consumer (B2C) segments. Hence, we will address the market imbalances in the data economy at the national and European levels.

To this end, the Hessian state government also expressly supports federal initiatives such as the tenth amendment to the Act against Restraints of Competition, also called the GWB Digitalisation Act, which came into force in January 2021 to protect the state's own SMEs and start-ups. It authorises the Federal Cartel Office to take targeted action against the abuse of market power by digital corporations in the data and platform market segment. The state government will work to ensure that similar instruments are also created at the European level.

AI and ethics:

Closely linked to the topics of open data and data monopolies is the processing of data with the help of AI. To compete globally, Europe needs a common ethical and legal framework for the use of artificial intelligence. Hesse is involved in strategic debates about the regulation of AI at the european and national levels to assist in shaping these developments.

It becomes increasingly important how ethical values can be operationalised in technical standards and which procedures should be used to test, approve and label AI technologies. The Digital Ethics Council of the Hessian state government has formulated four theses to initiate discourse between politics and society with the aim of increasing trust in AI-supported technologies. In the ethically responsible development and use of AI-based technologies and processes, the state relies on the high level of expertise and close collaboration with the Centre Responsible Digitality (ZEVEDI) and the AI centre hessian.AI. Hesse is thus an outstanding research location for responsible AI.



b. Active in cybersecurity

GOAL

Hesse is taking preventative action against the growing number of increasingly complex cyberthreats by intensifying networking between security authorities, which is supported by the Hessen3C competence centre. The Central Cybercrime Contact Point ensures better coordination of initial police measures and facilitates the flow of information between authorities.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

The Hessian state network is attacked many thousands of times each day. Targets for cyberattacks include municipal systems, critical infrastructure such as the electricity and water supply or hospitals, but also organisations, companies and individuals. Cybersecurity is a decisive factor for successful digitalisation. The development of the cybersecurity strategy by the Hessian Ministry of the Interior will act as a unifying force for cyber and IT security in Hesse and advance this action area of the Hessian digital strategy.

Cyberthreats are not only on the rise, but they are also becoming more and more complex and adapt quickly to changing conditions. One problem in countering them often lies in the jurisdictional boundaries of the security authorities. Better networking, communication and coordination between the security authorities is therefore essential for cybersecurity in Hesse.

Hessen3C:

Established in 2019 in the Hessian Ministry of the Interior, the Cyber-CompetenceCenter is where more than fifty experts from the administration, police and the Federal Office for the Protection of the Constitution work together to increase the security of the state's information technology, ward off cyber-specific threats and efficiently combat cybercrime. Hessen3C consolidates expertise in the areas of cybersecurity, cyberintelligence and cybercrime, and facilitates the exchange of information between the

HESSEN 3C
CYBER
COMPETENCE
CENTER

various government agencies. In doing so, the respective responsibilities are maintained and the principle of separation between the police and the Office for the Protection of the Constitution is strictly adhered to.

A cross-agency cybersecurity situation report is compiled daily. In the event of acute threats, affected state and local administrations are warned and informed immediately. With Hessen3C, operators of critical infrastructure and SMEs in Hesse have a central point of contact available around the clock to provide highly expert advice on cybersecurity incidents. A mobile unit can also provide on-site support if required.

As we move forward on this path of danger prevention, we will be dedicated to meet the current and emerging challenges of cybercrime with a high level of expertise, speed, and attention. Hessen3C will be accompanied politically by a Hessian IT Security Act.

✓ Investigation and prosecution:

Crime is increasingly shifting into the digital space. Examples include crimes involving child and youth pornography as well as the sexual abuse of children and young persons, hate speech in social networks, or fraud in online commerce. The targeted use of technology helps to evaluate suspicious images and to track digital crime patterns. This is the only way

to detect and stop misuse and crimes on the internet as quickly as possible and to prevent further offences.

The first point of contact of the Federal Criminal Police Office for Internet Crime in Germany is the Central Office for Combating Internet Crime (ZIT), a department of the General Public Prosecutor's Office in Frankfurt am Main. It is considered a pioneer in the fight against cybercrime and was able to report an important success in 2021 with the dismantling of the Emotet network. It is particularly responsible for taking initial measures that secure evidence in offences involving child pornography and the sexual abuse of children, darknet crime, and combating criminal darknet platforms, as well as cybercrime in the narrower sense, such as hacker attacks, data theft and computer fraud. These tasks are to be continuously developed as part of the Hessian digital strategy. As a founding member of the European Judicial Cybercrime Network (EJCN), the ZIT aims to further promote European cooperation in the fight against cybercrime.

The cyber departments of the Hessian State Office of Criminal Investigation and the regional offices handle investigations connected to attacks on the internet, data networks, information technology systems or their data. Business enterprises can report such cases to the Central Cybercrime Contact Point (ZAC). The initial police measures will be coordinated from there. The ZAC ensures the flow and exchange of information with other authorities and agencies such as the Hessian police headquarters, the ZIT, Hessen3C, the State Office for the Protection of the Constitution, the Federal Criminal Police Office, and the State Criminal Police Offices of other federal states.

We will continue to bring together and strengthen this network of security and law enforcement agencies in order to maintain the necessary capability to act and strike against cybercrime, even in the face of new challenges.

✓ Digital resilience:

In a world where digital infrastructure forms the backbone of the economy and society, its resilience is of paramount importance. Hessen3C, the ministries of the state government and the KRITIS coordination office work closely together to protect critical infrastructure (KRITIS). Hessen3C is also the central reporting point for Hessian KRITIS companies in accordance with the BSI Act of the Federal Government, which stipulates regulations for the work of the Federal Office for Information Security.

The municipal service provider ekom21 also advises Hessian municipalities on cyber and information security via its Municipal Service Centre for Cybersecurity. The goal for the future is to achieve a nationwide standard on the basic IT protection profile for the majority of Hessian municipalities.

c. Cybersecurity competence

GOAL

The top-notch cybersecurity expertise in Hesse is strengthened and utilised to its full potential. Through consulting, training and other support services, companies, state, municipal administrations and other institutions enhance their digital skills in cybersecurity. A new culture of innovation enables the police to use digital tools tailored to their needs to better safeguard the security of citizens.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

Cybersecurity requires not only strong research and knowledge transfer, but also the participation of users. In the Digital Hub for Cybersecurity, science, companies and start-ups in the field of cybersecurity work closely to exchange and provide mutual targeted assistance in the development of security solutions. The INNOVATION HUB 110 was set up specifically to develop new software applications for police work.

The state is focusing on close collaboration, with the National Research Centre for Applied Cybersecurity ATHENE, and on targeted research funding. To reinforce these measures in various areas, the Hessian Ministry of Interior launched a cybersecurity research funding guideline in August 2020, through which application-oriented research results from the field of cybersecurity can be generated and made generally available and exploitable. The aim is to preserve and further develop trust in the integrity and reliability of the digital world. We are proud of the research excellence in Hesse and will not only continue to strengthen it, but also focus on networking, knowledge and technology transfer in the field of cybersecurity. We are placing particular emphasis on the following focal points:

Digital Hub for Cybersecurity and ATHENE:

As part of the Digital Hub Initiative of the Federal Ministry for Economic Affairs, Darmstadt was chosen as the location of the Digital Hub for Cybersecurity in 2017. The city, which is a science hub, has a vibrant security ecosystem that is unique in Europe. In the Digital Hub for Cybersecurity, stakeholders from research, companies and the start-up scene connect and form Germany's largest cybersecurity innovation community with an impact far beyond the country's borders. With its training and consulting services, the Digital Hub for Cybersecurity supports start-ups in the commercialisation, scaling and internationalisation of their security solutions. Furthermore, companies find the right security partners for their digitalisation projects.

Digital security is particularly important for the economy, as the statements on the digital strategy underline:

» Cybersecurity is a key competitive factor. The digitalisation of companies in Hesse cannot succeed without IT security and the prevention of cyberattacks. «

The digital hub is closely linked to the National Research Centre for Applied Cybersecurity ATHENE in Darmstadt. In a hitherto unique and innovative cooperation model of university and non-university research, ATHENE conducts application-oriented top-level research on cybersecurity and privacy protection for the benefit of the society, economy and administration. ATHENE and the Hessian Ministry of the Interior work closely and share information in their collaborations. The institution is an essential part of the cybersecurity strategy of the federal government and the state of Hesse. We focus on strengthening such clusters of excellence in Hesse and support the sharing of expertise between industry and research.

INNOVATION HUB 110:

Since August 2020, IT specialists have been developing software applications for digital police work together with experienced police officers in a start-up atmosphere at INNOVATION HUB 110. The network meetings bring together representatives from the government, business,

and science. This work aims to transform modern technology into a tool for citizen-centric, state-of-the-art police work.

Additionally, it seeks to improve the police's communication and their immediate availability for citizens. The use of AI is of key importance in the areas of big data and mobility. With hessenDATA, the Hessian police already has an analytical platform for combating terrorism, extremism and serious crime. hessenWARN is an app for citizens that informs them about possible dangers in their immediate environment. In the future, they will also be able to send a wide variety of messages, thus allowing municipalities and the police to react even more directly to dangerous situations.

Under the motto »Rethinking security«, INNOVATION HUB 110 will continue to focus its work on digital innovations to strengthen the security of citizens in Hesse.

✓ Prevention and education:

An important pillar of the state's cybersecurity is enhancing digital skills. Hessen3C regularly conducts crisis and alert drills – not only within the state administration. Additionally, support services are being expanded for institutions involved in data-sensitive fields such as health and education.

Through the DIGI Check and DIGI Advice services for SMEs, these and municipal administrations are made aware of possible threat situations and their protective measures enhanced. Civil organisations and associations can also benefit from support in the form of information and advisory services, for example as part of the support programme *Ehrenamt digitalisiert* (Volunteers go digital), so that they can work in compliance with the GDPR and effectively prevent the misuse of data.

d. Digital Agenda for Law

GOAL

We aim to better adapt our legal system to the requirements of digitalisation. We want stop hate speech and the incitement of hatred in all its forms by offering state reporting centres. We want to empower our citizens to make sovereign decisions as consumers and to be able to defend themselves in cases of fraud.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

To ensure that the basic democratic values and rules of the analogue world are also enforced in the virtual world, we rely on an active rule of law and the elimination of existing regulatory gaps. As part of the Digital Agenda for Law, the Hessian state government is campaigning at the federal level to achieve this objective. Furthermore, with the ZIT, we have a competent law enforcement agency to combat internet crime. The prevention of extremism and consumer protection advice are also being continuously improved.

Digital Agenda for Law:

Unpleasant things we experience in the digital world include the spreading of false reports, personal insults and threats, spying and the misuse of data or identities, violations of copyright law, and many other infringements and rights violations.

To counteract such undesirable developments, the Hessian state government initiated a Digital Agenda for Law at the federal level early on. Together with other states, it repeatedly demanded adjustments to the legal system in Federal Council initiatives, which were subsequently made.

In 2015, Section 202d was added to the Criminal Code, which explicitly criminalises data theft. In 2020, the attempt of child grooming became punishable. This year, the law against right-wing extremism and hate crime came into force, which was strongly advocated for by the Hessian state

government. For many years, Hesse has been advocating the punishment of »digital trespassing« as well as for more effective tools in the investigation of crimes in the digital space and better protection for victims. In the coming years, we will continue to pursue this consistent further development of the rule of law so that regulatory gaps may be closed and to ensure that our »analogue« legal framework is fully valid and enforceable in the virtual realm as well.

In addition to dealing with new forms of crime, data abuse or information security, these amendments also address consumer protection, protection against discrimination based on automated decisions, the reduction of competitive disadvantages, the protection of personal rights, data sovereignty and intellectual property. Throughout the era of digital transformation, we will continue to consistently shape the appropriate regulatory framework for society and the economy in cooperation with the federal states, the federal government and the EU.

✓ Hesse against hate:

Hesse is a state governed by democracy and the rule of law, of openness to the world and mutual respect – in all areas of society, both online and offline. As a state and in society, we continue to take a firm stand against hatred, extremism and false propaganda on the internet. We advocate clear and severe consequences under criminal law and demand, the official criminalisation of defamation on the internet as a crime on the federal level.

The establishment of the operational Central Office ZIT has enabled us to create a sharp weapon of prosecution in response to the increasing number of cases – with the addition of 10 new positions in 2020. With the establishment of the online reporting platform *#Hessen-gegen-Hetze* (Hesse against hate) for hate speech in Hessen3C and the app *MeldeHelden* of the Hessian Ministry of Justice, the state government has set up contact points where citizens can report hate comments quickly, easily and, if necessary, anonymously. Criminally relevant content will be reported and prosecuted accordingly.

#HESSE AGAINST HATE

In the future, we will continue to rely on a strong rule of law with clear boundaries and on prevention. The state programme »Hesse – active for democracy and against extremism«, which also includes an advice centre for citizens at the State Office for the Protection of the Constitution, is an example of the preventative approach to safeguard against extremism. The

Hessian justice system also cooperates with the Hessian State Institute for Private Broadcasting and New Media, the University of Kassel, various media companies and actors from civil society who are committed to combating hate on the internet. We are also committed to grow digital media literacy in schools and other educational institutions as part of our digital strategy.

✓ Consumer protection:

Whether for products, software or services – we are customers in the digital world and enjoy consumer protection rights just as we do in the real world. The state of Hesse pays attention to whether these rights are guaranteed and, for example, the contractual declaration of intent is clear at all times. In addition to consumer protection law, we focus on transparency and competence through a broad range of offerings for online information and advice. The aim is to strengthen consumers' personal responsibility and to enable them to make sovereign decisions as to whether and how they want to integrate digital products and services into their everyday lives.

Data protection is the protection of fundamental rights and also protects citizens as consumers. The aim of the Hessian state government is to modernise data protection and make it more consumer friendly. In the past, Hesse has therefore advocated for greater self-determination in the handling of personal data and increased data security in ICT applications at the Ministers' Conferences for Consumer Protection. Citizens must be able to actively decide what happens to their data and how it is used. Hesse advocates a high and uniform level of data protection at the federal level and in the EU, which must apply regardless of the geographical location of the data processing.

The state government also advocates that the development of new devices, programmes and applications be examined more intensively in future to determine the extent to which data protection is adequately practised, and to identify any impact on the protection of privacy. In the future, we aim to further promote transparent, data-minimising, controllable technological design that avoids misuse (»Privacy by Design«) and suitable technical and organisational measures for data economy during its use (»Privacy by Default«), as set out in the EU's General Data Protection Regulation.

ACTION AREAS

Responsible science
and research

1. Digital innovations

Responsible science and research

VISION 2030

Hesse is home to visionaries. »AI made in Hesse« and responsible innovations are hallmarks of our state and lead to ground-breaking progress – whether in medicine, environmental and climate protection, mobility, or smart living. Hesse has a vibrant innovation ecosystem.

New products and digital applications promise a wide range of benefits to the economy and society, but also come with risks and challenges. Research expertise, innovative strength, and deliberate action are the basic prerequisites for shaping and driving this digital progress. With its universities and research institutions, Hesse is one of Europe's top innovation regions for future technologies, both in terms of basic research and application orientation.

»HESSE IS ONE OF THE **TOP 10** MOST INNOVATIVE REGIONS IN EUROPE!«

The 2030 digital strategy builds on these achievements by placing a special focus on maintaining and strengthening Hesse's competitiveness as a hub of science and innovation. It aims to promote further necessary digitalisation measures in research, teaching, business and administration and to advance the expansion of digital infrastructure and information management at universities and research institutions in the state.

The factors for the success of this strategy in the coming years are as follows: optimal conditions for research and teaching **(a)**, the upgrading of AI expertise **(b)**, a clear sense of responsibility in digitalisation **(c)**, and the transfer of knowledge and technology **(d)**.

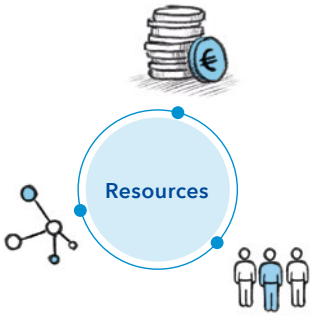
a. Optimal conditions for research and teaching

GOAL

→ • Hesse will increase its attractiveness as a science hub through the digitalisation of universities and research infrastructure and offer optimal research and teaching conditions.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

The basis for the innovative capability and future viability of our universities is resources – human, financial and infrastructural. Thus, the state of Hesse has allocated a record sum of 11.2 billion euros in the new Higher Education Pact for 2021–2025. Translating digital innovations into practice and applying them in a targeted way in business and society requires excellent education and strong digital skills for development, application, and critical evaluation. At the same time, universities themselves are conducting cutting-edge research that requires a specialized digital infrastructure. Therefore, we are placing a special focus on this as part of the state's digitalisation offensive. In doing so, we focus on three areas of action in particular:



✓ Digital Pact for Higher Education:

In April 2020, the State of Hesse concluded a digital pact with its universities – the only one of its kind in Germany – with 112 million euros allocated through 2024. With sums that increase steadily each year and are provided on top of the Hessian Higher Education Pact, the Digital Pact helps ensure that universities are well-equipped for all important aspects of digitalisation. The Digital Pact supports projects in the action areas of research, teaching, governance, administration and infrastructure.

These include increasing the availability of high-performance computers for research purposes, high-quality, barrier-free digital teaching and learning formats, the provision of data and results through open access and open science solutions, the networking of research data infrastructure, the augmenting of IT security, and cloud solutions which comply with data

€112 million

Digital Higher Education Pact until 2024

protection requirements. As a part of this, projects related to digital identity management, workplace virtualisation, and the digital transformation of university administration will be pursued. The findings from the management of the COVID pandemic also contribute to the further development of teaching and learning methodologies.

This will lead to the development of Hesse's universities on the digital front in the coming years and the creation of a new level of research and teaching. Digitalisation, with its opportunities and challenges, is an integral part of the curricula. The digitalisation of higher education institutions will remain an ongoing focus of our higher education policy in the future.

✓ High-performance computers:

Hessian Competence Centre for High Performance Computing: www.hkhlr.de

High-performance computing with available data is one of the most important scientific metadisciplines. The Hessian state government supports the expansion of computing capacity and research on new computer architectures. Our goal is to ensure that all Hessian universities and research institutions have access to high-performance computing resources.

With the Hessian Competence Centre for High Performance Computing, which is funded by the state and is an association of the five universities of Darmstadt, Frankfurt, Giessen, Kassel and Marburg, a strong network for advice and support has been created. In the Gauss Alliance for the promotion of high-performance computing, Hesse's interests are represented by TU Darmstadt as a voting member and Goethe University Frankfurt as an associate member. TU Darmstadt was also accepted into the National Alliance for High-Performance Computing (NHR) in November 2020. All these stakeholders and measures together form a strong alliance to continue working collaboratively on the expansion of existing capacities for high-performance computing in Hesse in the coming years.

In future, quantum computers and quantum-based methods will be able to find solutions where the computing power of the largest supercomputers has been insufficient to date. Moreover, the Hessian state government plans to channel the high level of research activity that already exists in Hesse and to establish close networks between science and industry stakeholders in order to create favourable conditions for the development of quantum ecosystems in Hesse as well. This will allow results from basic research to be applied rapidly and companies to contribute to the development of software and hardware for quantum-based technologies The state of Hesse continues to support the development of high-performance computing and wants to provide Hessian researchers and companies with better access to quantum computing in the future.

✓ LOEWE:

Research funding and third-party funding are important instruments for strengthening the research institutions in our state. With its five thematically open funding lines, the State Offensive for the Development of Scientific and Economic Excellence (LOEWE) sustainably promotes the Hessian research landscape and encourages cutting-edge research into future technologies. In the period from 2008 to 2020, the state of Hesse has made around 928 million euros available for this purpose.

€100 million

yearly increase in the LOEWE budget until 2025

In the current legislative period, the LOEWE budget will be gradually increased to 100 million euros per year by 2025 to give even more impetus to research in Hesse. One focus of this increased funding will continue to be digital excellence research and the development of new fields of science involving informatics or information technology, for example in digital medicine or social informatics. Moreover, the state supports the comprehensive application of computer-assisted procedures and the systematic use of digital resources in research.

b. »AI made in Hesse« is our brand

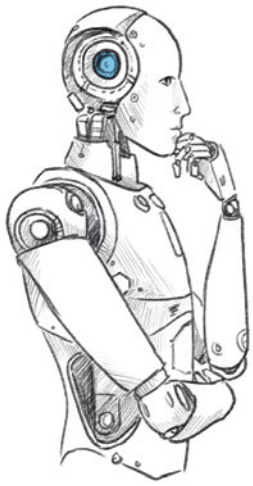
GOAL

We are strengthening AI expertise in Hesse and are transforming our hub for science and research into one of the leading addresses for AI-based innovations. »AI made in Hesse« will thus become our global brand that stands for responsible AI innovations.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

AI is one of the most important technologies of the 21st century. Many companies have been established or settled in Hesse that use artificial intelligence to establish new, data-based business models with regional, national, and international partners. This development is primarily taking place in sectors that reach global markets, such as the financial industry or the life sciences. Such entrepreneurial activities are supported and backed by the strong research excellence and infrastructure at Hesse's universities.

With the digital strategy, we seek to promote both the research and development of AI-based technologies and innovations as well as their transfer into real-world applications and successful business models. Under the leadership of Hesse's digital minister, an AI agenda is therefore currently developed in order to bring together and strategically align AI activities in Hesse, to create an even better computing and data infrastructure, to promote responsible AI-based innovations in a targeted way and to provide both companies and citizens with access to AI. The most important drivers for »AI made in Hesse« include:



✓ hessian.AI:

The Hessian Centre for Artificial Intelligence, hessian.AI, founded in August 2020, makes a significant contribution to the expansion of cutting-edge research, the strengthening of application-oriented technological research and teaching, as well as transferring them to business and society.

It connects the expertise of 13 Hessian universities with different institutional types and combines their respective strengths – a model which is unique throughout Germany. The state is funding the five-year start-up phase until the end of 2024 with 38 million euros and established twenty additional AI professorships. This will strengthen the existing, vibrant AI ecosystem in Hesse and utilise the outstanding expertise in the areas of machine and deep learning.

Besides basic research, focus will also be placed on promoting application-oriented AI innovations in areas such as smart cities, service robotics, public administration, smart factories, entrepreneurship, and business development. hessian.AI will work closely with the Centre Responsible Digitality (ZEVEDI) to reconcile AI and its ethical requirements. In Hesse, we place particular emphasis on »responsibility by design« in the development of new technologies, the promotion of early career researchers and the transfer of knowledge to business and society.

More about the Centre for Artificial Intelligence:
https://hessian.ai

In the dialogue on the digital strategy, it was emphasised that:

»Artificial intelligence not only needs innovative ideas, but also knowledge about how it works and how to use it. Only in this way can confidence and competence in dealing with AI grow in practice.«

✓ Strengthening AI skills:

We aim to enable direct exchange, co-design working, and AI experiences in fabrication laboratories (fab labs) and makerspaces to leverage AI potential from research more effectively for real-world applications at the intersection of future topics, start-ups and SMEs, and to strengthen AI skills. To this end, we want to create the necessary infrastructure to give companies and researchers space for the joint development, testing and evaluation of innovative AI systems and applications.

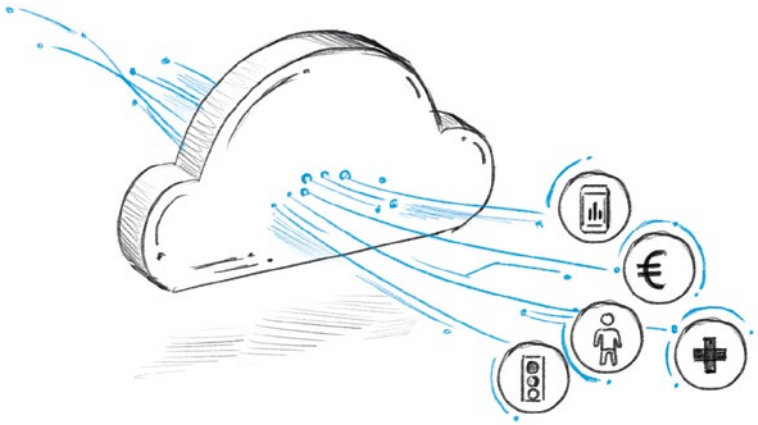
On the other hand, we aim to use suitable formats and infrastructure to create spaces for the transfer of knowledge to start-ups and SMEs, because the technologies of tomorrow require experts to apply them. In close cooperation with hessian.AI, ZEVEDI, the universities, the Frankfurt

TechQuartier and other Hessian start-up hubs, the goal is to promote the translation of scientific excellence into new innovative and responsible business models and products. A particular concern is to attract more women to the field of AI as researchers, developers, founders and professionals.

✓ Access to data:

Data forms the indispensable basis for AI-based innovations. The Financial Big Data Cluster (FBDC) is a project the state of Hesse has been working on with stakeholders from politics and administration, Hessian universities, and companies in the financial hub of Frankfurt since 2018 to establish a financial data cluster that represents the central application scenario for the financial sector within the European GAIA-X initiative. Closely linked to the establishment of the cluster is the SafeFBDC research and development project. The consortium will research, develop and prototypically validate new AI-based methods on the basis of five different use cases by the end of 2023.

Within the framework of GAIA-X and in other constellations, we are striving to establish and use further data spaces for research and application. We are focusing particularly on the pharmaceutical and life sciences sectors with a research hub for health data (see the action area »Digital society«) and mobility as another central data use case for Hesse, which we want to pursue in the Rhine-Main metropolitan region together with the stakeholders from the House of Logistics and Mobility (HOLM). In all these application examples, we rely on clever networking between research, business and institutions and will pay particular attention to sustainable governance rules that strive for data sovereignty, fair access and meaningful benefits.



c. Research hub for responsible digitalisation

GOAL

We have created a flagship project in the form of the Centre Responsible Digitality (ZEVEDI). We want to expand it further and make Hesse the leading research location for responsible digitalisation.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

The responsible development of digital innovations requires an inter-disciplinary approach that combines technical expertise and technological reflection. In particular, the AI-based analysis of data must follow an ethical framework that is in line with our core values and includes clear criteria for the use of AI-based systems and insights. Above all, the transparent use of AI systems and algorithms as well as the pursuit of justifiable decisions are essential requirements for responsible usage. The state of Hesse pursues the responsible shaping of digitalisation at three levels of action:

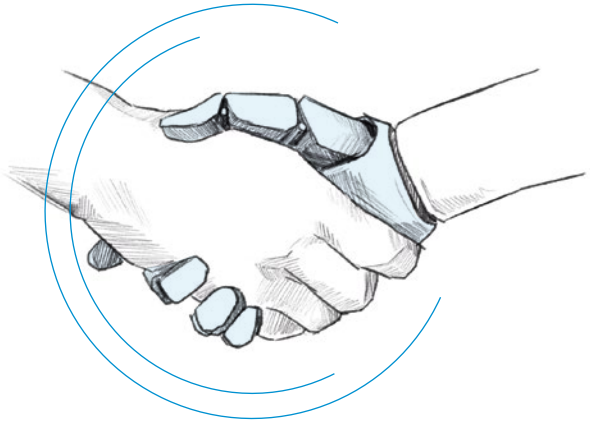
✓ Digital Ethics Council:

With the appointment of this expert group in August 2018, the Hessian Minister-President has underlined that the state government also intends to consider and evaluate the effects of new technologies and applications on people right from the start, thereby shaping the digital transformation responsibly. Having opened this discourse to society, the Digital Ethics Council, whose members include high-ranking representatives from science, business, media and society, will therefore be an important pillar of the Hessian digital strategy.

DIGITAL PROGRESS IN DIALOGUE: THE **DIGITAL ETHICS COUNCIL** IS AN IMPORTANT PILLAR OF THE HESSIAN **DIGITAL STRATEGY.**

The Council will also contribute the expertise and perspective of different areas of society to shape the digital transformation in Hesse in the future, and advocate for digital innovations that truly benefit people and society.

Issues such as the responsible handling of e-health applications and sensitive patient data or the use of AI technologies are just as much a part of this as the development of recommendations for strengthening digital skills and participation.



ZEVEDI:

Established in 2019, the Centre Responsible Digitality and its development is another supporting pillar of Hesse's digital strategy. It receives 2.1 million euros of funding per year. As an interdisciplinary competence network of universities in Hesse, it will research the requirements and consequences of digitalisation and provide recommendations for action in the fields of science, business, politics and society.

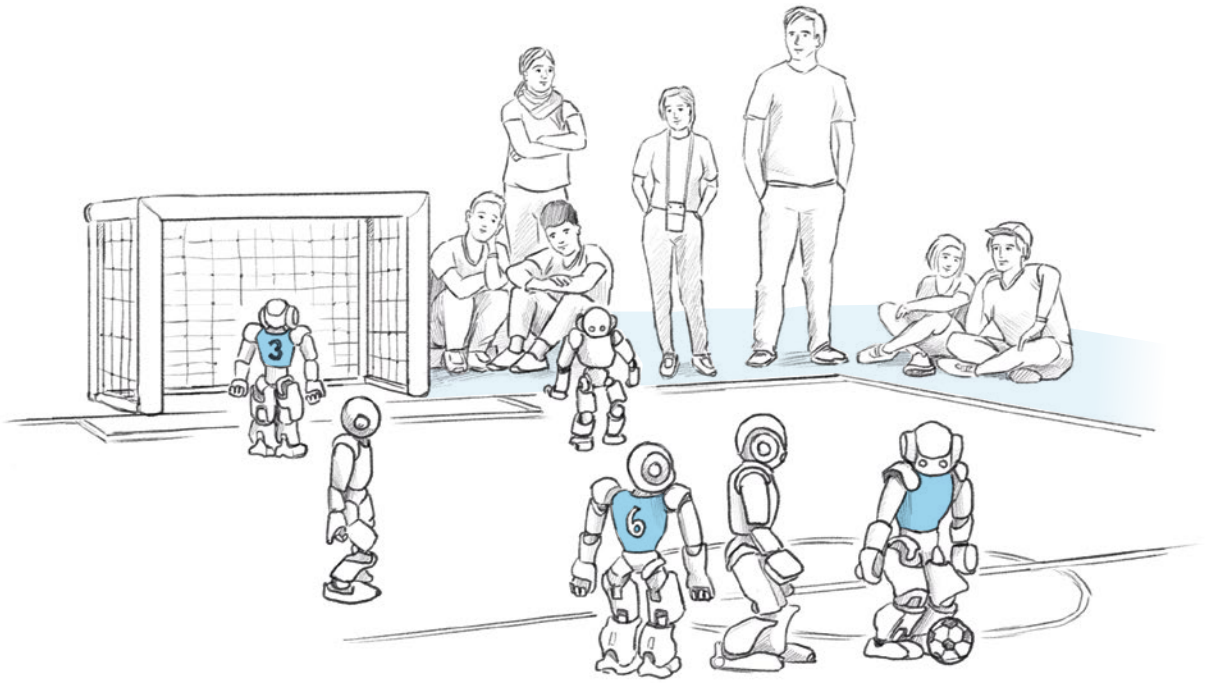
By doing so, we aim to shape the digital transformation such that it meets the needs of people and ensure that digital innovations are developed in accordance with our »responsible by design« principle. In the establishment of hessian.AI and ZEVEDI, we are therefore focusing on particularly close collaboration to utilise the entire breadth of Hesse's research expertise and make our state the leading research location for responsible digitalisation, particularly in the field of AI.

More about the Centre Responsible Digitality:
www.zevedi.de

Public dialogue:

AI innovations are still met with reservations and unease by many, as there is far too little awareness about how they work and their potential. A self-determined digital lifestyle requires knowledge and the opportunity to experience technologies for oneself. The Hessian state government is therefore focusing on interactive formats for a broader public: On the one hand, we want to give citizens of all ages an opportunity to get to know AI applications and their potential in a playful manner, but also to speak to representatives from science and business. This includes interactive and communicative formats such as AI school labs, AI experience spaces (digital locations), information campaigns, and roadshows.

On the other hand, we also rely on dialogue: Citizens, but also stakeholders from civil society and business, should be more involved in the development of digital technologies. This can take place in the form of hackathons, co-design workshops or living labs, in which interactions between developers and potential users are facilitated. Our goal is to develop new formats and ways of participation for this initiative, particularly with ZEVEDI as a facilitator at the interface between science and society.



d. Knowledge and technology transfer: Translating innovations into practice

GOAL

We want to apply digital innovations and knowledge in the real world in order to effectively capitalise on the added value of digitalisation for our state – in business, administration, municipalities or in the everyday lives of citizens.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

Translating digital innovations into practice is of key importance for the future of our state. Close collaboration between business, science and society is crucial for innovation and digital transformation. In this regard, the instruments of the action area »Digital innovations« are closely intertwined with those of the action areas »Economy and Work 4.0«, »Digital society«, »Smart city«, and »Smart region«. In addition to research and teaching, Hesse's universities are highly committed to knowledge transfer. This includes start-up programmes for students and researchers, support with patent management and other advisory services. These are to be further expanded with the new Higher Education Pact.

Digitalisation and digital start-up projects now play a central role in most spin-offs. Hence, we want to continue to place special emphasis on advisory services, funding and knowledge transfer. Supporting the start-up activities of women can also make an important contribution to gender-equitable digitalisation. In the area of digital knowledge transfer, we are focusing on three approaches in particular:

✓ Distr@l:

Launched in December 2019, the funding programme Distr@l (Strengthening Digitalisation, Living Transfer) enables universities, research institutions and companies to collaborate on implementing new solutions and risky project ideas in the context of digital technologies.

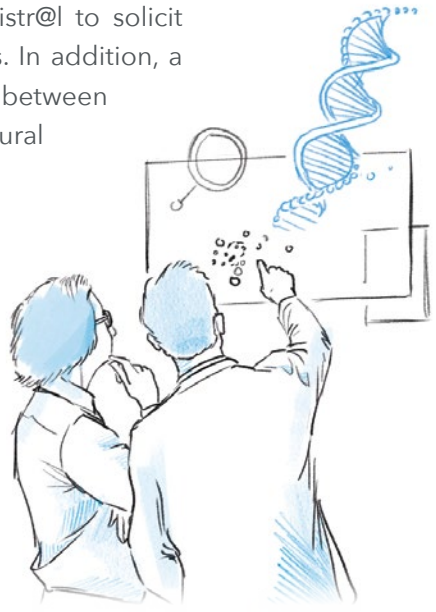
With 40 million euros in funding for the first five years, support is provided for aspects such as feasibility studies, digital product and process innovations, and knowledge and technology transfer. In 2020, funding was increased by up to 57 million euros in the wake of the COVID pandemic.

€40 million

Distr@l funding for 2020 – 2024

Special focus was placed on the promotion of application-oriented digital innovations by young companies, start-ups, and research groups at universities that are on the way to being spun off. Funding is deliberately open to a broad range of areas of application, with the main selection criteria being the degree of innovation and the projects' contribution to digital transfer. A large part of the funding goes to collaborative projects between companies and universities as well as to young graduates who wish to commercially exploit their research and development results, which fosters the concept of start-ups at universities.

A suitable call for tenders will also be issued through Distr@l to solicit innovative projects from young companies in rural regions. In addition, a new funding line will provide incentives for cooperation between universities and SMEs. Especially for young companies in rural areas, cooperation projects can create extremely deep links to universities in their region.



LOEWE 3:

The third funding line of the state programme LOEWE is aimed at applied research and development, in addition to support basic research through funding lines 1 (centres) an 2 (focal points). Funding isprovided for model and pilot projects to strengthen the collaboration between Hessian SMEs and universities as well as non-university research institutions. As part of LOEWE funding line 3, applied research and development projects involving scientific institutions and SMEs have been co-funded in a competitive selection process since 2008.

As of 2020, 324 projects have already been funded or are currently being funded. This corresponds to a total sum of 170.4 million euros with LOEWE accounting for 88.79 million euros. This LOEWE funding line is open to a wide range of topics and addresses a wide variety of sectors and innovation

LOEWE

focal points. Most of the projects funded are therefore clearly related to digitalisation, ranging from AI to Industry 4.0. We want to continue to use this leverage in a targeted fashion to translate research excellence into practical applications.

✓ Digital hubs and transfer:

Transfer institutions such as the federally funded Digital Hub FinTech in Frankfurt and Cybersecurity Hub Darmstadt, the *Mittelstand-Digital Zentrum Hessen* network (previously *Kompetenzzentrum Mittelstand 4.0*) and the House of Digital Transformation, which we intend to anchor more firmly in the regions, serve as key instruments for the exchange of information between stakeholders in research, business and society.

p. 74

The same applies to the formation and promotion of regional competence clusters, networks and knowledge pools for digitalisation, which intend to use digital innovations specifically for regional value creation and public services. The Hessian Innovation Strategy places a special focus on strengthening these cluster initiatives. Within the framework of our smart region activities, we also rely on strong networking and promote the regional exchange of information between stakeholders from science, business, politics and society.

Economy and Work 4.0

Successful and high performing through digital transformation

2. Economy and Work 4.0

Successful and high performing through digital transformation

VISION 2030

Hesse's strong performance is all thanks to the digital transformation. SMEs, the various trades and large companies are successful thanks to new business models, digital products and lean manufacturing processes. Digitalisation ensures high employment, value creation and sustainability – in both rural and urban areas. This increases prosperity and quality of life for all.

Hessian competitiveness depends greatly on the successful digitalisation of its economy. The Rhine-Main region is Germany's second most industrialized region after the Ruhr region. Hesse is one of the world's foremost locations for the chemical and pharmaceutical industries, diagnostics and medical technology, and also stands out in mechanical and vehicle engineering. The aerospace industry also enjoys a long tradition in Hesse and has an important presence in Darmstadt with two major international aerospace institutions and innovative service providers. Not to mention Frankfurt as the major financial and banking centre.

Our business hub also thrives on basic and applied research carried out at numerous universities and research institutions throughout Hesse, which serve as important drivers for innovation. With the state's »House of« concept, this research expertise in Hesse has been transformed into interdisciplinary and cross-regional platforms for cooperative research, training and further education as well as knowledge and technology transfer with a wide range of stakeholders from various key areas of competence.

The House of Finance, the House of Logistics and Mobility, the House of Pharma and Healthcare, the House of Energy and the House of Digital Transformation (previously the House of IT) represent the networking of players for the national and international profiling of Hesse as an innovation hub.

With the update of our digital strategy, we are focusing specifically on these strengths. We want Hessian companies to seize the opportunities afforded by innovative key technologies to attain success – be it the industrial Internet of Things, digital platform models, cloud computing, blockchain, AI, or robotics. The comprehensive networking of processes and the universal use of IT have a major impact on business models, job profiles, qualification requirements, employee deployment and how and where people will do their work in the future.

That is why we are focusing on three major areas in our digital strategy: First, we want to accelerate the digital transformation of our companies, in particular SMEs **(a)**. Secondly, we want to strengthen the digital economy, especially the start-up scene **(b)**, and thirdly, we want to make the world of Work 4.0 a success for everyone involved – particularly for employees **(c)**.

a. Digital transformation for successful companies

GOAL

We enhance the future viability of Hessian companies in all sectors. To this end, we focus on customised support for digital innovation and transformation, flagship projects, comprehensive advisory and support services, and the real-world transfer of knowledge and technology in dynamic interactions between science, research and private companies.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

Since the 2000s, we have been experiencing a fourth industrial revolution described by the term »Industry 4.0«. Formerly rigid value chains are becoming highly flexible digitalised value creation networks. Overall, Hesse's industry is undergoing a transformation towards dynamic digital ecosystems. We want to support this change through the digital strategy.

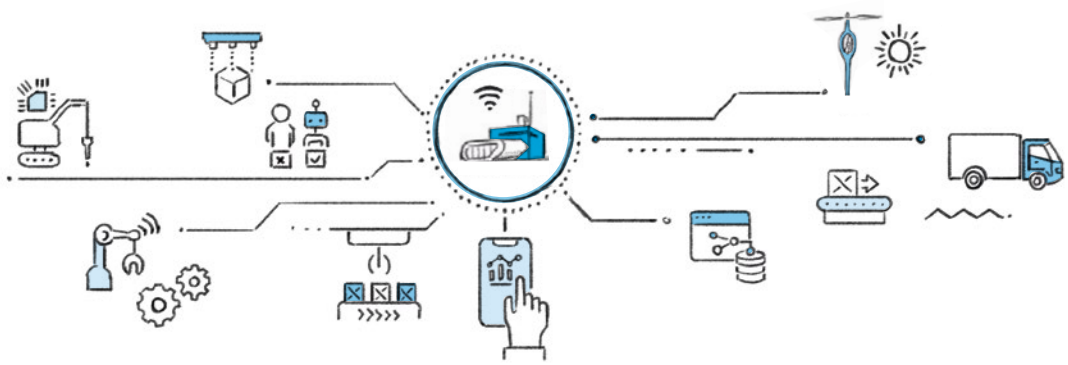
DIGITAL INNOVATIONS ARE A DECISIVE FACTOR FOR OUR STATE.

With the Hessian innovation strategy adopted in 2013, the state can look back on a common strategic course that will continue in 2021 with a new update. The promotion of digital innovation is a decisive regional factor in modern economies. The Hessian innovation strategy and the digital strategy are therefore closely intertwined. We are concentrating primarily on the following approaches:

Industry 4.0:

A stronger networking of all value creation processes – also beyond company boundaries – as well as an IT-based optimisation of systems and means of production is essential for competitiveness. At present, however, many companies still lack sufficient knowledge and, above all, the necessary optimisation steps for their existing systems and equipment. Market opportunities and cost-benefit calculations for Industry 4.0 projects are sometimes difficult to assess. The state of Hesse will support SMEs by providing advice and funding for the development of their own digitalisation strategies and the gradual migration towards Industry 4.0. Organisations such as the House of Digital Transformation and the *Mittelstand-Digital Zentrum Hessen* network play a decisive role in this.

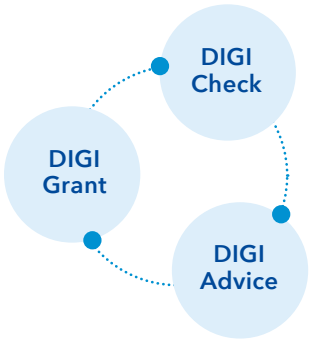
As part of the Hessian Industry Trialogue, the Hessian state government discusses digitalisation topics with business and trade unions. The focus is also on the sustainability potential that digitalisation holds in industrial manufacturing. This includes the effects of digitally optimised logistics and production chains, which ensure more sustainable economic cycles and a significant reduction in greenhouse gas emissions. We want to leverage this potential and develop Hesse into one of the most modern industrial regions in Europe.



SMEs, digitalised:

We are increasingly promoting the successful DIGI services which support Hesse's SMEs. DIGI Check, DIGI Advice and DIGI Grant have proven themselves and guide companies along their path towards digitalisation. The awarding of smaller DIGI Loans can also facilitate the implementation of digitalisation solutions in SMEs. Together with RKW Hessen, the state gives SMEs the opportunity to receive intensive and specifically targeted advice on the digitalisation of business processes, products and services.

We will continue to support the skilled trades in the development of digitalisation strategies with specially coordinated service offerings and refine our advisory services. Advisory and support services for SMEs, such as the Hessian Initiative for Energy Consulting in Small and Medium-Sized Businesses *(Initiative für Energieberatung im Mittelstand)* and the PIUS advisory services for production-integrated environmental protection are also to be included.



In addition to the funding instruments already mentioned, we will assess the expansion of further awareness-raising, consulting and funding measures as part of the development of an Economy 4.0 sub-strategy with the core areas SMEs 4.0 and Industry 4.0, and facilitate interactions between important stakeholders and institutions in the field of digitalisation. The European Digital Innovation Hubs (EDIH) will also play an important role in the creation of extensive support services for all Hessian companies.

Moreover, we also have a special focus on the retail sector, where we will continue to improve on innovative advisory and support concepts such as the *handel.digital* project of the Hesse Trade Association, as well as regional offerings, for example from the Chambers of Industry and Commerce. Within the framework of the Alliance for City Centres *(Bündnis für die Innenstadt),* a future plan for Hesse's city centres will be developed that incorporates aspects of digitalisation.

Through the promotion of smart municipalities and regions in the programme *Starke Heimat Hessen II,* cities and municipalities can provide additional impetus for the digitalisation of local commerce. In addition, various funding and support offerings are available for SMEs at the EU and federal levels. Our aim is to expand exchange, consultation, and funding even further into the state and provide low-threshold access to them to promote the digitalisation of SMEs over the long term.

House of Digital Transformation:

As part of the state's Houses of Strategy, we want to use the House of Digital Transformation (HoDT), a registered association, to provide an incentive for digitalisation in various industry sectors. The HoDT's role as an innovation cluster to promote digital transformation and to connect stakeholders from business, science and politics in Hesse will be further consolidated. To achieve this, the HoDT will bring together companies from all sectors as well as universities and municipalities that seek, share and offer know-how, experience and good practice examples.

Above all, SMEs and start-ups benefit from the tailored communication of the state's own offerings, which makes them more widely known. As part of the Smart Region Office of the state of Hesse, the HoDT also connects providers of smart city solutions. In the future, the HoDT will set up another branch in northern Hesse in addition to the Darmstadt office, which will focus on digitalisation in rural areas.

At the Economy and Work 4.0 thematic forum of the strategy dialogue, one thing was clear:

» Digital transformation requires the transfer of know-how, experience and digital solutions. «

Knowledge and technology transfer:

Project-oriented cooperation with each other and with universities is a driving force for many companies. Access to know-how, experience and research expertise through digital hubs or institutions such as the *Mittelstand-Digital Zentrum Hessen* network or the HoDT are very valuable here as bridge builders and initiators. With the Distr@l funding programme, we also make it possible for SMEs to implement new solutions and innovative projects in the context of digital technologies in collaboration with universities and research institutions. Moreover, they benefit from the promotion of knowledge and technology transfer at universities in Hesse, which prepare their current research findings in a targeted manner for economic exploitation and impart their knowledge.

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An alternative funding offer is provided by the previously presented, science-oriented funding line 3 (collaborative projects for SMEs) in the LOEWE research funding programme (see action area »Digital innovations«). We will continue to vigorously pursue close networking within the framework of collaborative projects, hub and cluster initiatives.

b. Digital economy – driver of innovation

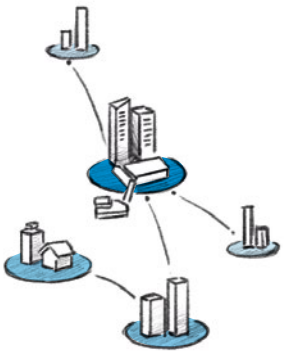
GOAL

We aim to specifically promote new technologies and business models as well as start-ups in the digital economy in order to drive technical and societal innovations, create jobs, and promote competition.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

In the course of the digital transformation, the percentage of companies in the digital economy is growing. In addition to classic IT and telecommunication companies, these also include those of the platform economy that act as brokers for services or products, as well as providers of cloud or blockchain solutions. According to the »German Startup Monitor 2019«, digital industries and business models are the most important environment in which start-ups are founded and are increasingly influenced by innovative key technologies such as AI. Hesse is one of the most dynamic federal states in this regard, particularly in the areas of e-commerce, fintech, health, software, analytics, and cybersecurity.

This is also facilitated by around 40 technology and start-up centres in Hesse and the excellent digital infrastructure. We intend to strengthen the fast-growing sectors of the digital economy with their enormous start-up and business potential by intensifying the application-oriented exchange of expertise and knowledge transfer. This will allow promising technologies for the implementation of new digital business models to be recognised at an early stage to accelerate their development. At the same time, we are promoting technologies of the future that will be used in the context of smart cities and smart regions. In the context of the digital economy, we focus on these areas:



AROUND **40**
TECHNOLOGY AND START-UP CENTRES
PROMOTE DIGITAL START-UP DYNAMICS IN HESSE

✓ Promoting start-ups:

The interministerial *Start-up Initiative Hesse* has laid the foundation for boosting the start-up scene. For example, with *StartHub Hesse*, a central contact point has been created for founders of start-ups in Hesse. *StartHub Hesse* is also intended to facilitate start-up processes within the digital economy.

To make Hesse interesting for young companies in the digital economy, the state will continue to provide more start-up funding and growth capital for start-ups. We will also use other components, such as innovation loans or investment funds to support young and growing companies in this field.

An important financial pillar is funding line 4 of the Distr@l programme. In the coming years, this will support spin-offs in the context of digital research and development as well as innovative leaps by young companies and start-ups. The testing and creation of new digital products and services also often takes place in start-ups. As dynamic partners in strong collaborative projects, they can also be funded via Distr@l funding line 2.

✓ Platform economy:

In the digital economy, platforms are central building blocks for more value creation and employment. By collecting and sharing information and efficiently bringing together supply and demand, they serve as the interfaces to all markets and economic sectors, network digital services, products and their providers or manufacturers in the industry. In contrast to traditional online trade and the sharing economy, there is still a lot of potential for business models of the platform economy in industry and SMEs as well as in business-to-business relationships (B2B). This requires, on the one hand, the transfer of knowledge and the promotion of innovative business ideas, especially in the SME sector and in start-up consultancy, and, on the other hand, fair competition based on a regulatory framework. We want to leverage the value creation potential of the platform economy for the Hessian economy even more in the future, for example by initiating knowledge and technology transfer and cooperation via the HoDT.

✓ Blockchain:

In the dialogue on updating the digital strategy, research stakeholders and companies assert the following:

»The use of blockchain technology requires a legally sound framework, especially for young companies.«

With its many innovative start-ups and software companies, its digital infrastructure and the high density of data centres, Hesse offers the best conditions for the blockchain sector. Our goal is for Hessian companies, society, and the administration to benefit more from this pivotal technology in the future. Thanks to the close interaction between research, business and politics at the HoDT, promising innovations are recognised at an early stage.

We will explore the potential of blockchain technology, such as in the secure organisation of value-added and supply chains in cross-border transport, in blockchain-based financial products or decentralised energy markets, with pilot projects in Hesse and make them more widely usable, especially in the context of smart cities and regions. We also provide support for regulatory amendments, for example in the legal design of secure digital identities and business documents (freight and customs documents, identity cards, etc.), and their implementation in the field of the public administration's digitalisation.

We aim to strengthen blockchain research and training in computer science as well as knowledge and technology transfer in business and administration, while at the same time paying attention to sustainability in the shaping of this pivotal technology.

✓ Fintech:

As a region known for banking and finance, Hesse boasts a dynamic, innovative ecosystem in the form of the Digital Hub FinTech. The Tech-Quartier as an innovation platform and driver for new business models and start-ups was established in Frankfurt within a very short time. Since 2018, it is where the State of Hesse has been driving the development of a financial data hub in collaboration with other stakeholders – the Financial Big Data Cluster.

The aim of the cloud-based platform initiated by the state of Hesse and developed together with its partners is to enable the cross-organisational exchange of data while preserving individual data sovereignty. Moreover, the business focus of companies, the respective responsibilities of science and supervision are considered. At the same time, cross-organisational cooperation in data-based projects is to be simplified and improved. This will promote data-driven business models in the financial sector throughout Europe. In this way, a uniform and standardised data basis will make financial supervision more efficient and safer. We will continue to pursue this goal with vigour and also build on closer cooperation between the Digital Hub FinTech and the FBDC with hessian.AI and the HoDT as a central innovation hub.

✓ Excellence hubs:

In addition to economic assistance for start-ups, our digital strategy also aims to continue promoting the transfer of knowledge through the formation of hubs, clusters and networks for the informal exchange of ideas between companies, science and administration. Examples include the *Mittelstand-Digital Zentrum Hessen* network, the HoDT, the hessian.AI centre for artificial intelligence and various cluster initiatives. The digital hubs in Frankfurt (FinTech) and Darmstadt (Cybersecurity), which are funded by the federal government, are also to be followed by further digital innovation hubs. We would particularly like to push the establishment of at least one EDIH in our state so that Hesse becomes part of the Europe-wide network of innovation hubs and can participate in the sharing of expertise at the European level. The state will continue to support the existing transfer organisations, lobby for financial support from federal and EU funds and encourage the establishment of additional hubs.

EUROPEAN EDIH NETWORK: **EUROPEAN DIGITAL INNOVATION HUBS**

Our goal is to create a visible transfer network that covers the whole of Hesse. We will also actively promote the networking of institutions with each other in order to create a successful basis for the exchange of information and joint projects.

c. Shaping the world of Work 4.0 as partners

GOAL →

We want to make the world of Work 4.0 a success for all workers in every sector through the expansion of training offerings, various campaigns, and close collaboration with the social partners.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

The digital transformation of the economy is fundamentally changing the requirements and conditions of the world of work. Due to its economic strength and the diversification of its labour market, Hesse is well-positioned. Where old professions and job profiles are disappearing, new ones are emerging – especially in the digital economy, with a large impact on employment. Nevertheless, there are also strong shifts in some areas.

This applies in particular to the decline of occupations in which workers predominantly engage in routine activities. On the other hand, growth is to be expected in cognitive and interactive occupations. We want to guide all employees through these changes in the world of work so that they do not need to worry about keeping their jobs but are instead well-equipped and trained to help shape the world of Work 4.0. In this context, the following aspects are of great importance to us:

The digital world of work was also addressed in the strategy dialogue:

»Digitalisation must lead to an improvement in working conditions for employees. We must make use of these opportunities.«

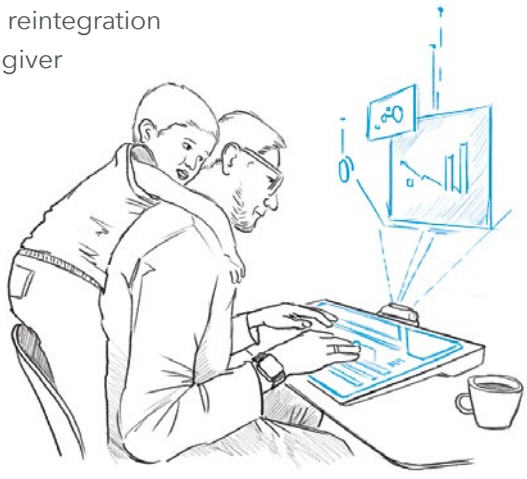
✓ Further education and qualification:

The indispensable basis and driver of a successful digital transformation for all are qualified employees and successful in-company training strategies. Many job profiles of existing professions are changing and require the ability to change and opportunities for further training. We support companies in developing and implementing qualification strategies.

As part of the state government's alliance to secure skilled labour, we will place a special focus on qualifying Hessian employees for the digital economy and digitalised job profiles and professions. The state of Hesse also places a special focus on equipping future and current employees for the Labour Market 4.0 in its own educational institutions, training and further education programmes, and initiatives, and will continue to expand these offerings.

✓ Flexible working arrangements:

We will work to ensure that the possibilities of digitalisation are used to respond more strongly to the needs of all participants in a life phase model. By making working hours and locations more flexible, it is possible to achieve a better balance between family, leisure time and work. Digital reintegration tools can also facilitate the return from parental and caregiver leave. We want to pay special attention to the participation of women in the digital economy. On the one hand, they should benefit from the income growth and flexibility of digital professions, but also be able to contribute their expertise in the information and communication technology sector to a greater extent than before.



Especially in rural areas, we want to promote attractive coworking spaces and mobile work arrangements.

COWORKING SPACES AND WORKING FROM HOME CAN SAVE RESOURCES AND REDUCE CONGESTION.

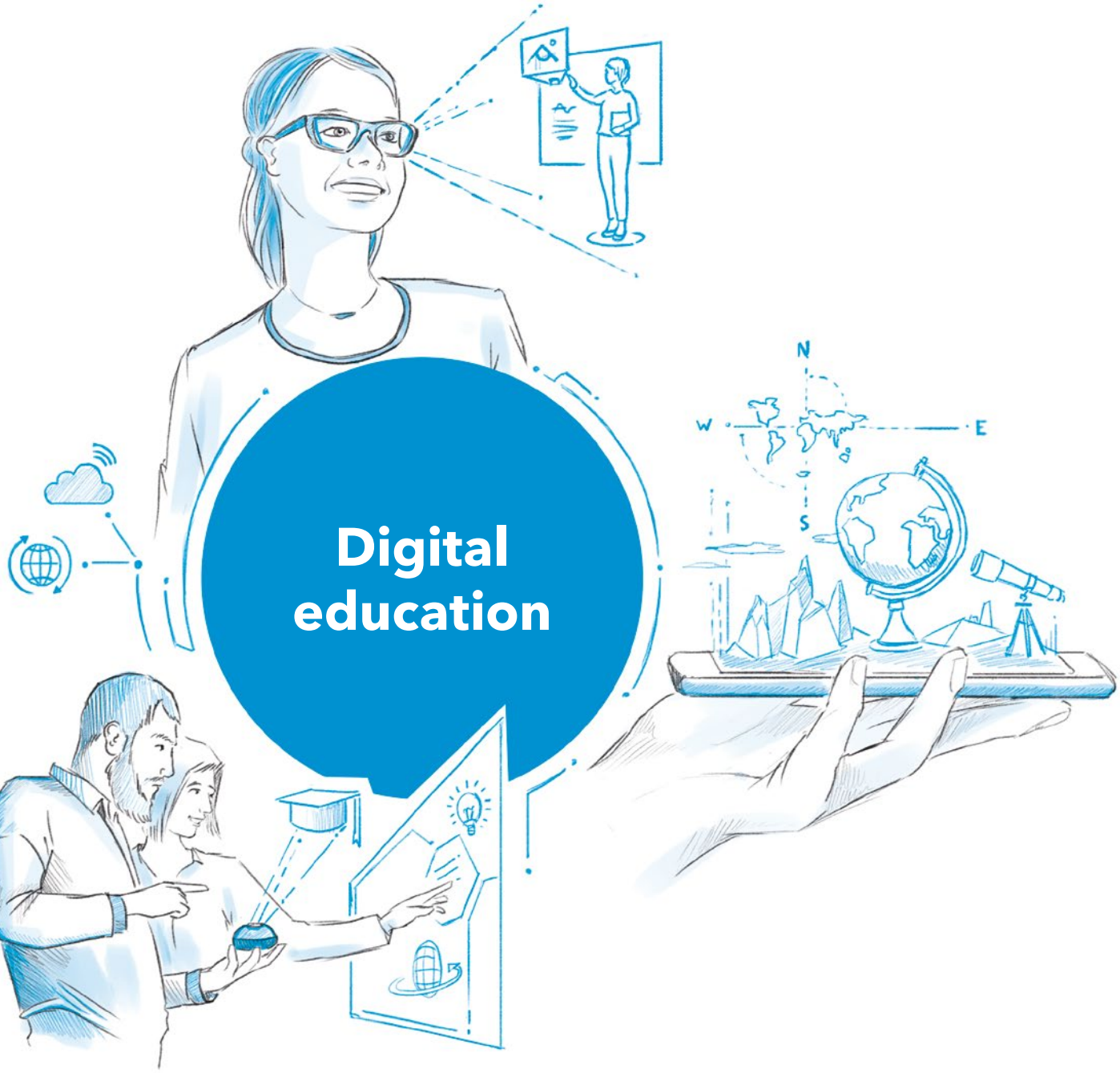
In office communities that share a good digital infrastructure, new forms of interdisciplinary, agile collaboration are emerging that create attractive workplaces and also attract the start-up scene.

With modern coworking spaces, life and work can be brought closer together for everyone, long distances and commuting times with their resource and congestion problems can be avoided and, in the long term, rural areas can also gain new location-related advantages.

✓ Shaping it together:

Our work also focuses on shaping the jobs of the future in partnership with trade unions, employers' associations, employees, and management. In order to work toward achieving favourable working conditions that enable more flexibility in companies and offer all employees opportunities to develop their potential, we intend to regularly share ideas with important stakeholders and jointly shape the transformation of the world of Work 4.0 positively for all those involved.

Furthermore, we want to offer more services providing information on good practices for the transition to Work 4.0. The aim is to create promising prospects for all employees in the digital transformation of the world of work. For example, digital tools and forms of work also create new professional opportunities for people with disabilities, which we want to promote decisively.



Strengthening skills,
discovering innovations

3. Digital education

Strengthening skills, discovering innovations

VISION 2030

Digital education in Hesse has many facets: It is playful in kindergarten, lively in digital school lessons, hands-on in vocational training and qualifications, motivational and innovative – at every age and in every phase of life. Citizens in Hesse decide competently for themselves how to meaningfully integrate digital technologies into their everyday lives. They discover new things and shape the future.

To use digital technologies successfully and proficiently, people need digital skills – at every age and in every situation in life. With offerings for the secure and meaningful use of digital media, we start with the little ones at home with their parents, in kindergarten or nursery school, and particularly at school. Another focus is to enhance the prominence of informatics and IT as subjects in in school and training, as well as in higher education. Coaching and training for skilled workers pursue the goal of imparting specialised or task-related know-how. Other measures are aimed at all citizens, from the young to the elderly, who might need help learning to use digital devices proficiently.

Digital learning and the upgrading of skills should not be limited to creating the right conditions for the use of digital technologies. On the one hand, digital tools in education offer great opportunities to make teaching and learning more efficient and customised. On the other hand, and even more important, is the creative use of the new possibilities of digitalisation. This includes evolving job profiles, digital innovations or even simply the beneficial use of digital tools within one's own sphere of activity.

In the context of digital education, we are setting three major priorities in the digital strategy: Firstly, digitalisation in schools **(a)**, secondly, vocational training and qualification of skilled workers **(b)**, and thirdly, lifelong learning **(c)**. Our overarching goal of raising awareness and enthusiasm for the potential of new technologies runs through all these areas of action in digital education.

a. School: Learning with digital media and for a digitalised world

GOAL

- We want to use digital education to best prepare pupils for a life in a globalised world and enable them to participate successfully in professional and social life. Hesse's Digital School Programme (*Digitale Schule Hessen*) is intended to create a common, digital education system for the entire school community – from the pupils to the teachers and parents – and to enable access that is tailored in line with needs.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

The COVID pandemic has highlighted the importance of digitalisation and digital skills. In many schools in Hesse, digital learning was already an important part of learning and teaching before COVID – but always conceived merely as a supplement to face-to-face teaching and not as a replacement. We want to use the experience and the impetus of the past months to further advance digitalisation in schools.

On their educational path, pupils should obtain recognised qualifications that enable them to participate successfully in professional and social life. Digitalisation is not an end in itself but should satisfy the pedagogical requirements for modern teaching and tailored individual support. Learning in the context of the increasing digitalisation of society and the world of work, as well as a thoughtful approach to digital technologies, are an integral part of the educational mission.

In the context of learning, Hesse follows the action areas of the strategy *»Bildung in der digitalen Welt«* (Education in the Digital World), which all 16 federal states adopted within the framework of the Standing Conference of the Ministers of Education and Cultural Affairs (KMK) in 2016. Hesse's Digital School Programme pursues a comprehensive digitalisation concept that, in addition to equipment and infrastructure, considers all school and school administration processes as a whole, and shapes them in a holistic,

One priority was included in every statement on the Digital Strategy:

»Education is the key to the digital world. Digital education must play a key role in all school types.«

professionally transparent and pedagogically goal-oriented manner. The aim is to create a common, digital education system for the entire school community – from pupils to teachers to parents – and to enable seamless access tailored to needs and tasks.

Hesse's Digital School Programme:

HESSE´S DIGITAL SCHOOL

With its state programme, the Hessian state government is implementing the Digital Pact for Schools agreed upon between the federal and state governments in 2018, and increasing the amount of federal funds allocated (372 million euros) to 500 million euros. During the pandemic, three additional quick-start programmes for pupil and teacher end-user devices and IT support were approved, each amounting to 50 million euros. The state programme covers four specific areas of action in the coming years:

More information:
www.digitale-schule.hessen.de

Modern IT infrastructure: In its Gigabit Strategy, the state government is considering schools as priority locations for broadband expansion and, at 270 million euros, is investing more money in gigabit expansion than ever before. All Hessian schools are to be provided with a gigabit connection by the end of 2022. It is also important that schools are equipped with Wi-Fi, digital work and interactivity tools, end-user devices for pupils and teachers, and IT support, which will be further enhanced as part of the quick-start equipment programmes.

We focus on modern IT equipment and digital learning environments that are adapted to the pedagogical profile and media concept of each school. This requires close coordination between the schools and the Hessian school authorities as important partners.

Teacher training: We see the acquisition of digital skills and the conveying of a carefully considered, didactically sound use of digital media in the classroom as essential tasks of future-oriented teacher training. This requires appropriate training opportunities in all phases of education, which we wish to expand. The use of digital aids in the classroom is already an important part of the first and second phases of teacher training and is to be given even greater emphasis in the future through an amendment to the Hessian Teacher Training Act.

In a large-scale further training offensive, we also prepare all teachers who are already teaching at our schools for the digital lessons of the future.

Furthermore, we inform teachers about the possible applications of digital media and tools in lesson development and teaching, as well as how they can be used for the benefit of all.

Digital education for teachers will have a long-term impact on the Hessian economy. That is why industry associations emphasise the following:

»Digital skills should already be taught in teacher training. They are the foundation of a good digital education.«

Pedagogical support: We are improving day-to-day life in schools through pedagogical and didactic offerings. On the one hand, the state is upgrading the Hesse school portal to provide a cloud-based learning and working platform for all Hessian schools. The school portal provides pedagogical content and media for daily teaching and learning, facilitates lesson planning and design, and allows collaboration and access to information independent of time and place.

On the other hand, the state will continue to support and provide expert advice to schools in creating media use concepts for the use of digital media in lessons. They are the basis for planning successful, pedagogically goal-oriented IT equipment. We also focus on a didactically sound inclusion of online services and digital learning experiences in lessons, such as virtual visits to extracurricular places or the use of learning platforms and apps, to enable pupils to engage in learning by discovery and to access global learning on the basis of the KMK's »Orientation Framework for Global Development in Education«.

We strive to enrich the lessons with digital tools and integrate the latest research findings on digital learning into the lessons. To introduce digital job profiles of the future and to arouse interest in ICT professions, we aim to inspire pupils in particular to take up MINT subjects (mathematics, informatics, natural sciences, technology), for example through interactive learning opportunities and AI pupil laboratories.

Responsible use of media: The teaching of skills for dealing with media is a central component of educational processes at school. This includes both the responsible use of digital media, using them in lessons in a pedagogically meaningful way, as well as the trying out of new forms of teaching and learning. By the end of their schooling, Hessian pupils are going to have acquired all the relevant skills in the field of media education. This will enable them to actively participate in society in a self-determined and responsible manner.

However, we not only support schools in the development of their media education concepts. Through offerings for media education, collaborative projects or, for example, training as digital school guides or media scouts we also directly support pupils from an early age. We train them in the secure, critical, and thoughtful use of digital media. By setting up a service point for responsible media use, we want to offer them, as well as parents and teachers, further support in media education.

b. Professionals of today and tomorrow: enhancing digital education and training

GOAL

We want to make trainees fit for the digital globalised world of work by providing them with adequate IT equipment that reflects state-of-the-art technological developments and digital education. We employ continuous further education and training so that both workers and companies can benefit from the potential of digitalisation.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

In the context of developing skilled labour, the digital strategy focuses on the higher education of IT specialists in Hesse as well as all relevant job profiles and apprenticeships. Various studies show that Hesse is well-positioned in an inter-state comparison regarding graduates with IT degrees. In higher education, we are striving for a further increase in students

and successful graduates in computer science and its subject-specific special degree courses in the fields of economics, engineering, media and life sciences. Scientific, certified further education at universities also plays a role here.

The highly dynamic nature of the digital world of work requires dual education that keeps pace with technological development, as well as continuous occupational training and further education, so that employees and companies can exploit the potential of digitalisation and globalisation. Hesse already has a good foundation here: Our state ranks among the top few in the provision of continuing education measures by the private sector. Our goal is for adults to engage in active lifelong learning about the instruments and aspects of digitalisation in all phases of life. We are therefore pursuing the following approaches in the digital strategy:

IT-Skills Loading ...

HESSE RANKS HIGHLY IN A STATE COMPARISON FOR GRADUATES WITH **IT DEGREES.**

✓ Occupational education:

Occupational education is greatly influenced by the digitalisation of work, production and business workflows in companies. Developing the skills to use digital aids and technologies in occupational education is therefore an essential task. In the Hesse's Digital School Programme, the state also focuses on vocational schools and, like other school types, supports them in terms of their IT equipment and infrastructure, pedagogical concepts, teacher training and the tailored use of digital tools and work technologies in the classroom.

As dual partners, the vocational schools should be able to keep pace with the advances in digitalisation in apprenticeship companies. To ensure that the equipment is adapted as digitalisation progresses, the modernisation of the equipment in the cross-company training centres, including ICT equipment, is also supported. With initiatives such as the *DIGITaLzubi* project of the *Bildungswerk der Hessischen Wirtschaft,* which is funded by the state, we will continue to focus on the needs-based teaching of workplace-specific IT skills and digital skills for apprentices and instructors in the company.

We gear occupational orientation measures to the diverse requirements of the digital world of work and special training needs so that disadvantaged young people can also be successfully integrated into the labour market.

Further education:

The rapid progress of digitalisation is not only transforming many jobs, but also creating completely new occupational fields. Continuing education and training in adulthood plays a decisive role in coping with this structural change. For this reason, the state promotes continuing education and training measures, and focuses on the needs-oriented teaching of digital skills as well as digitally supported learning – the latter being a focus of action that we want to deepen even more in the future.

This also applies to the digitalisation of the training facilities themselves, which face the challenge of providing suitable digital continuing education offerings for companies and their employees. The state-funded guideline »Continuing Professional Education and Training in the Age of Digital Transformation« by the association *Weiterbildung Hessen* provides important stimuli for the digitalisation of continuing education providers. To further develop this offering in a future-oriented manner, we will create a »Digital Skills« sub-strategy within the framework of the digital strategy, in which new, innovative instruments will be anchored.

Facilitating access:

One of the goals of the »Strengthening digital skills« campaign is to facilitate access to the diverse offerings of the vocational training centres, chambers and further education institutions and to raise awareness of them. The commitment and motivation of the learners is crucial.

How much companies appreciate continuing education measures also plays an important role here. It is up to them to develop company-specific qualification strategies as part of their digitalisation measures and to

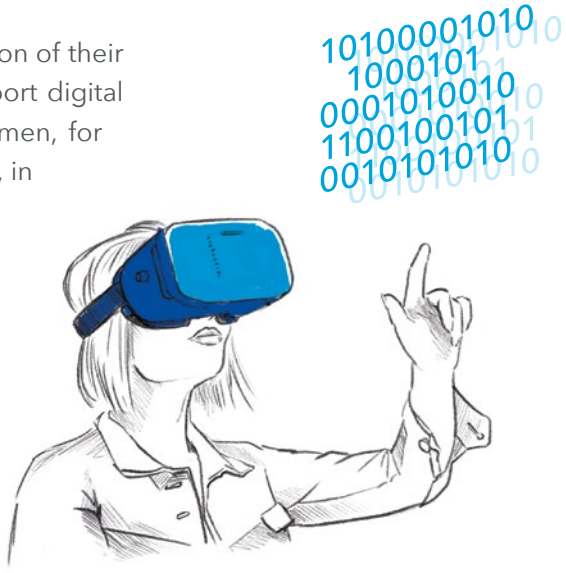
enter collaborations with qualified educational institutions and experts. The state will provide incentives within the framework of its advisory and support services since qualification measures are more easily accepted in a professional context.

Another important concern for us is to expand digital learning opportunities for disadvantaged persons, who are receiving increased assistance as part of Hesse's effort to promote the labour market, and to enable them to acquire digital skills. Both for the educational institutions that introduce disadvantaged people to the labour market and the municipal job centres, corresponding support offerings have been initiated which focus on digital learning, for example in the planning of the protective scheme for seekers of apprenticeships or the transitional qualification for women. We are consistently pursuing this path to integrate job seekers and people with special challenges into the Labour Market 4.0.

✓ Women go digital:

Despite the great demand for IT specialists, women are still under-represented in ICT professions. In Hesse, this needs to change quickly so that women can benefit from the income growth and flexibility of digital professions on the one hand, while also contributing more of their skills and employment potential to this sector. With the Women go digital initiative, we are increasingly focusing on raising awareness and networking among women. Specifically, this means introducing girls to ICT careers in school at an early age, and hence getting them excited about digitalisation and technology.

Women should aspire to work in IT-related fields. The digitalisation of their day-to-day work should also benefit them. That is why we support digital education and training and the resulting opportunities for women, for example an easier return to work after parental leave. Moreover, in the future, the Hessian State Government will focus on enhancing the digital skills of women, for example through the digiFORT initiative in the health sector, the inter-communal further education project digital women, and the *Wiedereinstieg* network.



c. Lifelong digital learning

GOAL

We want to improve digital skills in all life phases and situations – through counselling, promotion and support. In doing so, we focus on facilitating access to educational opportunities and the creation of spaces for experiences and participation.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

Digitalisation accompanies us in all phases of life, which is why we need to consider offerings for developing skills in all age groups. Even small children encounter digital devices through their parents and siblings, thereby intuitively learning the significance and use of smartphones and tablets. Senior citizens, on the other hand, are not »digital natives«, and acquiring digital skills is often a laborious process for them. For persons with a migration background, digital communication technologies often serve as a link to their old homeland. Sometimes, in addition to language deficits, a lack of digital skills also complicates the process of integration into everyday life and work.

Our goal is to achieve a conscious, thoughtful and benefits-oriented use of digital media at all ages, which is why children, senior citizens, and people with disabilities should receive special support from their relatives, their assistants or caregivers, and society. Not only the imparting of knowledge, but also the joint use and trying out of new technological possibilities is an essential element of digital learning. We want to place special emphasis on these areas.

Digital education from the very beginning:

Digital education starts at a very early age, and parents are important role models. Providing them with suitable information and encouraging daycare centres and primary schools to actively develop digital skills at an early age is a key starting point. The Hessian state government is pursuing this, for example, through the DigiKids media skills project for daycare centres and primary schools, which was launched in 2017. The earlier children are actively guided in the use of digital media, the sooner they learn to use them in a thoughtful and autonomous manner.

Contributions from civil society regarding the digital strategy emphasise this:

»If prosperity through digitalisation is to be experienced by everyone in Hesse in the future, people must be well prepared – at all ages.«

With the education and teaching plan for children from 0 to 10 years of age, the state government has developed an orientation framework for early childhood education whose modular offerings also focus on media competence and new media. It focuses on discovery-based learning and emphasises the opportunities that digital media bring for learning and participation. We want to improve the media education and technical equipment in child day care facilities as well as the relevant skills of professionals and instructors. The scope of offerings for promoting digital skills in children at an early age range from further training for educators and teachers to support services for parents and learning projects for the children themselves.

Lifelong learning:

With the »Strengthening digital skills« campaign launched in 2020, we are not only targeting working people, but would like to raise awareness among all citizens at all phases of life and motivate them to be more proactive in acquiring digital skills. With an online tool that assesses digital skills, interested people can perform a self-test on their level of knowledge on the web portal *www.wie-digital-bin-ich.de*.

How digital are you?
www.wie-digital-bin-ich.de

They will then receive educational, further training, and advanced training offerings based on the results. We will continuously expand these offerings so that they include as many people as possible in every age group.

As part of the second Continuing Education Pact (for the years 2021 to 2025), we have agreed with the Hessian adult education centres (VHS) and independent training providers to focus on digital learning settings. The focus of current and future pedagogical work should be digitality, and provide time- and location-independent, barrier-free, and diversely networked educational formats for digital learning. For the Continuing Education Pact, the state is providing almost 13 million euros for the next five years in addition to the previous funding under the Hessian Continuing Education and Training Act, thus giving its implementation a strong boost.

When it comes to digitalisation, we are also taking into account the special needs of people with disabilities or older senior citizens who are not digitally savvy and are focusing on low-threshold education and support services that are supported by digital mentors or social assistants (see action area »Digital society«).

✓ Learning by doing:

Not only the transfer of knowledge, but also trying things out and experiencing them together are essential elements of digital learning. In this context, we want to create spaces for experiences and participation, for example through formats such as AI labs, digital experience centres, co-design workshops, and hackathons. Such innovative offerings provide the public with the opportunity to get to know and try out the digital technologies and their added value.

One example of a participatory format was the highly successful nationwide hackathon *WirVsVirus* in the spring of 2020. It demonstrates how easy and effective it is to involve technology enthusiasts in the search for solutions to social challenges. The promotion of formats in which citizens themselves can take the initiative to develop digital solutions oriented towards the common good is an essential building block for us to enable society to benefit from an enthusiasm for digital technologies.

Digital society

Furthering health, enabling participation, promoting access to culture

4. Digital society

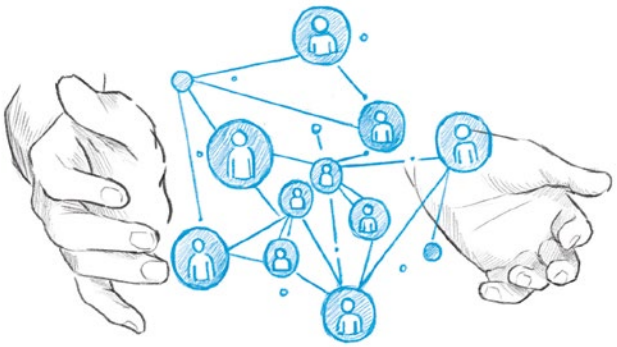
Furthering health, enabling participation, promoting access to culture

VISION 2030

Hesse stands for togetherness in the digital society. The digitalisation of health ensures a good standard of care, particularly in rural areas. Digital assistants promote a self-determined life and enable greater participation for all. Thanks to digital technologies, volunteer work, culture and tourism are alive and visible. Digitalisation thus strengthens cohesion.

Hesse stands for the dismantling of barriers and togetherness in a digital society. Digital tools and assistants offer a wide range of opportunities to support people with mobility or other limitations – through smart assistance systems, but also in the course of the digitalisation of the healthcare system, which allows the standard of care to be improved, particularly in rural areas.

We are also striving to use the potential of digitalisation to strengthen cohesion, cultural diversity in society and tourism. In the context of the digital society, we are concentrating on the following four focal points: the digitalisation of the healthcare system **(a)**, the promotion of digital participation **(b)**, the opportunities afforded by digitalisation for civic engagement **(c)** and for culture and tourism **(d)**.



a. Developing digital health through innovation

GOAL

We want to leverage the potential of digitalisation in the health sector and use it to improve medical care, particularly in rural areas. We are focusing on upgrading health services and e-health expertise throughout the state, promoting innovative telemedicine and using health data for the benefit of all.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

The digitalisation of the healthcare system is progressing in leaps and bounds. Back in August 2017, the state of Hesse launched an e-health initiative. Since then, it has been promoting innovative forms of care in the health sector with annual funding of approx. six million euros. With the introduction of the electronic patient file (ePA), in which all medical interventions, findings, images and prescriptions are to be stored, the exchange of information between specialist practices will be considerably simplified in the future.

Digital services are also playing an increasingly important role on the diagnosis and treatment side. AI-supported evaluations of X-ray images, treatment data or test series in pharmaceutical research are just a few examples of innovative applications of digital technologies in the health sector. In addition, patients have long been using wearables to monitor vital signs or health apps to support prevention and rehabilitation measures.

To leverage the potential of digitalisation in the health sector, we will focus on the following areas of action in the coming years:

Effective networks, optimal care:
www.ehealth-in-hessen.de

✓ e-health expertise:

In spring 2018, the Competence Centre for Telemedicine and e-health commenced operations. One of its focal points is advising practices, hospitals, emergency services, care and rehabilitation centres and other health service providers on digital medical applications and e-health

infrastructure. Doctors receive useful information on the implementation of digital systems and on more efficient and secure operation of their practices in compliance with data protection requirements, on new and demand-oriented digital forms of care, and additional networking possibilities for health services that stand to benefit their patients.

A special focus in the coming years will be the improvements that digital medical care will bring to rural areas. We will provide targeted support for initiatives in this regard, for example the establishment of telemedical consultation hours. In addition, we advise health and care-related initiatives on the telematics infrastructure and data protection requirements and inform all stakeholders about options for financial support.

In particular, the offerings of the Competence Centre are aimed at outpatient services in the healthcare system. We will continuously adapt and dynamically expand these digital support services to address future developments in the health sector.

✓ Stronger networking:

We want to use the opportunities afforded by telemedicine in a targeted fashion to provide better medical care and cross-sector networking between health care providers in the region and worldwide. Together with the partners in the Health Pact 3.0 *(Gesundheitspakt 3.0)*, we have already set a clear focus. The partners have set themselves the goal of establishing a health data pool in the form of an online portal.

To strengthen cross-sectoral care, the Health Pact also pursues the further development of indication-specific care plans that support cooperation between outpatient and inpatient medical specialists as well as other health and care professions for certain patient groups or disease patterns. The networking of stakeholders and health data enables more targeted and more efficient medical care. That is why we also strongly support corresponding collaborative projects at the municipal level.

Within the framework of the digital strategy, we also focus on upgrading digital skills in this field of application in order to make citizens aware of the opportunities and challenges of the electronic patient file and to inform them about how their data will be shared. Our aim is to achieve responsible, self-determined and benefits-oriented handling of health data by all.

Health data hub:

Health data is not only of central importance for medical care. It is also invaluable for medical and pharmaceutical research and development. The creation of a European Health Data Space is therefore one of the European Commission's priorities for the years 2019 to 2025. It aims to provide a clear regulatory framework for the efficient exchange of and direct access to various anonymised health data (electronic patient file (ePA), genetic data, patient registers, etc.), not only for health care, but also in health research and policy. The Hessian state government expressly supports this initiative.

We want to reinstate Hesse's reputation as the modern and innovative »pharmacy of the world«, and are therefore placing a forward-looking focus on AI and data usage. With the creation of our own Health Research and Data Hub, we want to make a decisive contribution to the promotion of the Health Data Space. In doing so, we will build on Hesse's strong expertise and economic prowess in the fields of pharmaceuticals and life sciences, which is consolidated under the Health Industry Hesse Initiative (IGH) under the leadership of the Hessian Minister-President and also synergises with the House of Pharma and Healthcare.

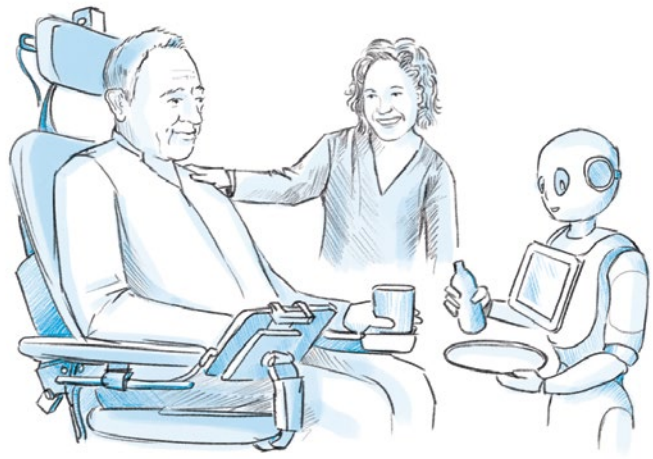
We intend to design such a flagship project jointly with the various stakeholders from research and industry, and in doing so, cover the necessary aspects of anonymisation, quality assurance, data access and

data use by employing sustainable and balanced governance. At the same time, we are doing everything we can to protect health data and our critical infrastructure, such as hospitals. Hessen3C's expertise and advice also extends to the particularly sensitive health sector.

✓ Promoting innovation and transfer:

As part of Hesse's digital strategy, we aim to further advance innovations in the field of healthcare. Back in 2020, the state launched a call for tenders in the field of e-health as part of the existing Distr@l funding programme. This call motivated applicants from higher education, SMEs and start-ups to present innovative, health-related projects. One thematic focus was on digital assistance, another on AI-supported projects, innovative approaches in diagnostics, and monitoring. Finally, digital projects from the field of epidemiology were also submitted.

Now that the call for tenders has concluded, we are not only funding many innovative projects for the health sector, but also expect further applied research and development projects from the health industry in the future thanks to the funding approach that has now been established. We are also using Distr@l as a driver of innovation in the field of e-health. To achieve this, we are also building on the close network of universities, universities of applied sciences and Hessian SMEs, which is reflected, among other things, in the cooperation and scientific support of joint digitalisation projects. For example, the Central Hesse Research Campus works closely with industry partners in the future-oriented field of digital medicine and e-health. The newly established funding for the universities of applied sciences also lays the foundation for continued, long-term cooperation and focuses more strongly on the training of new scientific talent. This pays off in many different scientific fields and application scenarios.



b. Promoting digital inclusion, reducing barriers to access

GOAL

We want to make digitalisation openly accessible to all. Everyone should have the opportunity to meaningfully integrate digital applications and technologies into their everyday lives, to use them for a better quality of life, as well as to lead a more self-determined life. We are committed to removing barriers to access.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

Digitalisation is now a part of our everyday lives. However, in the dynamics of the technological transition, a problematic societal divide between »onliners« and »offliners« is becoming noticeable. This is not about those who voluntarily wish to do without digital media and technologies. However, if people cannot use digitalisation because of their life situation or lack of skills, this is unacceptable since digitalisation pervades our lives.

DIGITALISATION IS NOW A PART OF OUR EVERYDAY LIVES. WE WANT TO MAKE IT **INCLUSIVE**.

Whether it is physical or mental limitations, language barriers or other hurdles – we want everyone to be able to integrate digitalisation into their lives in a meaningful and needs-based manner, both locally and globally. To overcome the existing digital divide and make digitalisation as inclusive as possible, we want to offer contact points and strengthen technological and application-related skills. For us, one of the central challenges of the digital strategy is to ensure that all people, despite their different abilities and interests, have access to digital offerings and technologies.

Accessibility:

Barrier-free access to digital technologies and services, such as information and services on the internet, is a basic prerequisite for participation in the case of persons with physical or mental disabilities. According to EU Directive 2016/2102, the online offerings must be designed such that they are barrier-free, i.e. accessible to all people, regardless of their physical and mental abilities.

The state of Hesse also views this as one of its duties and therefore appointed a state commissioner for barrier-free IT in September 2018 to advise public bodies on the provision of accessible information on the internet. We consistently emphasise open access and the dismantling of barriers in the offerings of the state. In other social and economic areas of application as well, we aim to work towards ensuring that hardware and software can be adapted to the abilities of persons in need of assistance. We consider the certification of particularly suitable software solutions and devices as well as the promotion of »accessibility by design« within the framework of model projects to be an expedient approach.

»ACCESSIBILITY BY DESIGN«

Thus, the state of Hesse has, among other things, created the »Young Digital Designers« category as part of the State Prize for Universal Design. It targets design solutions featuring digital products or applications offering a high level of usability for as many people as possible. There are many good ideas: In the first round in 2020, 180 submissions were considered in the competition. We want more such creative solutions for barrier-free digital technologies, for example approaches utilising voice/image output or simplified user interfaces.

✓ Getting everyone involved:

Our educational offerings and ongoing mentoring and guidance programmes will be expanded to break down any existing reservations regarding digital devices and their applications. They upgrade the digital skills of people who need assistance to participate in the digital world. With the *Di@-Lotsen* project, for example, we will create a low-threshold offering to assist older people in using digital devices. It will involve volunteers, above all from the older generation. Such mentoring models serve as cornerstones for taking advantage of the opportunities of digitalisation for a self-determined life in old age, to reduce inhibitions, and to encourage greater openness.

With the »Voluntary Social Year – Hesse digital« project, we want to increasingly link care and welfare by sharing application knowledge and making digital offerings in social institutions accessible. Back in 2020, the first year of the pandemic, we equipped nursing homes, facilities for the disabled and hospices in Hesse with 10,000 tablets to enable them to maintain contact with relatives through video calls despite the visiting restrictions imposed. A central task for future volunteers will be to meaningfully expand the range of application of the devices in the facilities, for example for memory training.

We are also concerned about how to further promote access to digital offerings and products for socially disadvantaged groups. We will focus on supporting this in schools, training and further education, in the teaching of skills, as well as in social institutions.

The stimuli for digital participation focus on one idea – enabling digitalisation for all:

Particularly older persons who are not digitally savvy require consistent and personalised offerings to understand the digital world and to be able to reap its benefits.

Digital assistance:

Digital assistance systems offer help for people who have specific needs. The goal in this area is to promote innovations in care facilities that facilitate a self-determined life and provide support for people who have physical limitations. The state will be initiating and guiding cross-sectoral developments for digital innovations in the field of assistance systems over the next decade through measures such as pilot projects, idea competitions, hackathons, and suitable funding opportunities.

This not only applies to the care and health sector; digital assistants can also make everyday life easier in many other areas of society. For refugees, communication technologies offer a link to their old homeland and at the same time opportunities to learn the language and culture of their new homes. Senior citizens can use video calls and messaging services to keep in touch with distant relatives and avoid traveling long distances by using digital services. Many assistance systems also offer the chance to live a fulfilling, self-determined life in old age.

Special applications and digital information services offer people with disabilities a wide range of support services for coping with everyday life. With the digital strategy, we want to make such digital offerings, which promote the participation of disadvantaged groups and increase their quality of life, more visible and accessible, and support their development within the framework of innovative projects. At the same time, we also want to bring all manner of societal groups together so they can interact and exchange ideas.

c. Greater participation and involvement thanks to digital helpers

GOAL

We want to use digitalisation to strengthen cohesion in Hesse and involvement in our state. In doing so, we are relying on civic networking opportunities and on wide-ranging participation formats so that we can all support each other even better.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

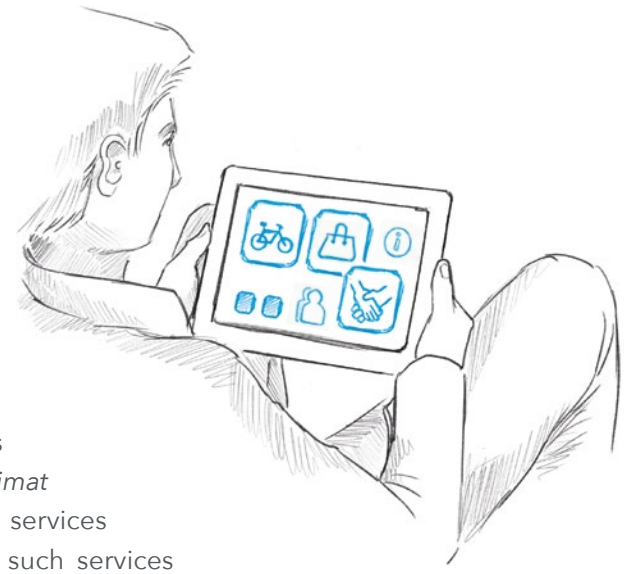
Digitalisation offers enormous potential, especially for increasing participation and improving the quality of life at local level. We want to exploit this potential to further promote civic engagement and social cohesion in Hesse.

In the state competition »Hesse made smart – Together, local, digital 2020«, which was held for the first time, ground-breaking, transferable projects and concepts that are currently being implemented received awards in the categories »Smart Community«, »Smart Participation«, »Smart Helpers«, and »Smart Learning«, which make the possibilities of digital solutions in this societal field visible. In the future, we will continue to focus on digital helpers and neighbourly engagement with and through digital networking.

✓ Digital togetherness:

Digitalisation offers many opportunities to strengthen social togetherness. One very important form is village or neighbourhood apps, which link citizens in a neighbourly manner and provide feedback channels to politics and administration. Through our digitalisation advice in the Smart Region Office, we would like to encourage municipalities and municipal institutions to develop and implement such innovative networking offerings.

Not only apps, but also web-based platforms and formats offer citizens excellent opportunities to participate in decision-making processes, particularly in municipal planning, for example in neighbourhood and settlement development. Participation platforms pave the way for more co-determination and the exchange of ideas in societal processes, specific infrastructure projects and municipal expenditures. Co-design workshops or competitions such as hackathons are successful formats for involving citizens.



The state promotes smart solutions in the municipalities through the municipal empowerment programme *Starke Heimat Hessen II*, thus also offering support for digital municipal services to promote local civic engagement. Since the success of such services depends on the number of users, we will also support municipalities in the development of communication strategies and low-threshold educational offerings.

✓ Promoting voluntary work:

Strong voluntary involvement is the glue holding our society together and is something we want to maintain and nurture for the future. That is why we launched a funding programme for the digitalisation of volunteer work in 2020. We plan to continue supporting non-profit associations and their umbrella organisations in the future – in the acquisition of suitable IT or software, in education and training measures, and in the optimisation of internal processes.

In this regard, the guiding principle for our digital projects is always to strengthen social cohesion and facilitate the work of volunteers. Due to the practical benefits in voluntary work, many people are becoming more trusting of digital applications. We see digitalisation as a crucial pillar of our promotion of civic engagement in order to keep it alive and enriching for everyone in the future.

DIGITALISATION
IS A KEY PILLAR FOR
PROMOTING
VOLUNTEER WORK
IN HESSE.

Social services:

Counselling centres, social services and welfare organisations provide indispensable services in many areas of society that make for a strong social network in Hesse. Here, too, digitalisation opens up considerable opportunities for greater efficiency, faster work processes, closer networking and better communication with target groups. However, many institutions, associations and counselling centres still see themselves as being insufficiently digitalised.

The state government aims to support them on their path: not only with the funding programme *Ehrenamt digitalisiert* (Volunteers go digital) but also specifically in areas such as the digitalisation of work with children and youth. This includes, for example, funding for the project »Youth work online« (*Jugendarbeit online*), the new youth action programme from 2022 to 2024 (*(Frei)Räume für Jugendliche*) with a funding focus on digital participation projects or the prevention of sexualised violence against children and young people. With the help of digital tools, counselling centres will be able to take better action, get across to and support their target groups, and protect them in dangerous situations.

d. Promoting culture and tourism through digitalisation

GOAL

We want to make culture and tourism a new digital experience. By doing so, we can provide a new level of access to cultural assets and allow everyone to participate in Hesse's rich cultural heritage, while at the same time improving access to tourism offerings.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

Digitalisation is a complex and challenging task that encompasses many aspects, both for cultural practitioners and our cultural institutes. With the help of digital technologies, new works of art can be created and interactions between individual stakeholders facilitated. That is why we want to guide cultural institutions and cultural practitioners in the integration of digital technologies and support them in the development of skills.

Digitalisation facilitates and opens up access to cultural assets for many people. It is already making the acquisition of knowledge and the way culture is experienced in our state more accessible and more vivid. It is therefore also our goal to make Hesse's rich cultural heritage digitally accessible via state-of-the-art solutions, to establish new modes of research activity, and to put collections and historical documents online. On the one hand, we are guided by the idea of making digitalised collections accessible independently of time and space. On the other hand, we also want to provide digital information services such as virtual reconstructions or apps for physical visits to museums and other institutions.

Experience our cultural heritage digitally:
www.kultur-in-hessen.de

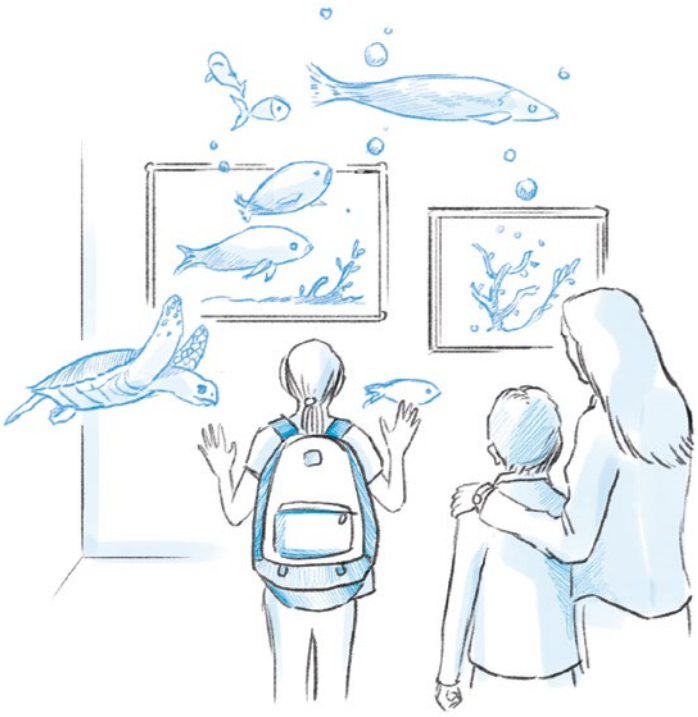
Digitalisation also offers numerous opportunities for our tourism offerings. Hesse boasts a dynamic and prosperous tourism industry that was on a successful course until the outbreak of the pandemic in 2020. More than 35 million overnight stays, a gross turnover of 14.3 billion euros and – converted into full-time jobs – 230,000 jobs show just how significant tourism is in Hesse. We want to use this basis to further expand access to tourism offerings in our state through digital innovation.

Interactive culture:

Culture makes an important contribution to critical reflection regarding the digitalisation of our living environment. We want to do justice to this contribution by promoting digital culture. More and more artists are developing digital works of art. With a great deal of creativity and inventiveness, cultural practitioners also showed us in the pandemic year of 2020 how they can reach their audience with online formats.

This not only involves marketing and information, but also participatory formats that enable a completely new form of interaction between audience and artist. It is possible, for instance, to expand the circle of visitors by adding a virtual dimension to the theatre space. By doing so, new target groups can be won over for theatre and other theatre-related educational and cultural event formats can be integrated.

We will advocate the further development of interactive digital formats and new meeting spaces in order to increase cultural visibility and diversity of expression. Harnessing digital potential is the key to achieving this: People of all ages, but above all children and young people, should be able to experience art and culture and participate in cultural education via new formats. The younger generation in particular can be targeted through digital offerings.



Digital cultural heritage:

Back in the pandemic year of 2020, the Hessian state government made ten new positions and three million euros available for digitalisation in the state's museums, listed buildings and gardens, and archives. We are consistently pursuing this path of digitalising our cultural heritage. This will give the institutions additional opportunities to more effectively digitise their collections and to communicate them to a larger audience through new formats – be it on the internet, social media or on site thanks to apps and virtual reality.

In future, digital managers will spearhead and coordinate the digital transformation for the state museums, the *Museumslandschaft Hessen Kassel*, the State Office for the Preservation of Monuments, and the State Palaces and Gardens. Digital curators will ensure that the collections are digitalised and that the digital copies are made available on the internet. This also includes collections from colonial contexts in Germany, which are to be made accessible by the federal government and the states as outlined in the »3-road strategy«.

In the dialogue process on the digital strategy, one focus was on greater participation and cultural diversity:

»Whether it is archives, museums, online libraries, or theatres: Digitalisation creates new ways to access cultural offerings. At the same time, it also encourages the creation of new digital cultural assets.«

The digital archive of the Hessian State Archives is being expanded in order to be able to permanently preserve the historically relevant data of the state administration and make it available for research in the future. We support the State Office for Regional History in the development of special offerings by its Hessian Information System on Regional History LAGIS for schools, political education, and historical research. Together with the State Agency for Civic Education, we are also focusing on digital access to extracurricular places of learning, as is currently the case with the development of an online contemporary witness memorial on the history of German partition with the Point Alpha Memorial and the Schifflersgrund Border Museum or the digitalisation of the Breitenau National Socialist Memorial.

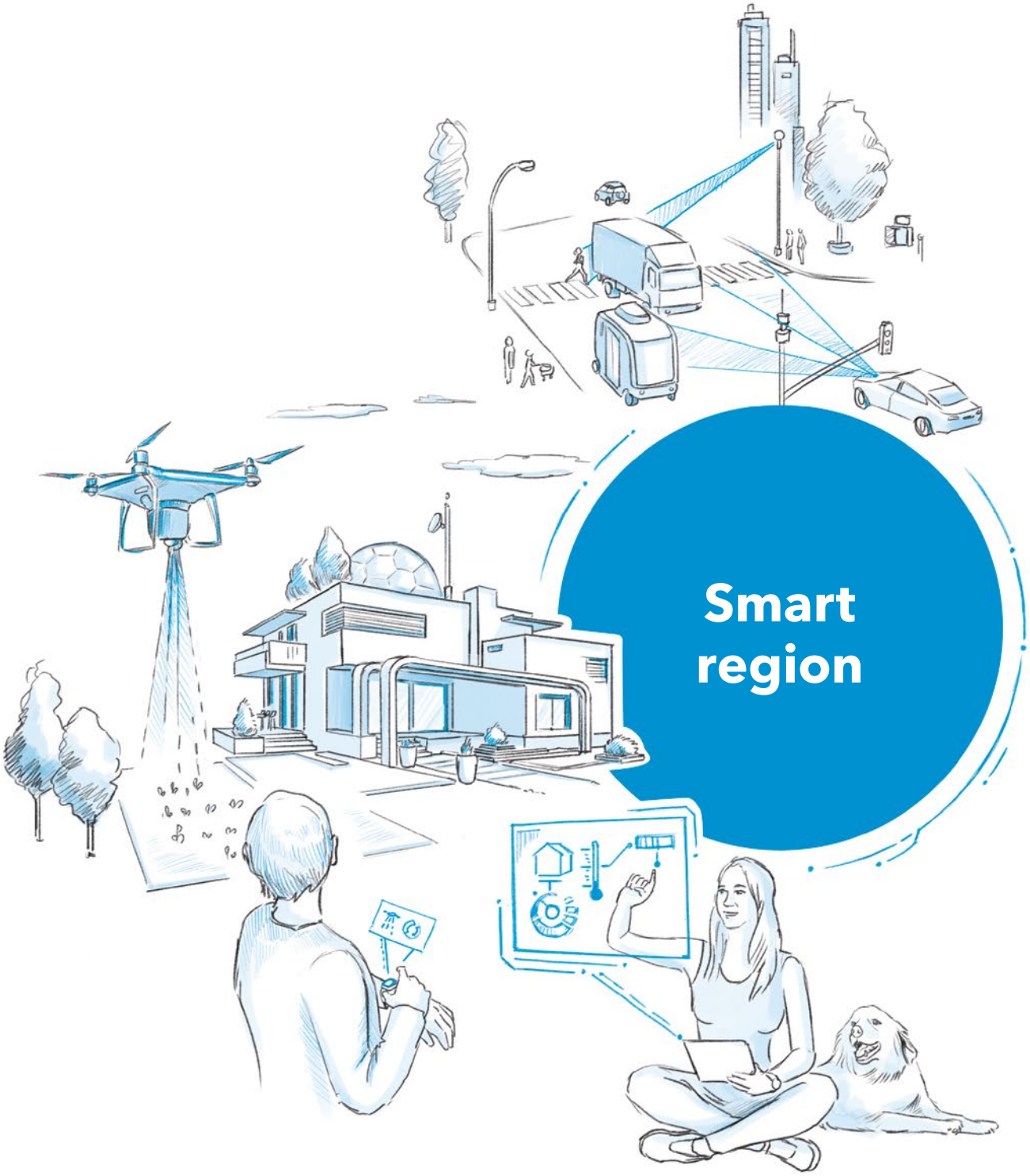
Our aim is to provide a broad range of information and convenient access to our cultural heritage and digitalised archives on the internet in order to meet the needs of as many user groups as possible. By doing so, we want to enable people with mobility and other limitations in particular to participate in our cultural and historical heritage.

Digital tourism:

Welcome to HESSE, THE STATE OF EXPERIENCES:
www.hessen-tourismus.de

Our strong tourism industry gives rise to an obligation to support tourism projects of the future and to promote innovation. Hesse's tourism offerings, its natural and cultural landscapes, towns and municipalities, spas and health resorts, sights and leisure destinations contribute to value creation and employment as well as quality of life and thus its attractiveness as a location, particularly in rural areas. Digital innovations in tourism can make it easier to find and experience what is on offer.

This includes upgrading the websites of *Hessen Tourismus* and Hessian tourist destinations, improved networking among stakeholders as well as the digitalisation of tourist offerings, for example through 3D scanning processes or the linking of individual offerings and attractions in context. In this manner, we hope to further simplify access to tourism offerings in Hesse for our own citizens as well as for guests from Germany and abroad.



Intelligent solutions
for urban and rural areas

5. Smart region

Intelligent solutions for urban and rural areas

VISION 2030

With a high quality of life and sustainability, urban and rural regions in Hesse are places of the future. Smart solutions ensure a healthy environment and convenience in all areas of life, such as transport, housing or education. Digital assistants take care of everyday tasks and autonomously driven minibuses provide for greater independence, even for people with physical disabilities.

Smart cities and smart regions increase the quality of life and sustainability, enable more cultural and social participation, promote the local economy and increase the efficiency and proximity of public services to citizens. This is why many Hessian cities are already pursuing smart city strategies, and very successfully. Municipal approaches to action are also intertwined with digitalisation concepts and strategies at the state level – whether in settlement development, health care, economic development or sustainability.

Digital strategies open up many possibilities for active local policy, especially in rural regions. For example, digital connectivity and the upgrading of infrastructure can make it easier to combine living and working in rural areas, promote the establishment of businesses, stimulate innovative solutions in agriculture, and improve education and health services.

In order to realise all these digital opportunities, the municipalities not only need a digitalisation strategy, but also to work together across the board, and not only in their immediate surroundings. The challenges for all are diverse and in part very similar, such that the development of joint solutions – also independently of spatial proximity – makes sense. Whether urban or rural, business location, transport hub or recreation area – smart regions only emerge through a concept tailored to the existing strengths and challenges as well as through the networking of stakeholders, infrastructure, access to data, and targeted advisory and funding measures.

We want to proactively promote digitalisation in Hesse with a regional agenda setting for digitalisation that addresses specific development needs, competence profiles and stakeholders. In the area of smart cities and smart regions, we are focusing on three outstanding priorities: Firstly, on consultation and promotion **(a)**, secondly, on central fields of application and potential for sustainability **(b)** and thirdly, on the creation of common data spaces for municipal solutions **(c)**.

a. Consultation and promotion

GOAL

- **We want a smart Hesse that is tailored to needs and omnipresent, taking into account regional requirements profiles and supported by a lively smart region community. Our goal is that all stakeholders receive the best possible support from the state. To this end, we are expanding expert advice and support services that meet the needs of target groups and we are intensifying networking between municipalities and regions. The focus is on the transfer of solutions and experience.**

WHAT'S IN PLACE & WHAT WE'RE PLANNING

In Hesse, the Smart Region Office and its partners provide a broad advisory and support network for the digitalisation of municipalities. We want to further strengthen this network, because the trifecta of analysis, advice and support has proven itself in the realisation of the digital transformation of cities, municipalities and districts.

Through specific formats, the Hessian state government will support the cooperation and networking of municipalities as well as the transfer of technologies and experience at the regional level and throughout Hesse, because traffic flows, environmental and supply problems do not stop at city borders.

In conurbations, inter-municipal cooperation can help to cushion pressure caused by growth. In rural regions, regional digital development can increase the attractiveness of a location as a place to live and do business. Both serve not only to achieve increasingly comparable living conditions between urban and rural areas – rather, useful digital solutions and processes can also be transferred to other municipalities.

Smart Region Office:

With the Office, the Hessian state government offers all Hessian municipalities a central point of contact for all matters relating to smart cities and regions. The aim of the Office is to provide a platform for the growing smart region community throughout Hesse. With a variety of networking formats, information offerings and advisory services, the Office provides tailored support to municipal decision-makers, municipal enterprises and other stakeholders on their path towards a digital future.

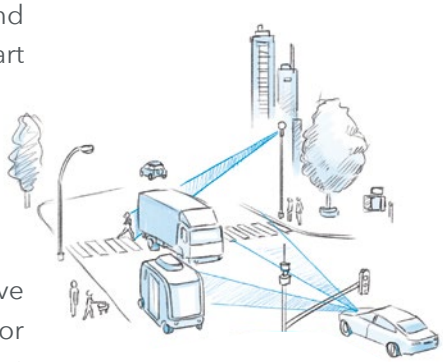
More information on Hesse as a smart region:
www.smarte-region-hessen.de

For example, a best practice database facilitates the search for successfully implemented projects and allows municipalities to learn from each other. We will continue to pursue this path and further advance the digitalisation of the municipalities in Hesse with networking and interactive formats.

Promoting smart municipalities and regions:

From 2021 onwards, we will be promoting the digitalisation of municipal administrations with the programme *Starke Heimat Hessen II*. This includes projects for the digitalisation of administrations and in all areas of extended public services, such as mobility, energy supply and education. The funding focus is deliberately aimed at generating innovative and model projects. This aims to ensure that the funding generates added value not only for the municipality receiving the funding, but potentially for all Hessian municipalities.

In the context of transfer, the Smart Region Office provides support via various formats, for example with the aforementioned best practice database or the regional exchange of ideas. Digitalisation consulting on smart cities / smart regions is available to all municipalities. In this way, we tap into the individual development potential of the municipalities and provide impetus for strategy development or for the implementation of specific application projects. Knowledge transfer, networking, advice and funding are the four approaches we use to pave the way toward a smart future for the municipalities in Hesse.



✓ Flagships:

The state of Hesse supports model municipalities with testing innovative digitalisation approaches. They serve as testing grounds and showcases for intelligent, forward-thinking solutions for Hesse and well beyond. The first such flagships already exist: For example, the digital city of Darmstadt, which won the nationwide »Digital City« competition of the German Association of Towns and Municipalities and the industry association BITKOM in 2017, has launched trend-setting projects in 14 action areas for public municipal services. We want to pass on the wealth of experience gained through the implementation to other municipalities as well.

In their statements on the digital strategy, business associations in particular emphasise the following:

» Smart regions are created through the networking of providers and users of smart solutions and the sharing of best-practice examples. «

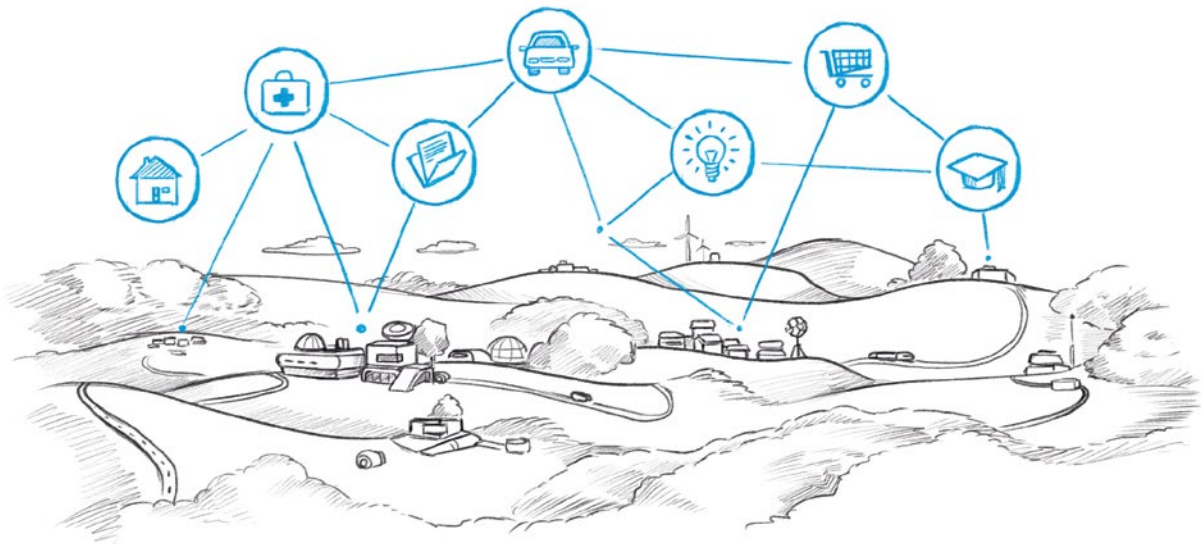
For a long time now, not only Darmstadt, but also Kassel has been a role model among medium-sized cities. Bad Hersfeld and Eichenzell provide guidance for smaller municipalities. Rüsselsheim and Wiesbaden are also already pursuing smart city strategies to create a better quality of life through intelligent infrastructure and digital services. Many more testing grounds and laboratories, also in rural areas, are to be created in the coming years. In these locations, experience with innovative digital solutions will be gathered and transferred to other municipalities and regions. We will raise awareness of the flagships throughout the state by promoting activities where ideas are exchanged. Digital pioneers need to become more visible and pass on their know-how to other municipalities.

Initiatives and networking:

For municipalities and regions, becoming smart is a joint task involving many stakeholders. Intelligent solutions and their implementation are the result of cooperation between entrepreneurial and scientific innovators, citizens and municipal decision-makers. As a state, we see ourselves in the role of a facilitator and pioneer: Networking, supporting innovation, removing obstacles, making successes visible, passing on know-how and stimulating the exchange of ideas and reflection.

Hesse is characterised by the diversity of its regions: They exhibit different value chains and competence profiles, and the education and research landscape are just as diverse as the settlement structure and infrastructure or demographic development. We therefore want to create special places throughout Hesse where smart solutions can be developed, tested, discussed, presented and reflected upon.

These locations – Smart Region Hubs – address the special development needs and profiles of the regions and are intended to offer local research and development excellent working conditions for living labs, digital testing grounds and the development of prototypes. The Smart Region Hubs serve as showcases for municipal actors, representatives, and citizens: Here, they can experience for themselves how innovative solutions are created, how they can be promoted, how they work, and what benefits they provide.



b. Smart cities and regions: Testing grounds for smart solutions

GOAL

When specific thematic areas are considered, the transformation to smart living is particularly evident. Whether in mobility, energy, housing or agriculture and forestry: We want to tap into digital sustainability potential to live even more comfortably, save resources and protect the climate.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

Smart cities and regions in Hesse are testing grounds for intelligent and forward-looking solutions and greater sustainability. In larger cities and metropolises, digital technologies support urban lifestyles and global economies and help to overcome the challenges of urbanisation. Rural towns and regions harness digitalisation to create new ways of adding value and connecting to other regions or conurbations, thus also counteracting a possible urban-rural divide.

At important transport hubs in Hesse, different forms of mobility come together, which interact and can be intelligently networked with each other. Smart transport solutions also offer opportunities for improving mobility in less populated regions. A wide range of sustainable opportunities are emerging in energy supply and agriculture. The state of Hesse supports the development and testing of smart city and smart region technologies and applications.

New mobility and logistics:

Better integration and networking of diverse means of mobility in the form of multimodal mobility hubs can only succeed with the help of digital traffic control and data-based platform solutions. This is particularly true for the Rhine-Main region, which, with Frankfurt Airport and the rail and motorway hubs, is one of the largest transport hubs in Europe. Here, feeder traffic in logistics and individual transport is already being optimised and different modes of transport are being interlinked and coordinated with each

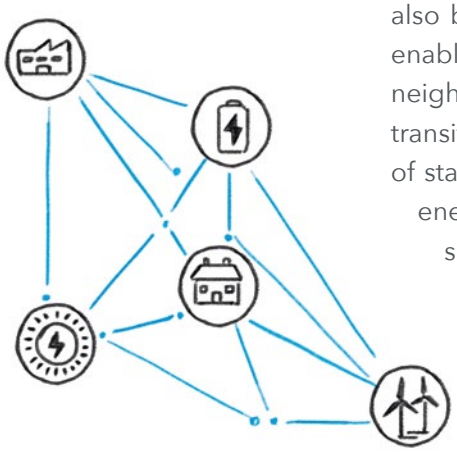
other. In future, the region can function as a testing ground and showcase for the whole of Hesse. The location of the new *Bundesautobahn GmbH* in the interdisciplinary and cross-sector mobility centre HOLM offers the opportunity to develop Hesse into a place of innovation for digital-based traffic control in interregional motor traffic.

Digitalisation also offers enormous opportunities in the area of local public transport, for example in data integration and cooperation with transport associations from neighbouring federal states. Initiatives such as Mobility Inside, in which Hessian stakeholders are significantly involved, are paving the way. Platform-based traffic control systems, such as those implemented for road traffic in Darmstadt as part of a digital city project, are also pointing the way. These not only reduce the occurrence of traffic jams, but also help to steer traffic flows in an environmentally sensitive manner.

This also includes digitally supported mobility options from public transport, sharing and carpooling services, which promote the intermodal use of transport through intelligent payment systems and digital offerings. The Hessian state government is aiming for such applications to be used throughout Hesse. In the field of autonomous driving, there will be dedicated test tracks for testing the technologies in a 5G environment with structured data integration into urban or sector-specific data platforms. We want to consistently tap into the digital potential to shape new mobility.

✓ Energy supply:

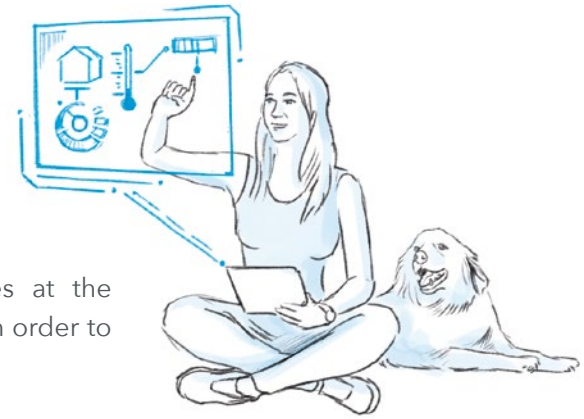
Digitalisation plays a decisive role in saving energy, controlling electricity consumption and integrating renewable energies, which are subject to fluctuations, into the electricity grid. This requires intelligent electricity grids (smart grids) and load management that coordinates supply and demand and ensures grid stability.



The heating transition, as an important component of the energy transition, also benefits from the expansion of digital infrastructure, for example by enabling energy optimisation concepts for larger building units such as neighbourhoods. Digital technologies are indispensable for the energy transition to succeed flexibly and at short notice despite the large number of stakeholders. In addition, digitalisation makes it easier for decentralised energy producers to enter the market. For this reason, the state of Hesse supports the establishment of smart grids that connect all stakeholders in the energy system – from electricity generation to transport,

storage, distribution and consumption. Smart meters not only record electricity consumption for the grid operator, but also create transparency for consumers and incentives for efficient energy consumption, which can be further enhanced by smart home solutions.

We also want to exploit the savings potential in terms of greenhouse gas emissions that can be achieved with the help of digital technology in the area of smart buildings and smart neighbourhoods with intelligent sector coupling for our state. In its energy roadmap, the Hessian government is focusing on all options for leveraging digitalisation in the energy transition, from smart grids to load control, prosumer structures, virtual power plants, smart energy markets and citizen services such as the Hesse solar cadastre.



We will continue to specifically promote digital technologies at the interfaces of energy generation, transmission and consumption in order to intelligently manage the challenges of the energy transition.

✓ Public municipal services:

For sustainability gains through digitalisation, public services in the municipality are a central action area that extends far beyond the potential described in the context of managing mobility or the energy supply. As part of their sustainability strategy, many cities are working on solutions such as intelligent street lighting, sharing the vehicle fleets of municipal companies or digitally controlled and monitored waste disposal (smart waste).

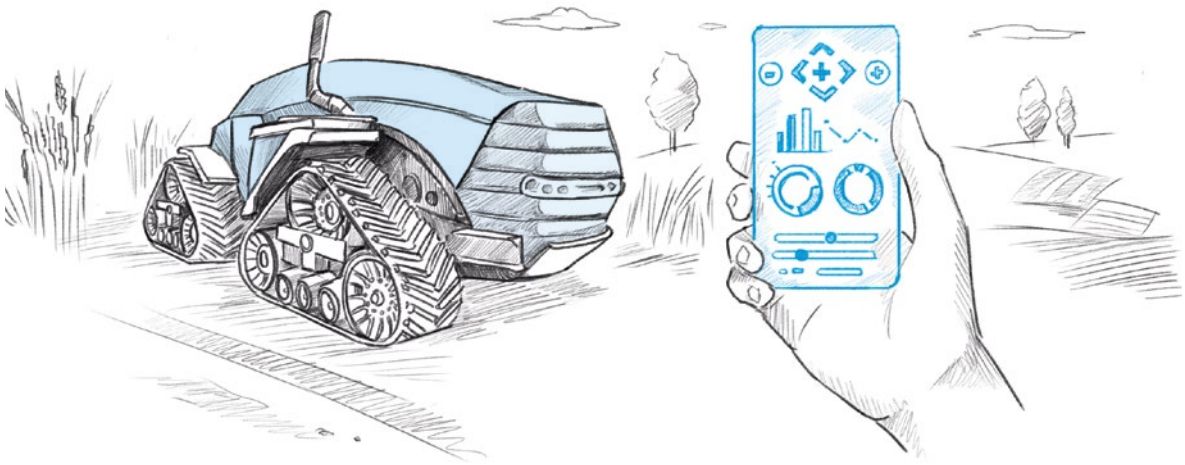
Additional possibilities for increasing sustainability include smart solutions for connected living, an intelligent energy and water supply, sensor-supported waste disposal and recycling management, as well as environmental sensor technology in the implementation of air pollution control concepts. Through the Smart Region Office, the Hessian state government supports the municipal level through networking formats, best practice projects, information offerings and consultations – flanked by funding for smart solutions for public services, as is already the case in the *Starke Heimat Hessen II* programme.

In this field, we also rely on innovative collaboration between science, research, companies and municipalities in order to support model projects, technology and knowledge transfer, and transform them into real-world applications.

Agriculture and Forestry 4.0:

Rural areas are characterised by agriculture, horticulture and viticulture, as well as forestry and the food industry. Farmers in Hesse are increasingly focusing on the digitalisation of their businesses. We will support them on the path towards smart farming and launch new funding programmes to make sustainable technological possibilities available to our farming operations. Digitalisation in agriculture should support environmentally and climate-friendly farming methods, improve animal welfare, optimise management, and thus contribute to the preservation of domestic agriculture.

In order to make digital technologies more widespread in practice, we are driving forward the future-oriented expansion of digital infrastructure in rural areas. The roll-out of 5G is a necessary prerequisite for the widespread use of precision agriculture and AI in the fields. The stables of the future will also use digitalisation to maintain animal health by means of modern sensor technology. Advancing potential digital sustainability innovations is an important course of action for future-oriented agricultural policy, which the Hessian state government is pursuing.



c. Hesse as a smart data region

GOAL

We want to create a common Hessian data space and enable innovations in administration and industry via data platforms and hubs. Our goal is to combine the highest data protection standards with the sensible use of non-personal data.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

Smart cities and regions of the future are based to a great extent on virtual spaces in which various local and regional stakeholders exchange data and thus drive innovation. Today, some municipalities in Hesse are already using urban data platforms as a basis for environmentally sensitive traffic management, transparency on noise and air values, and smart waste applications.

The key to creating innovative solutions for public and new services in the public space is the linking and intelligent evaluation of data. For example, real-time environmental data can be combined with real-time traffic data and used for a traffic control system that optimises traffic flows, also in terms of their environmental impact. For this to happen, however, datasets collected from various offices and authorities, which come in different quality levels and types, must be standardised, linked and made more easily accessible.

✓ Municipal data platforms:

Smart cities and regions need modern data management in accessible data spaces with suitable structures for the virtual (and, in the future, AI-supported) exchange and curating of data – starting at the administrative level between the different offices of a municipality, through the regional integration of urban and sector-specific datasets, such as from mobility systems or industry, to the supra-regional networking of existing data platforms in Hesse. For this reason, we want to promote municipal databases even more in the future.

SMART CITIES AND REGIONS NEED MODERN **DATA MANAGEMENT.**

In addition to a more detailed specification of the regulatory framework, standards are needed in particular to enable individual municipalities to develop platform solutions. We want to focus on offerings that satisfy the ever more stringent requirements for quality (machine readability) and availability of data (open data) and are based on open source. Lastly, the economisation of non-personal data, for example on the part of municipal utilities, can only be realised with professional tools and processes.

This requires standards such as those that already exist today with DIN SPEC 91357 »Reference Architecture Model Open Urban Platform« and are being established and further developed at a higher level within the framework of the GAIA-X process. We will also address these issues in a separate data strategy for the state as part of the Hessian digital strategy (see action area »Digital rules of play«).

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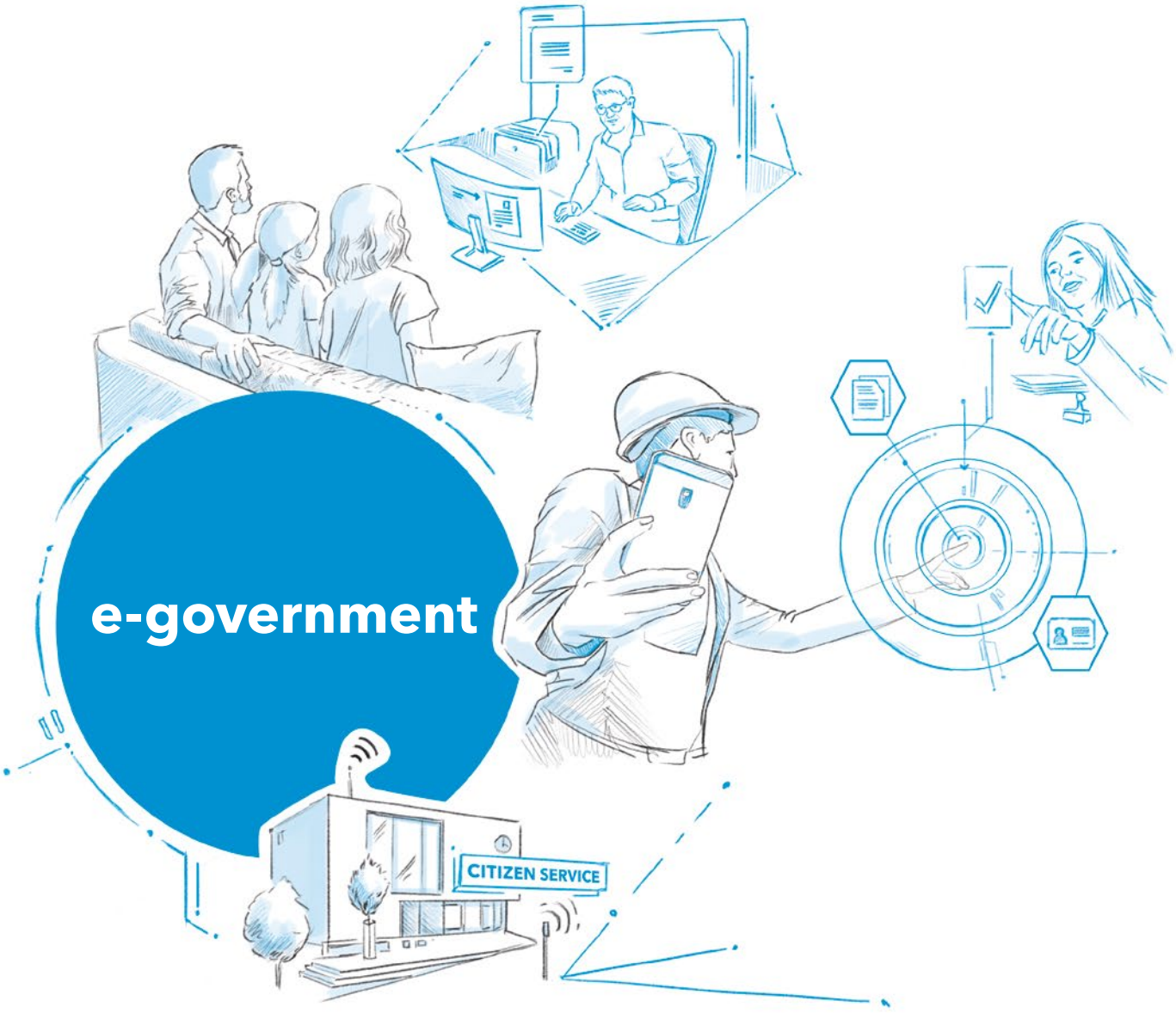
✓ Hessian smart region data space:

For the future, we are striving to create a Hessian smart region data space for our federal state in collaboration with key stakeholders from the smart city sector. This is to become the central interface and exchange platform for the use of data in public spaces and to provide orientation in terms of standards for a decentralised network of urban and sector-specific data spaces in Hesse.

We see the great potential of such data spaces for smart city or smart region solutions in the areas of mobility, transport, logistics and energy. In particular, we want to profitably integrate the economy and regional value chains into these data spaces. Joint action technically requires that the data spaces have open interfaces so that external stakeholders can be integrated while adhering to sustainable governance. We want to support this in our state of Hesse.



Close to the people,
customer friendly and secure

6. e-government

Close to the people, customer friendly and secure

VISION 2030

Digital administration is open to citizens, businesses and institutions in Hesse around the clock, every day of the year. Administrative services can be used conveniently, reliably and securely from home, whether it is an application for a place at kindergarten, a new driving licence or identity card, a business registration, or applying for a construction permit.

The digital transformation does not end at the door of the public authorities. An administration must constantly modernise itself, optimise internal administrative processes, bring them up to date and make them more efficient. The administration in Hesse is taking on this task. Back during the COVID pandemic, it developed standardised infrastructure for flexible working arrangements, which are being consolidated across departments.

Citizens expect digital business processes from their administrations, from the application to the delivery of the decision. Procedures should be quick and simple and easy to integrate into everyday life, regardless of whether citizens appear in person. The state of Hesse has already set the course with a citizen and service account and an administration portal. Citizens can use these offerings to easily and securely access online information on administrative services around the clock, and also submit applications for these services. For example, people can apply for civil status certificates, the replacement of lost driving licences or parental allowance from the comfort of their own homes.

You too can use the Hesse Administration Portal:
www.verwaltungsportal.hessen.de

In the further advancement of administrative digitalisation, the state of Hesse focuses on the clear benefits for the customers of the administration, in particular citizens and companies – while at the same time also including the employees of the administration – within the framework of its digital strategy and the Digital Administration Hesse 4.0 (DVH 4.0) sub-strategy set out therein. For us, administrative digitalisation in Hesse means that

we support the municipalities with establishing a digital town hall, are constantly modernising the state administration, and actively incorporating new technologies in the fulfilment of our tasks.

That is why we are focusing on three priorities in the area of digital administration: Firstly, it is about a clear orientation towards service and benefits in all services and administrative processes **(a)**, secondly, we want to offer all administrative services online at all levels – particularly at the municipal level **(b)**, and thirdly, we are focusing on digital innovations in the state administration **(c)**.

a. e-government: always focused on service and benefits

GOAL

- **We want to consolidate all official services of the municipalities, state and federal authorities within a central administration portal and make them accessible online to all citizens, companies and institutions at all times with a focus on service and benefits.**

WHAT'S IN PLACE & WHAT WE'RE PLANNING

Comprehensive digitalisation of the administration across all authorities requires the provision of official services online. The necessary legal foundation was created in 2018 with the Act on the Promotion and Protection of Electronic Administration in Hesse (Hessian E-Government Act). The core goal is to facilitate electronic communication with the administration and to make it more citizen-friendly, effective and efficient. For the services of state and federal authorities and also for all municipal offerings, the Hesse Administration Portal will provide user-friendly and service-oriented access as part of the digital offensive.

At the same time, the town halls, district and state authorities will continue to be open to those who prefer to meet their contact persons in the administration in person. The advantages of digital administration are obvious: It is open 24 hours a day, every day of the year, and eliminates

most in-person visits to the authorities. However, the digitalisation of the administration does even more – it offers citizens shorter processing times, less hassle and more transparency through automation and process streamlining.

The necessary further refinement of internal processes is also a benefit for the employees of the administration. With new concepts and integrated workplaces, it becomes possible for them to perform administrative work from any location. A reduction in time and effort required for administrative work through automation also frees up more time for contact with citizens or other meaningful work. All employees in the administration will receive comprehensive and forward-looking support in the process of digitalisation, from the design of the workplace to suitable offerings for training and further education. With DVH 4.0, we pursue the following principles and approaches:

✓ Service orientation:

In order to offer citizens even less hassle and more service in the future, administrative processes need to become more customer friendly. Different procedural options are included in this process. These include what are called one-stop-shop procedures, in which citizens will be able to initiate and also conclude a specific matter in just one digital session, whether it is establishing a company or changing an address after moving house.

In their feedback on digital administration, business associations call for less hassle:

» Fast, uniform access to all administrative services and the once-only principle save valuable time, especially in specialised procedures. «

Following the concept of a no-stop-shop procedure, administrative services such as issuing birth certificates or applying for child benefits after a birth can even be initiated by the authorities without citizens themselves needing to take action. The authority only approaches them in order to obtain specific data or documents required.

The once-only principle is also intended to minimise hassle and ensure that information only has to be communicated to the authorities exactly once. Data and documents recorded digitally in the administration will be exchanged and reused securely between the authorities as required, provided that no data protection interests of the persons concerned conflict with this. The Register Modernisation Act, passed in spring 2021, creates the prerequisite for this facilitated data exchange by standardising the administrative registers.

The consistent implementation of the once-only principle will also enable the meaningful linking of private-sector services and administrative procedures in the future, following the concept of a hybrid administration. For example, during a booking process for a holiday on a travel website, the expiry date of the passport could be checked via an interface to the administration portal and, if necessary, a new passport could be applied for immediately. The development and provision of comparable, high-benefit services is to take place step by step, with data security being a priority.

✓ Benefits-oriented:

As part of digitalisation, DVH 4.0 seeks to fulfil five promises regarding benefits for citizens in particular, which also benefit the employees of the administration:

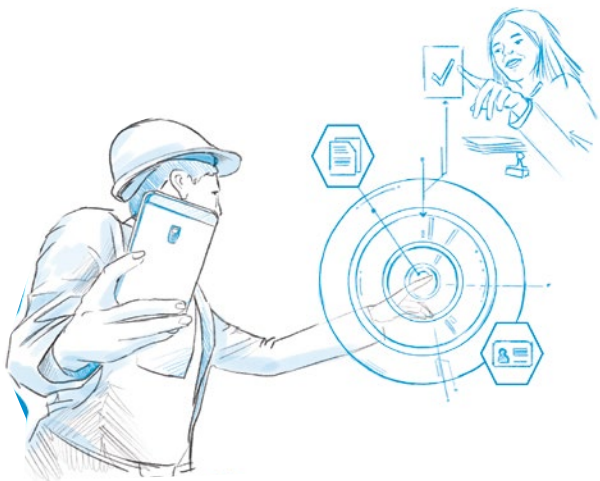
- To achieve a simple and transparent application process, applications need only be submitted in the future if this cannot be avoided. Furthermore, the forms and procedures are to be designed to be as simple as possible, and all citizens, companies and institutions are to receive direct, automatic and transparent feedback on the progress of their application process.

- The central task and goal of digital administration is also effective and economical administration. In combination with other promised benefits, business processes will be continuously improved and economically optimised, especially when it comes to the transparent and economic use of taxpayers' money.

- In order to achieve continuous and comprehensive processes in digitalisation, these processes will always be considered in a context that includes all the relevant authorities, such that duplicate work, costly additional coordination, and multiple instances of recording the same data are avoided. As a result, the necessary interactions with the authorities are minimised. Application processing is noticeably shortened.

- As part of DVH 4.0, the state will in future be even more responsive to developments in modern technologies and make them available for a dynamic, modern and sustainable administration. For all administrative processes, fully integrated digital workplaces, software products and IT systems will be used in digital administration, which will support the use cases in the best possible way within the conditions of the legal framework.

- We regard the modernisation and digitalisation of the administration as a constant challenge. The innovative and reliable further development of administrative work is another promise. The dynamics of digitalisation require that new trends are evaluated constantly with regard to their impact on administrative activities. Citizens can rely on innovative administrative services being provided with a high level of quality and functioning reliably.



b. Towards success together: online access on all levels

GOAL

We want to digitalise administrative services and offer them online at all levels. To this end, we are driving forward the necessary close cooperation between the federal government, the states, and the municipalities. We share our good solutions with everyone, implement tried and tested procedures from others, and in particular, support our municipalities.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

The successful realisation of online access to the administration requires the interaction of ministries and authorities at the federal and state level, municipalities in Hesse, and the IT service providers who advise the state and municipal level and support them in the implementation. This cross-level cooperation is a key to the success of Digital Administration Hesse (DVH).

PRINCIPLE FOR IMPLEMENTING THE ONLINE ACCESS ACT: **ONE FOR ALL.**

The legal framework for online access to the administration in Germany is the Online Access Act (OZG). It stipulates that by the end of 2022, the federal government and the states must digitalise their administrative services and offer them via administrative portals, which the municipalities can also use to offer their services.

The joint implementation of the Online Access Act by the federal government and the states is controlled by the IT Planning Council, which brings together all federal activities on the digitalisation of the administration through the Federal IT Cooperation (FITKO) in Frankfurt am Main. Of central importance in the federal digitalisation programme is the »one for all« principle: the federal states coordinate the digitalisation of services in the respective thematic areas so that other states can use them as well. The sharing of joint administrative solutions saves time, resources and costs.

In Hesse, we have pooled all our strengths for these tasks: In the department of the Minister for Digital Strategy and Innovation, the Chief Information

Officer (CIO) of the State of Hesse is responsible for the strategic orientation of the cross-departmental digitalisation of the administration. The operational implementation of the Online Access Act is carried out by the Hessian Ministry of the Interior and Sports. In this manner, efficient solutions are created collaboratively between the federal government, the states and the municipalities, whether it is the implementation of the Online Access Act, the exchange of data between the authorities, information security, or the qualification of administrative employees.

For municipal actors, but also for business associations, the decisive factor is:

The Online Access Act is a big step towards more e-government because the German register system should be modernised.

In implementing digital administration in the coming years, Hesse is pursuing the following lines of action with particular vigour:

Online Access Act:

With the Online Access Act (OZG), Germany has set itself ambitious goals for the digitalisation of public administration: In 14 key subject areas – from work and family to company management and development – 575 administrative services are be made available online, where they can be utilised directly and easily. Hesse is taking on an active role in the IT Planning Council and is involved in five thematic areas. These range from business management and development, work and retirement, to construction and housing.

An important implementation project in the latter area is the digitalisation of the building permit procedure. Far exceeding the requirements of the Online Access Act, municipalities will in future be provided with an online application assistant and a participation platform which, among other things, will manage the seamless digital cooperation between the authorities, applicants, builders and specialist agencies involved.

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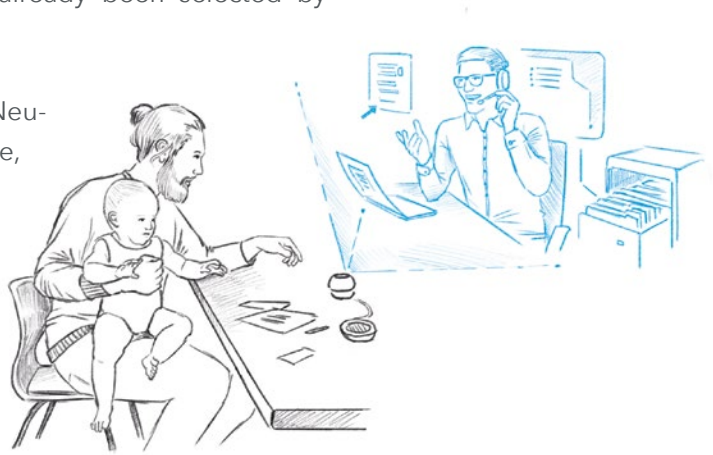
Administrative services are to be digitalised in the coming years – in all areas of life and work.

In the areas of taxes and customs as well as mobility and travel, the state of Hesse will even be in charge of the digital implementation of all services. There are already many examples of implementation in Hesse: In the Main-Kinzig district and in the Rheingau-Taunus district, the digital application for a driver's licence has been launched.

Birth and marriage certificates can be applied for from home via the registry office portal, as can parental allowance or the advance payment of alimony via the social portal. These are just a few steps which were taken on the way towards the agreed goal to offer all administrative citizens' services online. We are consistently pursuing this path.

OZG model municipalities:

The implementation of the Online Access Act is accelerated by the state's own consultations and promotion of the transformation process. Some municipalities are pioneers in this process and are developing and testing certain applications as models for all other districts, cities and municipalities in Hesse. 15 pioneering pilot projects have already been selected by municipal umbrella organisations.



As *OZG model municipalities*, Darmstadt, Neu-Isenburg, the district of Giessen, Grossalmerode, the district of Gross-Gerau, Hofbieber, Marburg, the district of Marburg-Biedenkopf, Taunusstein, Usingen, Viernheim, Volkmarsen, Wanfried, Wetzlar and Wiesbaden will be sharing their digitalisation solutions and experiences with other municipalities. This will give the digitalisation of the municipalities a significant innovation boost.

Supporting the municipalities:

The state of Hesse supports its municipalities and has its sights firmly set on digital town halls. This applies in particular to administrative digitalisation, because we want to make it a success for everyone, in particular for our citizens. For this reason, the *Starke Heimat Hessen II* programme will be providing 20 million euros annually from 2020 to 2024 for measures to implement digital town halls and for the municipalities' digital policy priorities. Moreover, as part of the programme, the state has also been providing the municipalities with the digitalisation platform *civento* by the municipal IT service provider ekom21 free of charge since 2020, thus allowing all municipalities to create application and processing workflows and offer services online.

SIGHTS FIRMLY SET ON DIGITAL TOWN HALLS: **20 MILLION EUROS ANNUALLY AND ADDITIONAL SUPPORT FOR MUNICIPALITIES.**

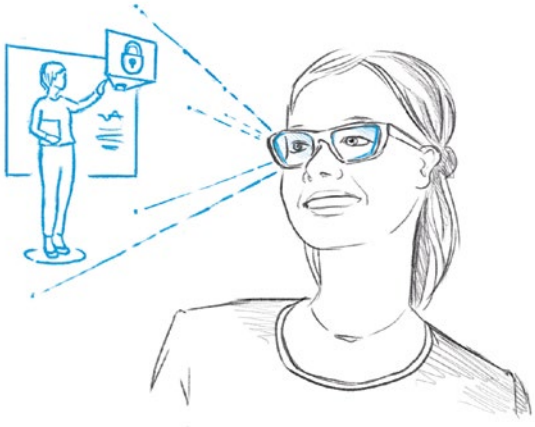
In addition, ekom21 offers all municipalities needs-based digitalisation advice and, with the Municipal Service Centre for Cybersecurity (KDLZ-CS), provides a comprehensive range of advice, analysis and training services as well as technical security solutions for municipal administrations. In addition, a municipal DIGI Check will enable self-evaluation. With these and other needs-based support services, we want to continue to do our utmost to advance the digitalisation projects of the municipalities.

✓ Strengthening digital skills:

With the increasing digitalisation of administrative work, the demands placed on employees in public service will also change. Work processes are being restructured, and innovative technologies and methods are finding their way into everyday administrative work. Administration is carried out by people who participate in the process of change and the accompanying cultural transformation. We pay particular attention to the digital skills of employees in the federal, state and local authorities.

Hesse has initiated the eGov-Campus project in the IT Planning Council, which is developing a modular, digital teaching and learning platform for quality-assured teaching modules on current topics in the field of administrative digitalisation. The platform intends to offer the administrations of the federal government and the states long-term and continuously updated content in specially designed online courses.

We will also initiate further projects for qualification in digital topics. By providing our employees with access to all information and knowledge at all times, we want to equip them for the daily demands of what is increasingly digital administrative work.



c. Innovative and modern state administration

GOAL

We want to harness the possibilities of modern IT infrastructure, innovative technologies and optimised processes in order to continuously modernise the state administration and to accomplish diverse tasks efficiently and in a citizen-friendly manner.

WHAT'S IN PLACE & WHAT WE'RE PLANNING

Digital Administration Hesse is not only aimed at the municipalities. The state administration itself is constantly evolving, and in doing so takes advantage of the possibilities offered by modern IT infrastructure, innovative technologies and optimised processes. The goal is a modern, efficient and citizen-oriented state administration – an ongoing process that has already seen considerable progress and success in recent years.

For example, Hesse is one of the drivers in the digitalisation of tax administration. For more than ten years, the Coordinated New Software Development of the Tax Administration *(KONSENS)* has enabled collaboration between the federal government and the states and brought about constant advancement and modernisation. Hesse is one of the five states in the IT steering group. The first and largest e-government portal in the administration was created with *ELSTER*, which enables electronic tax returns. Many other projects are being worked on to modernise, unify and standardise the software at the federal and state levels.

The digitalisation of the judiciary is also being consistently implemented with the e-justice programme and the digital strategy for the Hessian judiciary. On the one hand, they provide for the introduction of electronic legal transactions by the beginning of 2022 and electronic filing management by the beginning of 2026. On the other hand, with the introduction of the digital service point, the Hessian justice system has set a new standard for citizen-friendliness and service orientation through its service offerings.

DIGITAL SERVICE POINT OF THE HESSIAN JUSTICE SYSTEM

Whether it is the modernisation of the police IT landscape within the framework of the joint federal and state programme *Polizei 2020*, the

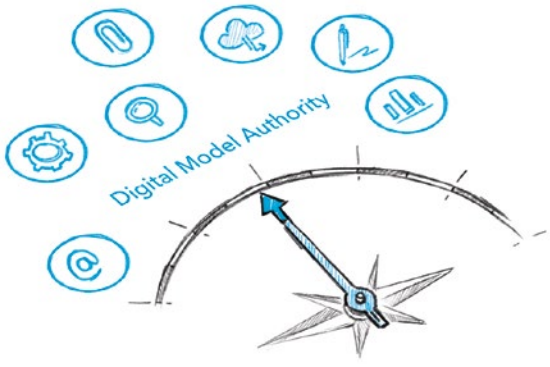
provision and collection of environmental data and geo-specialist data in the Hessian State Office for Nature Conservation, the Environment and Geology or the networking of school administrations as part of the Digitalisation of Education and Cultural Affairs programme – in all areas of the Hessian state administration we ensure modern, efficient and transparent administrative processes that are benefits- and service-oriented.

This also includes the incorporation of the latest technologies and digital innovations into the tasks of the state administration. AI, machine learning (ML) and, above all, cloud technologies open up flexible, scalable and standardised solutions for work processes in the administration and contribute significantly to increasing efficiency. Security and data protection play a key role here, because we want to leverage potential while keeping an eye on the risks. Responsible handling of data and state-of-the-art security are a matter of course for us. We focus on the following overarching aspects of the administration's digital innovation capability:

✓ Digital Model Authority:

For the digitalisation of the state administration, the Digital Model Authority (DMB) in the Hessian Ministry of the Interior is one of the central digitalisation projects of Digital Administration Hesse. The three Hessian regional councils were selected as pioneers and models for the digital transformation of the administration, as their extensive range of services covers wide areas of the state administration. In this way, citizens, companies and customers within the administration are to benefit in a concrete fashion from a digitalised, efficient and user-friendly administration.

The entire Hessian state administration is also expected to benefit from the experience gained by the model authorities. They are learning and experience spaces for developing digital innovations and optimisation processes, testing them successfully and then transferring them. The Digital Model Authority is both a testing ground and an innovator for the ongoing task of digitalising the administration.



Procedural Cloud Hesse:

The Procedural Cloud Hesse developed by the Hessian Central Office for Data Processing (HZD) is a cloud infrastructure for the rapid and efficient provision of virtual servers and clients. The high-availability platform, which is secured at two locations, paves the way towards digital administration. Through a self-service portal and standard browsers, access to the services will be straightforward.

It will not only be open to state employees via the Hesse network but will also be accessible to users of online administrative services via the internet. Additional functionalities will gradually be added to the Procedural Cloud Hesse in the course of implementing the Online Access Act. In this way, departments, state authorities and municipalities in Hesse will be able to access a central infrastructure and network their services even better.

AI in the state administration:

We also expect a significant improvement and increase in efficiency from the automation of administrative steps and the use of AI. AI and ML-based technologies are already being tested and used in various areas by the Hessian authorities. For example, the Hessian Central Office for Data Processing is investigating the possible use of cognitive services such as voice, image and text recognition in administration. In addition to in-person, telephone or written communication, chatbots can act as another communications channel and facilitate contact between citizens and the administration.

Leon, the chatbot of the Hessian Ministry of Social Affairs, for example, assists citizens with their questions regarding COVID restrictions. The Hesse Statistical Office uses ML technology to evaluate satellite images of agricultural land and record crop yields. A research unit of the Hessian tax administration is using AI to evaluate the Panama Papers in order to identify indications of tax and money laundering offences from the enormous amount of data. The Hessian police are realising a Hessian-wide forensics platform and developing services for the AI-supported recognition of child pornography image and video material.

As part of our intensified AI activities, we want to promote these and many other possible uses of such innovative technologies in the authorities and agencies in the future and at the same time define ethical principles and regulatory framework conditions for their safe use.

OUTLOOK

Digital Hesse

A glimpse of the future

Tobias, Sophia, Karim, Mia and all the other people in our vision of a day in March 2030 are fictitious; their wishes, goals, behaviour, jobs, hobbies and life paths are not. There is a little bit of Tobias, a little bit of Sophia in each of us – and with it the potential to change our everyday lives. Digital innovations will determine our lives around the clock. This is something we cannot escape, which is why it is all the more important that we actively shape the digital transformation so that people continue to be front and centre – and not the algorithm.

In our digital strategy, we have formulated clear ideas, specific action areas and targeted measures on how we will shape digitalisation. What we want:

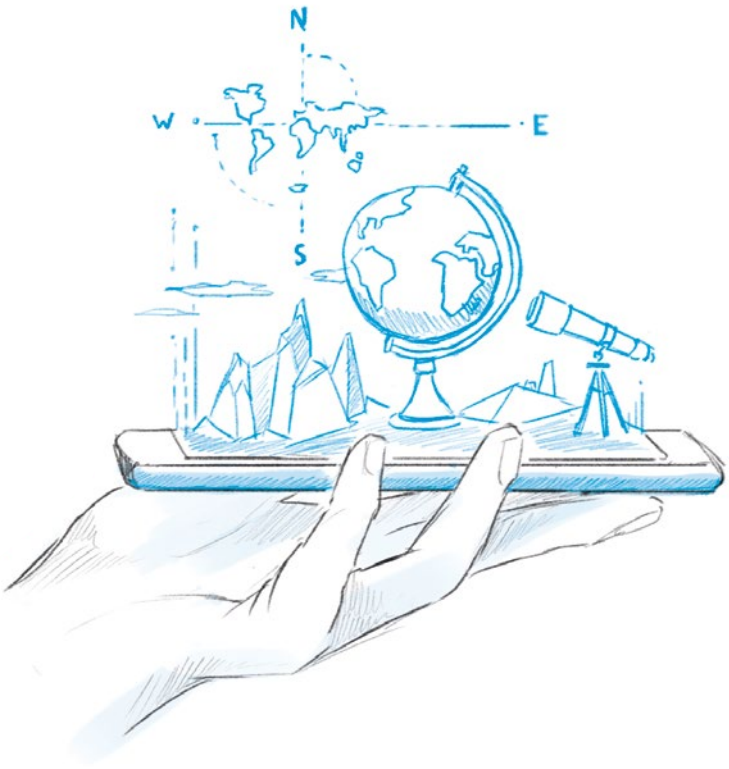
GOALS →

- Digital networks and a computing and data infrastructure that is among the best in Germany
- Digital regulatory law that ensures a secure and safe environment and fair play in the digital world
- Digitally successful companies, especially SMEs, which continue to be admired internationally for their products and processes
- A digitalised education system that equips our citizens and makes them competent and confident users
- »AI made in Hesse« as a strong brand that stands for responsible innovation and ground-breaking progress in medical and pharmaceutical research, in environmental and climate protection, in mobility and many other fields of application
- A digital society in which telemedicine services are the norm and digital participation is a reality, whether in culture, voluntary work or tourism
- Smart cities and strong rural regions that make Hesse even more liveable and attractive thanks to digitalisation
- e-government that is close to the people, focused on service and efficient

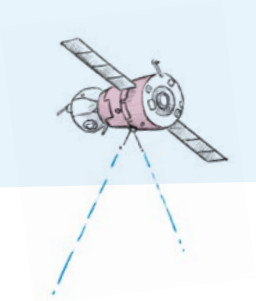
The state government is already working on these goals with commitment, across departments and in collaboration with business, science and society. Many measures are already underway, some are about to be launched, and others are still being developed. The department of the Minister for Digital Strategy and Innovation coordinates and steers this process.

One thing is already clear today: »A Day in Hesse 2030« will soon no longer be a vision, but reality. However, this is by no means the end of digitalisation. Quantum computers, powerful AI or 6G – the future holds even more such innovations.

We will also shape those. Our aim is to keep our finger on the pulse of the times, to promote new technologies responsibly, and to use them meaningfully. We will ensure that they serve Tobias, Sophia, Karim and Mia – and not the other way around. And we will create the necessary conditions to ensure that the future is – and remains – at home in Hesse.



Hesse's digital strategy at a glance



Digital infrastructure

- Powerful networks: gigabit expansion and mobile communications with 5G and 6G
- Sustainable data centres and green IT as a calling card
- Strong data platforms, use of satellite technology

Digital rules of play

- Commensurate provision and use of data
- Cybersecurity expertise and reinforcement
- Strong digital regulatory law and consumer protection

Digital innovations

- Strengthening »AI made in Hesse« as a brand
- hessian.AI and ZEVEDI for responsible innovation
- Knowledge transfer and open spaces for innovation

Economy and Work 4.0

- Digital transformation for successful SMEs
- Start-ups and the digital economy as drivers of innovation
- Shaping the world of Work 4.0 as partners

■ Cornerstones
■ Action areas

Digital education

- Hesse's Digital School Programme for the education of the future
- Strengthening skills, enhancing training and further education
- Promoting lifelong learning and learning by doing

Digital society

- Developing digital health through innovation
- Promoting digital participation and cohesion
- Strengthening volunteer work, culture and tourism through digitalisation

Smart region

- Consulting, transfer, funding: Hessian smart region
- Strong rural areas through digitalisation
- Intelligent solutions for greater sustainability

e-government

- e-government: close to the people, focused on service, efficient
- Towards digital town halls with the Online Access Act
- State administration: innovative, modern, digital

Glossary

5G/5G network
Refers to the 5th generation of mobile communications technologies and networks with download speeds of up to 10 gigabits per second. At these bandwidths, 5G also enables machines and devices to be included in communications (see also »Internet of Things«).

6G/6G network
The next generation of mobile communications, which is already under development and is expected to follow 5G when it is ready for the market in 2030. Transmission speeds of up to one terabit per second (TBit/s) and stronger links with AI applications are expected.

2030 Agenda
In 2015, the global community adopted the UN 2030 Agenda, setting 17 goals (Sustainable Development Goals) for socially, economically and ecologically sustainable development.

Artificial intelligence (AI)
Artificial intelligence (AI) is a branch of computer science that deals with machine learning (see below) and the automation of intelligently controlled behaviour. Machines or computer processors are developed and programmed in such a way that they can emulate human decision-making structures and solve problems independently using learning algorithms.

Augmented reality (AR)
Augmented reality is the computer-assisted extension of human sensory perception. In contrast to virtual reality (see below), reality is merely supplemented with virtual elements, for example in smart glasses for remote maintenance work.

Autonomous driving
A field of application of AI with increasing relevance. With the help of various sensors such as cameras, radar and GPS, autonomous vehicles are able to independently recognise their surroundings and the flow of traffic and to steer themselves.

Backbone network
The technical »backbone« or main data line of a digital infrastructure. It usually uses fibre-optic lines for fast data transmission.

Big Data
Refers to the enormous growth of data over the course of digitalisation and the process of analysing large volumes of data with the help of powerful computers and software programmes in various areas of application (e.g. finance, energy, medicine or transport).

Blockchain
A list of data records that can be continuously expanded and updated over time. The data records are stored at different locations and linked to each other via encryption methods. The best-known application is cryptocurrencies (such as Bitcoin).

Chatbots
Digital dialogue systems that are able to communicate in written or spoken form using natural language. Chatbots are often used on websites or in instant messaging systems. They analyse the input of users and respond to them using algorithmic rules (see also »Social bots«).

Cluster
A cluster is a spatial concentration of companies, universities, chambers of commerce, associations and other players from related industries, specialist or technological fields that enhance their innovative capacity and economic strength through networking, knowledge exchange and cooperation. There are around forty such clusters in Hesse.

Child grooming
Child grooming refers to the contacting of children and young people by perpetrators in social media or online chats with the aim of sexual child abuse and the related preparatory acts.

Data scientist
A data scientist works in a scientific field that uses methods from mathematics, statistics and information technology to glean insight and patterns from data.

Deep learning
A special class of optimisation methods for artificial neural networks. Deep learning has become one of the key drivers of development in the field of AI in recent years. Two of the most prominent examples are voice and face recognition.

Digital hub
A shared location for cooperation and networking between digital start-ups, technology companies and the sciences. In Hesse, there is the Digital Hub for Cybersecurity in Darmstadt and the Digital Hub FinTech in Frankfurt, both part of the Digital Hub Initiative of the federal government.

European Digital Innovation Hub (EDIH)
A non-profit organisation or consortium that supports companies, especially SMEs, and the public sector with their digital transformation. There are plans to establish a comprehensive network of Digital Innovation Hubs in Europe.

e-government
Refers to the use of modern electronic technologies to simplify and increase the efficiency of administrative processes. This also includes digital applications that simplify the communication and application process with citizens and make it more convenient (for example, digital driver's licences or tax returns).

e-health
Refers to health applications and services that use digital technologies (information and communication technologies), whether in prevention, diagnosis, treatment, monitoring or administration (e.g. electronic health records, telemedicine or personalised medicine).

e-learning
The term for all forms of teaching and learning using electronic or digital media. This ranges from small software applications, e.g. for learning vocabulary, to large platforms for schools or universities, through which content can be worked on together.

Fab labs
These »fabrication laboratories« are open technology workshops that enable interested parties from business, research or society to test and use modern production equipment and processes, for example 3D printing, AI applications or laser technology.

Financial Big Data Cluster (FBDC)
Since 2018, the state of Hesse together with other stakeholders has been pursuing the development of this financial data cluster as a cloud-based data platform in the financial centre of Frankfurt. The aim is to integrate financial data from the participating stakeholders into a common data pool and to test and further develop use cases and requirements.

Fintech
A portmanteau of the terms »financial services« and »technology«, it describes new business processes and technologies that are implemented in the financial sector. Fintech companies, including many start-ups, try to improve or even replace traditional activities in the financial sector with technology.

GAIA-X
A European project with the aim of developing a European data infrastructure and common requirements for it. The networking of decentralised infrastructure services is intended to create a common EU data space for different application areas, in which data can be made available in a secure and trusted fashion and shared in a user-friendly way. One use case is the Financial Big Data Cluster (see above) in Hesse.

General Data Protection Regulation (GDPR)
A regulation of the European Union that standardises the rules for processing personal data throughout the EU. This regulation was enacted in Hesse by the Hessian Data Protection and Freedom of Information Act (HDSIG) in 2018.

Hackathon
A portmanteau of the words »hack« and »marathon«, this describes an innovative and at the same time intensive event from the developer community. Participants usually collaborate in groups on software solutions to a specific problem over a short, predefined period of time.

High-performance computing (HPC)
Refers to extremely complex computational or storage processes that are impossible or impractical to perform with commercially available computers. In particular with regard to scientific computing, HPC is increasingly used in the calculation, modelling and simulation of complex systems and in the processing of large amounts of measurement data.

Industry 4.0
Industry 4.0 refers to the wholesale digitalisation of industrial production, based on systems that are digitally interconnected by smart sensors. The aim is to enable maximally self-organised production in which people, machines, systems, logistics and products communicate and cooperate with each other.

Internet of Things
The Internet of Things (IoT) is a visionary term that stands for the mass virtual networking of a wide variety of physical objects via the internet in the future. Embedded electronics (measuring devices, sensors), allow the objects to communicate with each other.

Living lab
Similar to the digital hub, a living lab is a place for creative collaboration between researchers, start-ups, companies and designers.

Machine learning (ML)
Machine learning (ML) is a sub-area of AI. In machine learning, IT systems learn to recognise patterns and regularities on the basis of existing data sets and to derive predictions and rules with the algorithms generated in this fashion. It is a way of harnessing experiential knowledge by machine.

Makerspace
A term largely synonymous with »fab labs« (see above). However, it more greatly emphasises the »making« of the participants.

Open access
As a scientific movement and digital strategy, open access aims to make research publications and data freely accessible or even available for further processing via licences.

Open data
Open data is data that can be used and distributed by anyone and for any purpose. It is generally not subject to any licensing costs.

Open source
In the digital environment, open source refers to software that, due to the open nature of its programme code, can be viewed by any interested person, individually customised and usually used free of charge or without incurring licensing fees. Well-known examples include freely available operating systems or browsers.

Robotics
An interdisciplinary field between computer science, electrical engineering and mechanical engineering. Among other things, machine learning methods are used to imitate human actions and to learn to perform tasks that are not feasible for humans.

Science Data Centre
The science data centre serves as technical infrastructure used not only to store large quantities of research data and make it available to the scientific community, but also to make it compatible for follow-up projects and analysis (see also »Open access«).

Sharing economy
Describes a concept of an economy based on the sharing or joint use of existing resources, which is experiencing a strong upwards trend with the spread of digital platforms and social media (digital economy).

Smart data
Refers to a further refinement process for mass data (see also »Big Data«) which leads to new insights, for example in the form of new links between the data and the use of small computer programmes (algorithms). Among other things, this can lead to the development of new innovative applications.

Smart grid
As a digital data platform, the smart grid ensures a more efficient energy supply by integrating all those involved in the process via the internet – energy producers, the market and consumers. The information obtained can be used, for example, to balance out fluctuations in supply and demand in real time.

Smart city
A smart city is a city that aims for sustainable, resource-efficient and technologically advanced development. Core infrastructure, such as energy or mobility, are networked via the internet and managed intelligently.

Smart home
The term refers to the networking, monitoring and intelligent control of, for example, household appliances or supply systems via the internet. For example, digital and thus remotely controllable radiator thermostats and automatic ventilation systems ensure the efficient use of energy and thus greater convenience while protecting resources.

SME
Common abbreviation for small and medium-sized enterprises with fewer than 250 employees and an annual turnover of up to 50 million euros (according to an EU definition). In Hesse micro-enterprises (under ten people) and small enterprises (between ten and fifty people) account for a large part of these.

Social bots
Software programmes that can simulate and automate communication in social media with the help of AI. For human users, they are therefore not always and directly recognisable as robots.

Start-up
A synonym for establishing a business. The state of Hesse provides special support for this (see e.g. www. existenzgruendung. hessen.de).

Virtual reality (VR)
Virtual reality is the fully computer-generated (3D) simulation of an interactive environment with physical objects that can be perceived by users as a realistic environment, usually via smart glasses (see also »Augmented reality«).

Wearable
Usually a small and networked mobile electronic device, such as a smartwatch, which can be worn on the body and assists users in real life with various functionalities.

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