Stadt Ulm
Digitale Agenda

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Smart City Strategy City of Ulm

- Executive Summary

Clever. Open. For Everyone. Sustainable.

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ULM 4 CLEVER CITY

Gefördert durch:
Bundesministerium des Innern, für Bau und Heimat
aufgrund eines Beschlusses des Deutschen Bundestages

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Introduction

Ever since the so called "Ulm Way" stands for a citizen-centred and innovative target direction. This is what makes the City of Ulm, Einstein's birthplace with around 126,000 residents, and its surrounding area with 10,000 companies and numerous research and development institutions, one of Germany's most dynamically growing economic and innovation region.

Being one of the first "Model Projects Smart Cities" of the Federal Ministry of the Interior and Community (BMI), the City of Ulm consistently continues its path of digital transformation. This path has been prepared over the last few years by lighthouse projects such as "Zukunftsstadt" - City of The Future (Federal Ministry of Education and Research), "Digitale Zukunftskommune@BW" - Digital Municipality of The Future@bw (digital@bw) and the process Digital City (explained in this brochure). Ulm works towards becoming a sustainable, liveable and intelligently networked city. The key to success on this path lies decisively in the collaborative and co-creative integration of the urban ecosystem of citizens, science, economy, municipal administration and businesses. Furthermore, the willingness to learn from each other and to try out various things are necessary. With the model project Ulm4CleverCity, the City of Ulm is actively shaping the Digital Transformation and consistently implementing it. Ulm is a pioneer, trailblazer and inspiration for other cities.

The project duration of Ulm4CleverCity from 2020-2026 comprises a two-year strategy phase and a five-year implementation phase. This management summary summarises the results of the participatory process, the development of the long-term digital strategy as well as the derivation of fields of action and concrete project proposals. A cornerstone of the strategy process and the basis for the development of measures was the early and rapid testing of solutions and project ideas.

Comprehensive and more detailed information is included in the long version of the Smart City Strategy Ulm and the online summary, which can be accessed on the home page - "Smart City Strategy Ulm"[1] (in German).

Initial Situation

The entire strategy is based on a detailed analysis of the initial situation as well as conversations with all municipal departments. The chapters one and two of the strategy document describe what the development of the Smart City Strategy Ulm is built upon. In addition to the experience gained from a large number of previous projects and the merger of existing approaches and strategies, it describes the so called "Ulm Breeding Ground". It consists of (1) structures, (2) procedures and methods, (3) IT infrastructures and (4) the civic city. It also includes (5) the so called "Fünfklang" (an interplay of citizens, science, business, public administration and politics).

Future Tasks

According to recent studies, Ulm is one of the most liveable cities in Germany and an important location for industry and services as part of one of the strongest economical regions in Europe. As a City of Science, Ulm cooperates in a wide network of universities, colleges, clinics and research institutions. In times of constant

[1] https://smartcitystrategie.ulm.de/

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change, it is important to maintain this quality of life and economic strength. Based on this goal coupled with specific challenges, four interdisciplinary and overarching tasks have been identified for the future:
The central future challenges for Ulm are:

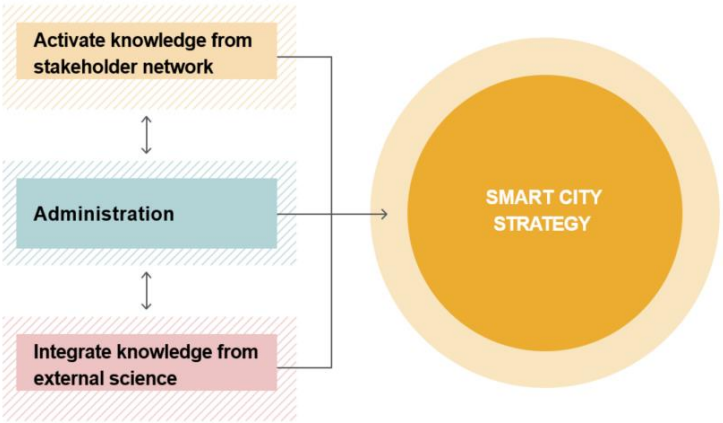
1. **Ulm in transition**: Ulm wants to actively shape change and find digital answers, especially in the context of demographic change, social cohesion, housing needs and economic innovation.
2. **The growing city:** Ulm is a growing city, which must adapt to environmental challenges, increased land consumption and housing due to an influx of people and growing commuter flows.
3. **Sustainable urban development, climate protection and circular economy:** the social, economic and ecological aspects of sustainability determine the framework for digitisation activities.
4. **Data handling:** In order to give all people the chance to act self-determined in everyday digital life, the urban data space ensures that data stay within the sovereign domain of the city and are used according to municipal rules.

The Participatory Development Process

As one of three major cities from the first funding round of the federal programme "Model Projects Smart Cities" (BMI), the city of Ulm is breaking new ground to rethink digitisation and urban development in a combined way. In doing so, the city builds on its previous experience. Ulm has already been working since 2015 on the core question: "How can our city be as liveable in 2030 as it is today using digital technologies?" This pioneering work highlights the link between urban development and digitalisation with an impact on urban society. This makes the strategy trend-setting and creates a role model effect for other municipalities. In addition, silos are to be broken down and citizens participate actively in the development process. This has resulted in a citizen-oriented and integrated smart city strategy that, in line with the guidelines and goals of the Smart City Charter, understands Digital Transformation as a holistic process.

Methodology and Approach

The Smart City Strategy bundles the subject area of Digital Transformation as a cross-section. It does not focus on technological solutions per se, but rather links them to analogue challenges and needs as well as the political and strategic goals of the city. In addition, standards and concepts are derived, such as guidelines in the area of Open Data or the Data Ethics Concept. The breakup of silo thinking becomes visible in the development of the fields of action. For this purpose, the City of Ulm uses the so-called Twinning Model. This states that scientific expertise is brought together with local stakeholder thinking. The respective players, stakeholders and scientists then agree on the content together. The result: scientifically sound



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fields of action with specific reference to the City of Ulm and clear benefits for the citizens of Ulm - according to the "Ulm Way".
In addition, scientists and experts support the overall process within the framework of accompanying scientific research and the advisory board. The advisory board plays an important role within the project organisation and the knowledge transfer. It supports the successful implementation of the project, discusses interim results and challenges, proposes solutions and acts as a multiplier with project communication. Project results, use cases and recommendations for action are disseminated by members of the advisory board, via their respective organisations across Germany, and published by scientific partners.
Communal administrative actors are involved as well. Preliminary discussions with all specialist departments served to define the strategic framework and identify relevant starting points and objectives. The specialist departments were able to participate early in the strategy process through regular coordinating rounds and steering groups. In addition, various information exchange and dialogue formats took place, such as in-depth workshops on specific fields of action, further training opportunities, such as Open Data training using the format of the Ulm Creative Space.

Short-term measures during the strategy phase 2020-2021

In order to gain insights for the implementation of measures, to test existing or newly designed processes and to integrate the specialist departments even more closely, short-term projects were identified and carried out in 2020 and 2021. These experiences were merged into the selection process of the long-term measures for the implementation phase. A total of 9 short-term projects were implemented in this first phase. These include the Visitor Trend Metering, Ulmutopia - the digital platform for cultural education, VIMA - the online space for people to meet virtually and get connected, the Education Folder, offering multilingual information and guidelines about the school system in general and schools in Ulm in particular, ICS – The Intercultural Communication Space in the Museum Ulm, as well as several workshops on LoRaWAN Technology and Smart Security.
The majority of the projects have been completed during the strategy phase, some however had to be delayed, e.g. the Chatbot and the Blue Parking Spaces. All the various experiences and lessons learned are very helpful and will be leveraged in the implementation phase.

Mission (Vision, Core Objectives and Targets)

The **vision** is a shared idea of what the City of Ulm is striving for at its core. It is intended to stimulate and motivate stakeholders from the administration, civil society, economy and science to jointly shape the Digital City of Ulm. For this purpose, the existing vision (as described in the "Digital City Brochure") was sharpened. In addition, the existing **core objectives** were elaborated and amended. The vision reads:

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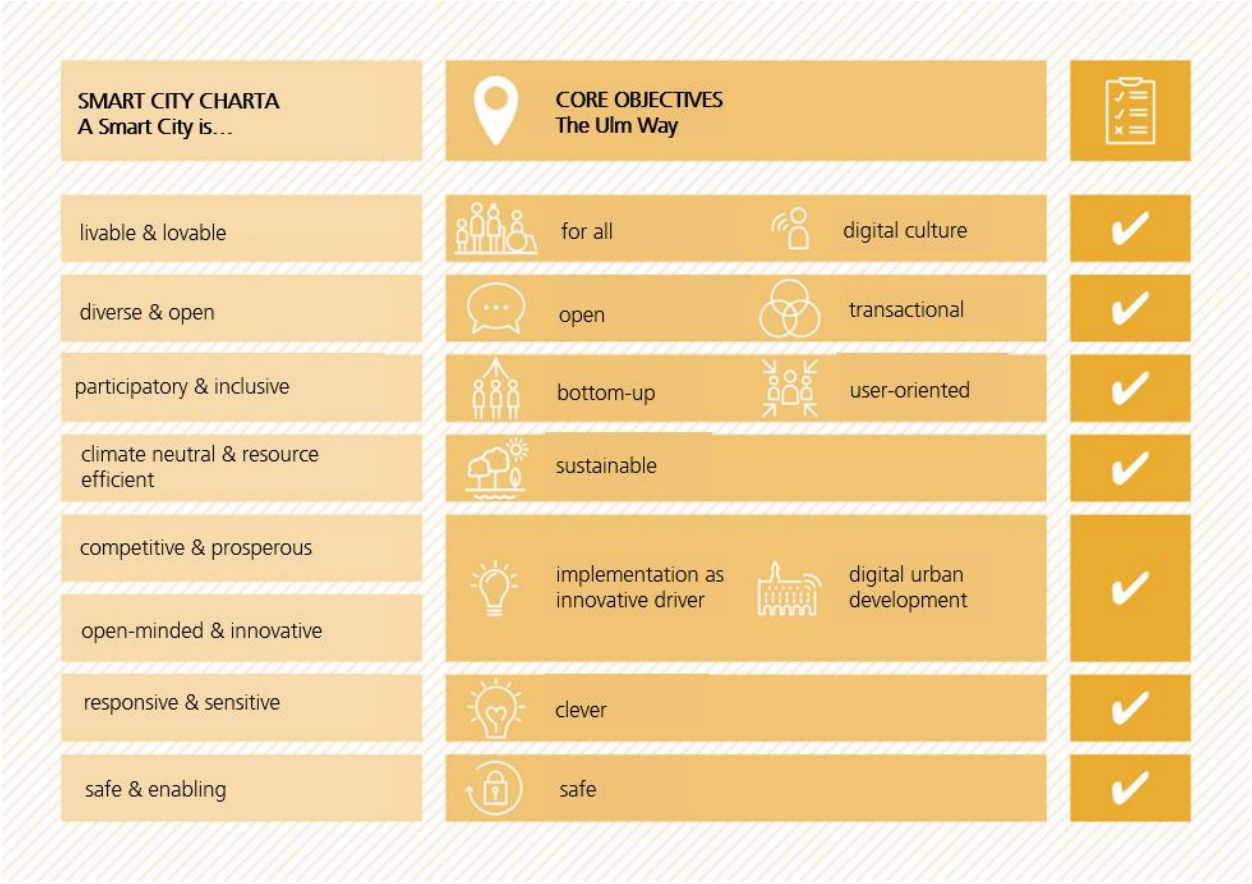
"The city of Ulm is a pioneer and beacon for using intelligent networking of digital technologies to make everyday life easier for people in the city and improve the quality of life. We are committed to sustainability and climate protection and reduce the use of resources."

In addition to the vision, the **target images** are also of great importance for the design of the Ulm Smart City. They form the bridge between the initial situation and future tasks, as well as the specification of technological and digital impact on the city in the fields of action. The contents of the target images take up solution approaches from the individual fields of action and help to present digital opportunities and connecting factors of the Smart City Ulm. One target image was developed for each future task.

The vision developed is in line with the Smart City Charter.



Fields of Action

The development of the Smart City Ulm happens in various fields of action. Starting from the vision and the target images, their implications are concretised in the fields of action. Each chapter consists of a presentation of the initial situation, the current challenges and the goals pursued within the specific field of action. The 13 fields of action of the Smart City Ulm are:

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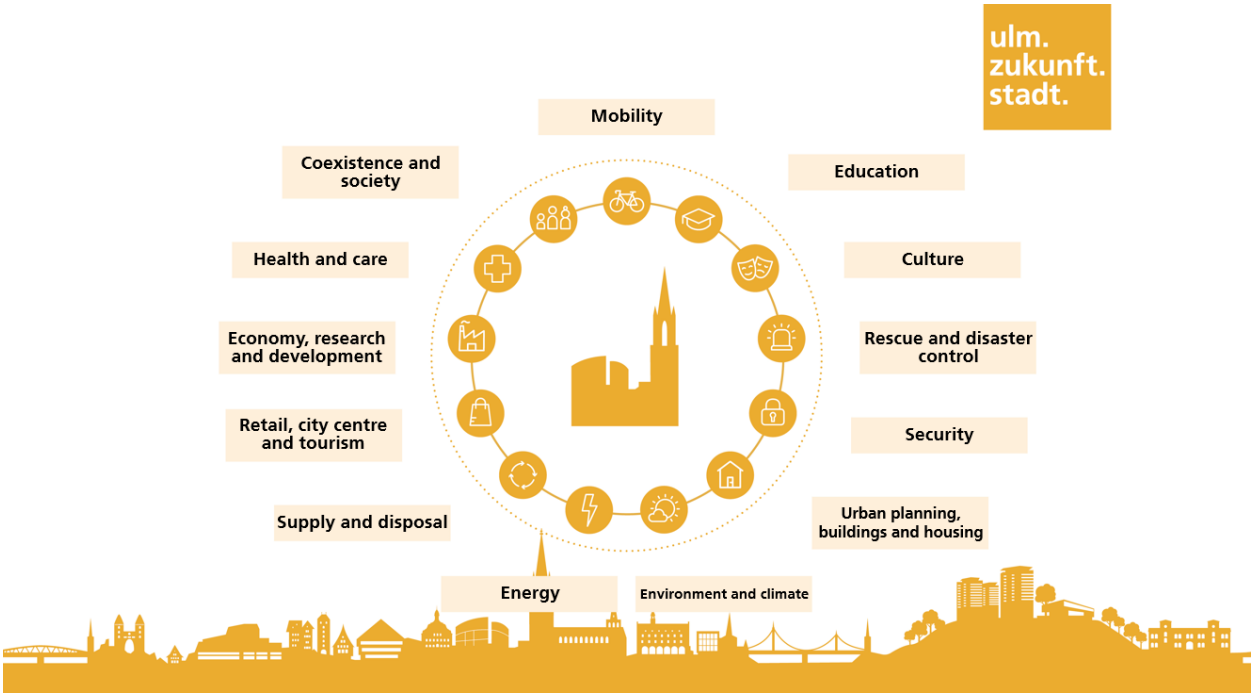

- **Mobility:** New forms of social coexistence, living, working, and leisure activities require a change in mobility. New digital technologies create further mobility alternatives required for the transport turnaround.
- **Culture:** Digitalisation and its opportunities should be used to make culture accessible, to protect it, to develop it further and to inspire people. Ulm's Culture stands for an expanded understanding of digitalisation that goes beyond the one-sided focus on technology: it should be implemented in analogue, in digital and in hybrid concepts.
- **Energy:** The energy turnaround represents a significant contribution to climate protection in the "Climate City Ulm". In the future, conventional energy sources are to be replaced by renewable energies such as hydropower, wind, sun, biomass respectively biofuels and geothermal energy - with the use of digital technologies.
- **Education:** Holistic education is a key to the future viability of a city. In Ulm, it covers the entire lifespan and should enable equal opportunities and participation for all people. This is especially true in the context of digitalisation.
- **Security:** The carefree use of urban space and secure infrastructures, data and applications are a basic prerequisite for a smart city to function at all. Therefore, the field of action "Security" includes aspects of security in public space and cyber security.
- **Economy, research and development:** Research and development should be brought closer to the urban society and exchange should be promoted. Supported by local companies, the "Real City Laboratory" can be used to test and develop new technologies in a user-centred way – according to regulatory frameworks.

- **Retail, city centre and tourism:** Retail, gastronomy, miscellaneous services, tourism, culture and housing will remain the important usages of the city centre in the future. However, the mix of these usages is clearly changing due to digitalisation. This requires new types of concepts that are digitally supported.
- **Urban development, buildings and housing:** Ulm is becoming an increasingly attractive place to live. The city is growing and so are the requirements for the neighbourhoods and the city centre. These must be reconciled with climate protection measures.
- **Rescue and disaster control:** Ulm's emergency services are in constant use. However, it is not enough just to complete the rescue operations. Numerous tasks along the rescue chain have to be carried out by various actors in order to successfully save human lives or avert disasters.
- **Coexistence and society:** Good coexistence of people of different origins, worldviews or religions, of different ages, genders, sexual orientations, with and without disabilities - in a networked world and urban society - has tradition in Ulm and is a social reality.
- **Supply and disposal:** Innovative network and digital technologies can make a major contribution to developing solution strategies in the area of supply and disposal and resource protection. They are fundamental for a sustainable economy.
- **Health and care:** Significant potential of digital technologies lies in the areas of health promotion and prevention as well as the area of health and nursing care. Human dignity is thereby the primary gauge for the use of digital technology.
- **Environment and climate:** The city of Ulm faces the challenge of implementing climate and environmental protection objectives. Digitalisation offers the opportunity to achieve these goals and to establish new perspectives and problem-solving strategies.

Measures during the implementation phase 2022-2026

From numerous submissions in the first call for ideas in summer 2021, promising measures were identified through a complex and multidimensional scoring[2]: A total of 27 project proposals were submitted online with a total budget of over €10 million. Out of these, ten project were proposed in the first round for implementation from 2022 onwards for the funding budget of the program "Smart city made in GE" by the Federal Ministry of the Interior and Community with a total budget of €3.8 million. These are named below:

Talking trees

"Talking trees" in Ulm's city centre collect data, process and publish them, e.g. on Instagram. Data can be retrieved with private devices, e.g. the smartphone to view live data onsite and from home, and a monitor screen planned at the Ulmer Stadthaus. Through regular online workshops/webinars, Instagram messages and short videos, many citizens should be reached. In addition, phytosensors will measure small changes in the thickness of leaves, which helps to detect drought stress.

[2] The Smart City Strategy was approved by the city council on 13/10/2021. The measures planned for implementation are subject to approval by the funding bodies BMI and KfW.

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Digital visitor guidance system

Installation of a digital guidance systems in Ulm's city centre which includes 20-25 displays. The changing display indications provide permanent orientation. A wide range of information can be accessed via the touchscreens, open data information from the City of Ulm (e.g. city maps, event calendars, important sights, mobility offers, cultural institutions, LoRaWAN measurement data, car parks, texts/photos/videos, leisure activities, etc.) or from private providers such as Ulmer City Marketing e. V. (e.g. shop-finder, street maps, current city centre events) and from the SüdwestPresse Ulm (e.g. current local, regional and national and international news). An editorial team verifies the content.

Smart urban green in the districts Wengenviertel and Dichterviertel

Due to the high density of the future building development in the Dichter district, the proximity to the Glacis facilities in the west and the upcoming Ulm State Garden Show 2030, innovative approaches to greening, irrigation and cooling are tested. The same approaches will be applied in the Wengen district.
Solutions will be tested in new buildings (Dichter district) and existing buildings (Wengen district) in the following areas:

- Digital irrigation
- Air quality and air purification by means of humidification
- Smart lighting to activate inner-city recreational areas

Co-Learning Spaces, Co-Operating Spaces and Fake News

A Co-Learning Space or Co-Operating Space is to be integrated in the Central Library (soundproofed and observable). Each area should offer space for approx. eight people, and be technologically equipped: flexible furnishing by the users themselves, free Wi-Fi, multimedia bus system to control video, audio and ambience, electrification of tables, wireless charging, presentation screen, audio system, both options available - bring your own device and onsite device lending, etc.
Bookings are made free of charge via an online tool. In the spirit of the sharing economy, the Central Library thus provides a shared infrastructure for various target groups, which is characterised by particularly flexible usage options. In addition, educational offers are initiated in the area of fake news.

Parking Garage of the future

Increasing security in the new parking garage between the train station and Sedelhöfe as well as in the existing "Deutschhaus" parking garage. The use of smart security technology is being tested in real operation.

- Application: Walking virtually accompanied in pairs
- Application: Protect employees of the parking company from hazardous situations, through mobile locators and emergency buttons.

Further measures and use cases will be developed in a participative manner with the citizenry and then designed and implemented.

Real, digital, networked - understanding neighbourhoods anew

In the social area Middle / East a new inclusive neighbourhood meeting place is being created that connects people, digitalisation and social work. Equipped with the necessary digital infrastructure, a neighbourhood meeting place is being built that offers low-threshold access to encounters and support, but also to

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digitalisation. Here - supported by experts - mediation structures, concepts and offers will be created and tested in order to promote participation in the Digital Transformation and to overcome the digital gap.
The aim is to promote participation in the Digital Transformation with low-threshold offers, to support disadvantaged groups of people on this path, to enable their participation in the social space via digital offers in a new way and to anchor digital tools in the everyday neighbourhood work. The concept resulting from the project work is then to be established citywide. The focus is on disadvantaged people and those with limited mobility, their individual needs as well as caring professionals and volunteers.

GetMyWallboxNOW
Establishing interaction between citizens and public utility companies via a digital platform to overcome the challenges of switching to e-mobility in private transport.
It is an intelligent digital information service for the installation and use of a wallbox in the power grid of the City of Ulm. The innovation consists of the deep integration of complex data sets to provide detailed information for each house connection. This provides citizens with fast information about their private charging station. At the same time the public utility companies recognise the hot spots of e-mobility much faster.

Sensor data management of the inner-city special parking area
Implementation of technology-open, sensor-based solutions for data collection, data evaluation and data provision respectively visualisation of the inner-city special parking area (parking lots for e-charging, disabled people, residents; optional: taxi parking spaces and inner-city loading zones).
Objectives:

- Data and planning basis for the optimisation of inner-city parking space
- Reduction and improvement of inner-city traffic through demand-oriented traffic management
- Low-threshold, improved offer for special users, e.g. mobility impaired, e-cars
- Depending on costs and/or availability, integration of multifunctional sensors (e.g. with environmental data)
- Data provision and open "interfaces" for the inner-city transport system (mobility app, modernised traffic guidance system, car parks, etc.)

The requirement is "collection of condition and additional data" (innovative sensors). Captured data will be made available via the data hub.

Basic infrastructure project: Further development of the data hub
The existing data hub to be supplemented with additional functions in order to be further developed according to the needs of the users.

Basic infrastructure project: Participation platform
An innovative platform for citizen participation to be established as free software. Central participation should continue to be guaranteed as a basic infrastructure across all specialized departments.

Fundamentals for successful implementation of the measures

During the strategy phase, it became clear that both **technical** and **organizational** fundamentals were needed in order to be best prepared for the implementation phase of the strategy. This ensures a stable basis for ongoing development. Therefore, the chapters present technical and organizational basics of the Smart City and demonstrate how the City of Ulm can successfully position itself in these areas.

Technical fundamentals

From a technical perspective, four topics are relevant:

1. **Infrastructural basics:** for smart city applications and IoT solutions, data must be collected and there must be a controlling intervention in the real world (sensors & actuators). Therefore, it must be possible to transmit the resulting data volumes (LoRaWAN, 5G, fiber optics, etc.).
2. **Data infrastructure:** data must be centrally merged (data hub), but at the same time processed for automated use. This is because data only offer added value if they are made usable for others and combined in new types of applications.
3. **Data-specific goals:** In order to deal meaningful with increasing volumes of data, standards and interfaces will be defined, open data will be pushed and machine readability will be a prerequisite. In addition, principles of sufficiency (only collect data that also offers added value) and the already adopted data ethics concept apply. The City of Ulm remains the master over its own data and regulates the handling itself (data sovereignty).
4. **Data excellence organization:** Data handling, also with regards to the data hub, should be regulated. This requires a data excellence organization that assigns rights and roles and regulates the handling of digital identities.

Organizational fundamentals

In addition to technical basics, the creation of organizational and cultural fundamentals is also crucial for anchoring the Smart City Ulm. Increasingly complex challenges require a new understanding of organization. The City of Ulm has set itself the task of shaping this change proactively and responsibly. In doing so, the design of the Digital Transformation must be aligned with the management of socio-ecological challenges and must serve sustainability.

In order to implement the goals from the vision and the fields of action and to create the necessary technical foundations, modified structures are required that ensure reliability and professionalism while at the same time allowing for dynamic and agile processes. This requires the development of competencies in the areas of (1) open government, (2) culture of innovation, (3) project management, (4) (IT) procurement, (5) data culture and data competence, (6) technical know-how, (7) user orientation, (8) involvement of citizens, and (9) further development of regional business and science.

These changes also enable the **development of new business and operator models.** These range from solutions within the city administration to cooperation with actors in the city network and beyond. They also deliberately include social business models when it comes to non-viable solutions to enable operation on a smaller scale, for example through voluntary work.

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Your contact for questions and further information

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