



FEDERAL STRUCTURES IN DATA MANAGEMENT

Innovative, responsible data management: an opportunity for Germany and for Europe

Data is the foundation on which our digital society is built. It has the potential to enhance numerous aspects of our lives — and has the same effect on economic activity and public administration. Despite this, there are many areas in which data is either still being underused or is not being targeted at specific issues. Data policy in both Germany and Europe focuses on the increased, innovative and responsible supply of data and how it is used. In January 2021, the German federal government published a data strategy containing a package of measures with this aim in mind, ranging from infrastructure expansion, increased data usage and equipping the population with data skills through to data adminis-

tration practices.¹ On a European level, a strategy for data has been drawn up as a means of addressing how data is handled,² while the GAIA-X project is laying the foundations for a networked, open data infrastructure based on European values such as data protection, transparency and openness.³ However, these principles have yet to be translated into a physical and regional infrastructure that uses real-life technologies and facilities.

Benefits of regional and federal data management

To achieve success, data strategies developed in this context need a data management concept that specifically caters to Europe as a federal location — in other words, something that is set apart from purely market-driven concepts and

national-level initiatives. A federal concept for data management keeps data physically within a single region while allowing interaction that operates beyond the boundaries of federal structures in their various forms (cities, states, countries and the EU, for instance). Data federalism can also be applied on an extremely small scale in several areas: towns and local authorities, companies and company locations, and even critical infrastructure sites such as airports and train stations.

There are numerous advantages to managing data with a federal approach, one of which is the ability to maintain regional sovereignty over data throughout the entire processing chain — from using sensors and capturing data to communicating data, storing data and using data analysis to create value. A federal strategy also establishes a link between an abstract, virtual data infrastructure and a concrete,



physical one, helping people trust and accept new solutions that emerge. Not only that, but it also enables highly flexible, localized responses to changes through the introduction of new digital solutions and possibilities, for example, and it makes data handling more sustainable because the physical distances that data has to travel are kept short.

As the very principle of federalism is founded in the way in which unions, countries and local authorities are organized, using data to make them operate more efficiently (that is, creating smart cities) is a natural application for data federalism. Looking beyond this, the Smart City Charter is envisaging digitalization being used to help cities develop in an integrated, sustainable manner.⁴ It is also worth noting that empowering cities and local authorities to use digital tools is one of the stated aims of the German federal government's recent stimulus package, and is set to receive funding to the tune of a billion euros.⁵

Putting data federalism into action in research and practice

There are numerous challenges facing the introduction of a regional and federal data management strategy in Germany. At present, there is no data infrastructure that would enable data to be supplied and used in line with the European principle of federalism. Where possible, an infrastructure of this kind would also need to provide specific ways of supporting applications so that the German economy and society

could benefit from them.

Turning to research considerations, introducing regional and federal data management also presents a range of challenges: creating a physical infrastructure — and a virtual infrastructure that works in line with this — in order to capture relevant data from a range of sources, transferring and storing this data, exploiting it, and using it to decide on recommended actions. In this context, it would also be vital to ensure that interoperability is maintained with existing infrastructures (such as regional custom solutions and GAIA-X).

Another consideration is that the growing quantities of data we are experiencing are increasingly making it necessary to develop new methods of processing. Making use of the latest research findings in the areas of distributed architectures, decentralized processing (edge computing) and artificial intelligence may create a key competitive advantage in this case (see the German federal government's Artificial Intelligence Strategy⁶).

It is also important to note that rising quantities of data require sustainable handling strategies — such as new concepts for capturing (or recapturing) and storing data, and for repurposing (recycling) it in different contexts.

1 German federal government (2021). [Data Strategy of the German federal government \(link only available in German\)](#).

2 European Commission (2020). [A European strategy for data](#).

3 German Federal Ministry for Economic Affairs and Energy (2019). Project GAIA-X — [A Federated Data Infrastructure as the Cradle of a Vibrant European Ecosystem](#).

4 German Federal Office for Building and Regional Planning (2017). [Smart City Charter](#).

5 German federal government (2020). [Combating the consequences of Corona, securing prosperity, strengthening sustainability. Decision of the coalition committee, June 3, 2020](#) (link only available in German).

6 German federal government (2020). [Artificial Intelligence Strategy](#).



RECOMMENDED ACTIONS

These recommended actions build on the German federal government's Data Strategy in three areas: infrastructure, data usage and data skills.

Establishment of an infrastructure for regional and federal data management

- Develop a physical and virtual data infrastructure with trials based on individual cities and local authorities in Germany; transfer the findings to companies and critical infrastructures such as airports and train stations
- Ensure interoperability with existing solutions: implement a German application project for data federalism in GAIA-X
- Introduce integrated, cohesive systems for data, data models and applications

Enhanced data usage

- Translate abstract data infrastructures into concrete applications: Energy, the environment, mobility and administration are all promising areas in the context of smart cities
- Provide users with access to data through standardized, interoperable data formats and user-friendly interfaces
- Make the benefits and potential of available data tangible by creating clearer opportunities for use and establishing data marketplaces
- Establish and make use of innovation communities and real-life laboratories: Increase the potential for innovation inherent in regions, allow for open regulatory spaces and test out research findings in practice

Data skills

- Encourage the development of operator and business models: Find profitable, sustainable ways for the economy and civil society organizations to use infrastructures
- Encourage community-based and regional ways of collaborating on exchanging data: Generate shared ideas and applications in order to create data management strategies that add value

Further information:

Fraunhofer Cluster of Excellence:

[Cognitive Internet Technologies](#)

Fraunhofer Policy Paper (2020):

[Artificial Intelligence: A Key Technology for Germany's and Europe's Competitiveness \(link only available in German\)](#)

Fraunhofer Policy Paper (2021):

[Digital sovereignty: Technologies for self-determination in digital spaces \(link only available in](#)

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