Mobilithek goes mobile

Traffic jams, long lines, crowds, and stress are part of commuters' everyday experience. Even those who use buses and trains and incorporate other mobility providers are familiar with the problems of overcrowding and searching for connections. But networked mobility with central data management that is mandatory by law offers a way out.

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Transport turnaround: Taming data volumes in intermodal transport

In many places, traveling by car is a nerve-racking experience: daily challenges include getting to work on time, finding a parking space, and keeping appointments. Private motorized transport makes a significant contribution to the global carbon footprint, with more than 150 million metric tons of CO_2 being emitted every year—in addition to all the other negative effects such as accidents, noise, and pollution. Even with the alternative, local public transport, passengers' mobility is restricted by the overcrowded means of transport, lack of connection options, and too few or uncoordinated intervals between control centers.

New legislative amendments and large-scale subsidy programs are now expected to herald the end of an era: the dependence on fossil fuels and excessive private motorized transport.

Annual CO_2 emissions from worldwide individual traffic

But it's still a vision: inner cities without noise and hustle and bustle, where electric buses, shared cabs, bicycles, and e-bikes guarantee comfortable mobility at all points. Intermodal travel—seamless and well-planned transfers with changing means of transport—is in demand.

From the bistro during lunch break quickly and reliably back to the workplace and finally home—something that can be planned for users at any time, e.g., via the app, depending on traffic volume and weather conditions with a chosen means of transportation. More mobility throughout Germany with less traffic—is it too good to be true? A major effort is needed to bring about the traffic turnaround.

Simply expanding fleets is not enough. Innovative digitalization technologies improve coordination among the various mobility providers and their control centers. Large and small providers benefit from new, multi-client-capable control systems and can thus provide the real-time data required by law—and offer their passengers more attractive services. But this requires a central point of contact for the cross-provider management of enormous amounts of data—for the benefit of operators and users alike.

Data spaces to the rescue

The first major step towards a centralized data hub with access to vast

amounts of mobility data has already been taken. With the Mobility Data Marketplace (MDM), the Federal Ministry for Digital and Transport (BMDV) has created a national access point for all operators and users of mobility data as mandated by the EU. The EU promotes the development of intelligent transport systems (ITS) and in Germany the MDM has this role. It is a neutral B2B platform with defined standards for data exchange. The idea is to consolidate access to mobility data across different means of transport, network elements, and stakeholders and make it available for easy retrieval.

But that is not enough. The task now is to expand and optimize data management. Requirements from the delegated regulations for the European ITS Directive and the amended Passenger Transportation Act stipulate that this first generation of the German national access point for mobility data needs to be ported to a new data space technology. Following a call for tenders, T-Systems was awarded the contract in 2021 to set up a comprehensive ecosystem for mobility data.

"That was the birth, if you will, of the Mobilithek," explains Sven Löffler from the Telekom subsidiary T-Systems, who is tribe and chapter lead of the Telekom Data Intelligence Hub (DIH). "Its purpose is to provide data from transport companies, road construction, and transport authorities and to supply information services. Deutsche Telekom is responsible for development and operation, as well as migration from predecessor systems."

All stakeholders, from mobility providers to transport authorities and information providers, can exchange their digital information with Mobilithek. The strict standards of the International Data Space Association (IDSA) and its IDS technology for secure, trustworthy data sharing are decisive here. The IDS-based design facilitates data sharing while protecting data sovereignty. This means that competitors no longer have to fear losing control over the use of their sensitive data when it is exchanged. Mobilithek brings together all the information needed to plan a trip anywhere in Germany.

When the system goes live, the tasks of the MDM access point will be transferred to Mobilithek. Likewise, the ministry's existing open data portal mCLOUD will be integrated into Mobilithek, but both predecessors can still be used.

Building bridges: Cloud-based data exchange with maximum security

In October 2020, German Chancellor Angela Merkel announced a data space for the mobility sector at an automotive summit. This initiative became the Mobility Data Space (MDS), which was launched at the 2021 ITS World Congress in Hamburg. With it, Mobilithek became its first and likely the most important data platform or anchor for mobility data. The MDS was realized by Acatech, the German Academy of Science and Engineering, with the support of several Fraunhofer Institutes.

It is solely focused on data exchange. It provides the central services necessary for the operation of a data space according to the IDSA:

- an identity provider to uniquely identify participants
- a vocabulary provider to ensure a common language
- a broker and metadata directory or "marketplace"—a kind of phonebook to look up data offers
- a data app store
- a clearing house

The data exchange is established directly between the participants themselves in a distributed manner by using IDSA-compliant connectors. Both MDS and Mobilithek utilize IDS technology to enable technical interoperability and a linkup, which is planned for the end of 2023.

Wishful thinking of many traffic planners—Park&Ride spaces are available, but are not yet used in many places yet.

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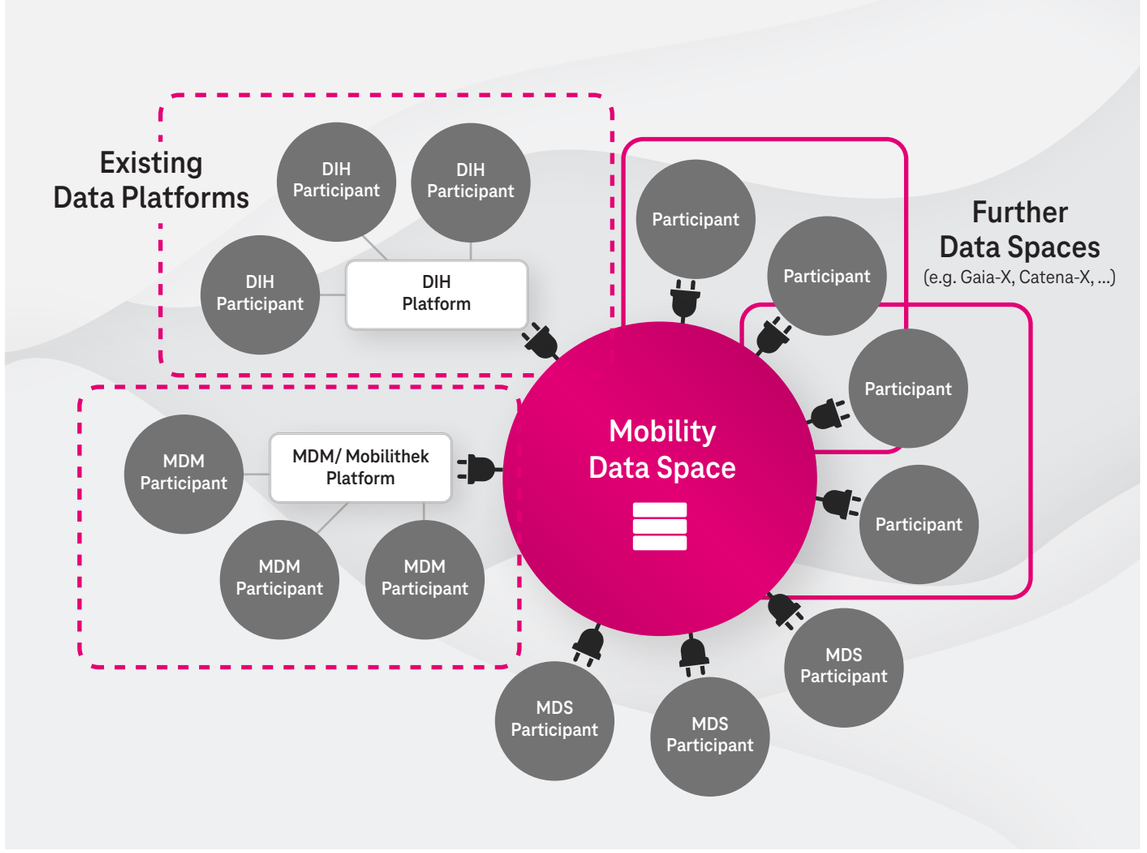

Fig. 1: Mobilithek as a mobility data anchor in a data room network.

While Mobilithek will, at least initially, mainly provide mobility data from public providers, it is also worthwhile for private providers to participate in it, ideally using MDS. The clear intention here is to build bridges and fuel data exchange between private and public stakeholders through Mobilithek and its connection to MDS. Furthermore, MDS could provide a conduit for pan-European expansion: other national access points could connect to create a common European mobility data space. To unite all stakeholders, the connected platforms need to have an intelligent architecture and smooth interoperability.

That is why the Telekom DIH is working "under the hood" of this ambitious large-scale project. It essentially functions as a data marketplace that ensures exchange while safeguarding data sovereignty and data rights. Data processing and analysis are designed as a platform-as-a-service in the cloud. Mobilithek, in turn, uses components of the Telekom DIH. As a pioneer in data spaces, the Telekom DIH has translated its previous experiences and insights into a carefully crafted three-step enablement offering to avoid a big leap into the unknown but allow any client to "think big, start small, and scale fast" (see Figure 2).

"Be Prepared—Advisory": Deutsche Telekom develops tailored advisory solutions based on a suite of standardized and therefore cost-efficient data space onboarding packages. This suite is composed of packages organized into the two phases of "Investigate & Understand" and "Implement & Scale."

Once prepared, the second offering following "Advisory" is **"Get Connected—Products"**, which includes the products "Connect" (Telephone connection) and "Space" (Private branch exchange)—all easy-to-use and conveniently delivered as a managed service in the cloud that shields you from evolving technology under the hood.

The third offering is **"Build & Orchestrate on Your Terms—Ecosystem"**, which allows clients to build, grow, and nurture their own data ecosystem complete with data space setup and configuration. One innovation here is a one-of-a-kind sovereign stack or "sovereign-all-the-way" solution, which creates a sandwich of sovereign data exchange with the Connect product on top of the T-Systems Sovereign Cloud powered by Google Cloud. This allows for data to be persisted and processed in a sovereign way before being exchanged in a sovereign manner.

Innovations in practice

But what does this mean in practice? Look no further than the Telekom DIH intermodal travel planning application enabled by a data space. The app was built as a minimum viable product (MVP) and demonstrator for planning purposes at RealLab Hamburg and tested with live

data and visitors at the 2021 ITS World Congress in Hamburg. In 2022, RealLab HH received the “Innovation Award Real Laboratories” from the German Federal Ministry for Economic Affairs and Climate Action.

“RealLab Hamburg is a real turning point. More than 30 well-known partners from science and business have not only developed new solutions together, but also tested them live. The result [...] shows for the first time how the mobility of a region can be positively changed to make it more sustainable, safer, and more attractive,” says Henrik Falk, CEO of Hamburger Hochbahn AG, the second-largest public transport operator in Germany.

The Telekom DIH team used data space innovation to construct novel data chains involving customer data to enable a mobility super app for new mobility chains that link up multiple modes of transport including public transport, micromobility, and shuttle services. The app is based on a data space to provide the necessary data, including static route and schedule data for public transport, dynamic data for parking, and locations of electric scooters, for example, as well as user membership deals and discounts across competing providers.

The good news is that intermodal travel can deliver impressive speed gains, which makes a shift to other modes of transport and lower CO_2 emissions a lot more likely. Who wouldn’t like to get from A to B faster? “Nothing is more effective with behavioral shift than a better, faster, and cheaper product” adds Sven Löffler. In the future, a link with Mobilithek could further enhance app performance with additional data, such as context and local event data.

Whether it's the Hertha vs. Union derby at Berlin's Olympic Stadium, 30,000 people attending a Helene Fischer concert at the Munich exhibition center, or the Hanse Sail in Rostock attracting hundreds of thousands of visitors to the city over the course of several days—major events or even just a storm that lasts for hours can mean it suddenly makes a lot of sense to do without e-scooters or to switch to car-sharing services.

A strong partner for the future journey

Keeping track of everything amid the confusion of ever new and evolving technological developments is a challenge for mobility stakeholders and often distracts from a focus on the core business and service innovation. As a pioneer and market leader, Deutsche Telekom has a special role to play in the search for strong partners: it has numerous interfaces with its customers. In the automotive sector, it is investing in new infrastructures itself: CASE (Connected, Autonomous, Service-based, Electrified) is a key aspect of this commitment.

In addition to connected driving, smart parking, and activities for the highly compatible expansion of charging stations for electromobility, it also has a lot to offer for control centers in public transport with ITCS (Intermodal Transport Control Systems). Last but not least, it awards projects and initiatives with its own recognized #GREENMAGENTA label for sustainability. The company also attaches particular importance to its consistent commitment to data protection and data security. Reason enough, then, to network with a reliable partner.

But there is still more room for innovation in the mobility data space. With Gaia-X Federation Services (GXFS), the next generation of data infrastructure is already in place. GXFS will link data and infrastructure ecosystems together to create a federated ecosystem that is open, transparent, and secure. The goal: the sovereignty of the European digital economy.

The enormous efforts in the area of tension between global warming, dirt and noise pollution in inner cities, and the lack of expansion of public transport in rural areas are beginning to bear fruit. New mobility providers are entering the market, and some major players can only benefit from integrating these services into their offerings with regulated data and sovereignty.

Less searching, more finding: Mobilithek eases the pain involved in searching, retrieving, and preparing data for innovative transportation solutions and can contribute to the transport turnaround. With it, public authorities can have everything in view: timetable data, traffic information in real time, disruptions, and local influences on traffic. It forms the basis in the first place for such data to be made available to users for their travel planning.

Furthermore, the focus is on the individual: central access to mobility data, which is used to create new, individually adapted offers, which provide advanced mobility in public transport. This also promotes the trend toward cross-regional cooperation between transportation associations.

Data made available via Mobilithek is significant for traffic policy—for example, when it comes to road safety. But it also creates the opportunity for exchange with individual rights of use and opens up an easy way for start-ups and companies in particular to develop new business models. The legally required open data and the data underlying the free licenses can therefore be used by any stakeholder to their advantage. Technology from the Telekom DIH creates a marketplace for digital data exchange with a high level of innovation and reach.

The opportunities for individual value creation as well as profitable collaborations call for action. Especially for a low-carbon future and satisfied passengers who make flexible use of the advantages of sustainable intermodal transport. ■

Fig. 2: DIH-offerings from Telekom—Advisory, Products, Ecosystem

Nothing is more effective with behavioral shift than a better, faster, and cheaper product.

Sven Löffler, Tribe & Chapter Lead Data Intelligence Hub