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The X factor: From Gaia-X to Base-X – Better mobility with better data

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This executive summary outlines implications of software development within Gaia-X mobility projects, which are funded by the German government and involve the Telekom Data Intelligence Hub (DIH) team. The primary focus is Base-X, an open data and service ecosystem following the Gaia-X principles, such as federated data (data remains stored with provider) and decentralized data (no single point of control). Base-X is specifically engineered to facilitating data-driven solutions to longstanding challenges within the realms of mobility and smart cities.

Gaia-X

Gaia-X was created in 2019 by French and German companies with the support of both countries' governments. It was established in June 2020 as a non-profit Association Internationale sans but lucratif (AISBL) under Belgian law, headquartered in Brussels. Gaia-X aims to create a federated data infrastructure to foster trust and data sovereignty, ensuring data protection, and enabling businesses to securely share and utilize data across borders while complying with European data regulations. Deutsche Telekom (DT), as a founding company of Gaia-X, has participated through its T-Systems International (TSI) subsidiary in numerous funding projects, including Gaia-X 4 Future Mobility (GX4FM), where Base-X has been developed.

Mobility's persistent price-performance problem

While digital technology has propelled consumer benefits in industries like entertainment (music streaming on mobile) and telephony (free Internet calling) forward by leaps and bounds, mobility seems to be stuck, if not moving in reverse: The time and cost involved in traveling from point A to point B are continuously increasing: Stuck in traffic, link.

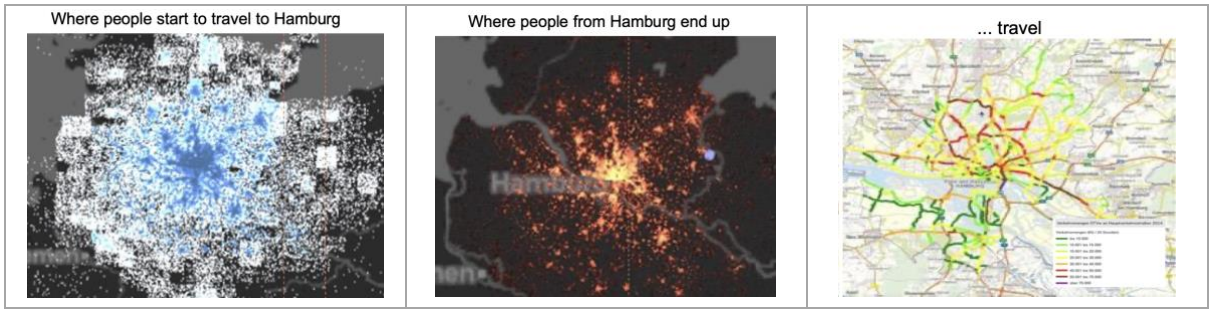

Figure 1: Hamburg digital traffic twin (Schlueter Langdon et al. 2021, link)

The solution: Think differently – "regional jets" and better data

"Regional jet": The arrival of smaller jets has transformed air travel by facilitating feeder lines from smaller cities, effectively bringing long-distance routes closer to our doorsteps. Similarly, the emergence of micro-mobility in urban areas, such as electric scooters, can shorten the distance to the subway or bus stop. And soon, e-scooters will be joined by autonomous shuttles.

Better data: The glue to bind together the various modes of transport from different providers, and then make these packages fit our diverse, individual needs is data.

- *Supply*-side data: Comprehensive information on vehicles (capacity, location/routes, availability, cost), traffic conditions, and time of day/week (holidays, rush hours) is essential.

- *Demand*-side data: Our own unique circumstances (location, trip purpose) and preferences (speed, cost, comfort) necessitate a personalized digital travel profile or "travel twin", link.

The train has left the station: From demos to real-life pilots

Don't reinvent the wheel: Our Base-X involvement builds on a demonstrator first developed in the Reallabor Hamburg project (RealLabHH) as a lab of the German Federal Government's National Platform Future of Mobility (NPM) with funding from the German Federal Ministry for Digital and Transport. In 2022, RealLabHH was awarded the "Real Lab Innovation Prize" by the Federal Ministry of Economics and Climate Action (link). Back then our demonstrator was based on dataspace tech 1.0 primarly from the International Data Spaces Association (IDSA) and Fraunhofer Institutes.

Mega trend servitization … SaaS: For Base-X in GX4FM, we've upgraded the dataspace tech stack to a Software-as-a-Service (SaaS) approach. SaaS represents a fundamental shift in software delivery, transitioning from traditional on-premises installations to cloud-hosted solutions accessible over the internet. This simplifies maintenance, upgrades, and scalability, allowing business owners to concentrate on their use case rather than technical intricacies. Our DIH team has transformed the entire dataspace setup from an on-premise installation to a managed service solution, relieving users from dealing with nitty-gritty technical details and enabling them to focus on their use case and automation. Our first commercial offerings are now available as LivingLab products (link).

Figure 2: Deutsche Telekom team with CEO Hoettges, Catena-X team, and Federal Minister Wissing

Case study: 3 steps to 30% faster trips

Actions speak louder than words: Our pilot was tested with live data from mobility providers in RealLabHH, including Hamburger Hochbahn AG, Sixt, and Tier Mobility (see Fig. 1), and at the launch of the system by visitors to the ITS World Congress in Hamburg, link.

- **Mobility super-app:** Overview**,** Link
- **30% faster:** Results, Link

Lessons learned: 3 steps – dataspace network, data products, super-app
We constructed our demonstrator in 3 steps:

1. **Dataspace**: Use dataspace to exchange better data with data sovereignty protection, link
2. **Data products:** Harmonize exchanged data with digital twins to build data chains, link
3. **Super-app**: Upgrade existing apps for data chains, see intermodal travel app demo, link

Business model shift: Benefit from super-app to explore selling A to B trips by the seat, link

Mobility dataspace events

- Hub.Berlin 2023: With Federal Minister Wissing and Telekom CEO Hoettges (see Fig. 2), link
- Market-X by Gaia-X Vienna 2023: Mobility spotlight, link
- Los Angeles Auto Show & AutoMobility 2022: Autonomous driving is arriving in LA, link
- ITS WC 2022 Los Angeles: First dataspace case study with IDSA & Gaia-X on stage in U.S., link