Imagining the city of tomorrow

Fraunhofer IESE accompanies the city of Braunschweig toward a Digital Ecosystem

The goal and vision for the use of urban data platforms (UDP) and urban data twins (UDT) is identical for most of these implementation projects: new, unused data sources in a municipality are to be digitally recorded and existing data silos in administration and business are to be broken up and their data merged into a common platform. This should allow intelligent control of municipal infrastructure, processes and goods in order to enable more efficient, improved or completely new services for public, private and commercial purposes. But how are such systems established in a city? There is no one-size-fits-all recipe for a municipality to enter the world of UDP and UDT, as all localities are unique. This is also shown by the city of Braunschweig's project to plan its digital municipal future.

A concept as individual as the city itself

Every city faces its own geographical, economic, social – and increasingly also climatic – challenges. It is uniquely organized and has an individual, historically evolved digital infrastructure. However, this existing infrastructure can only be integrated and expanded step by step. To this end, the focal points and specific use cases for the first steps toward a data platform and Digital Twin must be individually designed and planned. The development of such a Digital Ecosystem is never complete: as long as the city changes, the ecosystem must change with it.

The city of Braunschweig has secured powerful planning support for its journey toward a digital municipal future: Initiated by the Geoinformation Department of the City of Braunschweig, Fraunhofer IESE is working on a subcontract from the "PD – Berater der öffentlichen Hand GmbH". PD works exclusively for public clients in matters of strategic administrative modernization as well as in the areas of construction, infrastructure and municipal consulting.

The goal of the joint project is requirements elicitation and customized design of an urban data platform and an urban data twin for the city of Braunschweig. The main project components of Fraunhofer IESE lie in the requirements elicitation, inventory, and conceptualization phase, which is being conducted jointly with PD, but especially in the implementation of a so-called proof-of-concepts (PoC) for UDP and UDT.

Use case: construction projects and their impact on the urban climate

The first step after the requirements workshops will be the selection of a suitable use case for the PoC from the municipal fields of action. As a valid concept demonstrator, the prototype must be able to show the strengths and advantages of an urban data platform and demonstrate the ability of a data twin to answer "what-if" scenarios, for example by means of simulation. In the current project phase, a decision has not yet been made for the specific use case, but it is still worth taking a look at one of the possible variants:

New construction projects – especially the major ones – should be assessed in advance for their potential impact on urban climate. Until now, the only option has been to carry out an externally tendered climate simulation. This is a bureaucratic, lengthy and expensive procedure that is too time-consuming for small and medium-sized construction projects. Furthermore, this procedure does not allow for iterative planning loops involving suggestions for improvement with the participation of other departments of the city administration.

On the other hand, it would be desirable to use a digital process to independently carry out climate simulations for new construction projects in the urban area. In this case, a prototypical urban data platform would enable the sharing and transfer of data between the various departments, such as building, environmental and green space authorities, and the control of
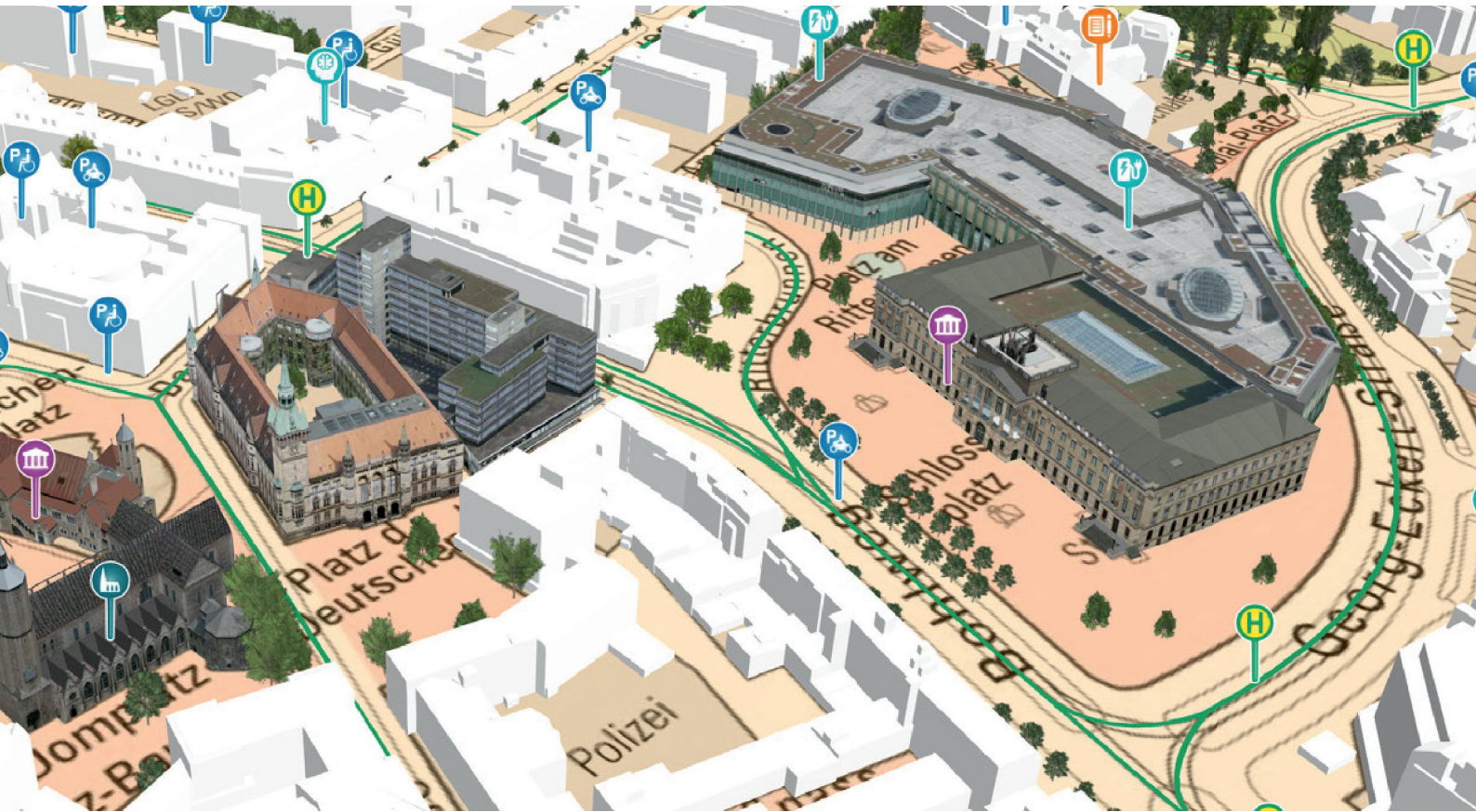
With the 3D basic twin, the city of Braunschweig already has a powerful infrastructure.

the digital process. An urban "climate twin" based on open source software would carry out the complex simulation calculations and visualize the results in a 3D representation of the city. Iterative planning loops involving various specialist areas would thus be possible. However, whether this use case can be fully or partially implemented as a PoC as part of the project still needs to be examined in consultation with the specialist departments and technology suppliers involved.

Creating the conditions for the Digital Ecosystem

Parallel to the development of the PoC, PD and Fraunhofer IESE are developing an overall concept for the UDP and other "specialized twins" of the UDT in close cooperation with the city of Braunschweig. To this end, unmet data needs, relevant use cases and any necessary organizational changes must be identified for the requirements identified. The aim of these analyses is to develop suitable processes that serve as the basis for the

operations of urban data platforms and data twins. The totality of these requirements and processes provides the prerequisite for the consolidation of a target architecture of the Digital Ecosystem, from which concrete technologies and infrastructures can be derived.

Spread Smart City and Smart Region solutions widely

The "DEUTSCHLAND.DIGITAL" marketplace developed by Fraunhofer IESE is part of the new step-by-step plan "Smart Cities and Regions" of the Federal Ministry of Housing, Urban Development and Construction (BMWSB). This is intended to create a framework for the digitalization of cities and municipalities in Germany and support them in implementing digital solutions.

Further information about the marketplace:
www.deutschlanddigital.org/

Click here for the step-by-step plan:
s.fhg.de/stufenplan-bmwsb