Smart Solutions
Management Consulting

3 rd. cross sector Symposium on Interoperability Vienna, June26 th 2025

Interoperability in Smart Cities, state of the art analysis from a German perspective

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Starting point

facts

- Germany has invested about 600 Mio € in Smart city projects in the last 6 years
- Total Budget until 2028:
  aprox. 900 m
- Money comes from regional and federal government

- Is there a sustainable , visible outcome?
- Did the projects consider interoperability?

Smart cities

Definition of Smart City

Definition:
A smart city is an entity that uses ICT effectively, to integrate the requirements of its urban community, in terms of energy and other utilities (production, distribution and use), environmental protection, mobility and transport, services for citizens (healthcare, education, emergency services etc.)

- Most German Smart City projects focus on technical and in a few cases also semantic interoperability

- Where do we find
  - Common communication standards
  - Common protocols

Smart Cities

Running Urban data projects, where the money is spent

Source: Fraunhofer IESE

- Do we really need so many platforms in Germany?
- What about
  - interoperability?
  - connectivity
  - GAIA-X

gaia-x

Smart Cities

Typical applications in German Smart City projects

interoperable europe

innovation ∞ govtech ∞ community

DATA SPACES

are shared digital tools, infrastructures and common rules facilitating data pooling sharing at city or regional level. Leveraging this data, public and private organisations can build new and innovative services responding to citizens' needs.

Urban Data Platform

is a digital infrastructure that collects, manages, and analyses data from various city systems and sources to support smart city initiatives and improve urban living. It acts as a central hub for data related to different urban sectors, enabling better decision-making, improved services, and increased citizen participation

Vage concepts!
No common understanding!

LOCAL DIGITAL TWINS

are virtual representations of urban or rural (local) physical assets, processes, and systems which are also connected to all the data related to them and the surrounding environment, as well as other assets in the same way as the physical assets, so that AI algorithms, data analytics and machine learning can be used to help the city operate more efficiently.

European Commission

Smart Cities

Modellkommunen Smart cities, where the money is spent

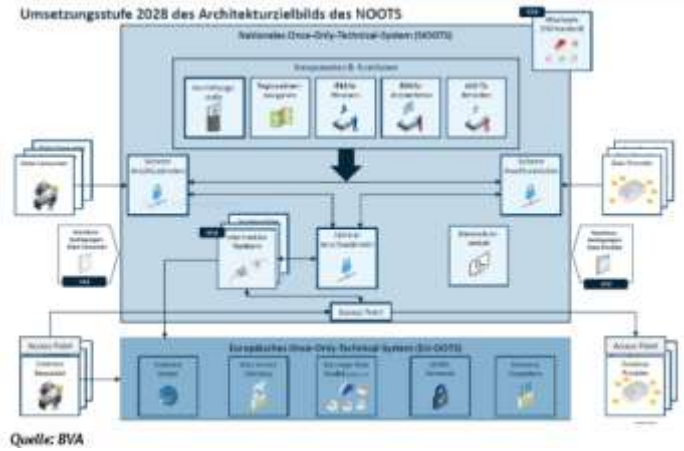
- The German Federal Government is currently funding 73 Smart Cities model projects as experimental sites for integrated urban development
- budget: €820 million
- 2019- 2027
- 3 governments!

Smart Cities: Register modernisation

Register modernisation: German National Once Only Technical System, NOOTS

- One of the largest IT projects
- New ministry BMDS in 2025 „Bundesministerium für Digitales und Staatsmodernisierung“
- **2021-2025 2 bn € , estimated savings 6,3 bn €/a?**

Are people or data “walking”, time will tell!



Quelle: BVA

Was bisher geschah:

- 03|2019 IT-Planungsrat richtet das „Koordinierungsprojekts Registermodernisierung“ ein
- 03|2021 IT-Planungsrat Beschluss Umsetzung Zielbild - Auftrag zur Konzeption an Programm Gesamtsteuerung Registermodernisierung
- 04|2021 Verabschiedung des Registermodernisierungsgesetzes (RegMoG)
- 06|2021 IT-Planungsrat Beschluss Einrichtung Programms „Gesamtsteuerung Registermodernisierung“
- 08|2022 Beginn der Konzeptionsphase, Workshop zur Vorbereitung der Entwicklung zu Themenbereichen
- bis 12|2022 Aufstellung und Entwicklungsarbeit der operativen Kompetenzteams zur Umsetzungsvorbereitung und Erprobung für Aufbau NOOTS, Anschluss EU-OOTS, Evidence Survey, Rahmenbedingungen Register, rechtliche Prüffragen, Kommunikationsstrategie, Stakeholdermanagement, Budget, Programmcontrolling
- 12|2022 Neuausrichtung der Organisationsstruktur für die Umsetzungsphase

Smart Cities

What did we achieve?

limited outcomes

Missing interoperabilityoperability

Interoperability meets Smart Cities

Standards, norms

🌐 Key Standards & Norms Categories:

- Technical: NGSI-LD, MQTT, LoRaWAN
- Semantic: FIWARE Data Models, SAREF
- Organizational: ISO 37106 (smart governance)
- Legal/Ethical: GDPR, ISO/IEC 27001, AI Act
- Data Exchange: DATEX II, GTFS, CityGML

🏛️ International & European Examples:

- ISO/IEC DIS 30145 1-3 Smart City ICT reference framework
- ISO/IEC / JTC WG 11 „smart cities“
- IEEE Reference architecture for smart cities (RASC)
- ITU/T SG 20 „ IoT and smart cities and communities „
- ETSI
- AENOR, Spain
- INSPIRE/OGC : Geospatial data standards
- DIN SPEC 91357, reference architecture OUP
- DIN SPEC 91377 (in development) :, datamodels and protocols in OUPS
- DIN SPEC 91607 Digital Twins for Cities and communities

- Norms and standards have to be financed
- Conflict of interest?

Interoperability meets smart cities

EU- Interoperability Framework for Smart Cities

Interoperability Framework: European Interoperability Framework for Smart Cities and Communities

To guide smart cities on their path to interoperability, the European Commission published in 2022 the European Interoperability Framework for Smart Cities and Communities (EIF4SCC), proposing an interoperability framework and holistic governance adapted to the sub-national level. The EIF4SCC encompasses all interoperability elements: legal, semantic, technical, organisational, and cultural interoperability.

More information on the EIF4SCC here.

Framework is the basis
But: Do German Smart City projects
Take into account the framework?

Interoperability meets smart cities

The MIMs

Fostering interoperability: Minimal Interoperability Mechanisms (MIMs) Plus

The MIMs Plus initiative consists of minimal interoperability mechanisms (MIMs) and additional fundamental building blocks, such as European specifications. Created by Living-in.EU's technical sub-group, MIMs Plus provide the requirements for implementing the minimal but sufficient capabilities needed to achieve interoperability based on a minimal common ground to enable interoperability of data platforms for cities and communities and create a marketplace on interoperable solutions. MIMs can help mainstream the delivery of services with a strong positive local impact, while at the same time addressing overall European goals.

More information on the MIMs Plus here.

European Commission

- Source:

Michael Mulquin

OASC, Data space symposium

Interoperability meets smart cities

MIMs in detail

The MIMs being developed by OASC

MIM	Function
MIM1: Context	Data sets/streams can be linked according to context
MIM2: Data Models	All data sets/streams use consistent data models
MIM3: Contracts	Appropriate data sets/streams can be found, and agreement can easily be reached for their appropriate use
MIM4: Trust	Citizens can take charge of how data about them is used so that it can benefit themselves and their community
MIM5: Transparency	Decision making algorithms will use data appropriately to make fair and transparent decisions
MIM6: Security	Data can be held and shared securely
MIM7: Places	Geo-temporal information can be accurately described in consistent ways
MIM8: Indicators	KPIs can rely on consistent data from across the ecosystem to enable reliable measurement of progress
MIM9: Analytics	Models and analytics used within the ecosystem can work well with other models and analytics
MIM10: Resources	Information about city related resources can be appropriately shared

- Source:

Michael Mulquin

OASC, Data space symposium

- Telecom meets geoinformatics!
- International smart city network open agile smart cities & communities (OASC) , conflict of interest!

- Are the MIMs considered in German rfps for UDPs, digital twins?
- MIMs only for Smart Cities?

Summary

- Huge amount of tax-money is spent
- Use case centered approaches
- Silos still exist!
- is there a willingness to standardize?
- telecom industry meets geoinformatics, conflict of interests
- A proven communication infrastructure, and protocols are still missing!
- Goverenance?

- But light @the end of the tunnel :
  you as audience of the conference

Annex

Overview of existing projects, where the money is spent

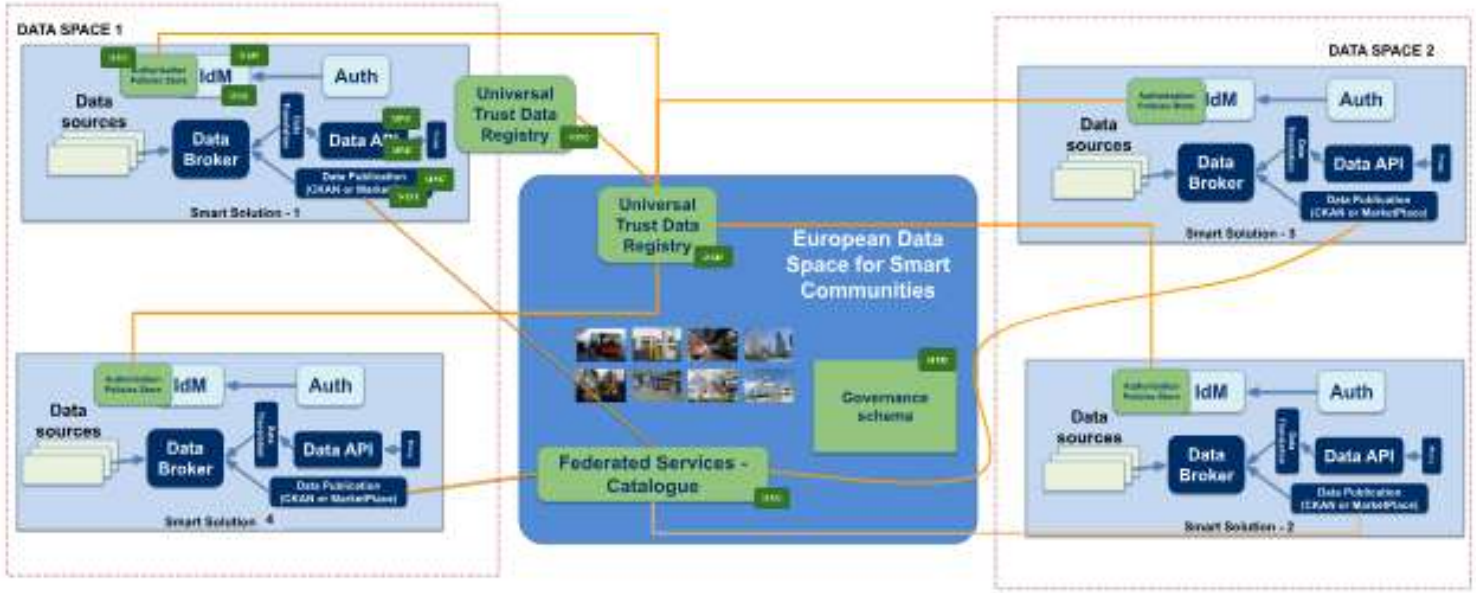
Oupen project invest bW

- OUPEN SmartCity made in BW: Launch of an innovative project to promote interoperable smart city systems for sustainable urban development 10/23-1025

- The aim of this project is to develop and introduce the first **interoperability testbed and certification** system of open standards for smart city information and communication technology (ICT) platforms and systems
- Municipalities and technology providers will be able to easily and efficiently integrate new hardware and software solutions into urban data ecosystems via **"plug & play"**.

Overview of existing Projects, where the money is spent

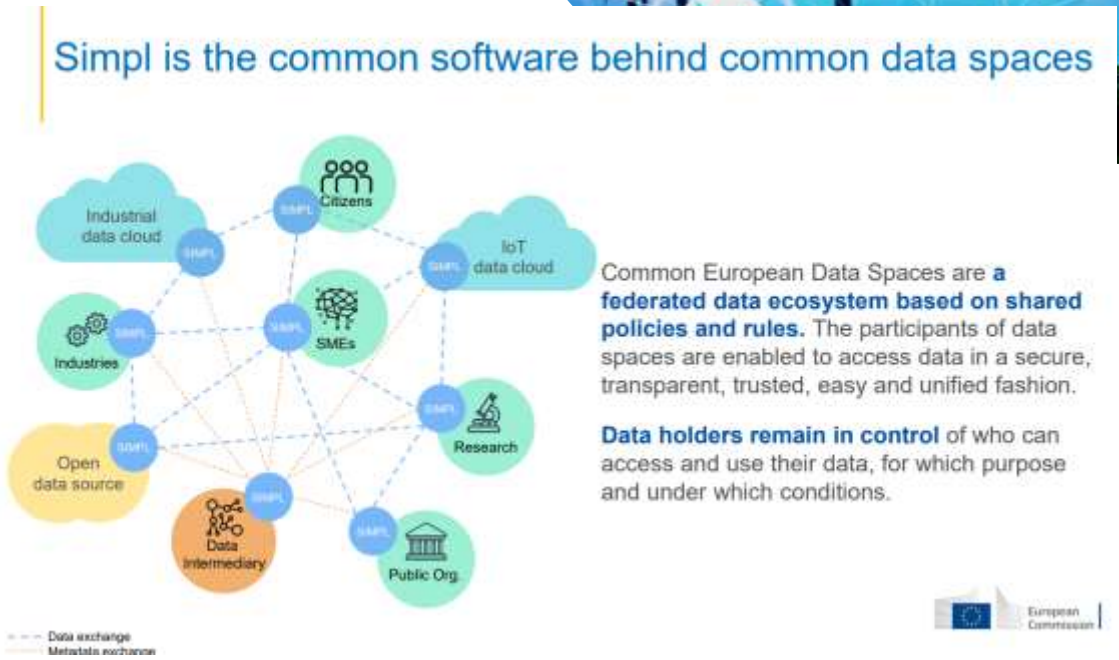
DS4SSCC



Overview of existing projects, where the money is spent

EU-Simpl

- The three-year contract (150 Mio. €) envisages the development of the open-source software package "Simpl-Open," which supports data spaces and other cloud-to-edge federation initiatives. The consortium is also developing preparatory studies for the next two stages of the Simpl-Open stack:
  - "Simpl-Labs," an environment for all sectoral data spaces that want to experiment with Simpl-Open before deploying it for their needs.
  - "Simpl-Live," multiple instances for specific sectoral data spaces, in whose management the European Commission plays an active role: Public Procurement Data Space (PPDS), European Health Data Space (EHDS), Language Data Space (LDS), European Open Science Cloud, Destination Earth, and Data Space for Smart and Sustainable Cities and Communities (DSSSC).

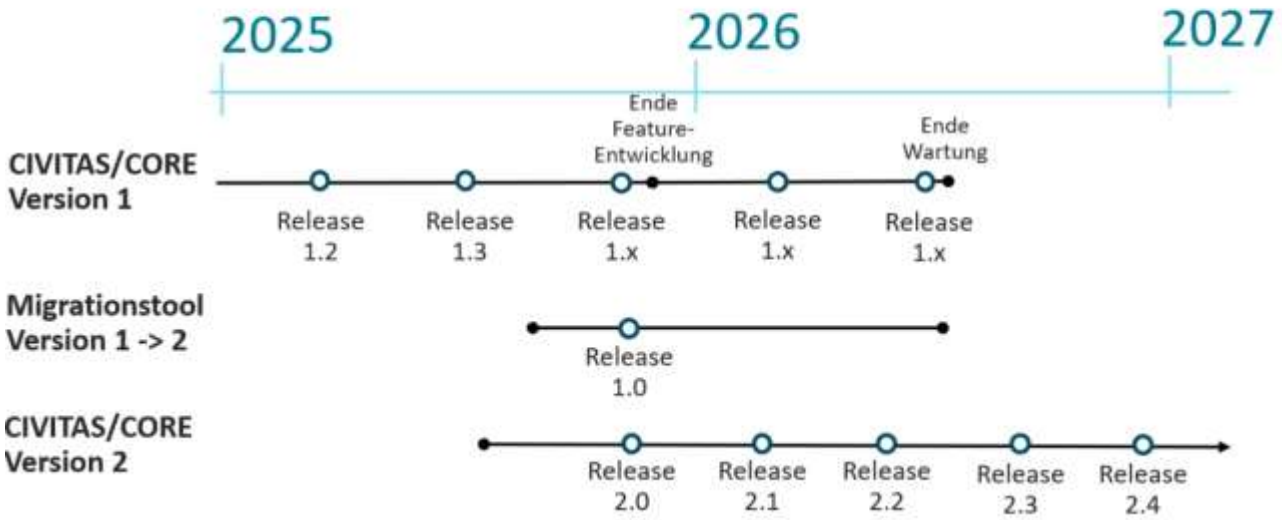


Overview of existing Projects, where the money is spent

rfp Civitas CORE , open source UDP

CIVITAS/CORE

Budget ca. 20 Mio €



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