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AEC FORUM
GEOSPATIAL + BIM + DIGITAL TWIN
#AECForum2025

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Plenary IV - Transforming Road & Highway Infrastructure through Digitalization

A snapshot on recent projects and innovations in Germany

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www.bmv.bund.de

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Overview

- Policy Goals and envisaged Impacts
- Innovation, Research and Development
- BIM Strategies and Deployment
- Communication and Outreach
- Unlocking the Potentials of Digital Twins for the entire Infrastructure Life Cycle
- The wider Data and Digital Policy Context

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Policy Goals for the Digital Transformation of Infrastructure Provision

Key:

Supporting the digital transformation of the infrastructure, planning and construction sector through advancing deployment of BIM, Digital Twins and Data Management

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Digital Transformation in Infrastructure – envisaged Impacts

Contributing to:

- Enhanced efficiency and reducing emissions across the entire life cycle of infrastructure, public, commercial and residential buildings
- Extending the overall data space for infrastructure and buildings
- Improved public consultation processes in planning and transport
- Supporting market particpation of SMEs and international competitiveness of Construction Companies and Developers

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Meta-study of research Publications in the Economic Impacts of BIM

- Out of 489 peer-reviewed research publications globally, 48 identified as relevant; of 170 other publications, 41 relevant
- In total, 32 publications available and selected for the analysis
- Overall, the studies examined show that BIM can significantly reduce cost risks, enhance the quality of plans and contribute towards finishing projects within time and financial budget across all projects phases and subsectors

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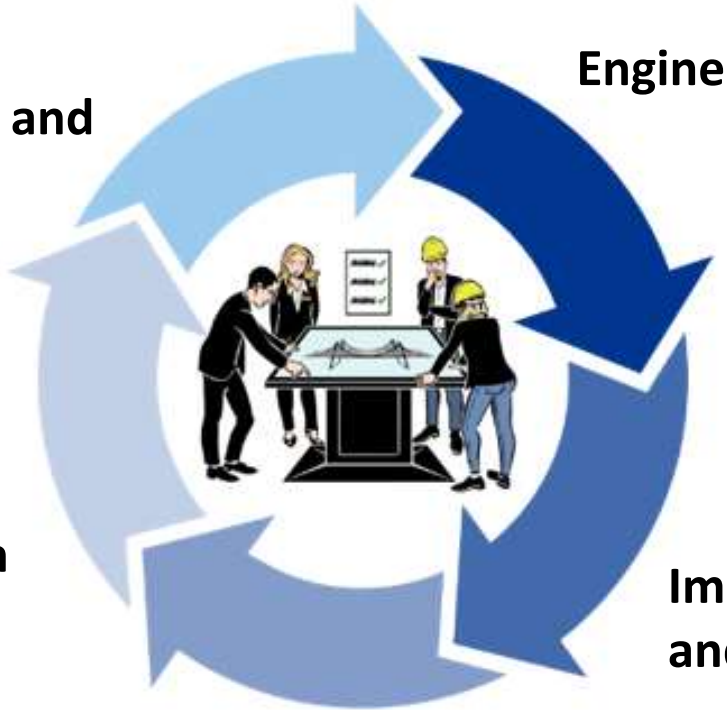
Digitalization across the entire Infrastructure Life Cycle



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From BIM to Digital Twins – Initiatives to support the Digital Transformation of Planning, Construction, Maintenance and Management of Infrastructure

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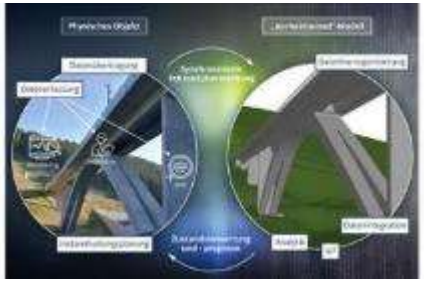
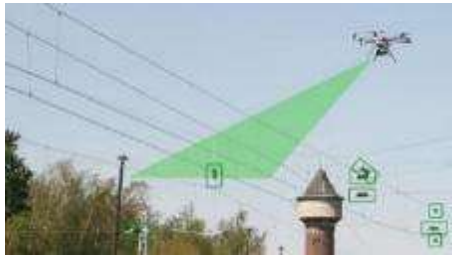
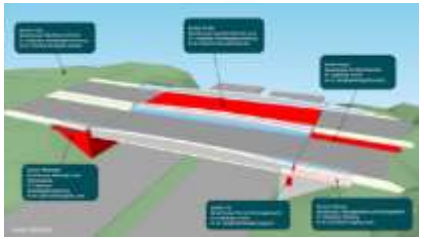
Research and Innovation - preparing the ground for BIM, Digital Twins and data-based Infrastructure Management

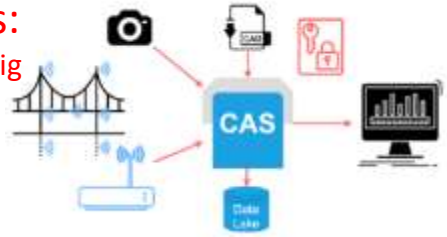
- Since 2017, BMV funded a wide range of projects (est. total grant volume > 50 Mill. Euros)
- addressing innovations for BIM deployment and digital Twins, integration with GIS, AI and new surveying methods and sensor technologies

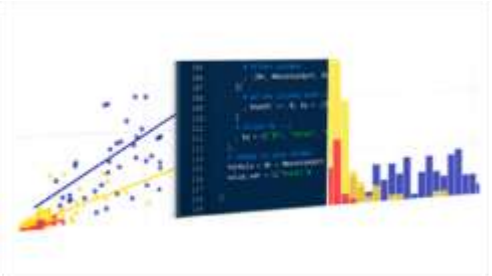






Profiles of all 600 Projects:
https://www.bmv.de/DE/Themen/Digitales/mFund/Projekte/mfund-projekte.html





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BIM-Implementation Strategies at Federal Level in Germany

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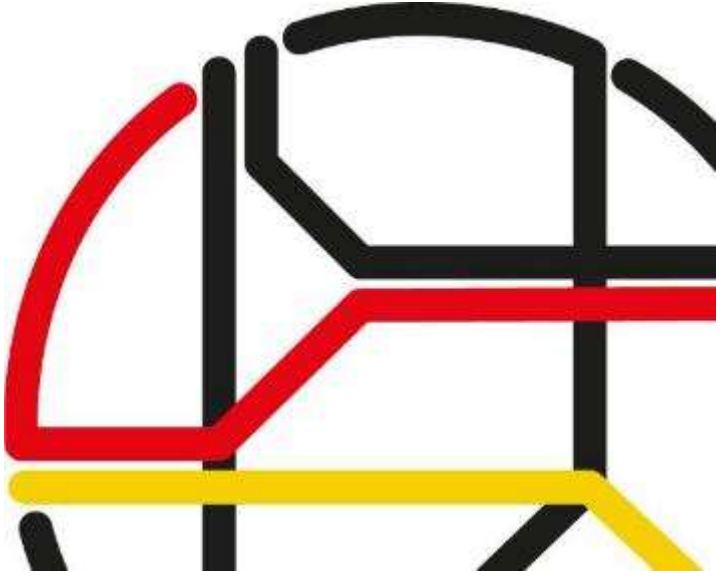
BIM Deutschland – National Center for Information, Networking and Capacity Building

BIM Deutschland – Zentrum für die Digitalisierung des Bauwesens

www.bimdeutschland.de

- Jointy established and financed by the Federal Ministry for Digital and Transport, the Federal Ministry of Housing, Urban Development and Building and the Federal Ministry of Defense
- so support harmonized and coordinated BIM-deployment across Sectors and preparing the basis for digital Twins



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Networking and Knowledge Exchange

- Online Workshop Series featuring the BIM-Portal, targeting different user groups
- Online consultation and training events for BIM practitioners on technical BIM topics
- Online Workshops featuring Digital Twins (potential applications and pilot projects)

Wissing and Geywitz kick-start platform to support digital planning, construction and operation

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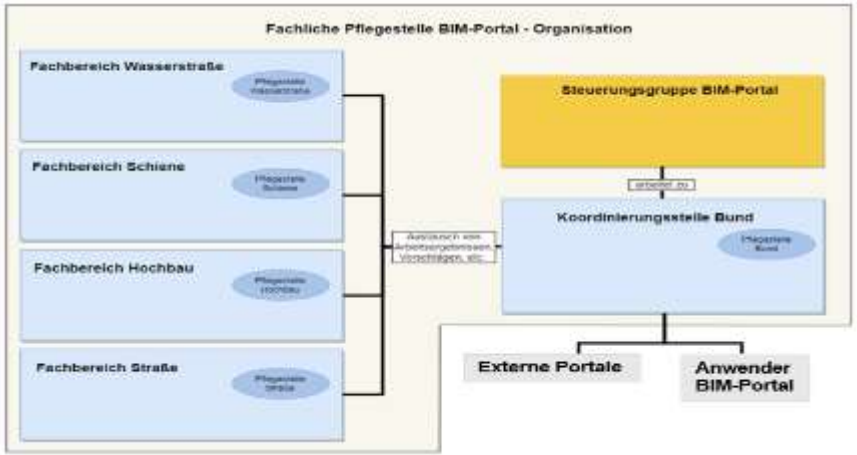
BIM-Portal of the Federal Government as technical Plattform and collaborative Process



https://www.bimdeutschland.de/leistungen/bim-portal

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BIM Standardization and Harmonization

- BIM-Standardization Roadmap (DIN 2022)
- Contributing to national and international Standards Committees

- **Technical Documents for BIM Deployment**

DIN VDI buildingSMART Germany cen ISO

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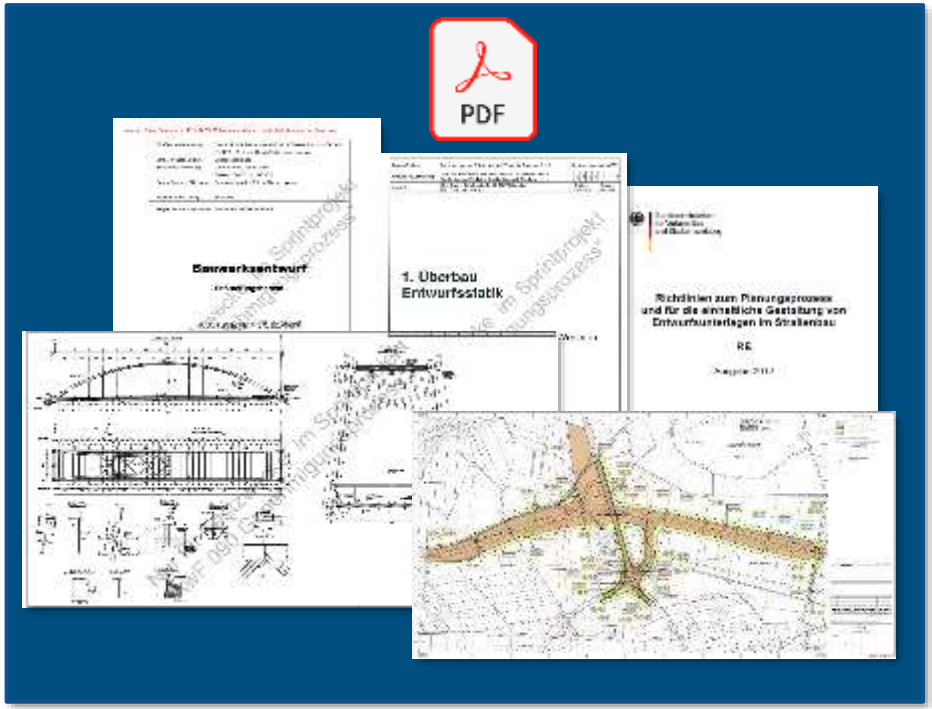
Digitalization of the Approval Process: BIM-CDE for Federal Transport Authorities



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From BIM Deployment to Digital Twins

…From the design and construction stage of new projects to the entire life cycle of (existing) facilities

…from static inputs and sources to comprehensive (real-time) operational data and analysis

…extending the focus from buildings and objects to users and other data sources and inputs

Summary based on: https://www.iotforall.com/digital-twin-vs-bim

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Stocktaking: Map of Digital Twin Projects in Germany (137)

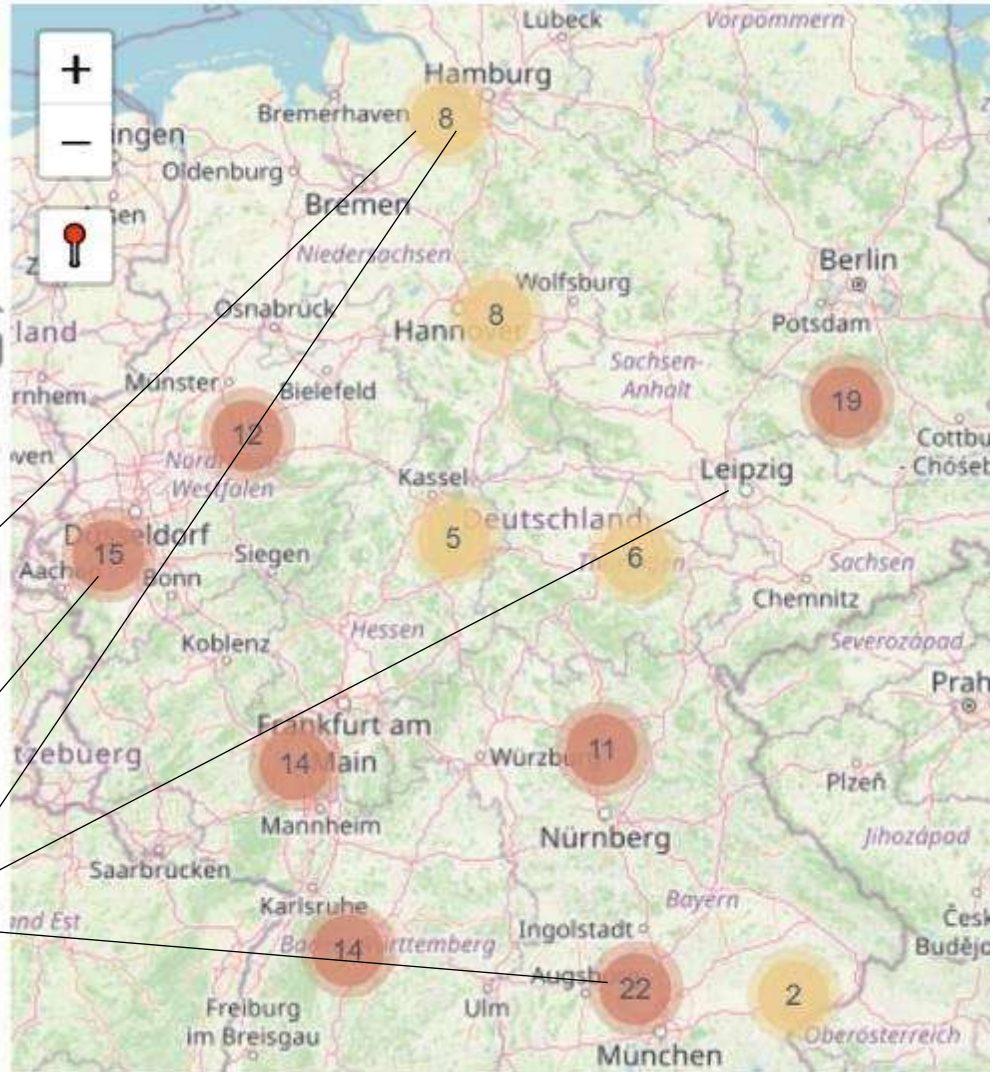
https://www.bmv.de/SharedDocs/DE/Artikel/DG/digitale-zwillinge-infrastrukturpraxis.html

Examples:

Digital Twin for **Predictive Maintenance** of the Köhlbrand Bridge in Hamburg

TwinGen
Digital Twins Technologies for Infrastructure Maintennance

Urban Digital Twin of the city of Munich, embedded in the larger Connected Urban Twins project with Hamburg and Leipzig



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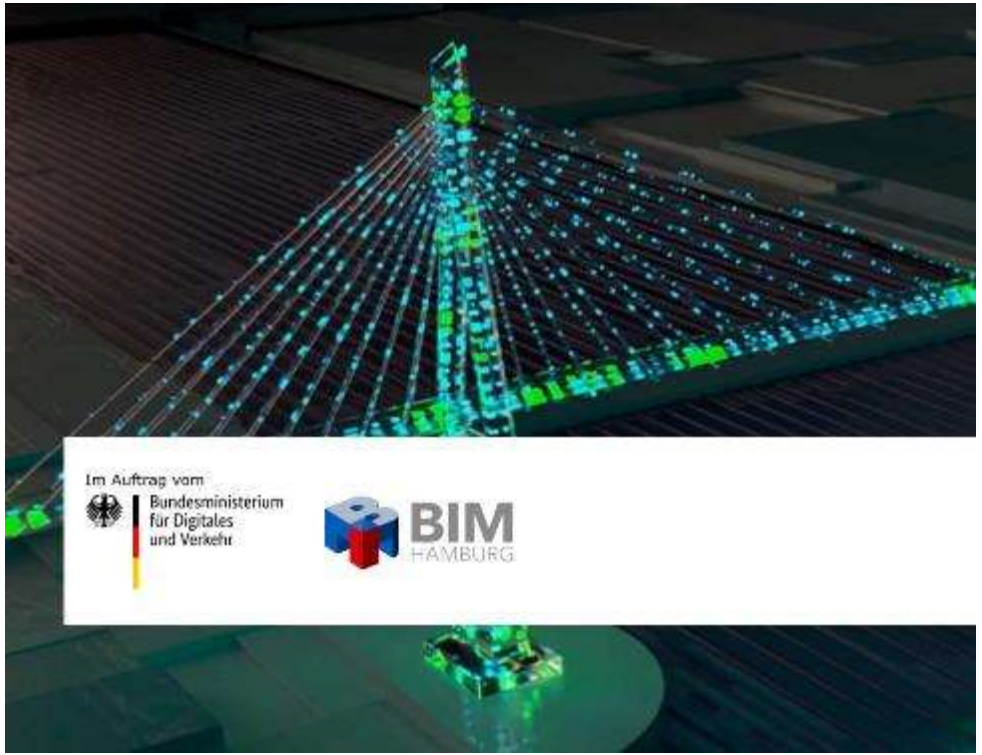
Digital Twins in Practice at Federal Level– the Köhlbrand Bridge in Hamburg

„Real Life Digital Twin Laboratory “

https://bmdv.bund.de/SharedDocs/DE/Pressemitteilungen/2024/003-wissing-bruecken-effizienter-erhalten.html



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Moving Digital Twins to practical implementation – Key Elements and Steps

1. Identifying and defining cross-sector/sector-specific demands
2. Systematic review of current research and case studies
3. Developing strategic approaches and implementation plans
4. Dialogue and stakeholder consultation
5. Establishing technical standards, systems, data governance
6. Defining owners and operators of digital twins
7. Enabling people and implementing organizational arrangements

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BIM and Digital Twins in Infrastructure – Data Policy and Digitalization Context

Federal Government National Data Strategy 2023

https://bmdv.bund.de/

https://bmdv.bund.de/SharedDocs/DE/Anlage/K/national e-datenstrategie.pdf?__blob=publicationFile

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The Federal Ministry of Transport has adopted a pioneering role for Open Data and Data Innovations in Transport and Mobility

- A Geo-Information Strategy (drawing on INSPIRE implementation)
- A grant program for data-driven innovations with a particular focus on Start-ups and SMEs: mFUND
- An Open Data Portal and a marketplace for real-time data from road traffic and public transport
- Public hackathons with Open Data from Transport Sub-sectors
- A data portal for national dissemination of remote sensing data from the Copernicus program: CODE-DE

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Catalyzing Data Innovations in Mobility and Transport - thematic Programme Areas

Data Access	Data based Applications	Data Governance
▪ Enable access to existing data sources ▪ Open up new data sources ▪ Improve usability of data sources	▪ Develop applications based on existing and new data sources ▪ Take into account economic potential and societal use	Explore societal aspects: ▪ Economic effects ▪ Political implications ▪ Legal framework

Topics covered:

Topics of the Federal Ministry of Transport (e.g. mobility, infrastructure) and related themes (e.g. environment, demographics, smart cities)

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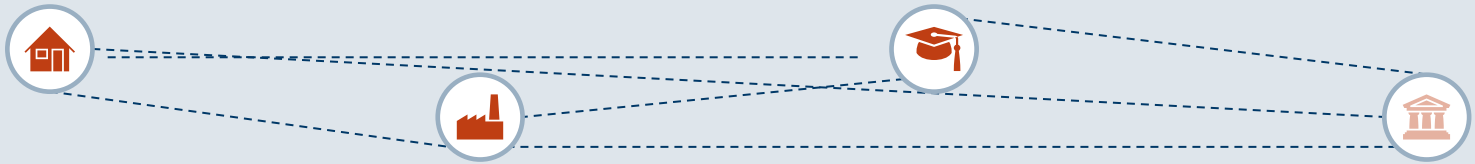
Target Groups and Partners for establishing a Data Ecosystem in the Transport Field

- Individuals
- Associations

- Startups/ Entrepreneurs
- SMEs and big companies
- Trade associations

- Universities
- Non-university research institutions

- Federal, State, Local Authorities and institutions (potentially with R&D functions)



Partnerships and networks incorporating a wide range of stakeholders

A+S Consult GmbH

TU Kaiserslautern

RWTH Aachen

Thank you for your attention !

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EasyDigiTwin2

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