BMVI-Workshop Series "Data Innovations for Smart Mobility in Europe"

Workshop No. 6: Data-based innovations for Building Information Modelling and digital twins in infrastructure planning, construction and maintenance

Date: Thursday, 20 January 2022   **Location:** Virtual Room (Zoom)
Time: 09.30 – 12.00 h (CET)

Summary

Rapid urbanisation across the world is escalating the demand for mobility services in cities and urban regions. At the same time, expansion of freight services is placing additional stress on existing transport infrastructure networks. As a result, there is demand for providing new infrastructure or upgrading existing facilities. Along this process, policy goals call for reducing greenhouse gas emissions, efficient arrangements with regard to construction and maintenance costs as well as for improved reliability. Digital technologies are critical for transforming the transportation infrastructure in a sustainable way. At the operational level, Building Information Modeling (BIM) methods and digital twins can facilitate more efficient planning, construction and management and enable comprehensive life cycle sustainability assessments of existing and planned transportation infrastructure.

Thematic overview

The sixth mFUND workshop of the series "Data Innovations for Smart Mobility in Europe" started with a brief introduction to the mFUND programme by Sarah Schmelzer, from Division 21 of the German Federal Ministry for Digital and Transport (BMDV). Sarah highlighted recent activities of the Federal Ministry with respect to data-related innovations for mobility, focusing on the mFUND research initiative and examples for innovative BIM applications. In his words of welcome, Christian Schlosser, Head of Division DG25 highlighted the BIM strategy of the German Federal Government. In particular, he explained the role of the national BIM competence centre "BIM Germany" and the BIM-Portal, which will be activated in 2022 and is intended to support all stakeholders (clients, contractors and building product manufacturers) in the process of establishing and mainstreaming BIM in Germany.

In the keynote speech, Nicola Moretti of the Centre for Digital Built Britain, University of Cambridge shared his experiences related to digital information management, the West Cambridge Digital Twin Research and GeoBIM condition assessment for campus-level asset management. Nicola highlighted the current need for applications and case studies and emphasised that particularly interdisciplinary questions should be addressed in these studies.

Presentation of Innovative solutions and projects

Speakers from five research projects presented new developments and experiences in the use of BIM and digital twins for sustainable planning and maintenance of mobility infrastructure.

The project ZEKISS, as explained by Jens Schneider (TU-Darmstadt), utilizes artificial intelligence for the assessment of railway bridges. In Germany alone, there are around 25.200 railway bridges with an average age of 73 years. These structures have to cope with the rapid development of the rolling stock and changes in the transport system. A highly automated and improved method for the condition assessment of existing railway bridges offers many advantages and opportunities for the improvement and planning of future infrastructure and vehicles.

Damien De Maya (Sitowise) explained the advantages of employing digital twins for the reduction of CO_2 emissions in urban developments, citing case studies of several Finnish cities. One of the cases involves the creation of a virtual model of Helsinki/Pasila in accordance with the InfraBIM requirements suggested by the buildingSMART Finland Forum. In another example, in Helsinki/Tapiola, real-time simulation and evaluation of hazards caused by glare from the sun when entering and exiting the bus terminal under different weather/season conditions were used in the development of terminal and street layout plans. Damien stressed that to carry out the presented projects, Sitowise made use of available data, mainly open data.

To demonstrate the benefits of using digital twins for supply chain optimisation in construction, Fabrice Berroir (Luxembourg Institute of Science and Technology) presented a case study from Luxembourg. The study focused on the development of a demo showing the applicability of norms and standards and illustrates how the approach increased safety and productivity and reduced CO_2 emissions, traffic congestion and total costs.

The project BEYOND investigates how the planning of large construction projects in the infrastructure sector can be carried out more cost-effectively, more quickly and at the same time with higher quality and with a lower error rate by combining BIM, AI and pedestrian flow simulations. Jimmy Abualdenien (Technical University Munich) explained how the movement of people under normal operations as well as in critical situations (like evacuations, for example) is being considered in the simulations. Applying the project`s methods can lead to significant benefits such as increased safety within train stations.

Sukalpa Biswas (TRL) presented the findings of the project CoDEC, which is funded by the Conference of European Directors of Roads (CEDR). The objective of CoDEC is to understand, in a very practical way, the key means for successful implementation of BIM principles within the European highways industry, in particular with regards to freeing and enriching data flow to and from Asset Management Systems (AMS). The project developed a data dictionary in

English language, which was subsequently translated into software/machine readable language, resulting in the creation of a data ontology. Building on this result, the project partners produced an Opel Application Protocol Interface, which creates and automates the bi-directional flow of data between different sources and BIM. These developments have been applied in the construction of roads, bridges, and tunnels in pilot projects in Belgium, The Netherlands and Finland.

The Way Forward: Supporting BIM deployment in Europe through Harmonisation and Standardisation

After the presentations of the projects and subsequent discussions, Christian Schlosser (BMDV) introduced BIM harmonisation and standardisation as a topic for open discussion in the seminar. In particular, the question is, how European harmonisation be advanced and coherent terminologies can be established. This session was supported by a contribution from Philipp Albrecht (Head of BIM Business Development of the German Institute for Standardization-DIN) on the preparation of an initiative and a call for collaboration.

Wrap up of the Seminar

Over 70 participants from 12 countries engaged in a lively discussion on the role of harmonisation, open data, the need for standardisation, barriers, opportunities, successes and advantages concerning the use of BIM and digital twins in the transport sector. The importance of collaboration was highlighted by several participants, emphasising the importance of interdisciplinarity, cultural differences, access to data and a data "language" for the successful implementation of BIM.

Christian Schlosser announced that BMDV intends to maintain the dialogue on BIM started with the seminar and is happy to share information on future activities with interested parties.