

ide₃a : A Digital Campus for Transdisciplinary Research on Interconnected Urban Critical Infrastructure Systems



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ide₃a

international alliance
for digital **e-learning**,
e-mobility and **e-research**
in academia

DAAD

Deutscher Akademischer Austauschdienst
German Academic Exchange Service



Federal Ministry
of Education
and Research



. RESEARCH-BASED TEACHING

- Interdisciplinary topic “Critical Infrastructure & Digitalization”
- Digital education platforms (Moodle)
- Digital tools, incl. a new serious game **ConnectiCity**



ide₃a-Ambassadors



E-learning Analyst

Icons created by Delwar Hossain, Gregor Cresnar from the Noun Project

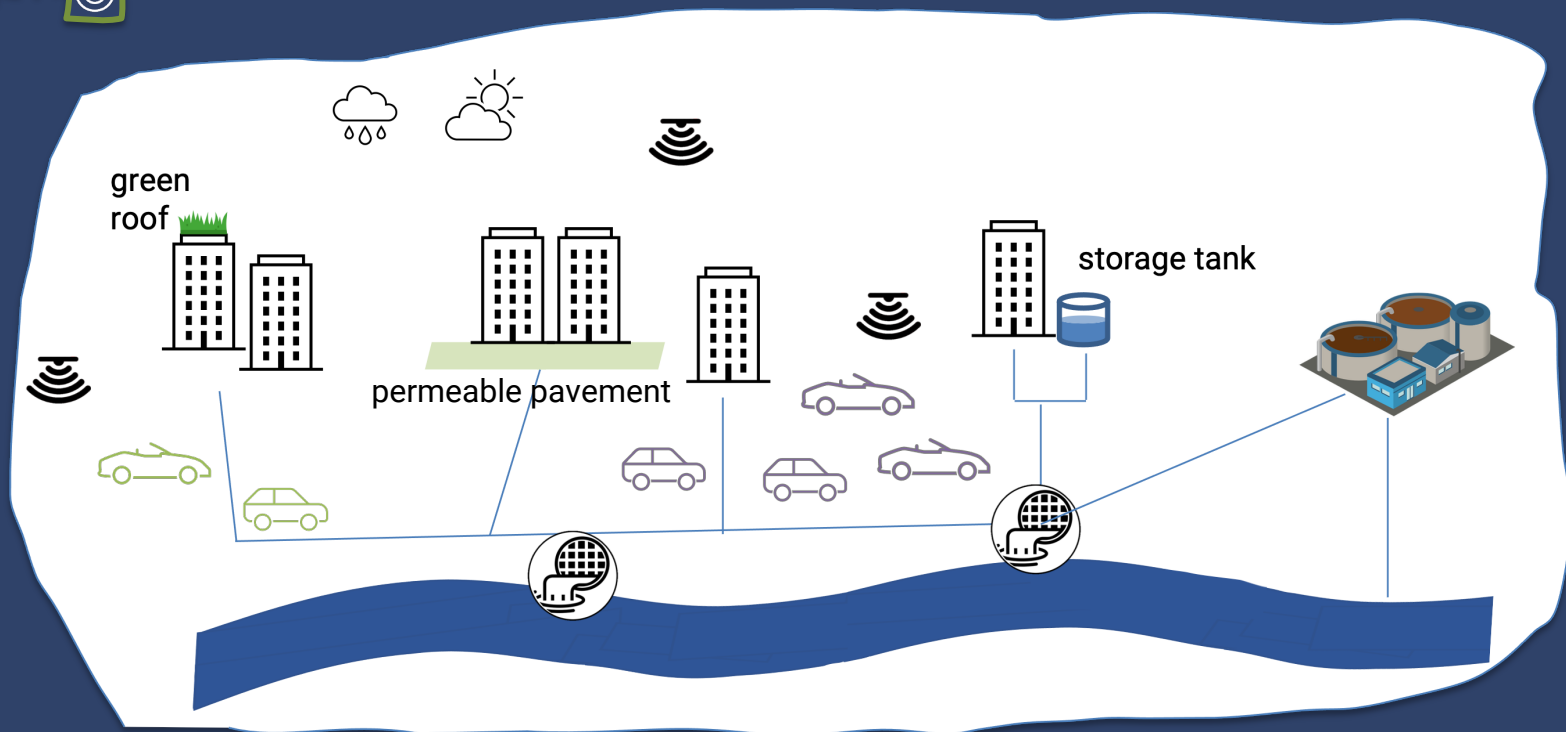


ConnectiCity

- Open-source, simulation-based serious game
- Integrates multi-sectoral models
- Simulates interconnected critical infrastructure systems
- Quantifies cascading effects under various climate, social, and technical scenarios



Credits: SWN TU Berlin

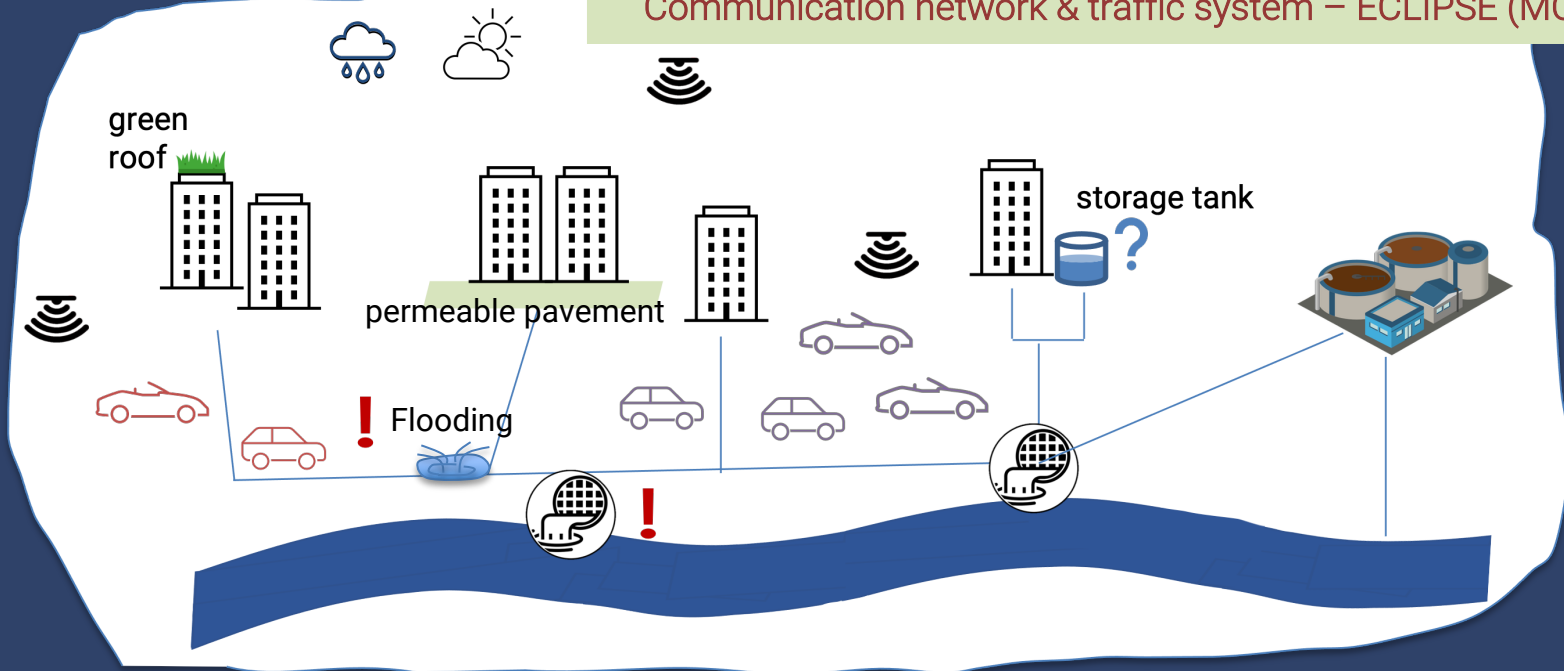


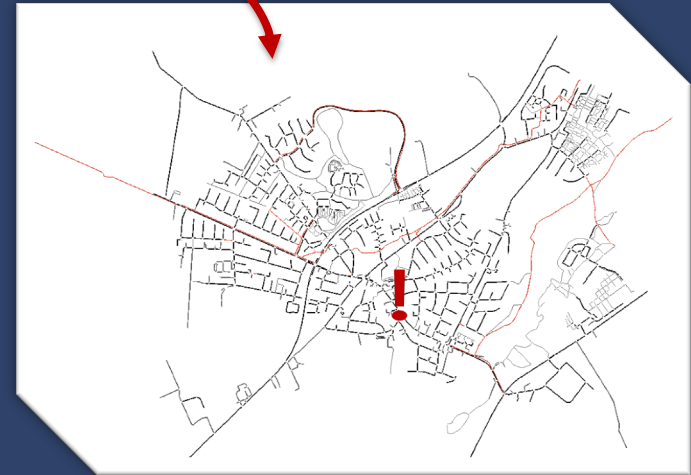
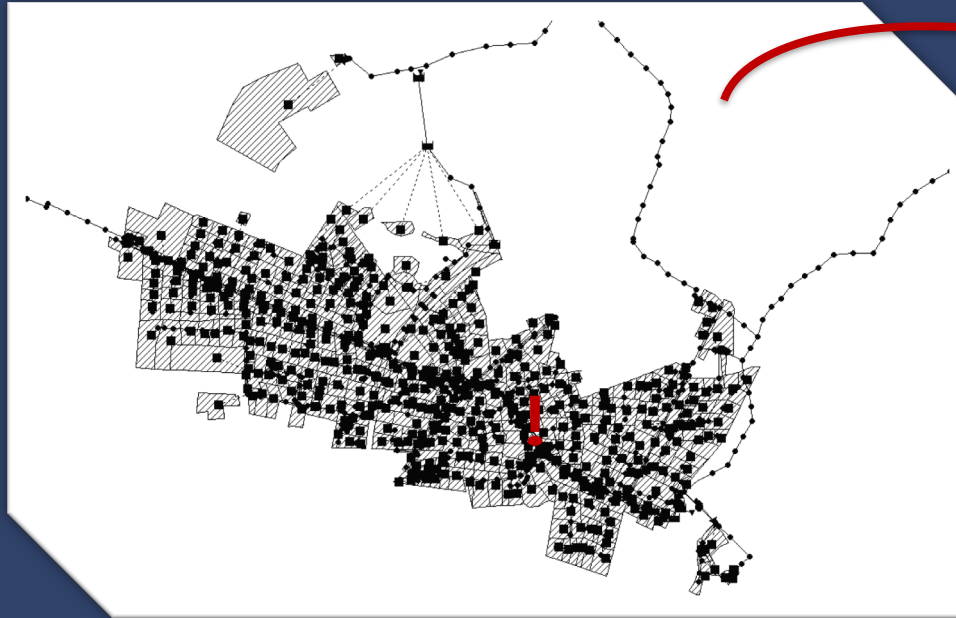
Icon of CSO from <https://www.blue-siren.com/collections/overflow-alarming>, WWTP from <https://pngio.com/images/png-a2274640.html>



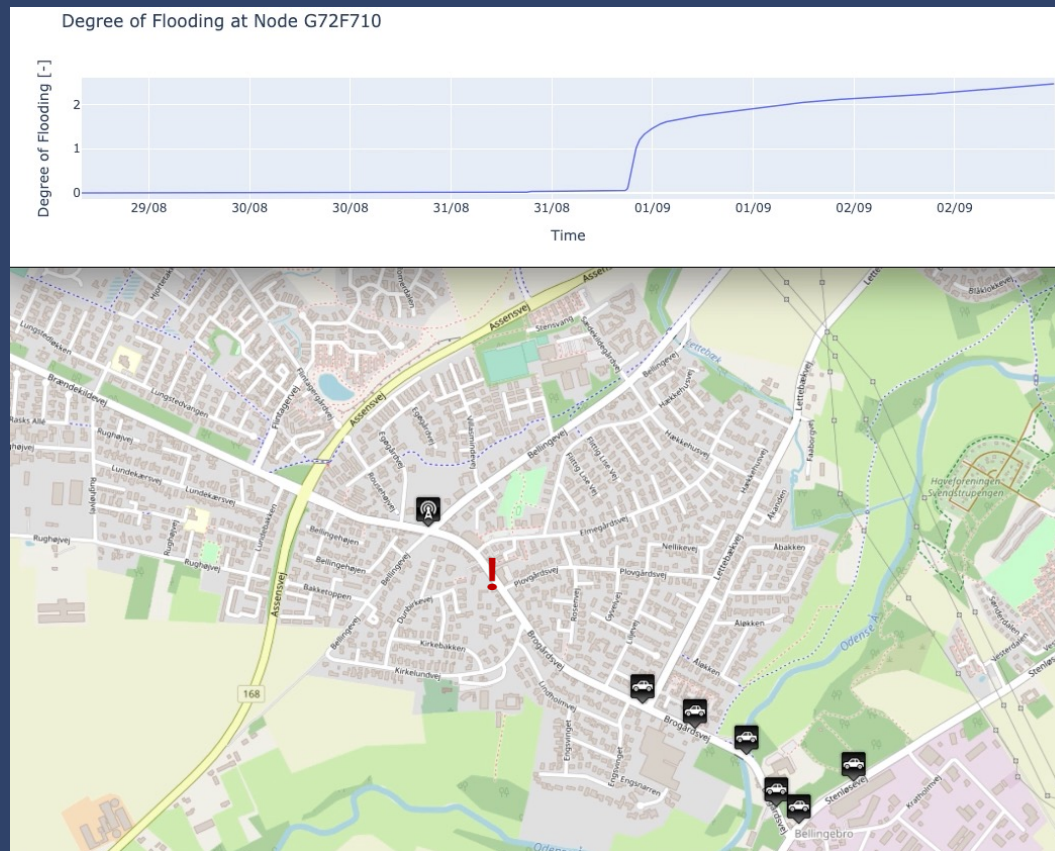
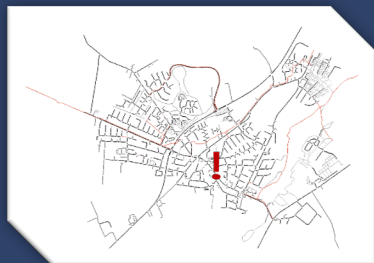
Stormwater (BGI, CSO, flooding) – SWMM¹

Communication network & traffic system – ECLIPSE (MOSAIC)²



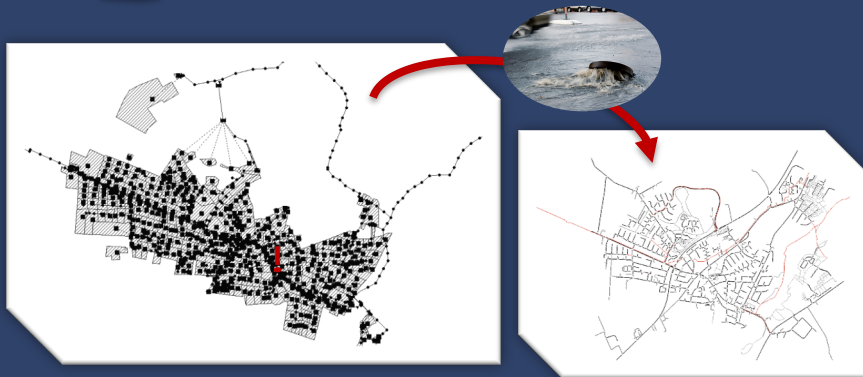


Source: Pedersen, A.N., Pedersen, J.W., Viguera-rodriguez, A., Brink, A., Borup, M., Mikkelsen, P.S., 2021. The Bellingue data set: open data and models for community-wide urban drainage systems research 1–28; <https://www.insblogs.com/catastrophe/frank-sewer-backup-basement-flooding/486>



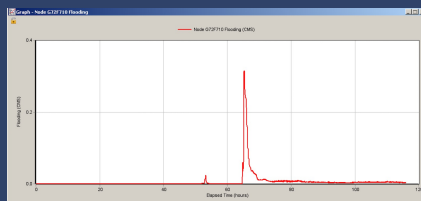


Digital Campus & ConnectiCity



Workshops from the course **Critical Infrastructure and Digitalization**, 2021

- Stormwater management X Blue Green Infrastructure
- Avoiding hazardous traffic environments via V2X



Smart City Hackathon, 2021

- Challenge: couple street inundation models with SWMM

Source: Pedersen, A.N., Pedersen, J.W., Viguera-rodriguez, A., Brink, A., Borup, M., Mikkelsen, P.S., 2021. The Bellinge data set: open data and models for community-wide urban drainage systems research 1–28. <https://www.insblogs.com/catastrophe/frank-sewer-backup-basement-flooding/486>, <https://www.epa.gov/water-research/storm-water-management-model-swmm>



“Critical Infrastructure and Digitalization”, summer 2021

Digital Water Networks and Interconnected Urban Infrastructure

– Prof. A. Cominola^{1,2}

Future Pumping Stations

– Prof. P. U. Thamsen¹

Modern Leakage and Erosion Monitoring

– Prof. K. Radzicki³

Digital Water City Project

– Dr. H. Schwarzmüller⁴



Digitalization of Urban Energy Systems

– Prof. R. Streblow¹

Peer-To-Peer Energy Communities

– Dr. L. Ableitner⁵



Smart Energy Management of Electric Vehicles

– Prof. S. Park^{1,2}

Decentralized Optimization of Intelligent Transportation Systems

– Prof. M. Liu⁶

Continuously Testing IoT Systems

– Dr. L. Thamsen¹ and J. Beilharz⁷

NebulaStream: IoT Stream Processing

– Dr. S. Zeuch¹

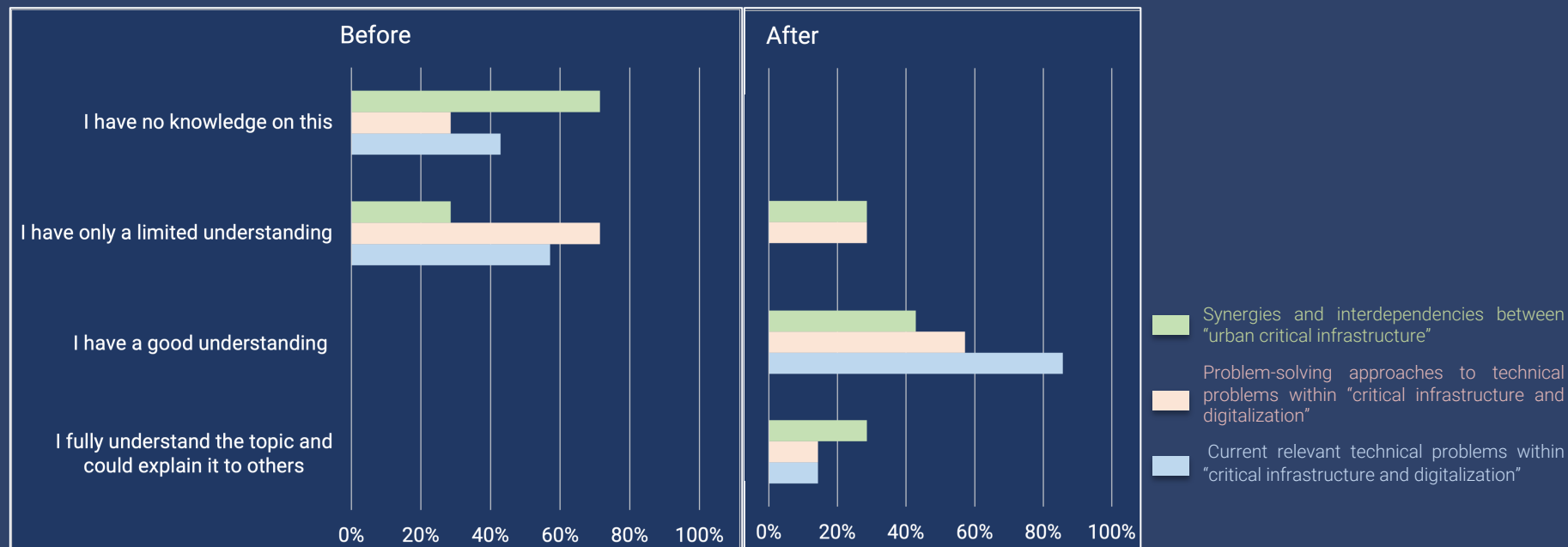
Social Media for Understanding City Dynamics

– Prof. M. Brambilla⁸



Digital Campus – Achievements

Survey results from pre and post participation of the course "Critical Infrastructure and Digitalization", 2021



Digital Campus – Achievements



- ✓ 3 new courses + 2 hackathons
- ✓ ~160 students attending the ide3a courses (3 semesters)
- ✓ 12 scholarships awarded (first edition)
- ✓ NEW partnerships established



"I value this experience deeply, and I am hoping for the success of the ide3a team and the other scholars in their futures."

- Carlos Muli (DCU student)





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Envision



Challenges

WHICH learning formats? (digital/blended/classroom)

HOW TO measure effectiveness of research-based learning?

WHAT are the lessons learned in providing effective training programs to students with very heterogeneous backgrounds?



Thank You

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