WP2 (Arbeidspakke 2)

Bærekraftig mobilitet som et integrert system (modellering og planlegging)

Sustainable mobility as an integrated system (modeling and planning)
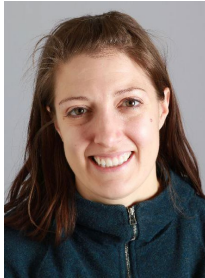
Fagdag
1ˢᵗ Sept 2023

Who we are:

Trude Tørset
(IBM, Professor)

Yngve Frøyen
(IAP, Professor)

Kelly Pitera
(IBM, NTNU & OsloMet, Professor)

Tsaqif Wismadi
(IAP, PhD student)

Zakiya Pramestri
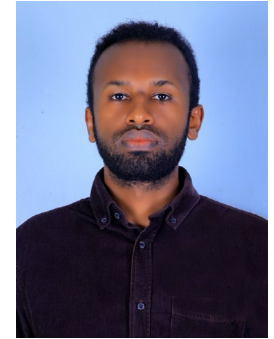(IBM, PhD student)

Zalalem Birhanu
(IBM, PhD student)

Freyja Brandel-Tanis
(Fullbright recipient for 2022-23,
term completed)

Eline Hernes
(IBM, Student researcher)

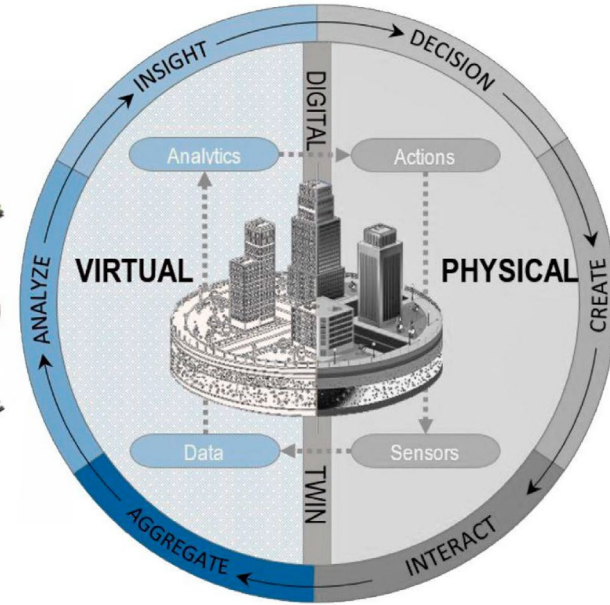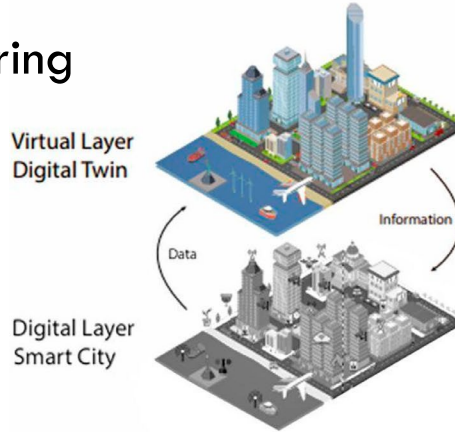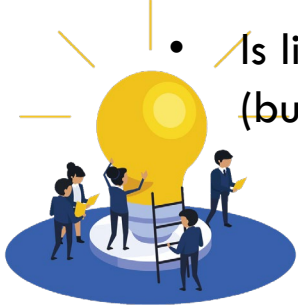Dipanjan (Dip) Nag
(IBM, Post-doc)

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We focus on the Transport system:

- Planning tools
  - **"Who?":** commuters, people
  - **"Where?":** movement in the city
  - **"What?":** current situation vs. future years
  - **"Why?":** commuter behaviour to a change in the system
  - Transport model: Calculate transport demand(trips) based on land use characteristics and transport services. Also helps us understand travel behaviour

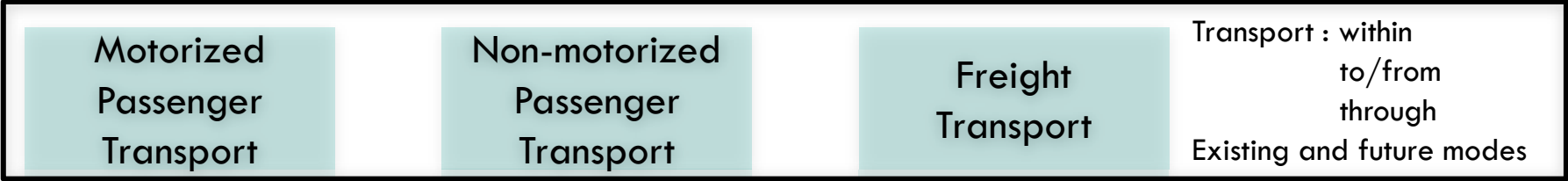- Are Digital Twins (DT) the next generation of planning tools?

Mobility DT:

- DT comes from the manufacturing field

- DT for City→ Mobility

  - Can communicate well

  - Capture many elements simultaneously

  - Many sources of data (ICT, IoT , etc.)

  - Is linked to other infrastructure (buildings, pipelines etc.)

Virtual Layer
Digital Twin

Information

Data

Digital Layer
Smart City

INSIGHT
DECISION
DIGITAL
Analytics
Actions
ANALYZE
VIRTUAL
PHYSICAL
CREATE
Data
Sensors
AGGREGATE
TWIN
INTERACT

Source: https://doi.org/10.3390/su14106263

- Help us in:

  - Testing scenarios

  - Providing reliable predictions

| Motorized Passenger Transport	Non-motorized Passenger Transport	Freight Transport	Transport : within to/from through Existing and future modes

Evaluation of digital twins for mobility **decision making** (1. how do the decision makers understand/use the tool? 2. how is it scalable, managed, how is the data gathered/used?)

Scenario assessment for Elgeseter (determining possible innovative solutions, testing the digital twin to assess solutions)

Digital Twin Development (incorporating current (static and dynamic) modelled data with the modelled built environment)

Transport model development (tool that predicts future flows of traffic due to new measures)

Understanding the current situation: **knowledge-based** mapping and assessment (what is the mobility "problem"?)

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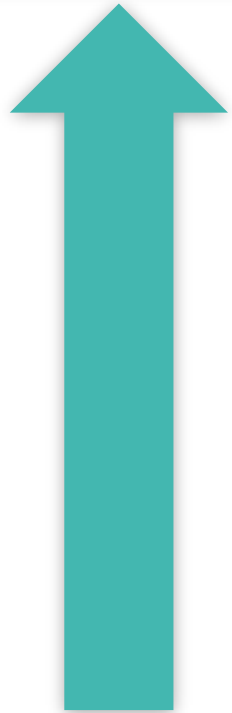
Measuring Impact of Sustainable Transport Initiatives on Interactions of Multimodal Road Users

Simulation-based Modelling with Empirical Data considering Digital Twins

Zakiya Aryana Pramestri

Research objectives:

- Analyzing mobility pattern to understand travel behavior across modes
- Transportation model of all modes including freight and active transport
- Simulations to measure the potential impact of transport initiatives
- Testing for developing an efficient and communicative DT platform

Source: Norconsult in https://miljopakken.no/wp-content/uploads/2013/01/20190220-alternativsvurdering_elgeseter.pdf

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The effect of three-dimensional geographical characteristics on the demand dynamics of urban transportation modalities

Research objectives:

- Effects of 3D attributes (slope, topography, etc.) on demand

- Leverages remote sensing technology and government databases

- Incorporates 3D attribute evaluation for transportation systems→ Output

M. Tsaqif Wismadi
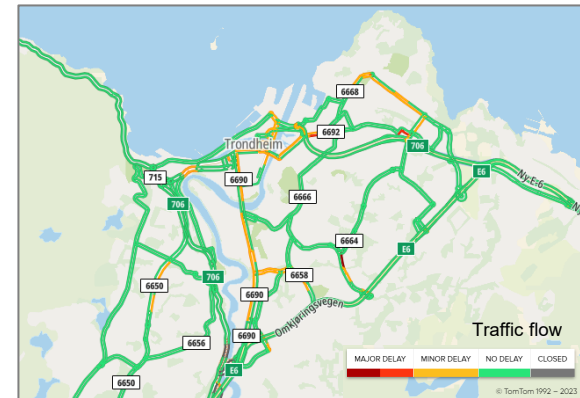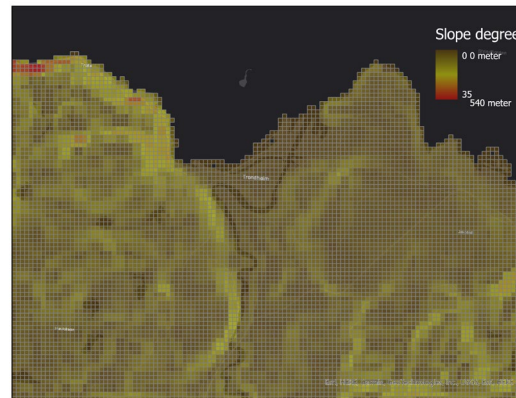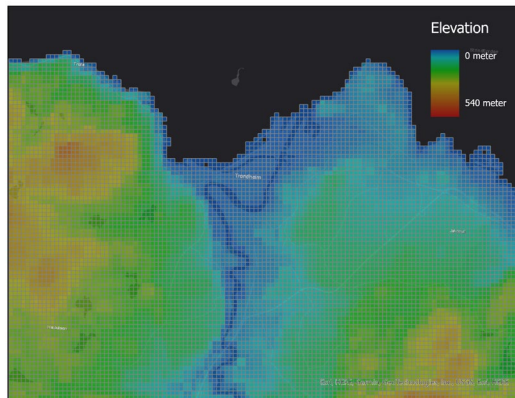
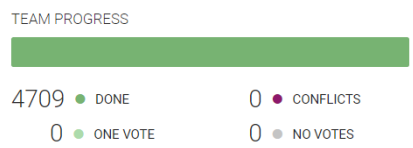# Systematic Literature Review – Digital Twins within Mobility

- To understand how Mobility DT is defined in Literature
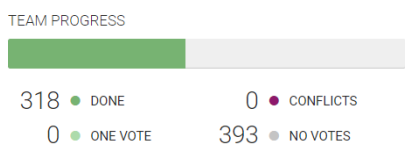
- How do stakeholders use DT for mobility?
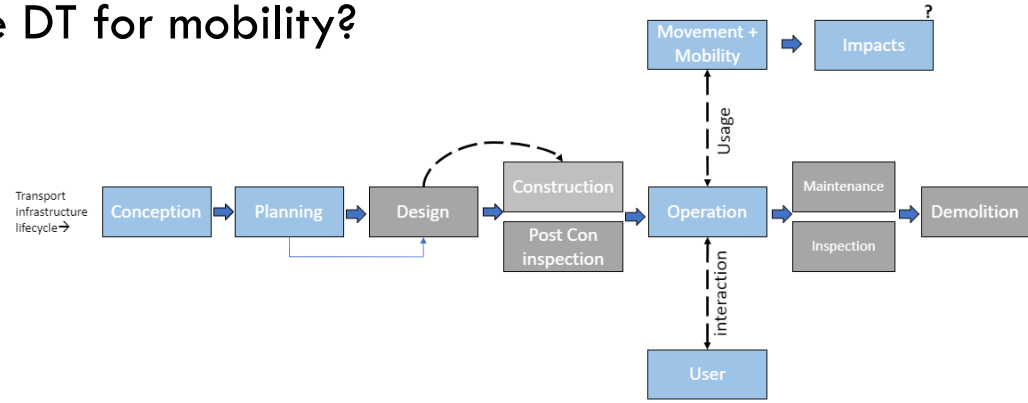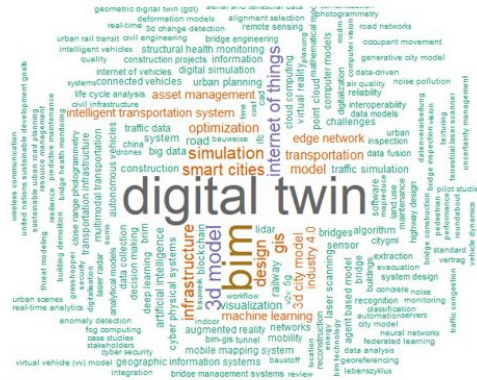
We have a few research activities

- Activity #1→ **Co-defining Digital Twin functions for Sustainable Transportation: What can it be used for?**

- Activity #2→ **"What activities do you generally use a planning tool for? (focus on Mobility and Planning)"**

Takk for at dere kom!

Smart Travel Survey 2023:

Expression of Interest

NTNU