Department of Science, Technology and Society
TUM School of Social Science and Technology
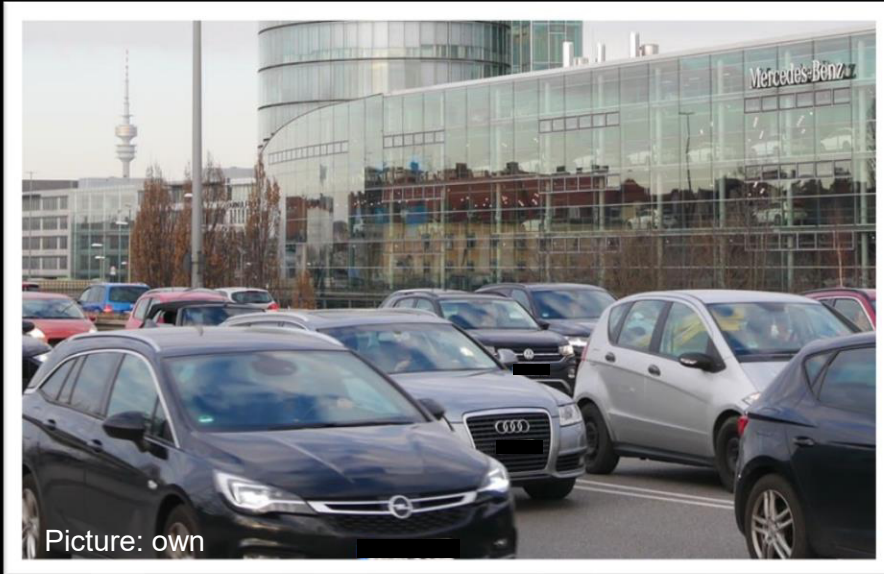Technical University of Munich

TUM

Making Mobility Futures by Experiment. Real-World and Virtual Testing as Governance in the Munich Mobility Landscape.

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TU Munich, Transforming Mobility and Society (TraMS) Lab

From present to the future?

Picture: own

Picture: DLR

Current Mobility Cultures

→ Experimentation

As Techniques of futuring
(Oomen et al. 2022)

Future Mobility Cultures*
*first picture on google: "mobilitaet zukunft"

Experimentation as key instrument in current innovation policy TUM

- Common conception of "real-world laboratories" and test beds:

  - testing the viability (and feasibility) of a new idea or technology under realistic conditions in sync with regulatory frameworks and societal responses

- Critical re-framing in recent STS literature: **simultaneous co-production of new technical, infrastructural *and* social orders** (Engels et al. 2019, Ryghaug et al. 2019, Marres & Stark 2020)

- Experimentation is interrelated with specific regional visions about the future of mobility (e.g. Servou et al. 2022)
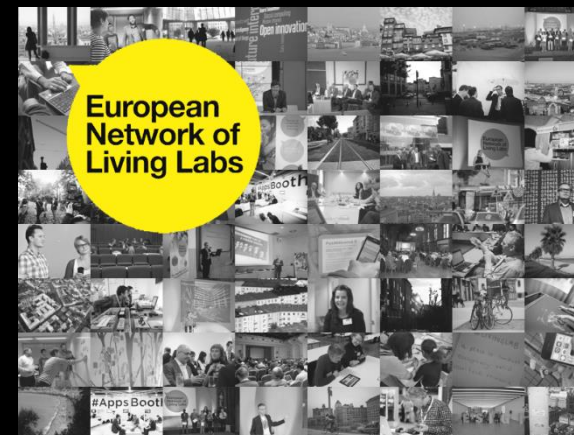
Research Approach

TUM

How do tech-centered real-world experimentation and simulation make mobility futures plausible?
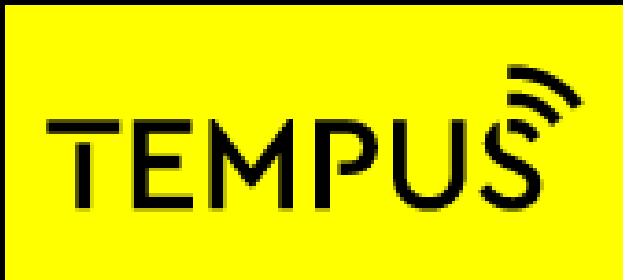

Design | **Case Study:** Experimentation and simulation in tech-centered projects in Munich Mobility Landscape

Method | Qualitative mixed-methods (documents, interviews, ethnogr. fieldwork, workshops)

Cases | *real-world* ("in vivo") testing of innovations | *virtually* ("in silico") testing of mobility innovations

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Case 1

© TEMPUS (n.d.)

Case 2

Analytical categories

TECHNIQUES OF FUTURING (based on Oomen et al. 2022) and its:

VISIONS

➢ Envisioned Future: Society, City, Mobility; Envisioned Purpose and Benefit of Testing

➢ Subject of the Experiment and its envisioned potential

STORYLINES: Presenting /Experimenting for the Future

➢ sayings & doings related to experimenting for the future

DRAMATURGY:

➢ Context of experimentation & Staging of the performance

VISION of the Case TEMPUS

TITI

"The goal of TEMPUS is a safe, comfortable and sustainable mobility for all people in Munich"
(TEMPUS Promotion Video)

Automation for safety and efficiency with effects on the overall traffic flow and less private cars.

Picture: ITIV, KIT

Picture: TEMPUS

STORYLINE: Real-world Experimentation in TEMPUS

Real-world experiment with seemingly autonomous car provides a current status how the future of mobility could look like

➢ Subjective and objective realities with autonomous vehicles

Proof-of-concept for ride-parcel pooling and provide a prototype for a business model

➢ Data from the real-world experiment calibrates the simulation

"Getting citizens on board" (project member)

➢ Raising awareness and providing information about future mobility

Testing technologies under real conditions

→ **Therefore, we need real-world experimentation**

Picture: TEMPUS

Picture: Julia Bergmeister

DRAMATURGY: Real-world Experimentation in TEMPUS

Tests on the interaction with seemingly autonomous car

➤ Surprise and confrontation with future mobility

Presence at mobility events in Munich

➤ Attracting broad audience with prototypes
   "Erlkönig" + rickshaw in the middle of new cars at IAA

Interaction with the technology - "find out what vehicle 'sees'"
(introduction at the IAA)

➤ Providing new knowledge about the technology

Bringing actors and materialities together

makes autonomous mobility futures more tangible


Picture: own

Picture: LHM

Picture: DobnerAngermann
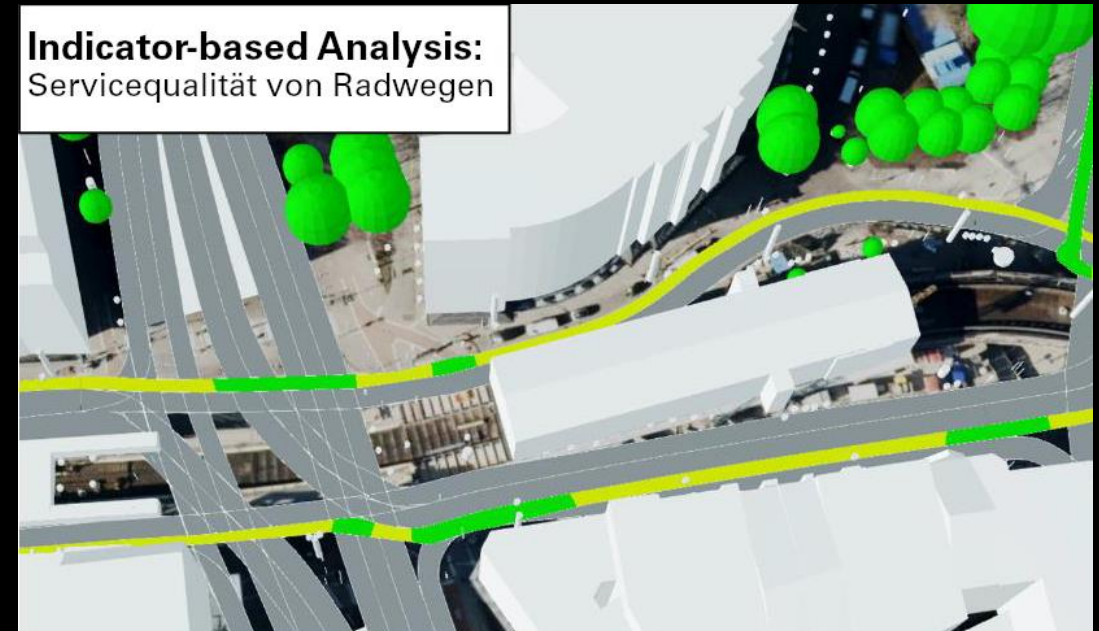
VISION of DUT in "Radentscheid"

Digital Urban Twins as "sandboxes" to conduct "experiments for the future" (Interview)

Work of the "Digital Twin Munich" to support the "Radentscheid"

➤ Indicator-based analyses, e.g. for the quality of bike-lanes

➤ Showing what-if-scenarios of the future after "Radentscheid": broader bike lanes, more greenery...
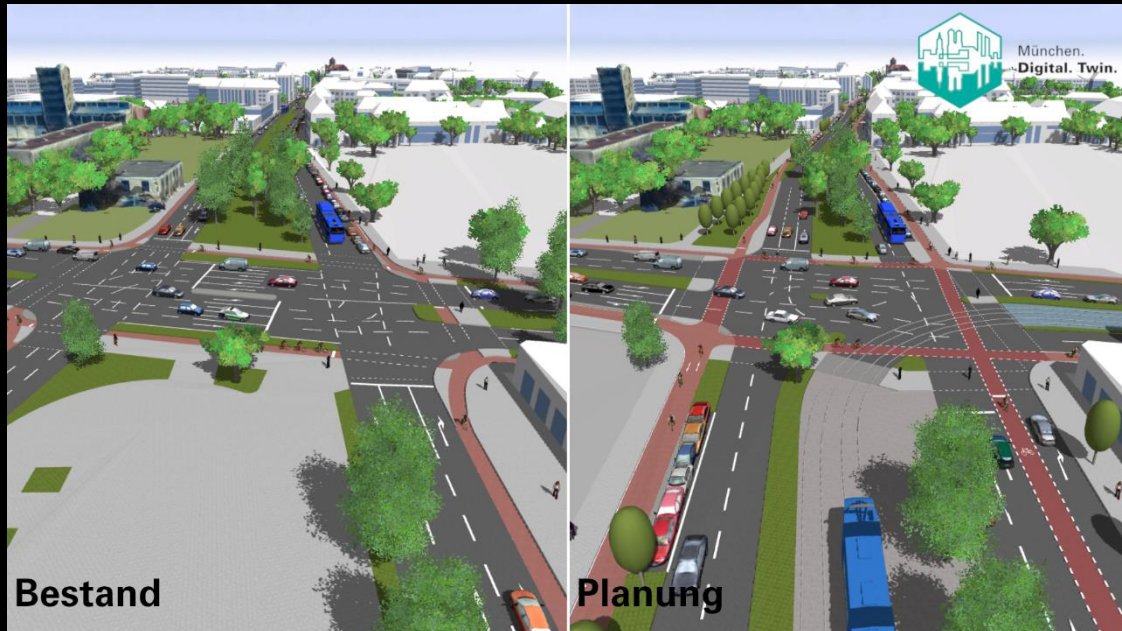
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STORYLINE: Virtual Experimenting for the "Radentscheid"

Promise of virtual testing to manage complexity at system level with better results

➤ safe environment to try out things without having to "touch the system"

➤ move beyond limitations of the "real" world

Quantification: data-based, "intelligent"

➤ future appears predictable and manageable

➤ ideal decision is possible

Visually presenting past/present and different futures simultaneously

➤ trajectory from past to the present

➤ showing "that" as specific future is possible, not „if"

Bestand   Planung

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*"And if you now have a **digital twin** where you could **play through different alternatives, what-if scenarios,** then you can make **better** decisions to reach your goal more effectively."*
(Interview)

DRAMATURGY: Virtual Experimenting for the "Radentscheid"

Technologies with different immersion-levels, e.g. VR

➢ People "experience" and "get a feeling" for the future

➢ Reduction of entry-barriers, democratic opportunity

Collective experiences

➢ Synchronization between what people "see"

➢ Idea of shared understanding

Engagement in certain moderated formats

➢ Production of „futures" is very costly and requires expert-skills

➢ The public is presented with a set of ready-made "futures"

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*„The **catchy and easy-to-understand form of presentation** significantly simplifies participation procedures for transport infrastructure projects and **leaves little room for misunderstandings** regarding the planned project.*

*The **playful use** of an interactive 3D web application and the **immersive experience** of a virtual reality application allow a **completely new type of public participation**."*

(Website Digital Twin)

Discussion – the role of experimenting in future-making

Virtual experimenting: for **depicting infrastructural futures** which are currently not possible to realize

- To *present* (based on real-world data) how a certain future would "feel" like

- To *convince* **people** that a certain future is imaginable

Real-world experimenting: for **proof-of-concept & technology development** which has to be prepared for its future application (Servou et al. 2022)

- To *present* that a certain future is already possible

- To *prepare* **people and technology for** a certain future

Conclusion

Both Real-world & Virtual experimentation **enable to experience and perform** mobility futures

 Present orientation: To make plausible that an experienced future is not ready yet → conservation

 Future orientation: To show that there is a certain future that is already performative → innovation

  ➢ Technical way of presenting futures supports its legitimation as "feasible" futures

  ➢ Construction of passive and predictable future society (which accepts, adapts, applies)

What does it mean to govern mobility futures responsibly?

 Tension between open-ended experimentation vs. system engineering approach

  ➢ Simplification has implications: what kind diversity and messiness of real life is excluded?

  ➢ Who is the addressee of the future performance? Who has the ability to take part in imagining these futures?

Thanks!

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Pictures

Pictures:

Page 1:

DLR (n.d) in https://www.helmholtz.de/newsroom/artikel/die-mobilitaet-der-zukunft/ (11.04.2024)

Tempus (n.d.): https://tempus-muenchen.de/ (10.04.2024)

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