Land use/transport interaction models post Covid-19

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AUM2020: Modelling the New Urban World
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Van Wee, B. (2015), Viewpoint: Toward a new generation of land use transport interaction models Bert van Wee. Journal of Transport and Land Use 8(3) 1-10
https://www.jtlu.org/index.php/jtlu/article/view/611

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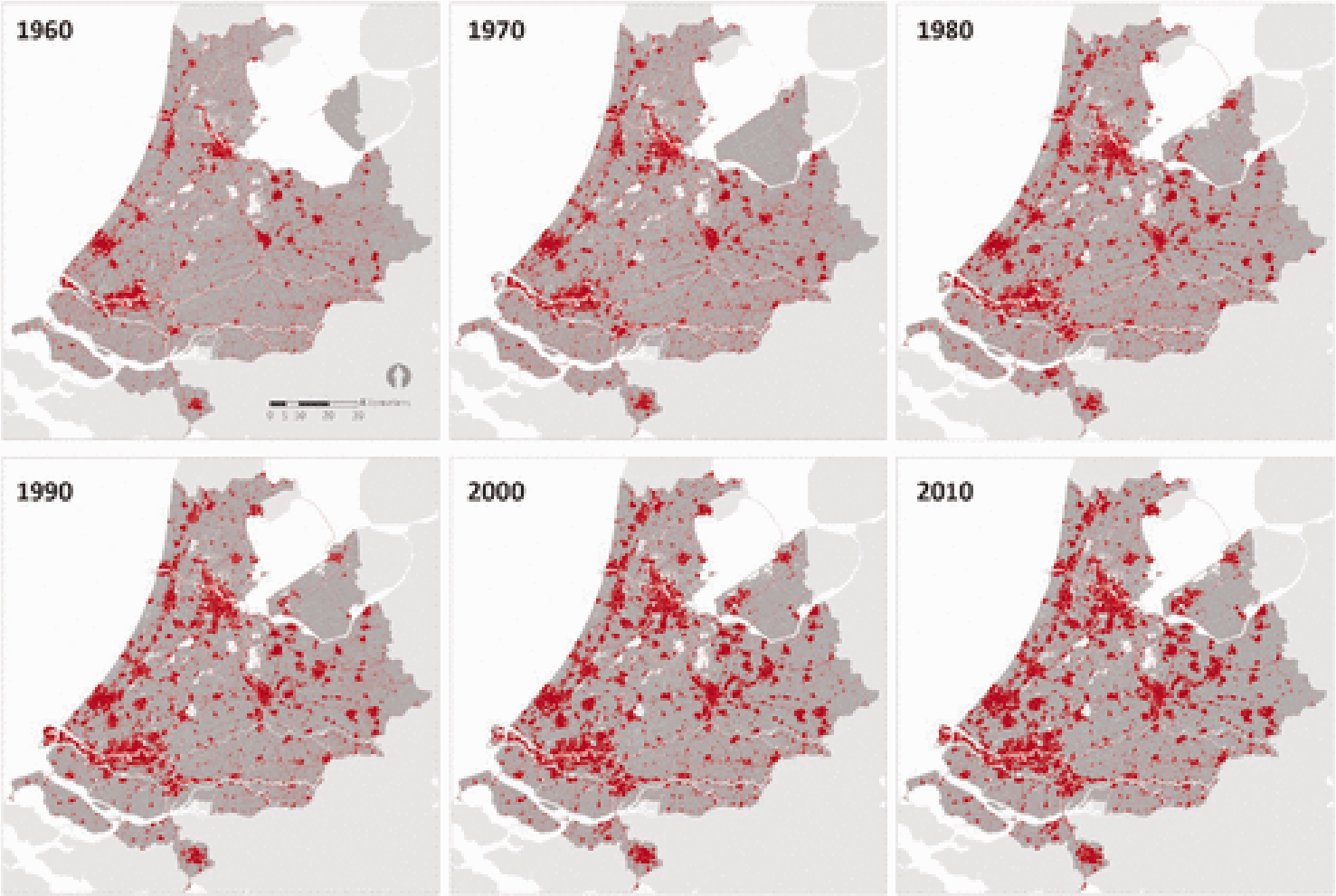
Background

- I never developed a LUTI model
- Heavily involved in strategic policy making in the Netherland (transport and land use)
- Much interest in wants and needs of policy makers and decision makers and the input of researchers they need
- Chair of committee advising on the future of the Dutch LUTI model



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Outline

1. Conclusions
2. Introduction
3. Underpinnings of conclusion
4. Policy implications
5. Summary of implications for LUTI models

1. **Conclusion**:

1. Needed: new LUTI models, for trends like:

- peak car
- decline (population, shops, services, …)
- the impact of ICT on activity patterns and travel
- cycling trends and policies
- AVs
- COVID19?(and maybe more)

2. Lack of empirical evidence: what-if – change parameters (Michael Wegener, lecture last week)

2. Introduction

LUTI models traditional focus: growth. More people, households, offices / work areas, commercial areas.

Common trends raising need for LUTI models:

- **Not more residential, commercial, work areas, but adaptations within current system (EU, Japan, some areas USA, ….)**
- **Linked to many changing policy questions (redevelopment, social exclusion, stop PT services)**
- **Asymmetry in effects: growth versus decline (sunk costs, behavioural aspects)**

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However:

- **Future of trends: uncertain**
- **Lack in empirical research: dynamics in these trends, and their wider impacts on the land use and transport system**

Therefore:
<u>What-if</u>

Also needed:

- **In addition to insights in travel behaviour: wider set of <u>accessibility indicators</u> (Handy, 2020)**
  - **potential accessibility (incl. ICT?)**
  - **possibilities for activity patterns**
  - **Desaggregations (groups of people, areas: fairness)**
  - **Logsum: valuation**
  - **Substitutability?**
- **<u>interactions</u> between key <u>actors</u> in the transport and land use system (serious gaming)**
- **dynamic <u>visualisations</u>**

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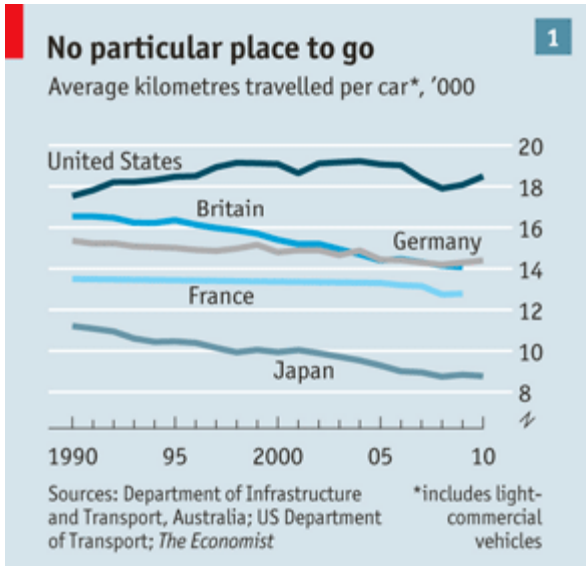
Much also relevant for conventional transport models

3. Underpinnings: trends

Peak car:

- Partly: fuel prices, economy (Bastian et al., 2016)
- Not only Crisis
- Parameters homogeneous groups of people probably not stable
- Trends uncertain

(e.g. Special Issue Transport Reviews, 2013, Goodwin and van Dender, eds.)



Goodwin, P., and K van Dender. 2013. Peak car—themes and issues. Transport Reviews 33(3): 243–254.

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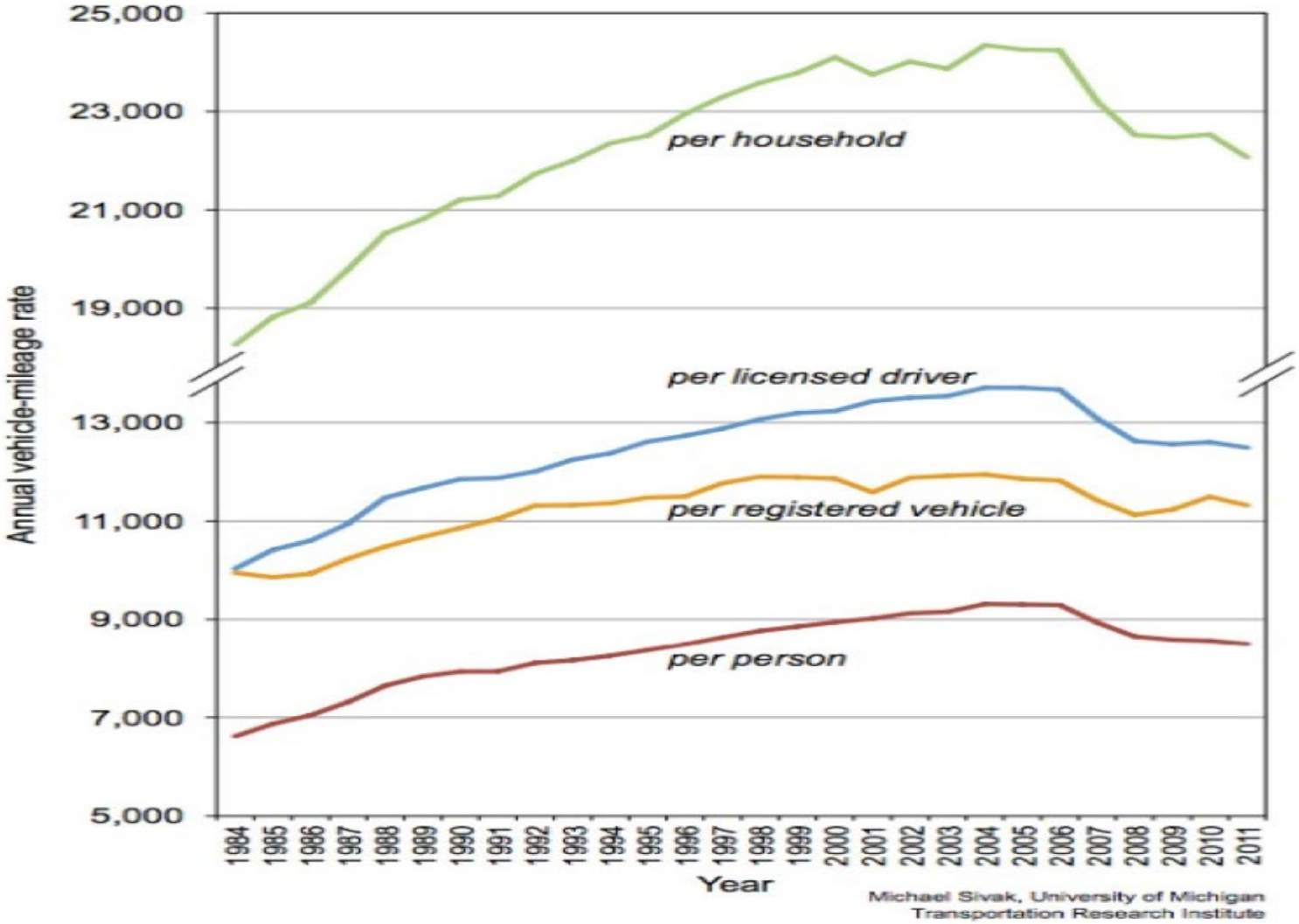
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Michael Sivak, University of Michigan
Transportation Research Institute

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LUTI: less impact of roads on land use? What-if: parameters

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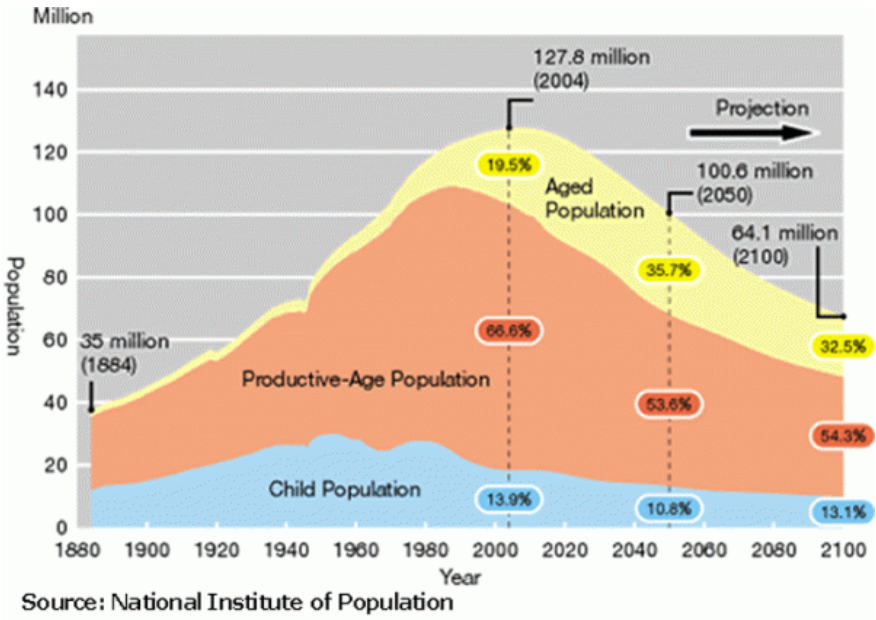
Demography

Less growth, decline, regional heterogeneity

Example national: Japan. Regional variation: France (social exclusion)

LUTI: from growth to decline
Sunk costs
Behaviour: not symmetric (e.g. income: Dargay, 2001; Wadud, 2014)



Dargay, J. M. 2001. The effect of income on car ownership: evidence of asymmetry. Transportation Research Part A 35(9): 807–821.

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<u>ICTs impact on activity patterns (working, changing shopping behaviour, e-learning)</u>

- **Substitution, complementarity, fragmentation**
- **Results in past applicable to future, in case of 'much better ICT'?**
- **Maybe dichotomy: social activities – proximity, other modes than car; utilitarian trips: more substitution ICT**
- **ICT to reduce social exclusion?**

- **Less traditional shops? Inner city dynamics? ‘Shops’ for information, advise, ‘seeing and feeling’. Buying: online. Then: no need to transport goods – less car use? Less impact of car accessibility on locations of shops?**
- **<u>LUTI:</u> too uncertain? What-if at best …**

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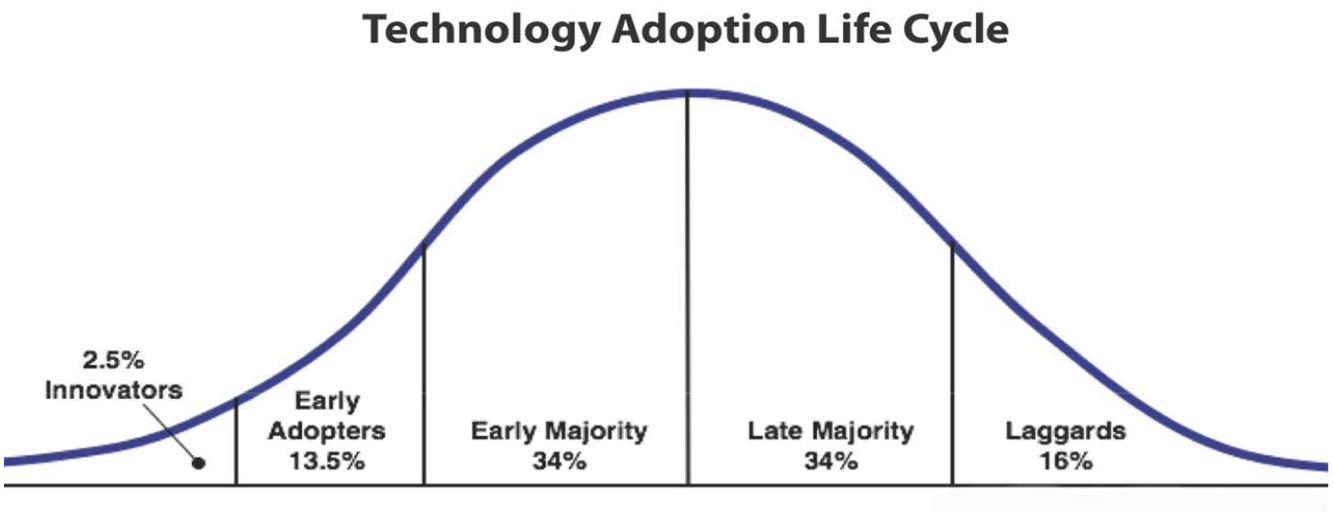
Electric mobility

- E-bikes, E-cars
- Range (bikes: +, cars -)
- Difference in consumers –
  early adopters versus others


Technology Adoption Life Cycle
2.5%
Innovators
Early
Adopters
13.5%
Early Majority
34%
Late Majority
34%
Laggards
16%

Electric mobility (continued)

- **Mode choice / substitution**
- **Generation**
- **Policies (e.g. restrictions, or separate lanes)**

LUTI: area specific?

Revival bicycle

Los Angeles, New York, Davis, Boulder, Paris, Lille, Germany, …. (Pucher and Bueler, 2012; new book forthcoming)

- **Proximity**
- **Quality of urban environment**
- **Indirect effect: policies – reallocation of space**

LUTI: short distances, active modes/cycling

Pucher,J., Buehler,R., (Ed.) 2012. CityCycling. MITPress, Cambridge/London.

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Autonomous Vehicles

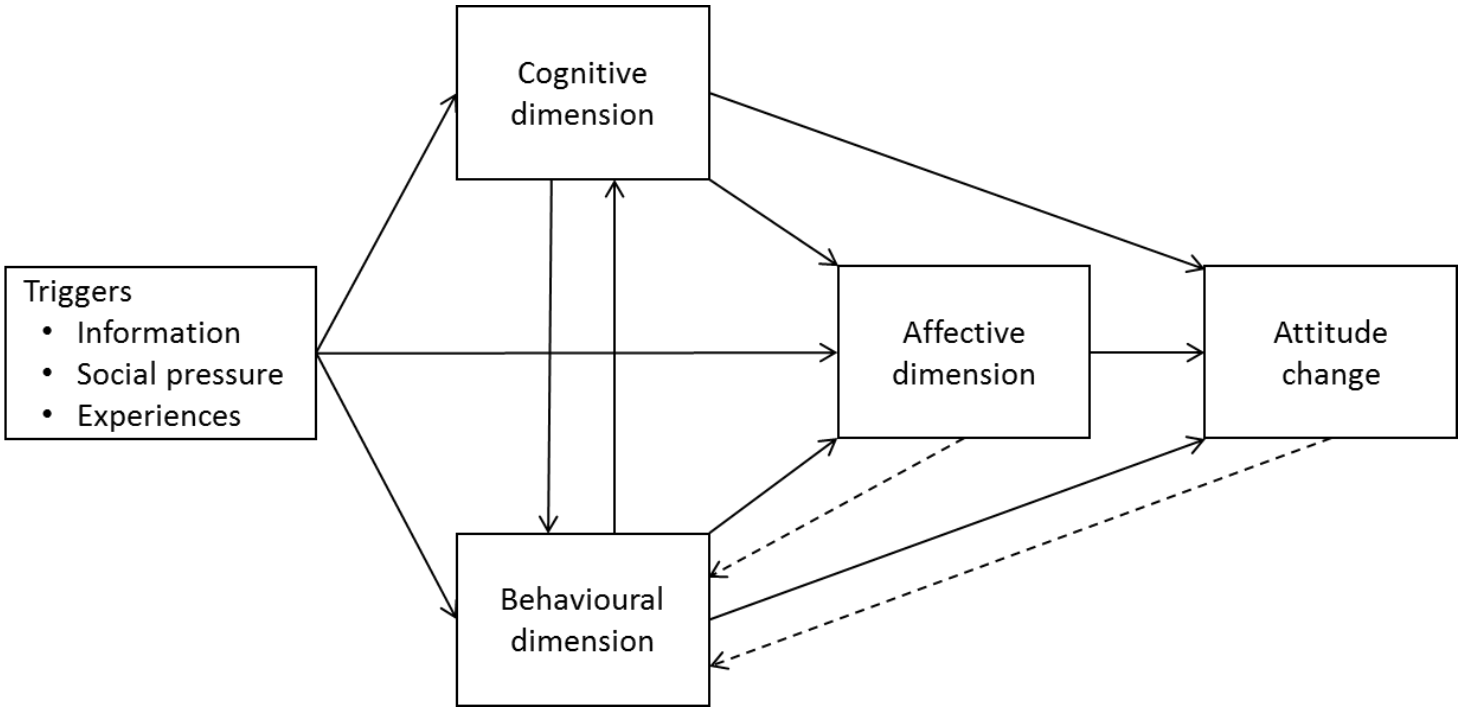
- Spatial implications, area specific. Highly uncertain (Milakis et al., 2018)
- More car orientend: increasing importance roads on land use?
- Travel time counts less: less impact roads on land use

Again: unclear. What-if

Milakis, D., M. Kroesen, B. van Wee (2018), Implications of automated vehicles for accessibility and location choices: Evidence from an expert-based experiment. Journal of Transport Geography 68 142-148

COVID19

- Long enough to change habitual behviour (Prof Hayashi)
- Attitude changes (Van Wee et al., 2019)
- LUTI models: very uncertain. What-if



Van Wee, B., De Vos, J., Maat, K. (2019), Impacts of the built environment and travel behaviour on attitudes: Theories underpinning the reverse causality hypothesis. Journal of Transport Geography 80,102540

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4. Policy relevance

- Redevelopment urban areas – interaction LU-T
- Implications of population decline. Market or interventions? Which interventions? Other destinations for offices? Which offices, where?
- Equity – social exclusion
- Infrastructure policies: are extensions ‘no regret’?
- Closures of PT (lines, stations / stops). Interventions or not? Which?

- Interaction between questions / topics

What do clients of LUTI model applications want and need?

- What?
- Which form (video, presentation, report, …)?
- Individual, group presentation, discussions, …?

- Important to understand – multi stakeholder decision making

How to deal with uncertainty

- External (economy, demograph, technology, …): scenarios
- Model structure: limited but relevant. See debates residential self-selection (Cao, Moktharian, Heinen, ..)
- Mathematical formula (linear, S-shaped, convex, ….) limited?
- Data/coefficients: large! Limited options for transerability fo models

My idea (changed): modellers explore many options, but communicate only under which conditions major policy implications would be different

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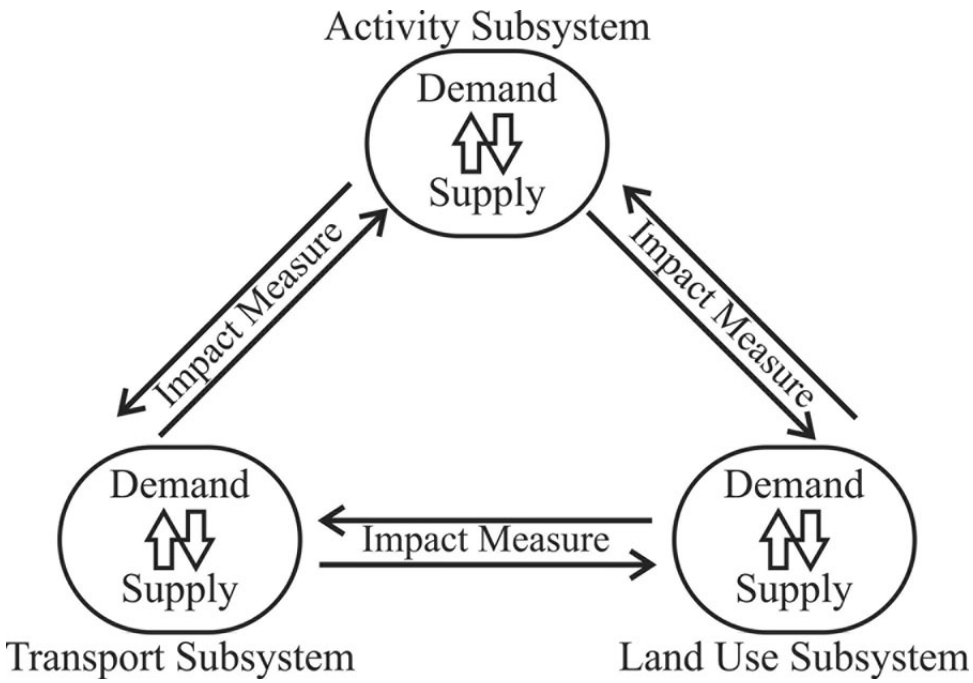
5. Summary of implications for LUTI models

- <u>What-if calculations</u>
- Accessibility indicators / how to model accessibility for which research or policy question?
- The role of key actors
- Combining LUTI and Expert Judgement
- Output, visualization

Other challenges LUTI models: conceptualization land use and transport interaction



Lopes, A.S., Loureiro, C.F.G., Van Wee, B. (2019), LUTI operational models review based on the proposition of an a priori ALUTI conceptual model. Transport Reviews 39(2) 204-225

- **Maybe combine land use, transport, activity based modelling?**
- **Conceptually attractive**
- **Progress in ABM far enough?**
- **Data problems will be reduced, other barriers exist**

Thank you!