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Microsimulation of travel demand: A view ahead

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Why bother ?

Short term:

- Interaction between activity choice and network performance, or information about network performance (timing, execution and number of activities)

Long term:

- Path dependency in long-term choices, home and work location; mobility tool ownership
- Interaction between mental maps and choices, in particular for activity execution

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Past implementations

- Zumkeller
- ORIENT/RV

- Dutch National Model and variants
- Portland and variants

- Microsimulation plus (Transims, Nagel et al.)

- Eindhoven
- ILUTE

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Background: Past implementations

- Zumkeller's models from the late 1970's

- ORIENT/RV (Axhausen; late 80's):
  - Sample of observed persons and their activity chains
  - Description of choice sets as a function of previous choices
  - Too simple choice models for destination, mode and parking type & location choice
  - Mesoscopic traffic flow simulation
  - Real time interactions (flow, route choice, parking)
  - Mental map, but no learning

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Background: Past implementations

Sample enumeration of choice models:

- Dutch National Model and others in that tradition
- Portland and variants

- H. Gunn, A. Daly, M. Bradley, J. Bowman, Y. Shiftan and others

- Choice of activity pattern (number, purpose, secondary activities)
- Choice of destination, mode at trip/tour level
- Linkage with aggregate assignment

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Background: Past implementations

Work in Eindhoven:

- Albatross, Amadeus etc.
- Rule- and choice based microsimulations
- First direct scheduling models (Joh)

ILUTE (Miller et al.)

- Linkage to housing market
- Linkage to mobility tool ownership
- Scheduling models

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Background: Past implementations

Microsimulations plus:

- TRANSIMS:
  - Iterative process to find the matching distribution of activity programmes
  - Location and binary mode choice

- Nagel and collaborators:
  - „Learning“ as choice set formation
  - Four stage process or
  - Direct models of activity chain formation (Charypar)

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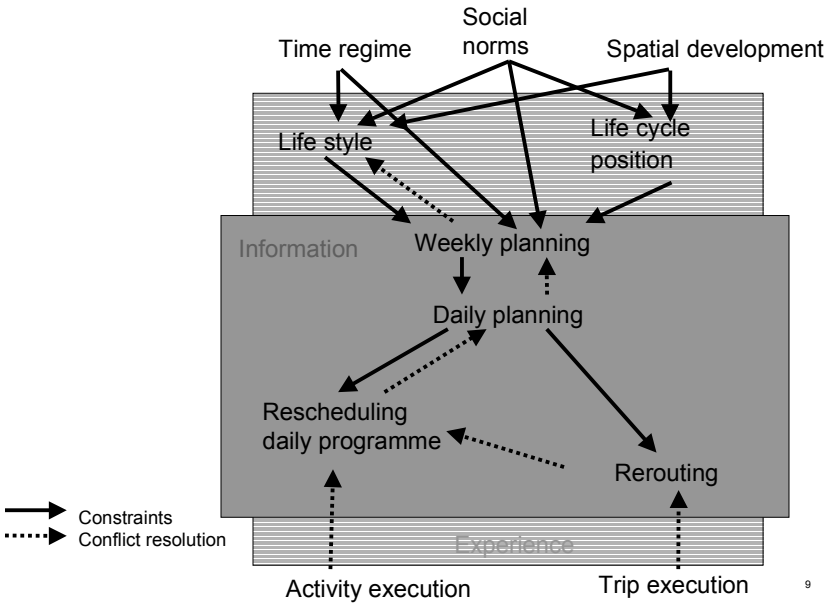
Current programme: Eurotopp



Axhausen et al., 1991

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Problems with past implementations

- Aim at steady state or equilibrium
- No proper consideration of prior mental maps
- Linkages between short- and long-term decisions often weak or missing
- Mostly four-step re-implementation
- Static choice of activity programmes (weak inclusive terms from trip performance)

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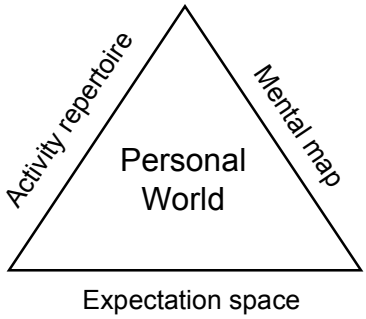
Terminology



Activity repertoire:	Known activities (what, what for, with whom, what minimum or maximum duration, how expensive)
Mental map:	Known locations (where, which activity, generalised costs of travel by time-of-day and day-of-week, temporal availability)
Expectation space:	Generalisations, rules derived from the mental maps and activity repertoire for known and yet unknown locations

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Terminology

Activity calendar:	Set of activities currently considered for execution
Activity schedule:	Set of activities scheduled for execution including timing, duration, location, mode and party This scheduled set is smaller then the set of the activity calendar
Scheduling:	Creating the schedule from the calendar using the mental map as the reference
Rescheduling:	Updating the schedule using the current experience and information as the reference

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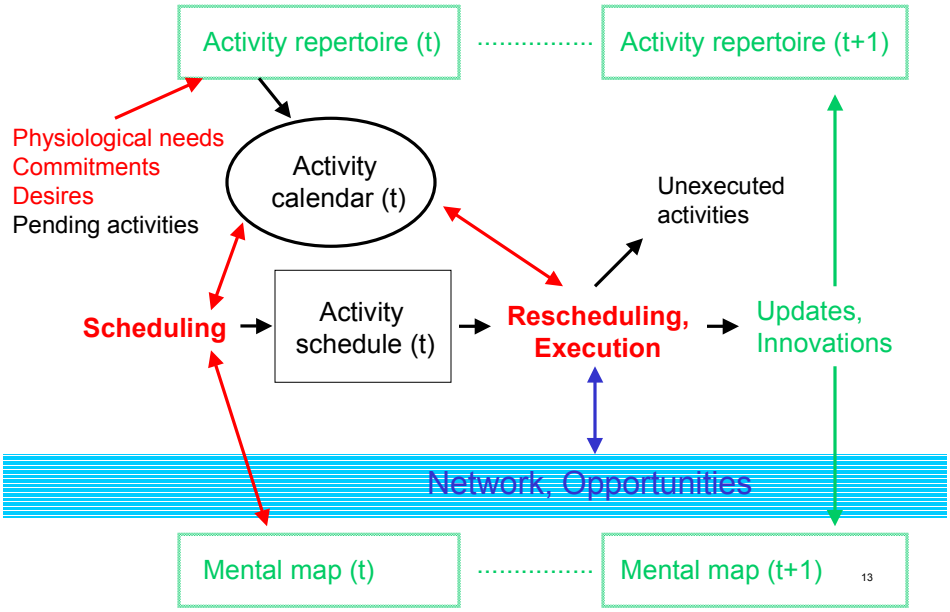
Personal daily dynamics



Issues: Initial conditions

- Generation of synthetic populations
- Generation of matching mental maps
- Generation of activity repertoires

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Issues: Network modelling

- Rerouting internal or part of rescheduling ?
- Inclusion of parking
- Inclusion of public transport and walking
- Implementation of advanced traffic control systems
- Speed of simulation; parallelisation of rerouting and rescheduling

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Issues: Activity generation

- Identification of activity patterns for physiological needs
- Identification of fixed commitments
- Competing hazard modelling of activity participation (desires)

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Issues: Scheduling

- Amount and distribution of buffer times
- Schedule delay and travel costs
- Utility functions for activity participation
- Integration of commitments and physiological needs
- Innovation (new locations, new activity types)

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Issues: Activity execution

- Impatience, inertia, rescheduling costs
- Scheduling under constraints
- (Spatial) search strategies
- Innovation (new locations, new activity types)

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Issues: Learning

- Functional forms of the learning models
- Parameter estimation for the learning models
- Generalisations

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Further outlook

- Ageing and interaction with activity generation
- Updating of households
- Question of “projects”
- Integration of the dynamics of the systems (networks, opportunities)

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