

ALBATROSS Overview

Albatross project team

Theo Arentze (main researcher)

Harry Timmermans (project coordinator)

Frank Hofman (Ministry of Transport)

Eindhoven University of Technology

Presentation outline

- Background and objectives
- Overview of the project
- Features of the activity-based model
- System components/agents
- Conclusions
- Ongoing and future research projects

Background and Objectives

- Albatross was developed for the Dutch Ministry of Transport (1997 - ...)
- Aim 1: Explore potentials of activity-based approach to travel demand modeling
 - institutional changes
 - Household and space-time constraints
- Aim 2: Explore potentials of a rule-based model of individual activity scheduling decisions
 - Consistent with behavioral theories of decision making and problem solving

Overview of the project (1)

- Developing a prototype system
 - Activity diary data collection in limited study area (1223 households, 2 days, 1997)
 - Data cleaning tool Sylvia (TRR 1999)
 - A rule-based model of daily scheduling given schedule skeleton (TRR 2000, book 2000)
 - Comparison with comparable utility-based models (IATBR 2001)
 - Face validity tests (WCTR 2001)

Overview of the project (2)

- Operationalizing the model system
 - Spatial transferability study (TRB 2002)
 - Generating schedule skeletons
 - Population synthesis (ETC 2002)
 - Stated adaptation choice experiment and model (TRB 2003)
 - Re-induction and upscaling to national level, costs variables (TRB 2003)

Overview of the project (3)

- In near future
 - Full scale applications of the model

Technique development studies

- Algorithms for extracting rules from data (GeoSys 2001, GA 2001)
- A co-evolutionary algorithm for predicting linked decisions (TRR 2001)
- String alignment methods for measuring model's goodness-of-fit (Joh: E&Pa 2001, GA 2001, TR-B 2002)
- Impact measurement of condition variables in rule-based systems (GA 2002)

Features of the Albatross Model (1)

- Choice facets modeled
 - What
 - With whom
 - How long
 - When
 - Where
 - Transport mode
 - Trip chaining

Features of the Albatross Model (2)

- A household-day is the unit of analysis
 - Interactions between individuals within households
 - Daily basis
- Takes a full set of constraints into account
 - Household constraints
 - Space-time constraints
 - Institutional constraints
 - Situational constraints

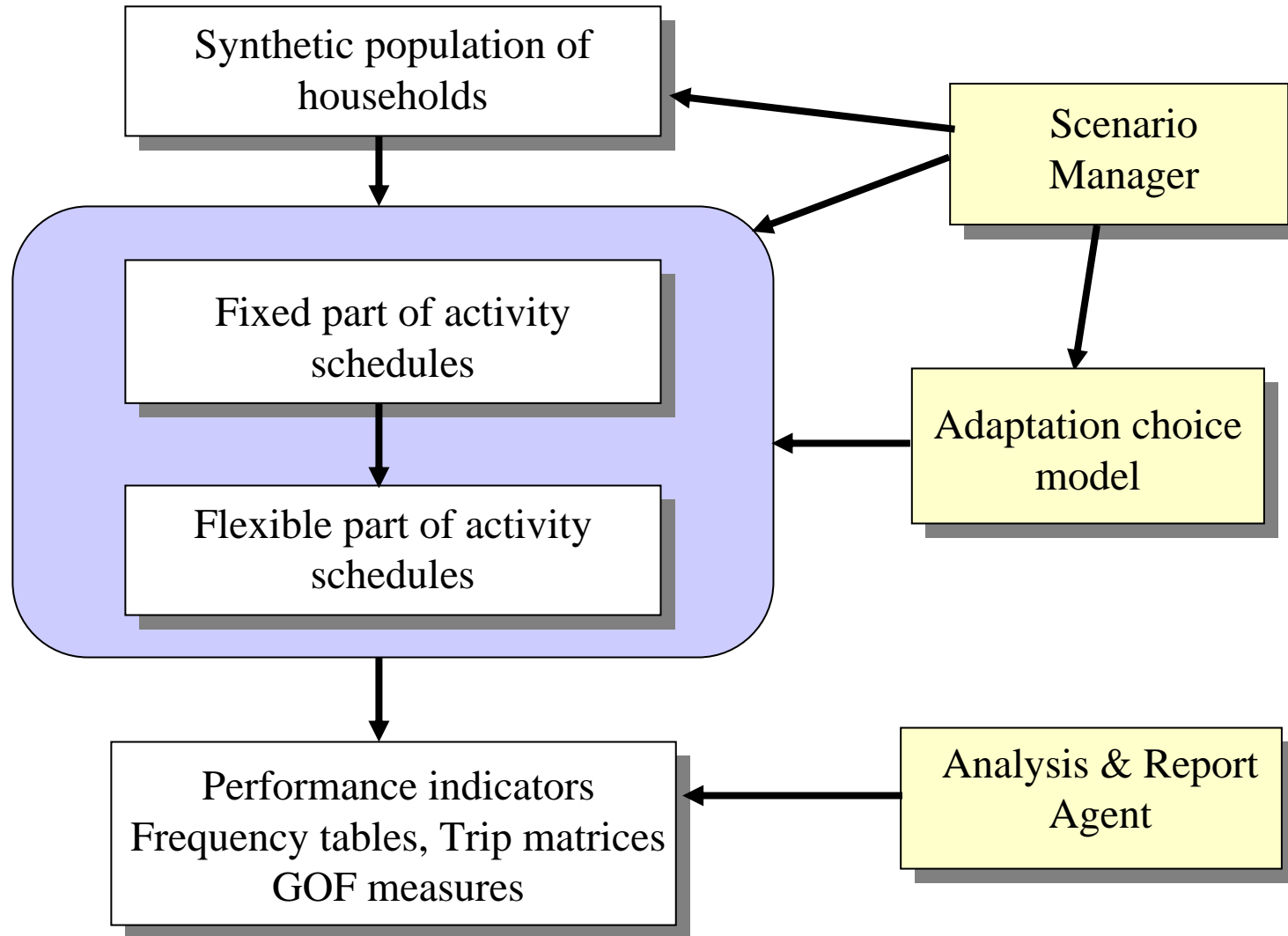
Features of the Albatross Model (3)

- Uses a detailed classification of activities
 - Paid work
 - Voluntary work
 - Bring/get persons
 - Other non-leisure fixed
 - Daily shopping
 - Non-daily shopping
 - Service related
 - Social activities
 - Leisure activities
 - Sleep

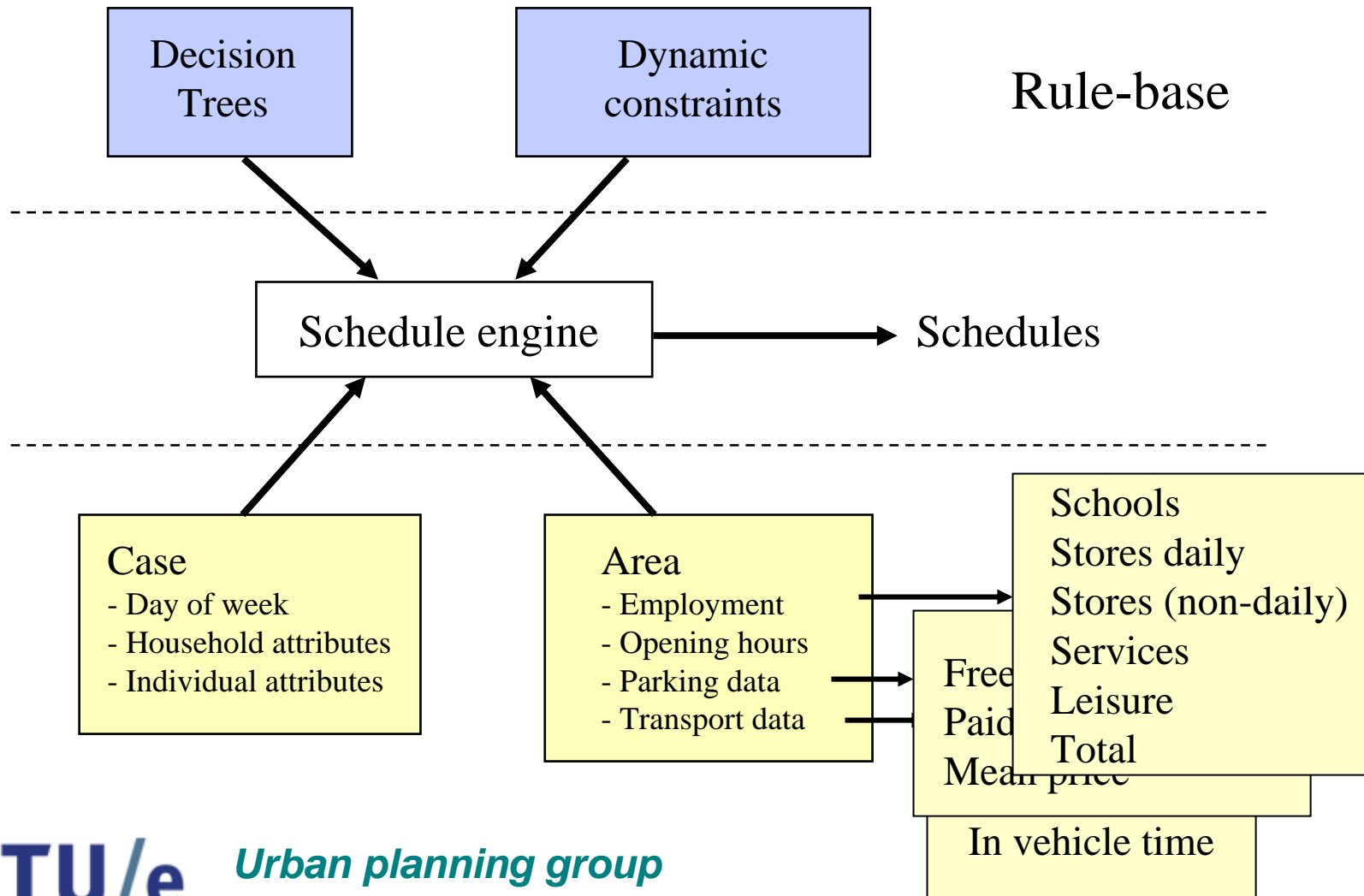
Features of the Albatross Model (4)

- In-home activities are largely undifferentiated
- Start time and duration for fixed activities are predicted on a continuous time scale

ALBATROSS model system



The Scheduler



Population Synthesis (1)

- Social demographics
 - Household marital and work status (5 levels)
 - Socio-economic class (4 levels)
 - Youngest child (4 levels)
 - Oldest age (4 levels)
 - N cars
 - Person gender
 - Person work status (3 levels)
 - Person car driver (2 levels)

Population Synthesis (2)

- Data sources
 - Demographic data per zone
 - Household sample data
- Iterative Proportional Fitting of a multiway attribute table (552,960 cells)
 - From individuals to households
 - Fitting cell proportions
- A region x urban-density segmentation of the sample

Adaptation Choice (1)

- How do people respond to transport/land-use policy measures?
- A primary response changes basic facets of the activity-travel pattern
- A secondary response re-schedules activities/trips

Adaptation Choice (2)

- Stated adaptation experiment and model estimation for predicting a primary response
- The same Albatross model for predicting the schedule implications
- The integrated process
 1. Predict schedule skeleton
 2. Predict and implement primary response
 3. Proceed scheduling

Conclusions

- Albatross is the first operational rule-based model of activity scheduling and one of the most comprehensive of its kind
- Albatross is now applicable on a national scale
- Empirical tests so far are promising
 - Relative performance
 - Spatial transferability
 - Face validity

Ongoing and Future Research

- Disentangling short-term and longer-term activity scheduling and household decisions
- Schedule implementation and adaptation
- Extending the time unit from a day to a week, month, etc.
- Integrating Albatross and a land-use model