

A lighthouse on a rocky island at night. The lighthouse is illuminated from within, casting a warm glow. The sky is dark with some light flares, and the water is dark and calm. The overall scene is atmospheric and serene.

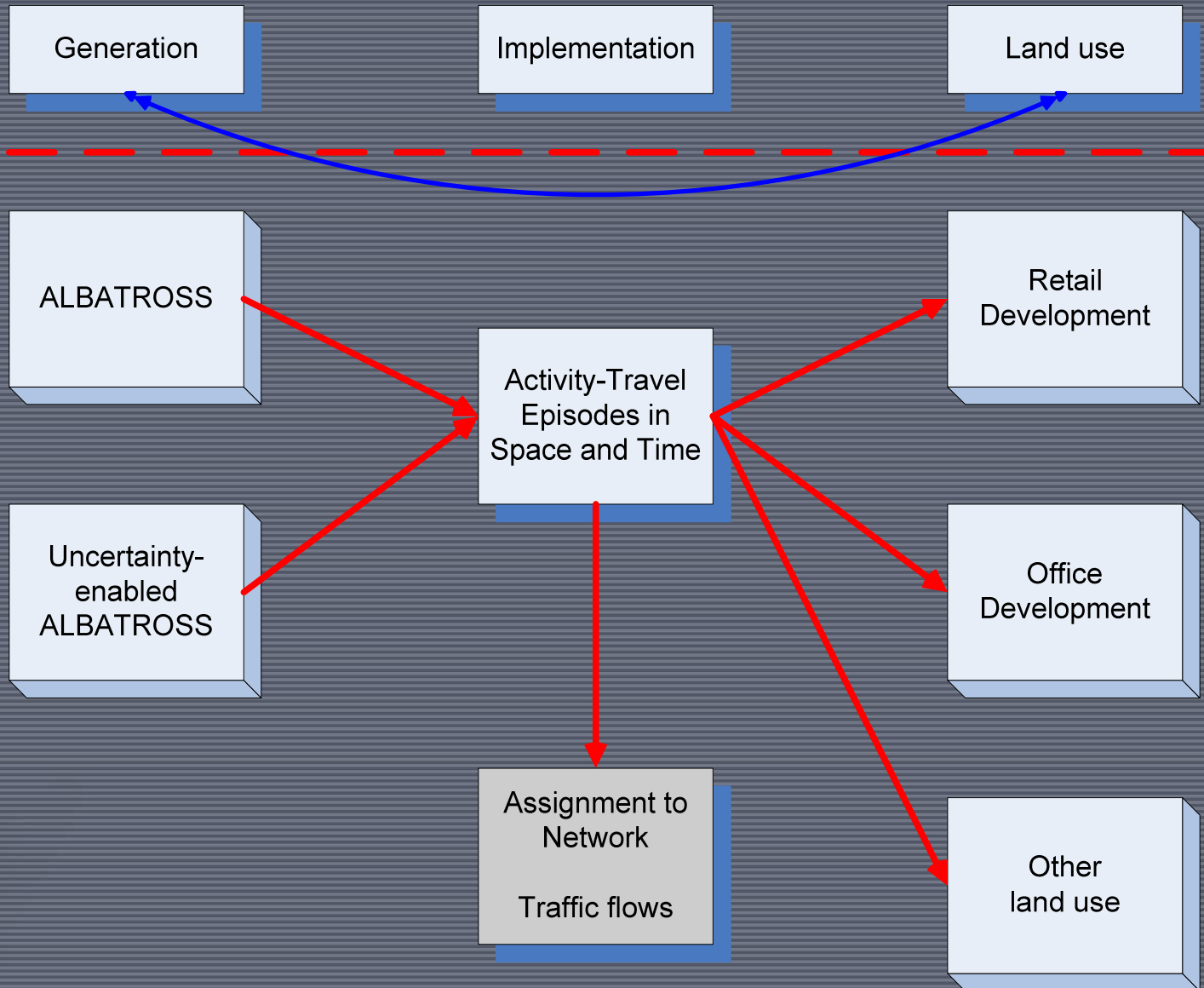
Integrating A Multi-Agent Model of Land Development and An Activity- Based Model of Transport Demand: Progress and Developments

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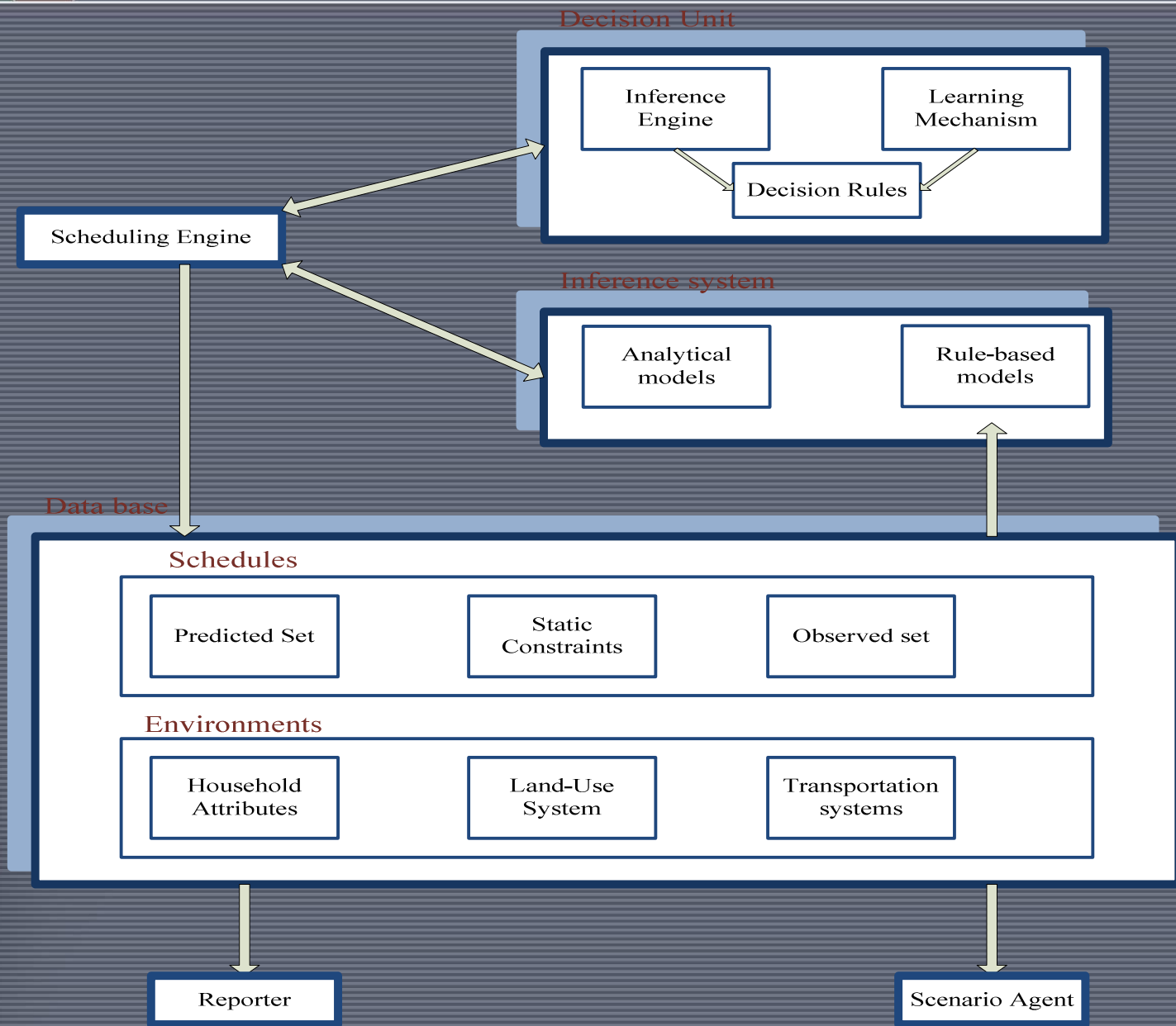
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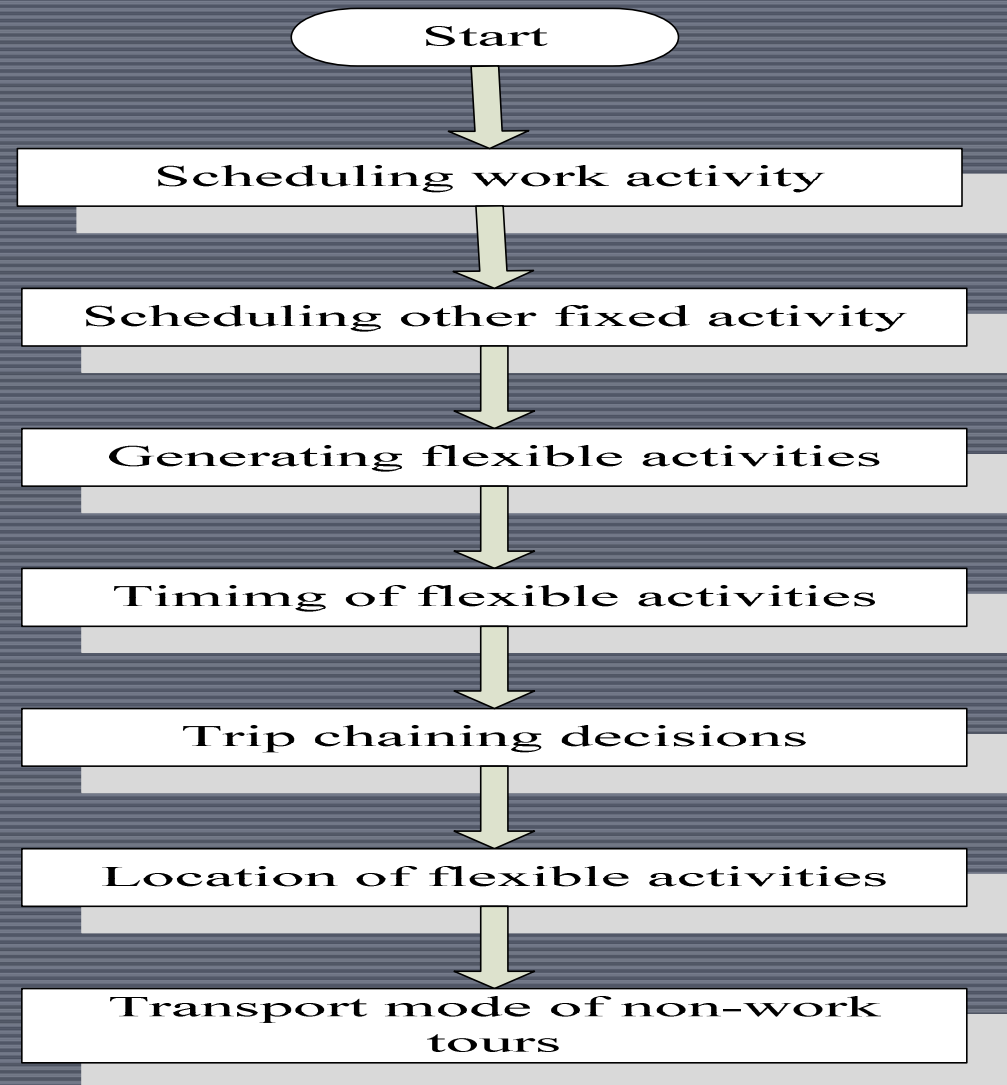
Context-Completed



Albatross and uncertainty



Albatross and uncertainty



Output ALBATROSS

- Individual space-time trajectories
(+ uncertainty estimates)
- Which activities
- Are conducted where
- When and for how long
- With whom
- Transport mode(s)
- Subject to space-time, household and institutional constraints and
- Dynamic choice sets.

Network

- Simulated activity-travel patterns are aggregated into OD tables and standard assignment algorithms can be used to simulate network traffic flows
- OR
- Individuals can be allocated to network directly



Issues

- Substitute aggregate approach for agents-based decisions
- Substitute log-sum for more comprehensive location decision making process

Land development: Approach

- Agents simulating reactions to accumulated demand
- Catchment analysis

$$Q_{lh} = \Delta Q_{lg_h} + Q_{lh'}$$

$$\Delta Q_{lg} = \sum_i V_{lg}^i + V_{lg}^r + V_{lg}^c$$

Demand act locations

Demand from road

Demand from city center

Land development: Approach

$$V_{lg}^i = P_i^g P_g \sum_{l'} \pi_{lg}^i(l') N_{l'i}$$

Probabilistic demand

Prob attracting people

Number of people present

$$\pi_{lg}^i(l') = \begin{cases} \pi_g^{1,i} & \text{if } l' \in PCA_i \wedge l' \notin PC_i \\ \chi \pi_g^{1,i} & \text{if } l' \in PCA_i \wedge l' \in PC_i \wedge d(l') < d^- \\ (1 - \chi) \pi_g^{1,i} & \text{if } l' \in PCA_i \wedge l' \in PC_i \wedge d(l') > d^- \\ 0.5 \pi_g^{1,i} & \text{if } l' \in PCA_i \wedge l' \in PC_i \wedge d(l') = d^- \\ \pi_g^{2,i} & \text{if } l' \in SCA_i \\ 0 & \text{otherwise} \end{cases}$$

$$V_{lg}^{i,po} = P_i^g P_g \left(\sum_{l' \in PCA_i} \pi_g^{1,i} N_{l'i} + \sum_{l' \in SCA_i} \pi_g^{2,i} N_{l'i} \right)$$

Total demand used to quantify cannibalisation

Land development: Approach

$$S_{lh}^* = \Delta S_{lg_h}^* + S_{lh'}^*$$

$$\Delta S_{lg}^* = \sigma_g V_{lg}$$

Optimum size

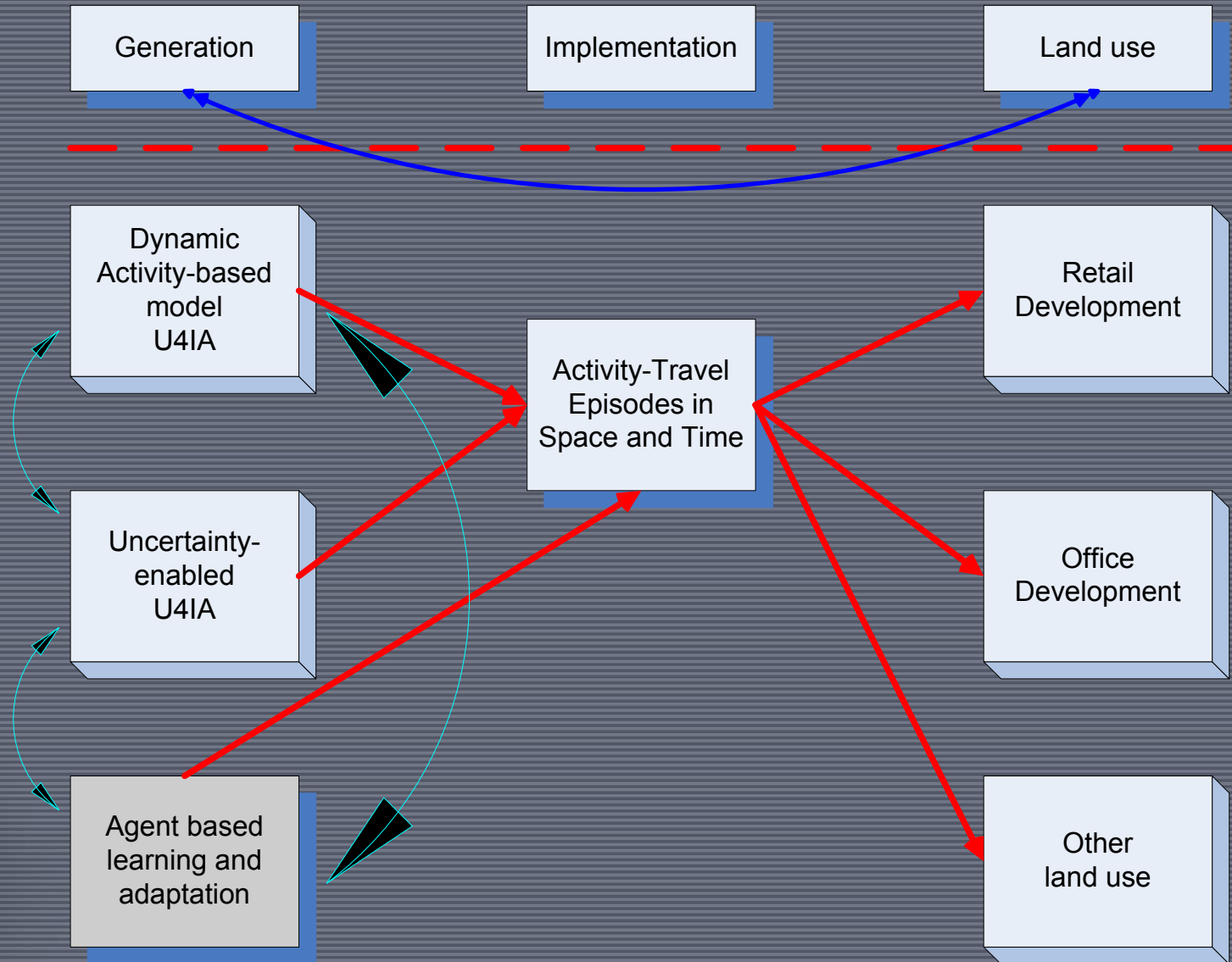
$$\Delta S_{lg}^* \geq S_g^-$$

Feasibility



- From static to dynamic travel demand generation
- From equilibrium to learning and adaptation

Context-Ongoing work



Statements

1. route choice should be another integrated with other choice facets of the activity-travel schedule
2. principle of equilibrium should be replaced by individual learning, adaptation and habits, based on incomplete and imperfect information
3. decision making under conditions of uncertainty and corresponding beliefs should become the standard
4. locations decisions of land use should be modelled in a considerably more comprehensive manner

A lighthouse on a cliff at night with a house and the ocean. The lighthouse is illuminated, and its light is visible. The house has several lit windows. The ocean is dark and calm. The sky is dark with some light clouds.

THANK YOU

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