The **ILUTE-TLUMIP** Linkage:
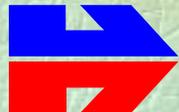## Questions Arising

JD Hunt

Third Oregon Symposium on
Integrated Land Use and Transport Models

Portland OR, USA
23-25 July 2002

Joint Program in
Transportation
University of Toronto

UNIVERSITY OF
CALGARY

Outline

Describe Questions Arising From Practical Development Work and Pursued in ILUTE Research

- Introduction

- Questions Arising

- Conclusions

Introduction
Context

- Oregon TLUMIP:
  - practical implementation, practical focus
  - work gives rise to issues - to 'questions'
  - cannot pursue these questions in practical implementation

- ILUTE:
  - seeking to be relevant
  - answer important questions, expand useful understanding
  - inform future practical implementations

- TLUMIP - ILUTE symbiosis
  - identify research questions arising in TLUMIP
  - explore in ILUTE
  - same people
  - with research results feeding back into practice

Issues Arising
Topic Areas

- Search Processes

- Treatment of Business Establishments

- Motivations

- Perceptions of Space

- Evolution of Sensitivities

- Public Agencies

Questions Arising
Search Processes

- Currently heavy reliance on logit choice models
  - strong assumptions
    - optimizing
    - compensatory evaluation
    - full information
  - hopefully behave 'as if'
  - computationally intensive
  - a 'hang-over' from aggregate modelling

- Proposing rule-based search instead
  - limited set of alternatives
  - satisficing
  - elimination-by-attribute
  - reduced calculations

Questions Arising
Search Processes

- Questions:
    - extent ongoing searches rather than discrete choices at fixed intervals?
    - method for identifying options?   imitate and adjust?
    - extent non-compensating evaluation used?
    - roles of time and money budgets?

    - results more accurate?
    - get 'unanticipated' emergent aggregate behaviour?

- Some of this considered previously, now a new relevance

Questions Arising
## Business Establishments

- Currently aggregate representation of economic production and consumption apart from households and space
    - misses out on benefits of micro-simulation

- Exploring micro-simulation treatment
    - agents are 'business establishments' (BEs)
    - some analogies to treatment of households
        - 'firmographics' like 'demographics'
        - utility-based location choice
        - variation in technical coefficients
    - some components like current aggregate treatment
        - production utilities, with buying and selling utility components
        - exchange zones with aggregate supply and demand responses
    - proto-BEs for testing new ideas

Questions Arising
## Business Establishments

- Questions:
    - motivations for 'firmographic' transitions?   any relevant constraints?
    - distribution of technical coefficients among BEs?
    - sources of relevant data?   handling small heterogeneous population?
    - potential for micro-simulation of markets?   aggregation of bids?

    - get reasonable development patterns emerging?
    - benefits justify effort?

- Some of this considered extensively previously; some not

Questions Arising
Motivations

- Currently no motivations apart from indirect utility maximization

- Motivations underlying activity patterns like activity patterns underlying trips

- Questions:
    - Maslow's hierarchy or extensions form a basis?
    - any relevant budgets? any diminishing marginal returns? any functional absence?
    - triggers for certain activities or 'projects' leading to activity patterns?
    - benefits justify effort?

- Area of extensive on-going consideration in Social Sciences

Source: website: http://www.connect.net/georgen/maslow.html
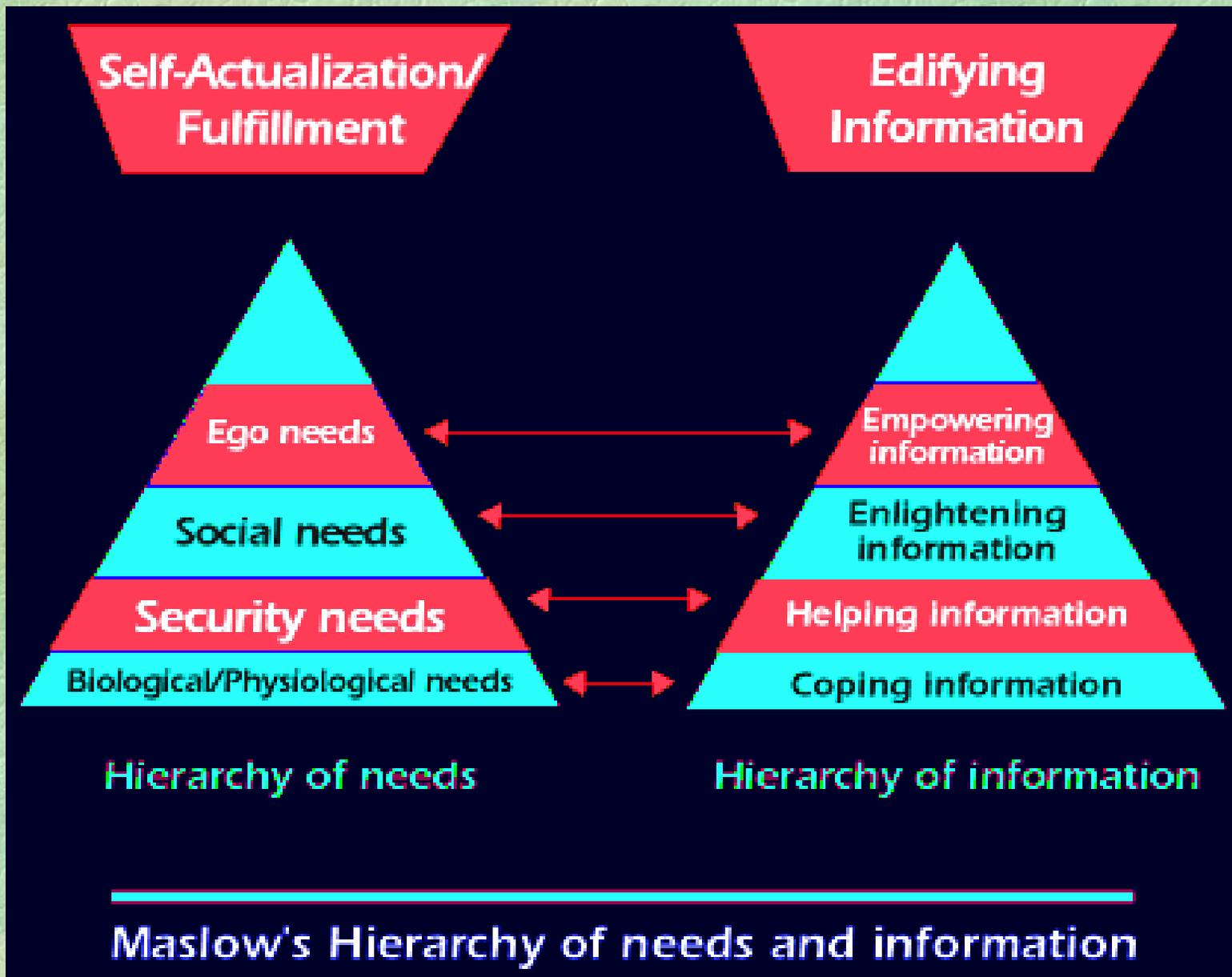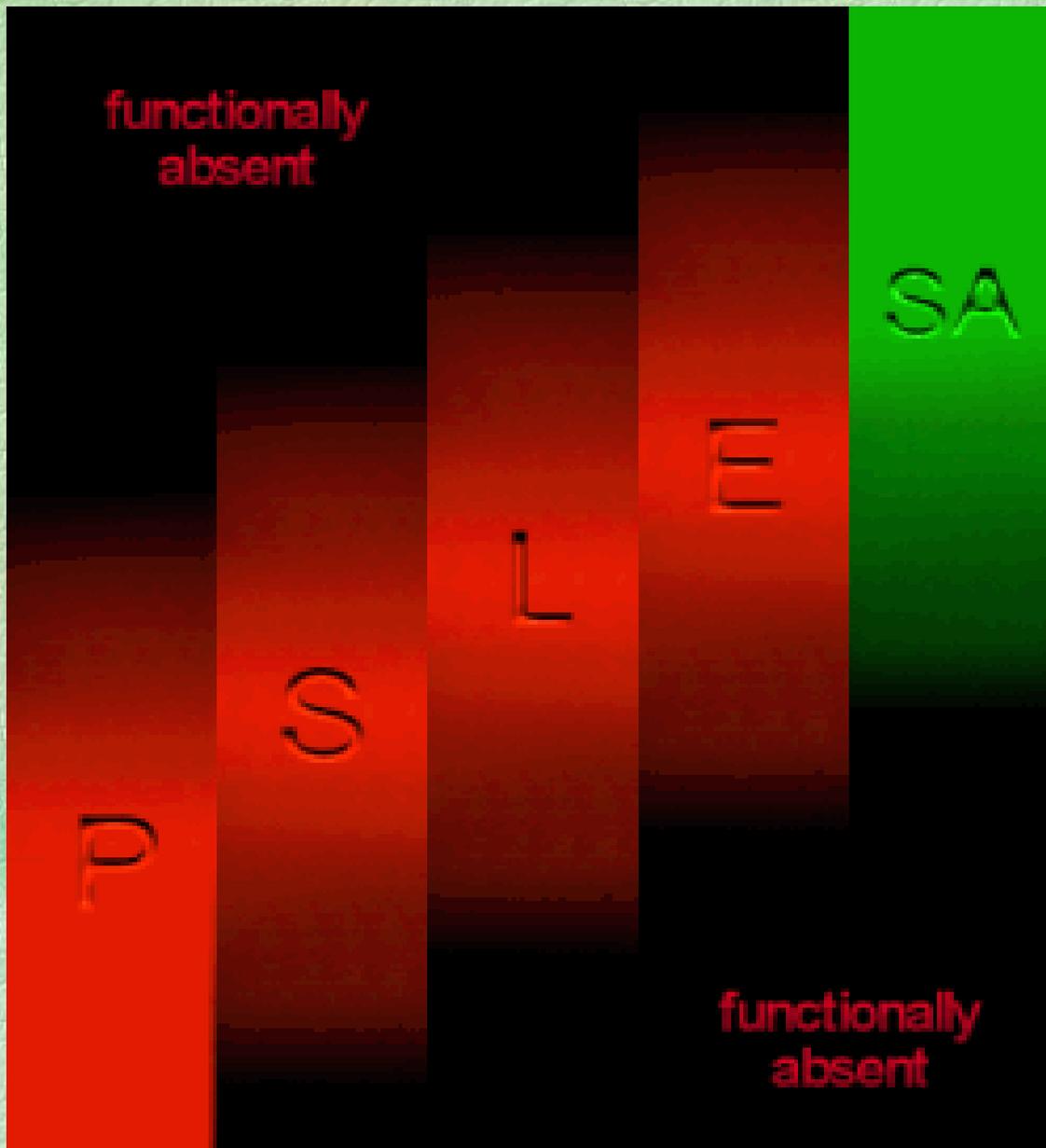
Note:

- current strongest needs dictate activities

- relevance (functional presence) of needs influenced by situation

- time cycles vary for different needs, increasing for higher levels

- motivations increase with increasing times that functionally present needs are left unsatisfied

Source: E Pettifor 1996 website: http://www.wynja.com/personality/needs.html
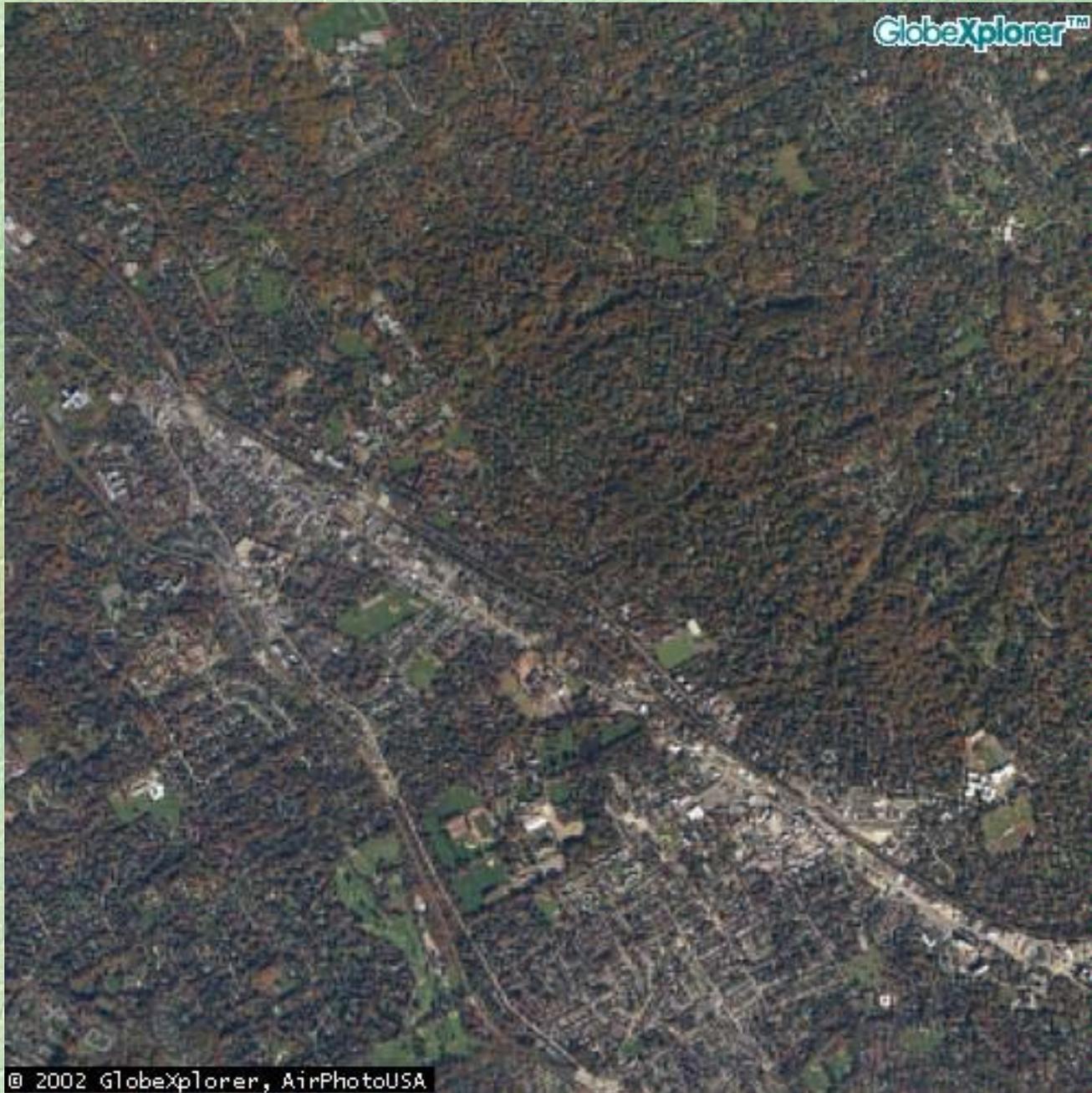
Questions Arising
Motivations

- Some work on nature of scheduling behaviour, working to conceptual model of scheduling process
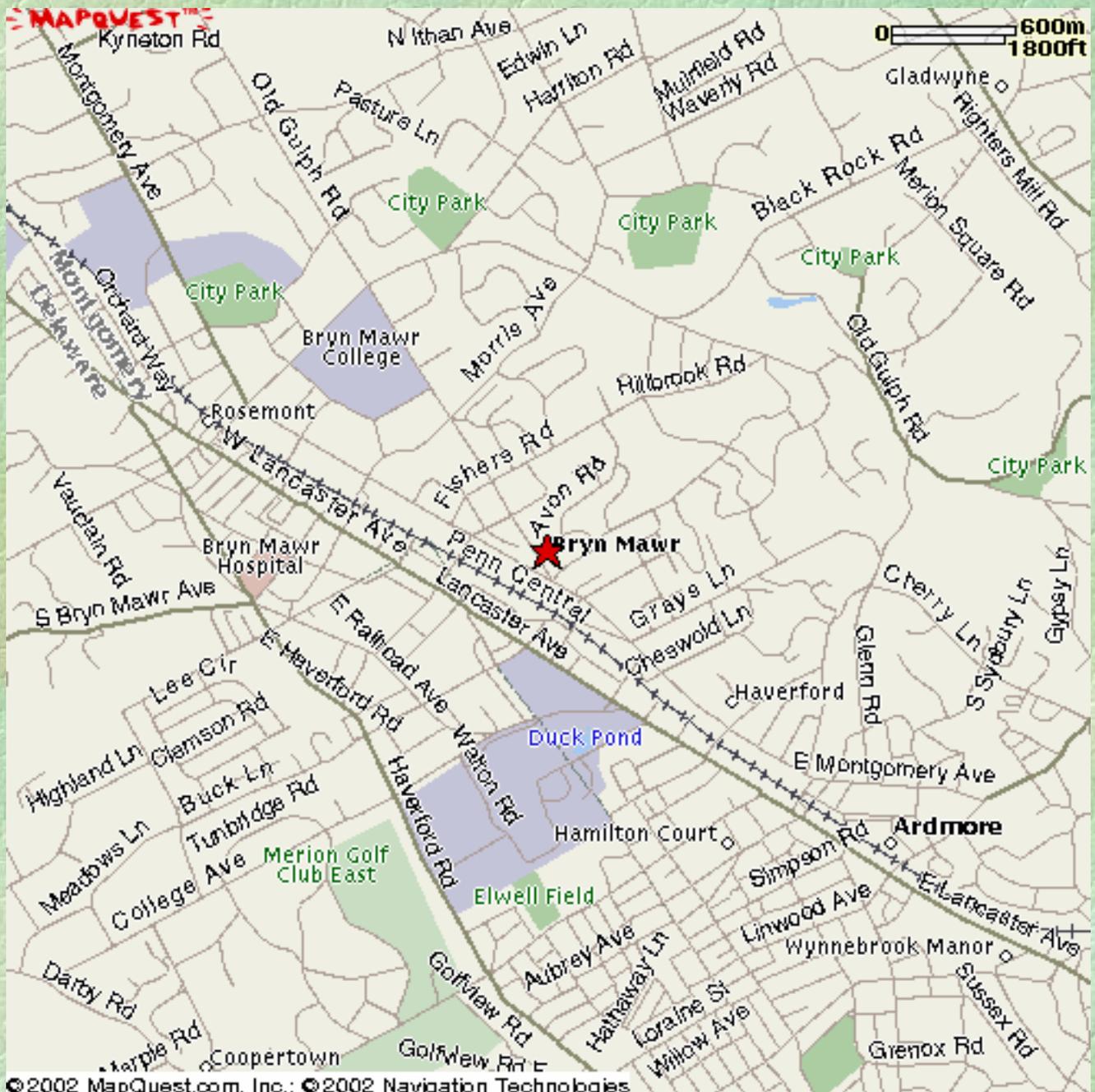
Questions Arising
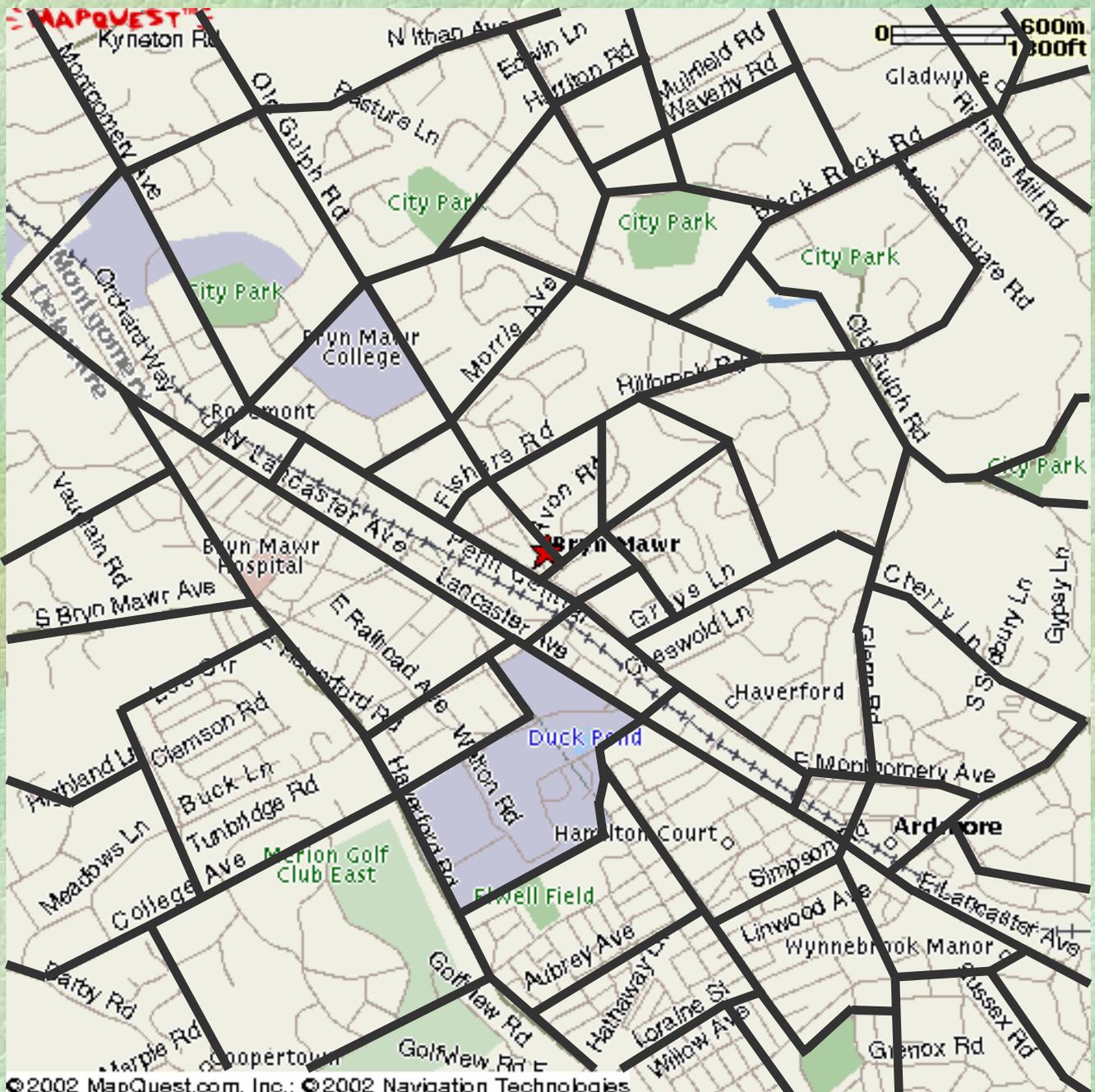## Perception of Space

- Currently locations treated as discrete zones or cells
    - logit choices among zones, with all related assumptions
    - full information assumption inappropriate
    - large computational burden

- Actual perception seem to be much more simple

- Questions:
    - nature of perception of space in different contexts?
    - how do accuracy and precision of knowledge about locations vary across space?
    - relationships between search costs and distance from relevant points of reference in different contexts?
    - distance or generalized cost used to order search through space?
    - points of reference?

Questions Arising
Perception of Space

- Some work done previously:
    - mental maps
    - mapping physical space into cognitive space

- Concerted effort appropriate
    - space a key component
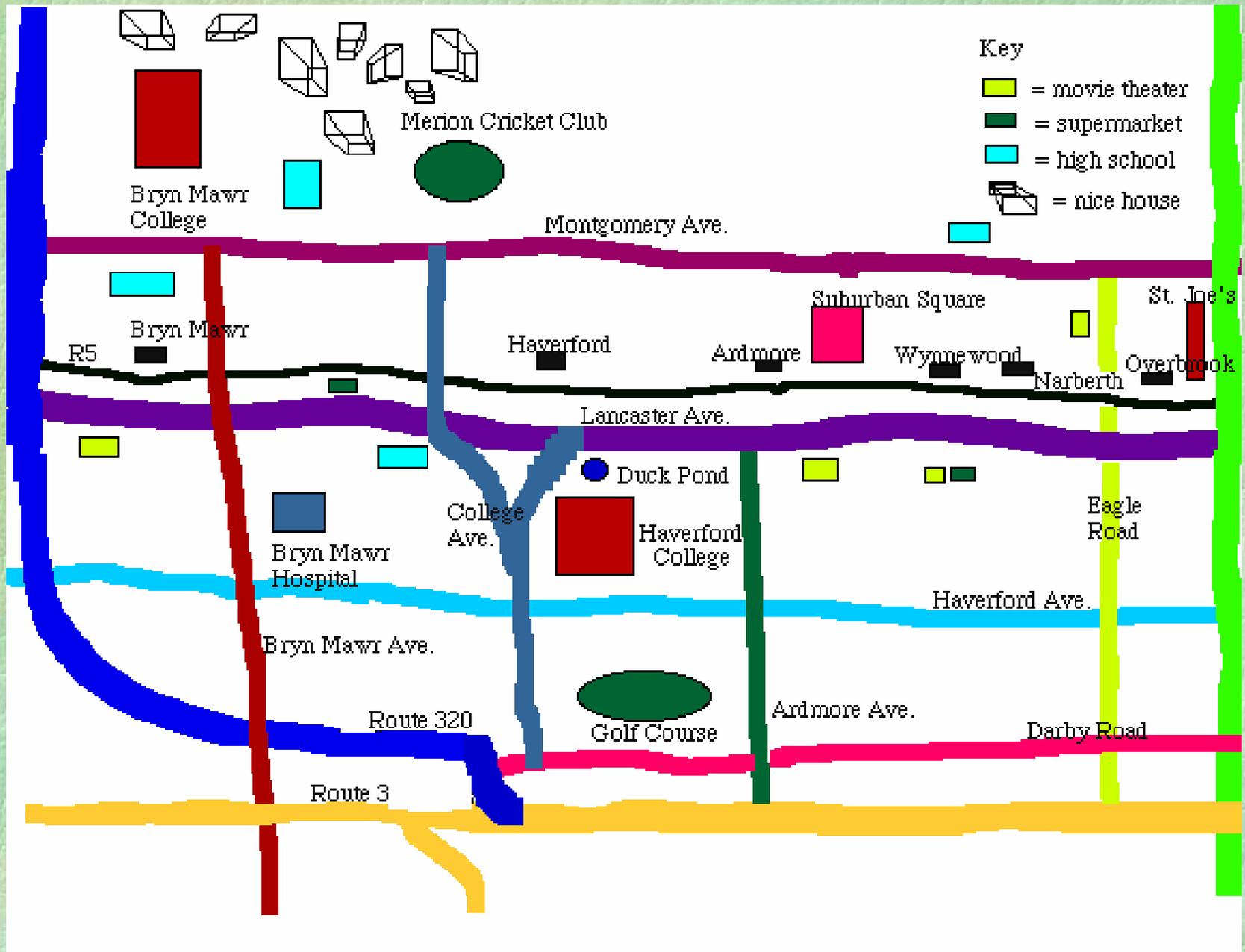   - large reductions in calculation effort

GlobeXplorer™

© 2002 GlobeXplorer, AirPhotoUSA

Key
- = movie theater
- = supermarket
- = high school
- = nice house

Merion Cricket Club

Bryn Mawr College

Montgomery Ave.

Suburban Square

St. Joe's

Bryn Mawr

R5

Haverford

Ardmore

Wynnewood

Overbrook

Narberth

Lancaster Ave.

Duck Pond

Bryn Mawr Hospital

College Ave.

Haverford College

Eagle Road

Haverford Ave.

Bryn Mawr Ave.

Route 320

Golf Course

Ardmore Ave.

Darby Road

Route 3

Source: website: http://www.brynmawr.edu/Acads/Cities/city360/lke.html

Haverford

Villanova

Bryn Mawr
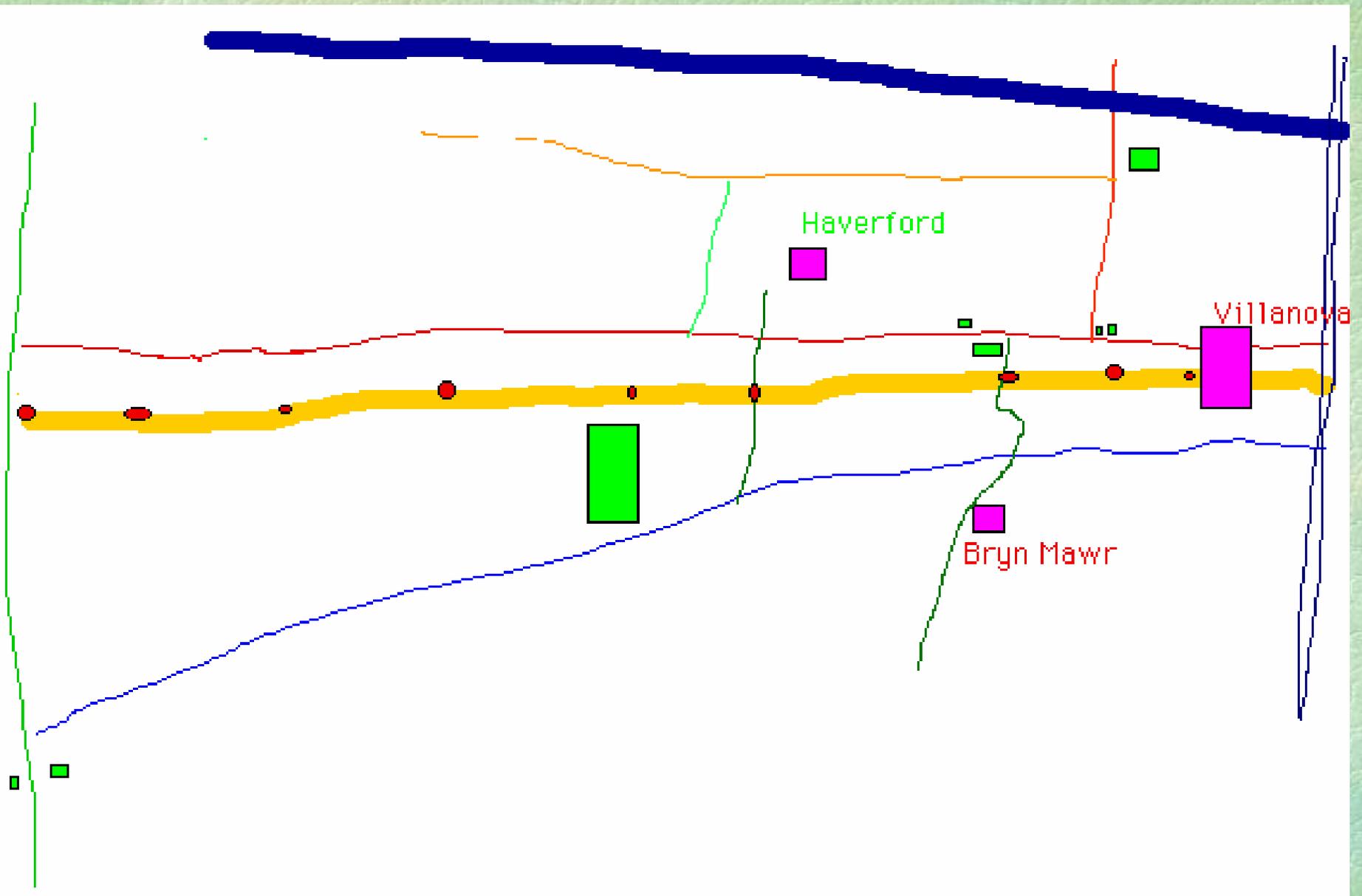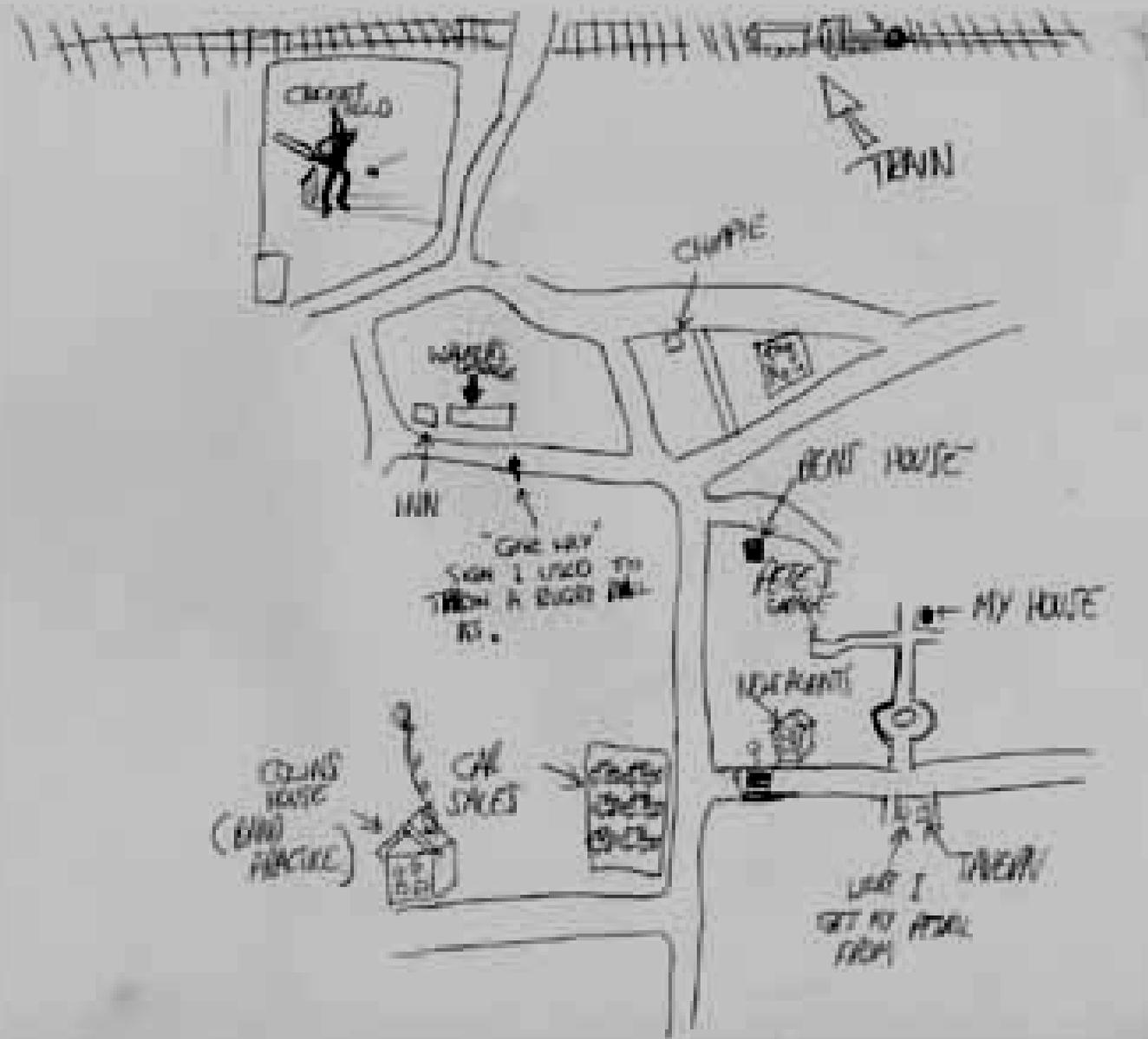
Questions Arising
Evolution of Sensitivities

- Currently utility function coefficients representing sensitivities
    - vary across agents - making them 'heterogeneous'
    - could be changed over time

- Could vary sensitivities over time, influenced by
    - exposure and experience (desensitised?)
    - advertising

- Questions:
    - nature of changes in sensitivities?
    - exposure to alternatives alter sensitivities to alternative's attributes?
    - any trends or 'drifts' to specific values over time?
    - awareness campaigns or public education impacts?

- Relatively little consideration thus far

Questions Arising
Public Agencies

- Currently all policy elements coded directly
    - policy responses to changing outputs determined off-line by analyst
    - labour intensive
    - difficult to interpret
    - potential for inconsistencies across different analysts

- Considering 'authority agent'
    - simulates policy responses according to specified rules
    - allows more general consideration, easing interpretation
    - reduces labour requirement

Questions Arising
Public Agencies

- Questions:
    - how are general policy rules specified?
    - handling of exceptions to general rules (as random component)?
    - include general and exceptions together?
    - simulation of single agent behaviour with random component appropriate?

- Almost no consideration to date
    - some call for this in TLUMIP2 or soon thereafter