CMAP ADVANCED MODELING SYMPOSIUM

August 31, 2012

10 a.m. – 4:00 p.m. CDT

At CMAP and Online

hosted by:
Chicago Metropolitan Agency for Planning
Kermit Wies

CMAP GO TO 2040

AGENDA

- 10:00 a.m. Welcome, introductions, overview
- 10:30 a.m. Agent-based freight modeling

  - *Noon - Lunch at CMAP*
  Presentation - CMAP's Highway Pricing ABM in application

- 1:00 p.m. Activity-based modeling and network microsimulation
- 2:30 p.m. Q&A
- 3:30 p.m. General ramblings

PANELISTS

- Peter Vovsha, Parsons Brinckerhoff
- Bill Woodford, Resource Systems Group
- Maren Outwater, Resource Systems Group
- Dan Beagan, Cambridge Systematics
- Mark Hickman, University of Arizona
- Hubert Ley, Argonne National Laboratory
- Hani Mahmassani, Northwestern University
- Kermit Wies, CMAP, *moderator*

WHY ARE WE HERE?

- 2008-2010 Symposium, Cadre, Strategic Plan
- 2011-2012 Freight Mesoscale
  Highway Pricing
  Transit Modernization

  - Today's Symposium

- 2013-2014 Freight Macroscale
  Dynamic Traffic Assignment

Freight Macroscale

- **White paper: An Agent-based Computational Economic (ACE) extension to CMAP's Mesoscale Freight Model**

  - Analysis framework
  - Defining the agents
  - Mapping the game
  - A manageable direction

Agent-based Freight: Analysis Framework

- Input-Output versus ACE
- Procurement: carrying baggage through a maze
  - Habitual Baggage
  - Cultural Baggage
  - Constitutional Maze
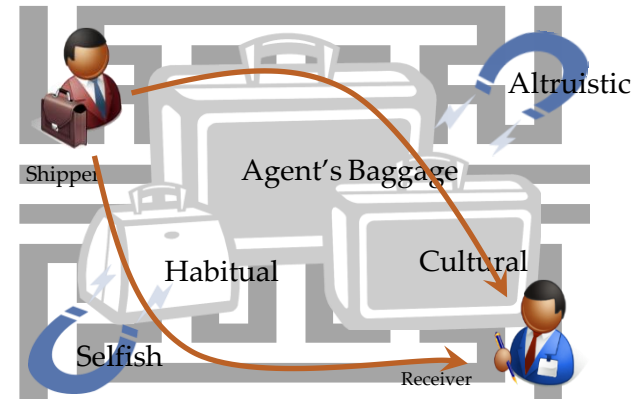
Agent-based Freight: Defining the agents

- Human cogs in the supply chain
  - Baggage is a metaphor for learning
- Work on behalf of their employer
  - Follow rules
  - Make decisions in interest of the company
- Are also human
  - Don't have perfect information
  - Make mistakes
  - Might be lazy, distracted, sick, etc.

Agent-based Freight: Mapping the game

- Define pseudo-scripts (i.e. roles)
- Assign baggage
- Inventory procurements
- Tilt the maze

AGENT-BASED FREIGHT: A MANAGEABLE DIRECTION

- ***Analysis Framework***
  - Is the agent-based computational economic approach appropriate?
- ***Defining the agents***
  - How should we assign agent roles?
- ***Mapping the game***
  - How can individual agents be assigned an initial set of baggage?

TIME FOR LUNCH!

- Presentation:
  CMAP's Highway Pricing ABM in application

Activity-based modeling and network microsimulation

- White Paper: **Regional network microsimulation, level-of-service metrics and activity-based demand modeling**

  - Analysis framework
  - Defining the agents
  - Mapping the game
  - A manageable direction

Activity-based modeling and network microsimulation:
Analysis framework

- Carry ABM trip rosters along with DTA agents
- En route comparison of plan with experience
- On-the-fly reaction
- Contextual learning

DEFINING THE AGENTS

- Agents:
  - Plan
  - Move
  - React
  - Learn

ACTIVITY-BASED MODELING AND NETWORK MICROSIMULATION: MAPPING THE GAME

- Agents react to conditions *en route* by
  - Altering their routes
  - re-planning their tours
- May include activity compression or mode changes
- Once *enroute*, uncertainty is more prevalent
- Reactions gel as learning which affects choice.

A MANAGEABLE DIRECTION

- ***En route choices***
  - What information (attributes of demand) can be carried forward from ABM to enrich network path choice?
  - What are other plausible determinants of path choice?
  - Can network microsimulation incorporate multi-modal path choices?
- ***En route knowledge***
  - Can skim matrices be eliminated from conventional choice models?
  - What information can from DTA can be assimilated into choice?
  - Can DTA suggest demand not present in surveys?

QUESTIONS FROM WEBINAR

- **Transit Modernization:**
  - How do you know which transit paths to have in the choice set?

  - How was the data for the pedestrian environment factor collected?

- **Freight:**
  - The freight model workflow (with the exception of assignment) seems a lot like a PECAS model. Has CMAP considered implementing PECAS to enhance its freight analysis?

General Ramblings

- Future opportunities to work with CMAP
- Research underway we should know about
- Collaborations with other agencies

THANKS FOR SHARING THE DAY AT CMAP!