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DASH: The Portland Region's Next-Generation Activity-Based Model

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DASH: *D*ynamic *A*ctivity *S*imulator for *H*ouseholds

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DASH *is the next generation activity based model being developed for the Research Center. This model will be used extensively in estimating the travel response by individuals to policies and infrastructure investments. Includes enhanced consideration of:*

- *Socio-economic roles of individuals*
- *Temporal dynamics*
- *Intra-household dependencies*

DASH: Development Team

- Consultant: Resource Systems Group (RSG)

  Dr. John Gliebe

- Metro Research Center Project Leads

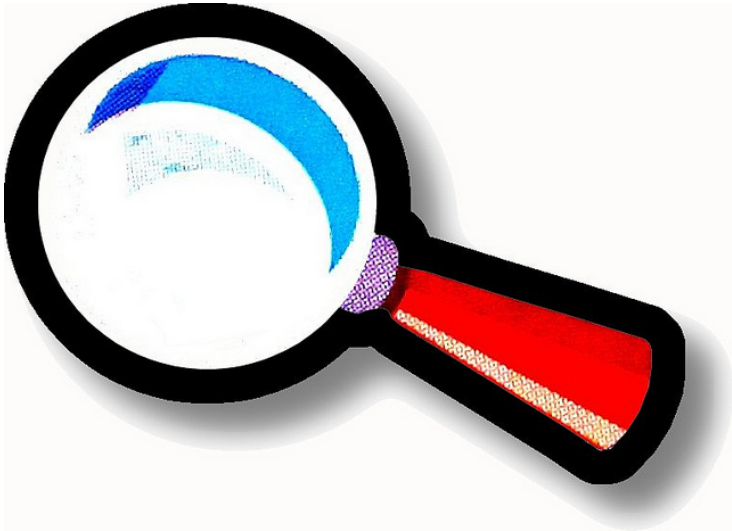
  Richard Walker

  Cindy Pederson

  Bud Reiff

DASH: Discussion Outline

- Issues motivating the design
- Key elements
- Framework
- Status



DASH: Designed to Better Address Policy Issues

- VMT reduction
  - Better identifies if/how travelers would react to policies/investments (e.g., modal options, time constraints, household obligations)
- Toll assessment
  - Travelers have roles – unique VOT. Leads to better toll sensitivity
- Emission reduction
  - Improved demand/speed estimation by hour. Emissions can be traced to “home” location

DASH: Designed to Better Address Policy Issues (2)

- Mobility
  - Multi-modal access to jobs, shopping opportunities, and recreation
- Equity
  - The individual is the focus. Much better suited to address impacts by market groups (e.g., income, age, transit dependency)

DASH: Key Features

- Modeling individuals – not households
- All the daily travel for the individual is expressed in terms of tours (e.g., home-shop-work-home)
- Individuals have "roles" – influences trip start time tendencies, value-of time, modal preferences
- Carpool obligations (intra-household travel dependencies)

DASH: Key Features (2)

- "Internal clock" within model. Influences decision regarding trip departure times, infrastructure system characteristics, etc.
- Travel choices influenced by level of service, costs, and other characteristics at the time of the journey

DASH: New Possibilities

- Focus on individual facilitates equity analysis
- Concept of Individual travelers in unique cars links well with dynamic traffic assignment.
- Population synthesizer – improved integration with MetroScope
- Much more than a travel model. Examples:
  - Zonal population (by time-of-day, age, income, roles, etc)
  - Auto locations by time-of day

DASH: New Sensitivities

- Many potential reactions to stimuli
  - Time of day shifts
  - Trip chaining (linked trips)
  - Activity patterns and destination choices
  - Mode choices
- Accounts for time and location requirements dictated by rideshare arrangements

DASH – Role Choice

- stay at home all day
- child pre K-12
- K-12 no school non-driver
- K-12 school non-driver
- K-12 no school driver not working
- K-12 no school driver working
- K-12 school driver not working
- K-12 school driver working
- college student not working without children
- college student not working with children
- college student part-time working without children
- college student part-time working with children

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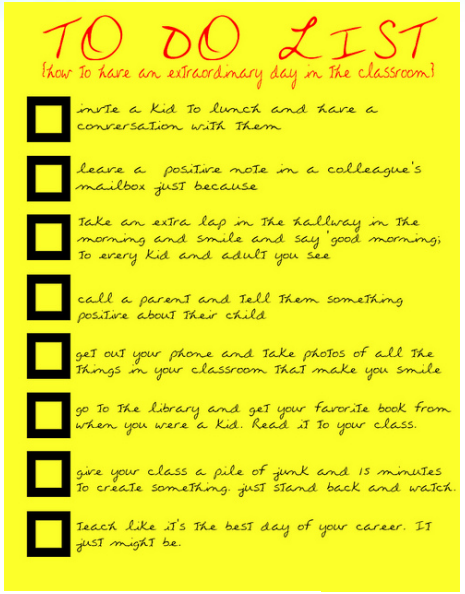
DASH - Role Choice (2)

- adult full-time working with college without children
- adult full-time working with college with children
- adult not working no college without children
- adult not working no college with children
- adult full-time working no college without children
- adult full-time working no college with children
- adult part-time working no college without children
- adult part-time working no college with children
- adult planned joint activities

DASH: Importance of Roles

- Tour patterns
- Trip start times
- Value of time
- Modal preferences



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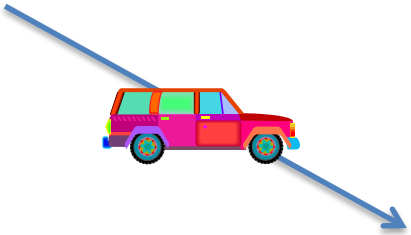
DASH: Tour Concept

Mode, activity location, and schedule

Lv 6:45 a.m.

Arr 6:15 p.m.

Arr 5:20 p.m.
Lv 5:50 p.m.



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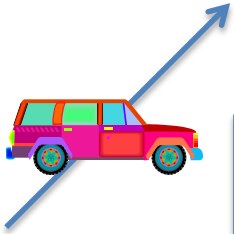
Lv 7:25 a.m.



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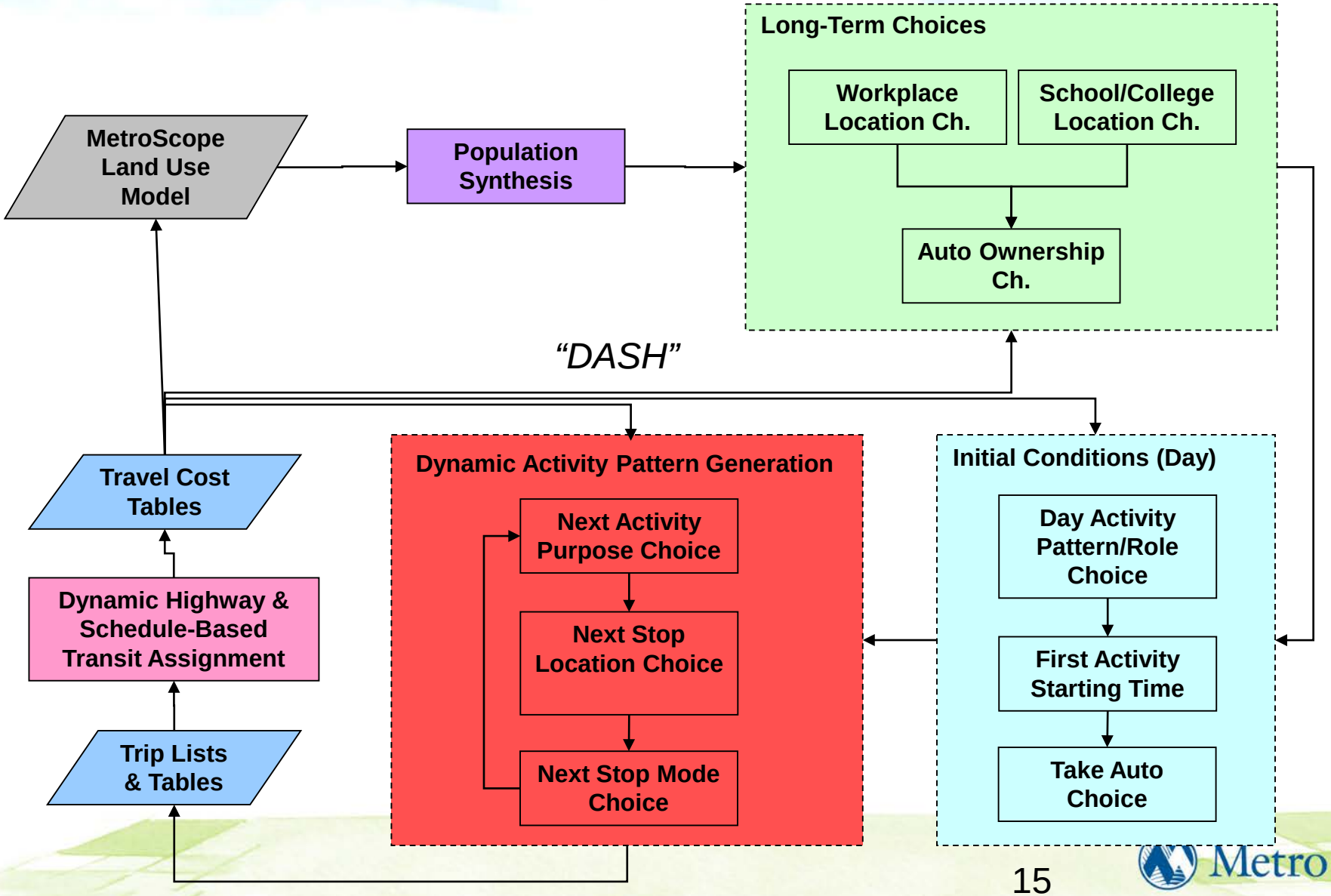
DASH: Conceptual Design



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DASH: Activity/Travel Logs

- Looks very much like a household trip diary!
  - Can be queried to produce summaries of activity/trip attributes by:
    - tour, mode, zone, zone pairs, activity type, time of day, person type, household types, etc.
  - Can be queried to produce trip tables for network assignment

pid	hhid	time	activity	location	tdist	ttime	mode	role	duration
1	200169	539	Workng	965	3.445	10.869	da	2	401
1	200169	949	SocRec	611	3.485	9.766	da	2	101
1	200169	1053	EndHom	611	0.549	3.554	da	2	386

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DASH - Status

- Currently under development.
- Schedule
  - Model estimation using 2011 survey – now
  - Model sensitivity testing – July 2015 thru March 2016
  - Model acceptance program – July 2015 thru July 2016

Happy Modeling!!!