Dynamic Ridesharing: Carpooling Meets the Information Age

August 5, 2010

Presented By:
Marc Oliphant & Andrew Amey
Questions To Answer

• What Is Dynamic Ridesharing
• Why Is It Important?
• Where Is It Occurring?
• What Makes It Work?
• How Can We Promote It?
Carpooling Is:

— Inexpensive
  - No buses, trains, drivers, mechanics, bridges, tracks, etc

— Environmentally Friendly
  - Less emissions per passenger mile
  - Fewer vehicles = faster speeds = less pollution

— A Congestion Reducer
  - Fewer vehicles to make same trips

— Light on infrastructure
  - Less road space & parking needed

— Socially Beneficial
Background on Carpooling

• 1940’s
  – First Conceived
  – WWII: Carpool for War Effort

• 1970’s
  – Oil Embargo
  – First Vanpools @ 3M, Chrysler
  – Organic Dynamic Ridesharing
    • “Slugging” in D.C. and Houston
    • “Casual Carpooling” in San Francisco
Background on Carpooling

• On Decline For Past 30 Years
  – 1980: 19.7%
  – 1990: 13.3%
  – 2000: 12.2%*

• Future: New Era of Ridesharing
  – Incentives: High Occupancy Toll (HOT)

*Pisarski, 2006, Commuting in America III
Fundamental Ridesharing Requirement

Two Individuals Who Are Proximate in Time and Space and Share a Common Destination

That’s all it takes
Five Elements of Successful Ridesharing

1. Logistics
2. Reimbursement
3. Incentives
4. Safety
5. Power
Evolution of Carpooling

1. Traditional Carpools/Vanpools
   * Interpersonal Relationships

2. Slugging/Casual Carpooling
   * Meeting Places

3. Technology Facilitated Dynamic Ridesharing
   * Virtual Framework
Traditional Carpooling

• Recurring, Consistent Arrangement
• Set Members
• Fixed Schedule

A Few Disadvantages:
  – Rigid schedule
  – Limited # of partners
  – Difficult to make changes on short notice
  – Awkward reimbursement
The Trouble with Traditional Carpooling:

Just before quitting time a man was called into an unplanned meeting. He couldn’t find anyone from his carpool to notify so he left a note for one fellow saying “I have a last minute meeting, leave without me.” At 7 p.m., when his meeting finally ended, he found a note on his chair that read:

“Their is a note that reads:

“Meet us at the restaurant across the street, you drove!”
Dynamic Ridesharing

*No Commitment
*No Pre-Arrangement

Advantages
• No rigid schedule or departure time
• Large supply of potential partners
• No obligation to any partner or arrangement
• Pre-arrangement is unnecessary
The Dynamic Ridesharing Umbrella

Dynamic Ridesharing

Slugging/Casual Carpooling
- Proven
- Organic
- Limited to 3 Cities
- Unique Circumstances Needed

Technology Facilitation
- Un-Proven (so far)
- Organized
- Unlimited Locations
- Still Requires Incentives
Slugging/Casual Carpooling

- No Money Exchanged*
- A Mutually Beneficial Relationship Between Passengers and Drivers
- Participants Cooperate to Save TIME and MONEY
- Driven by Incentives
- A Transit System that Goes of Itself.

*Change in San Francisco within the past month
How Slugging/Casual Carpooling Works

• Lines of People and Lines of Cars

• Create Instant Carpools Based on Common Destinations

(Horner Road Commuter Lot)
I-95 Exit 158 in Northern VA
The Return Trip

- Similar Afternoon System

14th Street and New York Avenue
Downtown Washington, D.C.
Slugging/Casual Carpooling
Three Metro Areas

• San Francisco
• Houston
• Washington, D.C.
Casual Carpooling in San Francisco

- Reduced toll for west-bound HOV-3 vehicles
- Most slugging occurs in the A.M.
STARTING JULY 1
CARPOOL TOLL $2.50
REQUİRED
Changes in San Francisco

New Tolls a Huge Topic of Debate on RIDENOW.ORG (http://www.ridenow.org/carpool/discussion.html)

• Hundreds of Opinions on Message Board
  – Riders Should Pay: Get Benefit
  – Riders Should Not Pay: Give Benefit
  – Drivers Should Ask for $1
  – Riders Should Offer $1, $.75, $.78
  – Etc...
Changes in San Francisco

San Francisco Chronicle, July 29, 2010

Bay Area bridge tolls take a toll on commuters

By: Will Kane, Chronicle Staff Writer

– “30 percent fewer people are using the carpool lane since July 1 toll change.”

– "It is disincentivizing now that I have to pay.“

-Michael Corr, former casual carpool rider
Slugging in Houston

• Slugging occurs on two HOV corridors:
  – Northwest Freeway (Route 290)
  – Katy Freeway (I-10)
Slugging in Houston

• April 2009: Katy Freeway HOV to HOT Change
  – Reduced Requirement from HOV-3 to HOT-2
  – Changed Slugging Dynamic
    • Riding w/ 1 Stranger is More Awkward than 2
    • Result: Less Slugging
Slugging in Northern Virginia

- Slugging began in the 1970’s with HOV laws
- Most extensive system
- Centered on the I-95/395 corridor
- 6,500 people slug each weekday (VDOT 2006)
Recent D.C. Headlines

WTOPNEWS.COM
DC Police Chief: No crackdown on slug lines
July 5, 2010

Chief: 'No change' in slug enforcement
June 17, 2010

NBC Channel 4
Save the Slugs!: D.C. should create official slug lines
By P.J. Orvetti, June 21, 2010

WAMU, 88.5 FM
Some Commuters See Increase in Tickets for Picking up Slugs
By Natalie Neumann, June 17
A Recipe for Slugging/Casual Carpooling Success

Systems need the majority of the following characteristics in order to succeed:

- HOV-3 or greater vehicle occupancy restrictions
- Strict enforcement of HOV laws
- Large numbers of commuters living and working together
- Long commute distances/times
- Convenient transportation alternatives
- A choke point to eliminate substitution
Implications

• Slugging/Casual Carpooling is great, however, it only occurs “naturally” in a few places

• What if we could artificially create the conditions that drive slugging/casual carpooling in other cities and corridors?
SLUGGING 2.0

EMAIL BASED DYNAMIC RIDEMATCHING
IN WASHINGTON, D.C.
Two Listservs (that we know of)

• “eSLUG”
    • Major Employers: U.S. Navy, USDOT, NGIA
  – http://groups.yahoo.com/group/eslug/
  – Destination: “Horner Road” Park and Ride Lot

• “RosslynSlugs”
  – Origin: Rosslyn Area of Arlington
    • Major Employers: State Department, Gannett Media (USA TODAY)
  – http://finance.groups.yahoo.com/group/RosslynSlugs/?m=0
  – Destination: “Route 17” Park and Ride Lot
Commonalities

• Both Groups Managed by Volunteers
• Unofficial
• Exclusively Used for Afternoon Ridematches
• Motivated by Ability to Use 2 Dedicated HOV lanes on I-95/395
Navy Yard eSLUG System

- [http://groups.yahoo.com/group/eslug/](http://groups.yahoo.com/group/eslug/)
- Provides PM Ridematch to Horner Road Park & Ride in Prince William County (24 miles)
Navy Yard eSLUG System

- Founded in August 2002
- 351 Members (as of July 1, 2010)

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Graphic: Number of Messages Sent to the Listserv Per Month Since Inception
Typical Daily Emails Sample

These emails were sent as of 9:45 a.m. Wednesday, June 30, 2010
Navy Yard eSLUG System Stats
From 3/29/10 to 6/25/10 (13 Week Period)

• # of Messages Posted Per Week
  – High: 138
  – Low: 93
  – Average: 115

• Unique Users Per Week
  – High: 38
  – Low: 24
  – Average: 31
Navy Yard eSLUG System Conclusions

• Effective but Inefficient
• Quick and Dirty
• No Official Meeting Place
“RosslynSlugs” System

- [http://finance.groups.yahoo.com/group/RosslynSlugs/?m=0](http://finance.groups.yahoo.com/group/RosslynSlugs/?m=0)
- Pickup Location
“RosslynSlugs” System

• Founded by Computer Programmer Mike Burkhart in the early 2000’s
• Created Yahoo Listserv- Feb, 2004
• Now Managed Through Personal Website www.mikeburkhart.com
• Serves Route 17 Park & Ride in Stafford County (45 miles, one way)
“RosslynSlugs” System

• How it Works...
• Participants Log-In to [www.mikeburkhart.com](http://www.mikeburkhart.com)
“RosslynSlugs” System

- Daily Ride Request Page
“RosslynSlugs” System

- Daily Ride Request Page (Detail View)
“RosslynSlugs” System

Emails:

– Morning Reminder
– Personal Reminder (if you have been matched)
– Final Daily Summary
“RosslynSlugs” System

- System is Highly Automated
- Final Carpool Match is Hand Approved by Mike Burkhart (System Administrator) Each Afternoon.
- Takes Admin. 15 Minutes Total Per Day (For Matching/Emailing, Etc.).
- Estimates ≈ 40-50 Unique Participants Per Week (Depending on Season)
PART III: Moving Forward
Supply Side Interventions

i.e. How to Supply More Ridesharing Connections

<table>
<thead>
<tr>
<th>Technology</th>
<th>Smart Device (phone/PDA) Applications</th>
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<tbody>
<tr>
<td></td>
<td>Hardware (RFID Cards, transmitters, receivers)</td>
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<tr>
<td></td>
<td>Ridematching Databases</td>
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<tr>
<td></td>
<td>Social Networking Applications</td>
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<td></td>
<td>List Serves (Email)</td>
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<tr>
<td>Infrastructure</td>
<td>Designated Commuter Parking Lots</td>
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<td></td>
<td>Signage Designating Line Locations</td>
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<td></td>
<td>Funding to Disseminate Information &amp; Marketing</td>
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<tr>
<td></td>
<td>Direct Access from Commuter Lots to HOV Lanes</td>
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<tr>
<td></td>
<td>Convenient Backup Transportation Options</td>
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</table>
## Demand Side Incentives

### i.e. How to Increase Ridesharing Participation

<table>
<thead>
<tr>
<th>Incentives For Ridesharing</th>
<th>Disincentives For SOV</th>
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<tbody>
<tr>
<td>Parking Incentives for HOV</td>
<td>Reduce non-HOV lanes</td>
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<tr>
<td>Preferred locations</td>
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<tr>
<td>Free/reduced fees, cash-out</td>
<td>Tol SOV’s during peak hours</td>
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<tr>
<td>Designated HOV lanes to create time savings</td>
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<tr>
<td>Tolls reduced or eliminated for HOV vehicles</td>
<td>Existing barriers</td>
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<tr>
<td>Subsidies / tax write-offs for carpooling costs</td>
<td>Congestion</td>
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<tr>
<td>Prizes, drawings, etc (NuRide model)</td>
<td>Long commutes</td>
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<tr>
<td></td>
<td>Cost to own/operate vehicle</td>
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<tr>
<td></td>
<td>Fuel price increases</td>
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<tr>
<td></td>
<td>Targeted taxation, Pay As You Drive (PAYD)</td>
</tr>
</tbody>
</table>

**Incentives**
- **Preferred locations**
- **Free/reduced fees, cash-out**
- **Designated HOV lanes to create time savings**
- **Tolls reduced or eliminated for HOV vehicles**
- **Subsidies / tax write-offs for carpooling costs**
- **Prizes, drawings, etc (NuRide model)**

**Disincentives**
- **Reduce non-HOV lanes**
- **Toll SOV’s during peak hours**
- **Congestion**
- **Long commutes**
- **Cost to own/operate vehicle**
- **Fuel price increases**
- **Targeted taxation, Pay As You Drive (PAYD)**
What Slugging Can Teach Us About Implementing Technology Facilitated Dynamic Ridesharing

- Strong Incentives
- Convenience
- Flexibility
- Critical Mass
- Framework
- Wide & Varied Participation
  - i.e. Not Just One Employer
Dynamic Ridesharing’s Vulnerabilities

• **Safety**
  – Slugging/Casual Carpooling: Quite Safe
  – Caution & Common Sense Prevail

• **Liability**
  – Slugging/Casual Carpooling: Nobody Is In Charge
  – Organized Dynamic Ridesharing: Raises Questions

• **Incentives**- CRITICAL!
  – Direct Funding, Political Will, Tax Policy, HOV/HOT
Contact

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  or marcoliphant@hotmail.com

Thanks to: American Planning Association’s Transportation Planning Division, APA Utah Chapter, Dr. Evans Cowley & Cody Price of Ohio State, & Naval Facilities Engineering Command
Dynamic Ridesharing: Carpooling Meets the Information Age

Andrew Amey
Student Researcher, MIT Real-Time Rides Research Project

American Planning Association Monthly Webcast
August 5, 2010
Outline

- MIT’s Current Research on “Dynamic Ridesharing”
  - Goals / Activities
- Outlining “Dynamic Ridesharing” (Technology Focused)
  - Technology
  - Selection of Providers
  - Opportunities
  - Challenges
  - Current Activities
- Research Recommendations
- MIT’s Next Research Steps
  - Rideshare Viability at MIT
  - Design a “Real-Time” Trial for MIT/Kendall Square
MIT “Real-Time” Rides - Goals

- Scan the Rideshare ‘Market’ and Identify New Trends and Innovative Service Providers
- Identify & Categorize Existing Rideshare Challenges
- Evaluate “Real-Time” Ridesharing
  - Which Challenges Does it Address? Which does it Exacerbate?
  - How have Previous “Real-Time” Initiatives Fared?
- Encourage Greater Interaction between Rideshare Stakeholder Groups
MIT “Real-Time” Rides - Activities

- Initially, a Two-year Research Project
- Compiled a List of Major Rideshare Service Providers
- Interviewed 15 Rideshare Stakeholders
- Organized the Real-Time Rides Workshop (Apr. 2009)
- Developed a Website to Share Research results (www.realtimerides.org)
- Designed a Model to Estimate Rideshare Viability at MIT and the VOLPE Transportation Center
- Proposed a Preliminary Design for an MIT Rideshare Trial
Defining “Real-Time” Ridesharing

- “A single, or recurring rideshare trip with no fixed schedule, organized on a one-time basis, with matching of participants occurring as little as a few minutes before departure or as far in advance as the evening before a trip is scheduled to take place”

- Key Aspects of the Definition
  - Occasional Nature of the Trips
  - Differing Trip Arrangement Timeframes
Some Enabling Technologies & Features

**Enabling Technologies**
- Smart Phones
- User-Friendly Interfaces - iPhone, Android (Apps)
- Constant Data Network Connections
- GPS-Functionality
- Ride Matching & Routing Algorithm
- Database

**Features**
- Social Network Integration (Facebook, Institution)
- Stored User Profiles
- Rideshare User Evaluation (eBay)
- Automated Financial Transactions
- Incentives / Loyalty Rewards
Providers Interviewed for our Research

- Carticipate (http://www.carticipate.com/)
- Commuter Connections - DC (http://www.mwcog.org/commuter2/)
- GoLoco (http://www.goloco.org/)
- Goose Networks (http://www.goosenetworks.com/home)
- Liftshare UK (https://www.liftshare.com/uk/)
- MassRides - MA (http://www.commute.com/)
- NuRide (http://www.nuride.com)
- PickUpPal (http://www.pickuppal.com)
- Piggyback Mobile (http://www.piggybackmobile.com/)
- Rideshare Online - WA (http://www.rideshareonline.com/)
- Zimride (http://www.rideshareonline.com/)
Major Rideshare Challenges

- Social/Behavioral
  - “Stranger Danger”
  - Lack of Mutual Benefit
  - Service Reliability
  - Schedule Flexibility
  - Consistency of Expectations

- Institutional
  - Public/Private Sector Roles
  - Business Model

- Economic
  - Little Incentive to Maximize Occupancy
  - Imperfect Information
  - High Transaction Costs

- Technological
  - Measuring Successful Trips
  - Common Database Specification
Benefits & Drawbacks of “Real-Time”

- Social/Behavioral
  - “Stranger Danger”
  - Lack of Mutual Benefit
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  - Data Privacy

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  - Imperfect Information
  - High Transaction Costs

- Institutional
  - Public/Private Sector Roles
  - Business Model

- Technological
  - Measuring Successful Trips
  - Common Database Specification
Flexibility vs. Reliability...

- Berkeley Research - Need for “Flexible Reliability” (Deakin, Frick & Shively, 2010)
  - Focus Group held with 60 participants to discuss Dynamic Ridesharing
  - Less than 5 interested in arranging ‘last minute’, or ‘instant’ trips. Not perceived as reliable enough.
  - Greater Interest in Occasional Trips, Booked in Advance, with Trip Match Confirmation at Specific Time

- Dynamic Ridesharing Enables Multiple Trip Types
  - Instant Trips (One-Time, Short Lead-Time)
  - Occasional, Pre-Planned (One-Time, Medium Lead-Time)
  - Traditional, Long-Term (Recurring, Planned in Advance)
...but Time & Money are Most Important

What do you like most about Slugging?
[Select all that Apply]

- Gasoline Savings
- Travel Time Savings
- Environmental Benefits
- Flexibility
- Meet New People
- Sense of Belonging
- Adventure of It
- Other

Source: Marc Oliphant Slug Line Survey, 2008
Current Activities

- Service Upgrades
  - Myriad of Private Providers
  - Rideshare Online (2009/2010)
  - MassRides (2010?)

- Demonstrations / Pilots
  - WSDOT Dynamic Rideshare Pilot (July 2010)
    - 6-Month Trial, Fall 2010, SR 520 Corridor in Seattle
    - Avego, Univ. of Washington, Nelson/Nygaard
    - Recruitment focused on large employers, TMAs
    - Driver History, Criminal History & Sex Offender Registry Checks
  - FHWA Value Pricing Grant - Santa Barbara Dynamic Ridesharing (Aug 2010)
    - Announced Very Recently, Santa Barbara Community Environmental Council
    - Combines Dynamic Ridesharing with Evaluation of Pricing
Key Research Recommendations

- Focus on Large Employers
  - Greatest Peak Period Congestion Reduction Potential
  - “Many-to-Many” to “Many-to-One” Matching Relationship
  - Social Network (Safety/Liability) Benefits

- Integrate Multi-Modal Travel Information
  - In general, people are becoming more multi-modal (+30% of Staff & Faculty use Multiple Modes to Commute to MIT in a Single Week)
  - Ridesharing, in particular, relies heavily on transit presence (DC, SF)

- Personalized Travel Planning
  - Family Members are the Largest Group of Participants
  - ~10% VMT Reduction from More Targeted Travel Information (Australia, Portland, OR)
Are Commute Trips Important?

- Why focus on Journey-to-Work Trips when they are only 1 in 6 of Total Trips Made?
- Insufficient Free Capacity to make a Difference?

- What are we trying to Improve through Ridesharing?
- Commute Trips are 16% of Person Trips, but…
- …22% of Vehicle Trips (heavier reliance on auto)…
- …27% of VMT (longer trips)…
- …33% of Empty Seat-Miles (lower occupancies), and…
- …46% of Peak Period Empty Seat-Miles!
- Do we have a Free Capacity Problem??
Next Steps at MIT

- Refine Rideshare Viability Estimates at MIT
  - Conducted a Preliminary Rideshare Viability Analysis among MIT Staff & Faculty
  - Modeling suggests that 50% to 77% could rideshare on a daily basis without significant changes in behavior. Max Effort VMT reductions were 9% - 27%.
    - Driver incurs no more than a 5 minute addition to their commute, 83% of matches require less than a 2 mile travel deviation
  - Follow Up will include Focus Groups with potential Participants

- Preparation for an MIT “Real-Time” Trial
  - Application for MIT Community Members
  - Integrated Multi-Modal Information (MBTA, Shuttles, etc.)
  - Parking Policies / Transit Subsidies
  - Possible Expansion to Other Kendall Square Organizations
Contact Information

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MIT “Real-Time” Rideshare

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