Forgotten Transit Modes

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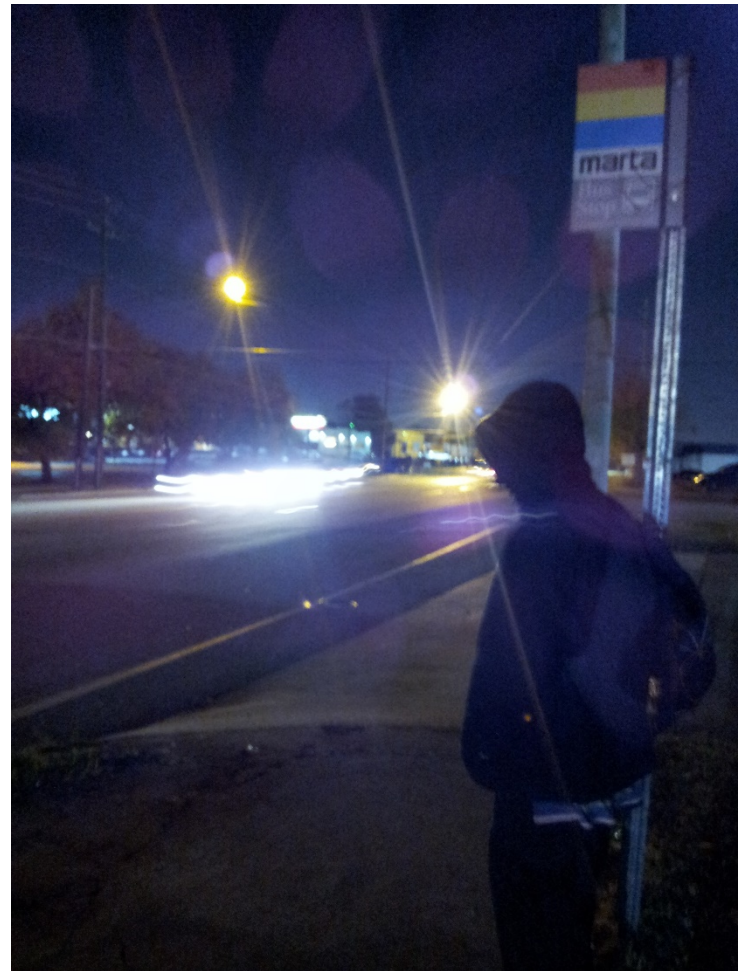
Agenda

- Problem Statement
- Research Questions
- Name that Mode!
- Transit Modes Overview
  - Safety
  - Economy
- Forgotten Modes
  - Aerial Modes
  - Surface Modes
  - Water Modes
- Transit Mode Selection Guidelines

Liamdavies

Problem Statement

- Cities in the U.S. are falling further behind in the global transit race.
- Our transit systems are generally less comprehensive, multi-modal, and innovative than many other cities around the world.
- Possible reasons include:
  - Lack of knowledge and experience
  - Liability concerns
  - Low density and demand
  - Car-centric development and culture
  - Cost of transit



Research Questions

- How do decision-makers choose which transit mode to use for a project?
  - Transit Mode Selection Survey
  - Interviews
- How do transit modes, including unconventional modes, compare to each other, and under what conditions should each mode be used?
  - Compile global examples for database, meta-analysis, case studies, and comparison
  - Develop transit mode selection guidelines
  - Create context-sensitive decision-support tools to help transit planning authorities identify appropriate transit modes for their projects

Name that Mode!

- Trolleybus

Name that Mode!

- Light rail

Name that Mode!

- Gondola

Name that Mode!

- Bus Rapid Transit

Mariordo (Mario Roberto Duran Ortiz)

Name that Mode!

- Water Bus

Gary Houston

Name that Mode!

- Maglev

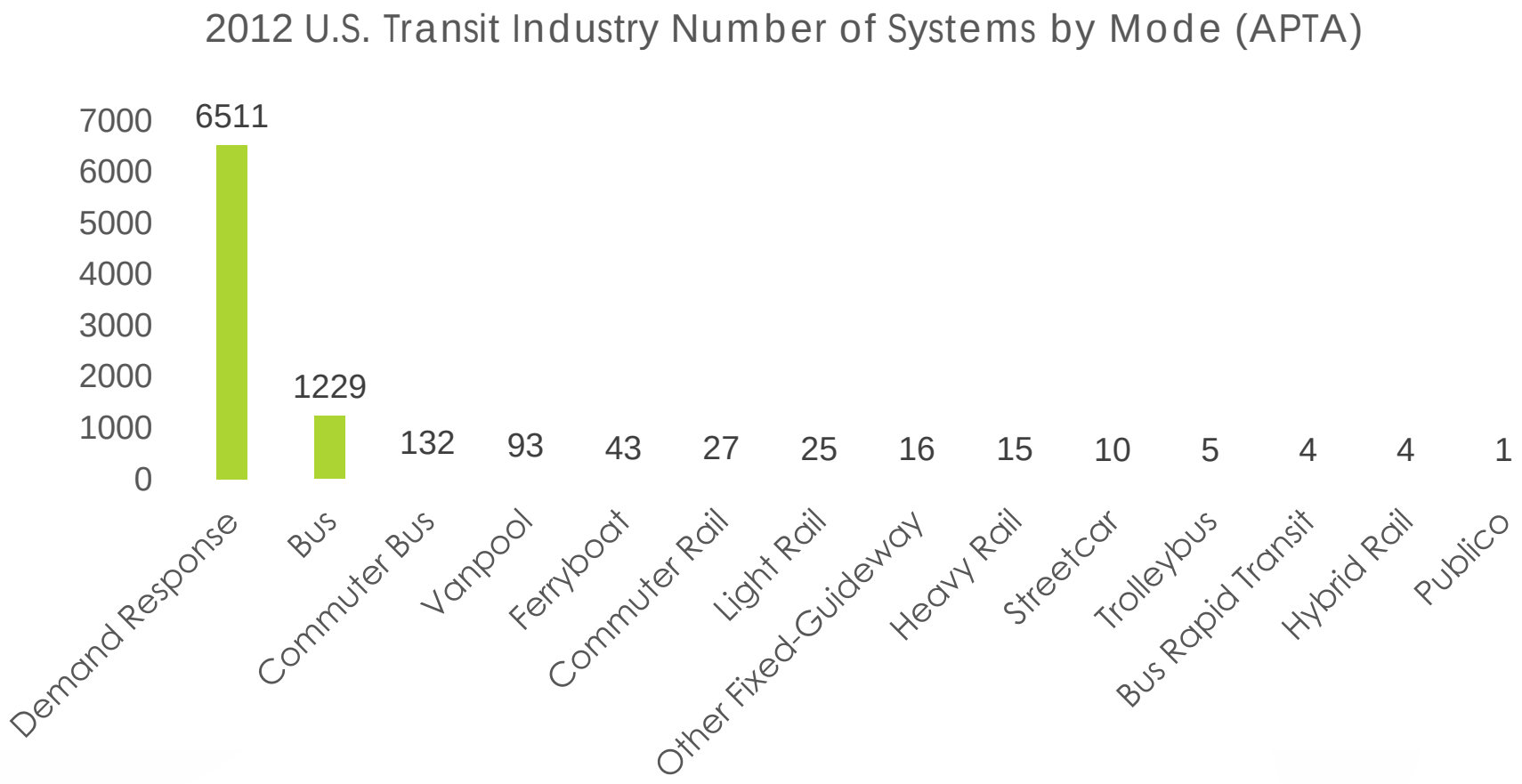
Transit Modes Overview

- Aerial Modes
  - Aerial Tramway
  - Funitel*
  - Gondola*
- Surface Modes
  - Bus
  - Bus Rapid Transit
  - Cable Car
  - Commuter Bus
  - Commuter Rail
  - Demand Response
  - Demand Response - Taxi
  - Heavy Rail
  - Hybrid Rail
  - Inclined Plane
  - Jitney
  - Light Rail
  - Maglev Rail*
  - Monorail / Automated Guideway
  - Publico
  - Streetcar Rail
  - Trolleybus
  - Vanpool
  - Vintage Trolley / Streetcar
- Water Modes
  - Ferryboat
  - Water Bus*
  - Water Taxi*

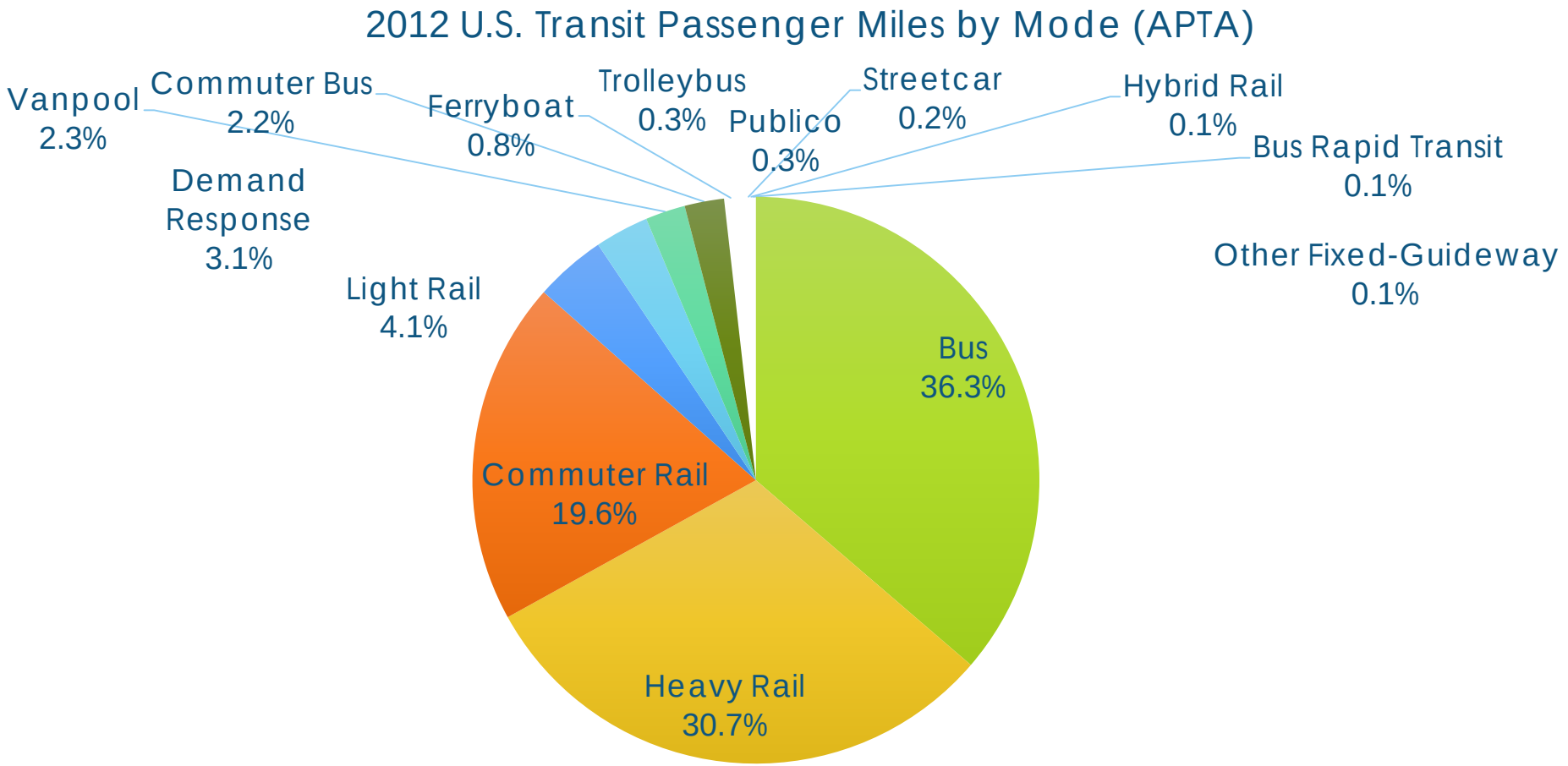
*Not in NTD Glossary

National Priorities

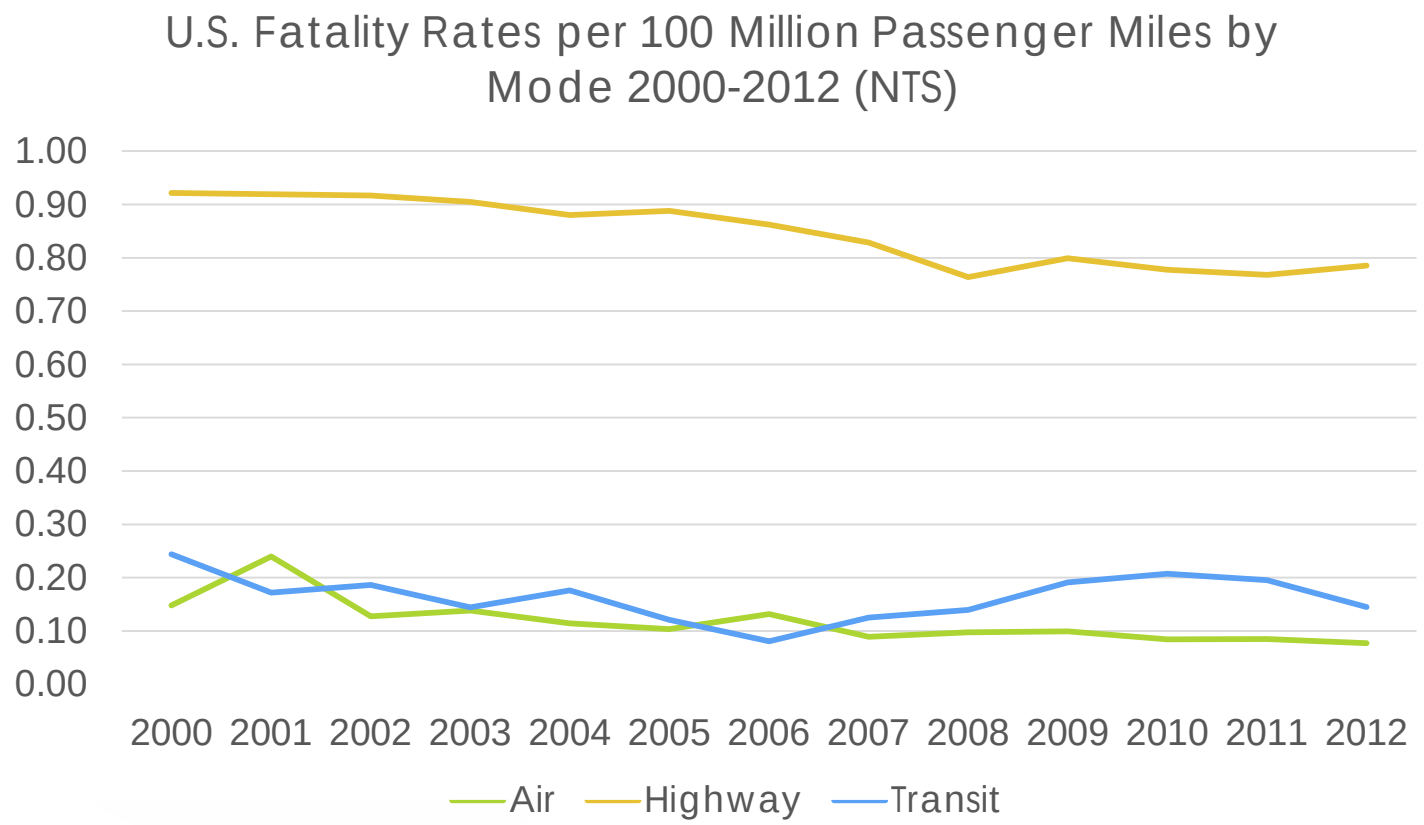
Mode Prevalence in the U.S.



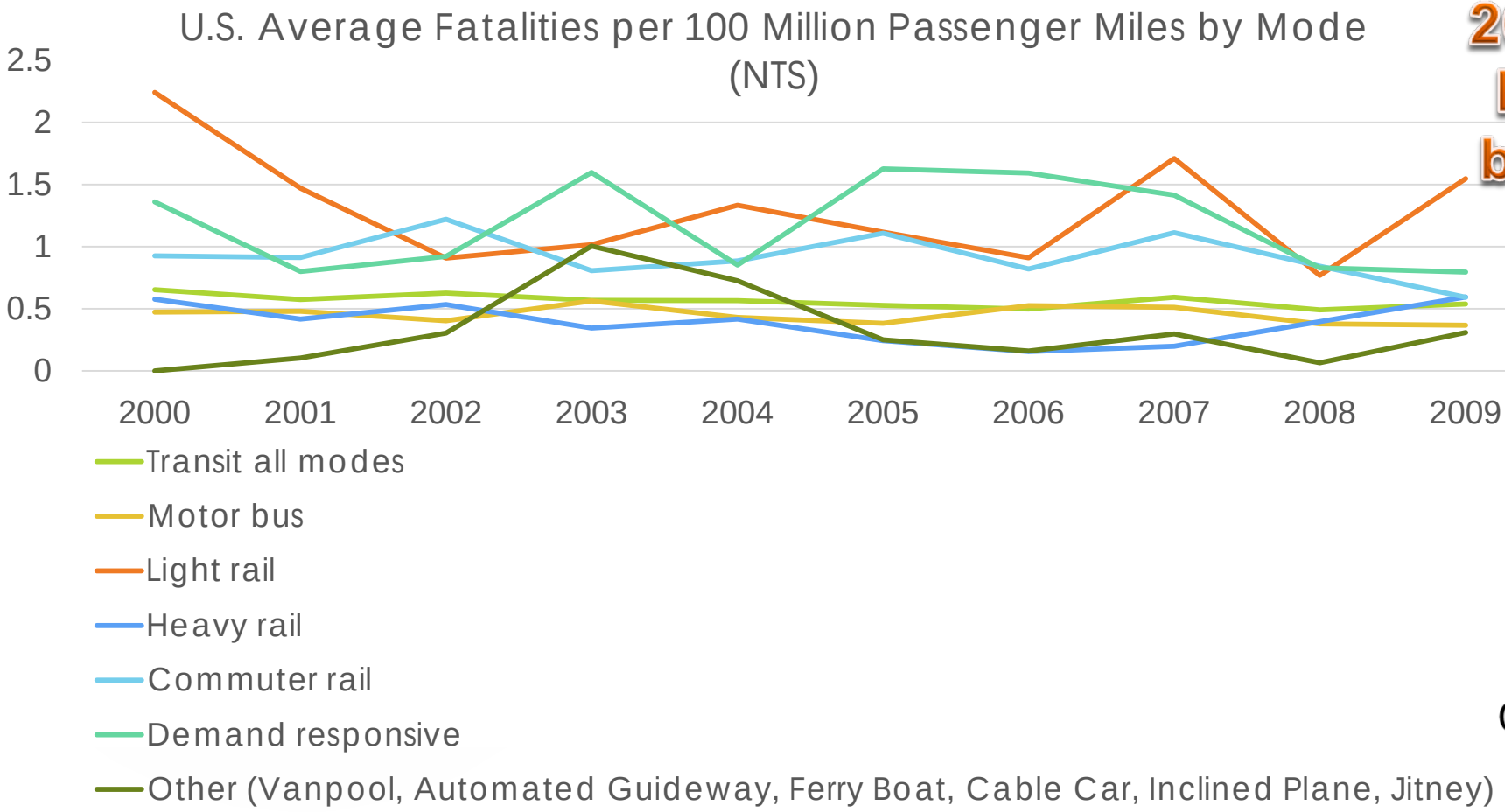
Passenger Miles by Transit Mode

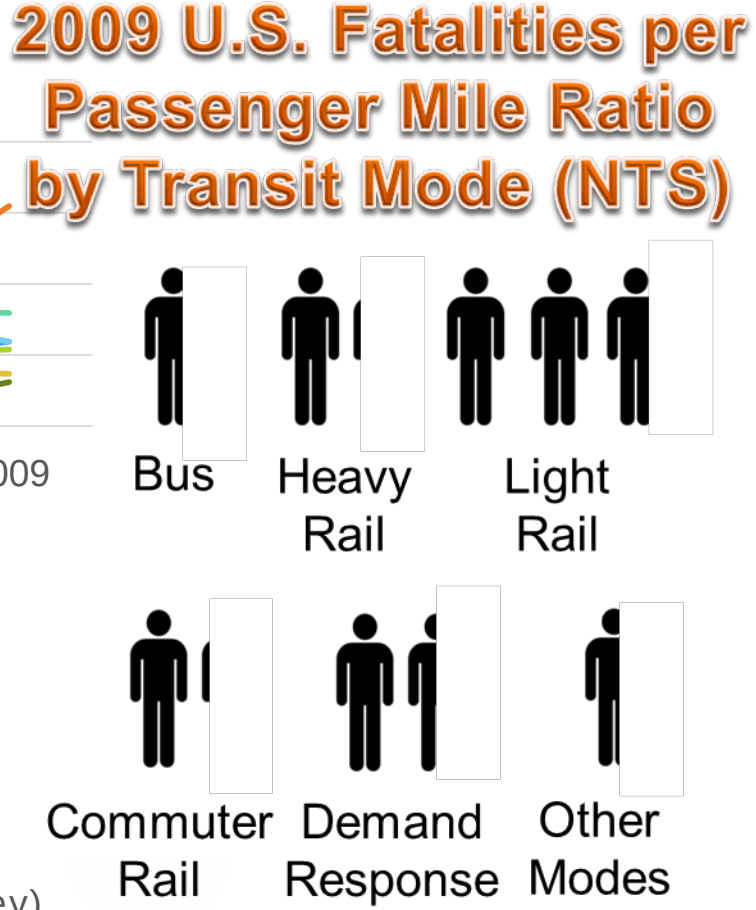


Safety – Transit, Highway, Air

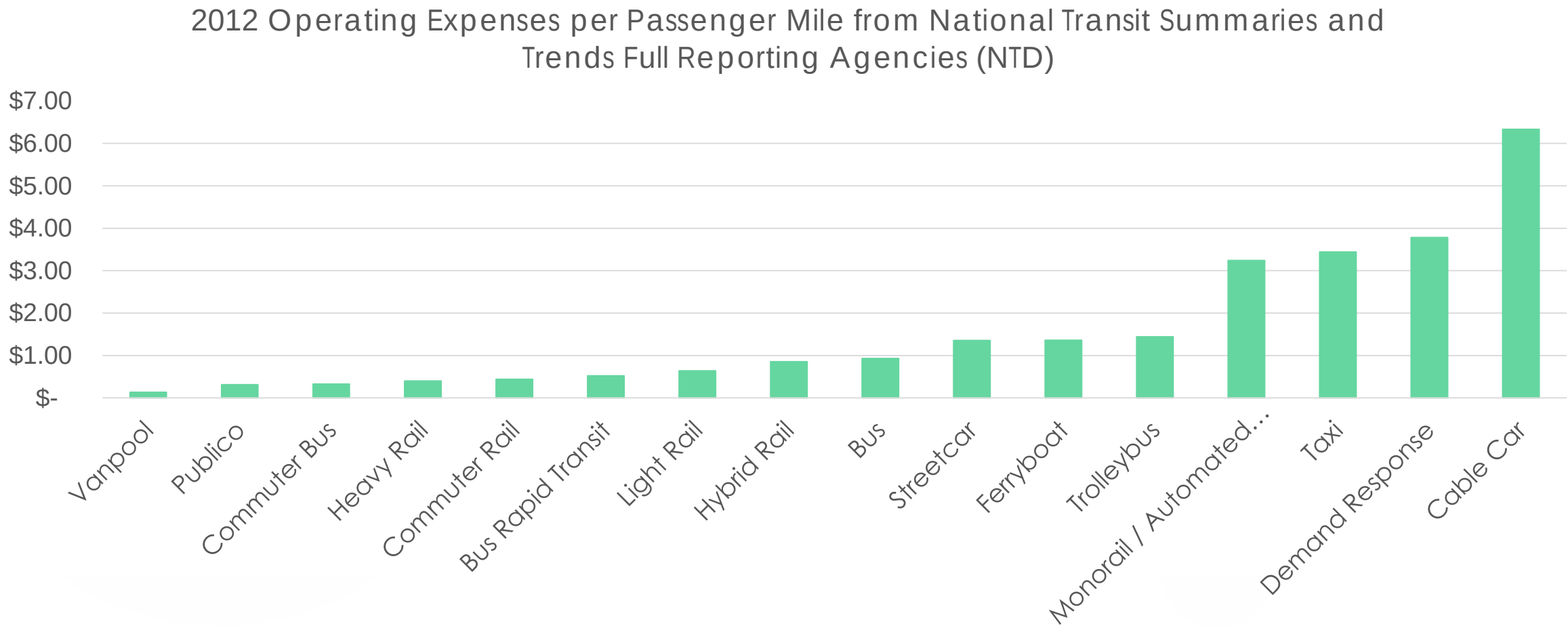


Safety – Transit Modes

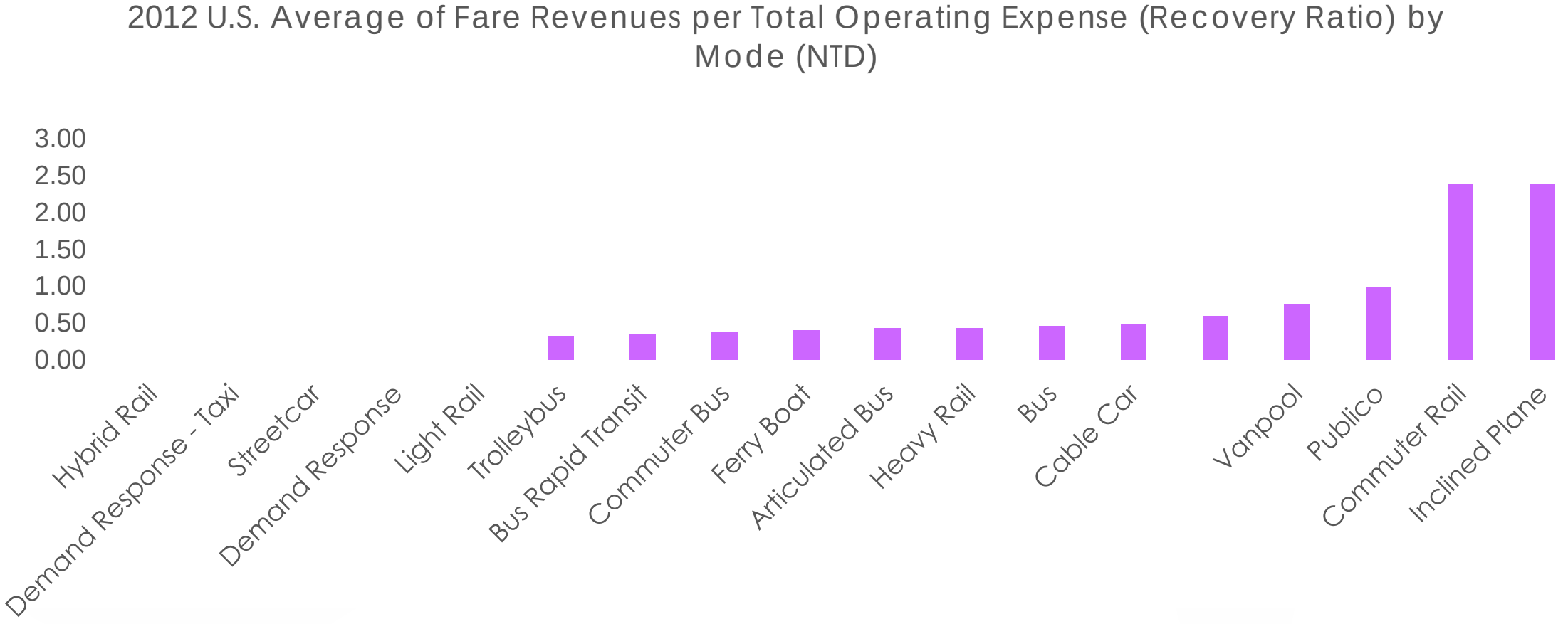




Economy – Operating Expenses



Economy – Recovery Ratio



Forgotten Modes – Aerial Modes

- Aerial Tram

- Gondola

- Funitel

Forgotten Modes – Aerial Modes

Gondolas

- MDG, BDG, TDG/3S
- Detachable grips
- Cars slow upon entering station
- On-demand, accessible
- Safe, reliable, and resilient
- Small footprint, Quiet
- Quick build time (< 1 year)
- Low operating costs
- Energy efficient and versatile
- Maximum speed ~16 mph

Examples – Urban Gondola Lines

- Creative Urban Projects
  - Gondolas (n=14)
  - 0.7-3.5 miles long
  - 2-6 stations
  - Max speed: 11-16 mph
  - Average speed: 6-14 mph
  - Trip time: 4-25 minutes
  - Capacity: 550-3,800 pphpd
  - Capital cost: $14-133 million
  - Cost per mile: $8-132 million
  - Fare: $0.25-21.50


Gillermo Villegas

Autopilot


Paul Farmer

Examples – Urban Gondola Lines

- Creative Urban Projects
  - Systems analysis (n=10)
  - Annual Ridership: 840,000 to 12,000,000
  - Annual revenue: $625,000 to $19,350,000
  - Estimated payback period in years: 1 to 33
  - System cost / annual ridership: $2,17 to $86.89

Case Study – Medellin Line K

- Medellin, Colombia (2004)
- 4 stations, 1.2 miles (2 km) long
- Monocable Detachable Gondola (MDG)
- Speed (mph): 11 (avg) / 11 (max)
- Trip time: 7 minutes
- Capacity: 3,000 pphpd
- Cost: $26 million (mostly public)
- Cost per mile: ~$21 million
- Fare: $1.00 per one-way trip
- Annual ridership: 12 million (>30k daily)

Camilo Sanchez

Case Study – Emirates Air Line

- London, England (2012)
- 2 stations, 0.62 miles (1 km) long
- Monocable Detachable Gondola
- Speed (mph): 8 (avg) / 14 (max)
- Trip time: 5-10 minutes
- Capacity: 2,500 pphpd
- Cost: $90 million (mostly private)
- Cost per mile: ~$132 million
- Most expensive ever built
- Fare: $6.85 per one-way trip

Forgotten Modes – Surface Modes

Maglev

- Demonstrated speeds up to 375 mph
- More efficient at high speeds
- Low maintenance
- Resilient in inclement weather
- Safe (1 fatal accident in 30+ years)
- Automated
- Lighter than traditional rail
- Faster acceleration and deceleration
- Able to ascend higher grades
- Limited use worldwide increases costs

Examples – Maglev Rail Lines

- Operational Systems
  - Asia – 3
- Test Tracks
  - Asia – 2
  - North America – 3
- Under Construction
  - Asia – 4
  - North America – 1
- Proposed Systems
  - Asia – 9
  - North America – 7
  - Europe – 4
  - Oceania– 3

Chris 73

Brucke-Osteuropa

Examples – Maglev Rail Lines

- In the Southeastern United States
  - Test Track
    - American Maglev Technologies, Powder Springs, GA
  - Proposed Systems
    - Atlanta to Chattanooga
    - Orlando International Airport to Orange County Convention Center

American Maglev Technologies

Case Study – Shanghai Maglev

- Demonstration Line (2004)
- 2 stations, 19 miles (30 km) long
- Speed (mph): 155 (avg) / 268 (max)
- Trip time: 7 minutes 20 seconds
- Capital cost: $1.3 billion
- Cost per mile: $68 million
- Extension expected to cost $18 million per km
- Fare: $6.40 to $8 each way

Case Study – Linimo

- Aichi, Japan (2005)
- 9 stations, 5.5 miles (8.9 km) long
- Top speed of 62 mph
- Trip time: 15 minutes
- Capacity: 4,000 pphpd
- Capital cost: $955 million
- Cost per mile: $174 million
- Fare: $1.35 to $3.00
- Cannot operate in high winds or with a load exceeding its capacity
- Ridership is ~50% of capacity
- Financial losses in recent years

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Forgotten Modes – Water Modes

- Ferryboat

- Water Bus

- Water Taxi

Forgotten Modes – Water Modes

Water Bus

- Smaller waterborne vessels
- Route flexibility
- Low infrastructure needs
- Multiple stops on a route
- Little or no traffic congestion
- Can be very cost-effective
- Boarding efficiency could be improved
- Not necessarily ADA compliant

Examples – Water Bus / Taxi Services

- United States
  - Baltimore, MD
  - Boston, MA
  - Chicago, IL
  - Erie, PA
  - Fort Lauderdale, FL
  - Jacksonville, FL
  - Long Beach, CA
  - New York City, NY
  - Oklahoma City, OK
- Orlando, FL
- Sacramento, CA
- Seattle, WA
- Tampa, FL

Will Dixon

Edward Johnson


Chris Wood

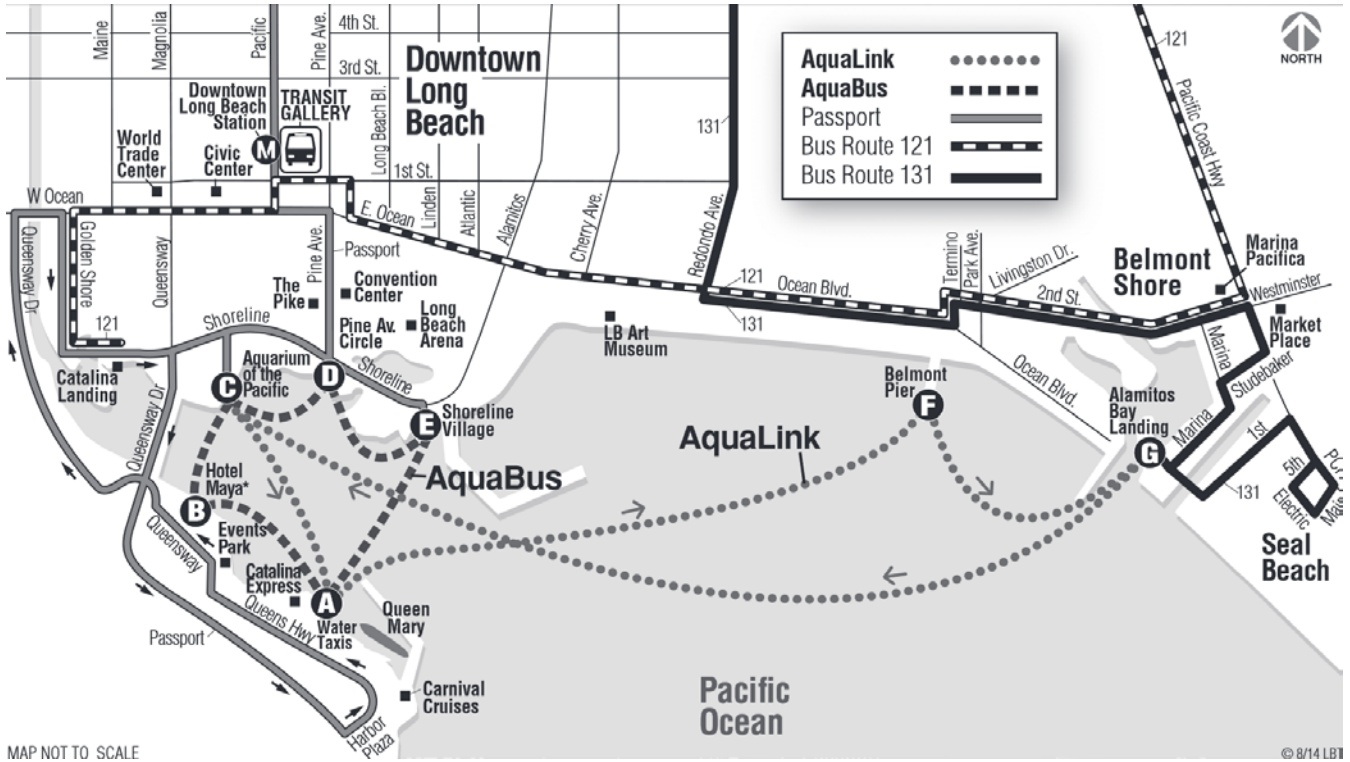
Case Study – Marina del Ray WaterBus

- Seasonal service
- 8 stops
- Fare: $1 one-way
- ADA accessible

Marina Del Ray Water Bus

Case Study – Long Beach AquaBus

- Seasonal service
- 6 stops
- Fare: $1 or $5 one-way
- ADA accessible



Transit Mode Selection Guidelines

- Keep an open mind
- Consider the context
  - Physical environment
  - Density
  - Land use
  - Other transportation modes
  - Traffic congestion
  - Community views
  - Service goals
  - Organizational priorities
- Don't forget aerial and water modes!

National Post

Next Steps

- Survey of Transit Planning Authorities
  - Support this research by taking the survey!
  - Pretest and provide feedback
- Tool development
  - Decision support tools for transit mode selection
  - Criteria based on national priorities and performance
  - Increase consideration and understanding of unconventional modes
  - Help transit planning organizations make more informed and objective decisions
  - Phase I: General mode comparisons and selection guidelines
  - Phase II: Context-sensitive tool and databases

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Thank you!

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