What is Bus Rapid Transit?
Prepared for Senate Banking Committee
Testimony by Gary Brosch
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The National Bus Rapid Transit Institute

is a collaborative effort of the Center for Urban Transportation Research (CUTR) at the University of South Florida, and the Institute of Transportation Studies (ITS) program at the University of California at Berkeley to facilitate the sharing of knowledge and innovation for increasing the speed, efficiency, and reliability of high capacity bus service through the implementation of Bus Rapid Transit systems in the United States.

www.nbrti.org
Current NBRTI Funding Partners

- Federal Transit Administration
- National Center for Transit Research (NCTR) and Partners for Advanced Transit and Highways (PATH)
- Florida DOT
- California DOT (CalTrans)
- Hennepin County, MN
- Riverside RTA
- Chicago RTA
- W. Alton Jones Foundation
Current Activities of the NBRTI

- System Evaluations
  - Lynx Lymmo
  - MDT Busway
- Development of FTA’s Action Plan for a Thriving BRT Market
- Administration of BRT Consortium
- Technical Assistance (Peer-to-Peer)
- Quarterly Newsletter
- Workshops
- Topic Research
- Website Development and Maintenance (Industry Portal)
Findings from System Evaluations

• Lynx LYMMO (Orlando)
  – Reduced congestion and lessened parking demand in downtown
  – Encouraged more transit use and walking
  – LYMMO (BRT) customers are significantly more satisfied with reliability of service and overall safety
  – 88 percent or higher customer “satisfied” and “very satisfied”

• South Miami-Dade Busway
  – Multimodal connection with 51.1 percent of customers egressing at the Dadeland South Station transferred to Metrorail
  – Riders are more satisfied with Busway service as compared to overall MDT services
  – Busway viewed as providing a significant increase in service speed
  – Almost one-half of the Busway customers were not previous bus users
**BRT Systems**

**United States: Consortium Members**

<table>
<thead>
<tr>
<th>United States</th>
<th>World:</th>
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<tbody>
<tr>
<td>Almeda, CA</td>
<td>Curitiba, Brazil</td>
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<tr>
<td>Albany, NY</td>
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<td>Louisville, KY</td>
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<td>Miami, FL</td>
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<td>Montgomery County, MD</td>
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<td>San Juan, PR</td>
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<td>Pittsburgh, PA</td>
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<td>Santa Clara County, CA</td>
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<td>Los Angeles, CA</td>
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<td>Las Vegas, NV</td>
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**World:**
BRT Consortium

- Resurrection of Committees
  - ITS
  - Vehicle
  - Transit Operations
  - Institutional Issues
  - Land Use
  - Other...

- Establish a Research Agenda for BRT
- Maintain Scheduled Workshops
- Share Knowledge at all Phases of Implementation
BRT Peer-to-Peer Program

- Based on USDOT’s ITS Peer Program
- Public and Private Sector Peers
  - Expertise
  - Geographic Distribution
  - Expenses Only
- Recipients
  - Public Sector Only
  - Short Term Technical Assistance
    - Telephone
    - Off-site Document Review
    - On-site Presentation
    - Mix
BRT Quarterly Newsletter

- Research Findings
- Technology Updates
- System Updates
- Upcoming Events
  - Conferences
  - Workshops
  - Tours
BRT Research Activities

- Hennepin County
  - Bus Lane Violation
  - Station Design Elements
  - Fare Payment Strategies
- SCRA
  - Technical Data Support Center
    - Specifications
    - Drawings
    - Cost Estimation
    - Similar to Automotive Industry
    - Parts Dept.
BRT Research Activities (cont.)

- Electronic Guidance
- Collision Warning
- Deployment Planning (Riverside RTA)
- Advanced Bus Stop Designs
- BRT Decision Support Tool
  - Cost Benefit Analysis
  - Deployment Strategies
NBRTI Website

- Portal to the BRT Community
- BRT Project Updates
- Video and Image Library (A-23 site)
- Bibliographic Database
- Contact List
  - Consortium
  - Friends
  - Industry
- Links
- Reports
- Meetings
What is a BRT system?

**BRT** is an integrated bus-based “rapid” transit system typically utilizing highly-flexible service and advanced technologies to improve customer convenience and reduce delays.
It’s no single trait, but the combination of traits that make BRT systems successful!
“Travel Ways”

- Exclusive or shared transit ways
  - at-grade or grade-separated
- Bus priority/HOV lanes (Houston)
  - exclusive on- and off-ramps
- Dedicated transit lanes (Curitiba, Brisbane, Pittsburgh)
- Transit streets or transit malls
  - transit–only streets (downtowns, Seattle and Denver)
- Mixed traffic (Los Angeles)
  - signal priority/preemption
- Queue jump (Auckland, NZ)
  - permit BRT vehicles to “jump” ahead of traffic queues
  - preemption
Los Angeles, CA
Auckland, New Zealand
Adelaide, Australia
Service Alternatives

- Premium service
- Higher average speeds than local service
- Average speeds comparable to LRT
- Parallel local and express service
- Major commuter corridors
- Skip stop
- Reliable
- High frequency
- All day
- Reduced dwell time
- Highly flexible
- No schedule
Just How Important Is Frequency?

All else being equal, frequency trumps mode.
Route Structures

- More direct than local service
- “Off-line” stations
- Anchored by major activity centers
- Major corridors
- Feeder routes
- Operate in low-density residential
- Flexible
- Effect on Land use
- No map
Honolulu, Hawaii

Phase 1: Middle Street to UH-Manoa  
March 1999

Phase 2: Pearlridge Extension  
August 1999

Phase 3: Waipahu Extension  
June 2000
Curitiba: Transit/Land Use
Stations: Potential Characteristics

- Differentiated from regular bus stops
- Enhanced shelters and/or transit center design
- Designated passenger “platform,” possibly raised
- Enclosed
- Can be multi-modal
- Other facilities (taxi stands, parking, etc.)
- Customer information (real-time)
- Joint-development/multi-use
- Facilitates quick boarding and exit
- Precision docking
- ADA accessible
Customer Experience

- Stations
- Map
- Payment
- Boarding
- Right-of-Way Design
- Live Info
- Relationship to Traffic
Customer Interface

Brisbane—Southeast Busway

It is entirely possible to create a rubber tire-based transit system with the customer experience of a high-end rail system.

“Brisbane is now at the leading edge in urban mass transit... the new busway...will attract international attention for the level of quality and customer focus that [has been] incorporated.”

—Hans Rat, Secretary General, International Union of Public Transport
Curitiba: Make Buses Like Metro

**Goal:**
Make buses run like subways.

**Problem:**
Buses take so long to load.

**Solution:**
Use mass-produced “tube stations” with platform-level loading, multiple doors along vehicles, and payment at station entrance, reducing “dwell time” to 20-30 seconds per stop.
Level Boarding

Level Boarding is the key to creating a rail-like experience. All of the above examples are bus-based systems that use it.
Vehicles

- Unique/distinct aesthetic design/look
- Environmentally friendly
- Variable propulsion systems
- High capacity (articulated, bi-articulated)
- Wide aisles, increased passenger comfort
- **Low-floor**
- Large window design
- Increased amenities (laptop connections)
- Multiple double-wide doors
- Dual-sided entry/exit
- LRT like
Los Angeles, CA
Curitiba, Brazil
Rouen, France

Figure 2. Civis vehicle.

Figure 3. Interior of Civis vehicle.
ITS: Advanced Technologies

Command Center

NextBus – Real-Time Customer Information
ITS – Advanced Technologies

- **Automated vehicle location**
  - real-time information
  - next vehicle
  - stop announcements
  - “ITEC” on-board info system
- **Signal priority/preemption**
  - reduce vehicle bunching
  - consistent wait times
  - on-time performance
- **Surveillance & security**
  - at stations
  - on vehicles
Vehicle Guidance

Curb-Guided (O-Bahn)

Embedded Guiderail

Adelaide: US$9 million/mile

Nancy, France

Leeds, UK: US$5 million/mile

Rouen, France

Optical Guidance
Signal Preemption and low floor vehicles aided in a:

- 28 to 33% decrease in travel time
- 30% increase in ridership, 14% net new
- No appreciable impact on cross–street traffic
Faster Fare Collection

- Fast, efficient so as to speed boarding
- Simple to understand
- Minimal on-vehicle transactions
- Cashless
  - smart cards (multi-use)
  - pre-purchased tickets
  - passes
- Proof of payment
  - enter station
Curitiba, Brazil
Cost Effective

- Vehicles
  - can be off-the-shelf
- No track or overhead wires
- “Travel Ways”
  - construction and maintenance
  - incrementally built (phases, flexible)
  - existing roadway network (mixed traffic)
- Uses existing vehicle storage facilities
- Uses existing and simple signal systems
- Workforce composition
  - using existing vs. acquiring new staff
  - wage differential for BRT vs. LRT
## Rapid Transit Mode Comparisons

<table>
<thead>
<tr>
<th>Statistic</th>
<th>BRT</th>
<th>LRT</th>
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<tbody>
<tr>
<td>ROW Options</td>
<td>Exclusive or Mixed Traffic</td>
<td>Exclusive or Mixed Traffic</td>
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<tr>
<td>Station Spacing</td>
<td>1/4 to 1 Mile</td>
<td>1/4 to 1 Mile</td>
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<tr>
<td>Vehicle Seated Capacity</td>
<td>40 to 85 Passengers</td>
<td>65 to 85 Passengers</td>
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<tr>
<td>Average Speed</td>
<td>15-30 mph</td>
<td>15-30 mph</td>
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<tr>
<td>P/H/D (exclusive ROW)</td>
<td>Up to 30,000</td>
<td>Up to 30,000</td>
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<tr>
<td>P/H/D (arterial)</td>
<td>Up to 10,000</td>
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<tr>
<td>Capital ROW Cost/Mile</td>
<td>$0.2M to $25M/Mile</td>
<td>$20M to $55M/Mile</td>
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<td>Capital Cost/Vehicle</td>
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<td>O&amp;M/SH</td>
<td>$65 to $100</td>
<td>$150 to $200</td>
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Comparative Capital Costs

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<th>Mode</th>
<th>Cost/Mile</th>
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<th>100</th>
<th>150</th>
<th>200</th>
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<tbody>
<tr>
<td>Subway</td>
<td>$200-350 m</td>
<td>3-5 Miles</td>
<td>10-35 Miles</td>
<td>18-200 Miles</td>
<td>35-200 Miles</td>
<td>1000-2000 Miles</td>
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<td>Light Rail</td>
<td>$30-100+ m</td>
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<td>Busway</td>
<td>$5-55 m</td>
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<td>Rail-Like Vehicles</td>
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<td>Rapid Bus</td>
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If the goal is to raise transit’s mode share in the region within a relatively short time span, it will be necessary to consider means of providing higher grade transit at lower cost.
Smart Thinking on Costs

Miami’s South Dade Busway supports ten-minute frequency service throughout the day using minibuses that cost under $35/hour to operate. Achieving the same frequencies with light rail would easily cost many times that.
A Bus-Based System that’s "Espectacular"
Bogotá, Colombia

Bogota’s new Transmilenio system reached 600,000 daily riders in its first year.
Conclusions

• Offer as “premium” service
• Brand as unique, integrated service
• Unique characteristics
  • vehicles
  • stations
  • fare payment
  • “running way”
  • higher speed
  • highly flexible
  • ITS
• Environmentally friendly
• Alternatives analysis/MIS
• The future
  • precision docking
  • magnetic guidance (driverless)
  • customer demand/route deviation service
  • interim alternative for rail corridor development
Conclusions

- BRT can provide effective solutions
- Characteristics suited to low density environments
- Offer advantages in early & incremental implementation
- Ultimately its reliability, directness, convenience
- Low cost, high capacity alternative to rail
- A tool worth having in the tool box
Bus Rapid Transit

BRT combines the quality of rail transit and the flexibility of buses. It can operate on exclusive transitways, HOV lanes, expressways, or ordinary streets. A BRT system combines intelligent transportation systems technology, priority for transit, cleaner and quieter vehicles, rapid and convenient fare collection, and integration with land use policy. For details, see the Reference Guide, Issues in BRT, and descriptions of participating projects.