Advanced Technologies & Smart Cities
Technology convergence will revolutionize transportation, dramatically improving safety and mobility while reducing costs and environmental impacts.

Benefits
• Order of magnitude safety improvements
• Reduced congestion
• Reduced emissions and use of fossil fuels
• Improved access to jobs and services
• Reduced transportation costs for gov’t and users
• Improved accessibility and mobility

Connected Vehicles
Vehicle Automation
Internet of Things
Machine Learning
Big Data
Sharing Economy

Connected-Automated Vehicles

Smart Cities
The Challenge

- 56.7 million; 19% US population
- Unemployment Rate – 13.2%; Income: $38,400 ($61,000)
- Poverty: 24.7% (9.0%)

- 21.4 million Americas are Veterans
- 2.6 million deployed in 2012, 45% of eligible Veterans file claims for disability
- Spending: $0.93 billion (2006) vs. $5.95 billion (2012)

- Disability rates rise as people get older
- 43.1 million age 65+ in 2012 or 1 in 7 people
- 28% live alone
- Expected to reach 72.1 million by 2030

WHO estimates that more than One Billion people in the world live with some form of disability
The global GDP lost annually due to disability is estimated to be $1.37 trillion to $1.94 trillion
Australian study: reducing the gap in workforce participation by 1/3 would result in a $43 billion increase in GDP over 10 years
Challenges and Opportunities

- 76% people with disabilities say adequate transportation is important to their job search
- 29% consider it a significant problem in accessing jobs \(^1\)

<table>
<thead>
<tr>
<th>Targeted Populations</th>
<th>Persons with Disabilities</th>
<th>Veterans with Disabilities</th>
<th>Older Adults</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Types of Disabilities</th>
<th>Vision</th>
<th>Mobility</th>
<th>Hearing</th>
<th>Cognitive</th>
</tr>
</thead>
</table>

| Enabling Technologies | ITS, Wireless & Sensors | Connected Vehicles | Automated Vehicles/ Personal Mobility | Robotics, Artificial Intelligence | Accessible Data |
### Documenting User Needs

#### Top Identified Barriers

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>75</td>
<td>Lack of / or inaccessible signage/maps/landmark identifiers/announcements</td>
</tr>
<tr>
<td>71</td>
<td>Navigation difficulties (do not know when arrive, transfer time, distance)</td>
</tr>
<tr>
<td>67</td>
<td>Inconsistent accessible pathway infrastructure</td>
</tr>
</tbody>
</table>

#### Top Identified User Needs

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>102</td>
<td>Amenity information (e.g. restroom, shelter)</td>
</tr>
<tr>
<td>88</td>
<td>Real-time transportation information</td>
</tr>
<tr>
<td>76</td>
<td>Safety, security and emergency information</td>
</tr>
</tbody>
</table>

#### Top Identified Issues with Technology

<table>
<thead>
<tr>
<th>%</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>46%</td>
<td>Training to use and awareness of new technology</td>
</tr>
<tr>
<td>21%</td>
<td>Affordability</td>
</tr>
<tr>
<td>16%</td>
<td>Performance quality (especially long-distance travel, rural areas)</td>
</tr>
</tbody>
</table>

**User Needs Final Report Due: Spring 2016**
Technology Recommendations

Wayfinding & Navigation Solutions
- Focus on integration of map data and standardized infrastructure descriptions from various sources
- New data unique and specific to ATTRI users should be developed

ITS & Assistive Technologies
- Focus on remote assistance for stakeholders and opportunities to inform and aid barrier traversal
- Modernizing assistive technology maintenance and asset management (area for advanced research)

Automation & Robotics
- Shared neighborhood autonomous vehicles which are cost effective and aid at traversing distances between transit stops, homes, and places of employment.
- Assist service models, electric vehicles, and autonomous vehicles create opportunities for novel accessible designs

Data Integration
- Reduce complexity and identify coordination in service matchmaking through open data and services
- Develop environment for community generated data

Enhanced Human Services Transportation
- Support initiatives by ridesharing services to involve ATTRI stakeholders and develop accessible versions of these services.
- Support mode shift through private on-demand ride services

Technology Scan Final Reports: Due Spring 2016
Application Development

Foundational Considerations

- Standard Accessible Data Platform
- Universal Design Standards
- Integrated Payment
- Leverage Existing Technologies

Smart Wayfinding & Navigation Systems
- Wayfinding and navigation systems for indoor and outdoor use
- Wearable technologies
- Community navigators

Pre-Trip Concierge & Virtualization
- Pre-trip and in-route traveler information
- Connected travelers
- Virtual caregiver help for pre-trip planning and on-route support

Shared Use, Automation & Robotics
- Assistive and collaborative robotics to enhance mobility
- Ability to plan and execute trips, associated services
- Transformative transportation alternatives

Safe Intersection Crossing
- Intersection crossing assistance for all travelers
- Pedestrians interface with traffic signals, vehicles and nomadic devices
- Guidance, notifications and alerts for optimization
Application Development

- Smart Wayfinding & Navigation Systems
- Pre-Trip Concierge & Virtualization
- Shared Use, Automation & Robotics
- Safe Intersection Crossing

Connected Citizens

Enabling Technology Solutions
- User Needs
- Data Sets
- Interoperability
- Universal & Inclusive

Policy & Institutional Interventions

Networks:
- Transportation
- Healthcare
- Home
- Workforce
Identifying user needs, determining the foundational considerations, and developing the applications and associated services to ensure accessible and independent mobility for all within a smart city.
ATTRI Program Trajectory

Phase 1:
Exploratory Research & Partnership Development

Phase 2:
Application Selection and Prototyping
- Collaboration & Partnerships

Phase 3:
Integrated Demonstrations and Pilots

ATTRI is addressing a significant transportation problem in a comprehensive way. The ATTRI Program is positioned to capitalize on potential large-scale opportunities.
Thank You!

Mohammed Yousuf
ATTRI Program Manager
Federal Highway Administration
Mohammed.Yousuf@dot.gov