INTEGRATED MOBILITY

Automated Transit (PRT) /Land Use/Architecture

Man and Machine
Low and High Tech
Movement

people, architecture, urban design,
energy, sustainability, transportation
and their future synergies
RELATIONSHIPS SUPPORTING EACH OTHER
CREATING NEW COMMUNITY VISIONS

- INDIVIDUAL MACHINES
- NEW MACHINES
- GROUP MACHINES

- ARCHITECTURE
- URBAN
- GLOBAL

- SYMBIOTIC RELATIONSHIP
- TECHNOLOGY
- Low/High

- Movement
- Built Forms
- Power Sources

- FUEL CELL - ELECTRIC
- WIND - SUN
- TRADITIONAL - HYBRID

Copyright
Shannon McDonald, 2004
Shannon Sanders McDonald, AIA
Only New Movement Technologies Can Change Design

Site Coverage for Typical Commercial Development (averages for Olympia, Washington)

- BUILDING/FOOTPRINT 26%
- LAWNS/LANDSCAPING 13%
- STREETS 3%
- SIDEWALKS 4%
- PARKING 54%

How can **WE weave** all of these aspects to create a healthier, safer, saner environment for all as technology continues to change?
<table>
<thead>
<tr>
<th>SMALL SCALE CHANGES</th>
<th>LARGE SCALE CHANGES</th>
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<tbody>
<tr>
<td>Pay-On-Foot / Pay–On-Foot Solar</td>
<td>Automated Parking</td>
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<tr>
<td>Parking by Cell Phone</td>
<td>Automated Transportation Systems -PRT</td>
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<tr>
<td>Car - Sharing Programs</td>
<td>New Fuel and Energy Sources</td>
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<tr>
<td>Dynamic On-Street Parking/Road Pricing</td>
<td>Road Infrastructure</td>
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<table>
<thead>
<tr>
<th>LOW TECH</th>
<th>HIGH TECH</th>
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<tr>
<td>Walkable Communities</td>
<td>GIS – Geographic Information Systems</td>
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<tr>
<td>Universal Design</td>
<td>GPS – Global Positioning System</td>
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<tr>
<td>Utilizing Existing Infrastructure and Vacant and Unusual Lot Configurations</td>
<td>AVI – Automatic Vehicle Identification</td>
</tr>
<tr>
<td>Bicycle Connections</td>
<td>LPR – License Plate Recognition</td>
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<td></td>
<td>PGAS - Parking Guidance Automated Systems</td>
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INTEGRATED MOBILITY

PRT (Personal Rapid Transit) & Connections with Other Modes and the Built Environment

Overlapping Issues

- Modes of Transportation
- Energy Source/Sustainability
- Human Interface
- Physical Location

Design for Architectural, Land Use and Planning Interfaces
Architectural, Land Use and Planning Interfaces

- Design for the Specific Community
- Opportunities for multi-dimensional solutions
- More frequent community based stations
- Mixed-Use applications
- Fully accessible
Parking and Shuttle Combinations Often Are Not Used

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Accessibility is singular and dependent on car

PATH DISTRIBUTION FOR INDIVIDUALS WITH DISABILITY

Due to the hilly terrain of the campus in order for a disabled person to travel from North to South, he or she would need to travel vertically (Elevator) through some of the buildings.
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PRT  (Personal Rapid Transit)

& Connections with Other Modes and the Built Environment

PRT,  GRT OR DUAL-MODE

As environmentally sustainable fuels sources have greater applications the PRT system can be fueled by other generating sources such as solar panels and other renewable energy sources linked to the power grid.

Eventually the Starr Car System as envisioned by William Alden where the “personal automobile” links with other “personal automobiles” to form transit now called dual-mode can occur.

StarrCar—Photo courtesy of Bill Alden of Self-Transit Systems
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**PRT (Personal Rapid Transit)**

& Connections with Other Modes and the Built Environment

New Interconnections

- Complete linkages between transit, architecture, energy, parking, and urban planning
- Environmentally sustainable solutions
- Pedestrian and machine oriented environments
- Totally integrated walkable land use decisions

Masdar City is the world’s first carbon-neutral zero waste city and is head-quarters of the International Renewable Energy Agency (IRENA). PRT is part of the underground infrastructure as a part of a complete package including all forms of transit in this car-free city.
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PRT (Personal Rapid Transit) & Connections with Other Modes and the Built Environment

- Connects Business Parking with T5
- 2.4 miles of single guideway
- 21 vehicles
- 3 stations
- 5min journey time

Traverses
2 rivers and 7 roads
Green belt land
Negotiates Aircraft surfaces
Bridges in-ground services
Conforms to T5 architecture
Looks “Intended”

Courtesy Martin Lowson: © ULTra Advanced Transport Systems Ltd.
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PRT (Personal Rapid Transit)

& Connections with Other Modes and the Built Environment

• 18 miles of track
• 80% elevated
• 350 vehicles
• 50 stations

Courtesy Martin Lowson: © ULTra Advanced Transport Systems Ltd.
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PRT (Personal Rapid Transit)

& Connections with Other Modes and the Built Environment

**In-building station:** Configurations, strategies and multiple synergies

What are the *design* and code issues?

*Basic Design Issues:*

visual connections for people and machine people interactions between uses small scale operations display accessibility safety security sustainable approaches

photo credit: Shannon Sanders McDonald, Architect
INTEGRATED MOBILITY

PRT (Personal Rapid Transit)

& Connections with Other Modes and the Built Environment

In-building stations, Configurations, strategies and multiple synergies

Basic Code Issues:

ASCE People Mover Standards – Part 3

NFPA-130, (2007) 5.1.1.2

“Special considerations necessary”

NFPA 101, other NFPA as appropriate for specific details

IBC Fire

Other IBC and local code requirements as appropriate to the building type and building type mix

photo credit: Shannon Sanders McDonald, Architect

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PRT (Personal Rapid Transit)

& Connections with Other Modes and the Built Environment

Plan Connections: Configurations strategies and multiple synergies

- Multi-directional
- Fully networked
- Multiple smaller stations for each community
- Potential for spatial or multi-level connections
- Potential to create fully walkable accessible communities

Student: Montana State University Matthew Killiam, 2002
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PRT (Personal Rapid Transit) & Connections with Other Modes and the Built Environment

Section Connections: Configurations strategies and multiple synergies

- Multi-directional
- Fully networked
- Multiple smaller stations for each community
- Potential for spatial or multi-level connections
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Student: Brandon Zahurba University of Nebraska 2001
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PRT  (Personal Rapid Transit)

& Connections with Other Modes and the Built Environment

Montana State Student work – Eryn Mikelson, 2002
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PRT (Personal Rapid Transit)

& Connections with Other Modes and the Built Environment
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*PRT* (Personal Rapid Transit)

& Connections with Other Modes and the Built Environment

We can move a PRT

- by elevator
- by ramp

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PRT  (Personal Rapid Transit)
& Connections with Other Modes and the Built Environment
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PRT (Personal Rapid Transit)

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photo credit: Shannon Sanders McDonald, Architect
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PRT (Personal Rapid Transit) & Connections with Other Modes and the Built Environment

Filter Garden—Leven Betts Studio.
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**PRT** *(Personal Rapid Transit)*

& Connections with Other Modes and the Built Environment
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PRT (Personal Rapid Transit) & Connections with Other Modes and the Built Environment

Connecting the Campus

In order for SF State to be fully connected to other enclaves, it needs a space to serve as its outlet for commuting across multiple scales. Metropolitan Atlanta has so far failed to effectively create diverse methods of connection between its neighborhoods, districts, cities, counties. The primary transportation system is the road network. This system has the potential to operate across almost any distance, but it isn’t the most efficient at all scales.
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PRT *(Personal Rapid Transit)*

& Connections with Other Modes and the Built Environment

<table>
<thead>
<tr>
<th>System</th>
<th>Distance (miles)</th>
<th>Capacity (passengers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRT</td>
<td>m</td>
<td>1-4 (maximum)</td>
</tr>
<tr>
<td>Road (bus, tram, etc.)</td>
<td>m, l, xl</td>
<td>1-5 (max), 1-50 (max)</td>
</tr>
<tr>
<td>Subway (mezzanine)</td>
<td>m, l</td>
<td>150 (theoretical max)</td>
</tr>
<tr>
<td>Train (underground)</td>
<td>l, xl</td>
<td>800 (average)</td>
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PRT  *(Personal Rapid Transit)*

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