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ULTra and Developments

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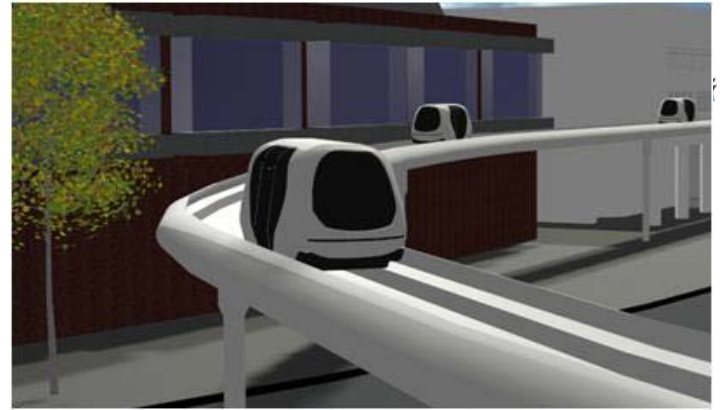
Outline



- Background
- Heathrow Application
- Experience to date
- Future Possibilities
- Autonomous Vehicles and PRT
- Conclusions



Objective



ULTra: Urban Light Transit:

Started January 1995 at University of Bristol

To define an urban transportation system for the next century, meeting future needs for flexible personal transportation, while being highly acceptable in an urban environment.

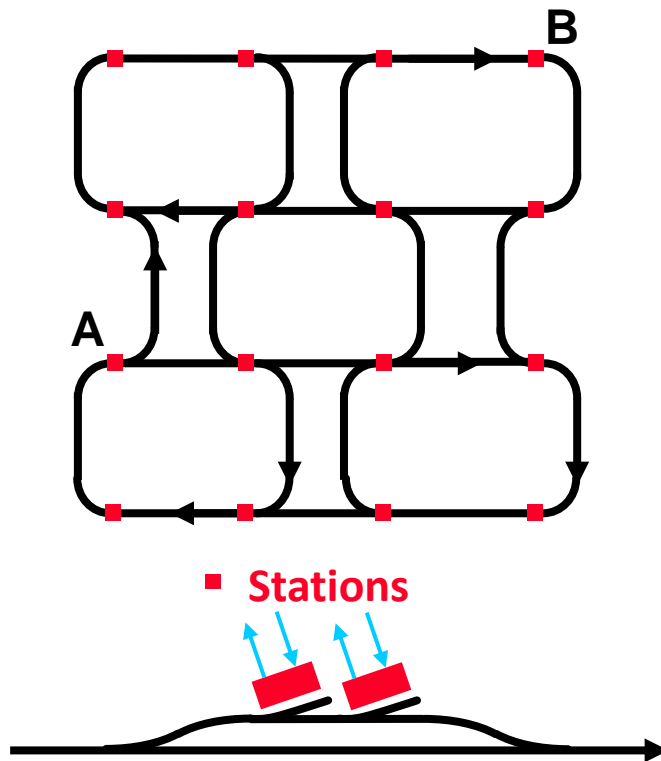
Requirements for the Ideal Transportation System

	Car	Public Transit
Available on Demand	Yes	No
Goes everywhere	Yes	No
No Stops	No	No
Environmentally friendly	No	?
Safe and Secure	?	?
Low Cost	Yes	?
Integrates with other modes	No	?

ULTra



A system of driverless small vehicles operating on a segregated track



- Available on demand
- Goes everywhere
- Non Stop
- Environmentally Friendly
- Safe and Secure
- Low Cost
- Integrates with other modes

ULTra

Yes

?

Yes

Yes

Yes

Yes

Yes

ULTra Control / Safety Case

Three layers

- Central synchronous control : assigns guaranteed safe paths to each vehicle
- Autonomous laser guidance maintains vehicle to assigned path
- Independent Automatic Vehicle Protection system using fixed block electromagnetic signalling

ULTra approved to carry passengers with no driver in 2003



Heathrow: Issues

- Congestion
- Space restrictions
- Pollution problems
- Capacity restrictions
- Passenger Service Issues



PRT seen as only practical solution to meet Heathrow connectivity requirements

Application at Heathrow

- 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"



Contract Awarded 2005



Heathrow pod today



Heathrow pod is up, running, and since opening in April 2011 has carried 500,000 passengers.

Average waiting time for a vehicle to arrive is about 10 seconds, with 80% of passengers having no wait at all.

High Reliability

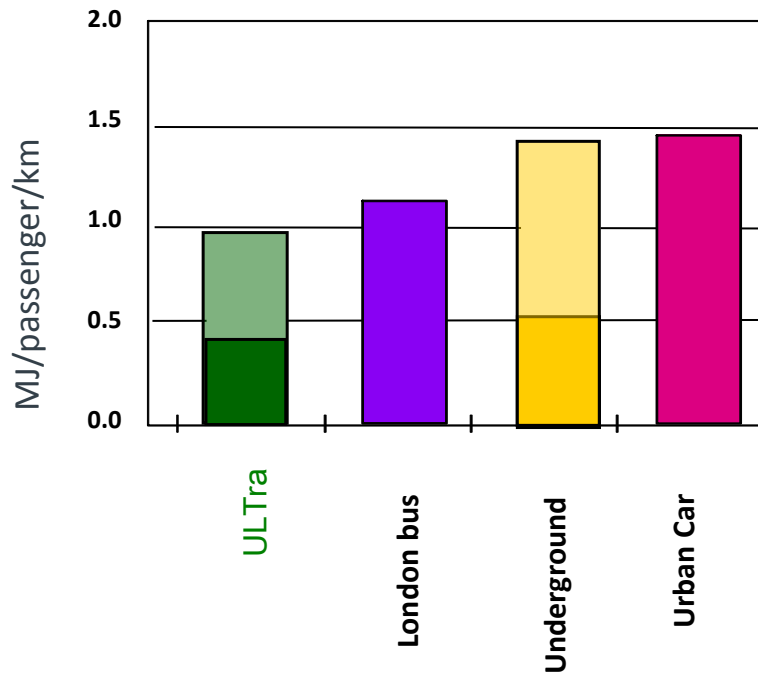


System	Availability
Heathrow Pod	99.0% (2011/2012)
Heathrow Express	98.0% (2010/2011)
London Underground (LUL)	95.6% (2010/2011)
Docklands Light Rail (DLR)	97.4% (2010/2011)
Tramlink	98.6% (2010/2011)
Overground	94.8% (2010/2011)

Figures from Transport for London



High Sustainability



UK Data. Assumptions:

- Average passenger loads
- Well to wheel (darker shading - direct electricity use only)

- Light-weight electric vehicles
- Low speed
- Only run when there is user demand
- Avoid 'stop & go' waste
- No on-site emissions
- Low external noise
- Low embodied energy

Passenger reactions



The future has arrived!

Super cool !!

Fun!

Very impressed

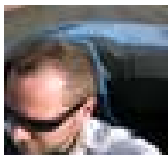
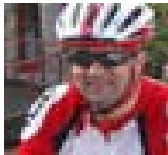
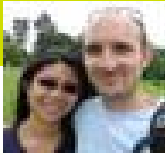
Awesome!!

I love these things.

Amazing

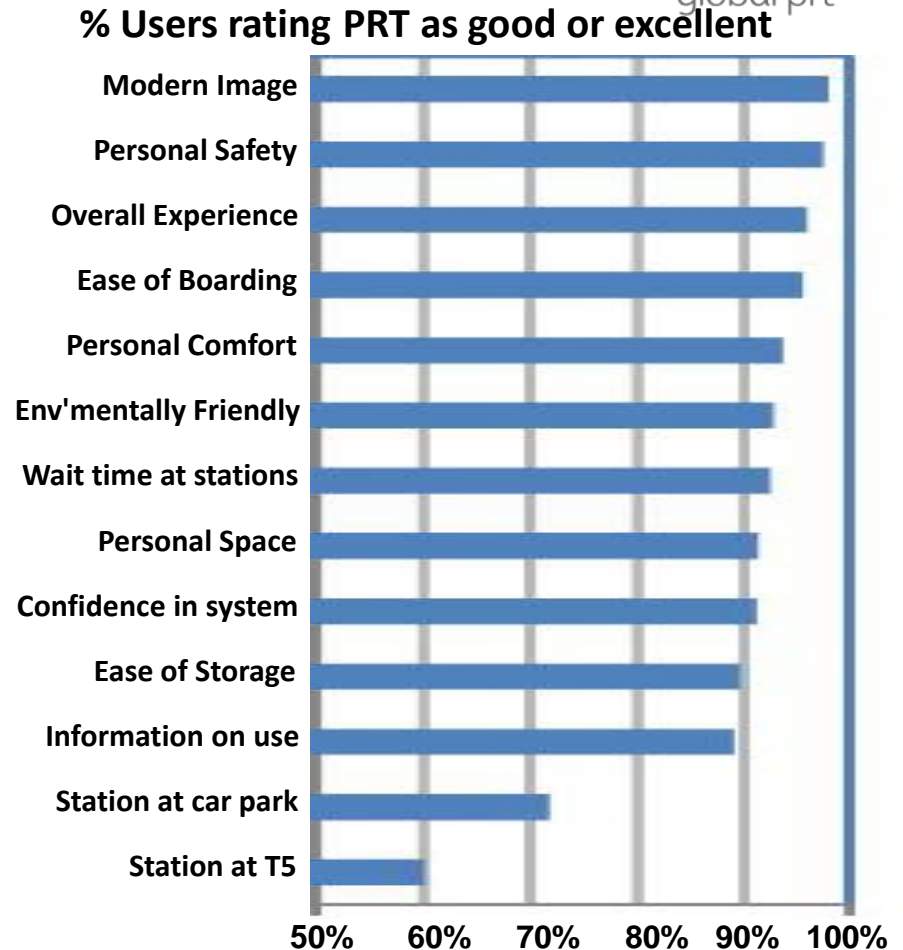
A transport revelation.

Greatest mode of transport known to man!



Passenger Ratings

Survey of 314 Heathrow Pod users conducted in May 2011 as part of the EU City Mobil Project.



Awards Success

London Transport Awards; Winner – Most Innovative Transport Project

British Parking Awards - Winner in three categories

AirRail News Awards; Winner – Innovation of the Year

“The Ultra Heathrow Pod stands out in terms of its technical, customer and business case innovation. The potential is huge and the way it has been implemented is an excellent example of how to test a new concept.”

“The Heathrow PRT is the best innovation ever in the support of airport’s needs. ULTRA should be proud to be at the forefront of an initiative that will transform travel globally in this century.”

“For years this innovative project was presented at Transport Conferences and see, now it is reality! And above all it works perfectly. Congratulations!! A true case of perseverance!”



Proving the benefits of a PRT system



- Service
 - No waiting
 - Reduced journey times
 - Predictability
 - Experience
- Environment
 - Reduced emissions – NOX, CO2, PM10
 - 50,000 bus trips per year eliminated



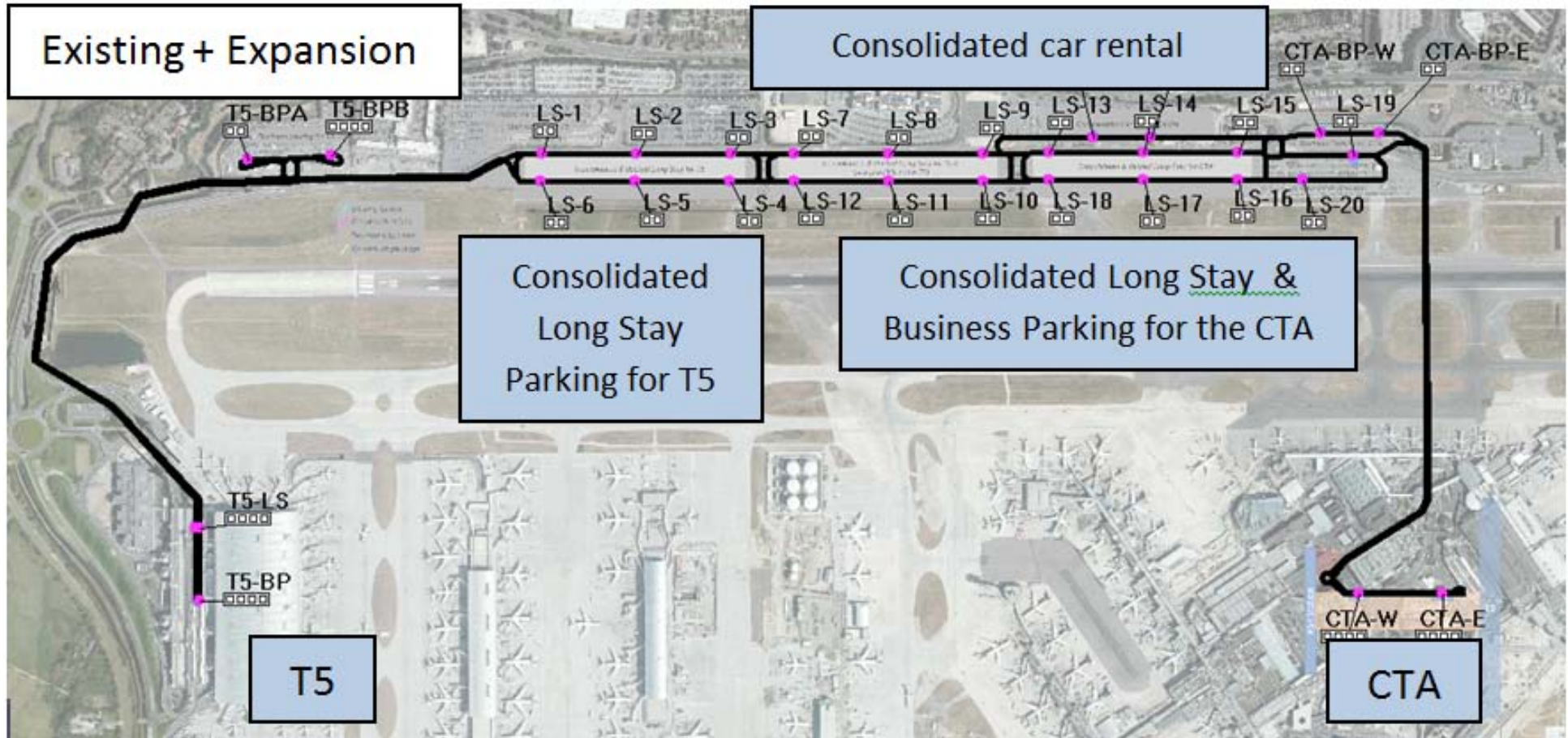
Next steps for Heathrow



- Conducting detailed feasibility work for expansion to T1,2,& 3



Early expansion alignment



Heathrow issues

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are the same as the issues faced by other airports, cities, business parks, commercial & university campuses, and residential areas



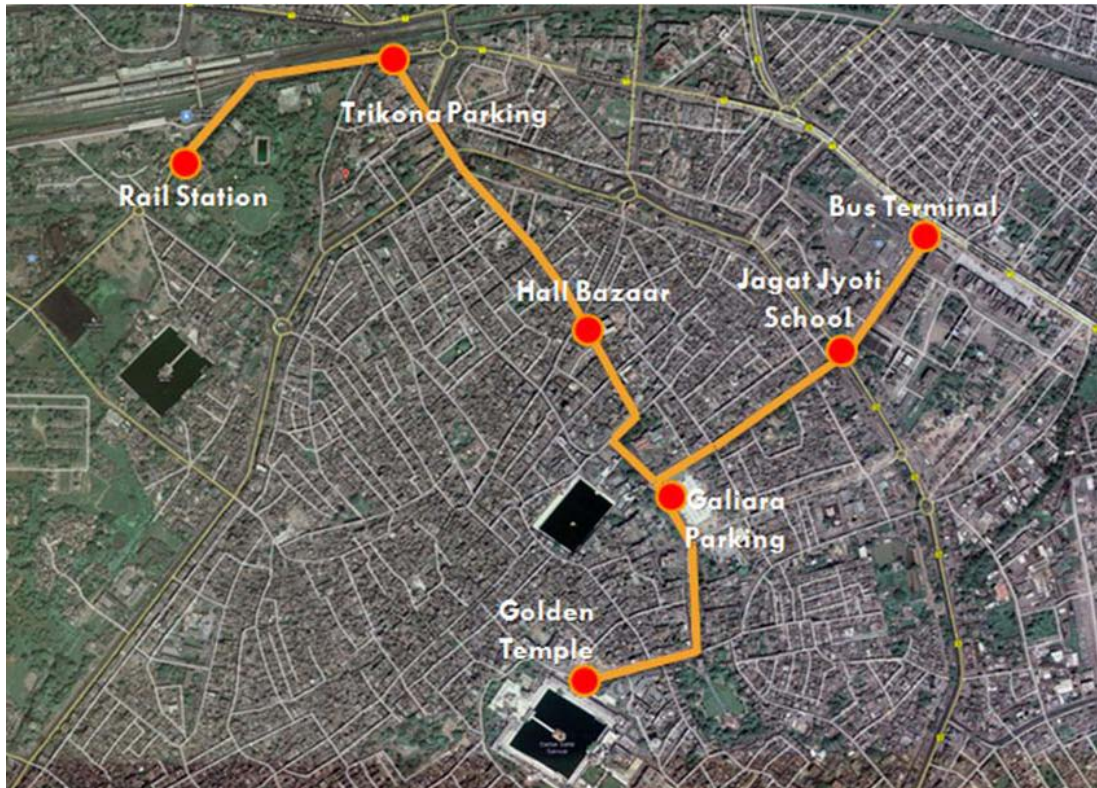
Next Steps for ULTra



- Exploring applications around the world
- Ultra PRT's India partner: ULTra Fairwood
 - First project: Link to Amritsar Golden Temple.



Amritsar details



- The first urban application of PRT.
- Up to 100,000 passengers a day
- 8km / 4.8 mile elevated guideway
- 7 stations
- Takes 35% of daily visitors to the Golden Temple
- Saves up to 30 minutes on the current journey times

The world's largest PRT system to date, entirely privately financed.

Due go live in 2014

Autonomous Vehicles and PRT



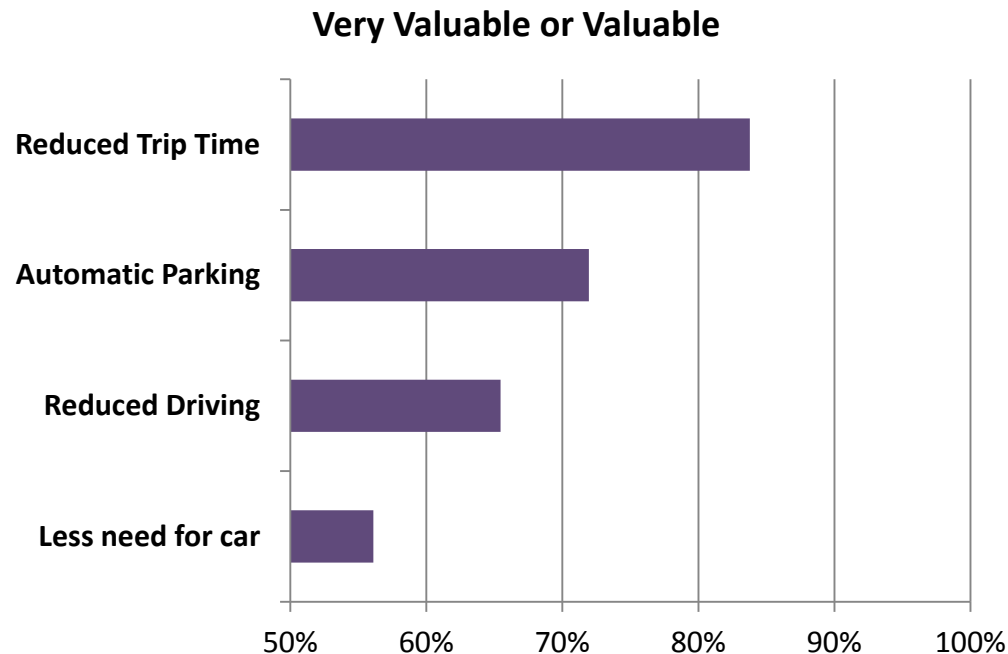
- Major parallels between AV and PRT
- Many AV technologies can find early commercial application in PRT
- AV development could learn from the PRT experience
- Dual mode opportunity



Dual Mode Questionnaire



What features would you value in future transportation?



220 responses: Focus Group, Students, Retired Engineers, Internet

Conclusions

- Practical operations demonstrate that PRT systems offer a very attractive service to passengers.
- PRT experience can be relevant to the further development of autonomous vehicles
- Driverless car technologies offer a variety of opportunities to improve PRT capabilities.



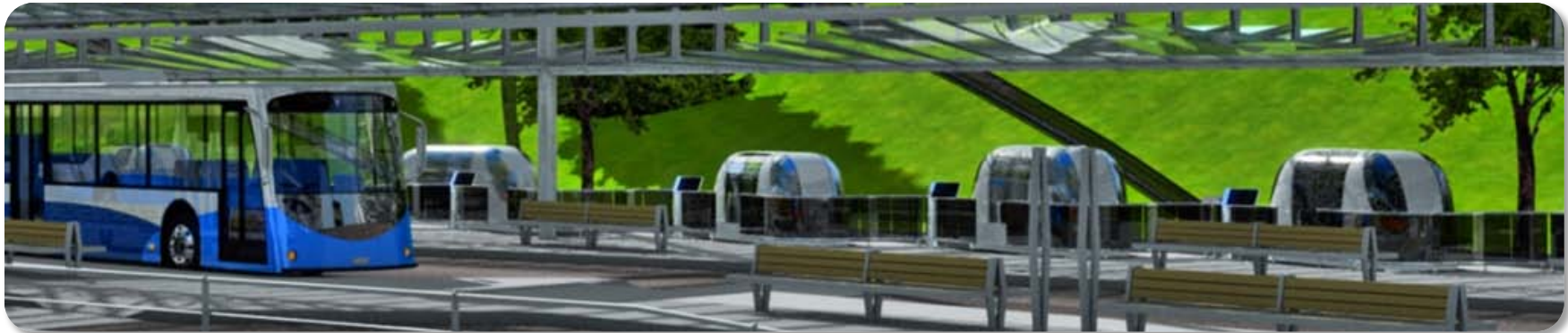
Thank You
- and please visit us at Heathrow

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Enhancing public transit

- Independent studies by Arup and ITS Leeds show significant benefits to existing bus & rail services when they are supported by an on-demand PRT network.
 - **Cardiff (UK):** A PRT system covering the last 2km to the Bay area would increase patronage by >100% on existing bus & rail services.
 - **Gateshead (UK):** a 21km PRT network serving the inner city would increase the use of rail travel by 168% in the peak and 232% in the off-peak.



UK Transport History

