URBAN TRANSPORT FUTURE
WHAT WILL HAPPEN TO CITIES WHEN WE HAVE AUTONOMOUS CARS?

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DIRECTOR RESEARCH

PLP/ARCHITECTURE
A SMALL LESSON IN TOPOLOGY

ONE VEHICLE (POD) PER TRACK.
THE MOST PRIMITIVE FORM
RAPIDLY ABANDONED
EXCEPT BY THE LIFT INDUSTRY
A SMALL LESSON IN TOPOLOGY

ONE-WAY SYSTEM – TWO-WAY TRACK
ALL TRANSPORT SYSTEMS USE THIS
EXCEPT LIFTS
HENCE SKYPOD (PLP RESEARCH PROJECT)
TOPOLOGY OF CONVENTIONAL METRO / UNDERGROUND / SUBWAY
TOPOLOGY OF CONVENTIONAL METRO / UNDERGROUND / SUBWAY

ALL INTERCHANGE IS ON FOOT

PLP/ARCHITECTURE
NEW TOPOLOGY
DISTRIBUTED SEPARATE DIRECTION TRACKS

EACH DIRECTION IS SEPARATED TO CREATE GRID
NEW TOPOLOGY
ADD AUTO-SWITCHES

AUTO-SWITCH ALLOWS CHANGE WITH NO SLOWING-DOWN
NEW TOPOLOGY
ADD SEPARATED ON-OFF INFRASTRUCTURE

ON / OFF STOPS CAN BE STATIONS OR EXISTING ROAD SYSTEM
WHAT SORT OF VEHICLE?
IT IS CONTROL SYSTEMS THAT MATTER
NOT THE SHAPE OF THE VEHICLE OR EVEN ITS WHEELS

THIS IS WHERE ROBOTS TAKE OVER – AUTONOMOUS VEHICLES

PLP ARCHITECTURE
Why redesign the vehicle, when it is the controls which need changing?

TRANSPORT PODS = AUTOMONOUS ELECTRIC VEHICLES = CARS

Motorway separation – 3 SECONDS = 66 METERS
Platoon separation – 0.1 SECONDS = 2 METERS
CROSSRAIL – PACKED WITH 1500 PEOPLE EVERY 5 MINUTES = \textbf{18,000 PASSENGERS / HR}

CARTUBE – PACKED WITH 4 PEOPLE PER CAR AT 80 KM /HR (50 MPH) = \textbf{40,000 PASSENGERS / HR}
SEGREGATED TRACK

- Only a SEGREGATED TRACK will provide enough speed to get capacity
- True for all systems – trains and roads
- Mixed traffic inevitably slows down system

ON SHARED TRACKS PHYSICS RULES

STOPPING DISTANCE AT 30 MPH - 75 FT : 50 MPH - 175 FT

PLP/ARCHITECTURE
THE DIGITAL TRAIN
THE AUTO-SWITCH
Network Criteria

**Primary Network**
- Traffic never stops (just as on motorway)
- Overall controller allows Dynamic Platoon Protocol data ahead of time and distributes load
- Dynamic pricing ensures the network to never overload

**Secondary Network**
- Access to local stops, reduced speed
- Is the road network
- Access to all drop-off points
- Already exists
- Issue is interchange between primary and secondary network
DYNAMIC PLATOON PROTOCOL
Controls spacing to allow smooth joining
Predictive spacing
System never slows
Typical speed 80 km/hr (50 mph)
Grid allows multiple routes
System dynamically control flow
NETWORK TOPOLOGY

SIMPLIFICATION
CONVENIENCE
(Point-to-point Travel)

- TAKE ME FROM WHERE I AM TO WHERE I WANT TO GO
- WHETHER BY RENTAL OR MY OWN VEHICLE
SUSTAINABLE ENVIRONMENT

- CHANGE FROM HYDROCARBON ECONOMY
- SUSTAINABLE TRANSPORT
- ELECTRIC PROPULSION
- CUT DOWN AIR POLLUTION
- CUT DOWN NOISE
NO CHANGING
(NO TO INTERMODAL)

- TRAINS STOP AT STATIONS
- TRAINS RUN TO TIMETABLES
- NO MORE HUGE CARPARKS
- CAR PARKS THEMSELVES OUT OF SIGHT
NETWORK IN LONDON

- TRAINS STOP AT STATIONS
- CARS STOP AT DESTINATIONS
- CARS FIT IN SMALL TUNNELS
- MOTORWAY INFRASTRUCTURE ALREADY HERE
ROSAM (ROadSlotAllocationMechanism)

Prevention Policy

- POLICY IS DYNAMIC
- BY KNOWING THE FUTURE
- BY CONTROLLING ACCESS

![Diagram showing policy over day cycle with time on the x-axis and capacity on the y-axis. The policy shows three states: ONLY SHARED, MULTI_OCCUPANCY, and FREE RUNNING.]

PLP/ARCHITECTURE
ROSAM (ROADSLOTALLOCATIONMECHANISM)
Policy by politics
V1 Free Market

- POLICY IS DYNAMIC
- BY KNOWING THE FUTURE
- BY CONTROLLING ACCESS

Policy over day cycle

- AUCTION SLOTS
- FREE RUNNING
- AUCTION SLOTS
ROSAM (ROadSlotAllocationMechanism)
Policy by politics
Socialism

- POLICY IS DYNAMIC
- BY KNOWING THE FUTURE
- BY CONTROLLING ACCESS