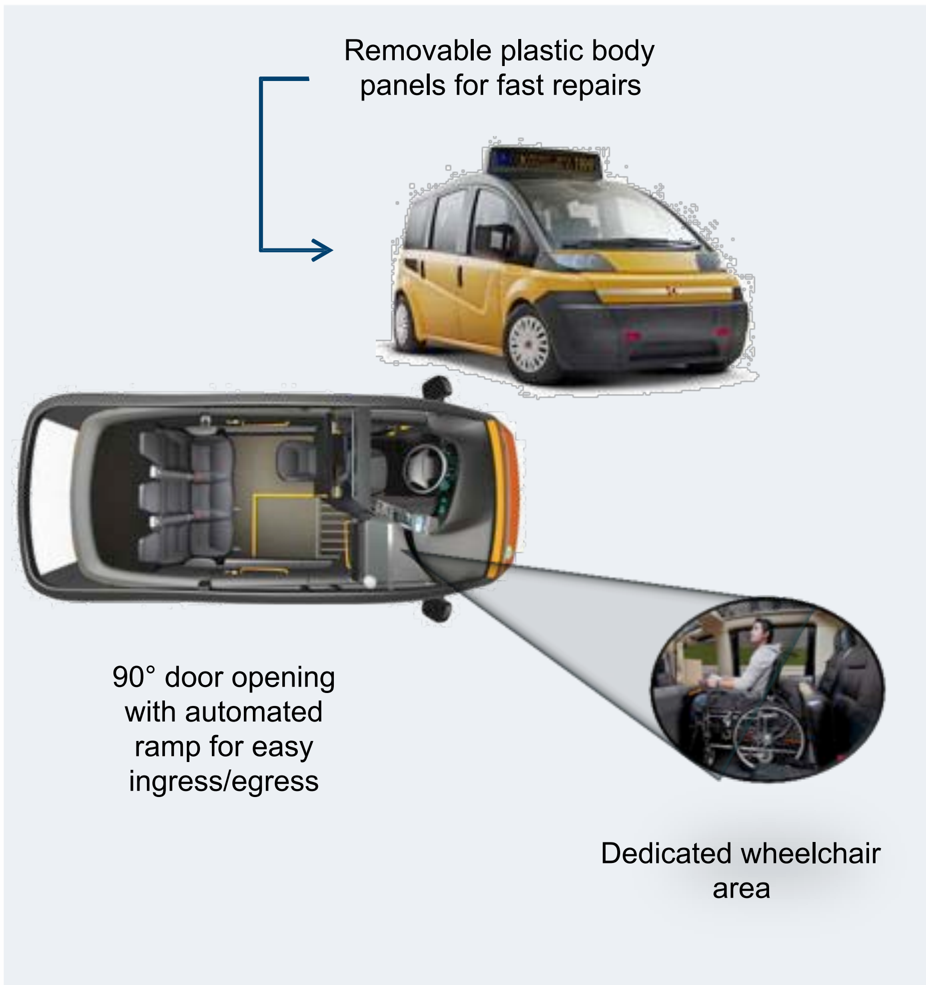
Shared Mobility Vehicle Design: Towards the Future

While latest taxi models are becoming more feature rich along with electric capabilities, OEMs are also focused on developing compact yet efficient concepts for shared mobility in the future

Karsan Concept V1



Major Players Shaping the On-Demand Bus Transit Market

NORTH AMERICA

Chariot
5000 rides per week
Raised $3 million in funding Acquired by Ford

AC Transit Flex
Launched by Alameda-Contra Costa Transit District Relatively lower fares - $2.1 for adults On-demand transit services have also been launched by Santa Clara Valley Transportation Authority

OurBus
70 passengers per day in New York and New Jersey
To open 75 routes by the end of 2017

Skedaddle
Inter-city on-demand bus transit
Number of members doubled to 80,000 between 2015 and 2016
250,000 rides in 2016

EUROPE

Moobil+, DrinBus: On-demand public bus services in Germany and Italy

Tuup
Offers multi-modal mobility options – on-demand ride sharing, intercity bus and train, car rental, and car and bike sharing
Kyyti is its on-demand shuttle service
15,000 users in 2 months
Service to expand from Oulu to larger cities in 2017

Allygator: Private on-demand buses (Germany)

ASIA PACIFIC

Didi Chuxing
Didi Bus - buses sourced from leasing companies & licensed travel agencies

Beeline
Singapore's on-demand bus app that directly connects passengers with bus operators

Shuttl
80,000 downloads
Target: 100,000 rides/ day by 2017

ZipGo
50,000 downloads
> 1000 rides/ day

CityFlo
1800 rides/day
5000 downloads

Australia
NSW Government will launch on-demand bus services in 2017

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Trends in Demand Responsive Shuttles Market

The demand responsive shuttle market is witnessing rapid transformations that is being accelerated by a wide range of stakeholders

Demand Responsive Shuttles Fleet Size,Global

Market Revenues

2017
$ 32 million

2025
$ 57 billion

Demand Responsive Shuttles – Key Trends

- **Investments**
- **Public Transit Partnerships**
- **OEM Partnerships**
- **Ride Hailing Developments**

Autonomous Shuttle Pilots – Global Snapshot

Transit agencies and authorities across many countries are playing an increasingly significant role in re-structuring the traditional bus and other mass transit markets

Florida, United States

easy mile

Bavaria, Germany

easy mile | DB

Japan

SB Drive

Singapore

navya

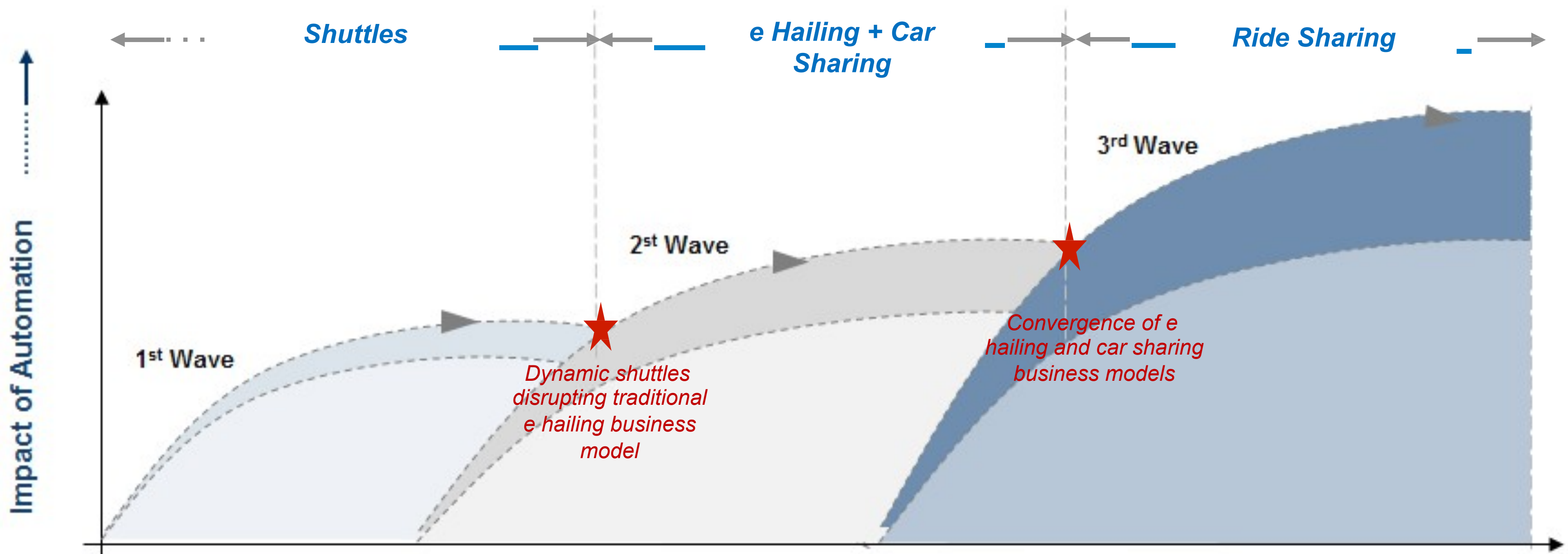
Paris, France

navya

Source: Frost & Sullivan

Automation & Shared to Disrupt Two Business Models

Convenience + Cost → Disrupt e hailing ; **First & Last Mile Connectivity →** Disrupt Car Sg



Purpose: On demand, economical Urban commute.	2023	**Purpose:** Urban and inter urban commute	2030	**Purpose:** Add experiential Value in mobility
KPIs: Space utilization, high charge density, capacity		**KPIs:** Ease of access, convenience, personalisation		**KPIs:** Personalisation, premiumness
Type of vehicle: *Specialised Pods*		***Type of vehicle:*** *Specialised vehicles with personalisation*		***Type of vehicle:*** *Hybrids capable of switching modes*

2050

1 **Dynamic AD Shuttles → e Hailing**
Catalyst: *Migration from fixed to dynamic routing over 25 mph*

2 **AD Car Sharing → e Hailing**
Catalyst: *First and last mile connectivity via automation.*

AD [Shuttles & e Hailing] → Dominant Business Models in [illegible]

Automated Shared Mobility Market Expected to Be Over $100 Bn By 2030

1 2030 Global Shuttles Market (Total vs AD)

$ 300 Bn
Market Value

4.1 Mn
Shuttles

$4.5
Per ride

67.5 Bn
Rides

$ 48 Bn
Market Value

$2.4
Per ride

20 Bn
Rides

- **Technology Enablers:** Urban focused geo fencing and HD locators, solid state lidar technology.
- **Dominant Regions:** 1. China 2. Latin America 3. Europe

F&S Recommendation:
- EV platform vehicles for up to 10 passengers with high end connectivity features and flexible seating arrangements.

2 2030 Global e Hailing + Sharing Market (Total vs AD)

$ 1.1 Tn
Market Value

28 Mn
Vehicles

$7.0
Per ride

156 Bn
Trips

$ 56 Bn
Market Value

$3.5
Per ride

16 Bn
Rides

- **Technology Enablers:** Fleet Management Software, Path Planning
- **Dominant Regions:** 1. North America 2. Europe 3. China

F&S Recommendation:
- Flexible architecture driven hybrid and EV vehicles capable of providing high end customisation

Shared Mobility Vehicle Design: Towards the Future

With growing need for on-demand shuttle services, more advanced concepts such as modular driverless designs can transform to make travel time and in-vehicle space more useful and productive

Current and Future Designs for Demand Responsive Shuttles

Easy Mile – EZ10

Provides customizable and scalable services for operating as a shuttle or as an "**on-demand**" ridehailing service

Can operate in either direction

Maximum seating capacity of 12 (6 seating, 6 standing)

14 hours operation time

Max. Speed: 40 km/hr

3 modes of operation: Metro Mode, Bus Mode and On-Demand Mode

Chariot – Demand Responsive Shuttle by Ford

Internet connectivity for passengers

14-seater capacity

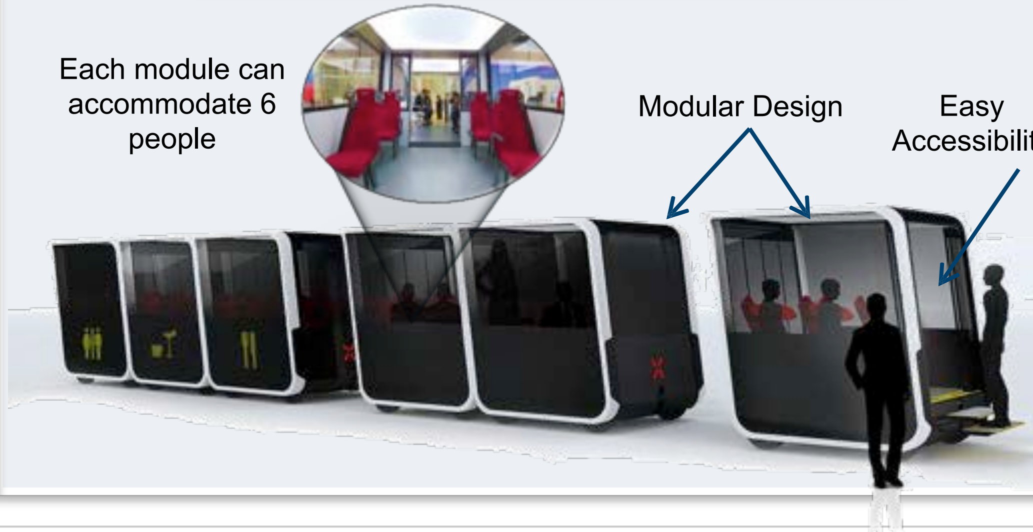
Live GPS Tracking

NEXT –Autonomous Modular Mass Transit

Each module can accommodate 6 people

Modular Design

Easy Accessibility



Partnerships and Investments Defining the Integrated Mobility Market

Delivery of real-time, door-to-door, multi-modal travel encompassing pre-trip, in-trip and post-trip services bringing Convenience, Time & Cost Savings to the Mobility User

Partnerships

Tuup — Chicago partner → DEMANDTRANS (SMART • MOBILITY • SOLUTIONS)

whim — West Midlands partner → nextbike

whim — Taxi partner, Helsinki → TAKSIHELSINKI (Siellä Missä Sinäkin)

SEPTA — Mobile ticketing partner → mozio

whim — Raised → Euros 14.2 million

TOYOTA, transdev, Aioi Nissay Dowa, MS&AD INSURANCE, DENSO

moovel — Acquired → Familonet

xerox ↔ LADOT (Moving LA Forward) ↓ GoLA (Find Your Way in LA)

Investments & Acquisitions

Source: Frost & Sullivan

Implications—OEMs are Moving to Car as a Service

A number of automotive OEMs are shifting towards offering mobility services to make up for the loss incurred in their vehicle sales as such services will help reduce the number of cars on the road.

	Drive Yourself Business Models				Be-driven Business Models					Smart Parking		e-Mobility	
OEM	One-way CS	Two-way CS	P2P CS	Corp. CS/Flexible Leasing/Rental	Ride sharing	Taxi Hail	Bike sharing	Bus/Shuttle Transit	Integrated Mobility	Parking Mgmt.	P2P Parking	Charging	Delivery Services
Daimler	✓ black		✓ red ✓ black	✓ black	✓ black	✓ black ✓ green		✓ green	✓ black	✓ black ✓ green	✓ black ✓ green	✓ black ✓ green	✓ red ✓ black
BMW	✓ black		✓ black	✓ black	✓ blue	✓ red ✓ black			✓ blue	✓ blue	✓ blue	✓ black ✓ red ✓ blue	
Audi		✓ black		✓ black ✓ green									
Hyundai	✓ yellow	✓ yellow ✓ black			✓ green	✓ green							
VW	✓ black	✓ green		✓ black		✓ green				✓ green	✓ red	✓ red	
Ford		✓ black ✓ green	✓ red	✓ black			✓ black	✓ black	✓ black	✓ black ✓ red			
Groupe PSA	✓ green ✓ black		✓ green	✓ black ✓ green						✓ green			
Renault-Nissan	✓ black	✓ black ✓ red ✓ yellow		✓ black	✓ yellow	✓ black ✓ green ✓ red						✓ red	
Toyota	✓ black	✓ red	✓ green	✓ black		✓ green ✓ red							
Honda	✓ yellow	✓ yellow ✓ black ✓ green				✓ green							
GM	✓ black	✓ black		✓ green		✓ green ✓ red	✓ red						
FCA	✓ red												
Volvo		✓ black		✓ black									✓ red
JLR		✓ blue			✓ blue	✓ blue							

✓ black: Own Initiative (either through subsidiary or by themselves)
✓ blue: Investment through VC arm
✓ green: Strategic partnership with investment
✓ red: Collaboration without investment
✓ yellow: Supplier relationship

*refers to experiments.
Only services and products currently operational are considered; past pilots and future launches are not included.
Source: Frost & Sullivan

Automotive Services Landscape In 2030

As value shifts from product to service, the market is expected to evolve from the car as a product to the car as an enabler of a connected living ecosystem

Source: Frost & Sullivan

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