The smart mobility society: a car manufacturer’s vision, by Toyota

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Summary

Toyota’s vision
Ha:mo Network
Grenoble City
Cité Lib by Ha:mo
Conclusion

Toyota’s Ha:mo
A new type of urban ultra-compact EV sharing connected to public transport
Toyota’s vision
Smart mobility society
Urbanization challenges cities

<table>
<thead>
<tr>
<th>Year</th>
<th>Urbanization Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>30%</td>
</tr>
<tr>
<td>2014</td>
<td>57%</td>
</tr>
<tr>
<td>2050</td>
<td>66%</td>
</tr>
</tbody>
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IN THE WORLD

Rethinking urban transportation

DEVELOPED COUNTRIES
- Lack of space
- Financial constraint

EMERGING COUNTRIES
- Severe congestion
- Economic losses

LESS DEVELOPED COUNTRIES
- Political uncertainties
- Poverty conditions

NEW MOBILITY SOLUTIONS HAVE BECOME A NECESSITY
Two major trends in urban area

**MASS TRANSIT SYSTEMS**
- Light Rail Transit & Subway
- Bus Rapid Transit

**SHARED MOBILITY**
- Ride sharing
- Car & bike sharing

**COMBINING BOTH TO SUPPORT MODAL SHIFT ?**
Vehicles, adapted to cities?

SHORT-DISTANCE NEEDS SUSTAINABLE CITY POLICY

40% < 3km & 10% < 1km
1 to 1.5 passenger /trip
60% with the driver alone

Figures for France

ULTRA-COMPACT EV, SUITABLE FOR URBAN CITIES?
A vision: Smart Mobility Society

**COMFORT** Connected with people...
- The vehicle will become a trusted partner through close communication with the driver.
  - The vehicle complies with the driver’s verbal and nonverbal commands.
  - The vehicle predicts driver’s actions in order to provide services and prevent dangers.

**ECOLOGY** Connected with the community...
- Optimizing the energy use of the entire community
- Achieving eco-friendly lifestyles with high quality of life
  - Actualizing a low-carbon society where homes and vehicles share energy with each other
  - Promoting local energy production/consumption
  - Creating communities that are strong enough to withstand natural disasters

**SAFETY** Connected with vehicles and roads...
- Toward the realization of Toyota’s ultimate goal: zero casualties from traffic accidents
  - Vehicles exchange their locations and speeds at all times.
  - Vehicles receive useful information from roadside infrastructure

**CONVENIENCE** Connected with society...
- Building a stress-free traffic environment where everyone can move around as they wish
  - Utilizing big data generated from vehicles to improve traffic control and disaster-related measures
  - Implementing an ultra-micro EV sharing service integrated with public transportation

**Insitutut Duurzame Mobiliteit**
Ha:mo Network
Multimodal solution
Harmonious Mobility Network

A SOLUTION FOR SUSTAINABLE MOBILITY

COMBINING MODES
a complementary solution to support modal shift

Society with Great Freedom of Movement
Improve convenience and accessibility

Local Communities Revitalization
Improve access and movement in the whole city

Green Society
Reduce CO2 emissions, less energy consumption waste
Ha:mo’s main features

- RESERVATION 24/7
- MULTIMODAL ROUTE PLANNER
- ONE WAY & STATION BASED MOBILITY SHARING SERVICE
- SPACE & ENERGY SAVING
- pay as you drive
Ultra-compact electric vehicles

COMS
1 seat / 1 trunk
L: 2.395mm
W: 1.095mm
H: 1.500mm
50km/charge
Lead-acid battery

i-ROAD
2 seats (tandem)
L: 2.345mm
W: 0.870mm
H: 1.455mm
50km/charge
Lithium-ion battery
A flexible solution for urban needs

LAST MILE (ecological)

I've got the time, I will use eco-friendly transportation.

STOP-OVER (convenient)

It has started to rain! I will stop somewhere for a while.

REAL-TIME INFO (efficient)

The road is closed? I am glad I knew that in advance!

DIRECT TRIP (quick)

I just want to get there as quickly as possible.
Verification projects

**TOYOTA CITY**

- **National program**
- **Mother project**
- **Technical & Options Evaluation**

**GRENOBLE CITY**

- **Local project**
- **First city expansion**
- **Marketing & Business Evaluation**
Grenoble City
A suitable context
Environment & mobility context

GRENOBLE CITY
161k inhabitants
40% of the jobs

TRAFFIC CONGESTION
40 days/year (3rd city, Fr)

METROPOLITAN AREA
448k inhabitants
sprawling in valleys

POLLUTION ALERTS
40 days/year (PM, NO₂)

Air, Energy & Climate
Master Plan
Mass transit network
Soft mobility modes
Innovative mobility solutions
Urban logistics

Public & Corporate
Mobility Master Plans

REDUCING
MOTORIZATION
IS A NECESSITY
A strong policy for modal shift

**MASS TRANSIT NETWORK**
- 5 tramway lines (47 mill. pass./2013)

**SOFT MOBILITY MODES**
- 4,000 bicycles (rental)
- 800 parking deposits

**INNOVATIVE MOBILITY SOLUTIONS**
- Multimodality badge, services...

**CAR USE** -18% & **CAR SHARE** 53% TO 48% (2002-2010)
The Presqu’île case

**SCIENTIFIC & BUSINESS PARK**

- Population x2 in next 10 years
- + 800,000 m² of construction
- Family/students, investments...

**CORPORATE MOBILITY PLAN**

- Reducing drastically car share
- 44% to 35% (2016)
- ... and even 20% (2025)

AN IDEAL CONTEXT TO EXPERIMENT HA:MO
Cité Lib by Ha:mo
The project
Public-private project (2014-17)

- Short-distance & multimodal needs
- Sustainable benefits for society
- Market & business potential
A mid-scale electromobility project

35 COMS + 35 i-ROAD

Free of charge onto on-street parking
Forbidden to drive on express roads & highways

27 STATIONS (120 SLOTS)

Located in the city centre as well as in the suburb
Supplied with green energy
A multimodal approach
Connected to public transportation
Integrated in Métromobililité

REAL-TIME INFO.

APPLICATION’S MENU

Requests: 5k to 10k/day

(Google Play & Apple Store)

ROUTE PLANNER

Insituut Duurzame Mobiliteit
The project in 3 steps

<table>
<thead>
<tr>
<th>Objective</th>
<th>1st YEAR</th>
<th>2nd YEAR</th>
<th>3rd YEAR</th>
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</thead>
<tbody>
<tr>
<td>Systems</td>
<td>Adjustment</td>
<td>Expansion</td>
<td>Business model</td>
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<td>Organization</td>
<td></td>
<td>Communication</td>
<td>Operating profit</td>
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<tr>
<td>Pricing</td>
<td></td>
<td>Marketing</td>
<td>Other cities ?</td>
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<tr>
<td></td>
<td></td>
<td>Loyalty</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Members</th>
<th>~500</th>
<th>~1,500</th>
<th>~3,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early adopters</td>
<td></td>
<td>Occasional users</td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Main KPI</th>
<th>Efficiency</th>
<th>Volume</th>
<th>Financial</th>
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</thead>
<tbody>
<tr>
<td>Quality</td>
<td>Efficiency</td>
<td>Volume</td>
<td>Financial</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Users’ voice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Membership</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenues/user</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structure costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Members:
- ~500: Early adopters
- ~1,500: Occasional users
- ~3,000: Frequent users
Collaboration with CEA

A potential of 4,000 members

Personal & professional membership

i-ROAD training in CEA’s facilities
First results in brief

Members: >600
Active users: 30%

ROUND TRIP
33%
66%

ONE WAY
30%
70%

AVERAGE
Time: 60 min.
Stop-over: 50%
Distance: >6km
21h-6h: 10%

Data: until Sept. 2015
## Active users: diversity of needs

<table>
<thead>
<tr>
<th></th>
<th>User 1</th>
<th>User 2</th>
<th>User 3</th>
<th>User 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>use/month</strong></td>
<td>14</td>
<td>16</td>
<td>18</td>
<td>26</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>20s</td>
<td>40s</td>
<td>20s</td>
<td>20s</td>
</tr>
<tr>
<td><strong>Status</strong></td>
<td>Student</td>
<td>Employee</td>
<td>Independent</td>
<td>Employee</td>
</tr>
<tr>
<td><strong>Private car</strong></td>
<td>No</td>
<td>Yes</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td><strong>PT</strong></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>One way</strong></td>
<td>23%</td>
<td>96%</td>
<td>94%</td>
<td>96%</td>
</tr>
<tr>
<td><strong>i-ROAD</strong></td>
<td>79%</td>
<td>87%</td>
<td>86%</td>
<td>87%</td>
</tr>
<tr>
<td><strong>Reason</strong></td>
<td>Lunch break</td>
<td>Child’s activities</td>
<td>Last mile</td>
<td>Inefficient PT</td>
</tr>
<tr>
<td><strong>Trips</strong></td>
<td>School/home (Stop-over)</td>
<td>Very diversified + week-end (late)</td>
<td>Suburb/workplace</td>
<td>Back to home in Grenoble</td>
</tr>
</tbody>
</table>

* Public transportation
Conclusion

The first year, necessary adjustments to build a reliable basis with full system in operation

From now, importance of marketing communications to increase and diversify membership

Confidence in the future as some mobility needs are already identified: niches, new needs ...
Rewarded with a smile
by exceeding your expectations

TOYOTA