WORLD ECONOMIC FORUM

COMMITTED TO IMPROVING THE STATE OF THE WORLD

Self-Driving Vehicles in an Urban Context

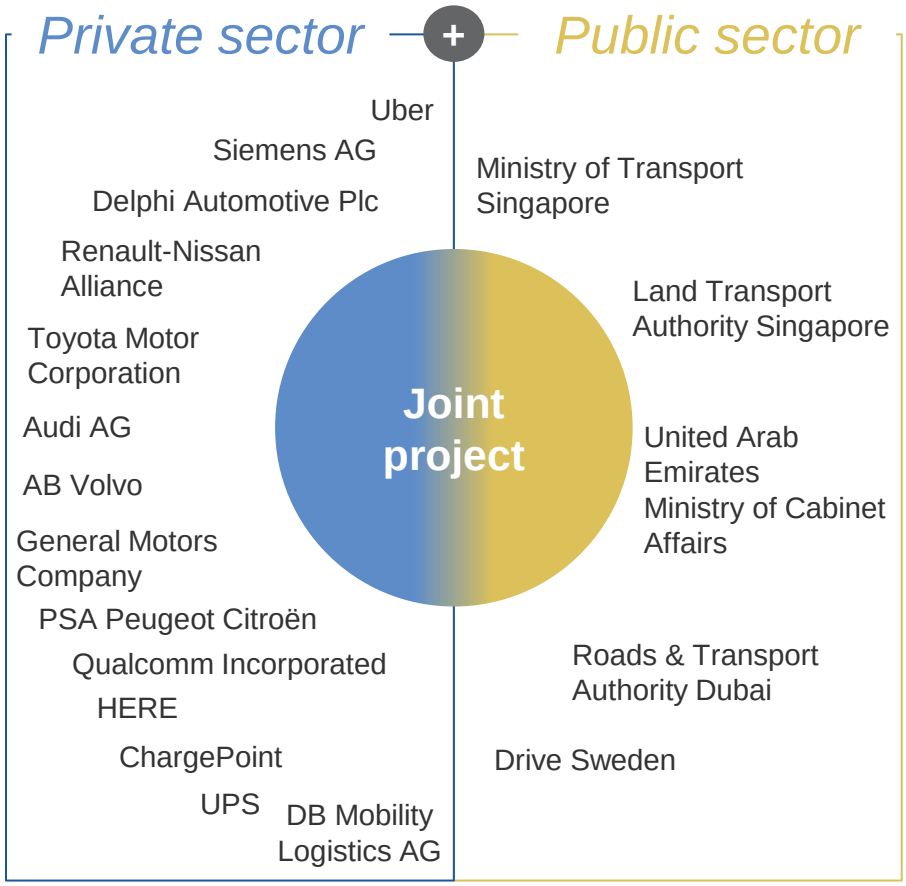
Press briefing

24 November 2015

This survey on self-driving vehicles was prepared with the support of The Boston Consulting Group

Project dedicated to shaping new urban mobility with self-driving cars

World Economic Forum project with the support of The Boston Consulting Group



Objective: Develop road map for a real-world pilot of urban mobility

In focus in this document

Understand consumer perspective on self-driving vehicles
- Conduct qualitative and quantitative customer research
- Conduct city policy maker interviews

Develop future urban mobility scenarios
- Assess impact on key stakeholders incl. consumers and operators
- Understand larger impact on cities

Develop roadmap for pilot implementation
- Define action items for each stakeholder in operating model for pilot government and other stakeholders

Note: This survey was prepared with the support of The Boston Consulting Group
Source: World Economic Forum; BCG

Extensive study of consumer and city perspective since June 2015

Step 1: consumer focus groups

— Six 4-hour focus groups conducted in **Singapore, Berlin and London**

— **MindDiscovery technique** applied to identify people's motivations and fears with respect to self-driving vehicles

— Discussion around **self-driving vehicles**, but also **specific mobility models** such as shared self-driving taxis

Step 2: consumer survey

— In-depth online survey in **ten countries**

— **5,500 city inhabitants** surveyed with various socio-demographic profiles

— **Conjoint analysis** included to understand consumer preferences between different shared mobility models

Step 3: city survey

— Interview series with diverse set of cities

— **25 city policy makers** interviewed

— Discussion about **city priorities and challenges** and potential **role of self-driving vehicles** and related mobility models

Study provides fresh insights into consumer perception of self-driving vehicles

Note: This survey was prepared with the support of The Boston Consulting Group
Source: World Economic Forum; BCG

10 insights from consumers and cities that surprised us

WORLD ECONOMIC FORUM
COMMITTED TO IMPROVING THE STATE OF THE WORLD

Consumers

1. Many consumers are **very open to trying and buying** a self-driving car
2. The key reason for this is **not having to park** a self-driving car
3. Consumers want a **traditional OEM** to produce the self-driving car
4. To consumers, a self-driving car is **electric or hybrid**
5. Many are willing to pay **more than $5K extra** for a self-driving car
6. They are slightly more reluctant to **share** a self-driving taxi, but will do it **at a high discount**

Cities

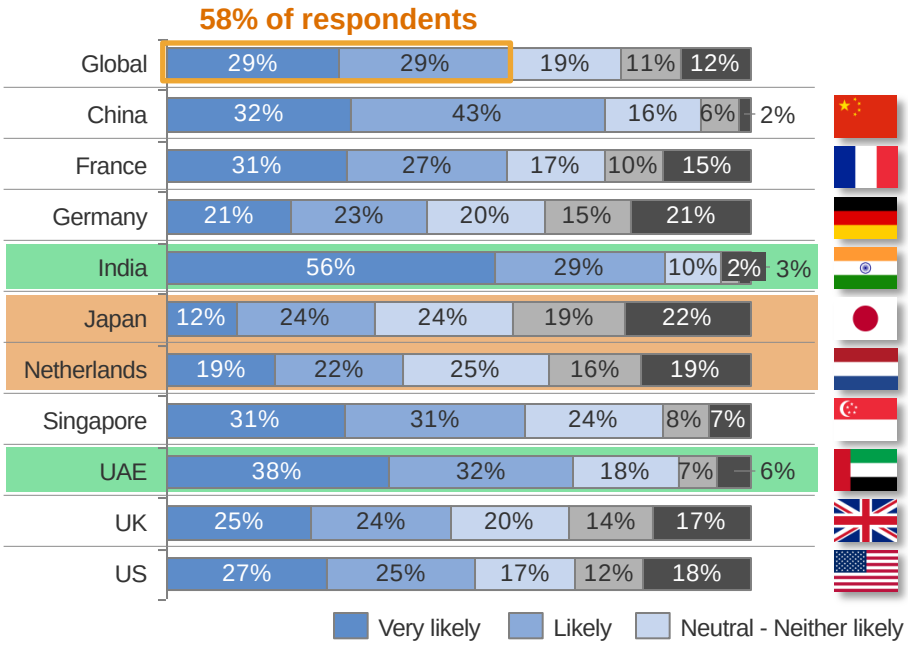
7. Cities expect self-driving vehicles to become a **reality in the next 10 years**
8. Key impediments to them are **public acceptance** and **technological readiness**
9. SDVs primarily seen as **last mile solution** complementing public transport
10. They prefer having **many private players** offering self-driving taxis

Note: This survey was prepared with the support of The Boston Consulting Group
Source: World Economic Forum; BCG analysis, consumer survey August 2015, city policy maker interviews 2015

1 Many consumers are very open to trying a self-driving car

58% say they would take a ride in a fully self-driving car

In % of respondents per country

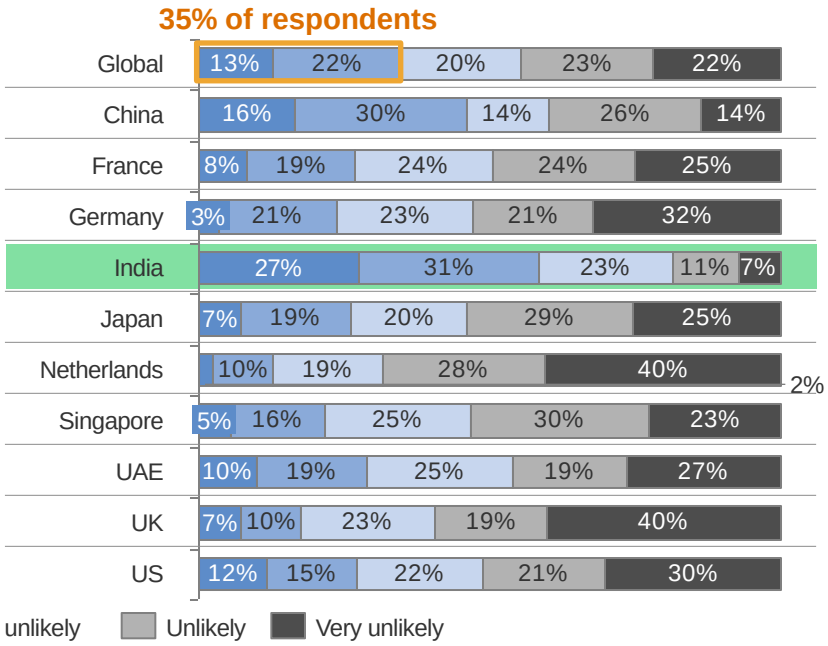


Q: Imagine that the **fully self-driving vehicle** became available in the market. How likely would you be to consider **taking a ride in it** (for example as a test drive, taxi or rental car)?

n=5,635

… but only 35% of parents would let their children ride alone in one

In % of respondents per country



Q:How likely would you be to **let your children ride alone** in a fully self-driving car?

n=2,480

Very likely | Likely | Neutral - Neither likely nor unlikely | Unlikely | Very unlikely

Note: This survey was prepared with the support of The Boston Consulting Group
Source: World Economic Forum; BCG analysis, consumer survey August 2015

2 Consumers see a direct benefit in not having to park and being able to do something else during their travel time

Drivers

"Drops me off, finds a **parking spot** and parks on its own"

"Allows me to **multi-task**/be productive during my ride"

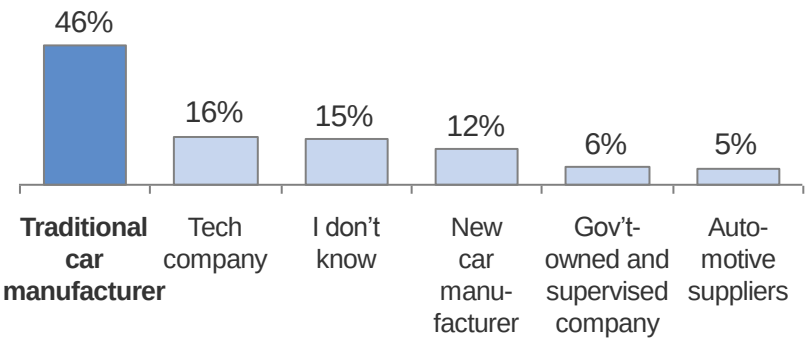
"Switches to self-driving mode **during traffic**"

Note: This survey was prepared with the support of The Boston Consulting Group
Source: World Economic Forum; BCG analysis, consumer survey August 2015

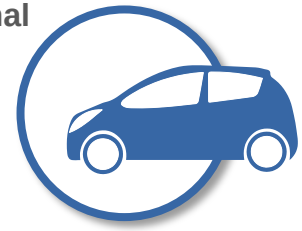
3 The most preferred producer of a self-driving car is a traditional OEM

OEM as primary source of trust

In % of respondents



Traditional OEMs

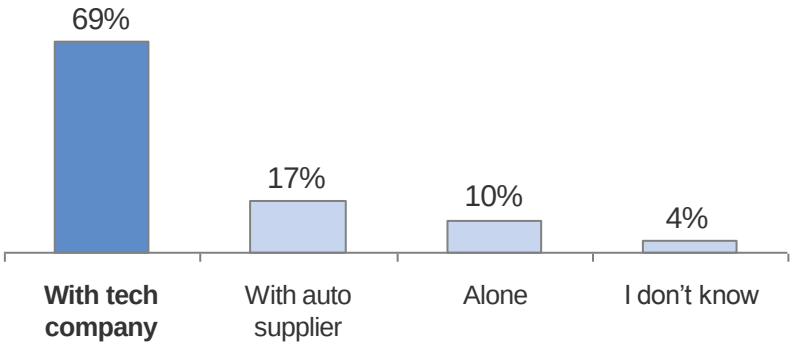


n=5,635

&

… in cooperation with other players

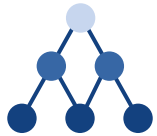
In % of respondents



Tech players

Mobility and logistics players

Infra players



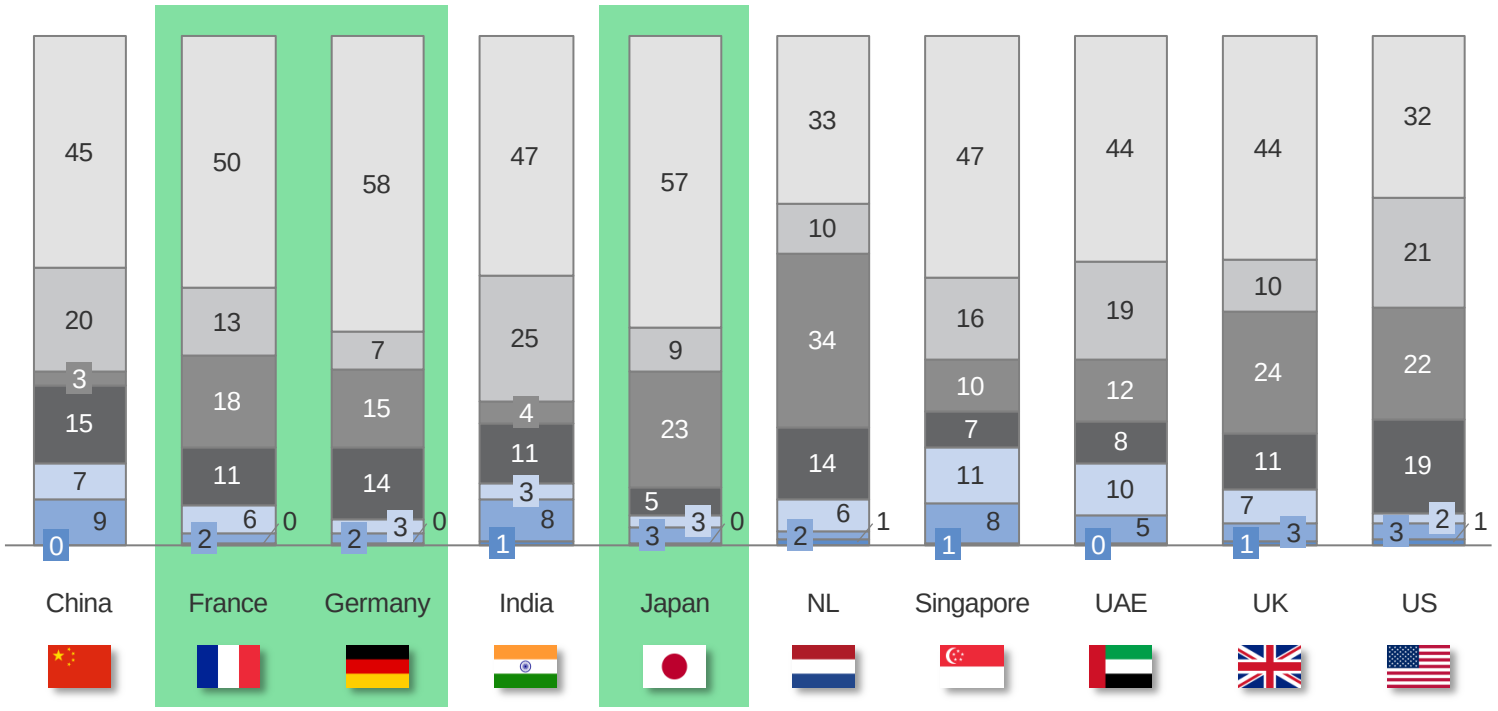
n = 2,579

… with other players contributing their relevant expertise

Note: This survey was prepared with the support of The Boston Consulting Group
Source: World Economic Forum; BCG analysis, consumer survey August 2015

3 Picture is consistent across all regions – trust in OEM particularly strong in France, Germany and Japan

In % of respondents per country



Q: Who would be the **ideal manufacturer** of a self-driving car?

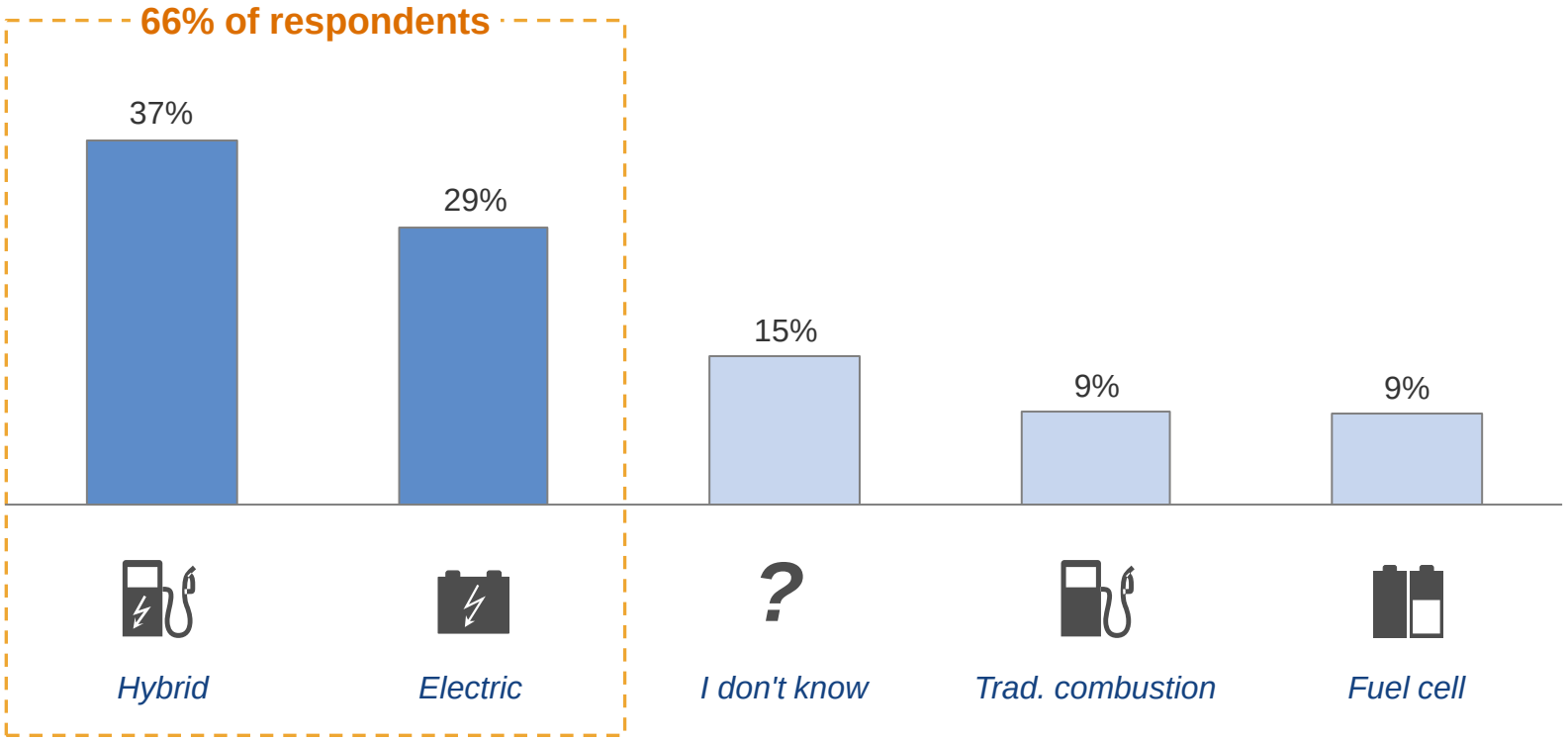
n=5,635

- Traditional car manufacturer
- I don't know
- A government-owned and supervised company
- Other
- Technology company
- New car manufacturer
- Automotive suppliers

Note: This survey was prepared with the support of The Boston Consulting Group
Source: World Economic Forum; BCG analysis, consumer survey August 2015

4 In consumers' minds, self-driving cars will be electric or hybrid

In % of total respondents



Q: What **type of engine** do you think self-driving vehicles will primarily have?

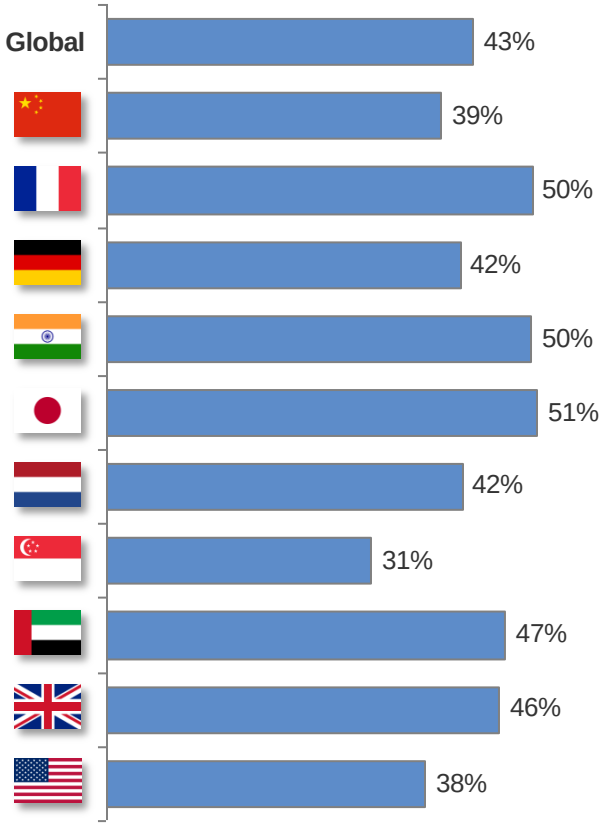
n = 5,635

Note: This survey was prepared with the support of The Boston Consulting Group
Source: World Economic Forum; BCG analysis, consumer survey August 2015

5 Many are ready to pay more for a fully self-driving car

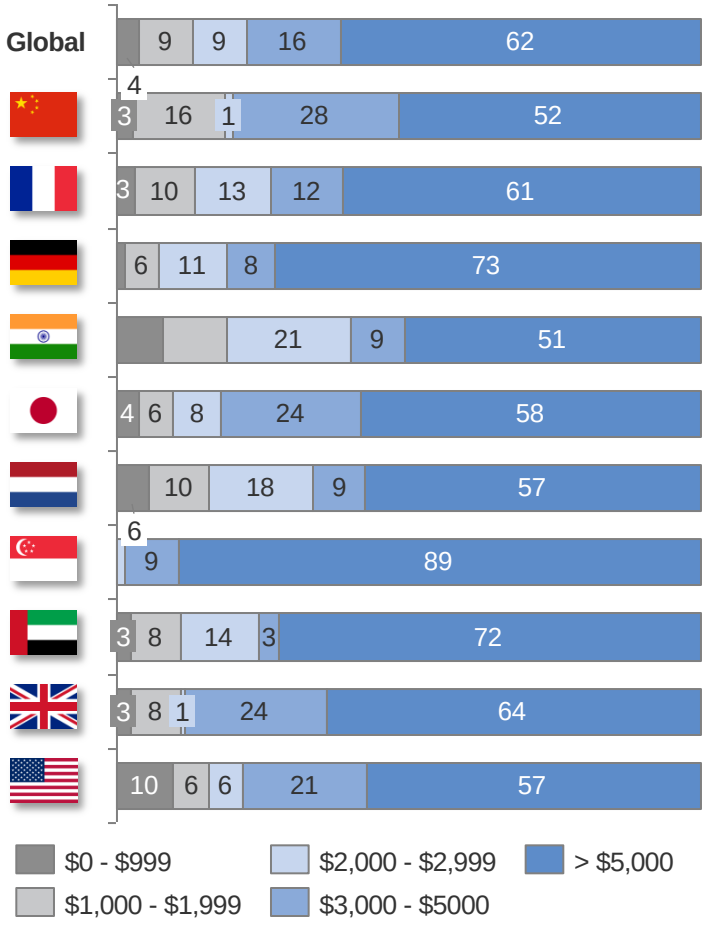
% of consumers willing to pay more for a fully self-driving car[1]

In % of respondents per country



… of which many would pay up to $5K more

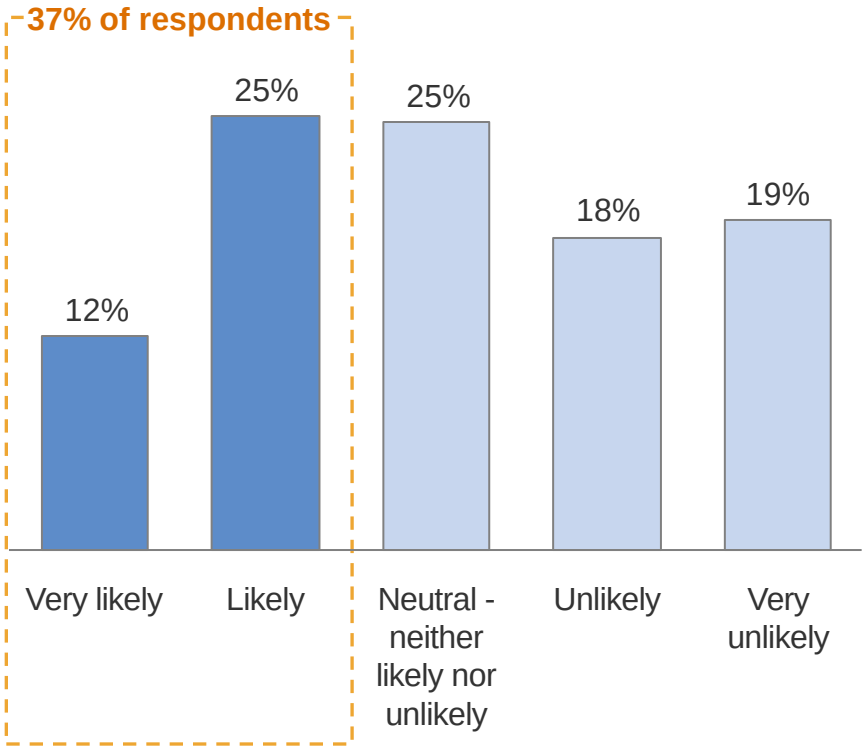
In % of respondents per country



1. Percentage of respondents that quoted an acceptable price for fully self-driving car in excess of base price quoted for regular car
Note: This survey was prepared with the support of The Boston Consulting Group
Source: World Economic Forum; BCG analysis, consumer survey August 2015

6 Consumers are more reluctant to share a self-driving taxi with strangers

In % of total respondents



Q: How likely are you to consider using a **shared self-driving taxi**?

n = 5,635

"It is not safe for a lady to share with strangers."

Janice, 39

"Who will maintain the car if it gets dirty?"

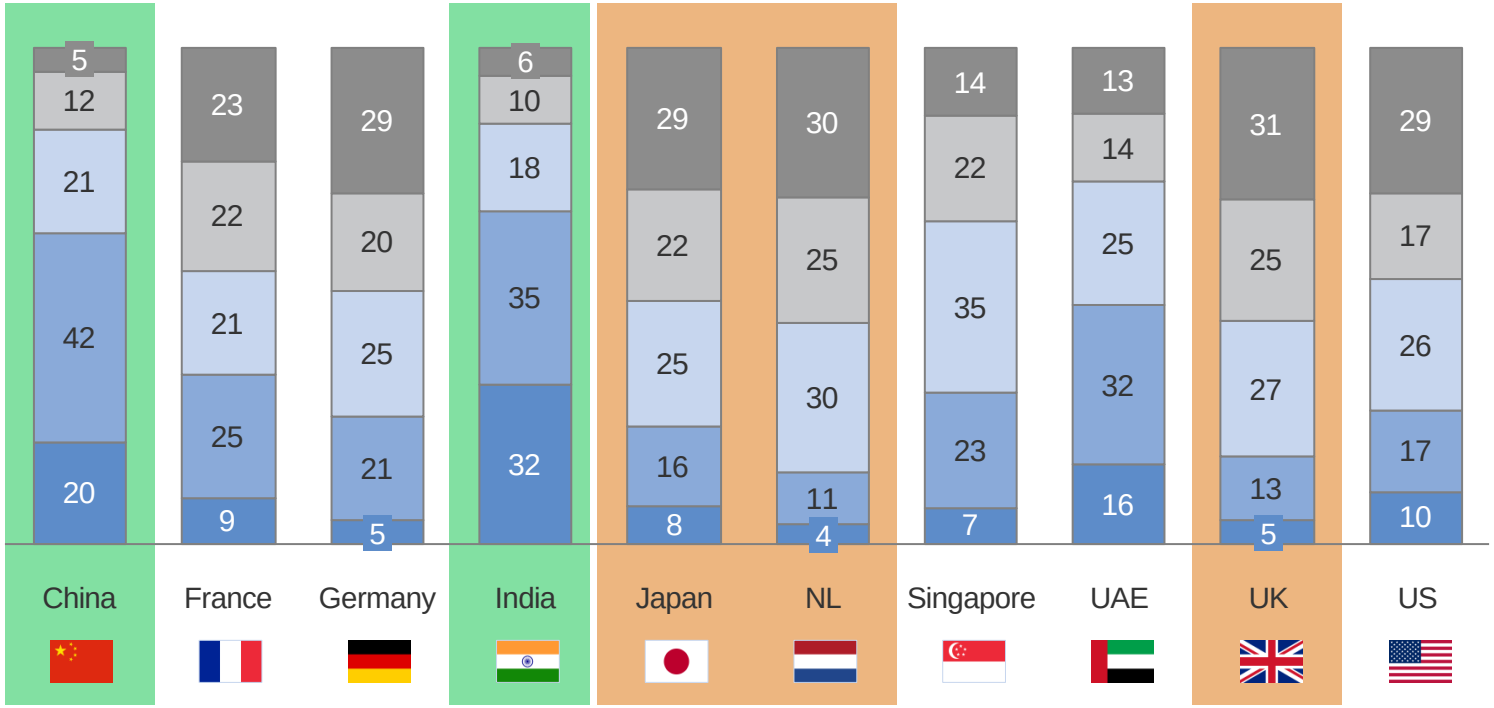
Keryn, 32

"Me, as a woman, I would never want to share a ride with three drunk guys at night"

Jennifer, 26

6 Highest willingness to use a shared self-driving taxi in China and India

In % of respondents per country



Q: How likely are you to consider using a **shared self-driving taxi**?

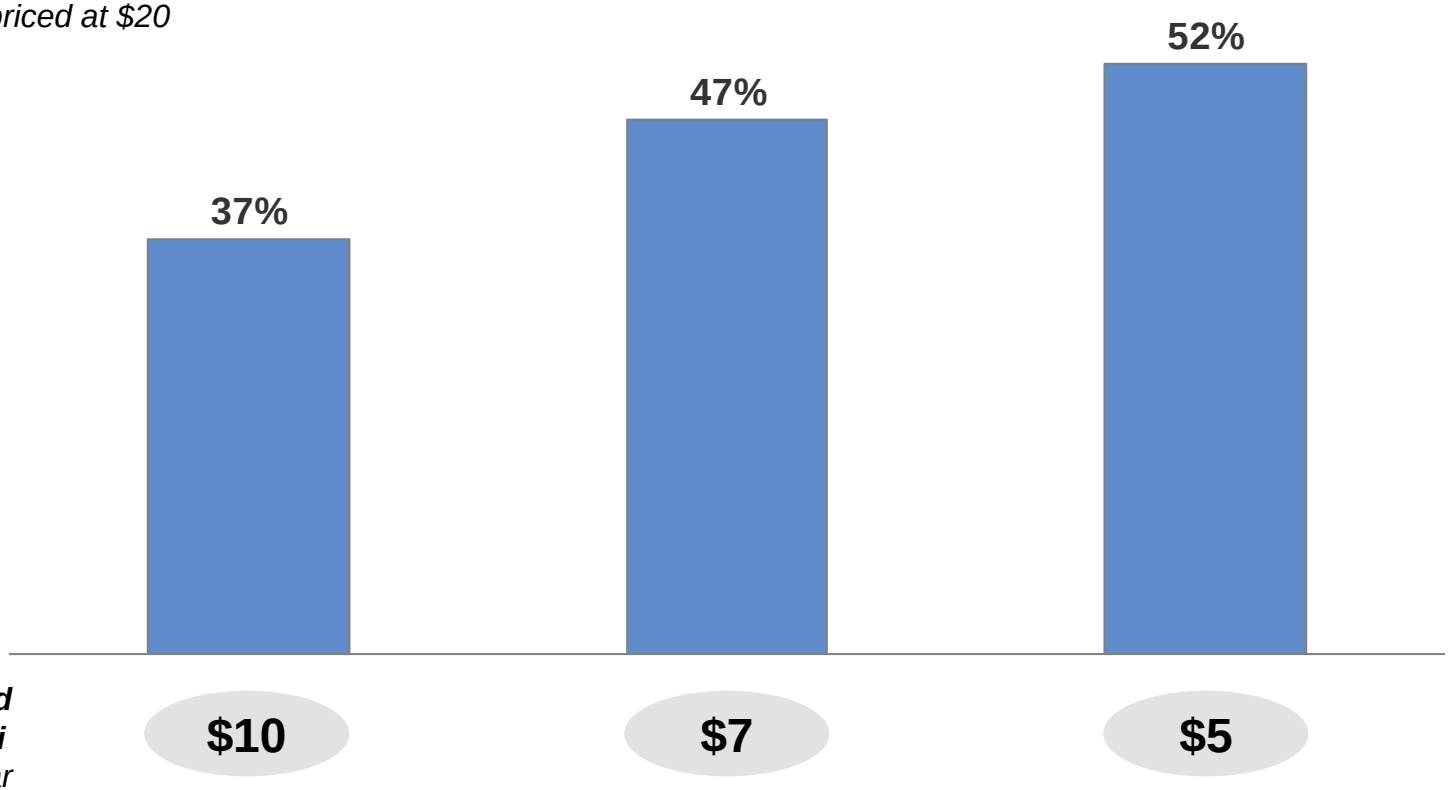
n=5,635

Very unlikely | Unlikely | Neutral - Neither likely nor unlikely | Likely | Very likely

Note: This survey was prepared with the support of The Boston Consulting Group
Source: World Economic Forum; BCG analysis, consumer survey August 2015

6 But at a sufficiently steep discount, they all opt for sharing their taxi

*% of respondents **opting for shared self-driving taxi**[1] vs. regular taxi priced at $20*



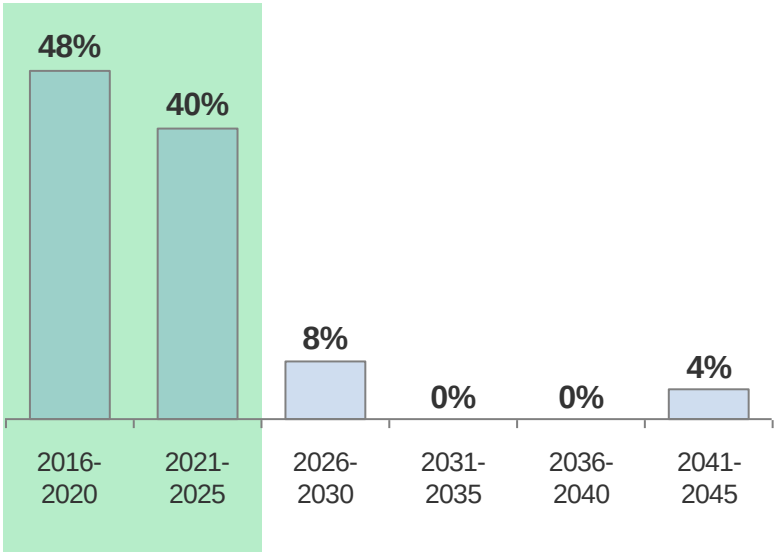
***Price for shared self-driving taxi ride** vs. a regular taxi ride at $20*

1. Based on a shared taxi configuration of 2 additional passengers, 5 additional minutes of wait time and no selection choice of other passengers
Note: This survey was prepared with the support of The Boston Consulting Group
Source: World Economic Forum; BCG analysis, consumer survey August 2015

7 Cities believe that self-driving vehicles become a reality in the next 10 years

Most cities expect commercialization in next 10 years

In % of total interviewees[1]



" We are **very supportive** of self-driving vehicle testing in our city."

" We **want to test self-driving vehicles in real-life** to see how they could change our city."

And many of them have specific SDV related initiatives under way

Singapore

Extensive multi-year SDV trials announced in October 2015

Gothenburg

DriveME project with 100 self-driving Volvo cars on public roads to start in 2017

Pittsburgh

Uber and Carnegie Mellon University developing and testing SDVs in Pittsburgh

Amsterdam

Promotion of self-driving vehicles development as part of Dutch EU presidency 2016

Milton Keynes

Trials of autonomous pod cars starting in 2016 as part of project UK Autodrive

London

Project GATEway to start trial of pod cars in Greenwich area in 2016

Toronto

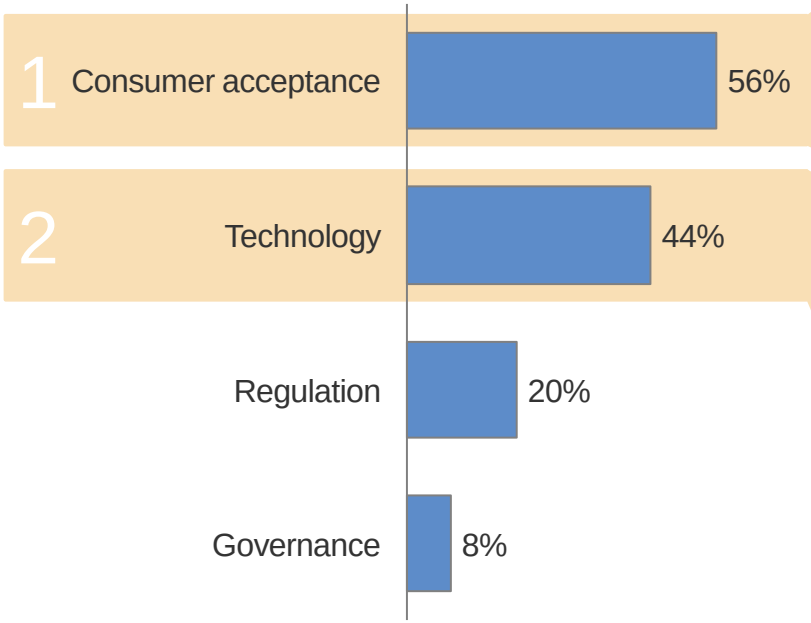
Started exploring impact on city; plans to develop two-year roadmap by year end

1. Due to small sample size results are not statistically representative; Note: This survey was prepared with the support of The Boston Consulting Group
Source: World Economic Forum; BCG analysis, city policy maker interviews 2015

8 Key impediments to realization are societal acceptance and technology

Homogeneous picture across most cities

Top impediments (multiple counts possible)
In % of total interviewees[1]



Rationale

*"This requires a significant **cultural change**"*

*"We will need to **get the public used to** self-driving cars gradually."*

*"The technical challenge of **interacting with pedestrians** in the city cannot easily be solved"*

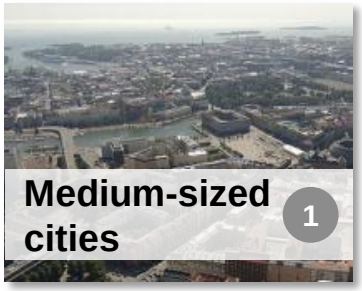
*"Technology needs to be **safe and approved** and consumers need to feel safe using them"*

*"How will crashes be programmed? Who decides on the **right priority for saving lives**?"*

Regulation not considered the most significant roadblock

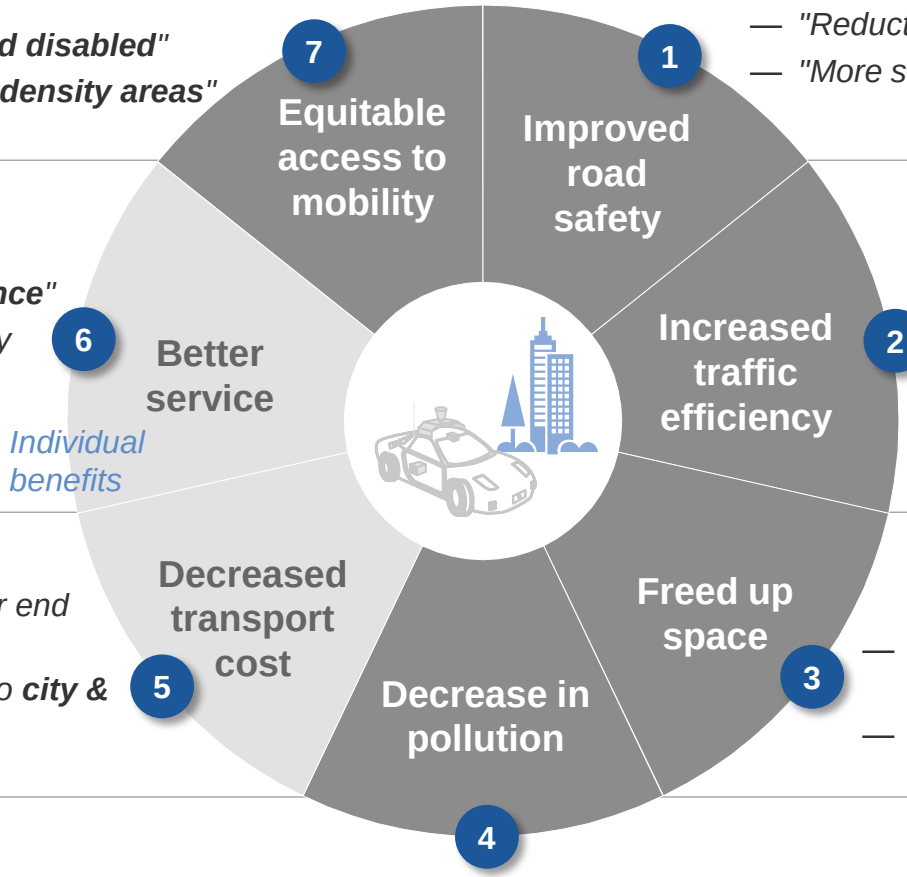
1.Due to small sample size results are not statistically representative; Note: This survey was prepared with the support of The Boston Consulting Group
Source: World Economic Forum; BCG analysis, city policy maker interviews 2015

9 Self-driving vehicles primarily seen as last mile solution

	 **Medium-sized cities** 1	**Car-centric cities** 2	**Established megacities** 3	**New megacities** 4
Example city	— Gothenburg	— Miami	— New York City	— Singapore
Use case	— **Last mile solution**	— **Last mile solution**	— **Last mile solution** — Freight transport — Utility	— Fixed and scheduled services — **Last mile solution** — Freight transport — Utility
Desired role vs. public transport	— Mostly complementary — Outside city center — Substitution of some low frequency bus routes	— Mostly complementary — Both in city center and outside — Substitution of some low frequency bus routes	— Strictly complementary — Outside city center	— Complementary and enhancing — Both in city center and outside

Note: This survey was prepared with the support of The Boston Consulting Group; Source: World Economic Forum; BCG analysis, city policy maker interviews 2015

9 Benefits perceived are both at societal and at individual level



— *"Reduction of **accidents**"*
— *"More safety for **all road users**"*

— *"No need to add new **car-focused capacity**"*
— *"**Less congestion**, better flow"*

— *"**Less parking space** needed in city center"*
— *"Possibility for **new city planning**"*

— *"**Less car travel** at low occupancy"*
— *"**Fewer cars** on the streets"*

— *"**Cheaper mobility** for end consumer"*
— *"Lower cost of travel to **city & consumer**"*

— *"Increased **convenience**"*
— *"More & better mobility **choices**"*

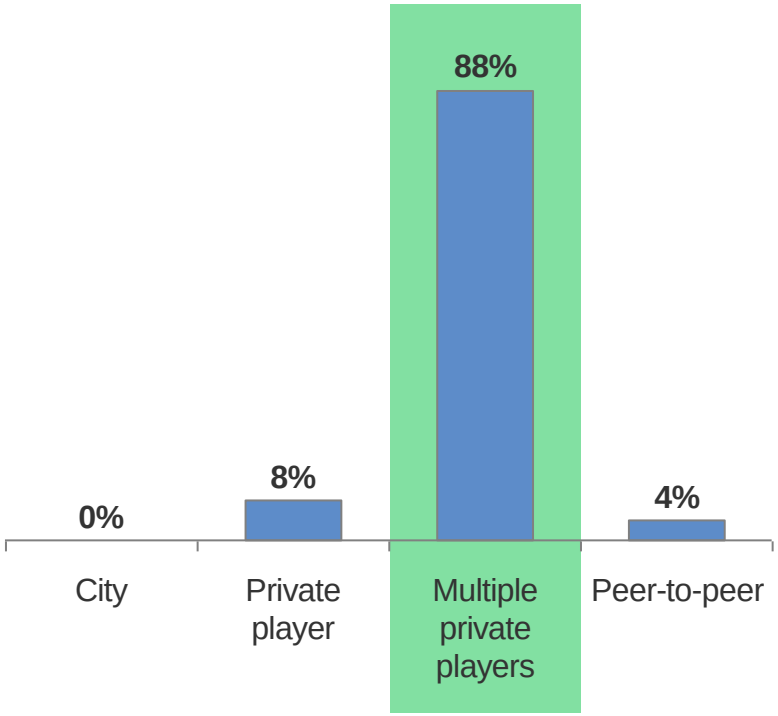
— *"Access to **elderly and disabled**"*
— *"Better access in **low density areas**"*

Note: This survey was prepared with the support of The Boston Consulting Group
Source: World Economic Forum; BCG analysis, city policy maker interviews 2015

10 Most cities prefer having many private players offering shared fleets

Free market economy most desirable

In % of total interviewees[1]



Rationale

The city is not best suited to operate shared self-driving fleets

- Long decision making processes
- Long and rigid investment horizons
- Decisions influenced by political considerations
- Difficulty funding required investments

Rather, the city should assume an enabling and regulating role

- Enable development of new technologies and provide testing environment
- Ensure safety at trials
- Regulate the market
  - Safety and security
  - Reach
  - Definition of service levels

Most cities open to working with third parties for provision of on demand services

1. Due to small sample size results are not statistically representative; Note: This survey was prepared with the support of The Boston Consulting Group
Source: World Economic Forum; BCG analysis, city policy maker interviews 2015