

# User experience in an autonomous car: driving is secondary?



**Preven  
Control**

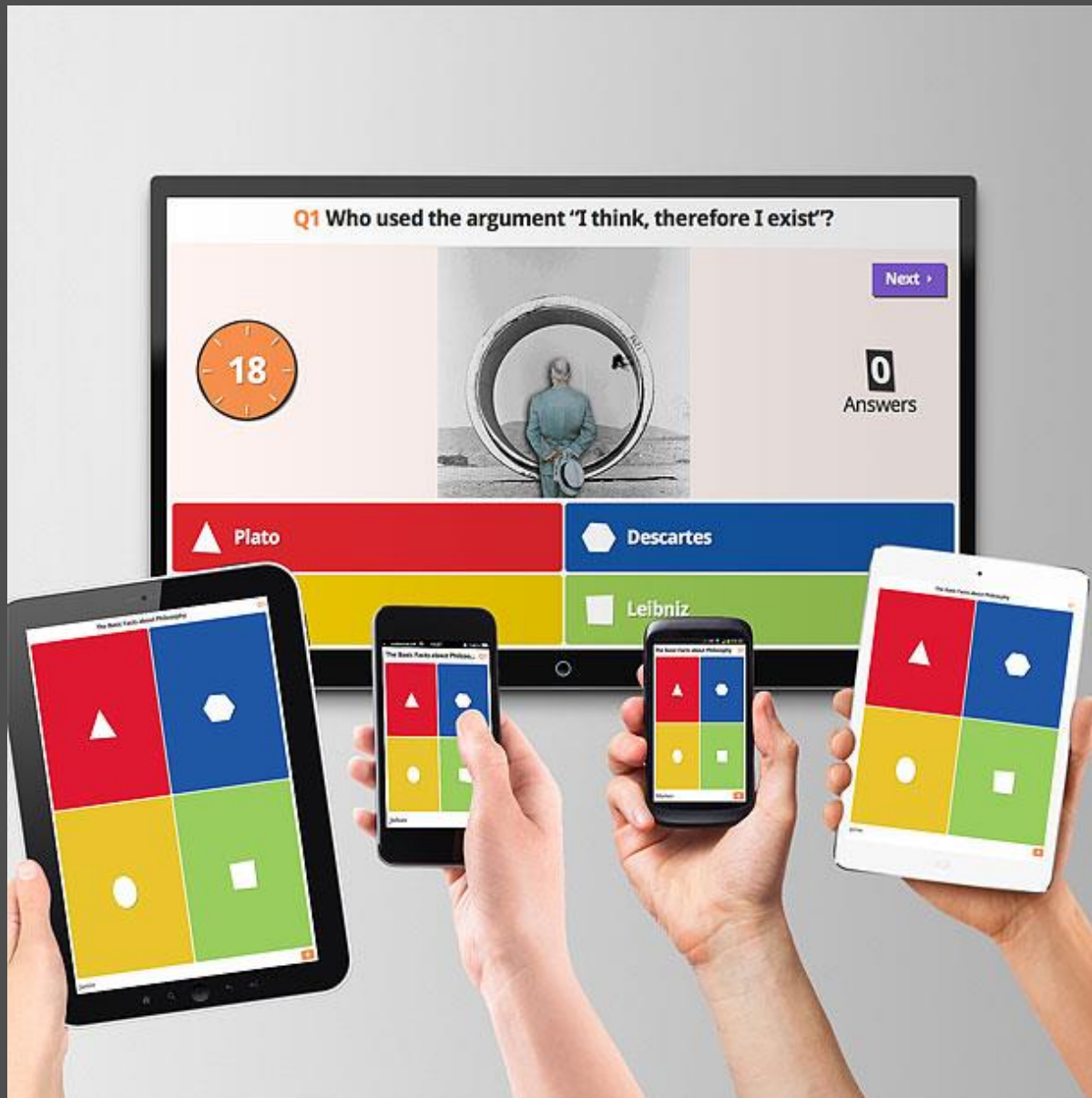
**Porriño, 15th September**



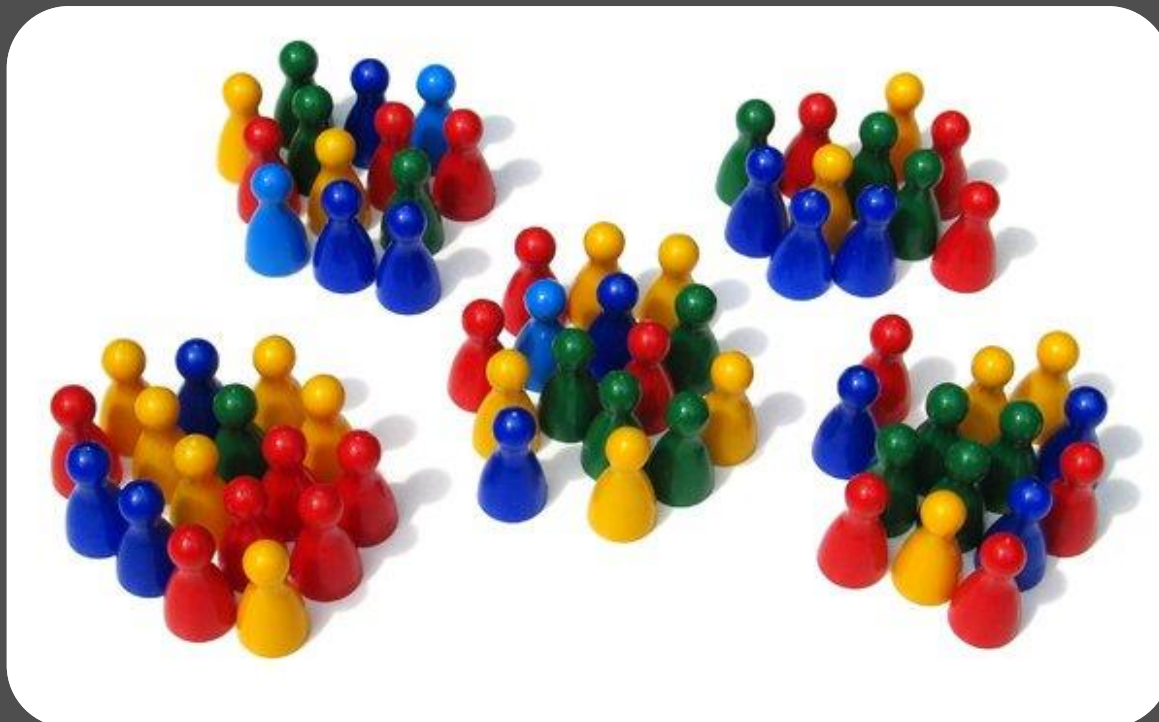
**Gustavo Adolfo  
Rosal López**



# PREVIEW



# PREVIEW



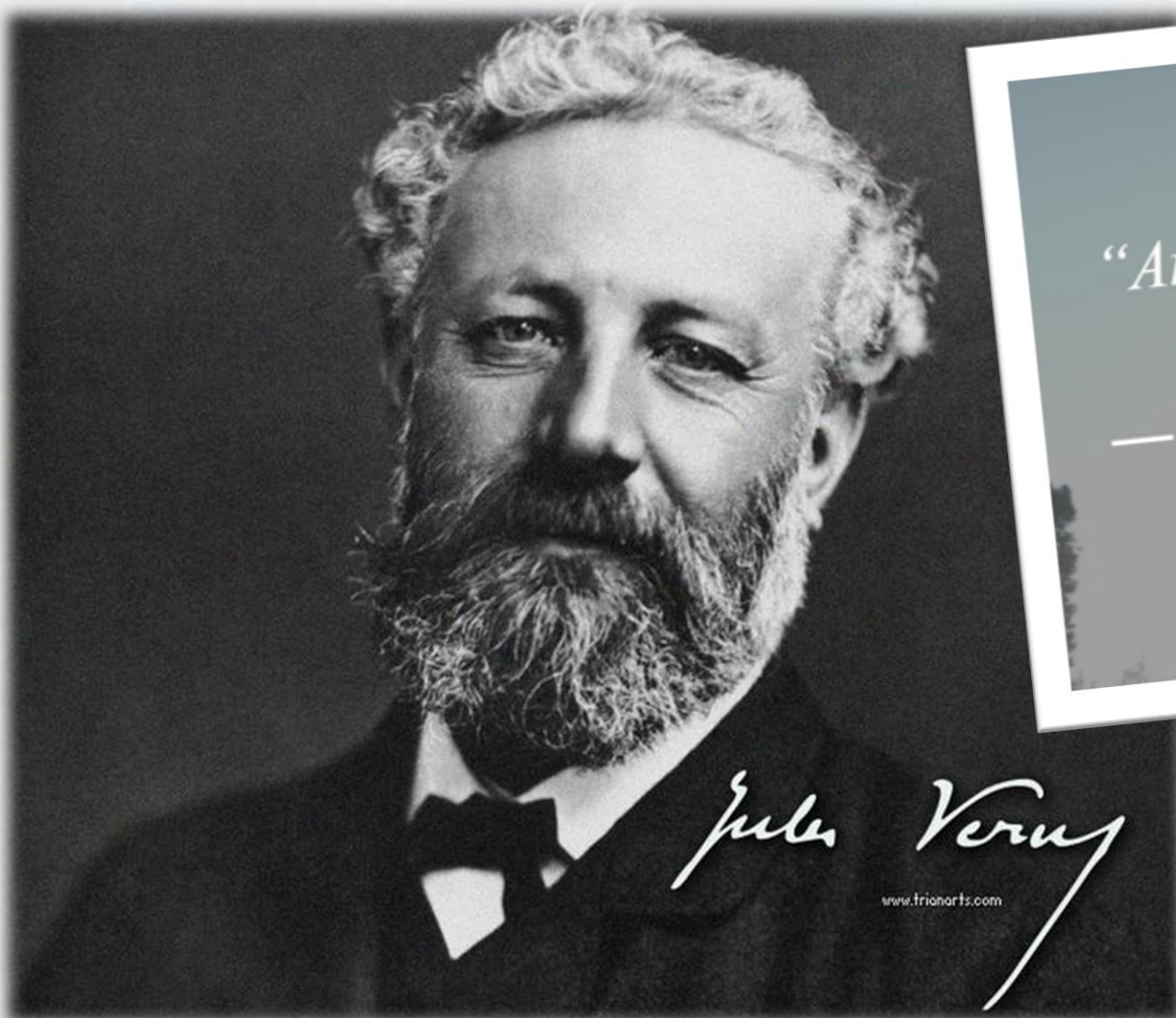


“The **best**  
way to predict  
the **⋮FUTURE⋮**  
is to  
**INVENT IT.**”

-Alan Kay







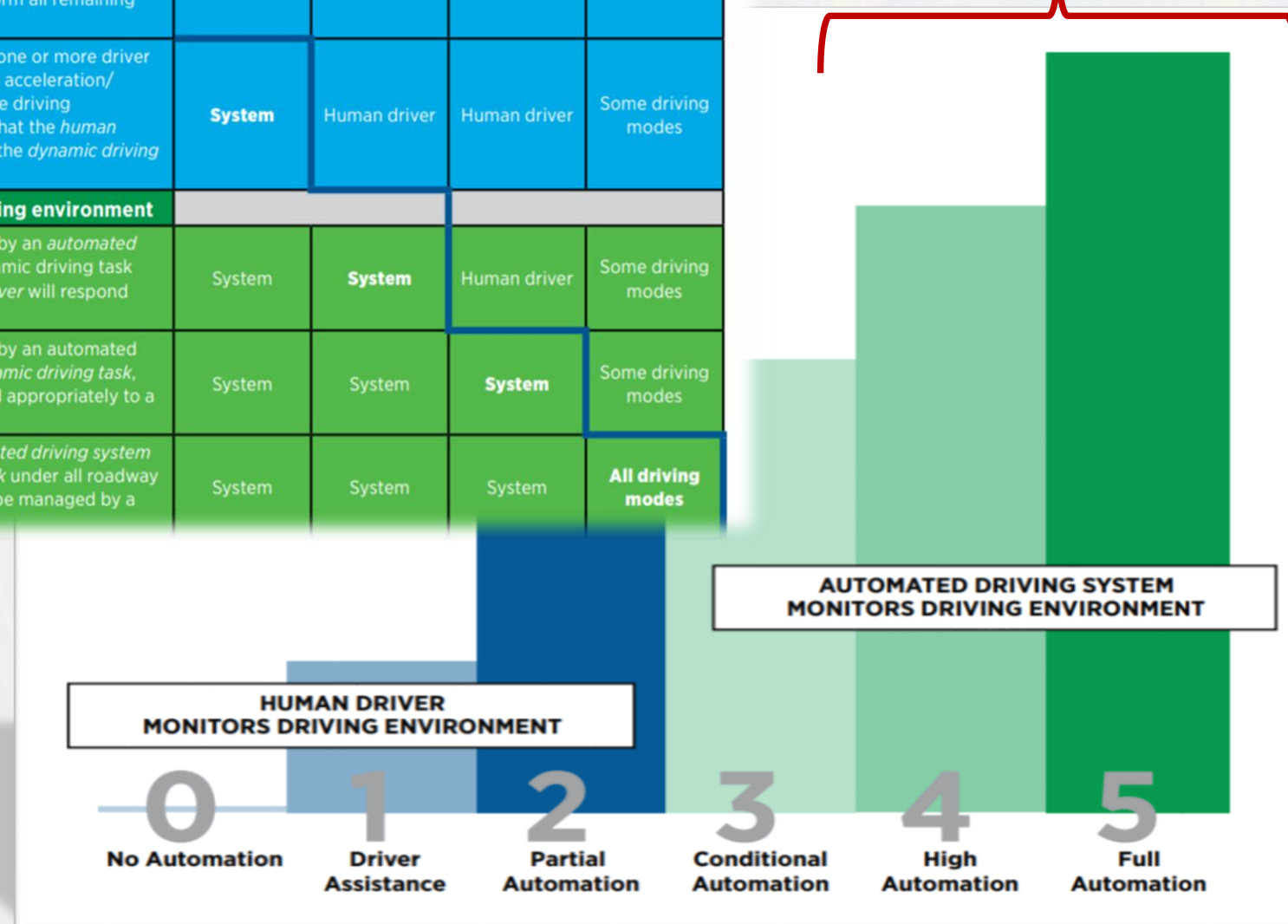
*“Anything one man can imagine, other men  
can make real.”  
— Jules Verne, Around the World in Eighty  
Days*



SAE level	Name	Narrative Definition	Execution of Steering and Acceleration/Deceleration	Monitoring of Driving Environment	Fallback Performance of Dynamic Driving Task	System Capability (Driving Modes)
<b>Human driver monitors the driving environment</b>						
<b>0</b>	<b>No Automation</b>	the full-time performance by the <i>human driver</i> of all aspects of the <i>dynamic driving task</i> , even when enhanced by warning or intervention systems	Human driver	Human driver	Human driver	n/a
<b>1</b>	<b>Driver Assistance</b>	the <i>driving mode</i> -specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the <i>human driver</i> perform all remaining aspects of the <i>dynamic driving task</i>	Human driver and system	Human driver	Human driver	Some driving modes
<b>2</b>	<b>Partial Automation</b>	the <i>driving mode</i> -specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the <i>human driver</i> perform all remaining aspects of the <i>dynamic driving task</i>	<b>System</b>	Human driver	Human driver	Some driving modes
<b>Automated driving system ("system") monitors the driving environment</b>						
<b>3</b>	<b>Conditional Automation</b>	the <i>driving mode</i> -specific performance by an <i>automated driving system</i> of all aspects of the dynamic driving task with the expectation that the <i>human driver</i> will respond appropriately to a <i>request to intervene</i>	System	<b>System</b>	Human driver	Some driving modes
<b>4</b>	<b>High Automation</b>	the <i>driving mode</i> -specific performance by an automated driving system of all aspects of the <i>dynamic driving task</i> , even if a <i>human driver</i> does not respond appropriately to a <i>request to intervene</i>	System	System	<b>System</b>	Some driving modes
<b>5</b>	<b>Full Automation</b>	the full-time performance by an <i>automated driving system</i> of all aspects of the <i>dynamic driving task</i> under all roadway and environmental conditions that can be managed by a <i>human driver</i>	System	System	System	<b>All driving modes</b>



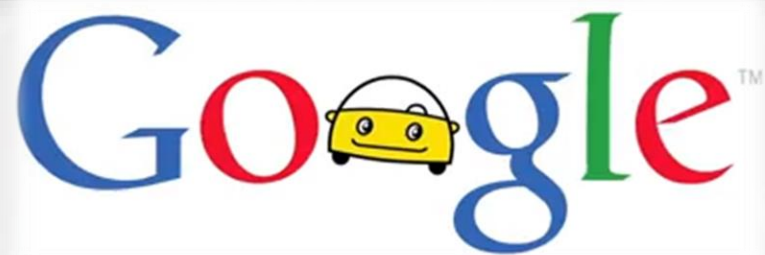
**SAE**  
INTERNATIONAL™





# Who is in control?

## Self-driving

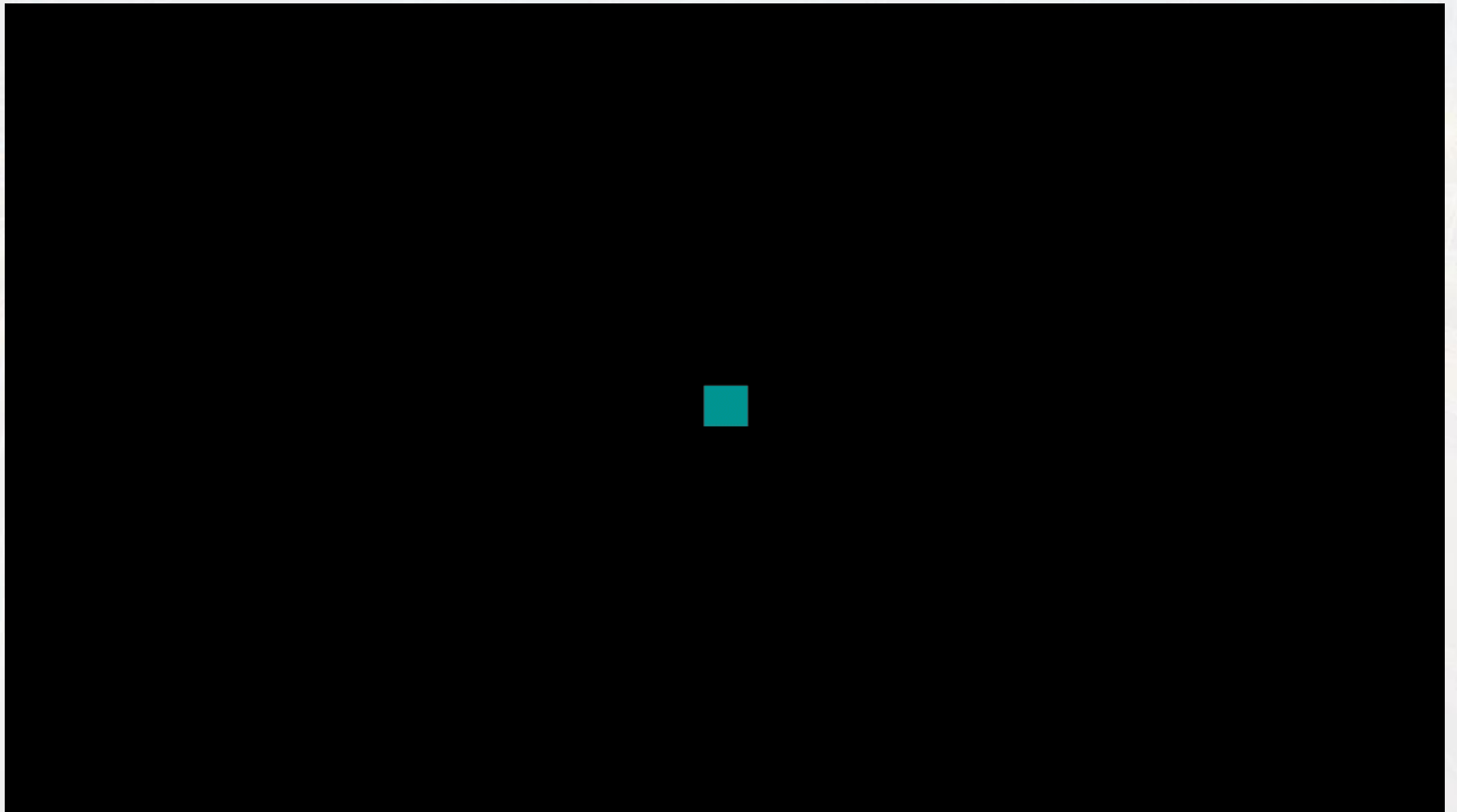


## Driver Assistance





Chris  
Urmson







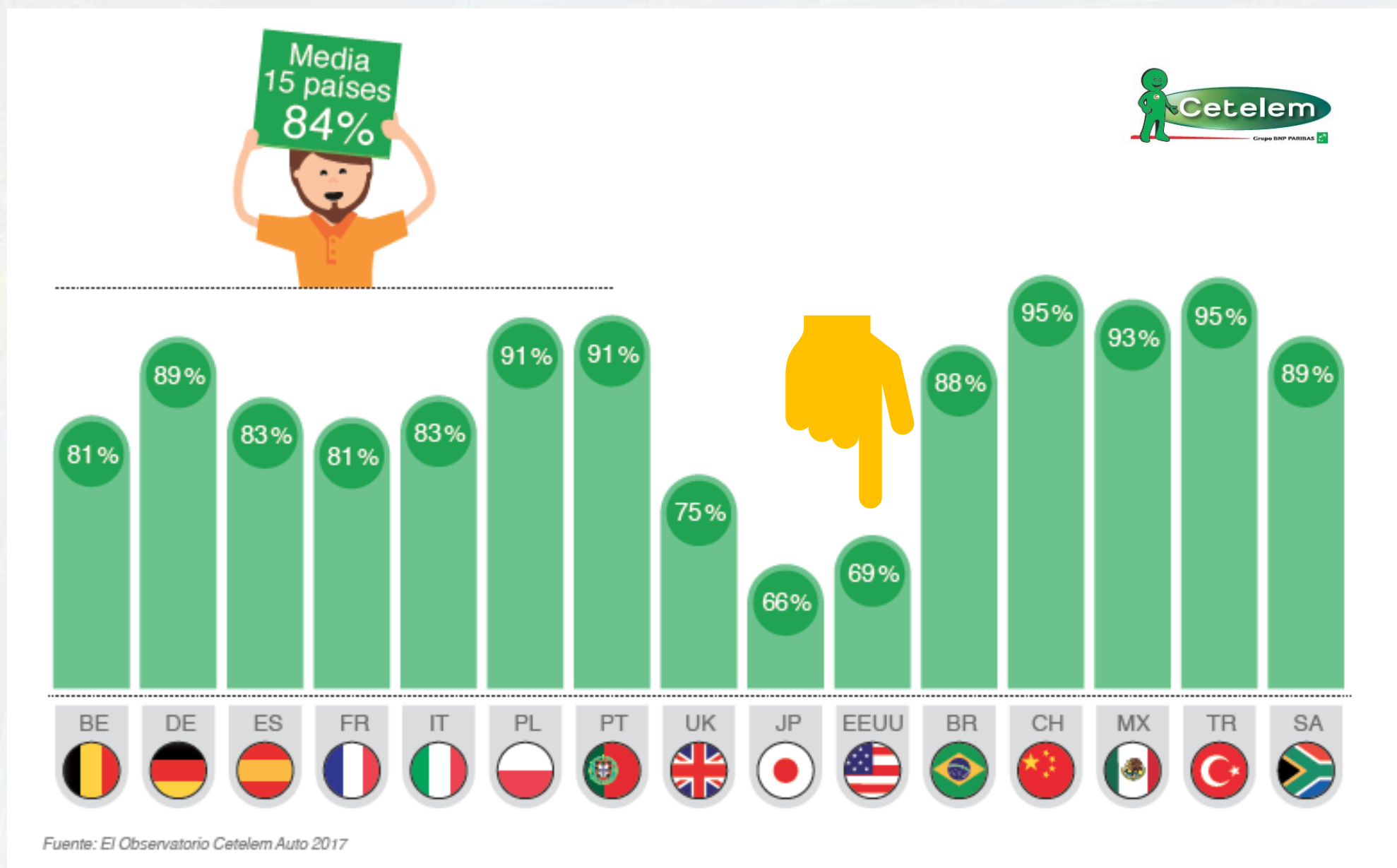
Life Tomorrow

		16-24	25-34	35-44	45-54	55-64	65-74	75+
2016	None	12%	8%	10%	6%	5%	4%	3%
	Emergency Only	18%	11%	16%	16%	15%	12%	17%
	Actively Help	27%	25%	21%	41%	44%	56%	52%
	Partial Control	16%	15%	19%	13%	17%	14%	15%
	Full automation	26%	40%	34%	23%	19%	14%	13%
<div> <div>←</div> <div>More comfortable with full automation</div> <div>→</div> </div> <div> <div>←</div> <div>Comfortable with active assist, but not with giving up control</div> <div>→</div> </div>								
2017	None	0%	3%	4%	3%	2%	2%	1%
	Emergency Only	24%	15%	11%	13%	10%	10%	10%
	Actively Help	46%	43%	49%	55%	63%	64%	69%
	Partial Control	16%	19%	15%	14%	13%	14%	10%
	Full automation	14%	20%	21%	15%	12%	10%	10%

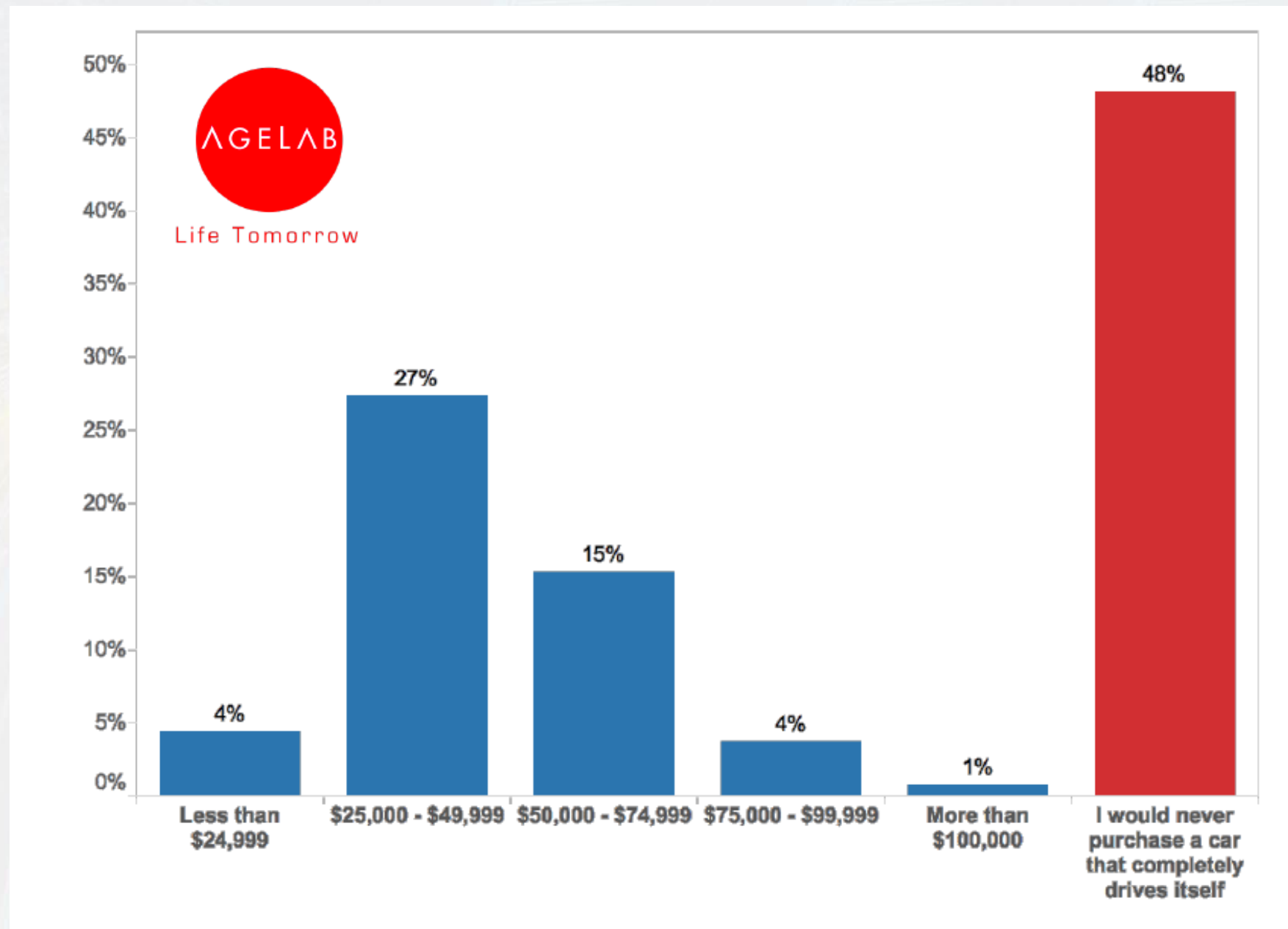
Maximum level of automation drivers would be comfortable with?



# "I love driving"







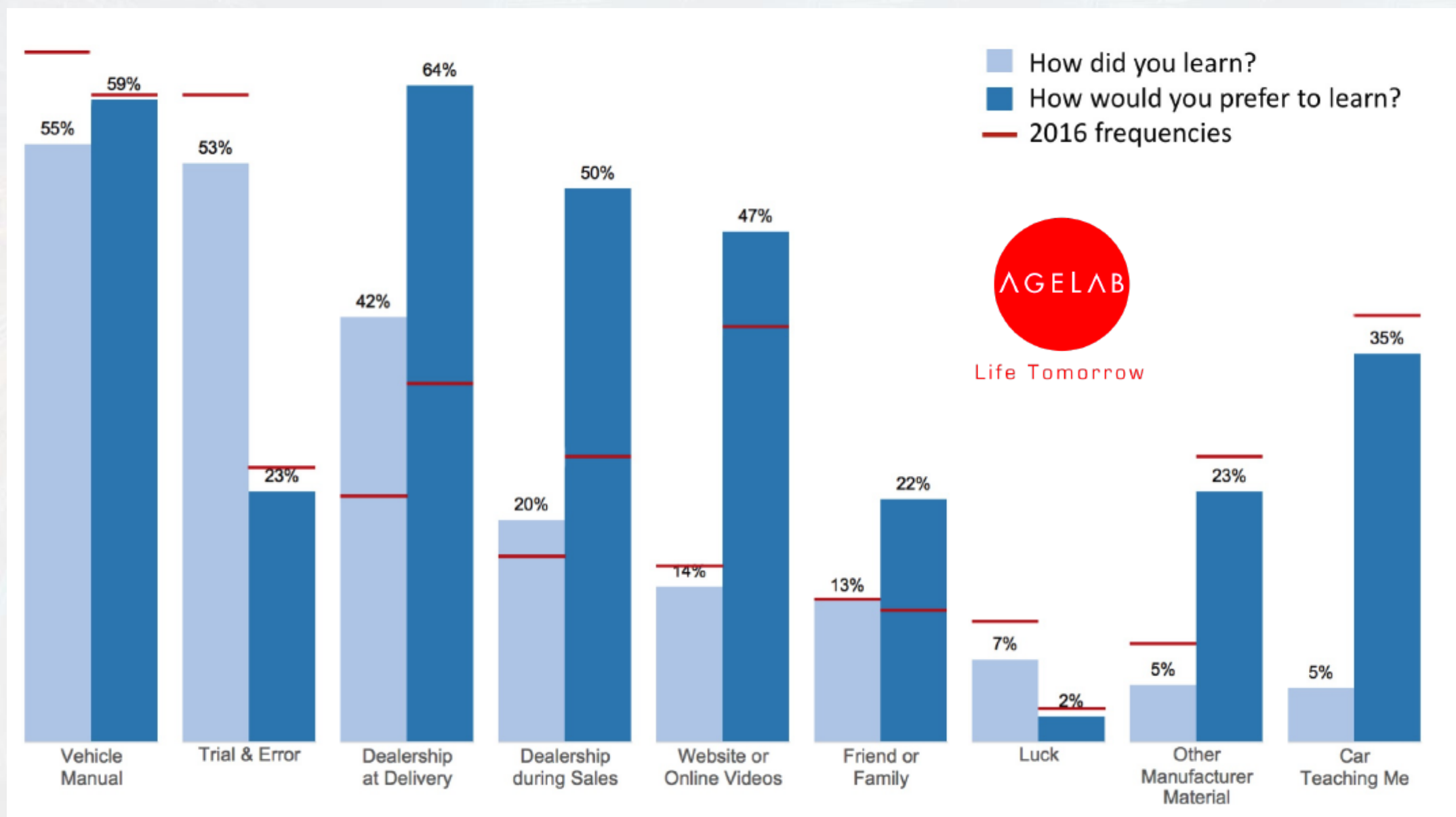
Amount participants would consider paying for a self-driving car





**Stated hesitations related to purchasing a self-driving car**





Current and preferred methods for learning to use in-vehicle technologies



# REFLECTIONS





What are the factors that influence acceptance and intent to use?

What is the best predictor of the use?

In what ways would people change their current travel behavior because of access to self-driving vehicles?

For shared or for personal use?

Will there be changes in jobs due to the use of self-driving vehicles?



# What are the factors that influence acceptance and intent to use?



Ability to be productive while traveling in a car

Relieves stress of driving

Trust that technology will be adequately tested

Safer than human drivers

Attraction of new technology



# What is the best predictor of the use?

Demographic variables such as age

Think using a self-driving vehicle would be fun

Use smartphones, text messaging, transportation apps...

Believe people whose opinions they value would like using self-driving vehicles

Have any physical conditions that prohibit them from driving

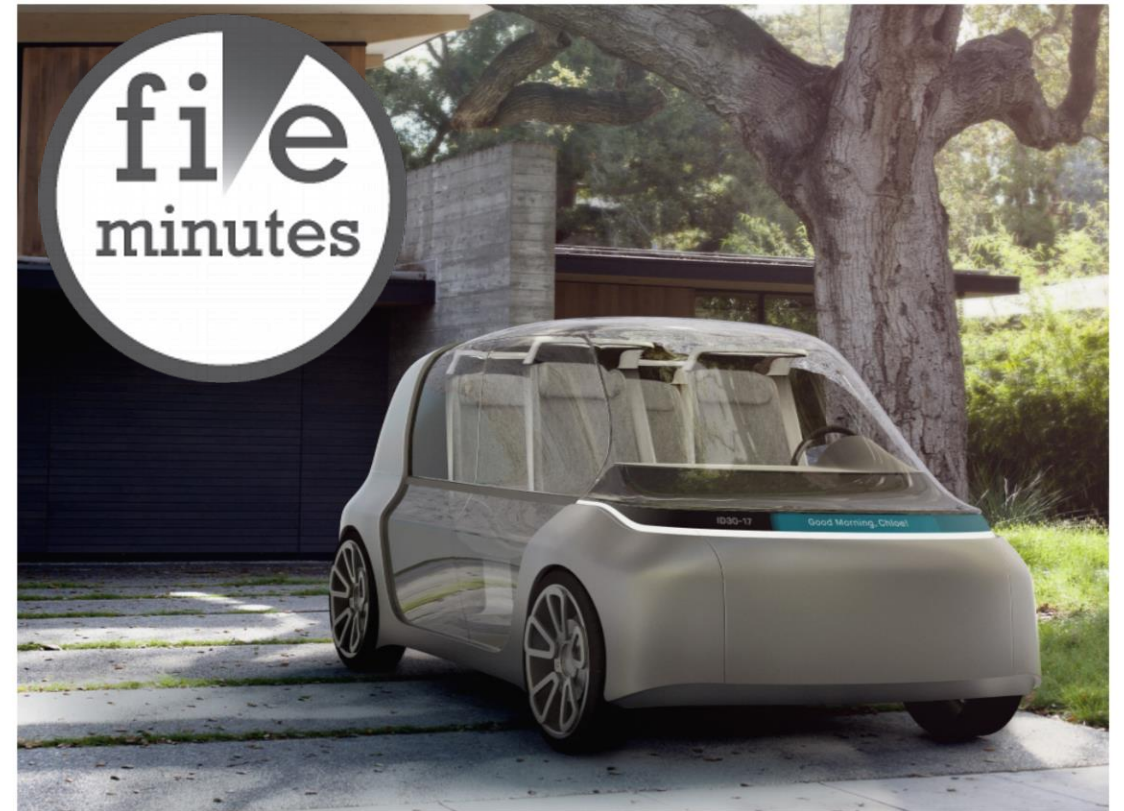
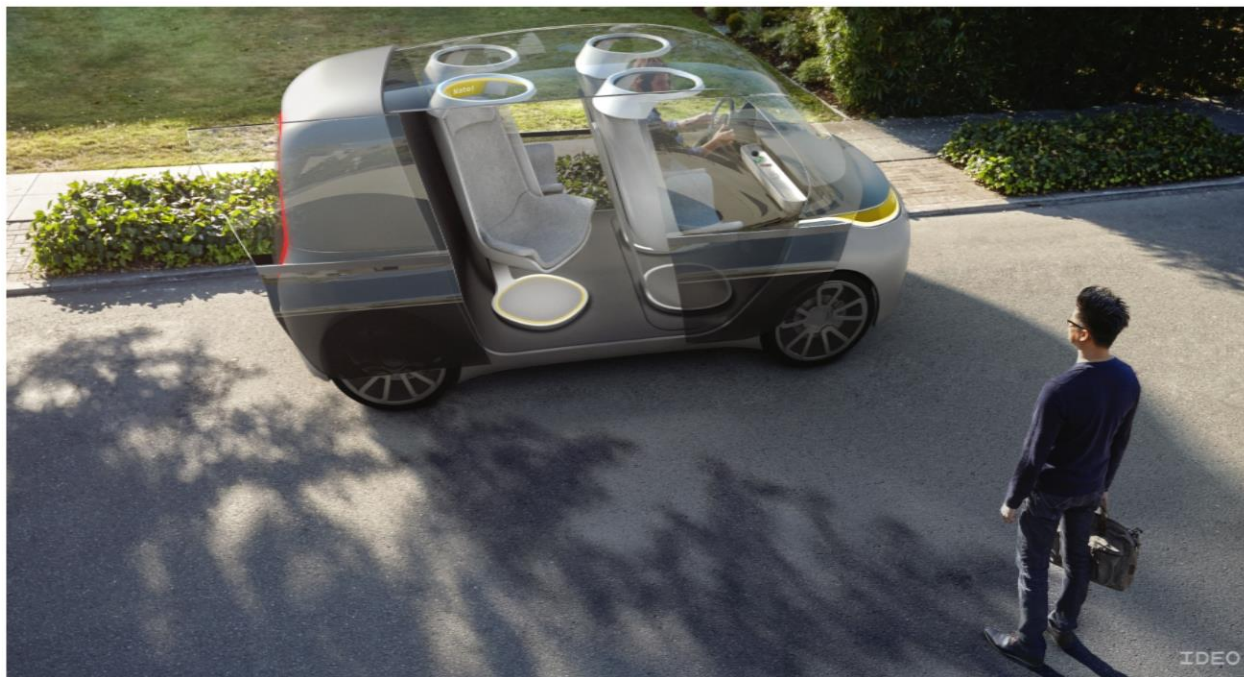




**“Manufacturers will want to have control over the use”**

**“People will buy self-driving vehicles when there is confidence in technology ”**

**“As long as they are expensive, they will be shared”**



**“The next generations will not want to own a vehicle”**

**“It will depend on the decisions of Governments”**

**For shared or for personal use?**



**Change in the number of vehicle miles traveled (VMT)**

**five**  
minutes

**Change in their residential location**

Changes in the  
use of social  
networks,  
internet ...

**Change in their long-distance travel behaviors**

**Change in the number of vehicles owned**

**In what ways would people change their current travel behavior because of access to self-driving vehicles?**



**five**  
minutes



**“They will be the offices themselves”**

**“Companies will have self-driving vehicles such as offices”**

**Will there be changes in jobs due to the use of self-driving vehicles?**

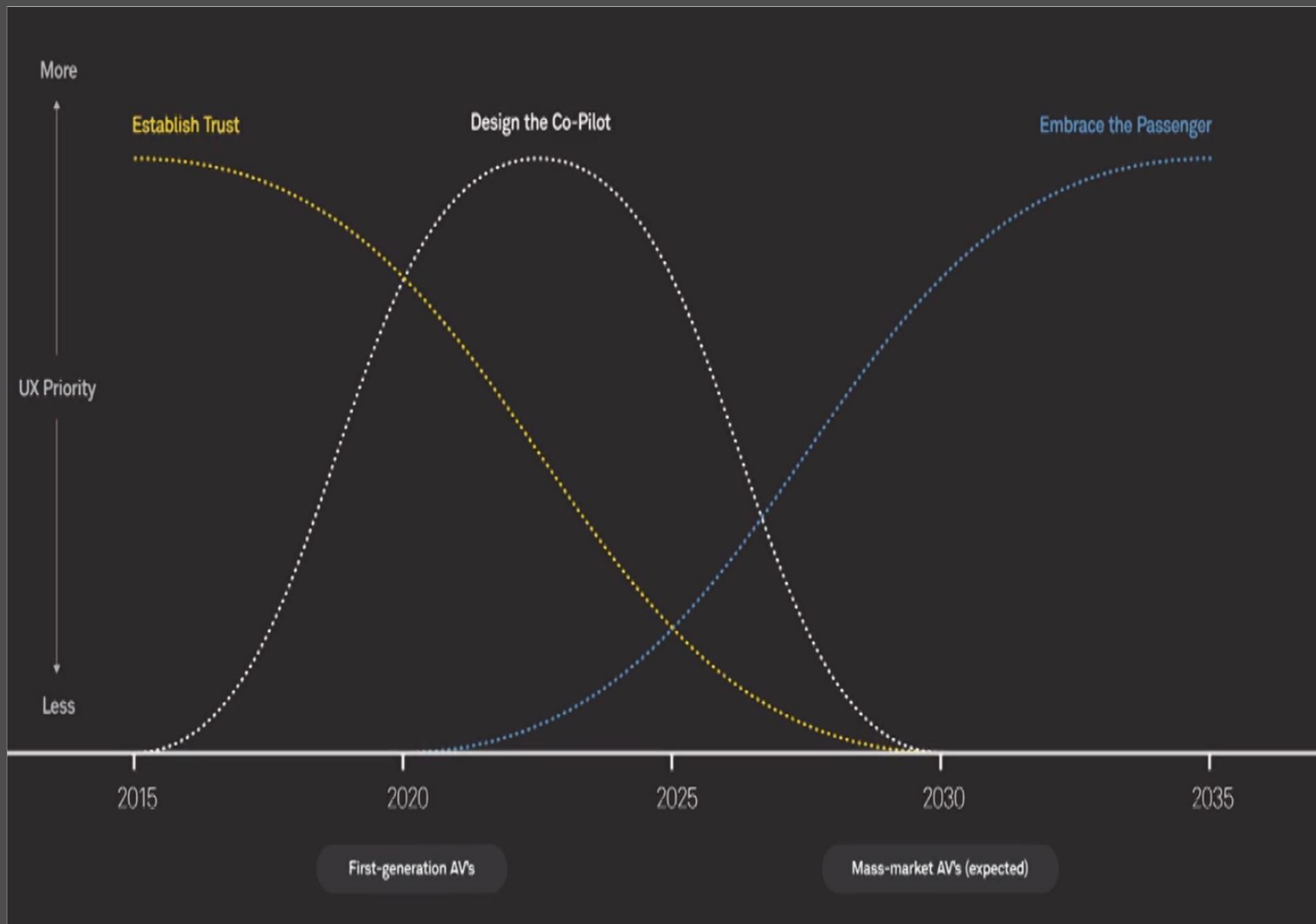
**“Laws will not allow to work on them”**

**“They will eliminate the current tendency to work from home”**



**“There will be no major changes in jobs”**



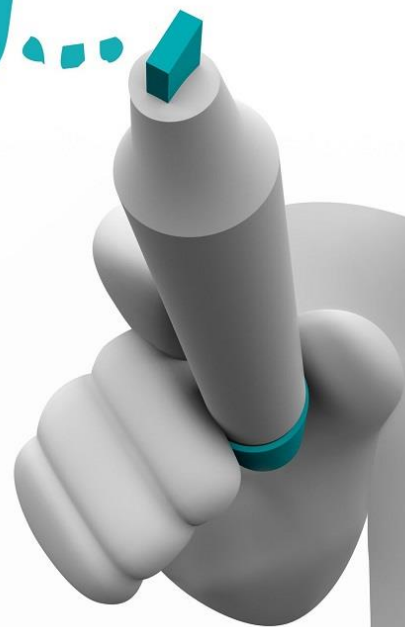




Mickey Mouse - Mickey's Trailer(1938)

# AVOID MODE CONFUSION

HOW  
TO...







**BUILD  
TRUST**



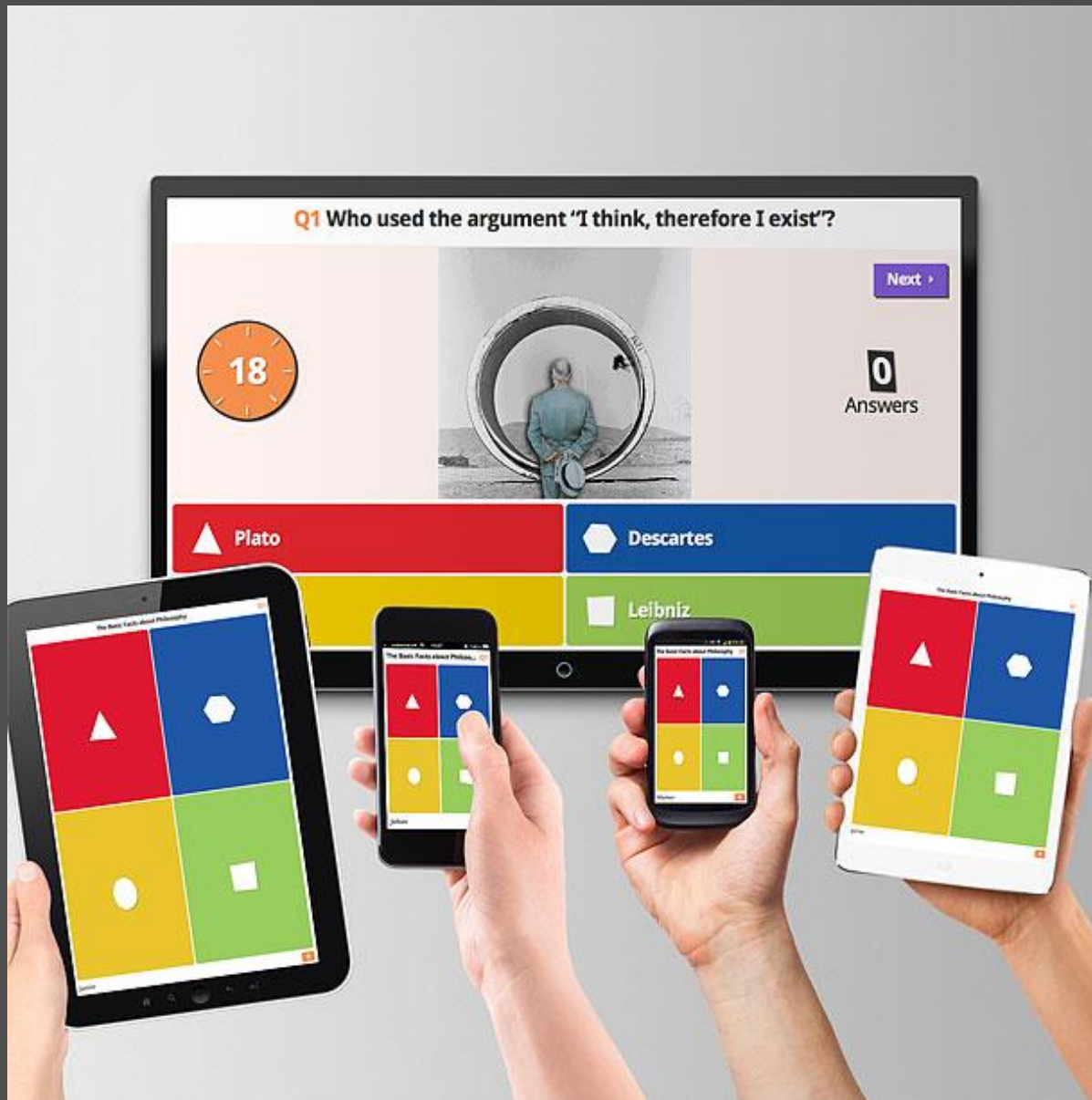


– EXCUSE ME. WHAT TIME IS IT?  
– I CAN ONLY TELL YOU APPROXIMATELY...  
– OK, GO ON!  
– IT'S FRIDAY.



# PROVIDE PREDICTABILITY







# User experience in an autonomous car: driving is secondary?



**Preven  
Control**

**Porriño, 15th September**



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Rosal López**

