EV 2.0 = an electric smart-appliance on wheels

Tesla is great… But what comes next?

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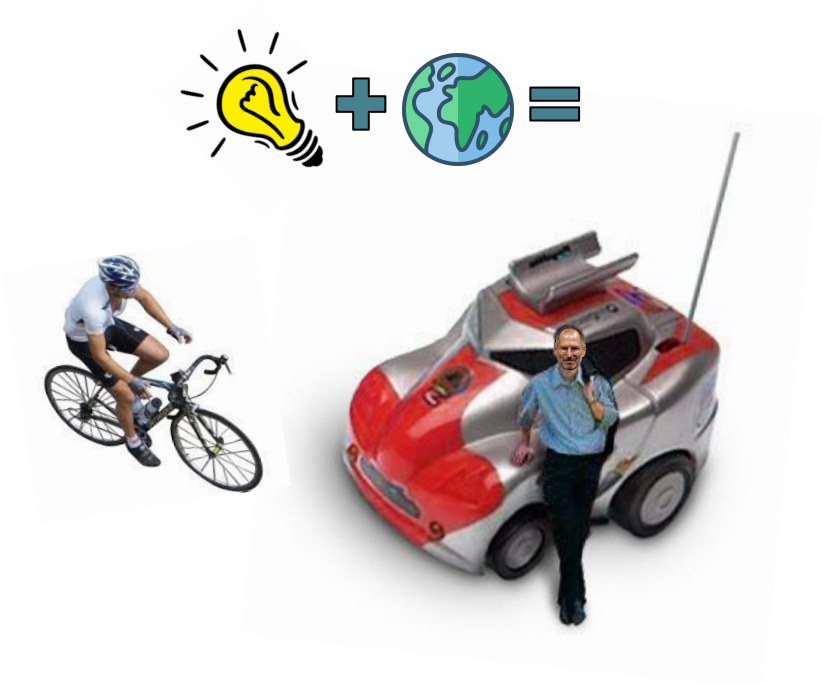


"Design is not just what it looks like, it's how it *works*"
Steve Jobs

Environmental demands and technological possibilities challenge us to *rethink* the car.

Academic studies and government policies make hardly sense if there is a serious disconnect between reality and what we're aiming for, when the mission to 'green' personal mobility and car travel are not met by the sort of vehicles that will bring affordable electrification and automation that truly works (see page 4).

Car use will remain popular. Can't we do something to mitigate its impact on the environment? Yes, we can. Vehicle mass not displaced = kWh not required = GHG not emitted. Vehicle size not displaced = Better traffic throughput and a better fit for self-driving. It'll be safer too for more vulnerable road users in the city (page 8).

Vision and concept laid out in this presentation have already found recognition with experts on a number of occasions. Its IP has been registered.

Ralph Panhuyzen, author/innovator

Developments are going way too slow… but THAT's the opportunity! *

Simple: Personal Communication got its smartphone. Personal Mobility needs a smart device too. Car Electrification and Automation are two sides to the same coin.

Right-click mouse to open blue-printed links in new window.

EV is to become a household's Nr. 1 electrical appliance...

CONTENTS

FISITA

* This outline is a spinoff from the original presentation author Ralph Panhuyzen has given for FISITA's World Congress, Sept. 2021

3. Climate triggers to rethink personal mobility, car travel

Bridge the gap between green intentions and harsh reality

When power grids are down and solar panels don’t work, you'd wish your EV isn't that massive that it needs that many batteries to charge up first in order for you to survive...

People wait for governments to commit themselves to targets, to draw up policies, new regulations. It’s up to businesses and industries to bring us the sort of green products and services that meets climate goals, and for consumers to want and buy them, particularly when it comes to mobility. *Well do they?* No, they don’t.

MPG used to be a big thing when the 1st Oil Crisis broke out in the early 70’s. Not any more with people buying gas-guzzling SUVs and trucks nowadays. Does this mean that the higher the gas prices, the more pressure there is to drill for more oil, the cheaper the gasoline, the higher the EV subsidies need to be? Have EV tax credits become a bonus for already burdening the budget?

That’s not a comfortable position for any government to be in, but it makes the U.S. car market particularly tough for further popularizing the electric car.

4. Automotive Industry is not really making progress

Carmakers and AV developers have joined forces to develop autonomous ride-hailing.
So far they hemorrhaged $ billions without any clear prospect that things will be better.

Infrastructure like clogged up arteries, and what does the industry come up with?

They use vehicles that are bulky and heavy, therefore require a lot of costly batteries, which makes it harder to do zero-emission ride-hailing profitably and equitably. The bigger battery packs make them extra heavy, which contributes to more wear and tear of roads and bridges.

AV Pilots have been going on for a number of years. So far, true SAE Level 5 seems out of reach. By this I mean: not just operated during the nighttime or on streets wide enough. Plus, the bigger the AV, the harder it is to maneuver through traffic. Experts have warned that cautiously, slow-moving taxis add to more gridlock. On top of all this, NHTSA, IIHS and ETSC warned that SUVs cause more pedestrian deaths because of the way they are built.

The astonishing conclusion is that the industry's response is neither green, nor will it improve safety nor mobility.

5. Still so much to do, tackle, make better...

Planet saving that *saves money too*

UN CLIMATE CHANGE CONFERENCE UK 2021

Climate Change will cost trillions to tackle. Then it must be a relief to know that some ideas and plans would actually save money whilst saving the Planet, even **make money** if you go global with them. Export. What's presented here, combines what's practical and pleasurable with what's inevitable; it may start with as few as one in 900 people looking for a new car (go to page 11).

6. There are two types of VMT

VMT 1: Vehicle Miles Traveled *

VMT2: Vehicle MASS Traveled
(weight-size-shape)

The more VMT 1, the more traffic.
Size matters. VMT 2 makes VMT 1 way more serious.

95% of the cars are wider than the usually single occupant (the driver) is tall. It's like expecting to make progress whilst moving sideways. No wonder that Micro-Mobility is getting popular. **VMT 2 goes down**! City governments tend to **curb car traffic** in favor of cleaner, greener alternatives.

Better anticipate! There's a HUGE market between the car, which has grown obese, and two-wheelers. This gap is also where *car electrification and automation overlap perfectly.*

* average occupancy private car: 1.2 person | ride-hailing car: 1.4 passenger

7. When VMT 1 is difficult to bring down… reduce VMT 2. Everybody wins.

VMT 1 (vehicle miles traveled) has gone up.
The hope is that shared use (ride-hailing, Public Transport, carpooling) would solve this… Thus far, in vain.

VMT 2 (vehicle mass traveled) went up too.
Diminishing the chances to 'green' mobility, to use roads more efficiently, to bring down the car's intrusiveness and transit times, to have profitable and equitable ride-hailing.

Road pricing related to VMT2 improves throughput. Perhaps an idea. The higher the VMT2, the higher the tariff. Ditto parking tariffs.

Hello, we are collecting signatures for a bicycle path…

Help! This girl wants to restrict our freedom!

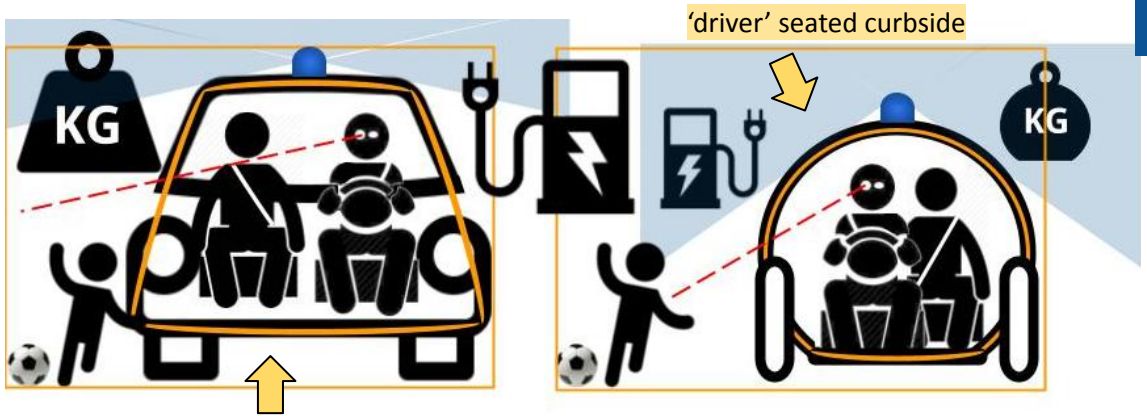
8. CAR ON A DIET

HOW to reduce vehicle weight-size-shape

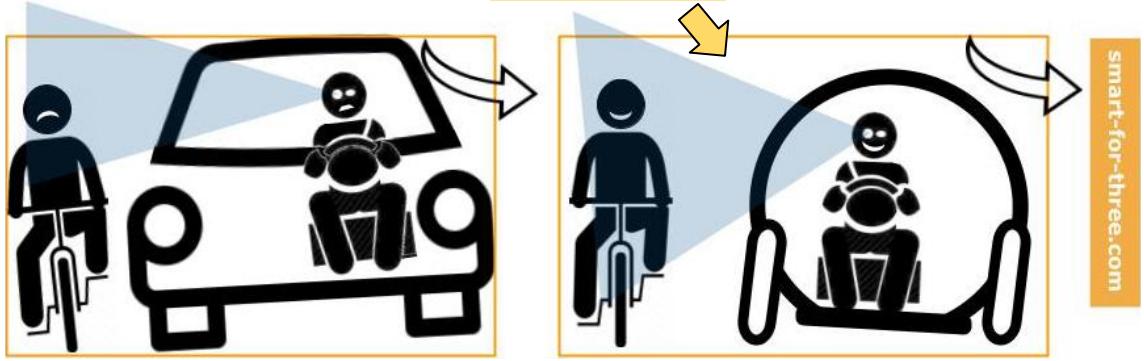
The lower a car's VMT 2

the lighter - smaller - sleeker - less boxy:

- The fewer batteries are needed (an EV's costliest and most polluting component), the more affordable the EV will be without the pressure to subsidize.
- The easier it is for the self-driving tech to scan and image the vicinity and evade other road users (simply more margin to maneuver).
- The more room there is to actually share space and other resources, such as the EV itself and the road infrastructure. Less wear and tear of roads and bridges. Smaller tires means less rubber particulate too.



The typical car box shape is not conducive to combining lightweight materials and rigidity. 'Sleek' doesn't sit well with a rectangular-platformed car either. Airplane fuselages are cylindrical for a reason. Leans into the bend to offset lateral forces.



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9. ELECTRIFICATION - the 'appliance' principle

Grid demand, charging, efficiency will be made a lot easier, incl. manufacturing

more General Electric than General Motors?
more Siemens than Volkswagen?
more Huawei than Hyundai?
more Panasonic than Tesla?
more Foxconn than Apple?
more Dyson than Byton?

If the car ceases to be the personalized 'living room on wheels' it is growing into, people will be more likely to use it as the utilitarian, shared mode of transport that mobility experts envisage, without losing *Freude am Fahren*.

The EV is to become the Nr.1 home appliance. Electricity demand goes up, causing even more strain on government finances, because of the much-needed investments in power grids and charging infrastructure. A lightweight, sleek EV can change all that. The trick is to lower VMT2 without bringing a 'small car'.

As the car is to lose its ICE-based engineering, it basically becomes an oversized RC toy car or **'SMART MOBILITY' APPliance*** which runs on batteries (perhaps H2). This means that OEMs other than automakers may bring a Next-Gen EV, which in turn can help to bring down a car brand's corporate emission profile!

The semi three-wheeler you see here is safer and comfier than similar-sized cars, it carries three passengers.

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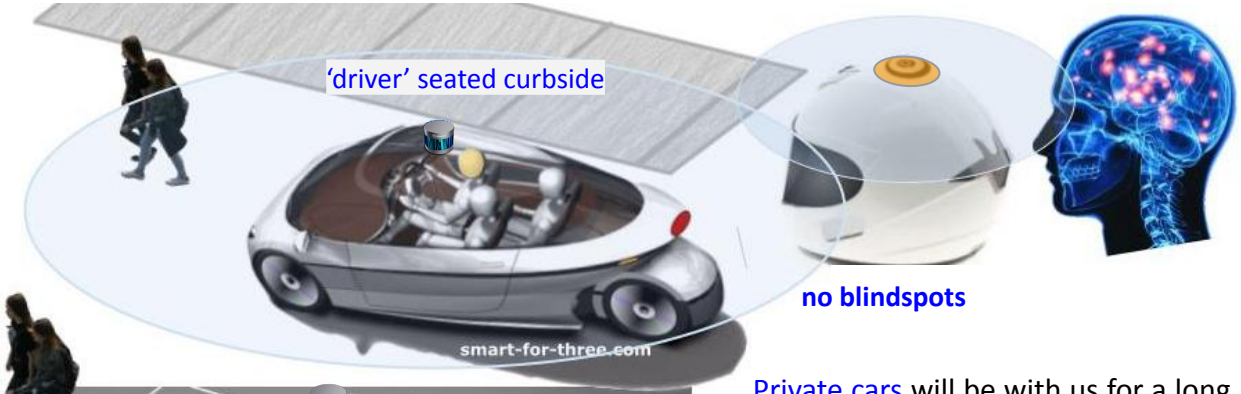
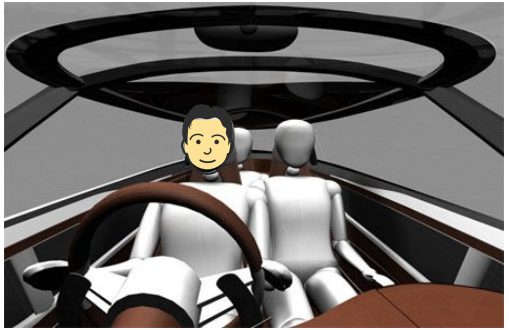
10. AUTOMATION - Have the vehicle fit the AV technology

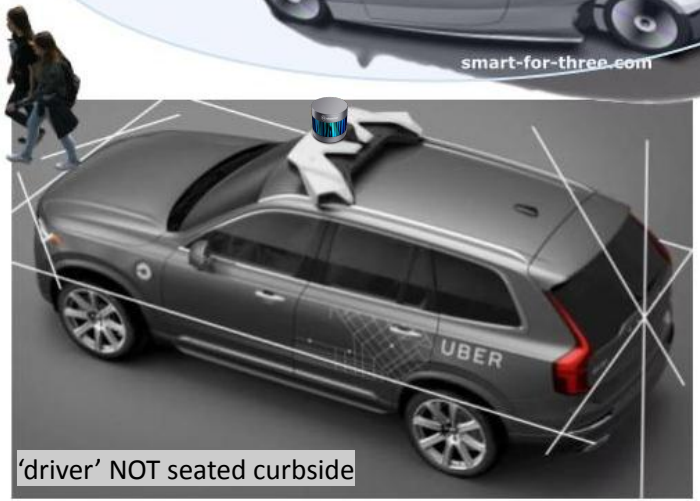
instead of the other way around

Its AV implications have been filed with the NHTSA

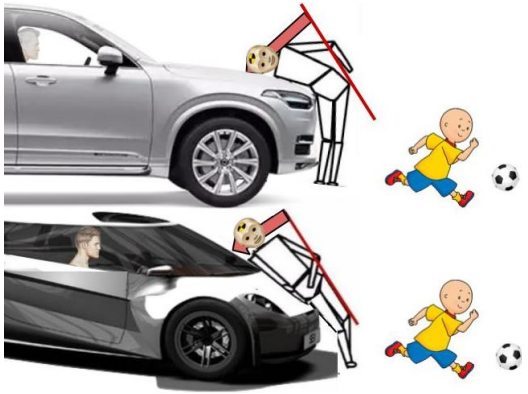


no blindspots





Private cars will be with us for a long time. In this outline, the prospect of driverless is used to lure car owners, subscription-holders and ride-hailers into reducing their VMT2. An AV can be set up like a 360° vision helmet. Sloping and rounded contours make it easier to 'sweep' the car's vicinity. Self-driving will bring utilitarian and intermodal use much closer (MaaS).



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Buttigieg wants 'eyesight test' for AVs

11. FOR WHOM?

Which groups may/will welcome a 'Smart-Mobility App'... to begin with?

singles

urbanites

early-adopters
(Tesla strategy)

greenies

techies

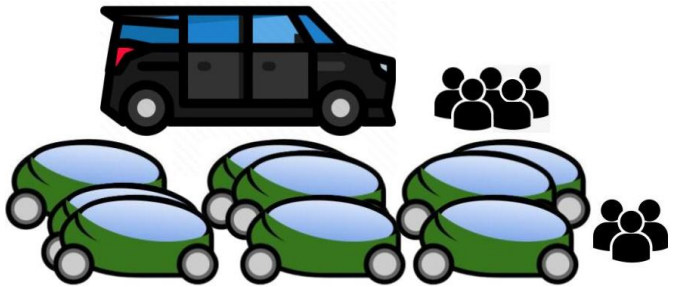
couples

millennials

the physically fit *

one-child households

two-car households



ride-hail companies incl. **UAM**

Car-like safety and comfort as well as the agility, economy and Fahrvergnügen of a motorized two-wheeler. Worldwide automobile sales are around 75 million annually. 'Reducing VMT 2' can start with luring 1 in 900 prospective car buyers each year, that's enough to have a viable production.

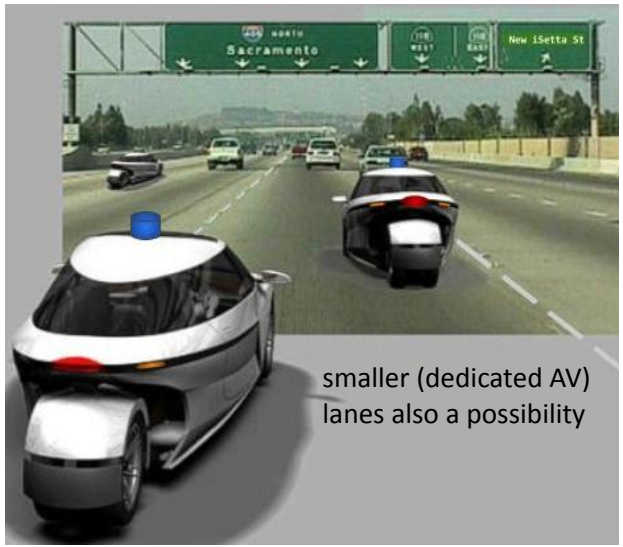
What if 1 out of 900 turns out to be 1 out of 90?
We should not forget that more than 60 percent of the world population lives in and around cities (urbanites). More than 60 percent of households in the U.S. have two or more cars.

Dramatically lowers the costs of having to deploy cars clumsier than the average ride-hail trip calls for. Improves the chances of intermodal usage in collaboration with Public Transport**.** Need more seats? *Then* deploy a people carrier or SUV.

* low boarding + exiting (although nothing sportscar-like) will not suit everyone

12. No longer confined, the car ceases to be a standalone thing

Investors have discovered electro-mobility. To use a Tesla term, **'ludicrous' lots of capital** goes to electric car companies without a future vision that sets them apart. Now SF filmmakers have speculated what the car will be like. On the right you see sleek maglevs in the 2002 film 'Minority Report'. Now leave out those costly flyovers. Below: sleek EVs using the freeway of



smaller (dedicated AV) lanes also a possibility

today in bricklayer (split-lane) formation. Spinning off a whole **ecosystem**. The car itself becomes a vehicle or platform for all sorts of peripheral technology and new ways of deployment.

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