THE ENGINE OF Car Digitalization

THIERRY CAMMAL, DIRECTEUR GENERAL, RENAULT SOFTWARE LABS

-Abstract: "what are the key enablers for the Automotive Industry to join the Digital ecosystem"
The Future is now…

The driving forces for the automobile future

- Mobility and Living
- Customer Values
- Energy and Environment
- Global Economic and Demographic Changes
- Technical Disruptions
- Transport Infrastructure
Now is the answer …

The automotive answer

- Electrification
- Mobility and Living
- Energy and Environment
- Autonomous Drive
- Connectivity

Demographic Changes
Technical Disruptions
Infrastructure
Vehicle sales to grow slowly

Recurring revenue pools to increase significantly (~30%):
  - Mobility services
  - Digital services
Software everywhere ...

Software will drive the future...

Artificial intelligence

Critic Control

...and Hardware will be the main enabler!

- Power electronics
- E/E architecture
- Massively parallel microcontrollers
“Today, Software represents 15-25% of total car value, and it will be more than 50% after 2020. We need to control this universe internally.”

Thierry Bolloré, Directeur Général du Groupe Renault
China changing the game dramatically!
China is becoming the true driver of the global auto industry
China’s digital landscape by numbers

- **772M**: Total Internet users in China (Dec 2017)
- **753M**: Total mobile Internet users in China (Dec 2017)
- **1.06Bn**: Monthly active users* on WeChat (Jun. 2018)
- **200+**: Global cities with Mobike operations since Oct. 2017
- **550M**: Didi users across over 400 cities in China (2017)
- **USD 30.8Bn**: GMV sales on Alibaba Singles’ Day 2018
The mobility in China: huge gap with mature markets
Eco-system covers all the aspects of life

Social Network

E-commerce, E-payment

Online entertainment
- Video streaming
- Music
- Online streaming
- Game
- Online FM
- News

Digital Lifestyle

Navigation

Online booking
Software is the key enabler for innovation and new business models

The automobility world joins the exponential digital ecosystem.
Digital disruption creates an entirely new business model
Tomorrow’s Electronics will play leading role…

…if it succeeds for 4 challenges
#1 Safety: Mandatory for new mobility!
#1 : New generations of chips are yet ready

INTELLIGENT SYSTEMS: A TECHNOLOGICAL DISCONTINUITY

1970

COMPUTERS: APPLICATION PROCESSING

1990

SMARTPHONES: CONNECTIVITY & MOBILITY

2020

INTELLIGENT SYSTEMS: ANALYSIS & DECISION-MAKING
A NEED FOR A NEW GENERATION OF PROCESSORS AT THE HEART OF INTELLIGENT SYSTEMS

1970

PROCESSORS DESIGNED FOR LARGE APPLICATIONS

1990

PROCESSORS DESIGNED FOR LOW CONSUMPTION

2020

PROCESSORS DESIGNED FOR INTELLIGENT PROCESSING
#2 Value for cost higher and higher!!!

=> Meaning that all these innovations (AD, EV, etc)… must keep the same TCO for the final customer
#2 More Moore and More than Moore are at stake!
#3 Interoperability & global standards: ex. of EV

Follow the car through Europe, and open standard protocols

- 2010 - 2016
  - DC high-power charging CCS (2350 kW @400/800 V)
  - DC high-power charging CCS (2150 kW @400 V)

- 2017
  - BMW i3
  - Audi e-tron (Q6)
  - Lucid Air

- 2018
  - Audi e-tron (Q6)
  - Porsche Mission E

- 2019
  - Volkswagen ID
  - Peugeot mid-size

- 2020
  - BMW 8 Series
  - Kia Niro
  - Hyundai Ioniq
  - Ford Model E
  - Mini E
  - Volkswagen e-Golf
  - Hyundai eSUV

- 2021...
  - Tesla Model S
  - Mazda EV
  - Infiniti QX
  - Tesla Model S
  - Peugeot i-Miev

- AC fast charging 43 kW
- AC charging 22 kW
- AC charging 11 kW
- Only AC slow (3.6-7.2 kW)

Cars and their models are shown in the diagram, along with their respective charging capacities.
#3 Some actors in China are speeding up!
#4 New paradigm for business: ex. BanMa

## OEMs
- ROEWE
- Yanfeng
- Bosch

## Tier 1 Suppliers
- Continental
- Flaimicro
- Delphi

## Software
- Panasonic
- Gemalto
- Texas Instruments
- Philips

## Chipset
- AllGo
- NXP
- Renesas
- Zeotech

## Devices
- Qualcomm
- AEE
- Yi

## Parking
- ETCP Group

## Alibaba
- AliPay
- Alibaba Group

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<tr>
<th>Road trip</th>
<th>B&amp;V</th>
<th>Insurance</th>
<th>Petrol</th>
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<td>OS\ID\Cloud\Pay</td>
<td>Online Audio</td>
<td>Telecom</td>
<td>Charging</td>
</tr>
<tr>
<td>Assistance</td>
<td>Traffic</td>
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**old**

**new**
#4 PFA can enable to bridge all the stakeholders
Define & create innovative, safe, accessible & affordable best in class platform SW solutions for Electrical, Connected & Autonomous vehicles

- Strengthen Alliance’s Embedded Software Competence
- View Vehicle as a Software System
- Internalize Critical Software to master SW vehicle quality
- Develop Innovative SW for future Alliance Vehicles
- Prototype solutions for early & reliable project decisions
- Participate in several research & open-source communities projects
RENAULT SW LABS
CHASING NEW VALUE!

Build a solid
Embedded SW Engine
Connected & Autonomous
enabling: 1 2 3

1 UX

2 B2C

3 B2B
VEHICLE EMBEDDED SOFTWARE « ENGINE » – 4 PILLARS

1. MULTI-SYSTEMS ENVIRONMENT
   Continuous Integration & Testing

2. Differentiating SOFTWARE INTERNALIZATION

3. SOFTWARE PLATFORMING

4. TRANSVERSAL VEHICLE SW ARCHITECTURE