GRANDES MENTES PENSAM ELETRICAMENTE
LAS MENTES BRILLANTES TIENEN IDEAS ELÉCTRICAS
EVS26 GREAT MINDS THINK ELECTRIC
LES GRANDS ESPRITS S'ILLUMINENT
AGAR BUDDHIMAN HO BIJLI YAAD KARO
GROTE GEESTEN ZIJN VERLICHT KLUGE KÖPFE DENKEN ELETRISCH
26th International Electric Vehicle Symposium

A Tale of Three Plugs

Infrastructure Standardization in Europe

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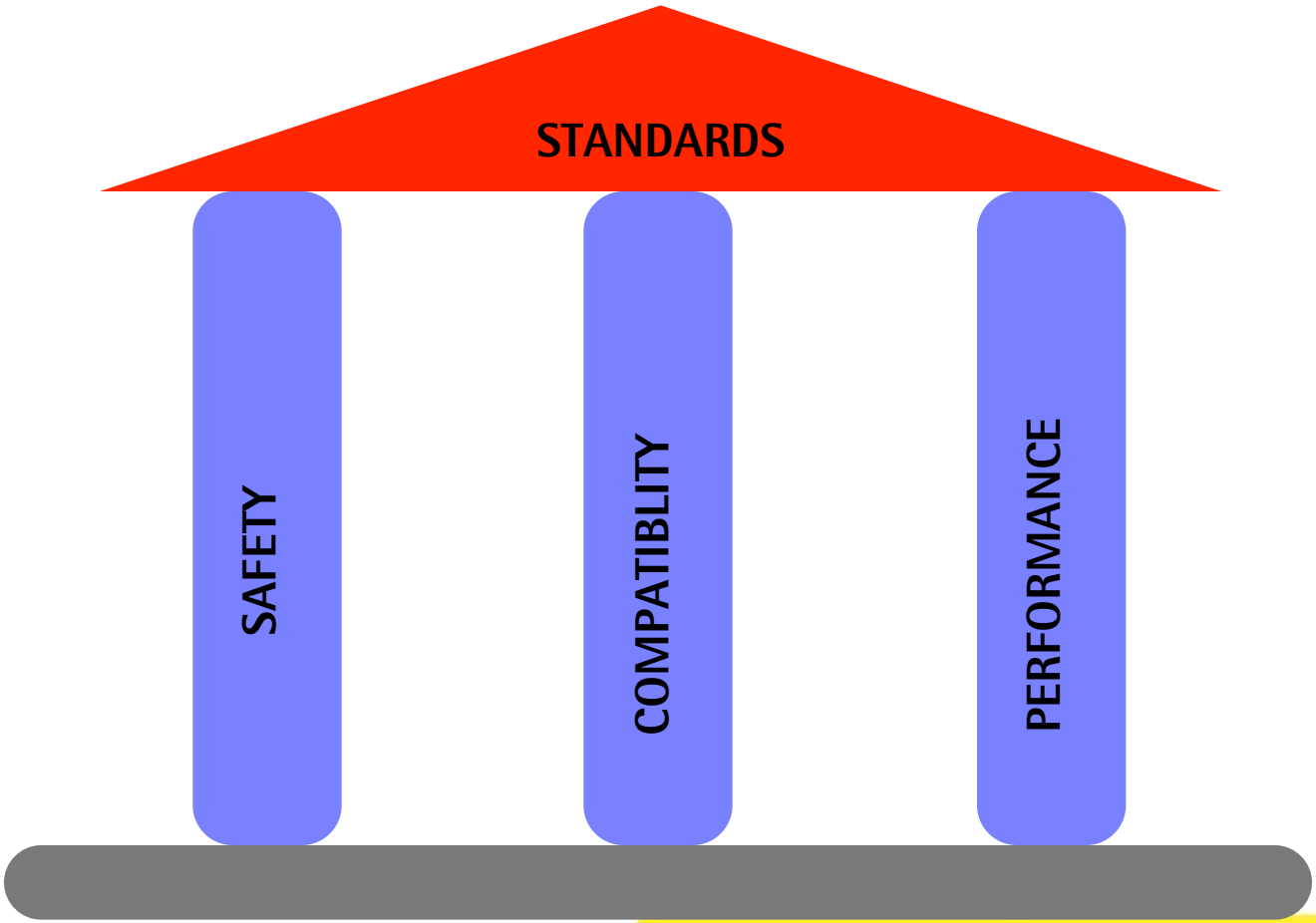
ORGANIZED BY THE WORLD ELECTRIC VEHICLE ASSOCIATION, WEVA
HOSTED BY ELECTRIC DRIVE TRANSPORTATION ASSOCIATION, EDTA
IN COLLABORATION WITH

The House of Standardization



Infrastructure standards

- IEC TC69: IEC61851 family of standards
- Other committees involved:
  - ISO TC21 SC22: ISO17409 (vehicle-related)
  - IEC SC23H: IEC62196 (accessories)
  - IEC SC23E: RCD's
  - IEC TC64: IEC60364-7-722 (installations)
  - IEC SC17D: IEC61439-7 (assemblies)

European standardization

- EU Mandate M/468
- CEN-CENELEC Focus Group on Electromobility
- CENELEC TC69X revived 2011
  - Expediting adoption of international standards
  - No duplication or parallel work
  - European standards where specifically necessary

61851 charging modes

- Mode 1: standard a.c. outlet
  - potential safety problems on bad installations
- Mode 2: standard a.c. outlet with ICCB
  - improved safety, but not elegant solution and plug not protected
- Mode 3: dedicated a.c. outlet
  - full safety and ampacity control
- Mode 4: d.c.

Which accessories

Standard domestic

Standard industrial 60309-2

Dedicated EV 62196-2

- Type 1
- Type 2
- Type 3

Standard outlets

- Domestic outlets: various designs in Europe
- Not really fit for currents > 10A

Standard outlets

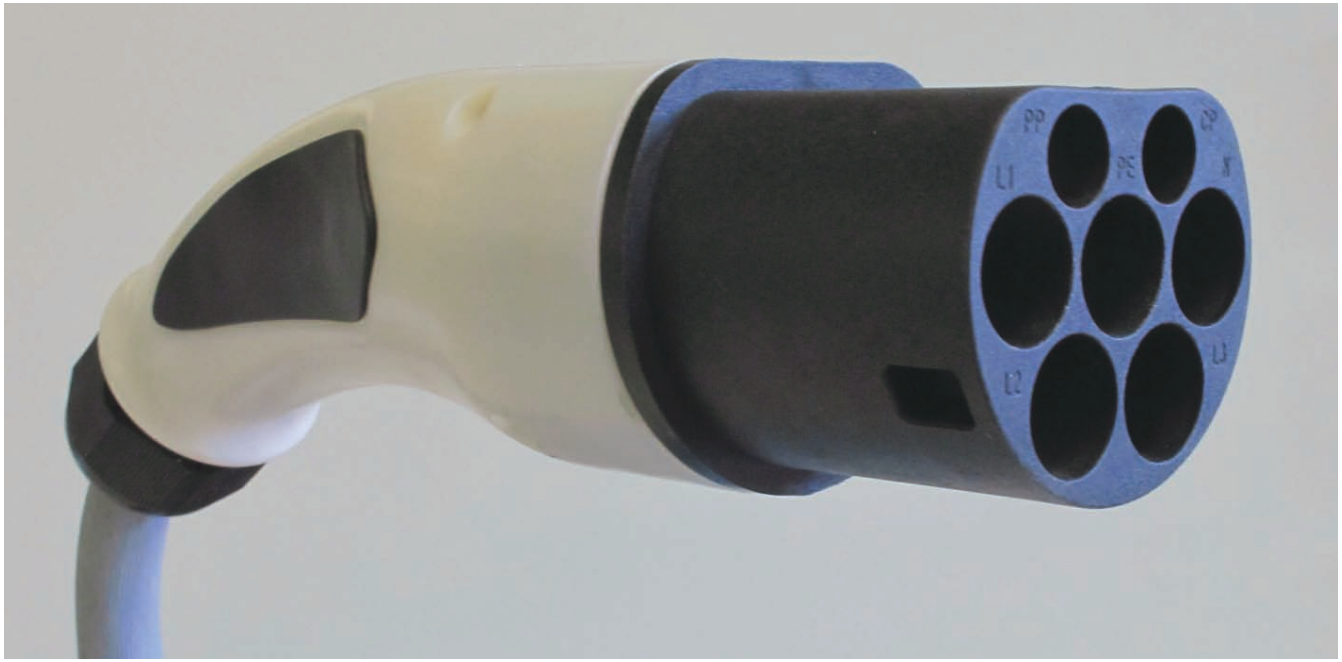
- IEC60309-2 Industrial plugs
- Widely used, cheap and reliable
- A good contender for Mode 1 and 2?

IEC 62196-2 accessories

- Type 1: vehicle coupler (not used as plug)

IEC 62196-2 accessories

- Type 2 three phase plug



IEC 62196-2 accessories

- Type 3 plug with shutters

Choice of the plug

- National and commercial vs. safety interests
- Creating an open market for accessories complying to international standards
- Demand for standard accessory
- Most countries tend to prefer Type 2
- Type 3 support strong in France and Italy

Public infrastructure

- Emergence of public charging stations
- Mode 3 for enhanced safety and performance
- Case C (attached cable): theft risk
- Case B (loose cable): use of Type 2 or 3 plugs
- Billing system: cost of energy vs. parking and transaction costs

Private charging

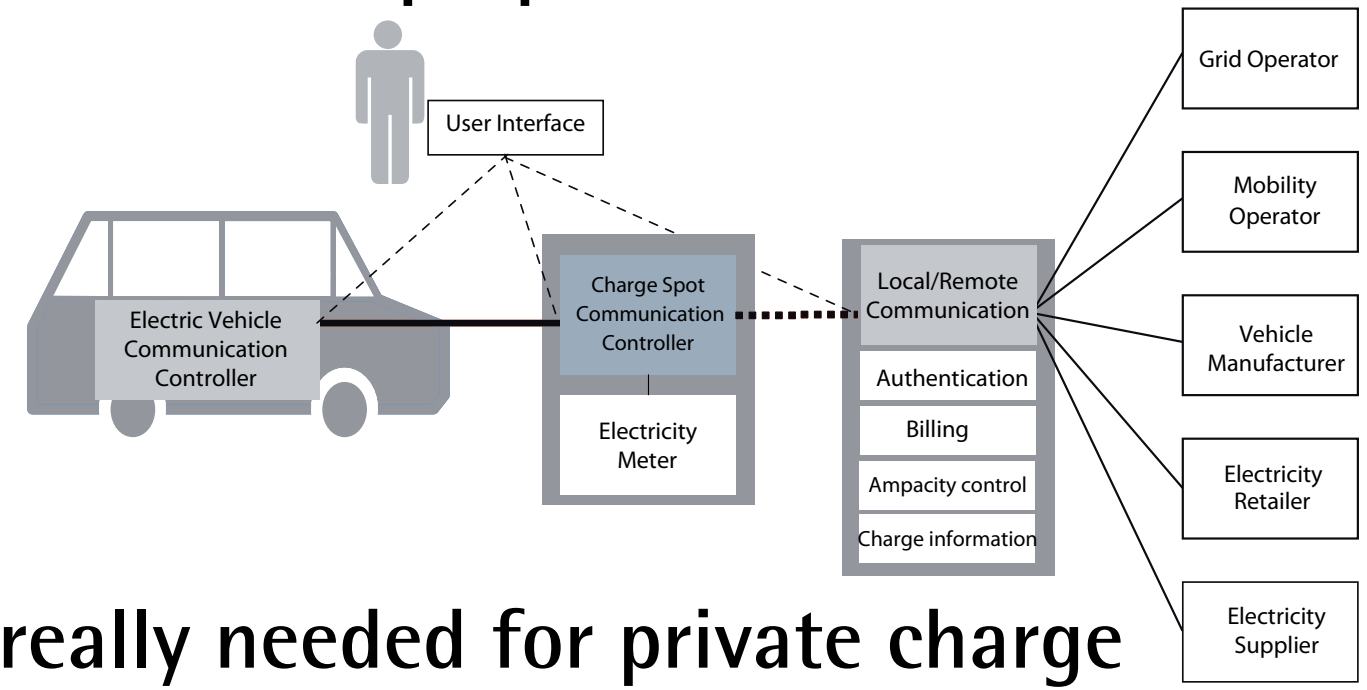
- Low infrastructure cost essential
- Mode 3 charging infrastructure as standard part of the domestic electric installation
- This is the electrician's job!
- Formation of electricians and opening of the market
- Certification authorities
- Electrical trade

Cost for the user

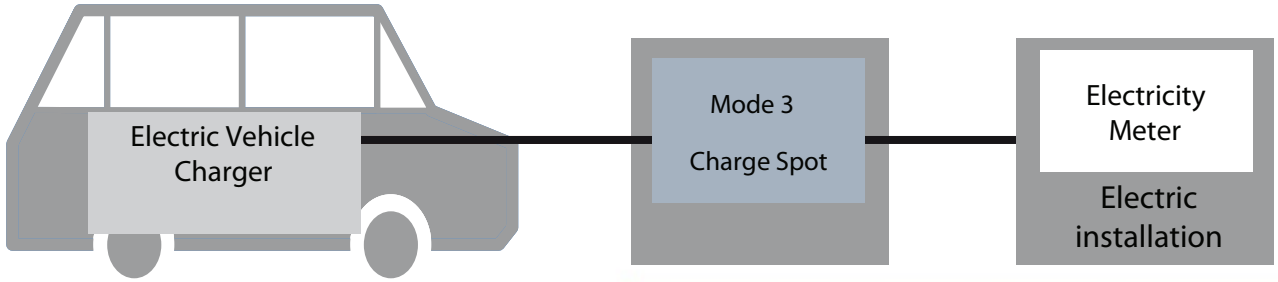
- In advance of the smart grid
- Optimal exploitation of tariff and use of domestic installation
- No need for complex business models
- K.I.S.S. principle

Complex business models

- What is sometimes proposed



- What is really needed for private charge



Conclusion

- Simple,
- Safe,
- Smart charging

- through Standardization !

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