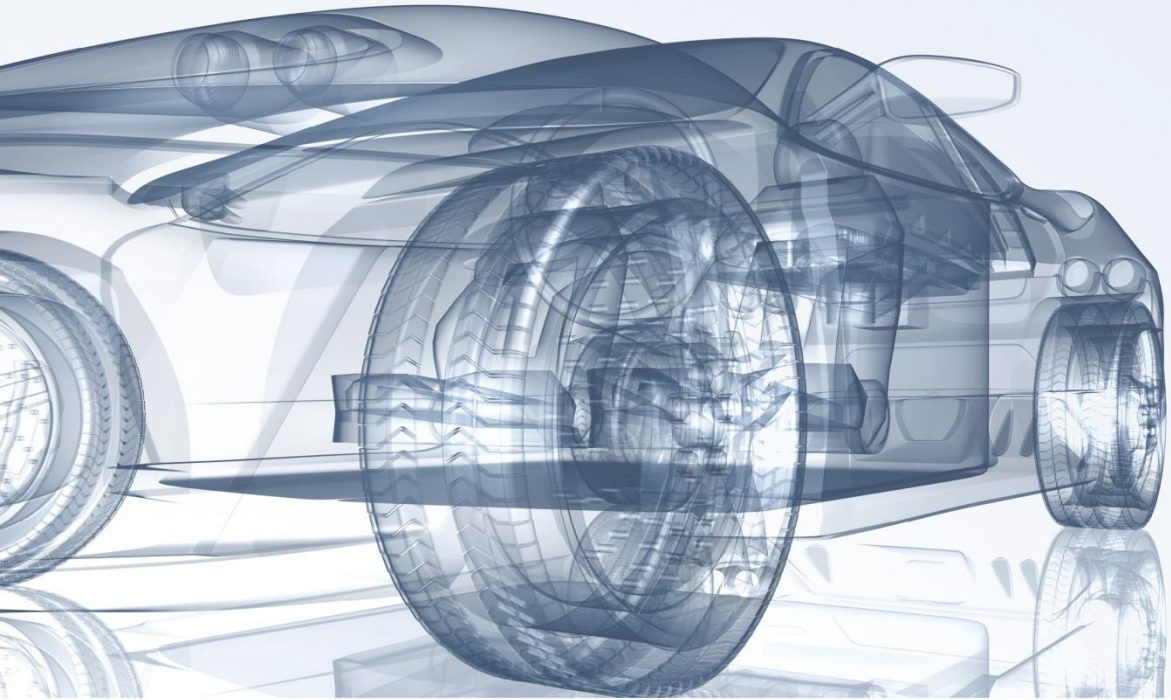
evs 30



The 30th International
Electric Vehicle
Symposium & Exhibition

October 9–11, 2017

Messe Stuttgart, Germany

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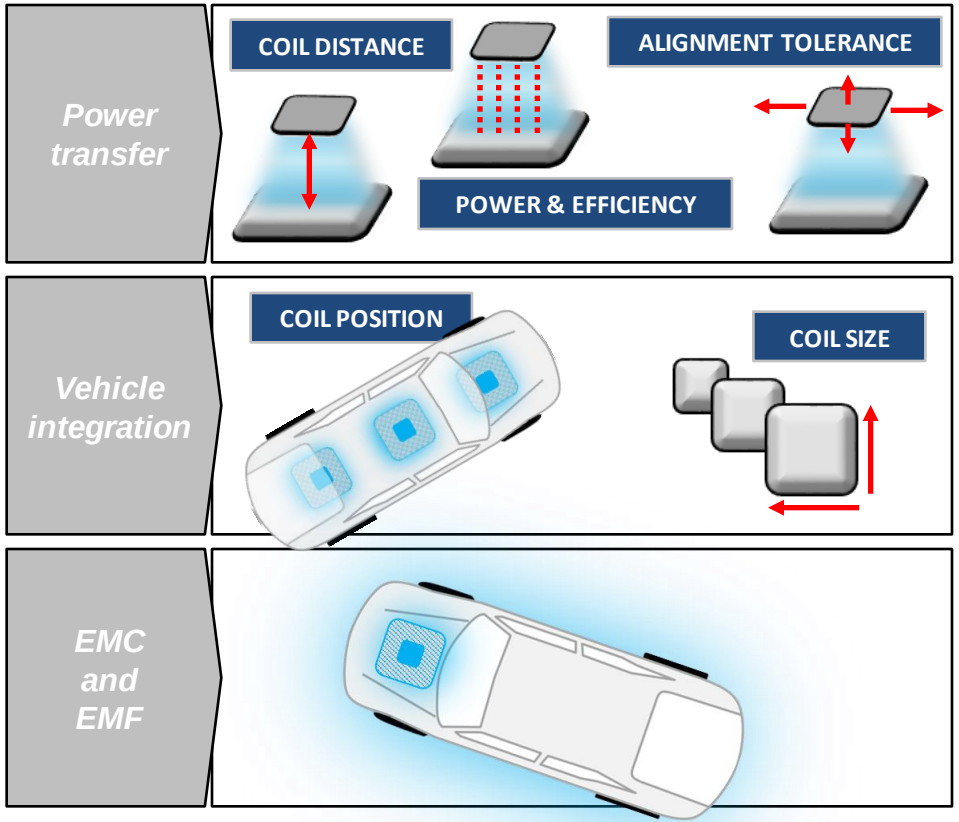
Wireless Charging 2020 – Interoperable and Standardized

EVS30 – Session F2
Stuttgart, 10/10/2017

Johanna Heckmann & Michael Scholz
P3 Group GmbH – Heilbronner Str. 86 – 70191 Stuttgart

Content

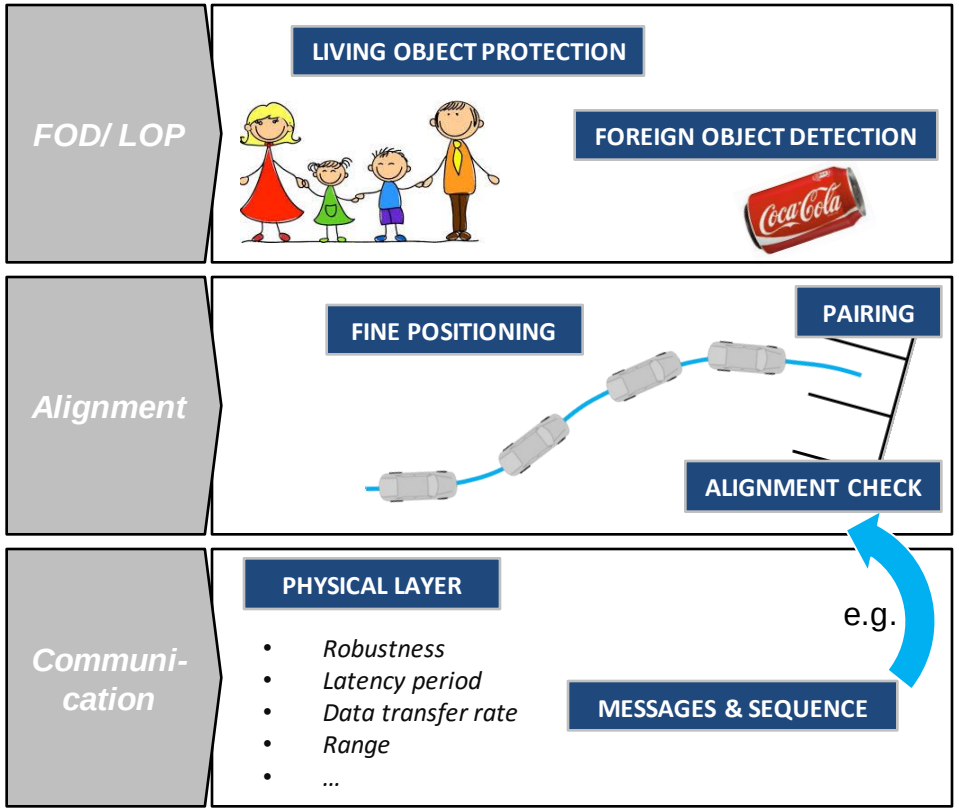
Technological challenges with respect to standardization (1/2)



Standardization challenges

- *Determination of interoperability requirements with respect to different technologies (e.g. designs) and applications*
- *Unification of coil position in parking spot with respect to position in vehicle*
- *Limit definition and determination of requirements for keeping the limits*

Technological challenges with respect to standardization (2/2)



Standardization challenges

Determination of requirements and testing procedures with universal test bodies

Identification of robust technologies with adequate accuracy that support different types of vehicles

Definition of messages and sequences with respect to dedicated functions and used technologies

Content

1 **Overview of technological challenges**
Technological and standardization challenges

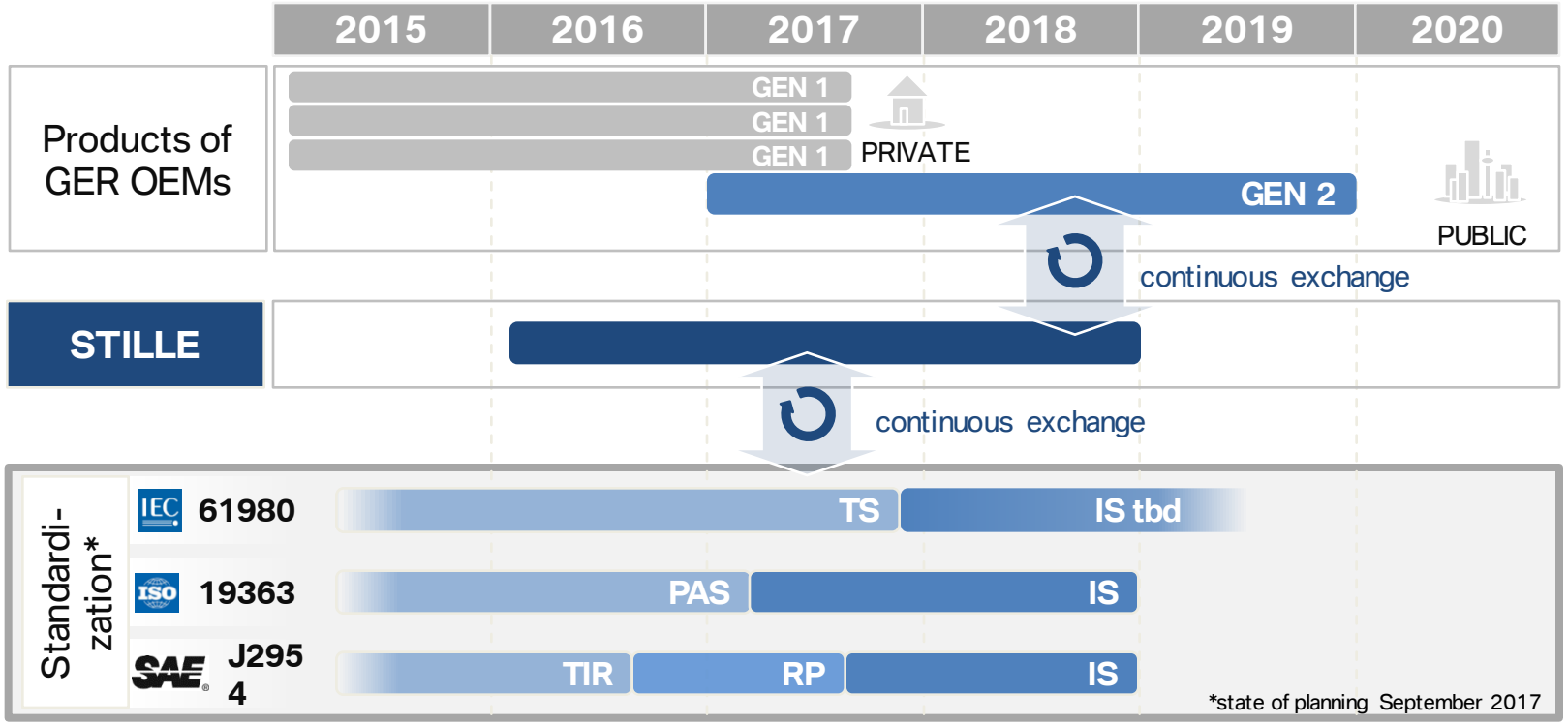
2 **Status and goals of standardization**
International projects and timeline

3 **Activities and status of project STILLE**
Project goals, structure and activities

Major international standardization projects in the context of inductive charging

#	next pub	title	focus
IEC 61980-1	IS	*Electric vehicle wireless power transfer (WPT) systems Part 1: general requirements*	
IEC 61980-2	TS	*Part 2: Specific requirements for communication between electric road vehicle (EV) and infrastructure with respect to wireless power transfer (WPT) systems*	
IEC 61980-3	TS	*Part 3: Specific requirements for the magnetic field wireless power transfer systems*	
ISO 19363	IS	*Electrically propelled road vehicles – Magnetic field wireless power transfer – safety and interoperability requirements*	
ISO/IEC 15118	IS	*Road vehicles – vehicle to grid communication interface*	
SAE J2954	RP	*Wireless charging of electric and plug-in hybrid vehicles*	

Overall timeline for standardization with respect to market introduction



Content

1 **Overview of technological challenges**
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The STILLE project aims to develop an interoperable interface for inductive charging systems

Period:
01/05/2016 to 31/12/2018

Funds:
4,1 Mio. EUR

Consortium lead:
P3

Supported by:
Federal Ministry for Economic Affairs and Energy

Background

- Different system proposals are discussed within the standardization of inductive charging systems to become an interoperable interface.
- Not only the regulatory environment, also the manufacturers put increasing pressure on the determination of an interoperable interface. The aim of the manufacturers is to offer interoperable inductive charging systems in the market from 2020 on.

Project Goals

- By validating existing system proposals practically, necessary findings can be made to design the interoperable interface of inductive charging systems.
- All the findings will be used as input for the international standardization to support decisions to determine the power and communication interface of inductive charging systems.

Standardization

- IEC 61980
- ISO 19363
- ISO/IEC 15118
- SAE J2954

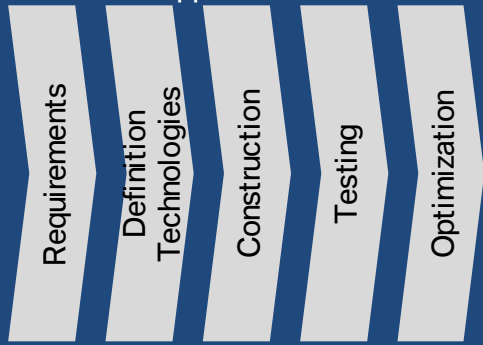
STILLE is divided into 8 work packages. There is practical validation as well as theoretical research within the project

1	Interdisciplinary Topics	P3	
2	Use Cases & Business Models	zeppelin universität zwischen Wirtschaft Kultur Politik	

Technical WPs		Lead	Objections
3	Power Transfer	TMG / TOYOTA	Cross testing of different systems and evaluation of the interoperability.
4	EMC & EMF (incl. FOD/LOD)	BMW	Practical examination of EMC and EMF in consideration of the technical feasibility.
5	Positioning	Continental	Testing and recommendation to define a technical system for position detection.
6	Communication	Audi	Recommendations to define the communication interface (physical layer to messages).

Approach

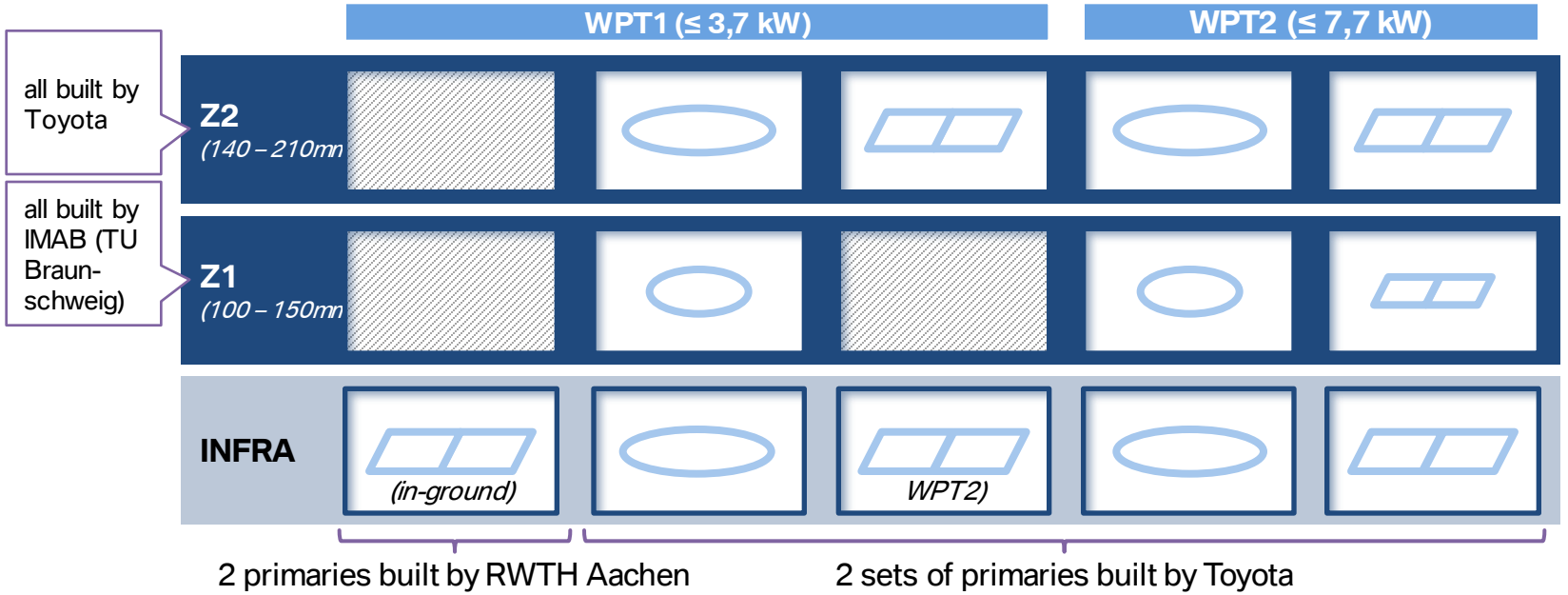
Practical validation of existing approaches:



7	European Test-/Certification Platform	TÜV SÜD	
8	Input for International Standardization	BMW	

WP3 – Power Transfer

Systems built and tested up to now



Testing

All combinations ("matched" and "unmatched") were tested. Measurements with z1 devices were done by IMAB (University of Braunschweig), measurements with z2 devices were done by Toyota.

WP5 – Positioning

Fine positioning systems built and tested up to now

Fine positioning ...

techn. options

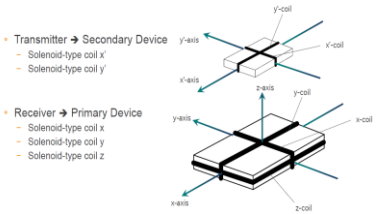
"radio frequency"

- Several 870 MHz antennas inside pads

RF withdrawn due to environmental influences and no guaranteed availability of frequency range.

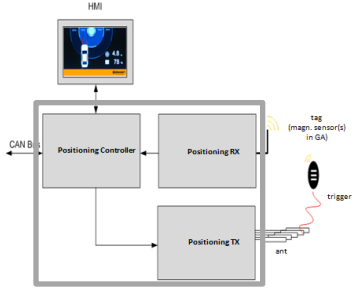
"magnetic vectoring"

- 5 "vectoring " coil inside pads
- 110 to 150kHz, 1kHz channels
- 1 x 3D coil at GA
- 1 x 2D coil at VA



"low frequency"

- 4LF trigger antennas in EV, 1-2 sensor (s) in GA
- currently based on 125kHz
- 4 LF- Antennas RX on EV
- 2x 3D coils as ID-Giver



... **Pairing *** → **Initial alignment check *** → **Continuous alignment check ***

Unique correlation between charging spot and EV

Determination whether EV is within alignment tolerance before start of charging

Determination whether EV is within alignment tolerance during charging

*technical options are under investigation

Thank you for your attention