„Future needs of Deutschen Bahn AG regarding ICT on train"
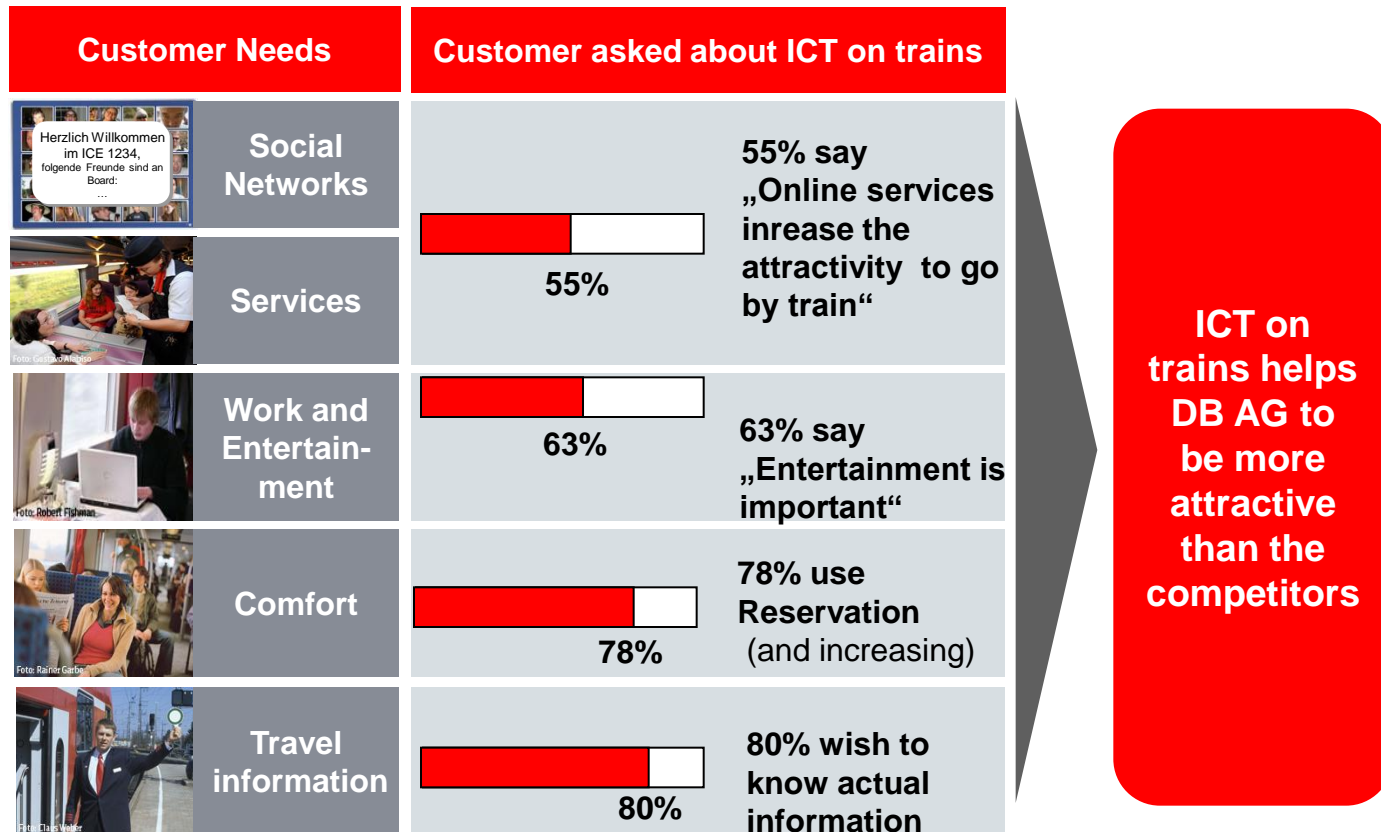## Workshop 20 and 21 October 2011 in Prague

Deutsche Bahn AG

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Rolling Stock Technology, Electronics (TEF32)

Prague, 20.10.2011

Importance of ICT in trains

Customer Needs	Customer asked about ICT on trains
Social Networks	55% say „Online services inrease the attractivity to go by train"
Services	55%
Work and Entertain-ment	63% say „Entertainment is important"
	63%
Comfort	78% use Reservation (and increasing)
	78%
Travel information	80% wish to know actual information
	80%

ICT on trains helps DB AG to be more attractive than the competitors

Future trends regarding ICT on trains

Customer needs		Today every train	Today some trains	Future trends
Applauding Service	**Social Networks**			Facebook: „I'm in the ICE" DB-train- "Apps"
Improved Service	**Services**		Tickets onboard Ticket service	E-Ticketing
	Work and Entertain-ment		Use of mobile phones WLAN Audio/Video Infotain-ment Show Velocity Comm-ercials	Always Online LTE
Basic Service	**Comfort**	Reservation		Control Lights Show how crowded the train is My own seat Control temperature
	Travel information	PIS: Destination PIS: Next stations	PIS: Realtime information PIS: Next Connection	PIS: Repairs on infrastruct. Dyn. chain of mobility

Functions

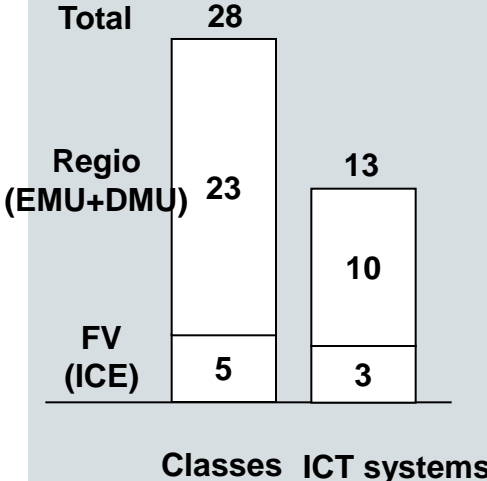| Category	Function
Passenger oriented services	■ Passenger Information System (PIS) (show next stop, delay, reached connections) ■ Infotainment frontal (show news, videos, commercials on TFT-Display) ■ Infotainment interactive (customer can purchase audio, video, e-books on his own mobile end device) ■ Internet in the Train for customers ■ Community Applications (e.g. chat, guestbook, social networks)
Video surveilance CCTV	■ Video surveilance
Crew oriented services	■ Computer for crew ■ Show video survaillance on display for driver or crew ■ Customer Services (can order snacks and drinks with own mobile phone)
Train Operator and Maintainer orientated services	■ Passenger Counting System (PCS) ■ Send position to Backoffice ■ Seat reservation ■ E-Ticketing ■ Operate systems over ground to train communication (Load software and configuration, reboot, monitor)

Growing number of Functions. Category is not always easy to define!

DB creates own classification right now.

A standard classification can help but must be done quickly.

Present situation: DB AG buys ICT like a screw.
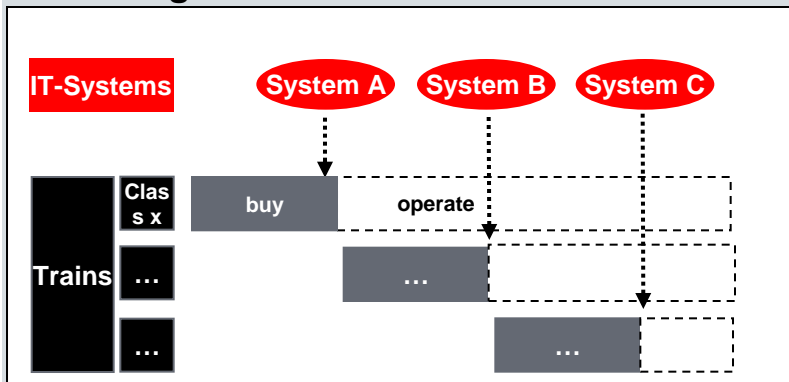# „Define functional needs and order it. Afterwards lets hope it works"

Running Systems	Issue	Result
Each new project has its own specific ICT	■ DB buys ICT as part of the train. Every manufacturer has a different strategy. → new train → new ICT system architecture	■ Many different ICT Systems → a lot of ressources need to control the chaos ■ No synergistic effects. (e.g. we buy 20 ICT components for one train project instead of 1000 for all our trains)
Total 28 **Regio (EMU+DMU)** 23 13 10 **FV (ICE)** 5 3 **Classes ICT systems**	■ IT is only bought and not managed. ■ Future deveolpment of new software features can only be done by the original manufacturer as the interfaces are unknown to DB AG.	■ Time to market for new features is 3 years instead of the needed 1 year. ■ High prices due to monopoly situation. ■ No reuse of functions from one class in another.
	■ ICT and TCMS is not always seperated.	■ The Eisenbahnbundesamt wants to know about every change in the system for homologation.

What is the new approach regarding ICT on trains?

Strategy for ICT on trains

Product management

From single solutions….

IT-Systems   System A   System B   System C

	Clas s x	buy	operate
Trains	…		
	…		

… towards product management

IT-System   V0   V1   V2   V3   V4   V5   t

	Clas s X	buy	operate
Trains	…		
	…		
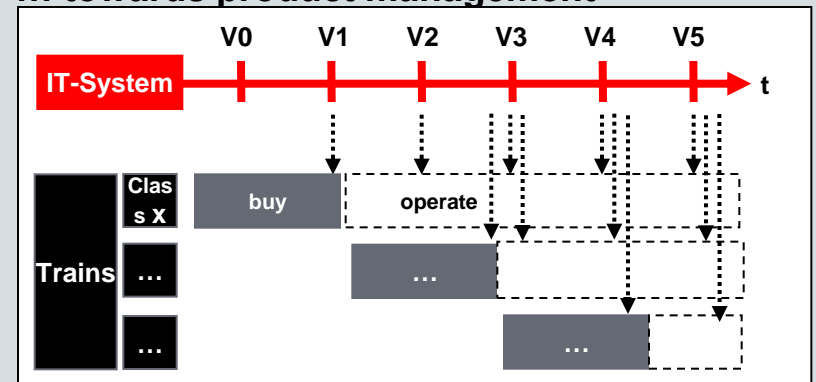
Standard-isation and separation

From a mixed IT architecture…

ICT   Safety relevant applications
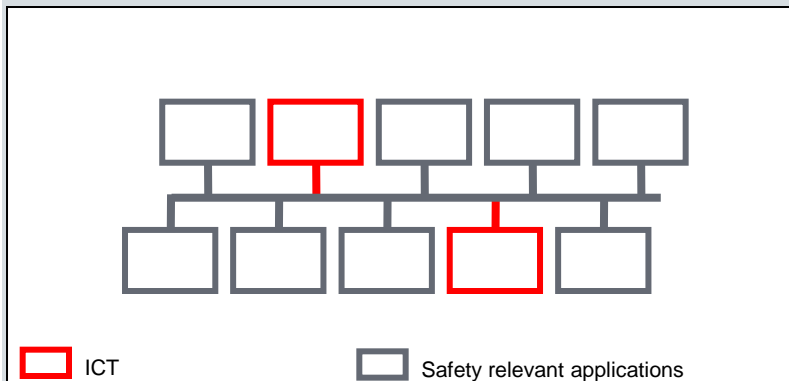
… towards standardisation and separation

Gateway

6
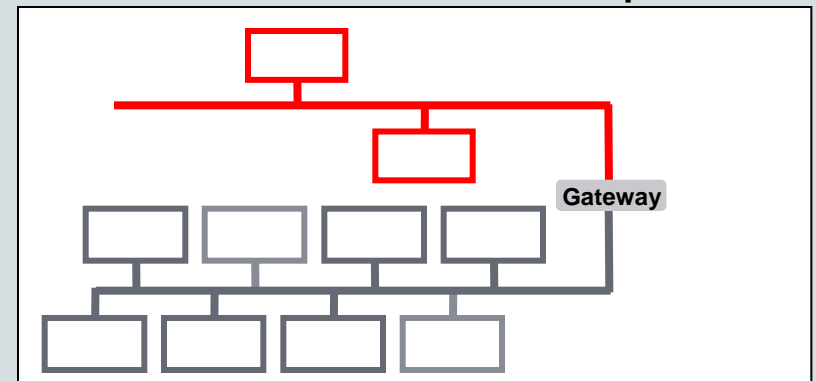
Projects within and outside DB AG with the scope of ICT

internal / external

TOP Fzg-Beschaffung TP Fahrzeug-IT T

Standardisation PIS Fernverkehr (long distance trains) FV

ITK-Plattform (regional trains) TEF/Regio

Railnet 2.0 FV

UIC SET 8

EB² Ethernet Backbone T.TVI

MIP Fernverkehr (long distance trains) FV

PRINCE

CENELEC / IEC
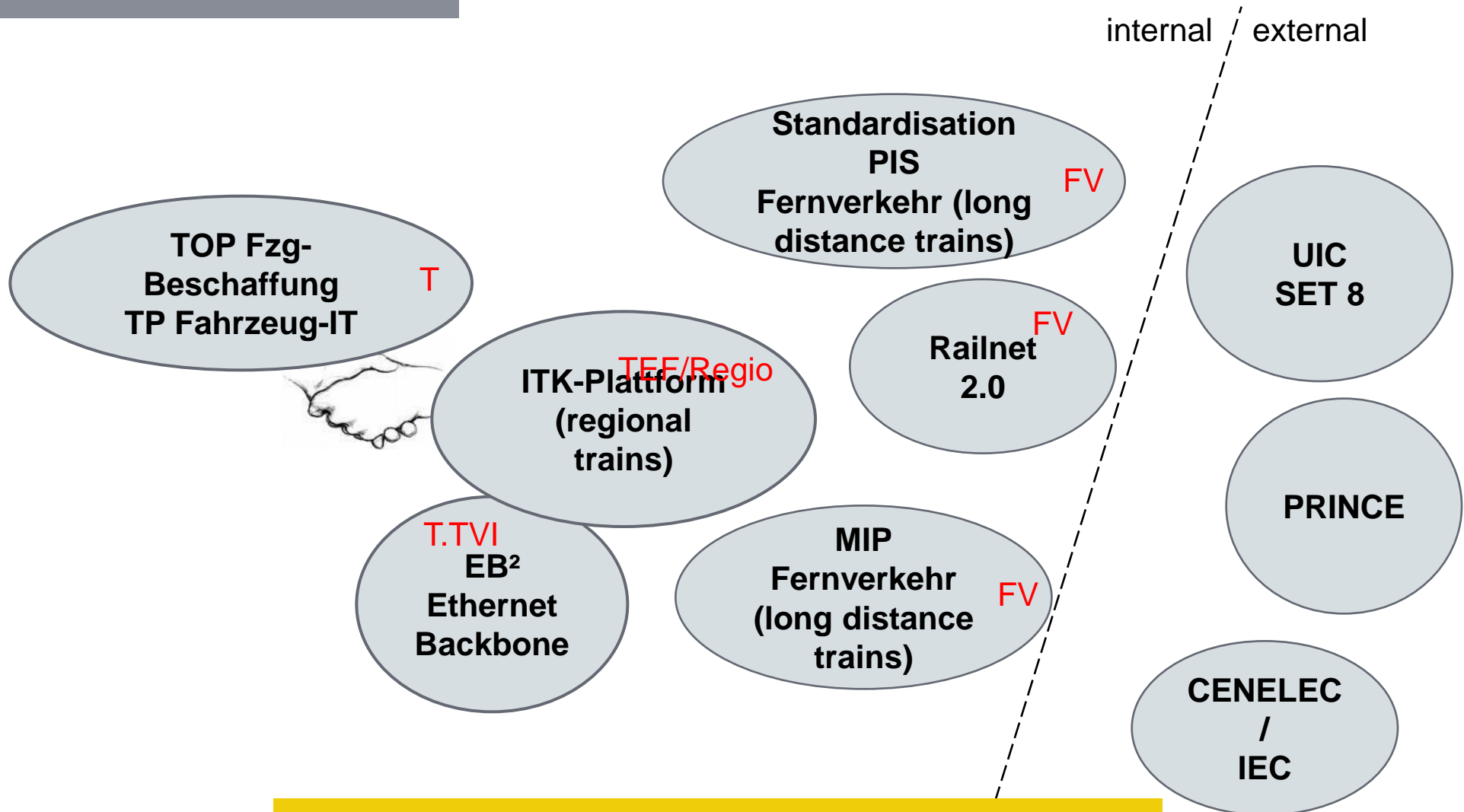
Question: How can we coordinate the projects?

Project ICT-Plattform DB Regio and DB AG

Goal:
Specify all interfaces and functions in the OMMS.
Choose first component manufacturers from market.
Integrate all functions at the DB laboratoy.
Reuse the system for future trains.

Zug-Land-Verbindung über GPRS
Permanente Zugortung über GPS

Kommunikations-Gateway

| Diagnose-daten | Videoüber-wachung | Internet im Zug | Fahrgast-Information | Info-tainment | Ortung | Sitzplatz-reservierung | E-Ticket Fahrgeld-Managem. | Autom. Fahrgast-zählung |

Offenes IP-Netzwerk (Breitband-Ethernet) für nichtsicherheitsrelevante und Komfortanwendungen

Gateway

Diagnose, Wegimpuls, Türsignal Uhrzeit, GPS Koordinaten

Fahrzeugsteuerung und Leittechnik
MVB (Multi vehicle bus) und WTB (Wired train bus)

| Diagnose | Bremssteuerung | Türsteuerung | Antriebs-steuerung | Zugsicherungs-systeme |

Gateway

DB Backofficesysteme

Project ICT-Plattform DB Regio and DB AG

Cooperation with ⇔ SBB CFF FFS

SBB already has open interfaces and reuses them when they purchase a new train.

Zug-Land-Verbindung über GPRS
Permanente Zugortung über GPS

Kommunikations-Gateway

| Diagnose-daten | Videoüber-wachung | Internet im Zug | Fahrgast-Information | Info-tainment | Ortung | Sitzplatz-reservierung | E-Ticket Fahrgeld-Managem. | Autom. Fahrgast-zählung |

Offenes IP-Netzwerk (Breitband-Ethernet) für nichtsicherheitsrelevante und Komfortanwendungen

Gateway

Gateway
Diagnose, Wegimpuls, Türsignal Uhrzeit, GPS Koordinaten

REGIO

DB
DB Backofficesysteme

Fahrzeugsteuerung und Leittechnik
MVB (Multi vehicle bus) und WTB (Wired train bus)

| Diagnose | Bremssteuerung | Türsteuerung | Antriebs-steuerung | Zugsicherungs-systeme |

Project ICT-Plattform DB Regio and DB AG
Time table
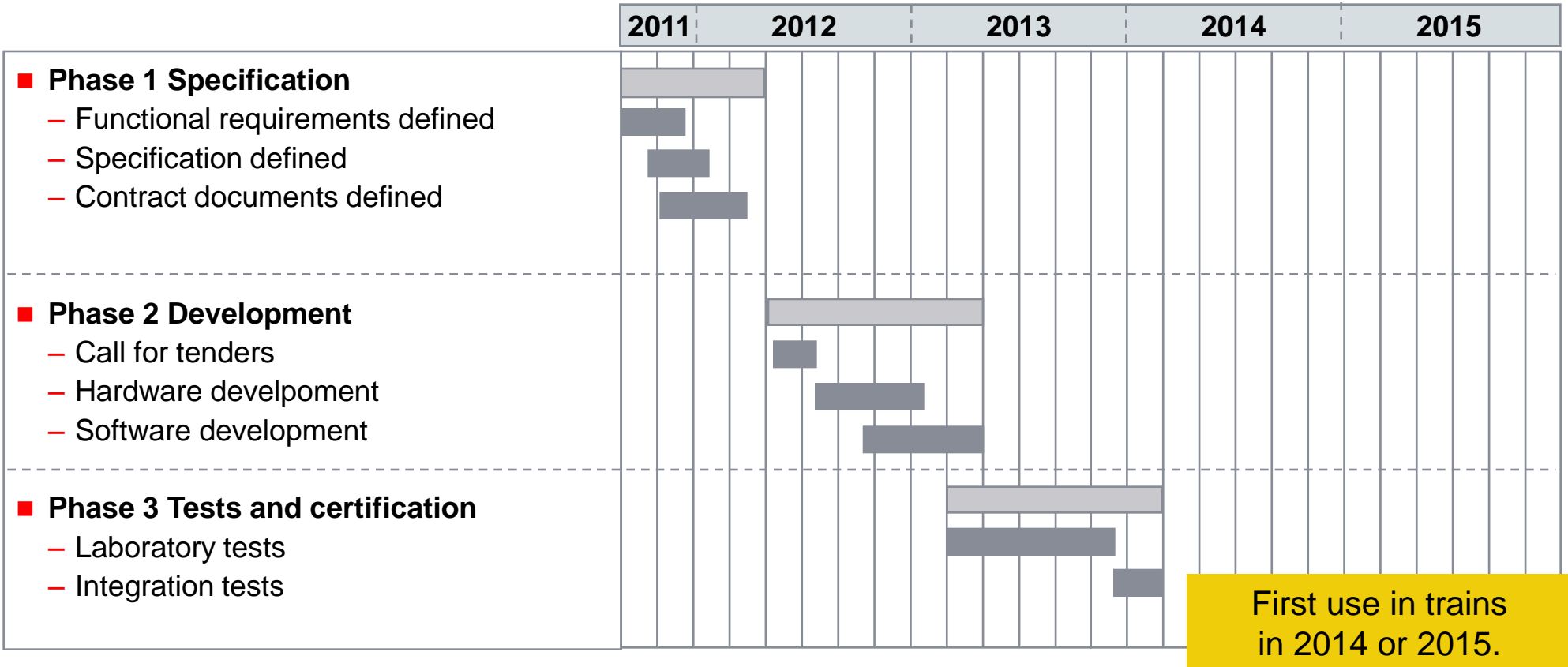
Project MIP DB Fernverkehr

- MIP (Mobile Integrationsplattform) defines a similar system like a Mobile Communication Gateway (MCG as described in IEC 61375)

- DB brings own Hardware and Software into the train and defines the interfaces to the train systems. → DB can later easily integrate new functions

- Already used for: train to ground communication regarding PIS, Positioning, Diagnosis data

- Mostly used in long distance trains (up to now)

Mögliche MIP Anwendungen
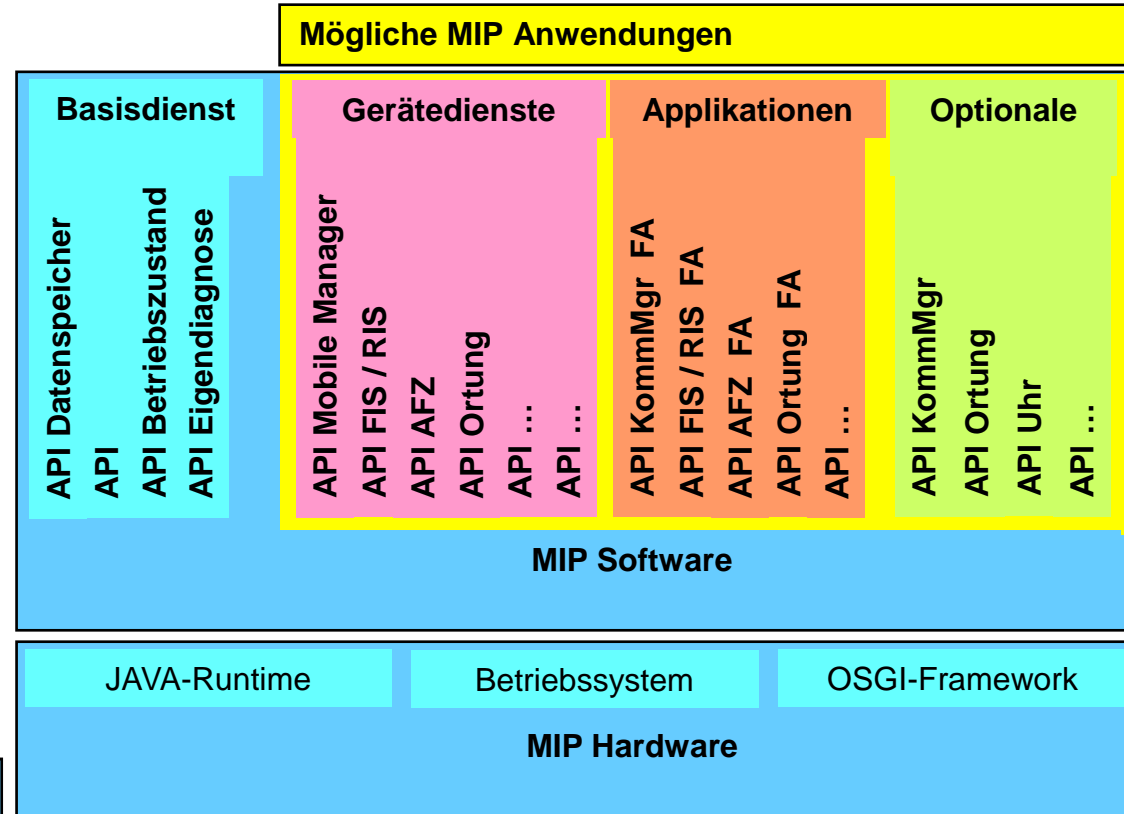
Basisdienst

- API Datenspeicher
- API
- API Betriebszustand
- API Eigendiagnose

Gerätedienste

- API Mobile Manager
- API FIS / RIS
- API AFZ
- API Ortung
- API …
- API …

Applikationen

- API KommMgr FA
- API FIS / RIS FA
- API AFZ FA
- API Ortung FA
- API …

Optionale

- API KommMgr
- API Ortung
- API Uhr
- API …

MIP Software

JAVA-Runtime	Betriebssystem	OSGI-Framework

MIP Hardware

MIP Basis

Passenger Oriented Services – PIS
Example for interfaces

GPRS / UMTS / LTE

MCG

ECN / Standard Ethernet

ETB / Standard Ethernet

Onbard Multimedia applications

Safety related applications

Gateway

Sub-Systems

TCMS

Audio functions

MVB / CAN / ECN

WTB / ETB

RB 22228   12:06
Münster Hbf – Essen Hbf
+Essen Hbf ist aufgrund polizeilicher Ermittlungen derzeit
Nächster Halt   ● Heute
12:14 Essen   12:17
Ausstieg rechts   Gleis 5a
Abfahrten Essen   Gleis
12:15 IC 127   Köln Messe/Deutz   2
Abfahrt heute vsl. 12:25 von Gleis 12
12:22 RB 22233 Nottuln-Appelhülsen   6b
12:30 ICE 231   Frankfurt(Main)Hbf   2
Abfahrt heute vsl. 12:35
12:47 ICE 233   Bremen Hbf   3
Bitte beachten Sie auch die örtlichen Lautsprecherdurchsagen

HAUPTBAHNHOF   WC
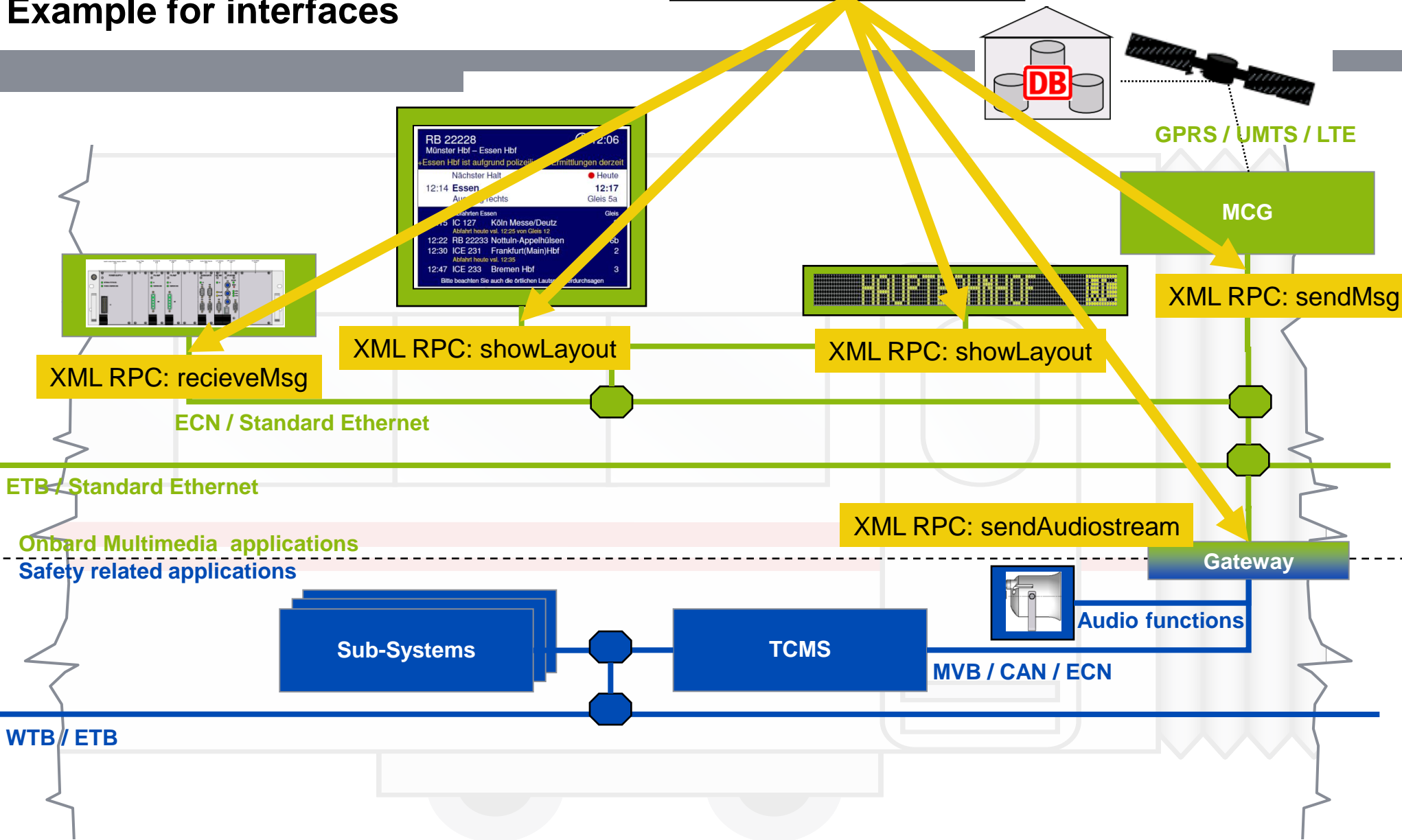
Passenger Oriented Services – PIS Example for interfaces

DB will specifiy these interfaces.
SBB uses XML Remote Procedure Calls
Scope of IEC 62580?

GPRS / UMTS / LTE

MCG

XML RPC: sendMsg

XML RPC: recieveMsg

XML RPC: showLayout

XML RPC: showLayout

ECN / Standard Ethernet

ETB / Standard Ethernet

Onbard Multimedia applications

Safety related applications

XML RPC: sendAudiostream

Gateway

Audio functions

Sub-Systems

TCMS

MVB / CAN / ECN

WTB / ETB

Expactations and questions

IEC 61375
Expectation:
- Lower purchase costs for network equipment and reduction of complexity.

Questions:
- Do we really need the same technology for the multi media bus, that is used for the safety related applications? Can we reduce costs, if we use standard ethernet protocols?
- Is the separation of the safety realated and the multimedia applications scope of new developments within the IEC 61375?

IEC 62580
Expectation:
- Results of standardisation helps us with our own projects.

Questions:
- How far will standardisation go?
- Is it possible to reuse some of the work done at SBB alreay and the new project between DB and SBB?

Thank you for your attention!