ModLink –
The Interface between the train and the people

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The keys for the future competitive European Rail System – the motivation for the ModLink SP

Standardisation

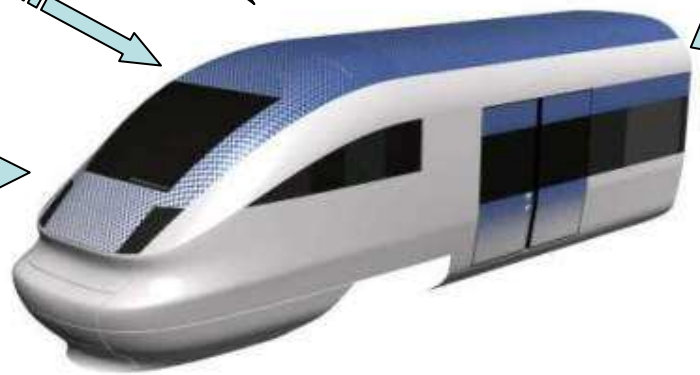
Modularisation

Harmonisation

LCC optimisation

Interdisciplinary approach

Learning from other sectors



New culture of cooperation – consensus approach

Industry – operators – researchers – associations – standardisation bodies

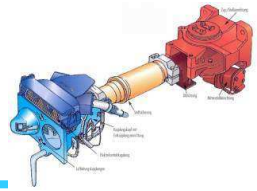
ModLink Scope and Objectives

- **Within MODTRAIN, the SP MODLINK is responsible to *elaborate*, to *specify*, to *test* and to *prepare standardisation* of the interoperable human-machine-interfaces (HMI) for**
  - the driver
  - the passengers
  - the train staff
    - In addition the MODLINK involves the interoperable train-to-train data interface
- **Thematic areas affected => organisation of MODLINK in working areas**

EUCAB

EUPAX

EUCOUPLER



EUCAB – the EUDD approach „Learning from other sectors“ paves the way

from the thirties …
Junkers Ju-52

- Fly-by-wire
- Improved ergonomics
- Modularisation
- Display and terminal technology

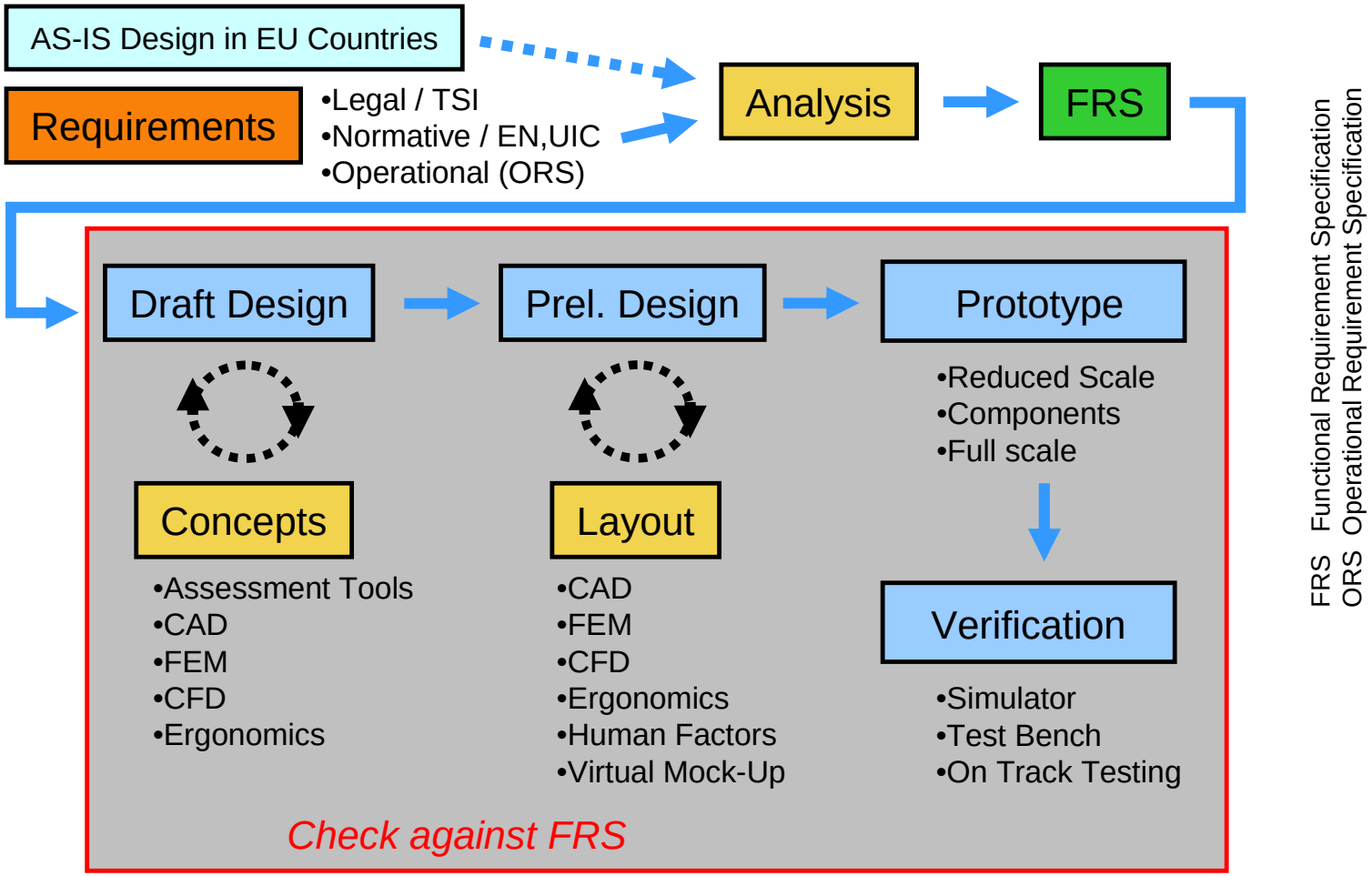
… to Airbus A380

Consensus buidling process paved the way to modularised and harmonised *European Driver‘s Desk (EUDD)*

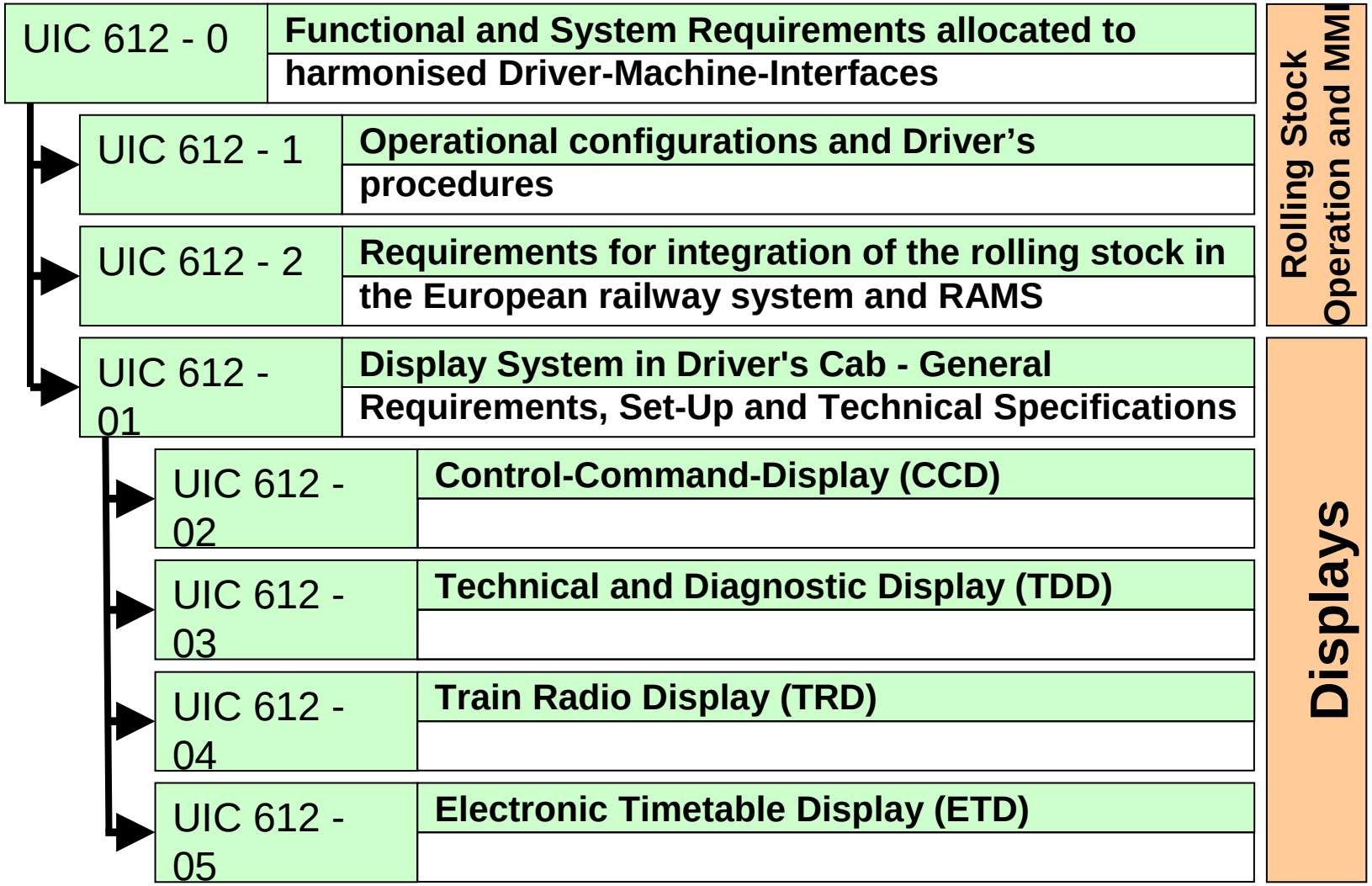
- ✓ Optimised MMI by applying latest knowledge in ergonomics
- ✓ Enhanced functional modularisation
- ✓ Shift of functionalities: from controls to displays
- ✓ Min 15% cut of Life Cycle Costs

Industrial Design Process

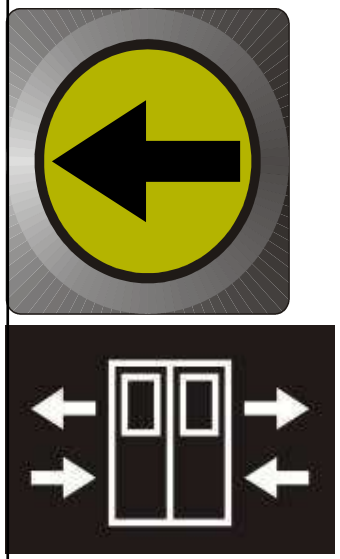
Industrial Design Process:



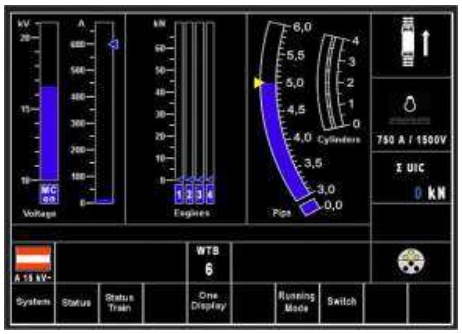
Structure of the UIC leaflet 612

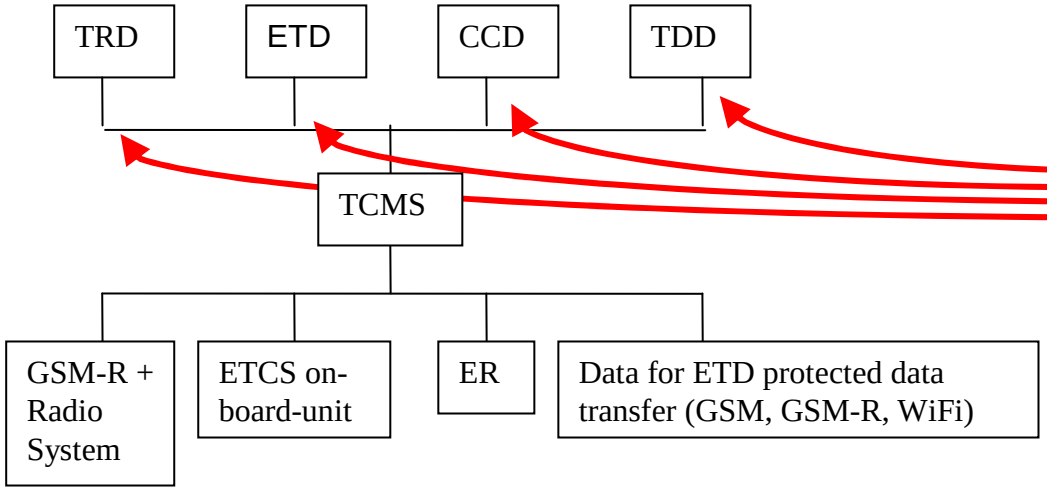


Extract of UIC 612 leaflet

Operating element Position [Form]		Symbol / indication	Positions and function		Explanations Mandatory preconditions Miscellaneous	effective for				
						Master Cab status	MCB	v= 0	v> 0	MT
021	**Door control: Left side doors – release and cancel release** Round push button with lamp [Q]		U	**First pushing of the button:** ●Release the left side doors, if train is at standstill. **Second pushing of the button:** (only in case of driving without train crew = driver responsible for closing the doors): ●Cancel release of the doors **and** ●**only for SNCF**: start warning (as long as pushed, at least 5 s) ***Not for SNCF***: each door will close automatically after automatic warning at the door, if no passengers are entering through the doors for t > 3 s. **Indication of light in the button**: ●Dark: all doors are closed **and** not released for opening. ●Lit: permission for opening (locally at door by passenger) has been given by the driver (only possible in stand-still). ●Flashing: no release for opening is given, but at least one door is not closed.	●For trains **without on-board staff** the push button is only in the driver's desk. ●For trains **with on-board staff** being responsible for closing the doors, a push button or a functional identical device (key, handle, etc.) in addition is located near the door. Push button "R" (pos. 023, right door) and "L" (pos. 021, left door), if you want to permit to open **all** doors.	F/N/R		X	s. note at pos. 022	X	

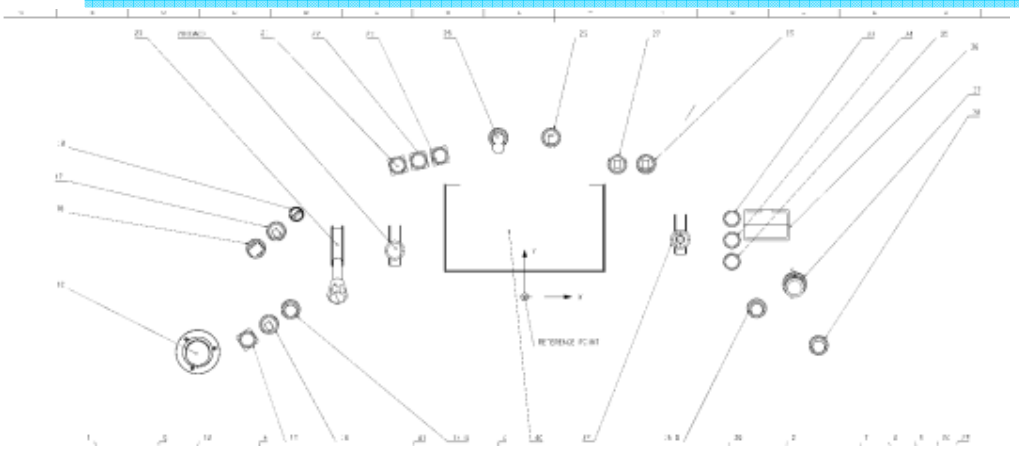
ORS 612-0x: applications based on one standardised DDU





Key is the independence of the displays from the applications, that are using them for Driver-machine-interactions ! This will improve rolling stock reliability in case of a **faulty display** and non-faulty application. The application suggests to use one of the remaining displays, possibly by merging essential information.

UIC 612: elements positioning proposal



Optional elements

Optional elements with fixed location:

- 003 Only for STM "LZB"
- 005 Emergency signals (warning lights, may no longer be requested in a new TSI OPE)
- 006 Electronic timetable display (ETD)
- 007 BP (brake pipe) & MP (main air reservoir pipe) pressure gauge (option: to be integrated in the TDD)
- 008 Brake-cylinder pressure gauges (option: to be integrated in the TDD)
- 024 Train lighting (may be replaced in the target system due to TCMS providing the trigger information – see section 5)
- 028 Instrument lighting (may be replaced in the target system due to TCMS providing the trigger information – see section 5)
- 030 Gooseneck microphone
- 031 Driver activity control button

Optional elements with fixed location only for locomotives and driving coaches:

- 018 Train Power Supply
- 021 Door control: left doors-release & cancel release
- 022 Door control: Forced closing
- 023 Door control: right doors-release & cancel release

Mandatory elements

Mandatory elements with fixed location:

- 001 Train radio display (TRD)
- 002 Technical & diagnostic display (TDD)
- 004 Control command display (CCD)
- 012 Train radio emergency call
- 013 ETCS : override (EOA)
- 014 ETCS : release intervention
- 015 ETCS : acknowledge
- 016 Pantograph / Diesel engine
- 017 Main Circuit Breaker / Power transmission
- 019 Automatic Speed Control (ASC)
- 025 Sanding
- 027 Head light
- 029 Task (on desk) & driver's cab lighting
- 033 Travel Direction "Forwards"
- 034 No Travel Direction: "Neutral"
- 035 Travel Direction "Backwards"
- 036 Driver's Identity card reader
- 038 External warning horn
- 040 Key board
- 041 Document holders
- 101 Train radio-handset

Mandatory elements with optional location according to the location of the desk in the cab (left or right side):

- 010 Emergency stop valve with "Emergency stop" function

Mandatory elements with fixed location only for locomotives and driving coaches:

- 009 Brake pipe pressure adjuster (overcharge)
- 020 Combined traction/dynamic brake controller with integrated driver activity control push button
- 026 Release brake
- 032 Driver's automatic brake controller (automatic brake)

Mandatory elements with fixed location only for locomotives:

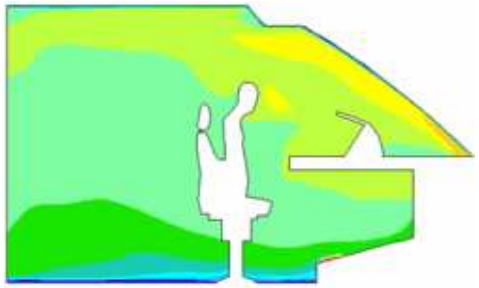
- 037 Direct brake

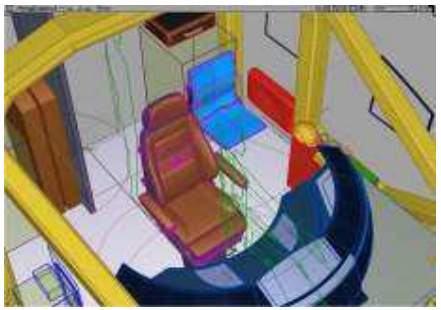
Mandatory elements with fixed location only for EMU/DMUs:

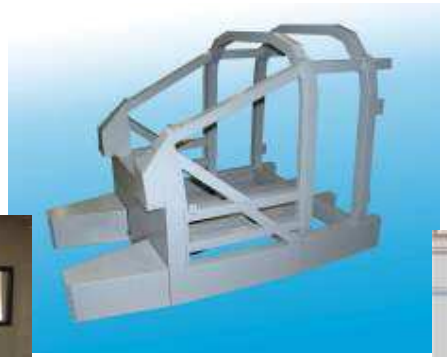
- 021 Door control: left doors-release & cancel release
- 022 Door control: Forced closing
- 023 Door control: right doors-release & cancel release

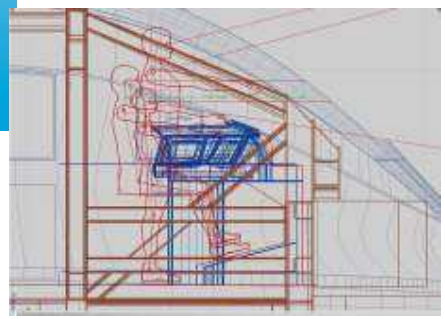
Translations of Requirements into tangible Hardware

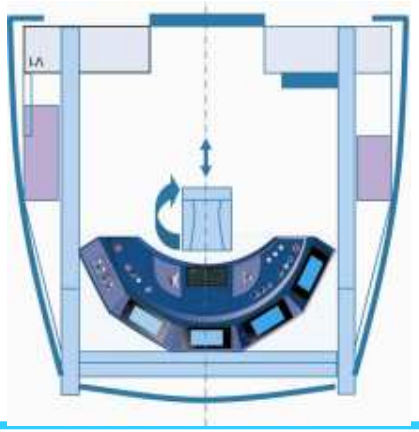
- Thermal Comfort
- Exterior Design
- Aerodynamics
- Structural Layout / Crash
- Packaging of Systems and Interior Components
- Drivers Desk Layout / Ergonomics



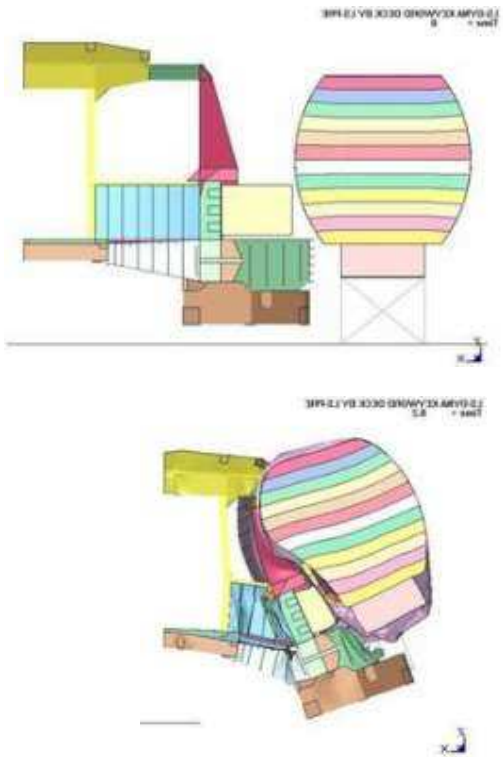


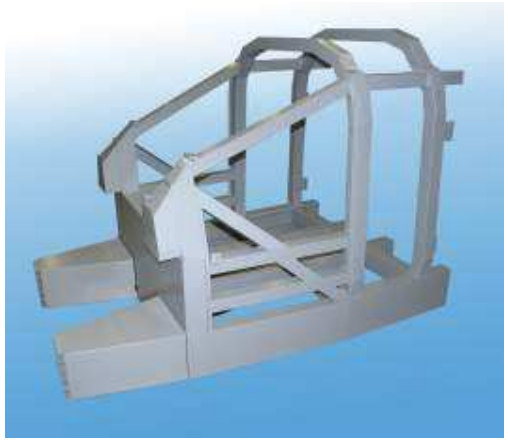


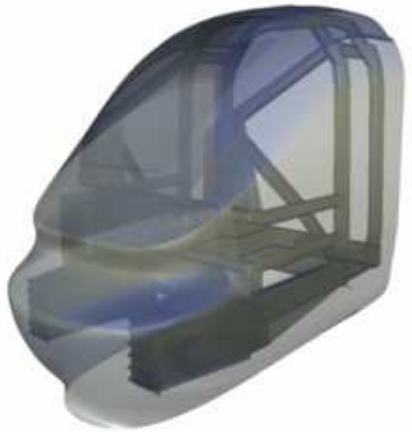




Structural Layout / Crash







1) FEM Analyses of TSI crash scenario

2) Volume Model of Crash Structure

3) Exterior Design (Aerodynamics, Repair Cost)

Packaging / Interior Layout

Standardised solutions

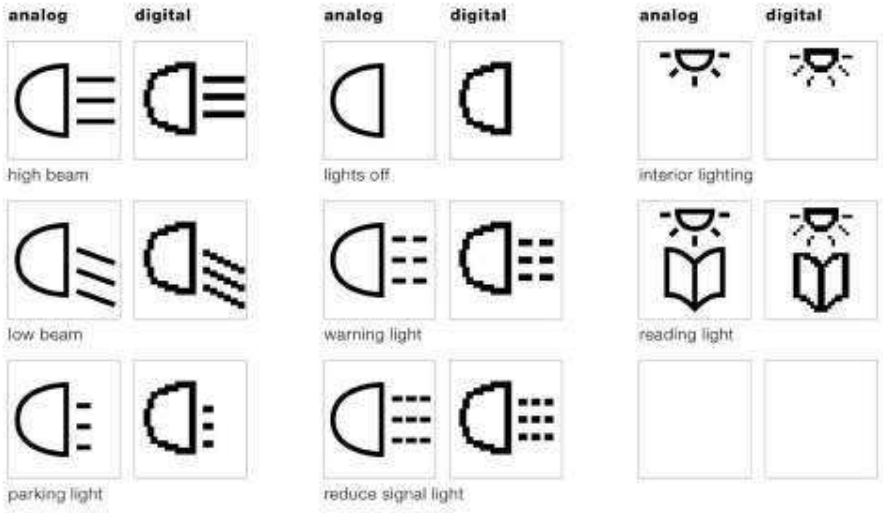
Ergonomically optimised

Cost efficiency considered

Desk / Erogonomics

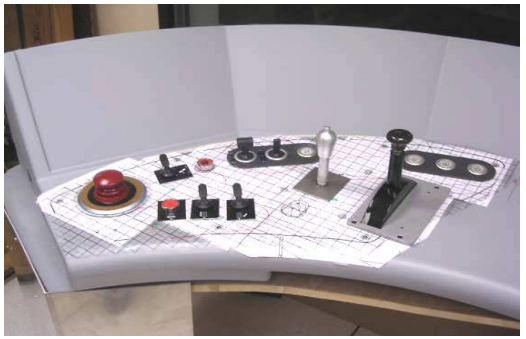
Desk Components (Intermediate Results, Innotrans 2006):

Optimised nozzles and HVAC components



Validation / Testing

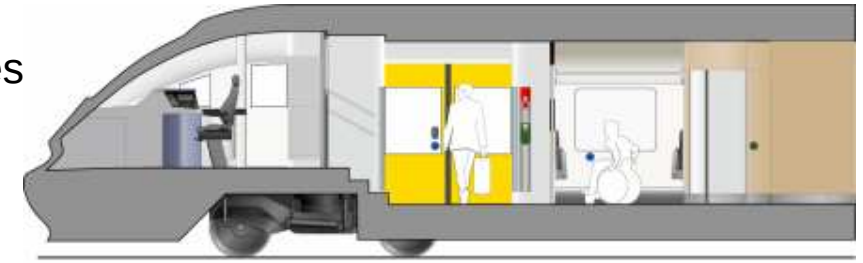
- **Tests at Simufer in Lille**
  - Scientific analyses by IAS
- **Validation of Desk designs against operational practise**
  - Three test campaigns with Four design variants
  - Almost 60 comprehensive test cycles with drivers from 11 countries
- **Generally extremely positive Feedback!**
  - But no desk was perfect
  - Constructive comments lead to continuous improvements between the campaigns
  - All desk variants are proven in practise!
- **Results form the basis for upcoming EN (CEN WG 37)**

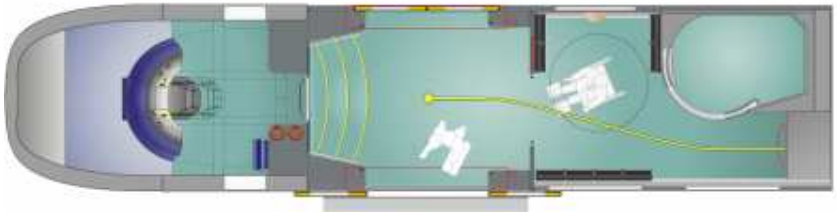


Passenger and Train Crew Interfaces

Main Goals:

- Passenger Entrance, Compartment features and Toilet meeting **TSI People with Reduced Mobility (PRM)**
- **Standardized Interfaces** to Doors and Emergency Systems
- **Innovative PIS / Infotainment**
- Integration of **Passenger Alarm Systems**





Status:

- ✓ Requirements analysis
- ✓ Tests with PRM done

Next Steps:

- Transformation of results into **norms**
- Preparation of **follow-up project** activities

Passenger and Train Crew Interfaces (2)

Impressions

from Innotrans 2006:

Validation / Testing

- **Tests with PRM and reference people**
  - Elderly people
  - Wheelchair users
  - Blind and visually impaired people
  - Deaf persons
  - Parents with small children
  - Reference persons without mobility impairments (“control group”)
- **Scientific evaluation by IAS**
  - Statistical analysis
- **Results feed back to**
  - EN 14752 “Railway applications – body side entrance systems”
  - TSI PRM - “Persons with reduced mobility”

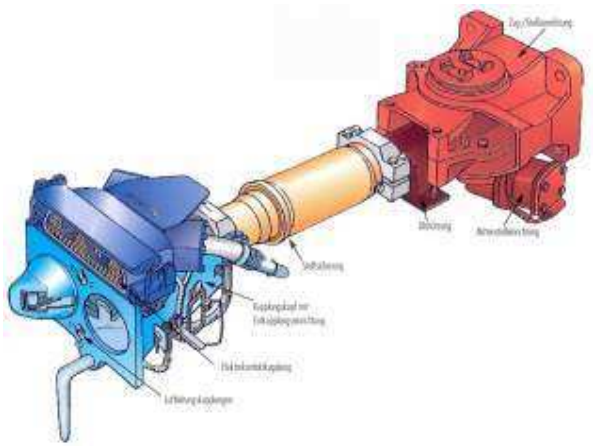
EUCOUPLER – the interoperable data link

Overall Goals:

- To specify the interoperable data link between trains and locomotives
- Important milestone towards the vision of “open coupling” – the seamless connection between trains from different operators all over Europe

To achieve theses objectives, the EUCOUPLER team aimed at

- the agreement on the Kind of Signals to be exchanged
- the standardization of the Data Format
- the standardization the Hardware Interface of the Coupler



Final Handover of Change Request to UIC 556

- Four migration “packs”
- Increasing number of Functions moved from Train lines to Ethernet Technology

Summary and Outlook

- **Requirements analyses with respect to the Human-machine-Inteface successfully performed for**
  - Drivers Cabin
  - Passenger Entrance region and Vestibule
- **Full scale prototyping of Cab as well as Entrance area and part of Passenger Compartment**
  - Manufacture of tangible Hardware
- **Validation and Testing performed for**
  - Whole Cab (Entering, putting into service, etc)
  - 4 Driver desk variants at Simufer, all “passed”!
  - Entrance area and Passenger Compartment with respect to TSI PRM
- **Follow-up R&D activities envisaged**
  - To consolidate EUPAX results for future TSI PRM upgrade
- **Handing over of results to standardisation bodies**
  - TSI
  - EN
  - UIC