MODTRAIN

Main achievements and future potential in the point of view of Railway Undertakings
UIC- Leaflet 612

“Functional and System Requirements allocated to harmonised Driver-Machine-Interfaces”
We can not expect a successful standardisation of technical interfaces of products if the way how we use such products remains customer-specific.

Therefore harmonisation of operational requirements is the key factor for success in gaining standardisation benefits.

MODTRAIN is based on the commitment of the three big operators, SNCF, Trenitalia and DB, to speak with one voice and UIC performing the balance with all other members. UIC 612 has been elaborated in open UIC workshops and provides operational requirements harmonised on system level in a degree that has never been achieved before.
The consequence of individual solutions…
Brief summary about the history of UIC 612

2004

SNCF, Trenitalia and DB joined the biggest EU R&D project in the railway domain – the 30.4 Mio € project MODTRAIN. All other railways are represented by UIC.

Our major contribution to the project: Providing common operational requirements that will drive standardisation.

The previously elaborated specification for the “High-Speed Train Europe” was a valuable starting point, however lacking in applicability for locomotives and not sufficiently addressing train & vehicle control issues and driver-machine-interfaces.

SNCF, Trenitalia and DB started together with many other railways under the roof of UIC the drafting of the “Operators Requirements Specification” (ORS), that became UIC 612.
Brief summary about the history of UIC 612

2005

- UIC 612 drafting progress – then called “MODTRAIN ORS” – has been presented to UIC PTR
- Drafting was mainly performed by SNCF – Trenitalia – DB expert teams, using UIC-extranet and MODUSER-meetings as main dissemination platforms for the draft specifications
- In addition, report was given to UIC study groups (1 & 4)
- Main concern of the other railways: Will UIC 612 become too detailed and might prevent future innovation?
- Commitment that future plug & play of interchangeable modules needs standardised operational function requirements
- UIC-workshops have been started for consolidating UIC 612 with the help of all UIC-railways interested in standardisation.
Consolidation of UIC 612 enabled the formal approval of the most mature parts in PTR at 24th of October, see UIC e-news:

“In this first meeting (of PTR steering body at 24th of October) the participants approved the new UIC Leaflet 612 “Functional and System Requirements allocated to harmonised Driver-Machine-Interfaces” – Operators Requirements Specifications (ORS). This document is an important input of UIC members to European Standardisation Projects, such as MODTRAIN, MODBRAKE and EUDD+. In more than 40 UIC workshops a lot of railway experts have been integrated in all steps of elaboration and reviews. This UIC Leaflet is now available on the UIC web site in the three UIC languages.“
Brief summary about the history of UIC 612

2007

- UIC 612-2 has been finalised and signed by Directors at 27th of March.
- First revision cycle of UIC 612-0 and 612-1 has been completed, considering up to now available industry comments.
- Due to extraordinary strong contribution of ÖBB-experts the architectures of the main display applications (ETCS, Train Diagnostics, Electronic Timetable) have been provided: UIC 612-0x (5 parts, dealing with all display-based applications in the driver’s cab).
- At 15th of May UIC PTR has approved the set of UIC 612 leaflets. UIC administration has put the documents on the public UIC website: [http://www.uic.asso.fr/technique/article.php3?id_article=214](http://www.uic.asso.fr/technique/article.php3?id_article=214)
## UIC 612 – Structure of the leaflets

<table>
<thead>
<tr>
<th>UIC 612 - 0</th>
<th>Functional and System Requirements allocated to harmonised Driver-Machine-Interfaces</th>
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<tbody>
<tr>
<td></td>
<td>Provides the location and precise functional requirements for each operating and displaying element – not only on the driver’s desk, but for all MMI in- and outside of the traction unit. It is the “lead document” for operation of traction units.</td>
</tr>
<tr>
<td>UIC 612 - 1</td>
<td>Operational configurations and Driver’s procedures</td>
</tr>
<tr>
<td></td>
<td>Specifies the various train configurations and indicates the available functions. Specifies also the transition from one configuration to another one.</td>
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<tr>
<td>UIC 612 - 2</td>
<td>Requirements for integration of the rolling stock in the European railway system and RAMS</td>
</tr>
<tr>
<td></td>
<td>Specifies the dedicated sub-system requirements for the main functional modules of the traction unit or the train.</td>
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<tr>
<td>UIC 612 - 01</td>
<td>Display System in Driver’s Cab - General Requirements, Set-Up and Technical Specifications</td>
</tr>
<tr>
<td></td>
<td>Specifies the hardware requirements for the Displays, and also software requirements valid for all display applications (e.g. use of colours).</td>
</tr>
<tr>
<td>UIC 612 - 02</td>
<td>Display System in Driver’s Cab - Control-Command-Display (CCD)</td>
</tr>
<tr>
<td></td>
<td>Specifies the ETCS-information and TCMS-information in addition to TSI CCS and TS 50459. Provides the image-trees for a comprehensive visualisation to the driver.</td>
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<tr>
<td>UIC 612 - 03</td>
<td>Display System in Driver’s Cab - Technical and Diagnostic Display (TDD)</td>
</tr>
<tr>
<td></td>
<td>Specifies the TCMS-information in addition to the CCD (e.g. main machine data and failure management. Provides the image-trees for a comprehensive visualisation to the driver.</td>
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<tr>
<td>UIC 612 - 04</td>
<td>Display System in Driver’s Cab - Train Radio Display (TRD)</td>
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<td>Specifies the Train Radio – information. Provides the image-trees for a comprehensive visualisation to the driver.</td>
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<tr>
<td>UIC 612 - 05</td>
<td>Display System in Driver’s Cab - Electronic Timetable Display (ETD)</td>
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<td></td>
<td>Specifies the Electronic Timetable – information in addition to the CCD in case of ETCS-operation and STM-operation. Provides the image-trees for a comprehensive visualisation to the driver.</td>
</tr>
</tbody>
</table>
Example: UIC 612-1 specifies the functions allocated to the Operational Modes of RST

The main content:

- Operational modes (on train, traction unit, cab and desk level)
- Preparation, related preparatory work
- Change of driver’s cab
- Starting
- Operating procedures, train service and shunting (including limit values for train operation; Release, lock and reset conditions for basic functions like traction inhibition and emergency brake; Other reactions to faults or operating errors)
- Brake system
- Washing run
- Disposal, applicable finishing actions (shutting down)
- Multiple traction or push-pull train
- Transition (between different ATC/ATP-systems or/and power supply / catenary)
- Pulling
- Towing
- Connecting to earth
- Faults
Standards shall become the result of a market-driven process and demonstrate the generation of added value.
How to achieve competition on module and component level?

Precondition for interchangeable modules and components is the availability of interface specifications.

Those interface specifications do not affect Intellectual Property Rights (IPR) for technical solutions ("black-box-approach").

The approach of Interoperability Constituents perfectly supports the provision of interface specifications.

The standardisation of interfaces for interchangeability, independent from the manufacturer, is the next important step for true competition on spare-part level.
Harmonised and PRECISE operators requirements specifications are the preconditions for economic benefits by scale-effects due to standardisation and modularisation.
Contribution according to the Core Competences

Manufacturers:
Main focus on functions and interfaces without operational impact

Operators:
Specification of operationally relevant functions and interfaces is the operators key competence. They determine the degree of operational performance of a traction unit
UIC 612 – the main achievements:  
Harmonised requirements drive standardisation of components

Functional Specification with standardised interfaces

UIC 612 has been quality-checked by the requirements assessment tool QUARS (MODCONTROL) and proven to be the Top Quality Specification!
UIC 612-0x is driving standardisation: Applications based on a standardised display

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 simply uses one of the remaining displays, possibly by merging essential information.

Hans-Günther Kersten, DB
Ralph Müller, DB
The interchangeable display is a big step forward in terms of harmonisation of operational requirements, train reliability and true competition on module level.

Operators did their job and standardised the interfaces to the driver.

Manufacturers are still requested to standardise the interfaces to the cab and control system.
Main principles for applying UIC 612

– Innovative concepts on system-level may request new definition of interfaces and are therefore out of scope. They will become subject of the standard’s change process.

– Most requirements should apply to all kind of rolling stock, specific requirements for specific types of rolling stock only if requested by operational needs (→ no standardisation at “any cost”)

– Cost-drivers shall be demonstrated based on real and comparing calculations
Hans-Günther Kersten, DB
Ralph Müller, DB

External Sources
- TSI HS/CR RST, PRM EN/national standards
- Former/Ongoing European Projects

MODTRAIN sources
- Train architecture (FBS/PBS) (UIC 612)

FRS/SyRS Interface Spec.

Products for Interchange ability

Design rules

Future TSI & EN Standards

2008 and beyond

before MODTRAIN

1200 single parts
2000h 40 days

after MODTRAIN

500 h 10 days

1200 single parts

2000h 40 days

500 h 10 days

2000h 40 days

beyond MODTRAIN
Simulation tests and EUDD+-prototype-testing are means to validate and improve UIC 612 in a future revision cycle. Future commercial projects will provide further valuable feed-back for the improvement of UIC 612.

A lot of specification work regarding operational requirements is currently done in commercial projects. UIC 612 should be made available for cross-acceptance as soon as possible.

ETCS DMI specification is just starting inside the ERA. Providing UIC 612 could help a lot in order to focus on rolling stock integration needs and economics more than in the past.

Referring to common requirements (UIC 612) will speed up further harmonisation by preventing experts from working in isolation and protecting “traditional habits” from standardisation.
Thank you for your attention!