# IRS — Integrating the Railway System
The Austrian Initiative for Interoperability of ICT Systems

Interoperability is a key factor in digitalisation.

The use of harmonised technical standards is a key requirement for cost-effective system integration. Communication standards allow some flexibility in implementation, so interoperability can therefore only be achieved through a normative application of these standards. This is achieved with the specification of so-called interoperability or integration profiles. The basis of the methodology is the common specification of profiles by users and manufacturers to ensure acceptance and technical feasibility. The IRS methodology accompanies the entire process chain from the specification of the profiles to the performance of the interoperability tests.

The IRS-Cargo[1] project is based on established processes in the health sector (IHE[2]), which have already been adapted for the energy sector (IES[3]). The described process provides a transparent and collaborative approach that covers the four levels of interoperability (legal, operational, semantic, technical) and leads to an application-based specification of the required interfaces.

The three pillars of the use case based IRS methodology
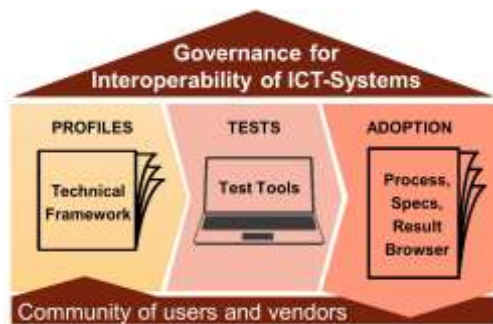
Profile	IRS accompanies the process of developing "Technical Frameworks" which contain the integration profiles
Tests	IRS provides software tools for conducting interoperability testing where manufacturers test their software products for interoperability and conformity to the standard
Adoption	IRS supports the development of a community and the exchange of publicly available results ("Technical Frameworks", successful test results)

The methodology also includes a governance that regulates a framework for community cooperation and the development and reuse of interoperability profiles. The transparency of the process ensures sustainable investment protection for manufacturers and users and also increases product quality and performance at lower costs.

The IRS approach: Cross-sector knowledge transfer of established concepts

The basis for IRS-Cargo was an established methodology from the healthcare sector, where a participatory process (ISO/TR 28380) was established within the global organisation IHE, in which manufacturers and users jointly specify the interoperability profiles for ICT systems. As part of the project, a cross-sectoral knowledge transfer took place, in addition to the proof-of-concept of the adapted methodology, a white paper[4] was published that describes the entire process in a sector-neutral manner. The knowledge transfer enables rapid implementation in the rail sector with the expertise built up.

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[1] Verband der Bahnindustrie - IRS – Integrating the Railway System
[2] https://www.ihe.net/
[3] IES Initiative — Smartgrids Austria
[4] White Paper for an Interoperability Process

The central element of the process is the Technical Framework, which is jointly specified by industry-specific users and manufacturers and is available to manufacturers to implement the interoperable solutions after publication.
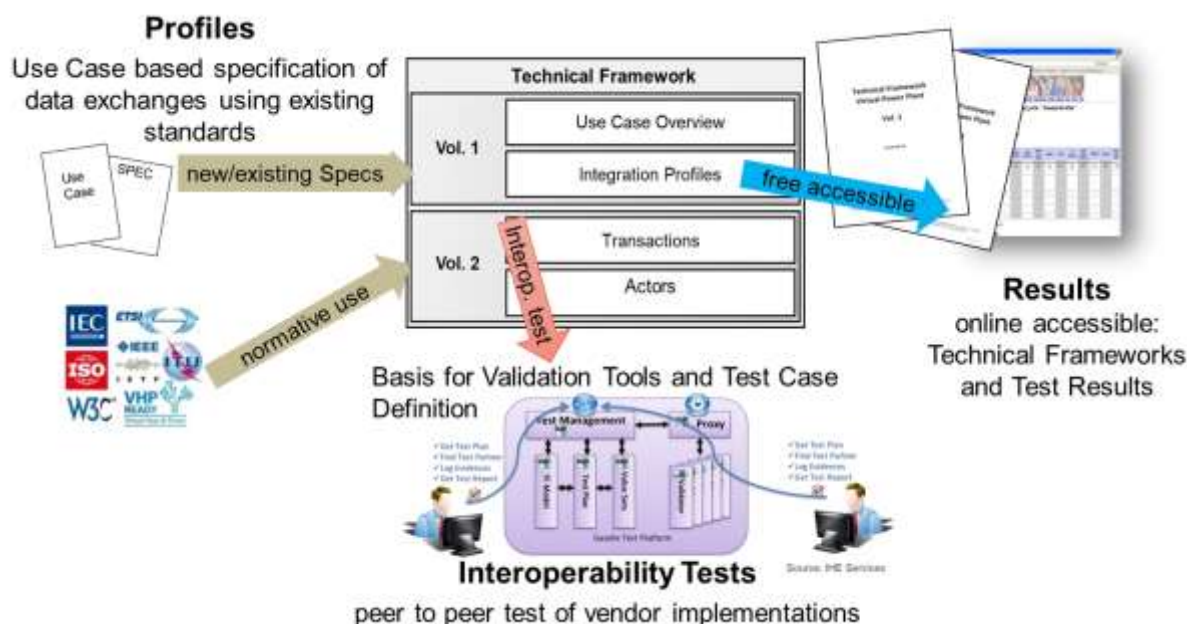
Standardised specifications of the interfaces of interacting ICT-systems for automated data exchange are created. These can then be implemented by manufacturers and tested following the process.

The offer: IRS provides support in the implementation of the processes
With the built-up know-how of its experts, IRS provides an offer that, on the one hand, supports the joint coordination of manufacturers and users in the specification of the integration profiles and, on the other hand, provides the software tools for the interoperability testing of software products. This will support the establishment of processes that enable the long-term development of interoperability of ICT-systems, regardless of the industry.

Examples of implementation to illustrate the added value of the methodology
As a result of the methodology, normative specifications of the interfaces of interacting ICT-systems for automated data exchange are created. These can then be implemented by manufacturers and, following the process, they can also be tested for interoperability.

Example 1: Interface specifications based on existing TSI regulations
(Legal) rules often prescribe business processes at a high level of abstraction, which is not yet sufficient to provide a clear specification for the implementation of ICT-systems.

The TAP/TAS TSI describes business processes for passenger and freight traffic, e.g. a train path request for their validity in Europe. The file formats for data exchange are also defined as XML schemas.
Using the approach to describe IRS methodology use cases, the processes are presented in more detail and in flow diagrams. The relevant data formats are added in the context. This results in a normativce specification of the business process, which also shows and eliminates room for interpretation in the course of the work. Country-specific extensions can also be added to the Technical Frameworks.

In this case, the added value of the IRS methodology consists of the normative sprcification of the interfaces as an extension of the European regulations. This can serve as a significant support for the establishment of harmonised rail-systems in Europe. The extension of the TSI, which is only exemplarily implemented in the project, could in future be integrated at European level as a follow-up step or in the definition process of the TSIs, with the involvement of the relevant stakeholders.

<u>Example 2: Support to newly developed systems through the structured process</u>
In the course of digitalisation, many business processes will be redefined in the future and subsequently implemented using ICT systems. For new systems, such as the Digital Automatic Coupling, currently being developed at European level, the structured IRS methodology can accompany the harmonisation of business processes and then support the specification of the interfaces. By taking into account existing expertise from other sectors, synergy can also be exploited, e.g. in the implementation of security requirements.

Synergies through cross-sectoral knowledge transfer
- IHE serves as a worldwide reference for the established, holistic methodology
- Experience from IES in the energy sector accelerates results in the rail sector
- Synergies through the use of existing general profiles, e.g. for security and privacy
- Use of the tried-and-tested open source test platform Gazelle also for the railway sector

Austria as a pioneer in interoperability in different sectors
The topic of interoperability was first addressed in the IES-Austria project specifically for the energy sector, further developing the methodology and testing possibilities for ICT systems and then disseminated into other sectors. Especially the expertise for peer-to-peer interoperability tests exists mainly Austria and can lead to international application of the methodology for Austria and its international positioning. Austrian companies can benefit from this and position themselves early on as a provider of internationally relevant technologies and solutions, thus creating high-quality jobs in R & D, production and service.

The Vision: From an initiative to a European organisation
From Austria, it is now necessary, in cooperation with international partners, to establish a coordinated, stable European implementation process, including the sustainable development of the methodology. It is important that harmonisation processes take place at international level in order to ensure cross-border communication of digitised systems of the future digitised rail.

Cooperation between the IRS initiative and relevant stakeholders in the railway sector, other European initiatives and relevant EU projects should be encouraged. The initiative provides collaboration with stakeholders in other EU Member States and provides expertise such as process support, training, provision of test systems and tools to support a growing community in Europe.

[White Paper for an Interoperability Process](English)

The white paper produced in the project describes the developed process industry neutral. The approach described to achieve interoperability is based on the experiecne of the projects and the existing methodology in the healthcare sector (ISO TR 28380)

For more information, please visit: Verband der Bahnindustrie - IRS – Integrating the Railway System

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