

# AREVA Interoperability Solution

To manage capital projects, multiple industry sector participants — including nuclear energy, oil & gas, petrochemical and transportation — need to move information from one place to another, with high quality, reliability, and without regard for which information system was used to create the data. Companies must be able to adapt their information exchange programs quickly and easily.

That's why AREVA has developed the AIRE platform, a solution dedicated to interoperability.

## The Need for Interoperability

The AIRE platform was developed to allow project data exchange between partners who use different design methods and tools. It allows the quality of data to be verified and validated before and during automated data exchange.

The AIRE platform enables the exchange of plant technical data across applications, such as CAD, PDM and ALM, resulting in enhanced interoperability. The quality and reliability of this data exchange is crucial to the schedule and cost efficiency of these business processes and is at stake in many capital-intensive asset industries. The enhanced interoperability through the AIRE platform is not based on writing dedicated data conversion programs or on requiring manual data re-entry.

Design, construction, tests, operations and maintenance (O&M), and dismantling of large installations involve many contributors who have their own methods and information systems, but must be able to exchange various technical data and documents with each step of installation.

## Typical scenarios for interoperability include exchanges between:

- Engineering partners
- Architect / Engineer firms and suppliers
- Customers (operator and project owner)
- Dissimilar systems within the same company

## Benefits

- Allows project data exchange between partners who use different design methods and tools
- Allows the quality of data to be verified and validated before and during automated data exchange
- Reduces the collaboration gap with third parties (better lead-time, better data reliability, lower cost of data exchange)
- Streamlines company information system by concentrating the interfaces on a standards-based platform and integrating the principles of the Semantic Web
- Integrates a new data source quickly through pre-defined publication or integration processes
- Enables the use of multiple standards for data exchange and manipulates a wide set of technical data objects
- Maintains independence among contributing players — all sources are treated similarly without preference for format or particular reference frame
- Follows and adapts as standards evolve
- Allows structured access to the features of the Semantic Web



**AIRE**  
AREVA Interoperability Services

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forward-looking energy

## Interoperability Principles and Standards

In order to make interoperability a reality, it is necessary to combine several capabilities:

- Data sharing model, which describes a product, including the concepts of objects, object families, documents, relation between objects, evolution of descriptive information, changes, constraints between objects, identification and changes of the physical objects
- Sharing object terms and object families with descriptions that are common or standardized
- The convention of a format and a technology for exchange

The interoperability standards (for example, STEP, ISO 15926, IFC) define these three capabilities. Among those standards, ISO 15926 is designed for handling the technical description of a process plant. AIRE was designed based on this standard, although other standards could easily be supported by extending the current AIRE platform.

## Basics of ISO 15926

**ISO 15926 is defined into a series of PARTS:**

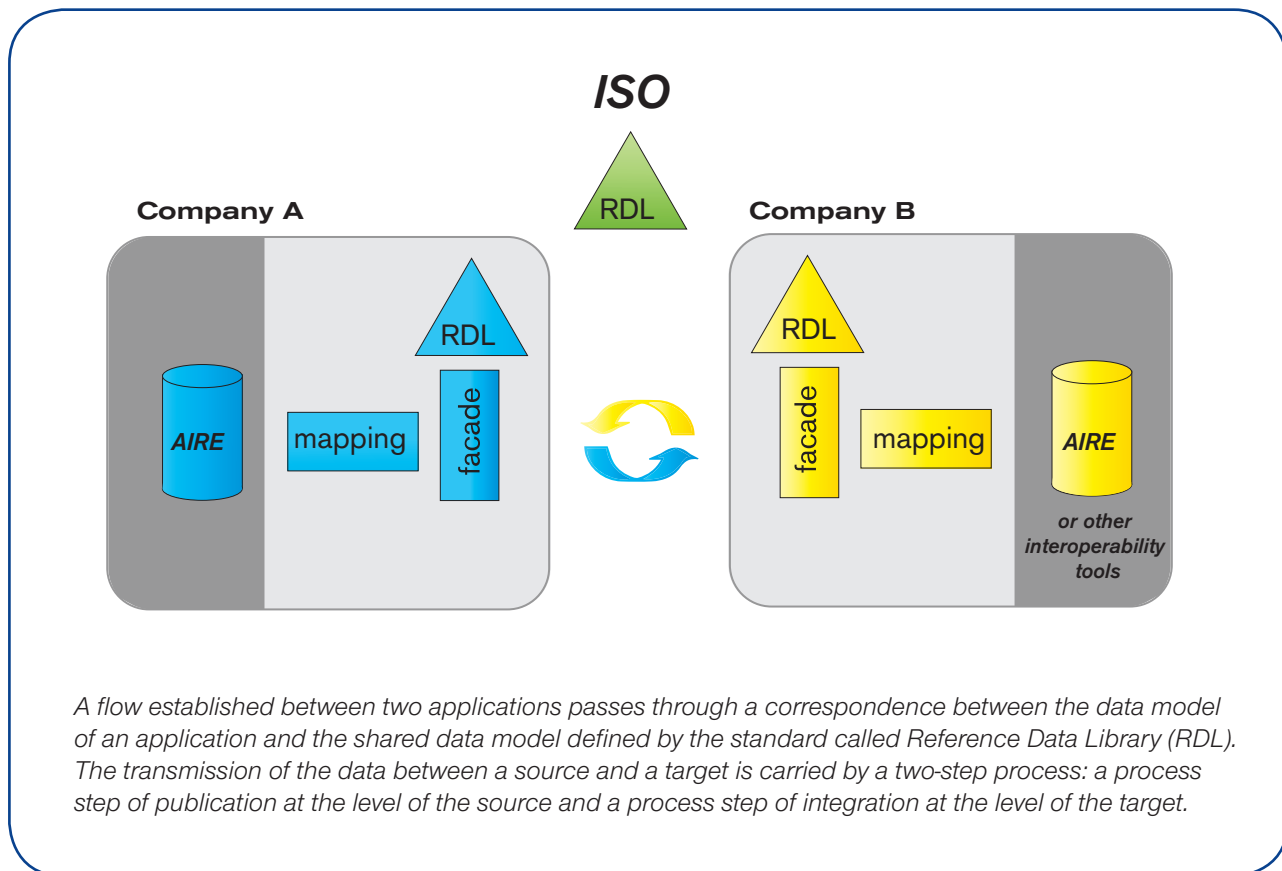
- Part 2:** Covers the objects of the data model and their characteristics (*natural language, grammar*)
- Part 3:** Covers the data model for geometries
- Part 4:** Describes the objects, families of objects and their characteristic attributes (*reference data: dictionary, thesaurus*)
- Part 7:** Relates to the definition of templates, i.e., models gathering and associating the information in a coherent way for exchange (*phrase, sentence, paragraph, verse, rhyme and lyric*)

**Parts**

- 8/9:** Relates to the means of exchange

*The other parts of the ISO15926 relate to the processes of management of the standard (enrichment, validation, etc.).*

## ISO 15926 in Operation



## When developing the RDL, projects and companies have a choice:

- 1 Use a global standard (like JORD)
- 2 Use industry data libraries, which may include equipment not recognized globally
- 3 Use an RDL that is locally defined by the project data in a source or target system
- 4 Use combination of all three in a federated RDL that leverages global and industry RDLs where practical, beneficial, and available

Operationally, a company wanting to carry out an ISO 15926 exchange selects the appropriate RDL, which will contain the references of the objects to be exchanged. It can be the one developed by ISO or one tailored to its exchange needs, while waiting for improvement of standards.

In terms of technology, the ISO 15926 standard is based on the capacities of the Semantic Web, which is also a standard for the representation and the communication of the information between machines via the Web. The Semantic Web standards are defined by the W3C organization (which standardizes the Internet) and provide sustainability to ISO 15926 ensuring use of existing tools and expertise. The Semantic Web allows integrators to easily build, step by step, without altering previous integrations.

### Partial Interoperability

Interoperability solutions seeking compliance with ISO 15926 exist, and some are deployed by service companies (specialized software publisher, engineering companies) or integrated into software package suites (CAD solutions for plant installation to PDM solutions). Unlike the AIRE platform, these solutions have typical limitations. Some do not implement the whole scope of the standard; for example, only Parts 2 and 4 are used, but with a proprietary exchange format or a format requiring specific integrations (XML or spreadsheets). However, solutions that only partially implement ISO 15926 may have difficulty reading or publishing information in a direct way with more advanced systems.

## AREVA Interoperability Platform

- ✓ Standard IT web services
- ✓ Modular architecture adapted to the user profiles
- ✓ Proven methodology to build new connectors quickly
- ✓ RDL management
- ✓ Collaborative mapping
- ✓ Data exchange management
- ✓ Data quality and business process modeling

## Features

- Enables applications to interoperate through various standards and different business scenarios by establishing a platform for the following processes:
  - RDL creation
  - RDL federation (by class substitution)
  - RDL mapping among partners
  - Data exchange facade creation
  - Specification creation preparation
  - Data exchange, publishing, receipt, and validation
- Provides connectors allowing the connected applications to interoperate. Connectors have been developed for several proprietary applications. Other integrations are under study and/or can be developed “on demand.”
- Can read and generate outputs in structured XML and spreadsheet files.
- Ability to check and control information before publication to partners directly from a source system with pre-defined data quality rules.
- Enables the control and detection of changes in the content of previously received information. This feature is done by comparing data payloads with current target system.
- Able to implement cyber security requirements to insulate external exchanges from network threats.

## The AIRE Technology

The AIRE platform is based on Open Source technology for the Semantic Web, widely distributed and sustainable, and can run using most current RDF databases.

### IT Tools

- Console
- AIRE Settings
- Web Services
- Exchange Tools

### Admin Tools

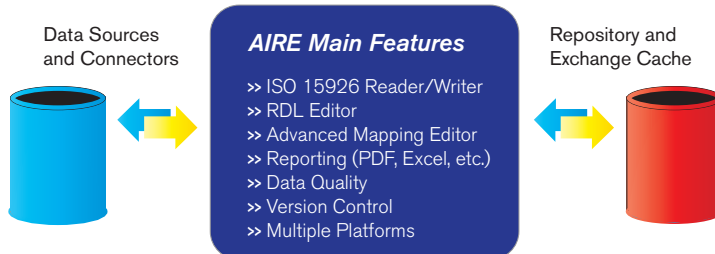
- Collaborative Mapping
- RDL Browser

### Users Tools

- AIRE Portal
- AREVA DB-2D

### The AIRE solution includes various functional components:

- Bidirectional connectors with the various applications, files or databases
- Transformation, federation and report functions
- Semantic Web Tools (RDF bases, reasoners, management of the facades)
- Technical or business modules



## Four Technical Modules:

1. A setting and administration module
2. A module to organize the exchanges using command lines
3. Web services
4. Workflows to manage exchange process

## Five Functional Modules:

### 1. Mapping Editor Module:

- Map correspondences between the business applications data model and the catalogue of the standard (for the ISO 15926, the RDL Part 4 and the templates of Part 7)
- Filter / limit the information from the source application exposed to the exchange
- Select the appropriate catalogue (Standard, Community, Project)
- Collaborative mapping: capability for the exchange partners to check if their “mapping” is correct and to test that the exchange meets specification

### 2. Publication Portal Module:

- Report information published (sort / filter / batch)
- Publication by containers, by accessible searchable facade
- Check of received data - visualization (1D, 2D)
- Detection of changes between 2 receipts — Integrity monitoring

### 3. Plug-in Integrations in Business Applications:

- Some standard plug-ins are available out-of-the-box for major plant design and maintenance applications
- Allow the target applications to display and check the received information, and to import.
- Allow the export of data
- Fast build and set up of new application connectors
- Generic connectors
  - Reading and writing in a relational data-base, a spreadsheet, file with tags (XML)
  - Reading and writing of spreadsheet programs
  - Reading and writing in specific plant design applications
- AIRE is not strictly limited to Web Ontology Language (OWL) Part 8 formats for exchange and integrations with target systems. In fact, OWL Part 8 is not the preferred due to scalability for large data payloads. AIRE works with target connectors and can exchange data using adapter settings with no data transformation required for import.

### 4. Plug-in for 2D Schematics

- P&ID integration is available for a major plant design platform

### 5. RDL Browser

- To browse RDL and quickly find reference data from different facades

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