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# Introduction to data interoperability standards

The purpose of data standards is to ensure consistency, accuracy, and interoperability of data across different systems, platforms, and organisations. By defining clear rules and formats for how data is structured, stored, and communicated, data standards facilitate seamless data exchange and integration, enhance data quality, and enable effective data analysis and decision-making.

More specifically, data interoperability standards are defined as specifications or guidelines that enable the exchange and utilisation of data across diverse systems, applications, or platforms.

Such standards can address multiple facets of interoperability, including:

* Data exchange mechanism: The method used to transmit data, e.g. an Application Programming Interface (API).
* Data file format: Address the formats of how the data is stored, compressed, and encoded for use by software. For example:
  + CSV (Comma-Separated Values) is a file format where data is stored in a tabular form with commas separating each field.
  + PDF (Portable Document Format) which stores complex documents that include text, images, and more.
* Data syntax and structure standards: Address the syntax and structure of data being sent. Syntax refers to the programmatic ‘grammar’ or language rules, while structure dictates the sequence of the message e.g. order of data elements to pass in the message. For example, ISO/IEC 21778:2017 Information technology JSON (JavaScript Object Notation) data interchange syntax standard includes syntax rules such as the use of curly braces {} for objects.
* Semantic data standards: Address the semantics, i.e. the meaning/interpretation, of the data being transmitted. These are usually standards that apply at the data element level, and can be in the form of a vocabulary, ontology, or data dictionary. There are also standards for how to write data semantics.
* Data element level standards: Specific rules around the use of a data element. For example, the formula that should be used for a particular data element.
* Standards for standardised values: Address data that is used universally, for example standardised country codes, or units of measure. For example: ISO 80000 Quantities and units standard, ISO 8601 Date and time format standard.
* Procedures surrounding data: These are standards for how data is collected, organised, exchanged, interpreted, processed, used, secured, shared, governed, etc. This includes aspects like error handling. Examples include: ISO 27001 Information Security standard, ISO/IEC 11179 Metadata Registry Standard, and ISO 8000 Data Quality standard.

Some standards encompass several of these facets. Electronic Data Interchange (EDI) standards are a good example of this. For example:

* UNECE EDIFACT (Electronic Data Interchange for Administration, Commerce, and Transport) which is also approved as the ISO 9735 Electronic data interchange for administration, commerce and transport (EDIFACT) standard, is a common standard that specifies the data syntax, message structure, and standardised values to use.
* [ANSI X12 (American National Standards Institute X12)](https://x12.org/about/about-x12) governs a number of Electronic Data Interchange standards and XML schemas which drive business processes globally [has GS1 representation Supply Chain Committee].
* Globally adopted GS1 standards include the Electronic Product Code Information Services (EPCIS) and Core Business Vocabulary (CBV) standards. These standards are widely used in various industries for supply chain traceability and have been adopted by numerous countries worldwide. Data standards for traceability require the definition of product (physical items and logistics units), places of locations of relevance to supply chain activity, legal entities (responsible parties) and in many cases details of processes. Given the foundational importance of traceability for global trade it should be of little surprise that international standards are mature and well adopted by many industries to address chain of custody and traceability. The most widely used global standard for supply chains as recognised by ISO and Standards Australia are GS1 Standards. They include approximately 50 industry-recognised standards including a specific Traceability Standards and supporting standards to define supply chain events.

**Acknowledgement of Country**

We acknowledge the Traditional Custodians of Australia and their continuing connection to land and sea, waters, environment and community. We pay our respects to the Traditional Custodians of the lands we live and work on, their culture, and their Elders past and present.

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