SDN Contribution

Getting Started with ISO 11179

Summary

The International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) Joint Technical Committee One (JTC1) is responsible for developing standards related to information technology. JTC1 Sub Committee (SC) 32 is a key subcommittee of the JTC. JTC1 SC32s responsibilities include data management interchange. ISO/IEC 11179 – Information Technology: Metadata Registries is a key standard focused on this topic.

ISO/IEC 11179 Information Technology – Metadata Registries is a comprehensive, six-part data and metadata standard that focuses on the common sharing of data elements across systems within an enterprise and between enterprises. The standard defines what a metadata registry is, how a data element can be classified, and how the data can be semantically described, named, identified, stored, retrieved, and managed. It provides guidance for establishing metadata description registries, as well as registration, authorization, and maintenance itself. The data model that is described in metadata is based on the well known entity-relationship model that is used in relational databases.

Several parts of ISO/IEC 11179 provide very strong concepts that are used in several other important standards. One of these is the ISO 15000-5 Core Components Technical Specification. ISO 15000-5 provides the basis for the development of SAP GDTs (Global Data Types) and is a key component of the SAP NetWeaver and Enterprise Services Architecture strategies.

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Since his master's degree (MSC, 1993) Gunther Stuhec has worked with communications and EDI technologies. As a consultant in a software house for middleware and EDI systems he developed strategic concepts for customers and was responsible for various EDI projects. He joined SAP SI as a consultant in 1999, where he was responsible for implementing

XML/EDI projects in conjunction with SAP systems. Since 2001 Mr. Stuhec works for SAP AG as a "Standards Architect" and has been involved in standardizing business standards on both semantic and syntax levels.

He is the chair of the UN/CEFACT Techniques and Methodologies Group (TMG) that is responsible for the development and maintenance of the UN/CEFACT CCTS standard. He is also a member of various international and national standardization bodies like UN/CEFACT, ISO, and DIN. He is actively involved in developing standards and serves as an interface between these bodies and SAP, introducing SAP's requirements into their work and incorporating their latest findings into SAP's development activities.

Mark Crawford

Mark Crawford joined SAP in October 2005. He is an architect in the Technology Standards Group focusing on industry standards and methodologies. Prior to joining SAP, Mark was a Senior Research Fellow for a Washington D.C. government think tank where he specialized in XML, eBusiness standards, and Semantic Data Modeling. Before that he spent 23 years as a U.S. Naval Officer with extensive experience in Logistics, IT, Supply Chain, Procurement and Finance. Mark has been involved in both cross and vertical industry business standards, and the underlying methodology standards that support them. He is actively involved in UN/CEFACT standards activities, to include: vice chair of the Applied Technologies Group and chair of the UN/CEFACT XML Syntax Group, editor for UN/CEFACT CCTS, chair of the UN/CEFACT Core Components Harmonization Project, as well as Co-Chair of the ISO 15000-5 Core Components Technical Specification in ISO TC154. He previously was involved in the X12 Communications and Controls Subcommittee, vice chair of the X12 XML Working Group, and Chair of the joint X12/CEFACT Core Components initiative.

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About ISO 11179

Despite the advent of new information technology concepts such as web services and service oriented architectures, basic requirements still exist to define, describe, and manage data. The International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) Joint Technical Specification 11179 Information Technology – Metadata Registries is the most widely recognized de jure standard in this area.

ISO/IEC 11179 is one of the few mature standards for storing and interchanging enterprise metadata in a controlled environment. ISO/IEC 11179 standard is divided in six-parts that defines the metadata for an organization and interchange of data elements in a Metadata Registry. The goal of ISO/IEC 11179 is the common sharing of data elements across systems within an enterprise and between enterprises, which is commonly searchable and understandable by a common semantic description of content. Therefore, this standard defines what a metadata registry is, how a data element can be classified, and how the data can be semantically described, named, identified, stored, retrieved, and managed. It provides guidance for establishing metadata description registries, as well as registration, authorization, and maintenance itself. The data model that is described in metadata is based on the well known entity-relationship model that is used in relational databases.

ISO/IEC 11179 is the basis for building a registry that provides mechanisms for enabling global data retrieval, maintenance and interchange. The unique semantic meaning, maintenance and classification of data are very precise to support a high reusability as well as the common use by multiple users.

Several parts of the multi-part ISO/IEC 11179 standard contain very strong concepts that are used in several other important standards. One of these standards is the ISO 15000-5 Core Components Technical Specification that is being used for the development of SAP GDTs (Global Data Types). ISO 15000-5 uses the ISO 11179 concept of the data element model, as well as defining, naming and identifying of data elements. These concepts are defined in ISO/IEC 11179 Part 1: Introduction, ISO/IEC Part 3 – Registry Metamodel and Basic Attributes; ISO/IEC 11179 Part 4 – Formulation of Data Definitions, and ISO/IEC 11179 part 5 – Naming and Identification Principles.

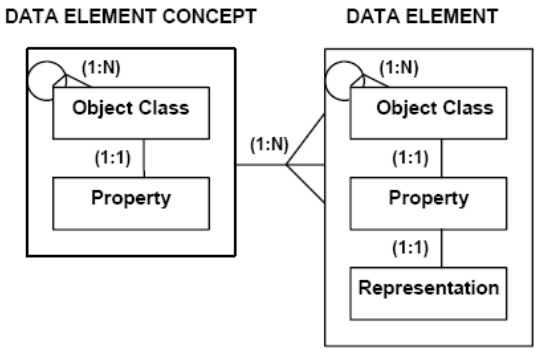
The UN/CEFACT Registry Specification V0.9 (Draft) considers also many aspects of ISO/IEC 11179 and ISO 15000-5. This UN/CEFACT Registry Specification specifies the criteria for implementing the UN/CEFACT Registry that will serve as a global registry/repository of reference data for e-business.

The ISO/IEC 11179 Standard In Detail

ISO/IEC 11179 deals with metadata that defines and describes data, and a metadata registry that encompasses managing and administering all aspects of that metadata. The metadata registry treats each set of metadata as belonging to an administered item (data element or other unique registry item). Administered items are:

- Classified per ISO/IEC 11179-2
- Specified per ISO/IEC 11179-3
- Defined per ISO/IEC 11179-4
- Named per ISO/IEC 11179-5, and
- Registered per ISO/IEC 11179-6

ISO/IEC 11179-1:2004(E) Information technology — Metadata Registries (MDR) — Part 1: Framework



Part 1 contains an overview of the ISO 11179 standard and defines and describes the basic concepts of data elements, value domains, data element concepts, conceptual and representational (physical/logical) domains and classification schemes necessary to understand the remaining parts of the specification. A key aspect of the framework is its overarching data model as shown in the figure. This model is the basis for the data conventions of several other modeling methodologies, to include ISO 15000-5. Additionally, he concept of metadata registries is introduced, as is its role in the semantics of data, the representation of data, and the registration of the descriptions of that data. It is through these descriptions that an accurate understanding of the semantics and a useful depiction of the data is found.

ISO/IEC 11179-2:2005(E) Information technology — Metadata Registries (MDR) — Part 2: Classification

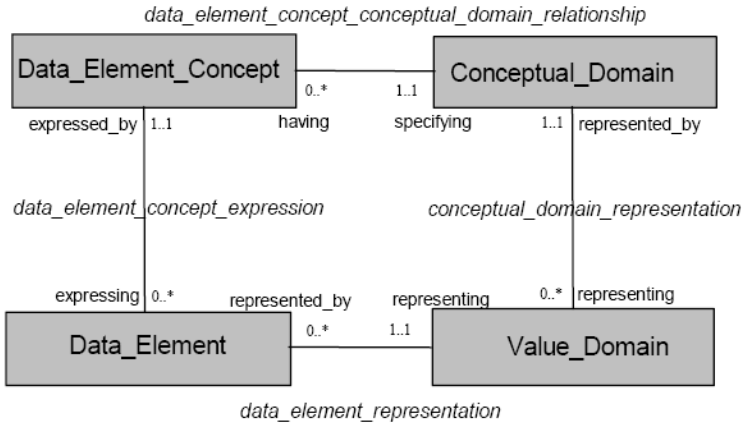
Part 2 describes a conceptual model (classification region) for managing classification schemes. Part 2 contains a detailed set of attributes that constitute a comprehensive classification scheme. A Part 2 conformant classification scheme may be used to classify diverse administered items, which are the registered artifacts in a metadata registry. These classification schemes can be used for classification of: key words, thesauri, taxonomies, and ontologies. Part 2 supports the registration and administration of all or part of a classification scheme, and provides a mechanism for classifying an administered item in a metadata registry.

Classification schemes created in conformance with Part 2 support:

- Deriving and formulating abstract and application administered items;
- Ensuring appropriate attribute and attribute-value inheritance;
- Deriving names from a controlled vocabulary;
- Disambiguating;
- Recognizing super-ordinate, co-ordinate, and sub-ordinate administered item concepts;
- Recognizing relationships among administered items;
- Assisting in the development of modularly designed names and definitions.

ISO/IEC 11179-3: 2003(E) Information Technology – Metadata Registries (MDR) – Part 3: Registry metamodel and basic attributes

Part 3 specifies the structure and conceptual model of a metadata registry. As shown in the figure, the metamodel defines basic constructs in terms of conceptual models and includes a number of basic attributes that are necessary to define the metadata items (administered items) – such as data elements, data element concepts, value domains, conceptual domains, classification schemes, and other related classes. It provides a detailed structure for a metadata registry that encompasses the constituent parts (metadata and data to include structures) of the registry as well as specifying and applying metamodels.



Component parts of an ISO 11179 defined metadata registry include:

- Types, Instances and Values
- Extensibility
- Data References
- Metamodel Description
- Administration and Identification
- Naming and Definition of artifacts
- Classification
- Conceptual Domain
- Value Domain
- Physical/Logical Data Domain

Part 3 also defines a basic set of data element attributes that may be used in those situations where an entire metadata registry is not appropriate. Defined attributes include those for:

- Data Element Concepts
- Data Elements
- Conceptual Domains
- Value Domains
- Permissible Values
- Value Meanings

ISO/IEC 11179-4: 2004(E) Information Technology – Metadata Registries (MDR) – Part 4: Formulation of data definitions

Part 4 provides both requirements and guidance for developing unambiguous definitions for data elements and their components. A well formed definition is imperative for semantic understanding of all stored data and metadata. The guidance in Part 4 focuses on the structure and semantic aspects of definitions. Specific definition rules include the requirement for definitions to:

- Be stated in the singular
- State what the concept is, not only what it is not
- Be stated as a descriptive phrase or sentence(s)
- Contain only commonly understood abbreviations
- Be expressed without embedding definitions of other date or underlying concepts
- Guidance includes the requirement for data definitions to:
- State the essential meaning of the concept
- Be precise and unambiguous
- Be concise
- Be able to stand alone
- Be expressed without embedding rationale functional usage or procedural information
- Avoid circular reasoning
- Use the same terminology and consistent logical structure for related definitions
- Be appropriate for the type of metadata item being defined

The recommendations in ISO 11179-4, as well as those of ISO 11179-2 and 5, must be further specified in specific implementation standards such as those found in ISO 15000-5 Core Components. The requirements and guidance contained in ISO 11179-4 as instantiated in ISO 15000-5 play a key role in describing SAP Global Data Types.

ISO/IEC 11179-5: 2005(E) Information Technology – Metadata Registries (MDR) – Part 5: Naming and identification principles

Part 5 describes how to form conventions for naming administered items to include data elements and their component parts. It includes specific guidance for developing naming and identification of data element concepts, conceptual and value domain components. It details the structure and component parts of data element naming that supports a more lingual syntax and grammar to achieve an unambiguous semantic meaning for human understanding.

The ISO 11179-5 recommendations for naming conventions include requirements to address:

- Scope
- Authority
- Specific Rules
    - Semantic Rules – understanding of the data element name
    - Syntactic Rules – structure of the data element name
    - Lexical Rules – controlled term lists, length, character set, language
    - Uniqueness Rules – requirements for uniqueness within specific contexts

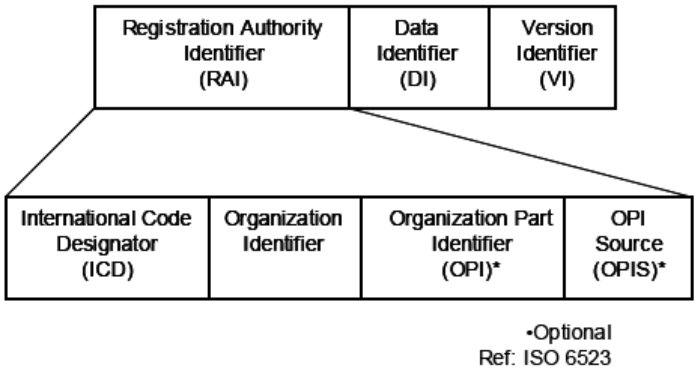
A key aspect of Part 5 is the trisection of data element naming. This approach plays a key role in defining and naming of SAP Global Data Types. As shown in the figure, this trisection, details methodologies for ensuring all data elements are consistently named and constructed.

By way of explanation:

- The “Object Class” is a set of concepts, abstractions or things in the real world that can be identified within clear boundaries and meanings, and whose characteristics and behavior follow the same rules (examples: automobile, person, household, order ...).
- The “Property” is a characteristic feature shared by all the instances of an object class (examples: color, age, income, address ...).
- The “representation” describes how the data is represented, meaning the data type and its value range (examples: a date can be represented with date or datetime value domains).

Each of these three name components can be semantically refined by at least one qualifier. The semantic, syntactic, lexical and uniqueness guidelines defined in the specification ensure the trisection is consistently applied. Implementation specifications, such as ISO 11179-5 formalize these guidelines as specific implementation rules.

ISO/IEC 11179-6:2005 Information Technology – Metadata Registries (MDR) – Part 6: Registration



Part 6 defines how administered items are to be registered through a central registration authority. It gives instruction for the allocation of unique identifiers for each data item, and provides information about the maintenance of administered items. Identifiers consist of three parts – Registration Authority Identifier, Data Identifier, and Version Identifier. Part 6 goes beyond data elements to include registration and administration of data element concepts, conceptual domains, and value domains. Part 6 defines a Registration Authority (RA) which functions as principal responsible agency for registration, allocation, and maintenance of administered items.

ISO 11179 Intellectual Property

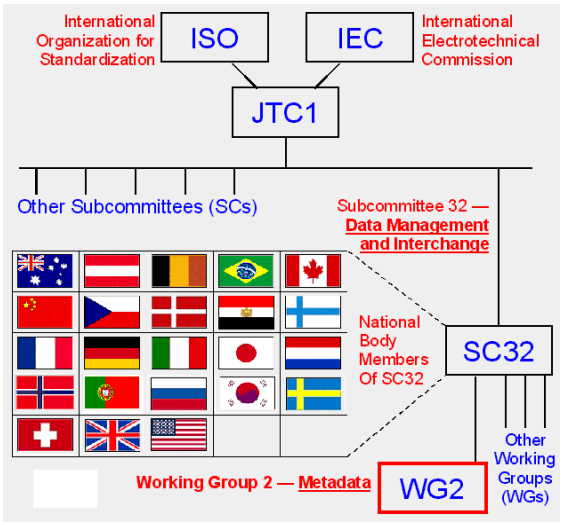
A general overview of the ISO position on intellectual property, copyrights, and royalties can be found on the ISO Intellectual Property Rights web page. All work done in ISO TCs falls under the ISO document Guidelines and policies for the protection of ISO's intellectual property. . Each of the 6 parts contains a forward that states "Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights."

ISO 11179 Conformance

Each of the 6 parts contains specific conformance clauses that define the conformance criteria for that section.

Organization – Responsible Standards Body

ISO 11179 is developed and maintained by ISO/IEC Joint Technical Committee One – Information Technology, Subcommittee 32 – Data Management and Interchange, Working Group 02 – Metadata Registries.



Copies of ISO/IEC 11179

ISO 11179 is available for purchase at the ISO Store. In addition copies of ISO 11179 are made freely available through agreements with JTC1, and can be found on the Freely Available ISO Standards website.

Official ISO/IEC 11179 Status

There are three levels of full ISO standards – Draft, Final Draft, and International Standard. The Draft International Standard (DIS) represents the consensus of a TC. Once a DIS has been approved by a TC it is widely circulated to solicit feedback. That feedback is evaluated by the TC and incorporated into a Final Draft International Standard (FDIS). The FDIS is reviewed and approved by ISO members through the voting process. If successful, the standard is then published as an ISO International Standard (IS). ISO 11179 Parts 1 through 6 hold IS status. JTC1SC32WG02 is actively engaged in developing the next version of the standard.

ISO 11179 Implementations

A number of government agencies and private sector companies around the globe have implemented ISO 11179. A few of the government agencies include:

- Australian Institute of Health and Welfare - Metadata Online Registry (METeOR)
- US Department of Justice - Global Justice XML Data Model GJXDM
- US Environmental Protection Agency - Environmental Data Registry
- US National Cancer Institute - Cancer Data Standards Repository (caDSR)
- US National Information Exchange Model NIEM
- US Health Information Knowledgebase
- RepXML from EDIFRANCE
- Global Information Locator Service (GILS)

Recommendations For Use

- http://xml.gov/documents/completed/iso11179.htm

Role of ISO/IEC 11179

SAP customers around the world use ISO standards in every aspect of their business – both for product development and information exchange. ISO/IEC 11179 is a key standard currently in use within SAP in NetWeaver and the SAP Enterprise Services Architecture as the basis for ISO 15000-5. SAP is using the ISO 15000-5 Core Components Technical Specification in NetWeaver and next generation enterprise services for development of SAP Global Data Types, their underlying Core Data Types, and internal and external XML expressions.

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