
Two of a Kind

On the surface it seems as if the standards iIRDS and VDI 2770 are battling for dominance as the preferred exchange format for digital technical documentation. However, a closer look reveals that a lot of work has been invested to make them consistent.

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The process of digital transformation is not only changing our modern industry – it’s also having a tremendous effect on technical documentation. Due to increasingly customized product variants, widespread global supply chains and a multitude of utilized IT systems, the amount of technical documentation is growing exponentially. To master the situation, information management resorts to the classification of metadata and standard file formats as its means of choice. Yet, more often than not, these measures are company-specific or depend heavily on the software used. As a result, the fundamental advantages of a comprehensive information exchange are lost.

Currently, PDF format is still the preferred method for the delivery of digital manuals. But in most cases, these PDF manuals are equivalent to the scanned version of paper documentation: They don’t allow further organizing, assigning or filtering. As a result, most of the valuable additional information is lost, and it becomes much more difficult for the user to classify the content. This approach is quite puzzling if you think about the abundance of metadata and structure available in modern content management systems. In particular, content delivery portals benefit from what is called “intelligent information”, which can generate real added value for users.

A New Hope

Companies have long been hoping for a standardized exchange format for digital technical documentation. This would greatly facilitate communication with suppliers, as well as internal information exchange. At the same time, it could serve as a solid basis for mapping modern data-driven use cases to content. Developed by an independent body and in accordance with industry requirements, the standard should bridge organizations and systems to enable a lossless flow of information. As metadata plays a central role in the assignment of product and information types, it should be readily accessible. Table 1 provides an overview of various standards that are suitable for the exchange of information.

In Germany, two initiatives emerged that were dedicated to defining the technical guidelines: A working group of the VDI, the Association of German Engineers, developed minimum requirements for digital manufacturing information for the process industry. The primary goal

was to standardize the exchange between suppliers and clients within the process industry, and to incorporate these guidelines into national and international standardization.

A working group of tekomp, the German Association for Technical Communication, developed an exchange format for technical communication content. The main objective was to provide information intelligently, and to enable a manufacturer-neutral exchange between systems (e.g. content management systems and content delivery portals). Also, where appropriate, the working group wanted to standardize information-related metadata in a domain ontology.

Over several years, the two guidelines VDI 2770 and iiRDS evolved, which offer a distinct categorization for technical information. In addition, they also establish file formats for content and

metadata, and define the structure of an exchange package.

The Lord of the Things

Both projects basically pursue the same goal. However, the resulting requirements are implemented differently. The guideline VDI 2770 focuses on entire documents and reflects – with its emphasis on PDF files as mandatory format – the current status of technical documentation. In contrast to this, the iiRDS standard leaves the document context behind and takes a topic-oriented approach that focuses on different content formats and semantic relationships. This allows relevant information units to be delivered to the user according to the respective situation and target audience.

DCC	Document kind classification code, regulated in DIN EN 61355, which is also referenced in VDI 2770; see DIN EN 61355-1:2009-03
eCl@ss	Data standard for the classification of products and services based on internationally standardized features; it is used for object referencing in VDI 2770 and can also be used in iiRDS
iiRDS	intelligent information Request and Delivery Standard; an open source standard developed by the iiRDS consortium for the exchange of digital technical documentation; specifies a container format and an RDF-based domain ontology; see iiRDS 1.0.1:2019-07
IRI	Internationalized Resource Identifier; the internationalized version of the Uniform Resource Identifier (URI); a unique global identifier in a defined form, containing the subtypes URL (e.g. web addresses) and URN (e.g. ISBN)
IRDI	International Registration Data Identifier; internationally standardized identifiers used by eCl@ss for referencing objects
RDF	Resource Description Framework; method for describing relationships between resources through statements known as triples; can be expressed in various formats, such as RDF/XML; used as basis for the iiRDS metadata file
VDI 2770	VDI guideline that defines minimum requirements for the exchange of digital manufacturer information for the process industry; specifies a container format and an XML-based metadata schema; see VDI 2770-1:2020-04
XML	Extensible Markup Language; a media-neutral markup language for structured data, used for content capture or serialization of metadata

Table 1: Standards for information exchange
Source Jan Oevermann

In order to model the necessary semantic relationships for a user-centric content delivery, an ontology focusing on technical documentation was designed for iiRDS, providing a framework for the assignment of metadata. Based on a collection of typical use cases, a clear emphasis was put on references to context (activity, time, target audience) and objects (product, component, tool).

Whether VDI 2770 or iiRDS, each approach has advantages and disadvantages that affect which format might be suitable for a company. Many suppliers who currently deliver paper documentation with their technical products might prefer to use the VDI guideline, as this will enable them to meet the minimum requirements of large buyers in the future. However, the requirements for modular topic-oriented documentation are more likely to be met by the iiRDS.

Both standards highlight a fundamental principle of modern information management: the clear identification of content, metadata and (physical) objects such as products or components. It is this principle that allows establishing relationships and ensures universal interchangeability. While iiRDS continuously uses IRIs (its specialization, the URL, is well-known in the Internet), VDI 2770 relies on a combination of domain-specific IDs, IRIDs used in eCl@ss and specific encodings. These include the DCCs from the standard DIN EN 61355 or ClassIds for VDI 2770 document categories. Since version 1.0, these can be specified in iiRDS as so-called “complex identities”, allowing a clear assignment across both standards.

Similarities as well as differences are also evident in the specific technical requirements. Both standards use a ZIP archive as the container format. However, the specifications regarding the file and directory structure in the container are different. For example, the VDI guideline has strict requirements with regard to the content format (PDF/A and optional source files). In the case of iiRDS, only the iiRDS/A variant specifies rules for file formats: XHTML5 or PDF/A.

The key metadata in VDI 2770 is converted to an XML file for each document, whereas in iiRDS a single RDF file is provided for all files. This file also defines the relationships within the overall pack-

 iiRDS (Document type)	 VDI 2770 (Document category)
Administrator guide	Operation
Assembly instructions	Assembly, commissioning, disassembly
List of parts	Components
CE declaration of conformity	Certificates
Certificates	Certificates
Contractual documents	Contract documents
Electronic identification plate	Identification
Identification document	Identification
Installation instructions	Assembly, commissioning, disassembly
Maintenance instructions	Inspection, maintenance
Operating instructions	Operation
Parts catalog	Spare parts
Plan	Drawings, plans
Quick reference guide	Assembly, commissioning, disassembly
Repair instructions	Repair
Safety instructions	General safety
Sales catalog	Contract documents
Specification	Technical specification
Technical drawing/diagram	Drawings, plans
Transport instructions	Assembly, commissioning, disassembly

Table 2: Document types in iiRDS and VDI 2770

age. In the VDI guideline, this task is performed by the so-called main document at the top level (a kind of table of contents) as well as the nested structure of the package contents.

The use of a single RDF file also means that iiRDS packages, due to their high level of complexity, can only be created and read by special systems. On the other hand, the rather simple structures and XML-based metadata of the VDI format still permit direct human processing.

The War of the Worlds

The standard VDI 2770 contains the standards DIN EN 82045-2 and DIN EN 61355, and includes a significant number of requirements from document management. iiRDS, however, focuses on semantic and functional relationships between different content types and product components. Mere administrative metadata such as release or status transitions don't play a major role. Moreover, as regards metadata modeling, the iiRDS follows the "open world" approach. This practice is widely used in the semantic web and allows the user to define new values and relationships based on the ontology. All modeling is basically allowed unless it is specifically prohibited. For example, it is explicitly provided for that company-specific values for target audiences or product life cycle phases can be added. This contrasts directly with the requirements specified in the VDI guideline, which state prescriptively what kind of modeling is permitted.

Owing to the "open" and "closed" modeling approaches, as well as the fact that the tekomp iiRDS standard allows a multitude of further information units in addition to documents, the metadata model of the VDI guideline can be considered a subset of iiRDS. Thus, using well-prepared and regulated iiRDS data, a VDI 2770 package can be generated, albeit often with information loss on the metadata level. This is clearly visible in the classification of documents. The 20 predefined document types from iiRDS can be assigned unequivocally to the 12 document categories from VDI 2770. However, the reverse is not possible without additional information.

Table 2 compares document types.

The Usual Suspects

Although they differ in their particular priorities, both exchange standards have their *raison d'être*, and will coexist in the foreseeable future. However, they are by no means incompatible – rather, they can benefit from each other. Cases in point are the easy entry level of the VDI 2770-based delivery of documents as well as the extended level of the iiRDS, which provides topic-based and networked information in a context-sensitive manner. Due to the close cooperation of the respective committees, the formats exhibit similar ideas and goals, and can be easily mapped to each other. This is especially useful for companies that can't decide yet which standard to opt for in the future. With the help of proper metadata and the respective software, it is already possible to generate both formats or to use hybrid packages for the exchange.

Regarding formats and modeling, the requirements of the standards can serve as well-established best practices. This also helps to refute distribution as a

selection criterion, which many companies rely on when evaluating a standard. If the basic principles of solid information management (i.e. metadata, structure, and identification) are adhered to, an intelligent exchange format is within sight. And the usual suspects for this have already been found.

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Referenced norms and standards

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IEC 61355-1:2008 – Title (English): Classification and designation of documents for plants, systems and equipment - Part 1: Rules and classification tables
- **DIN EN 62023:2012-08; VDE 0040-6:2012-08 – Titel (Deutsch):** „Strukturierung technischer Information und Dokumentation“ (IEC 62023:2012), Deutsche Fassung EN 62023:2012
IEC 62023:2011 + Cor. :2012 – Title (English): Structuring of technical information and documentation
- **DIN EN 82045-2:2005-11 – Titel (Deutsch):** Dokumentenmanagement – Teil 2: Metadaten und Informationsreferenzmodelle (IEC 82045-2:2004); Deutsche Fassung EN 82045-2:2005
IEC 82045-2:2004 – Title (English): Document management - Part 2: Metadata elements and information reference model
- **iiRDS 1.0.1:2019-07 – tekomp iiRDS Standard** – intelligent information Request and Delivery Standard – Version 1.0.1 – Release Date 12 July 2019. www.iirds.org
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