

Knick >

 **plusmeta**



**THE ART
OF MEASURING**

**Delivering Intelligent
Information to Enable
the Digital Twin for
Medium-sized
Enterprises**

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22th October 2024

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- › Meet the Experts and Companies
 - Introduction to Knick
 - Introduction to plusmeta
- › Understanding the Challenge
 - Identifying the Problem
 - Objectives and Initial Situation
 - Adjusted Objectives for the Pilot Project
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 - Why Choose iiRDS?
 - Project Overview
 - AI-Based Classification
 - Key Findings
- › Utilization of Results
 - Chatbot Optimization with iiRDS Metadata
 - Asset Administration Shell
- › Outlook and Conclusion

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Introduction to Knick

› Facts and Figures

- Family-owned company
- Founded over 75 years ago
- Based in Berlin
- 298 employees
- Motto: "THE ART OF MEASURING"

› Product Lines:

- Interface Technology
- Process Analytics

› Key industries: Chemical, Pharmaceutical, Biotechnology, Food and Beverage, Water and Wastewater, Energy, Rail, eMobility



Interface Technology



Process Analytics

Introduction to plusmeta



› Facts and Figures

- 5 years in the market
- 16 employees
- Part of Quanos Group since 2023
- 35+ Customers in EU, USA & Asia

› plusmeta Benefits

- Cloud-based infrastructure
- Web application & API
- Human-in-the-Loop or full automation
- Direct interface to Schema ST4 (CCMS) and various content delivery solutions



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Identifying the Problem

- › Product information is currently limited to PDF format due to legal requirements, lacking prerequisites for digital distribution.
- › Our content in the CCMS (Schema ST4) lacks a robust metadata structure and is not sufficiently organized into self-contained topic formats like DITA, limiting its usability and accessibility.
- › The absence of a dedicated content delivery solution forces global teams and customers to rely on manual downloads, resulting in inefficiencies and outdated information.
- › There is no existing infrastructure to ensure reliable and verifiable content delivery, which is crucial for meeting legal compliance.
- › We are building an infrastructure to deliver handover documentation as VDI 2770-compliant Asset Administration Shell (AAS) packages, but this system lacks modular content delivery.

Objectives and Initial Situation

- › Transition content to a Content Delivery Portal (CDP) to reduce printing costs, streamline updates, and enhance the user experience with new media formats.
- › Implement iiRDS to enable faceted search for internal use and eventually for delivering concise and verifiable content to customers, aligned with product delivery dates.
- › Generate iiRDS packages directly from the CCMS for use in the CDP and as an exchange format with other systems and applications.
- › Expand the use of iiRDS packages to integrate content into the service knowledge base, learning management system (LMS), and deliver VDI 2770/AAS-compatible packages.
- › Demonstrate that small and medium-sized enterprises (SMEs) can meet customer requirements and support Industry 4.0 standards.

Adjusted Objectives for the Pilot Project

- › Assess the suitability of iiRDS as a metadata model for Knick
- › Identify key considerations for developing a digitalization strategy
- › Conduct a proof of concept using plusmeta software to:
 - Automate metadata assignment.
 - Classify existing content subsequently in the CCMS.
 - Integrate ECLASS product master data into iiRDS.
 - Analyze prerequisites for creating variant-specific product information.
- › Out of scope:
 - Implementing the interface between Schema ST4 and plusmeta.
 - Handling content beyond the sample data.
 - Extending the metadata model.
 - Full implementation of iiRDS packages within the Asset Administration Shell.

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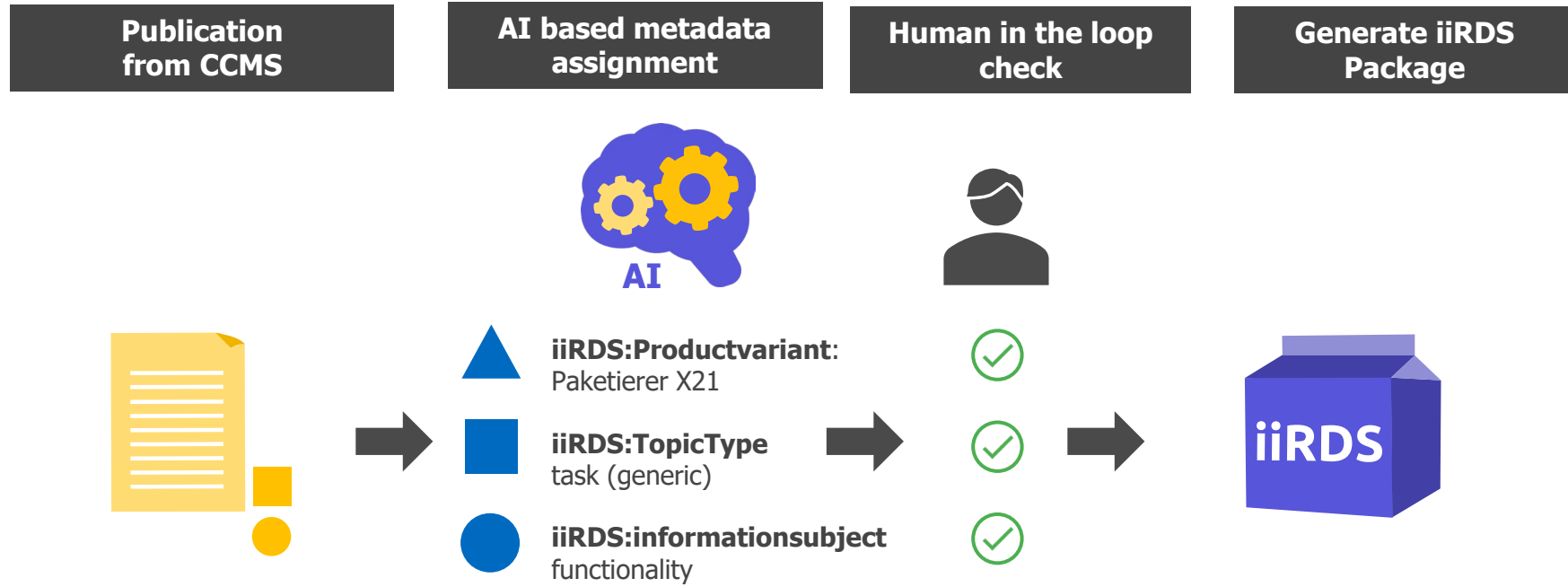
Why Choose iRDS?

- › Standard exchange format
- › Existing metadata model
- › Proven metadata model as a basis for content delivery
- › Can be extended for specific companies
- › Basis for Asset Administration Shell

Project Overview

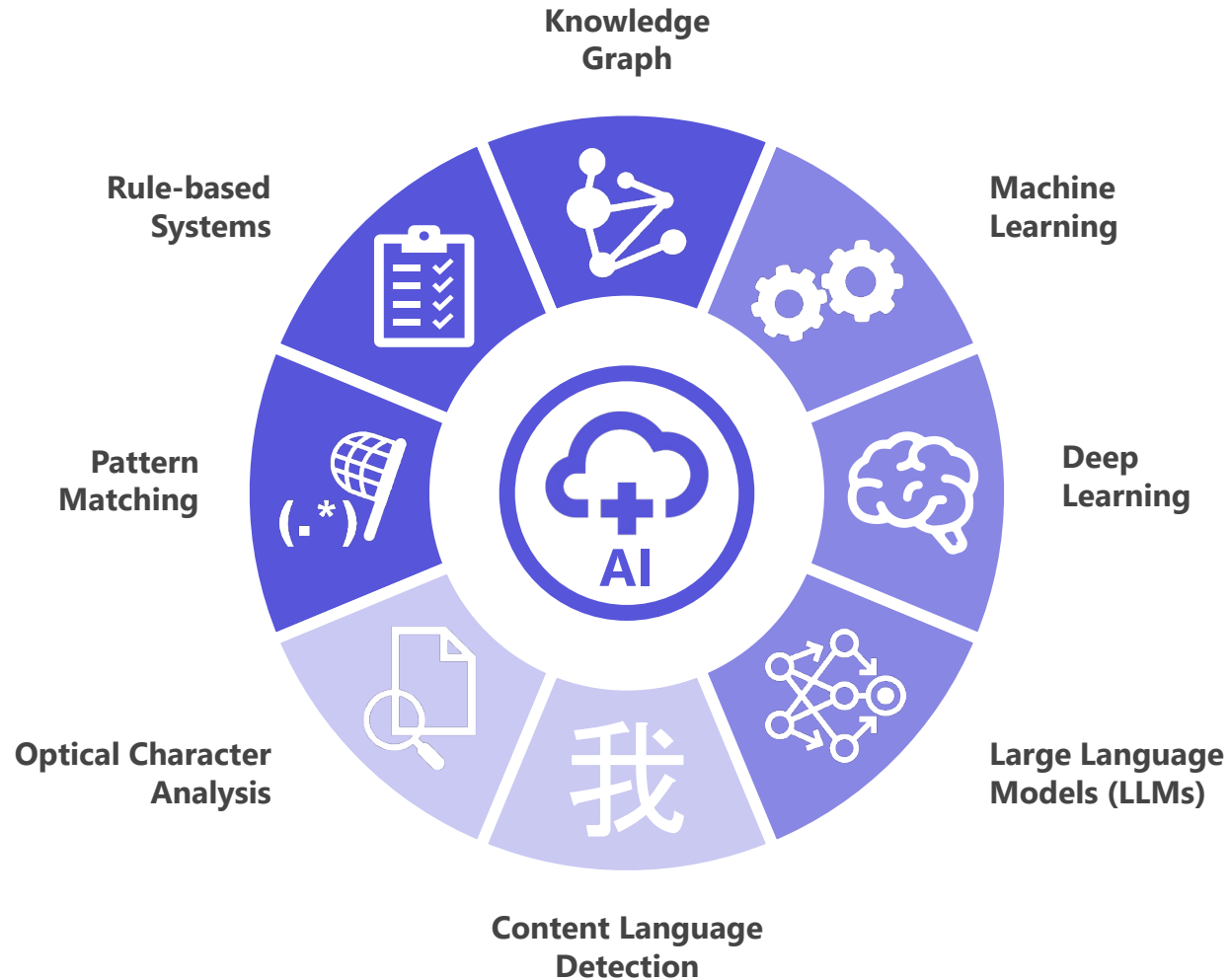
- › Analyzed the potential applications of iiRDS metadata.
- › Created a mapping between the Knick metadata and iiRDS.
- › Developed a target metadata model for Knick based on iiRDS standards.
- › Set up requirements for automated metadata assignment.
- › Reviewed results of the automated metadata assignment – First round.
- › Reviewed results of the automated metadata assignment – Second round.
- › Generated an iiRDS sample package.
- › Identified key insights for the digitalization strategy.

AI-Based Classification



The screenshot shows a software interface for AI-based classification. The top navigation bar is blue and contains a settings icon, the text "P41000 TA neu > Enrich content automatically", and user profile icons. A left sidebar contains a tree view of content components: "HTML Directory 2024 10 21 17 ...", "P41000 TA neu", "Ergänzende Hinweise", "Sicherheit", "Bestimmungsgemäßer ...", "Anforderungen an das ...", "Isolation", "Produkt", "Lieferumfang", "Produktidentifikation", "Messbereiche Grundtyp...", "Typenschilder", "Symbole und Kennzeich...", and "Funktion". The main content area is dark-themed and displays search results for "funktion". It shows two content components: "Funktion" (CONTENT COMPONENT • 3 AI BASED) and "Funktionsbeschreibung" (CONTENT COMPONENT • 6 AI BASED). The "Funktionsbeschreibung" component is selected, showing its details: "968525195968613643.html", "HTML file • Content component • 7.8 kB", and a text description. The description includes: "Funktionsbeschreibung", "Der P41000 ist in verschiedenen Ausführungen verfügbar. Abhängig von der Ausführung unterscheiden sich die Produkteigenschaften.", "Das uni- oder bipolare Eingangssignal wird vom P41000 erfasst und in ein normiertes analoges Ausgangssignal gewandelt.", "Eine beispielhafte Anwendung ist die Strommessung über einen Shunt-Widerstand.", "Die hohen Potentiale des Eingangskreises sind durch eine galvanische 3-Port-Trennung zwischen Eingang, Ausgang und Hilfsenergie getrennt.", and "Die elektronischen Bauteile des P41000". To the right of the description is a "Metadata" panel with 12 items: "Title*" (Funktionsbeschreibung), "Language" (German), "Node class" (Description), "Topic type" (Concept (generic)), "Publication" (TA Betriebsanleitung), and "Document type" (Operating instructions). The bottom navigation bar shows "P41000 TA neu > Enrich content automatically > Assign and approve metadata".

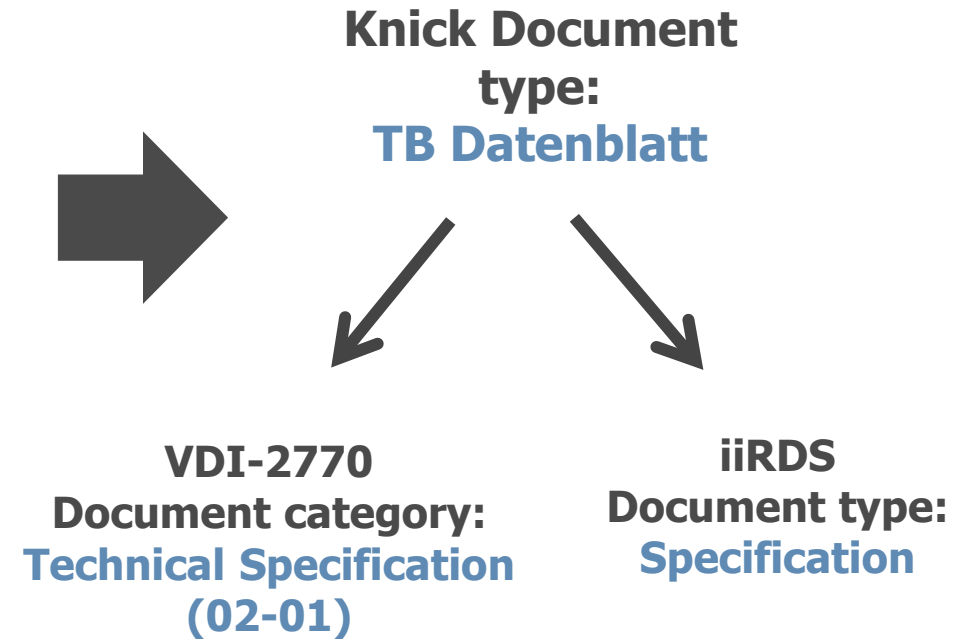
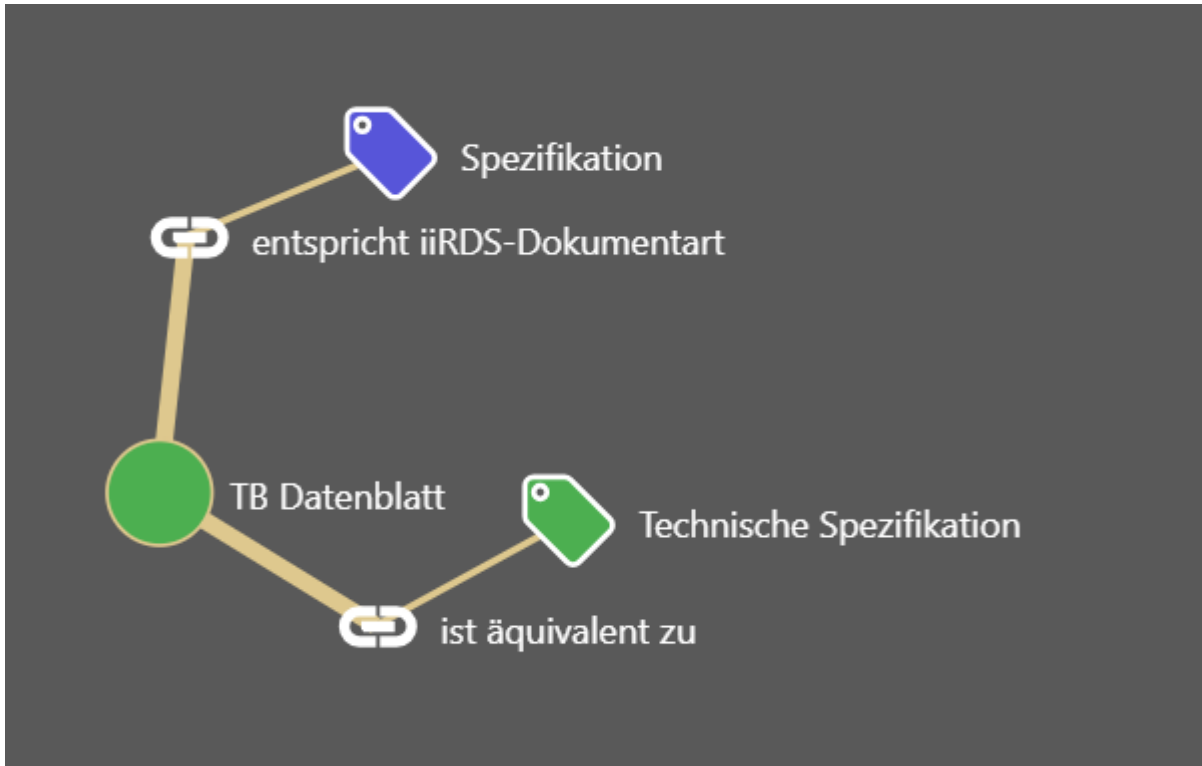
AI-Based Classification



Metadatum	iirds	
Titel	✓	Read from HTML content
Language	✓	Read from ST4
Node class	x	Read from ST4
Publication	x	Read from ST4
Topic type	✓	Mapping from node class / rule-based recognition / (machine learning model)
Document type	✓	Mapping from ST4 data in metadata publication
Information subject	✓	Rule-based assignment of iirDS default values, simple post-training via indicators + extension of self-defined default values with the aim of providing detailed information access.
Product life cycle phase	✓	Rule-based assignment of iirDS standard values, simple retraining via indicators
Product variant	✓	Mapping from ST4 specifications, project specification for unclassified content
Component	✓	Rule-based detection for newly defined values
Organisation	✓	Mapping of product variant
ECLASS	✓	Mapping of product variant
Technical data, e.g. weight	x / ✓	Extractor
Comment	x	Manual input if required, e.g. revision notes

Mapping

- Relationships between different data models can be stored in the Knowledge Graph and form the basis for mapping.



Mapping

- Information for the iiRDS metadata model can be derived from certain node classes in ST4, such as the product life cycle phase, the information topic and the topic type.

Beziehungen: Plan

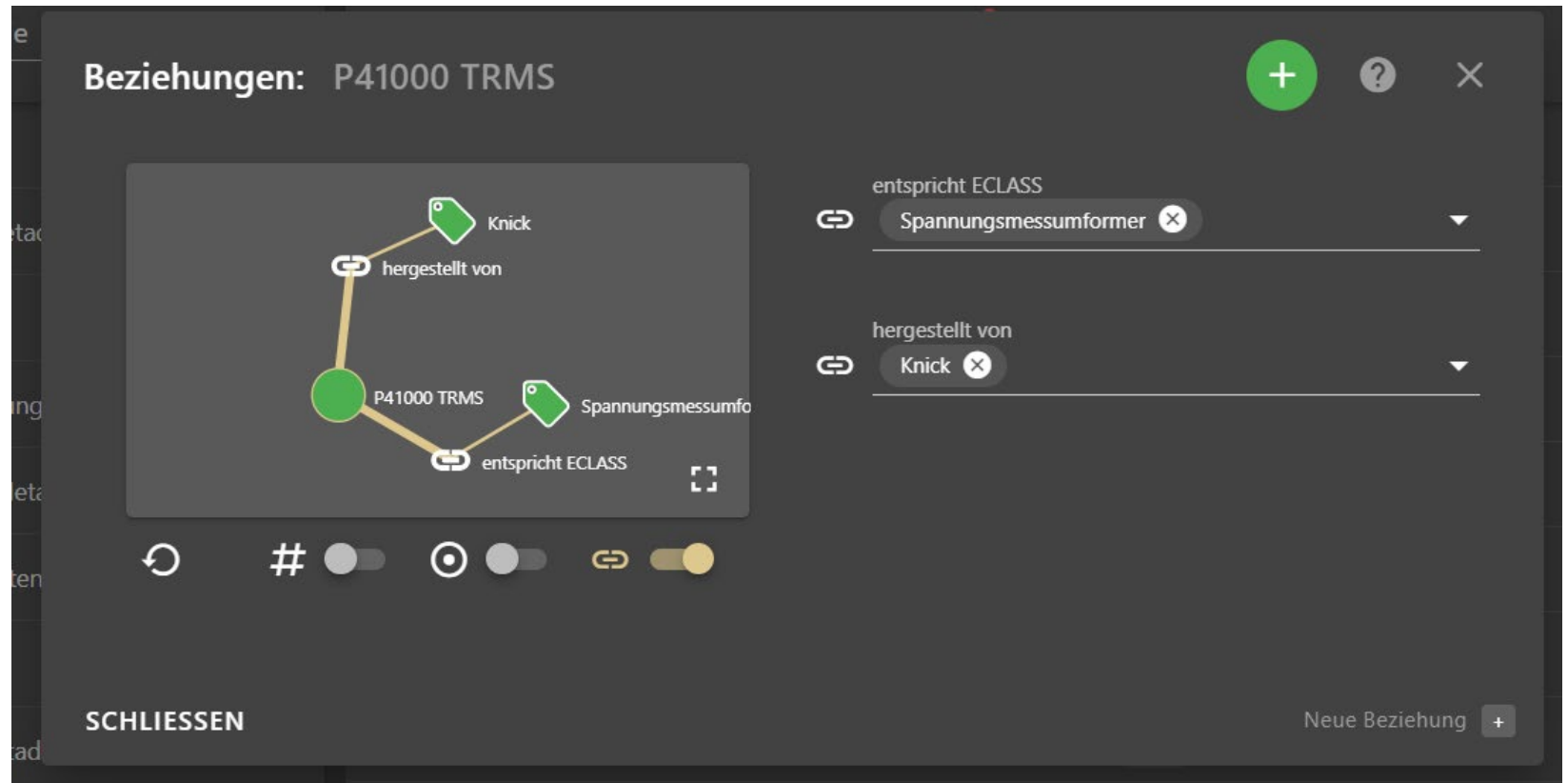
The screenshot shows a software interface for managing relationships. On the left, a diagram titled 'Beziehungen: Plan' shows a central node 'Plan' connected to several other nodes: 'Referenz (generisch)', 'Technische Übersicht (generisch)', 'Erstinbetriebnahme', 'Betrieb', and 'Inbetriebnahme'. Each connection is labeled with 'entspricht iiRDS-...' (corresponds to iiRDS-...). On the right, a list of these relationships is shown with dropdown menus and delete buttons. The list includes:

- entspricht iiRDS Produktlebenszyklusphase: Inbetriebnahme, Betrieb, Erstinbetriebnahme
- entspricht iiRDS-Informationsthema: Technische Übersicht (generisch)
- entspricht iiRDS-Topictyp: Referenz (generisch)

At the bottom left is a 'SCHLIESSEN' button. At the bottom right is a 'Neue Beziehung +' button. A mouse cursor is pointing at the 'Neue Beziehung +' button.

Mapping

- > In this example, the ECLASS and the manufacturer are assigned to the product variant.



Beziehungen: P41000 TRMS

entspricht ECLASS

Spannungsmessumformer

hergestellt von

Knick

P41000 TRMS

Spannungsmessumfo

entspricht ECLASS

hergestellt von

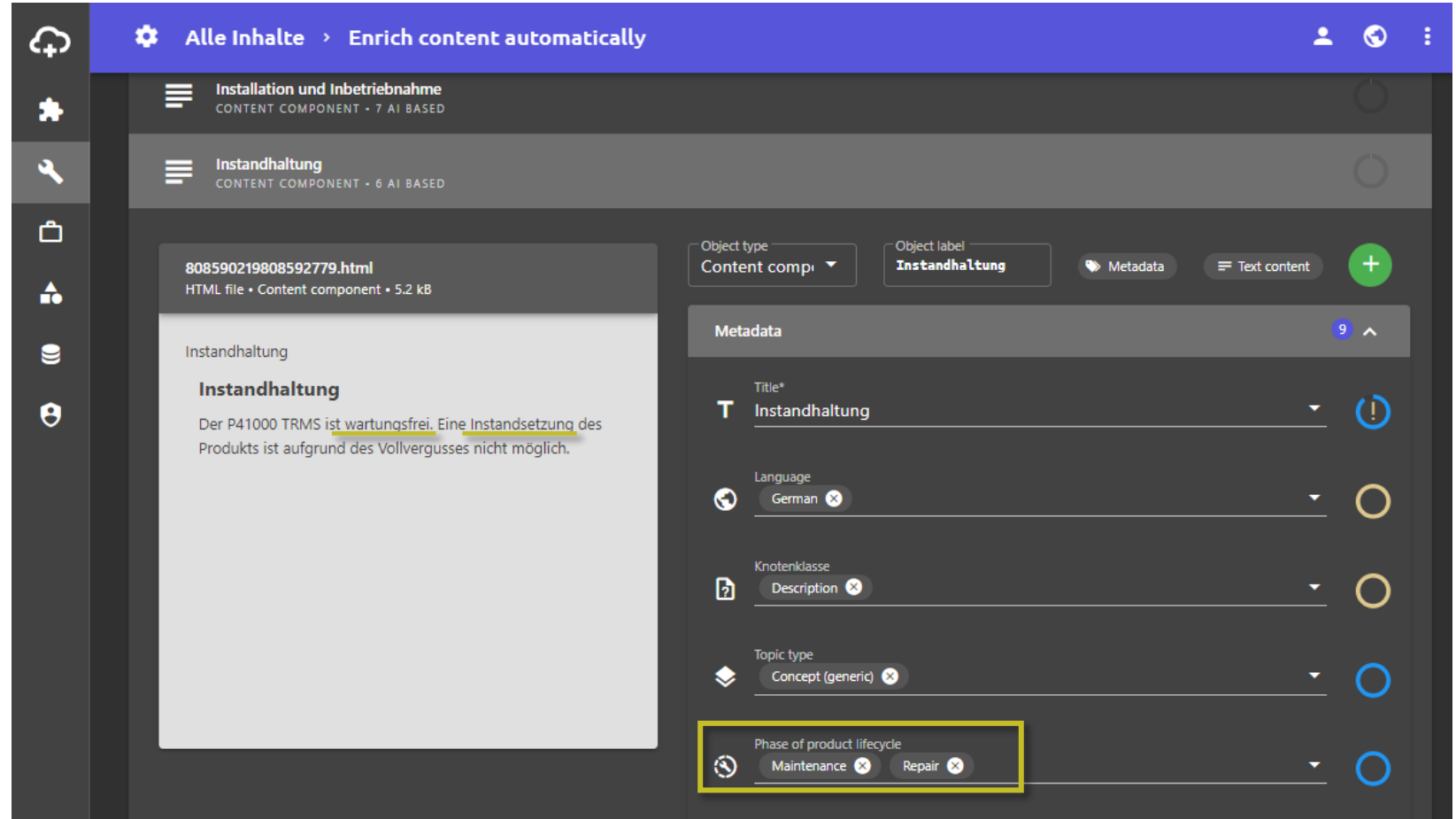
Knick

SCHLIESSEN

Neue Beziehung +

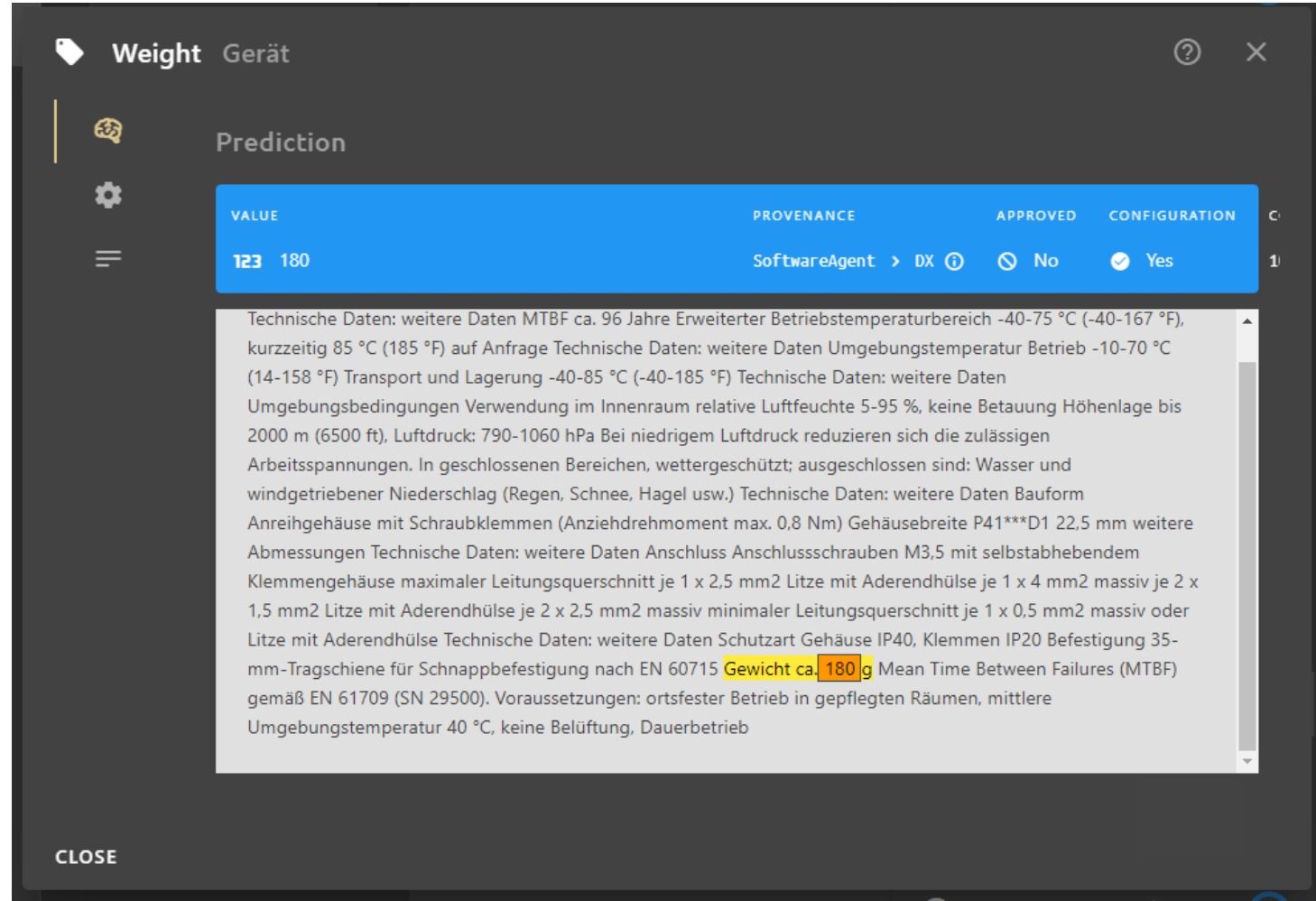
Rule-based Systems

- Rule-based detection takes into account the metadata and indicator labels. In addition, parameters such as the location and hit accuracy are taken into account.



Extractor

- Dynamic extractors are based on pattern matching. You can recognize technical specifications by their designations and typical units



The screenshot shows a software window titled "Weight Gerät" with a "Prediction" section. A table displays the predicted value and its provenance.

VALUE	PROVENANCE	APPROVED	CONFIGURATION
123 180	SoftwareAgent > DX	No	Yes

Below the table, a text area contains technical specifications for the device, including operating temperature ranges, environmental conditions, and physical dimensions. The weight is highlighted as "Gewicht ca. 180 g".

Technische Daten: weitere Daten MTBF ca. 96 Jahre Erweiterter Betriebstemperaturbereich -40-75 °C (-40-167 °F), kurzzeitig 85 °C (185 °F) auf Anfrage Technische Daten: weitere Daten Umgebungstemperatur Betrieb -10-70 °C (14-158 °F) Transport und Lagerung -40-85 °C (-40-185 °F) Technische Daten: weitere Daten Umgebungsbedingungen Verwendung im Innenraum relative Luftfeuchte 5-95 %, keine Betauung Höhenlage bis 2000 m (6500 ft), Luftdruck: 790-1060 hPa Bei niedrigem Luftdruck reduzieren sich die zulässigen Arbeitsspannungen. In geschlossenen Bereichen, wettergeschützt; ausgeschlossen sind: Wasser und windgetriebener Niederschlag (Regen, Schnee, Hagel usw.) Technische Daten: weitere Daten Bauform Anreihgehäuse mit Schraubklemmen (Anziehdrehmoment max. 0,8 Nm) Gehäusebreite P41**D1 22,5 mm weitere Abmessungen Technische Daten: weitere Daten Anschluss Anschlussschrauben M3,5 mit selbstabhebendem Klemmgehäuse maximaler Leitungsquerschnitt je 1 x 2,5 mm² Litze mit Aderendhülse je 1 x 4 mm² massiv je 2 x 1,5 mm² Litze mit Aderendhülse je 2 x 2,5 mm² massiv minimaler Leitungsquerschnitt je 1 x 0,5 mm² massiv oder Litze mit Aderendhülse Technische Daten: weitere Daten Schutzart Gehäuse IP40, Klemmen IP20 Befestigung 35-mm-Tragschiene für Schnappbefestigung nach EN 60715 **Gewicht ca. 180 g** Mean Time Between Failures (MTBF) gemäß EN 61709 (SN 29500). Voraussetzungen: ortsfester Betrieb in gepflegten Räumen, mittlere Umgebungstemperatur 40 °C, keine Belüftung, Dauerbetrieb

CLOSE

	Pilot Project
Objects / Topics	40
Metadata Total	428
Metadata per topic	10,7

Assignment method		
Set by User	78	18%
Read from ST4	150	35%
AI set metadata	200	47%

Typical evaluation metrics	
Automation	72%
Manual duration	556 Min.
Duration with AI	178 Min.
Time saving	-378 Min.

Assumptions for the calculation

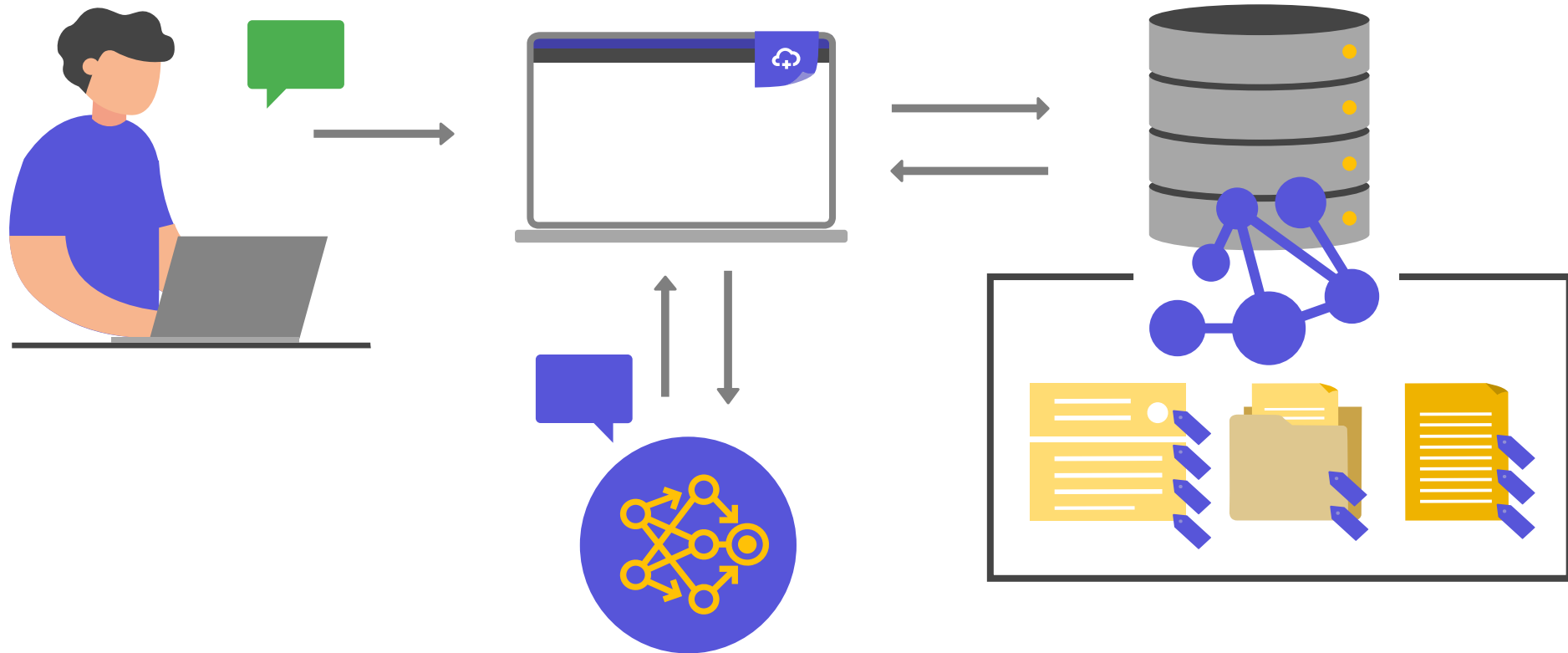
- 2 minutes per metadata to be assigned manually
- 1 minute to check and correct an AI-assigned metadata / assigned in plusmeta
- 0.5 minutes to check a correctly set metadata

- › Recommendations for the authoring process
 - Implement a topic-oriented structuring approach.
 - Differentiate content by topic types (e.g., concept, task, reference).
 - Establish structuring and writing guidelines for each topic type.
 - Standardize information topics across all product categories.
- › Adjustments to the publication strategy
 - Determine the appropriate granularity (complete information products vs. modular units).
 - Link modular information units to specific products (e.g., by serial number).
 - Transition from a document-centric approach to smaller, more manageable information units.
 - Maintain document context and structure using directory nodes.
- › Metadata assignment based on the CDP scenario
 - Identify which objects (fragments vs. nodes) require metadata assignment.
 - Decide whether metadata should be transferred back to the CCMS or assigned directly in plusmeta for each CDP preparation.
 - Determine whether there are CDP provider specific requirements.

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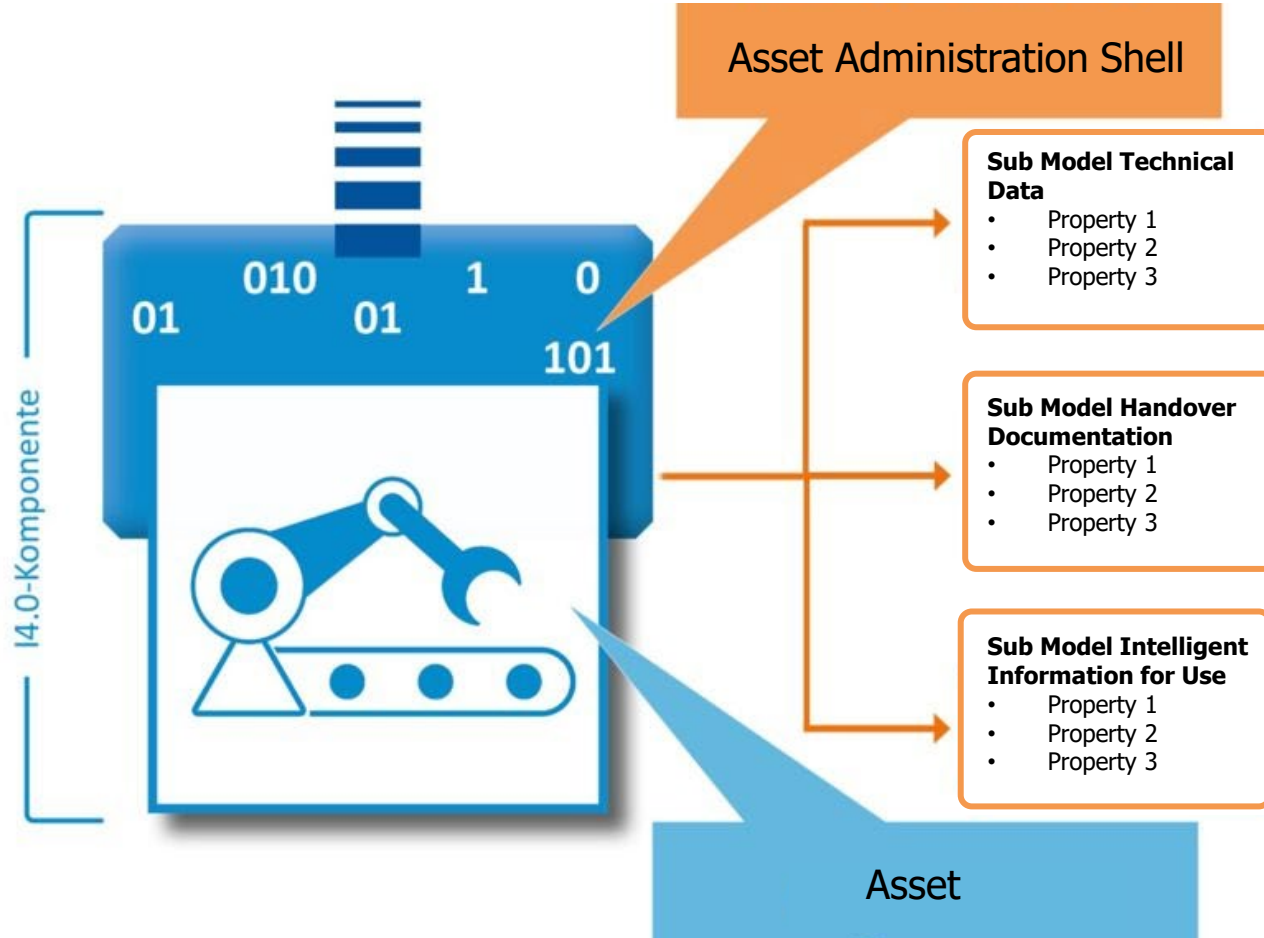
Chatbot Optimization with iIRDS Metadata

> Demo



Asset Administration Shell

> Demo



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Next Steps: Short-term

- › Analyze the requirements for IT infrastructure, security, and maintenance of a potential solution with the IT department.
- › Develop the integration of the Content Delivery Portal into Knick's existing online presence with the Marketing department.
- › Assess risks and develop measures for risk mitigation.
- › Evaluate potential software solutions based on the requirements list.
- › Estimate the necessary resource requirements.
- › Management decision on the implementation of the concept.

Next Steps: Mid-term

- › Define a specific project plan with key milestones.
- › Establish relevant Key Performance Indicators (KPIs) for managing and measuring the project.
- › Initiate change management by fulfilling the necessary training requirements in the Technical Documentation department.
- › Evaluate proposed process optimizations and implement appropriate adjustments.
- › Restructure and optimize existing content in the CCMS.
- › Introduce the iiRDS metadata model.
- › Assign existing content in the CCMS with iiRDS metadata.

› Key Challenges for Knick

- Operating as an SME with limited resources, requiring a deep understanding of company needs and capabilities.
- Meeting increased demands for enriched information (e.g., VDI 2770, AAS) from both internal and external customers.
- Integrating iiRDS into a currently non-existent company-wide metadata strategy.
- Navigating the impact of timing and unpredictable external influences (e.g., organizational changes).
- Convincing management and decision-makers by clearly communicating the potential benefits and preparing relevant use cases.

› The iiRDS pilot project:

- Initiates internal discussions and sparks new projects or initiatives.
- Provides valuable insights for shaping the digitalization strategy.
- Acts as a catalyst for further development and innovation.

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 Thank you for your attention