

Content Management & Content Delivery

for Digital Information Services

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Wolfgang Ziegler

- Karlsruhe University of Applied Sciences, Germany
„Communication und Media Management“ (HKA)
 - » Knowledge, information, content, data modelling
 - » Information processes and systems in TC
- Institute for Information and Content Management (I4ICM)
 - » Research Transfer (PI-Class, CVM, REx, CDP, CoReAn, microDocs/SCR)
 - » System evaluation & introduction, process analysis/(re-)engineering, CMS/CDP analytics & optimizing, classification

Institute for Information
and Content Management



Agenda

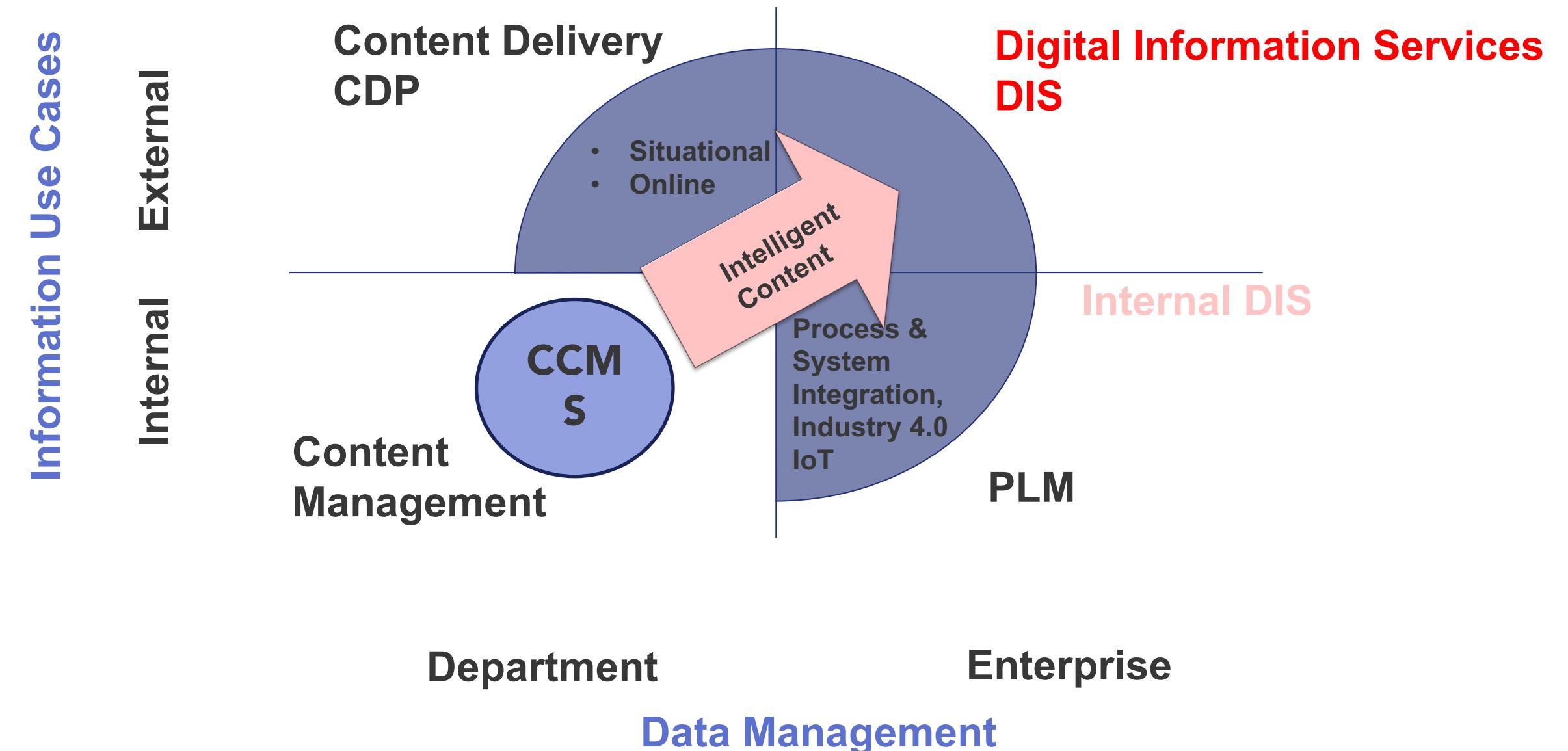
- Introduction
- Content Management Concepts
- Content Delivery Concepts
- Content Management Deep Dive
- Delivery for Digital Information Services

Introduction

**Content Technologies and
Digital Information Services**

Introduction

Evolution of (Technical) Information Perspectives



Introduction

CMS

What is the (state-of-the-art) focus of content management and related technologies?

- Granular Information: topic-based content
- Metadata enrichment (of topics) according to product or media variants
 -
- Support of content-related processes
- Automation of CMS processes (generating, publishing)

Introduction

Manuals & data on
configurable products

CMS

[Web](#)



The depiction of the products may differ from the actual specific design.



Search

Downloads

下载

[所有](#) [所有语言](#)

数据表

	↑↓ 描述	↑↓ 文件大小	↑↓ 语言 / 国家
	Type 8139 data sheet radar level measurement device	2 MB	EN / EU
	Typ 8139 Datenblatt Radar-Füllstandsmessgerät	2 MB	DE / DE
	Type 8139 fiche technique Niveaumètre radar	2 MB	FR / FR

用户手册

	↑↓ 描述	↑↓ 文件大小	↑↓ 语言 / 国家
	Operating Instructions Type 8139 Level measuring device	6 MB	EN / EU
	Quickstart Type 8139 Level measuring device	1 MB	EN / EU
	Bedienungsanleitung Typ 8139 Füllstandmessgerät	6 MB	DE / EU
	Manuel d'utilisation type 8139 Appareil de mesure de niveau	6 MB	FR / EU
	Quickstart Typ 8139 Füllstandmessgerät	1 MB	DE / EU

[更多详情](#)

Introduction

Manuals & data sheets for highly configurable products

CDP

CMS
(Publishing)

Application area

J Version: - Status: RL (released | freigegeben) printed: 05.06.2019

3.2 Principle of operation

LEVEL TRANSMITTER 8139 is a radar sensor for continuous level measurement of liquids.

The small process fittings offer particular advantages in small tanks or tight mounting spaces. The very good signal focusing ensures the use in vessels with many installations such as stirrers and heating spirals.

The LEVEL TRANSMITTER 8139 is available with different antenna systems:

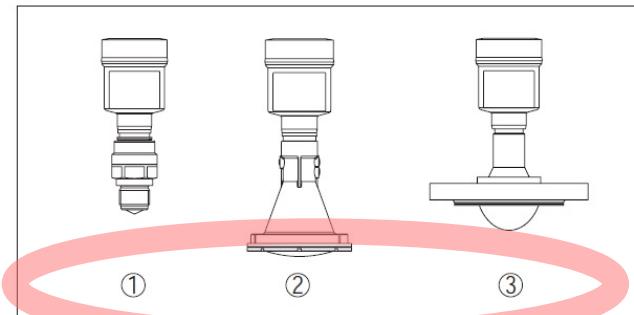


Fig. 2: Antenna systems LEVEL TRANSMITTER 8139

- 1 Thread with integrated horn antenna
- 2 Plastic horn antenna
- 3 Flange with encapsulated antenna system

You will find recommended values for socket heights in the following illustration or the tables. The values come from typical applications. Deviating from the proposed dimensions, also longer sockets are possible, however the local conditions must be taken into account.

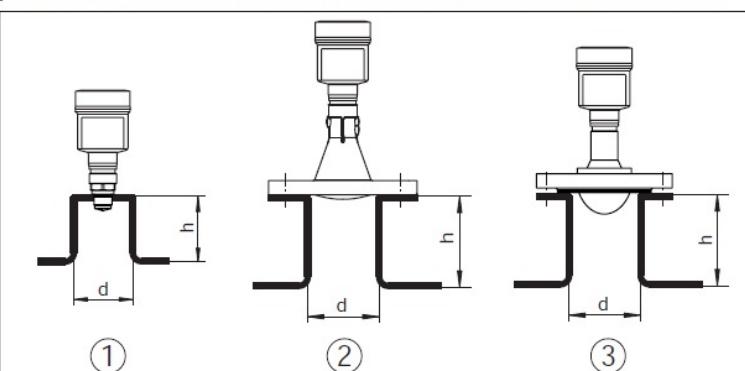


Fig. 17: Socket mounting with deviating socket dimensions with different versions of LEVEL TRANSMITTER 8139

- 1 Thread with integrated horn antenna
- 2 Plastic horn antenna
- 3 Flange with encapsulated antenna system

Thread with integrated horn antenna

Socket diameter d	Socket length h
40 mm	1 1/2"
50 mm	2"

≤ 150 mm ≤ 5.9 in
≤ 200 mm ≤ 7.9 in

58499-EN-190321

LEVEL TRANSMITTER 8139 • Two-wire 4 ... 20 mA/HART

Complexity for Content Collection of variants users: depending on parameters

10 Supplement

Version	Material	Seal	Process temperature (measured on the process fitting)
Thread with integrated horn antenna	PEEK	FKM (SHS FPM 70C3 GLT)	-40 ... +130 °C (-40 ... +266 °F) -40 ... +200 °C (-40 ... +392 °F)
		FFKM (Kalrez 6230)	-15 ... +130 °C (5 ... +266 °F) -15 ... +200 °C (5 ... +392 °F)
		FFKM (Kalrez 6375)	-20 ... +130 °C (-4 ... +266 °F) -20 ... +200 °C (-4 ... +392 °F)
Flange with encapsulated antenna system	PTFE and PTFE 8 mm	PTFE	-40 ... +130 °C (-40 ... +266 °F) -40 ... +200 °C (-40 ... +392 °F) -196 ... +200 °C (-320.8 ... +392 °F) ⁸⁾
		PFA	-40 ... +130 °C (-40 ... +266 °F) -40 ... +200 °C (-40 ... +392 °F)
		PTFE	-40 ... +200 °C (-40 ... +392 °F)
Hygienic fitting with encapsulated antenna system	PTFE	PTFE	-40 ... +200 °C (-40 ... +392 °F)
		FKM (A+P 75.5/VA/75F)	-20 ... +130 °C (-4 ... +266 °F)
		EPDM (A+P 70.10-02)	-40 ... +130 °C (-40 ... +266 °F)
		FFKM (Kalrez 6230)	-15 ... +130 °C (5 ... +266 °F)

Derating, ambient temperature

Introduction

CDP

DIS

Content Delivery Objectives (User side)

- **Create and deliver more and better user-centered information**
 - situational (according machine and user situation)
 - case-based (following predefined use cases)
 - product-/variant-specific (as most as possible)
 - accessible (searchable, available and managed)
 - suitable media
- Create new business cases / Digital Information Services

Introduction

DIS

Internal
DIS

Use Case Dependencies & Requirements for Deliverables & Services

- **Sales process / Information & Product Search:**
 - Overview data and summarized tables
 - Specific: Data sheet, technical data, dependency information
- **Product Planning:** specific envisaged configuration
- **Set-up /Installation:** specific context and configuration setting
- **Service/Repair planning:** specific existing configuration
- **Operation/Customer services:** Detailed information

Introduction

External Perspective (regarding information)

So, we need to ...?

- ... improve customer satisfaction / user experience (also by reducing complexity)
- ... i.e. provide information more specific to product and features (variants, configuration)
- ... integrate information into IoT processes
- ... use modern electronic media (Apps, Search, Delivery)
- ... make information exchangeable on a digital basis
- ... offer new product services (or, at least, enable new services)

Content Management

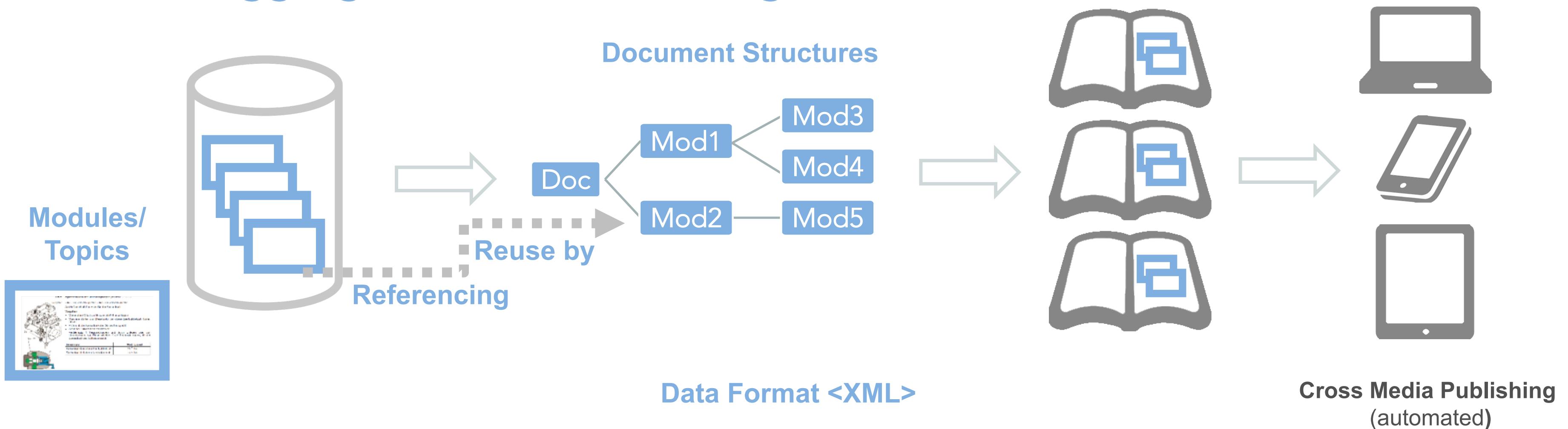
Creating (native-) intelligent content

CM Methods

Referencing modules/topics

- permits controlled processes
- avoids uncontrolled redundancies
- defines and populates document structures by topics

Reuse, Aggregation and Publishing



CMS drivers and demands from industry

Products from industrial engineering and manufacturing are characterized by „mass customization“ and „globalization“ :

- Short-time development cycles
- Many changes within development phase
- Frequent and rapid changes within time of use (software updates, servicing for manufacturing/machines)
- Use of standard parts & components (mass production) and reuse of parts
- Adapting products to customer needs (customization & variant management)
- Adapting products to addressed markets (globalization issues for export-oriented industries)
- Comply with regulations and standards
- **Software similar, but different** (software functions , more software variants/branches, license management; in many cases more individual customizing; influence agile development)

CM Methods

Grundfos:

AEM environment

Basic CM Concepts in TC

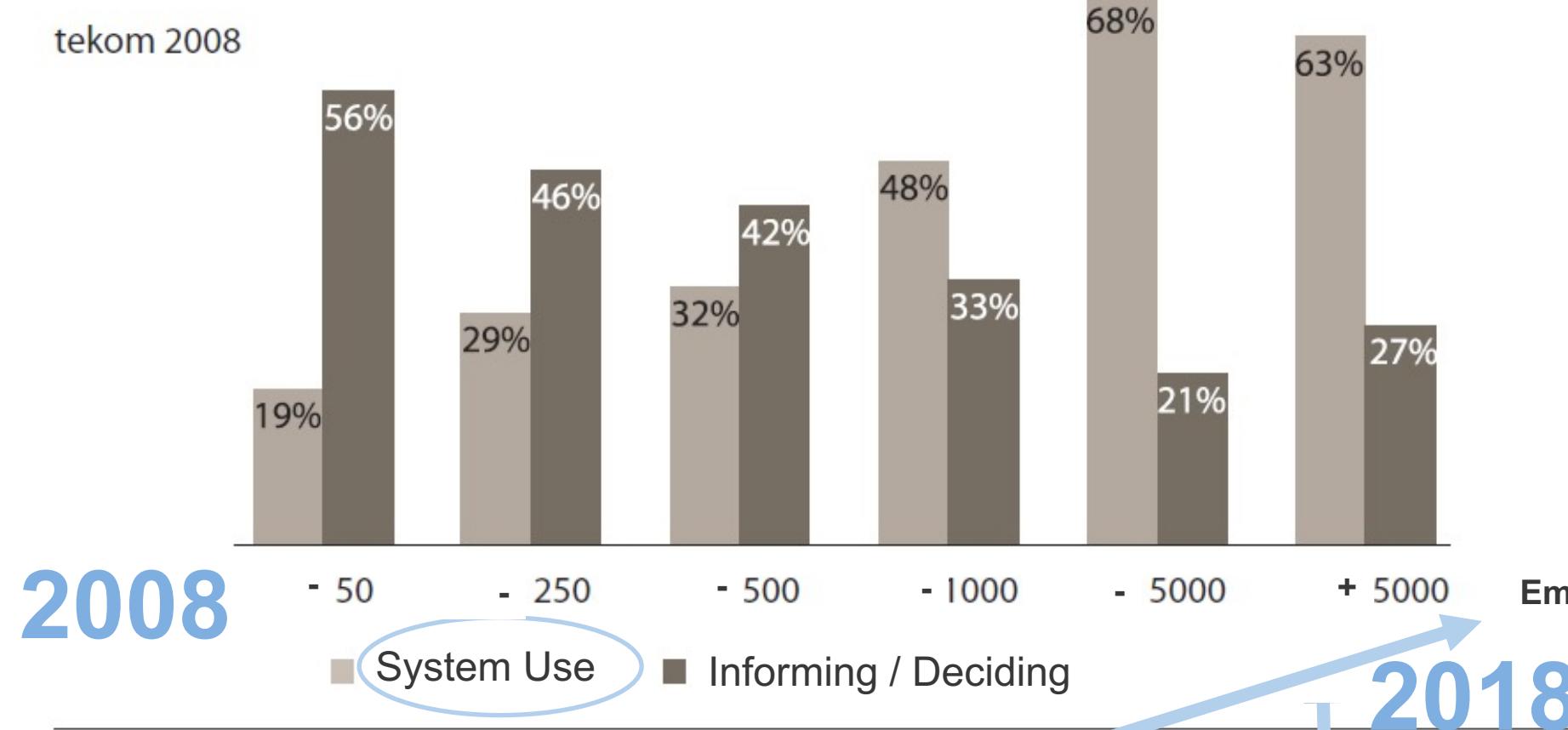
- **CMS principles**

Controlled reuse of content modules (topics) in multiple delivery structures, documents or media using metadata

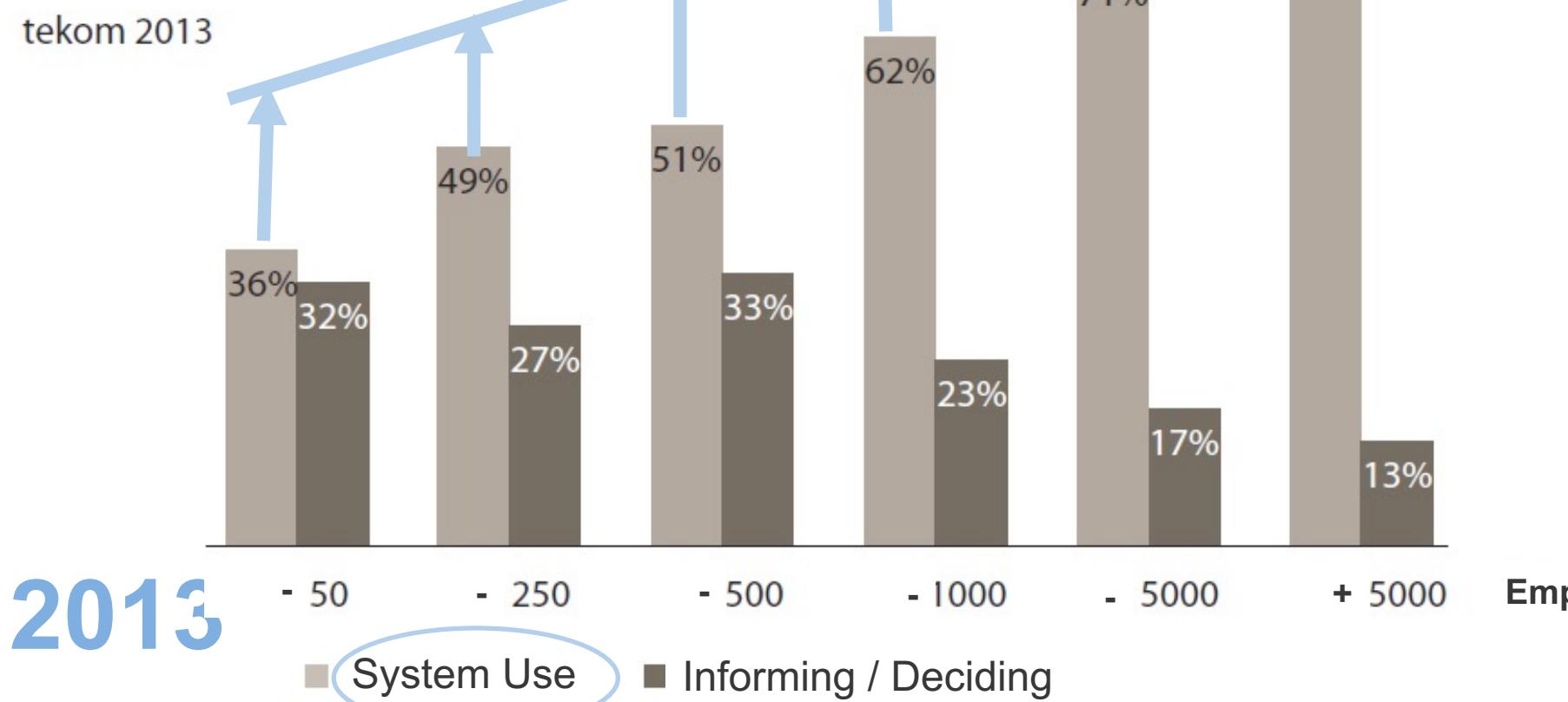
- **CMS offer technologies for**

- Variant management (product & media variants, configuration)
- Version management (change Management)
- Translation management (internationalization, globalization)
- Cross media & publishing management

Increasing Use of CMS



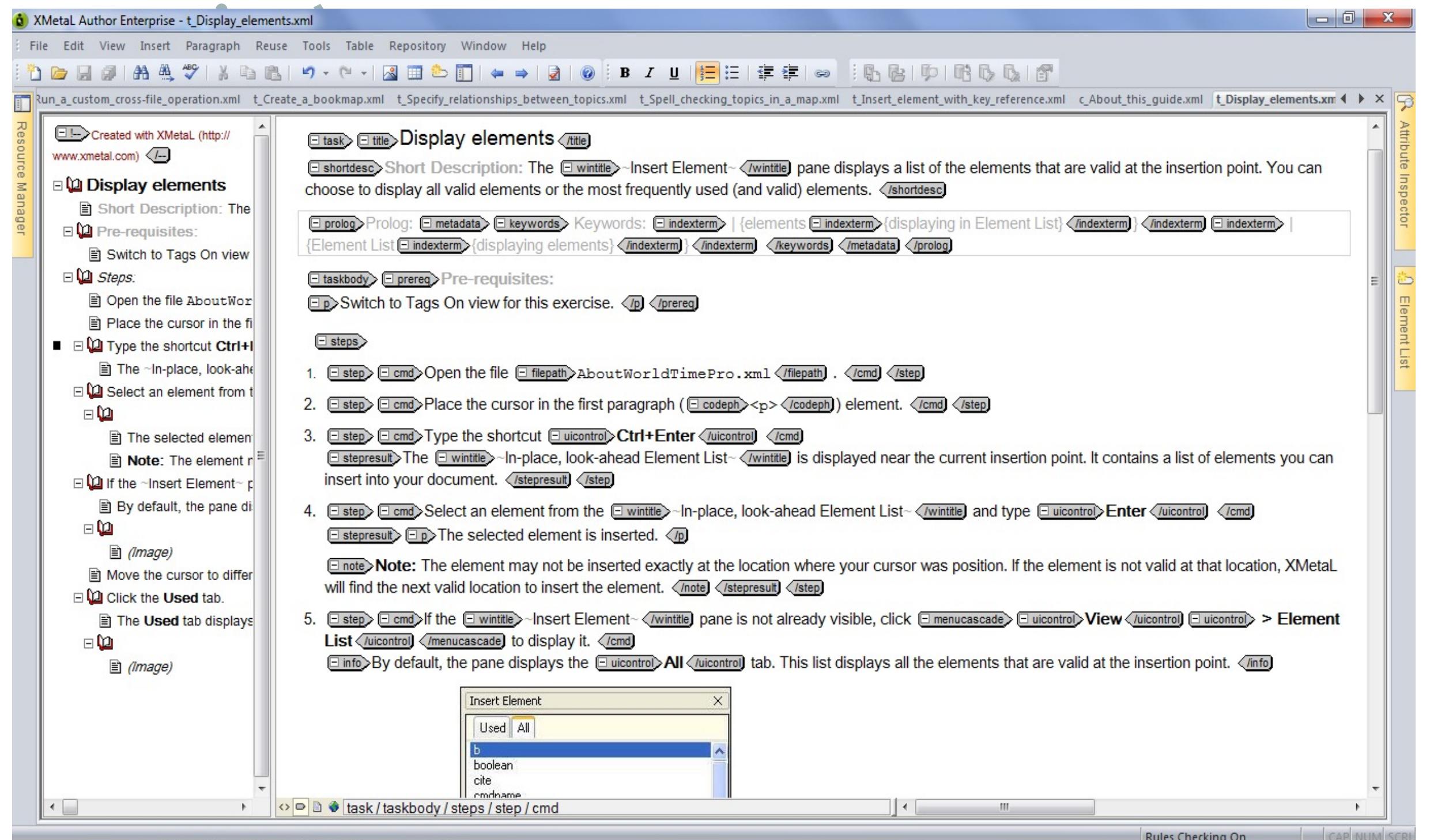
Evolution of CMS distribution
in German speaking countries
for various company sizes



Small and mid size
companies started to
use CMS for improving
efficiency of document
creation and for
creating new media

CM Methods

XML Authoring environments (for content)



CM Methods

What is TC focussing for authoring & structuring?

- Comprehensive, minimalistic writing
- Rules-based writing
- Consistent terminology
- Writing for international markets (translation, localization)
- Self-contained information: topic-based writing
- Structured and standard information models (XML, DITA)

CM Methods

How to turn topics into
intelligent content

Metadata Enrichment by Semantic Metadata for Modular Content (PI-

Class®)

Product Classes

**Physical & Virtual Objects
(Product Components)**

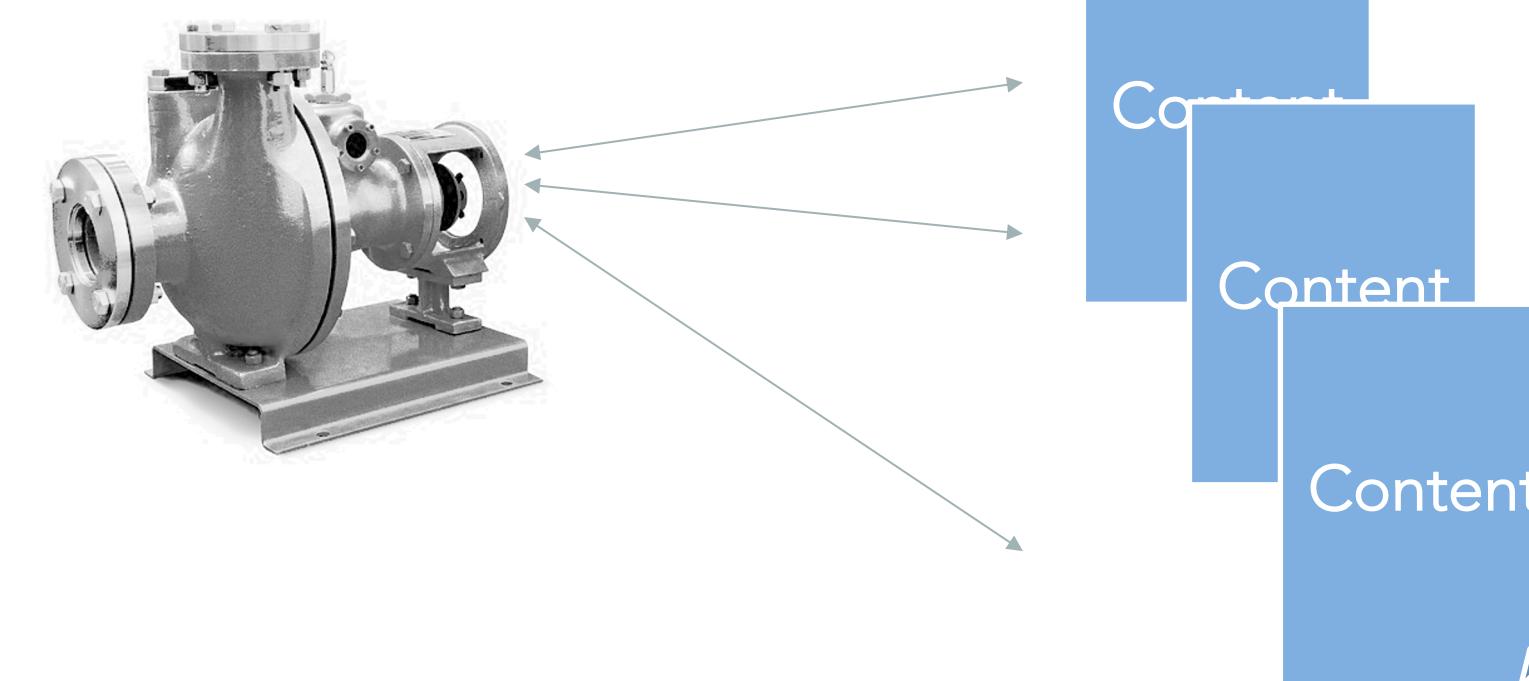
**Content Objects
(Modular Topics)**

Information Classes

Operation

Dismount

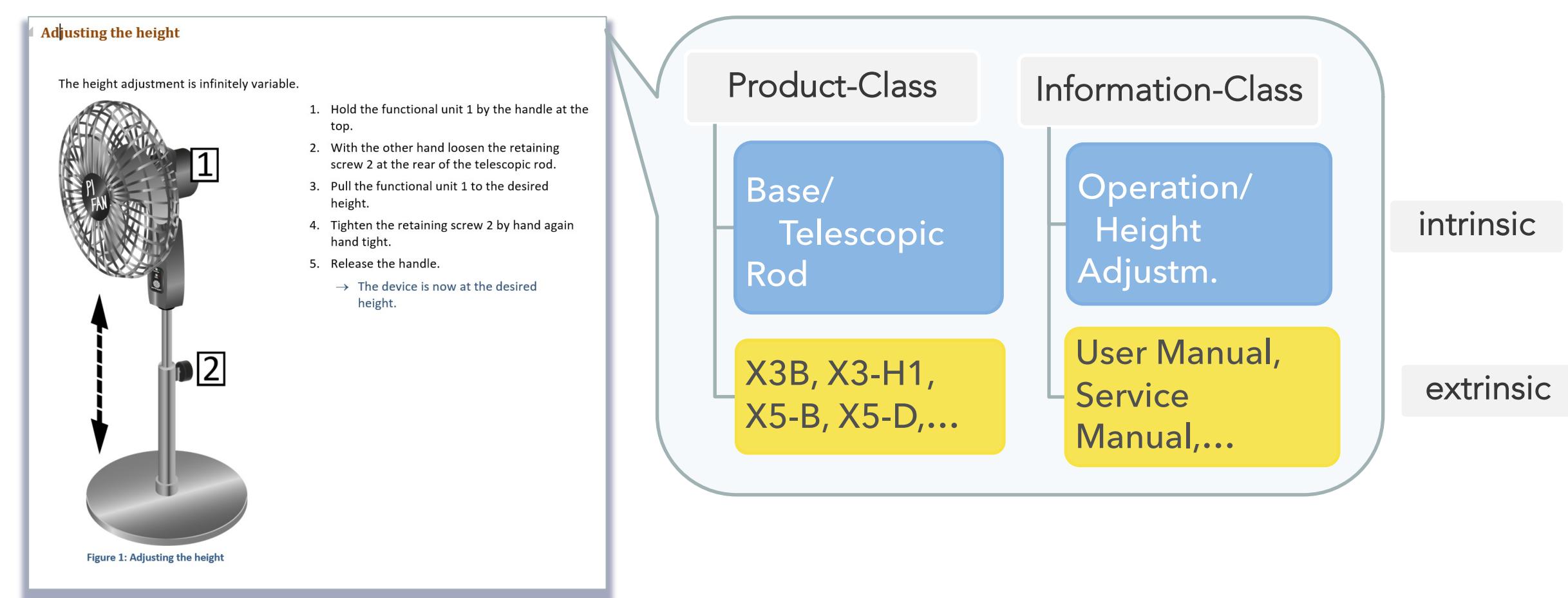
Repair



CM Methods

Metadata
for identifying
and addressing
modules/topics

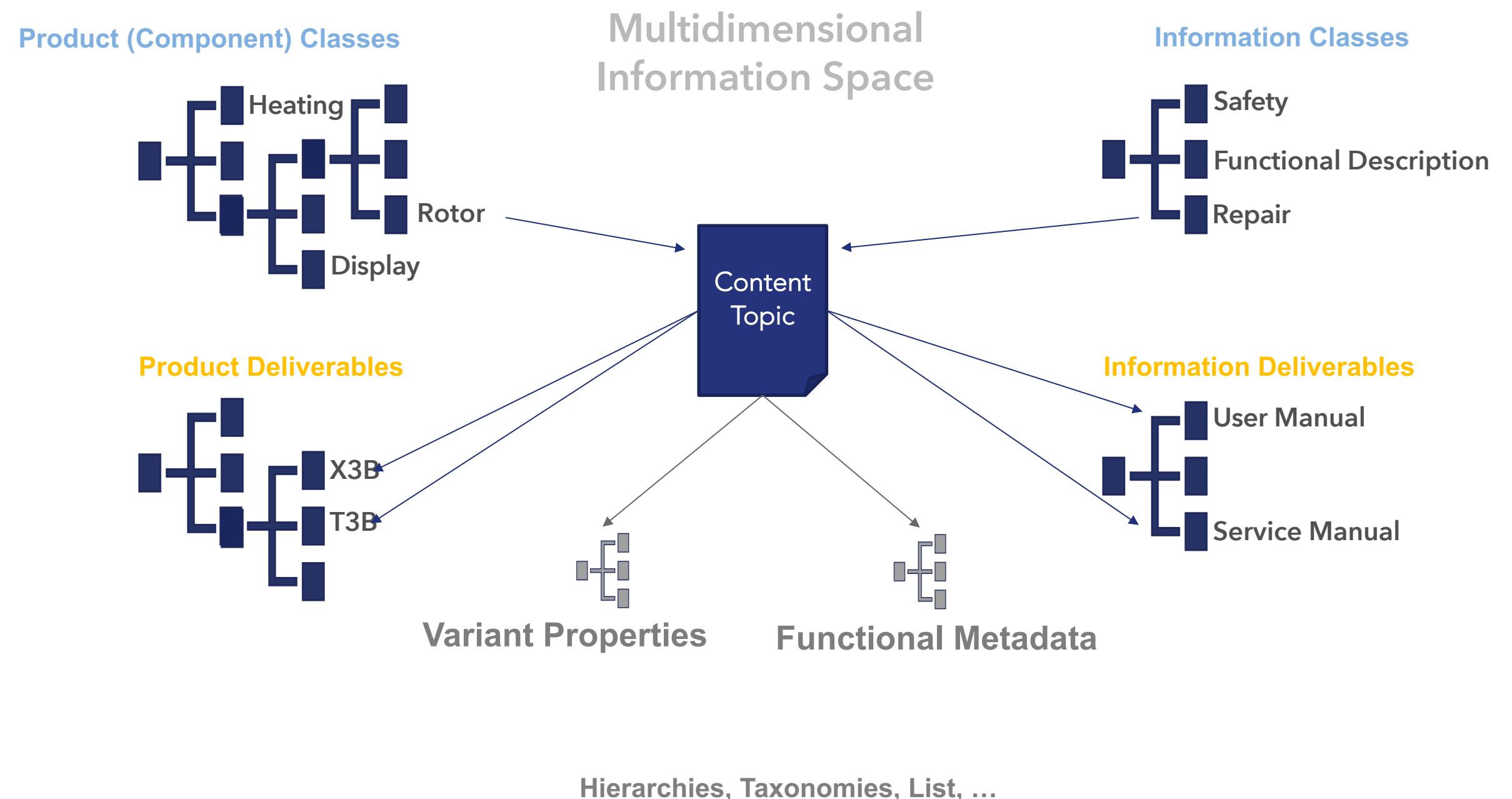
Basic Dimensions of Topic Classification (PI-Class®)



Topic: self-contained information unit;
topic concept and content is defined by (intrinsic) PI-classes

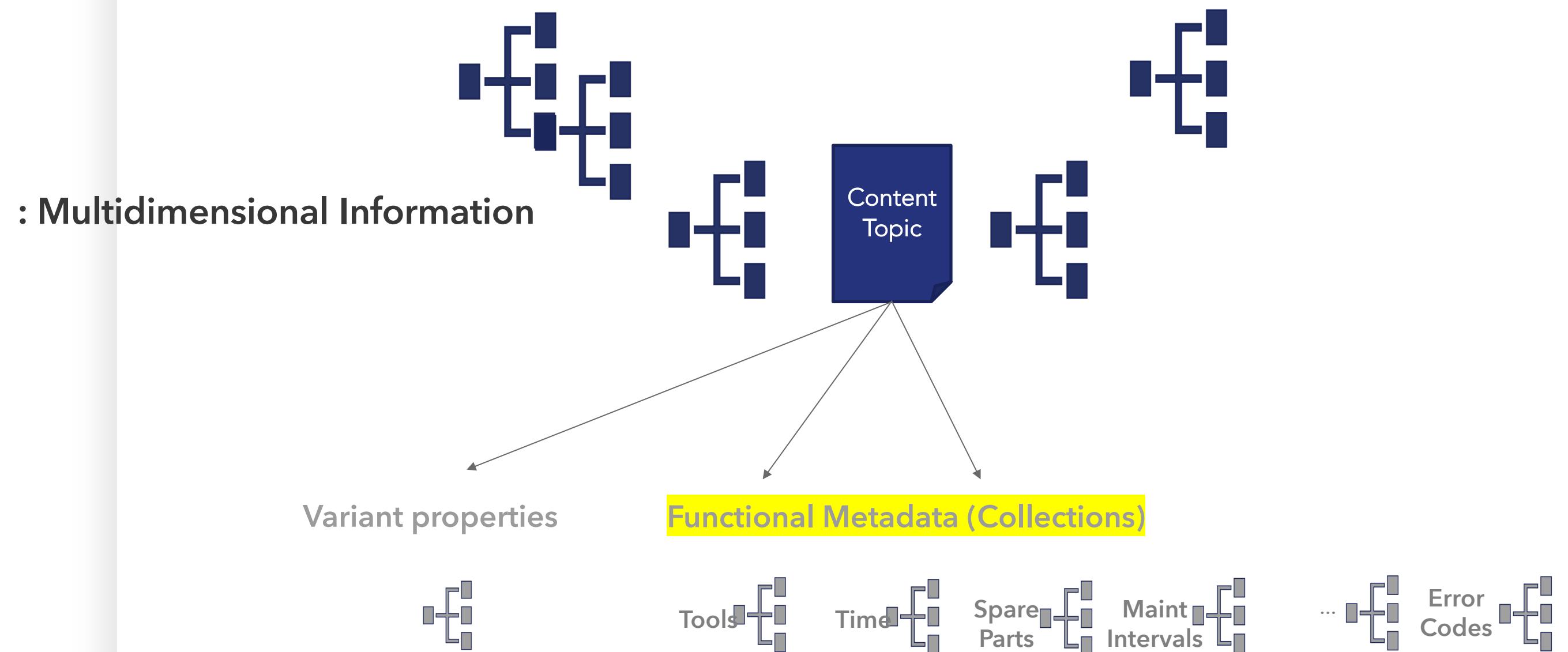
CM Methods

CMS „Taxonomies“ from Topic Classification (Basic PI-Class)



CM Methods

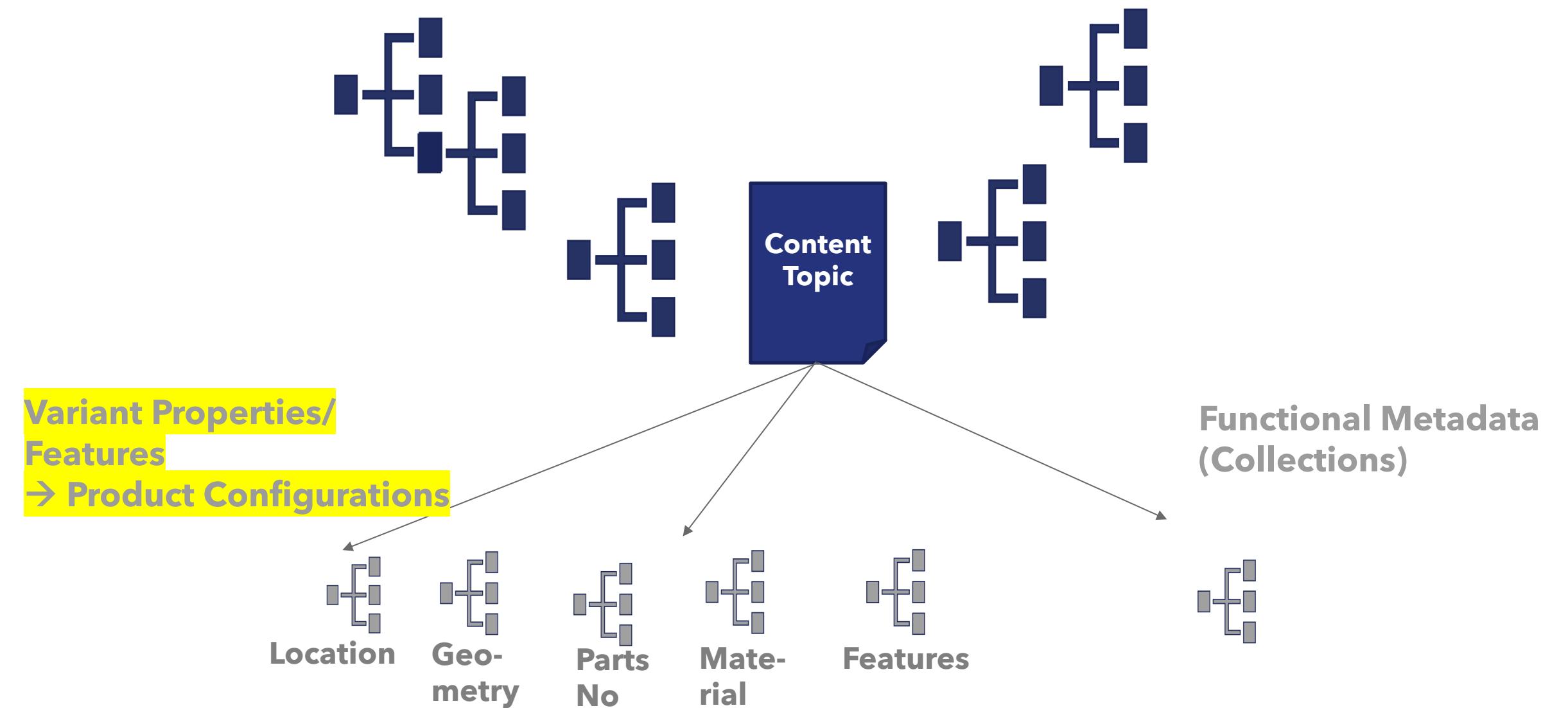
CMS „Taxonomies“ from Topic Classification (Extended PI-Class)



CM Methods

CMS „Taxonomies“ from Topic Classification

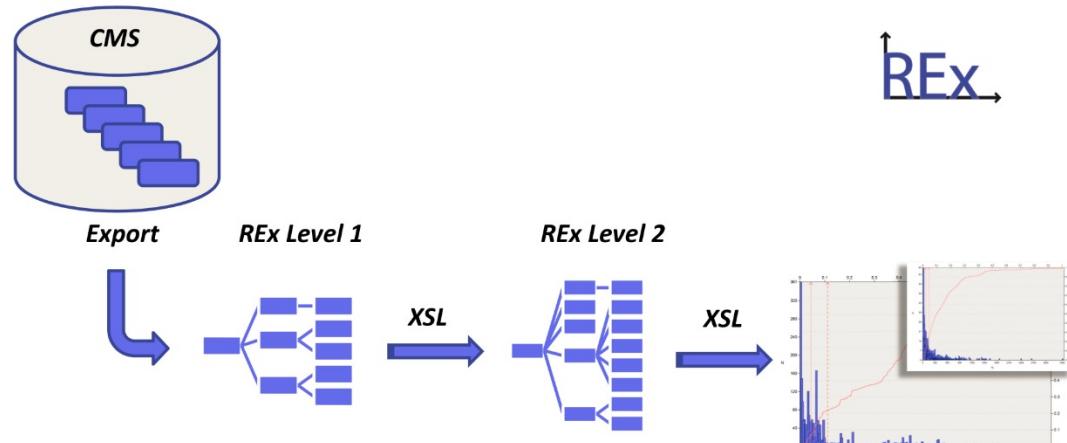
Extended PI-Class: Multidimensional Information Space



CM Methods

e.g. Report Exchange
(REx)

Methodology



Analyzing CMS processes and use of CM methods

- System development & improvement can be proven & tracked by KPI
 - Reuse numbers of modules, fragments, media, ...
 - Reuse rates of deliverables (documents, ...)
 - Efficiency / cost indicators (Sharing factors per publication)
 - Change rates and new content rates (per publication)
 - Document fingerprints (module reuse rates from doc's)
 - Variant management (number of variants, complexity)

Content Management

Summary I (CMS)

- Technology and methods are available in CMS for topic-based and configuration-specific information creation, document assembling, publishing and provisioning (packaging). Deliverables rely strongly on taxonomic classification of topics.
- Limiting factors are often data quality / process integration within companies and human factors (complexity of information structures; „lost in metadata“ of different configurations) as well as a lack of information planning! (Therefore, also analytics is needed...)
- Planning, analysis and management of processes (like variant management) depend on metadata quality

Content Management

Summary /Vision II (CMS)

- Highly structured content, enriched by semantic metadata has been created, but often only used for (automated) PDF/print production.
(Even though CMS can produce all types of media)
- Latest delivery technologies benefit from and require such structured content packages
- New media (e.g. chatbots, training, animations, AR/VR/MR) demand additional or new types of accessible information structures and content objects.

Intelligent Content Delivery

Making use of native intelligence of content

CD Methods

Webshop

Alibaba.com

Products Search NEW

Categories | Ready to Ship | Trade Shows | Personal Protective Equipment | Buyer Central | Sell on Alibaba | Help | Get the App | English - USD | Ship

See FAQs on the Coronavirus (COVID-19) and Alibaba.com shipments learn more >

All Products Customization Ready to Ship

CATEGORIES

- Laser Pointers
- Flashlights & Torches
- Laser Equipment Parts
- Scopes & Accessories

Supplier Types

- Trade Assurance
- Verified Supplier
- ≤1h response time

Product Types

- Ready to Ship
- Paid samples
- Fast dispatch
- Delivered Duty Paid

Min. Order

less than

Price

min - max

Supplier Country/Region

search

- Hong Kong S.A. (1)
- India (80)
- Italy (5)
- Japan (44)
- Pakistan (8)
- Russian Federation (1)
- Singapore (24)
- South Korea (26)
- Taiwan, China (1)
- United States (28)

Past Export Country/R...

Management Certi... NEW

assessments, certification, inspection and/or related examination related to any authenticity or certificates are

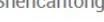
 **ALS 150lm Rechargeable LED Pen Light Laser Pointer Portable Flashlight**
Ready to Ship | Led | Led Light Source
\$17.99-\$44.99 / Piece
2 Pieces (Min. Order)
CN AEC Lighting Solutions Co., Ltd.
2YRS Verified  
5.0 ★ (9) | "amazing service"

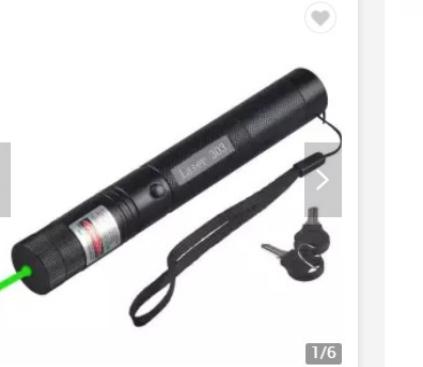
 **Hot Selling USB Rechargeable Long Distance 50mw 532nm Tactical Green 303 Laser Pointer**
Remote Control | Long Distance
\$2.55-\$3.85 / Piece
50 Pieces (Min. Order)
CN Ningbo Alite Lighting Technology Co., Ltd.
7YRS Verified  
4.7 ★ (59) | "fast delivery"

 **3 KG high-accuracy metal fiber pointer laser head made in japan**
6 months warranty
\$21,900.00 / Piece
1 Piece (Min. Order)
JP Micro Edge Process Co., Ltd.
2YRS  
Contact Supplier

 **Professional 303 Green Red Laser Pointer With Star Head 532nm Lazer Flashlight**
Fast dispatch | Remote Control
\$3.40-\$3.80 / Piece
10 Pieces (Min. Order)
CN Yiwu Zhangkun E-Commerce Co., Ltd.
2YRS Verified  
4.9 ★ (51) | "customer service"

 **2.4GHz Laser Pointer Remote Slideshow Presenter Wireless Presentation Control**
\$5.69-\$6.99 / Piece
200.0 Pieces (Min. Order)
TW SHENG YIH TECHNOLOGIES CO., LTD.
3YRS  
5.0 ★ (5) | "fast delivery"

 **Drop Shipping 5in1 Long Distance High Power Burning 450nm 1600mw 3000mw Laser Pointer 303 50mW**
Ready to Ship | High Power | Long Distance
\$20.00-\$24.00 / Piece
1 Piece (Min. Order)
CN Chengdu Shencantong Trading Co., Ltd.
2YRS  
4.6 ★ (34) | "good service"

 **High Power Rechargeable Red Blue Green Laser Pointer 303 50mW**
Ecommerce goods
\$3.00-\$4.50 / Piece
1 Piece (Min. Order)
CN Ningbo Topcom Lighting Co., Ltd.
11YRS Verified  
4.8 ★ (59) | "excellent service"

 **Logo Custom Wholesale 1mw 5mw 4 Red Green Blue Violet Purple uv Laser Pointer**
Ready to Ship
\$0.80-\$0.90 / Piece
10 Pieces (Min. Order)
CN Ningbo Topcom Lighting Co., Ltd.
2YRS  
4.9 ★ (7) | "Good service"

Content Delivery Portals (CDP)

(Definition 2013)

Basic definition and functionalities

Systems offering web-based access to modular, aggregated content or other information for various user groups (or applications) by related search & retrieval mechanisms (or services).

Basic functionalities

- Access or import content from relevant data sources and corresponding systems
- Manage and update content within the content lifecycle
- Retrieval functionalities including user interfaces for content searching and indexing
- Web-based display of content on a modular or document-based level
- Web services handling requests from other applications and events.

CD Methods

GUI principle of CDP

Facetted search/request and topic delivery

Component

Hydraulic system

Oil Pump

Information

Procedure

Testing

Machine

Z-006

Document

Service

Hydraulic system

The hydraulic oil sample is taken via a test connection on the variable displacement pump.



Fig. 250: Sampling point for hydraulic oil

- ▶ Start the engine and wait 3 minutes.
▷ The hydraulic oil is circulated.
- ▶ Engage the parking brake and secure the machine against rolling away.
- ▶ Connect the test line to the test connection G.
- ▶ 0.2 l Drain the hydraulic oil into the receptacle.
- ▶ Fill the sample container.
- ▶ Remove the test line and seal the test connection.

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CD Methods

Facetted search/request and topic delivery

Customer-dependent Configuration !

Component

Hydraulic system

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$a_1 | b_3 | \dots | x_5 | y_1 | z_5$

CD Methods

Need for changing
concepts of topic creation
and metadata handling

Application area

J Version: - Status: RL (released | freigegeben) printed: 05.06.2019

3.2 Principle of operation

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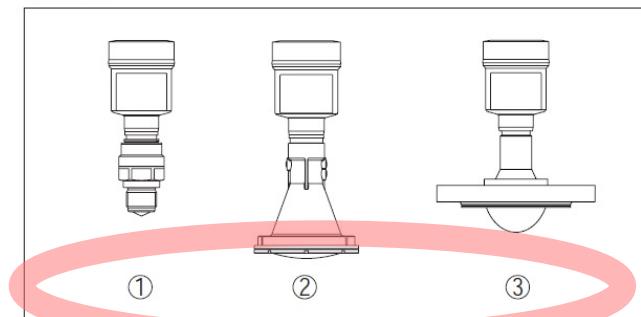


Fig. 2: Antenna systems LEVEL TRANSMITTER 8139

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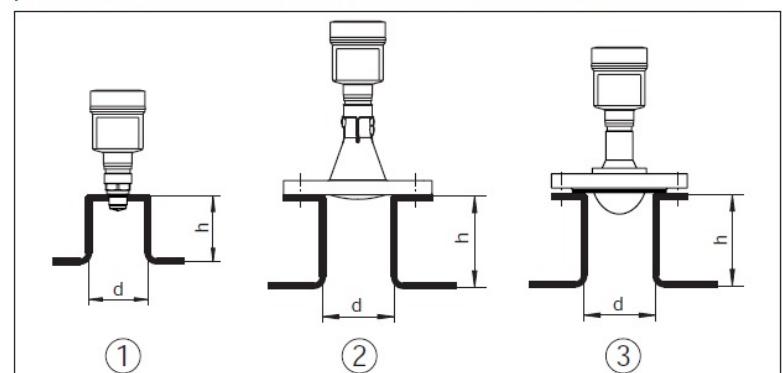


Fig. 17: Socket mounting with deviating socket dimensions with different versions of LEVEL TRANSMITTER 8139

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Thread with integrated horn antenna

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40 mm	1 1/2"
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58499-EN-190321

LEVEL TRANSMITTER 8139 • Two-wire 4 ... 20 mA/HART

Selection/Generating of publication depending on parameters

DURRER

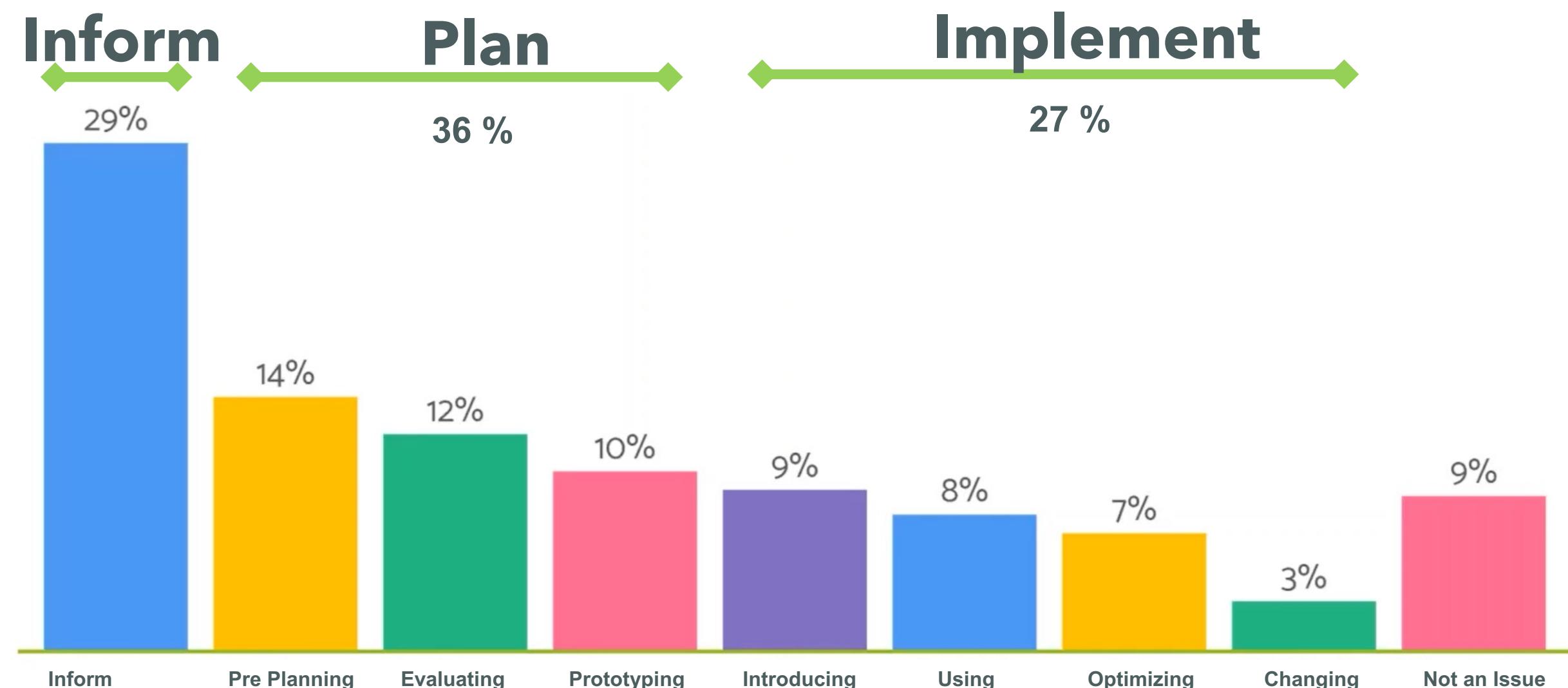
10 Supplement

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T Version: - Status: RL (released freigegeben) printed: 05.06.2019	PTFE and PTFE 8 mm	PTFE	-40 ... +130 °C (-40 ... +266 °F) -40 ... +200 °C (-40 ... +392 °F) -196 ... +200 °C (-320.8 ... +392 °F) ⁸⁾
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Derating, ambient temperature

CDP Market

Content Delivery: System Introduction Phases



Ziegler/Steurer

CDP Scenarios, tekom 2020
02.11.2020

CD Methods

(Demo

PI-Fan reference model)

Content Delivery Portal (PI-Fan)

The screenshot shows a web browser window displaying the TOPICPILOT Content Delivery Portal. The URL in the address bar is https://service.topicpilot.de/i4icm/?search&query=Rotor&facets=PIF_P-intrinsisch_%7C_nid58190fc11dd21664c0a802645977d8c1+AND+Produkt_%7C_nid85e7506eb2e33f90c0a802687f559f0c+AND+Proc. The page title is "TopicPilot Suche / "Rotor"".

The interface includes a navigation bar with "TOPICPILOT", "Direct Search", and a user icon. A green header bar displays the search term "Rotor" and a count of "3" results. The main content area features a "Structured Search" section with "Facets" and "Navigation" tabs. The facets panel shows filters for "Bauart" (Standgerät, Tischgerät), "PIF_I-intrinsisch" (Procedures), "PIF_P-intrinsisch" (All Components: Rotor, Steuerungsmechanik, Schwenksteuerung), and "Produkt" (X-Series: X-Serie). The search results list three items:

- Rotor reinigen Cleaning the rotor**
Bei Verschmutzung des Gerätes müssen die Flügelräder des Rotors gereinigt werden. Hier erfahren Sie, wie Sie dies tun können.
15.01.2016
- Rotor montieren Mounting the rotor**
Bevor Sie Ihr Gerät benutzen können, müssen Sie zunächst den Rotor montieren. Hier erfahren Sie, wie Sie dies tun können.
15.01.2016
- Schwenkbereich freiräumen**
Der Schwenkbereich des Gerätes muss frei sein. Hier erfahren Sie, was Sie im Fall von Störung der Schwenkfunktion tun können.
15.01.2016

At the bottom, there is a footer with "Docufy Topic Pilot [www.pi-fan.de]", copyright information ("© DOCUFY GmbH, 2015 | Impressum"), and a note ("DOCUFY TopicPilot Web Application, v2.0.2").

CD Methods

Content Delivery Portal (PI-Fan)

TOPICPILOT.

Suche Alles Anzeigen 2

Navigating the document structure (before/after faceted search)

Suchresultate

PI-Fan T3-B	Content
-------------	---------

Ventilator „PI-Fan“ T3-B

- Allgemeine Sicherheitshinweise
- Produktbeschreibung
 - Bestimmungsgemäße Verwendung
 - Vorhersehbarer Fehlgebrauch
 - Technische Daten
- Montage
- Adjusting the tilt**
 - Inbetriebnahme
- Bedienung
 - Neigung einstellen
 - Einschalten und Geschwindigkeit einstellen
 - Schwenkfunktion ein-/ausschalten
- Wartung
 - Rotor reinigen
- + Fehlerbehebung
- Kontaktdaten
- Entsorgung

Adjusting the tilt

03.02.2016

Der Ventilator hat einen Neigungswinkel von -15° bis +35°. Diesen können Sie schrittweise in 5° Schritten einstellen.



Neigung einstellen

1. Greifen Sie den Ventilator am Griff auf der Oberseite.
2. Neigen Sie den Ventilator, bis er den gewünschten Neigungswinkel erreicht hat.

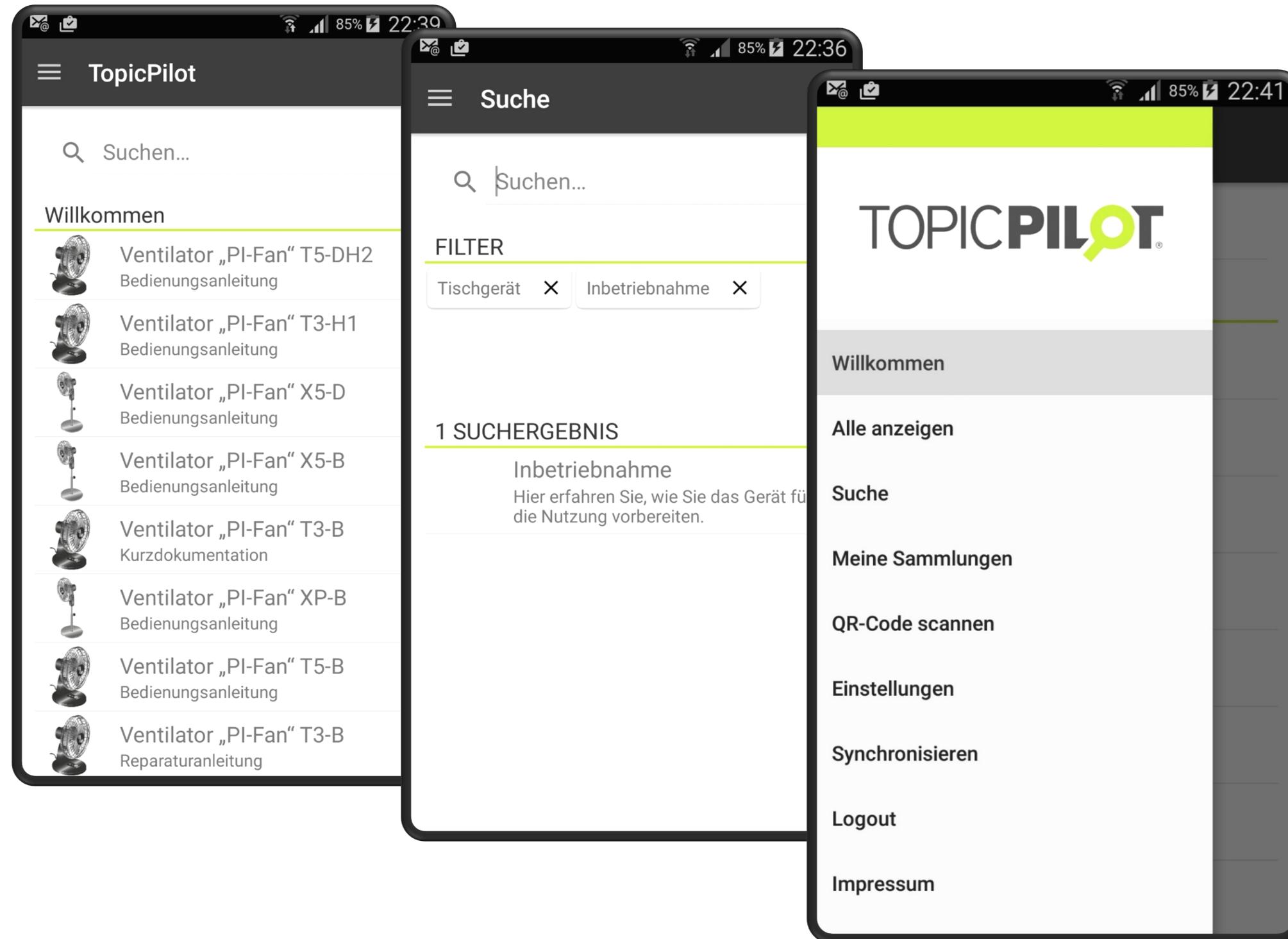

Notiz Ein deutlich hörbares Einrastgeräusch signalisiert, dass sich der Neigungswinkel um eine Stufe geändert hat.

Weiterführende Informationen

www.pi-fan.de

CD Methods

App Delivery Application including Search

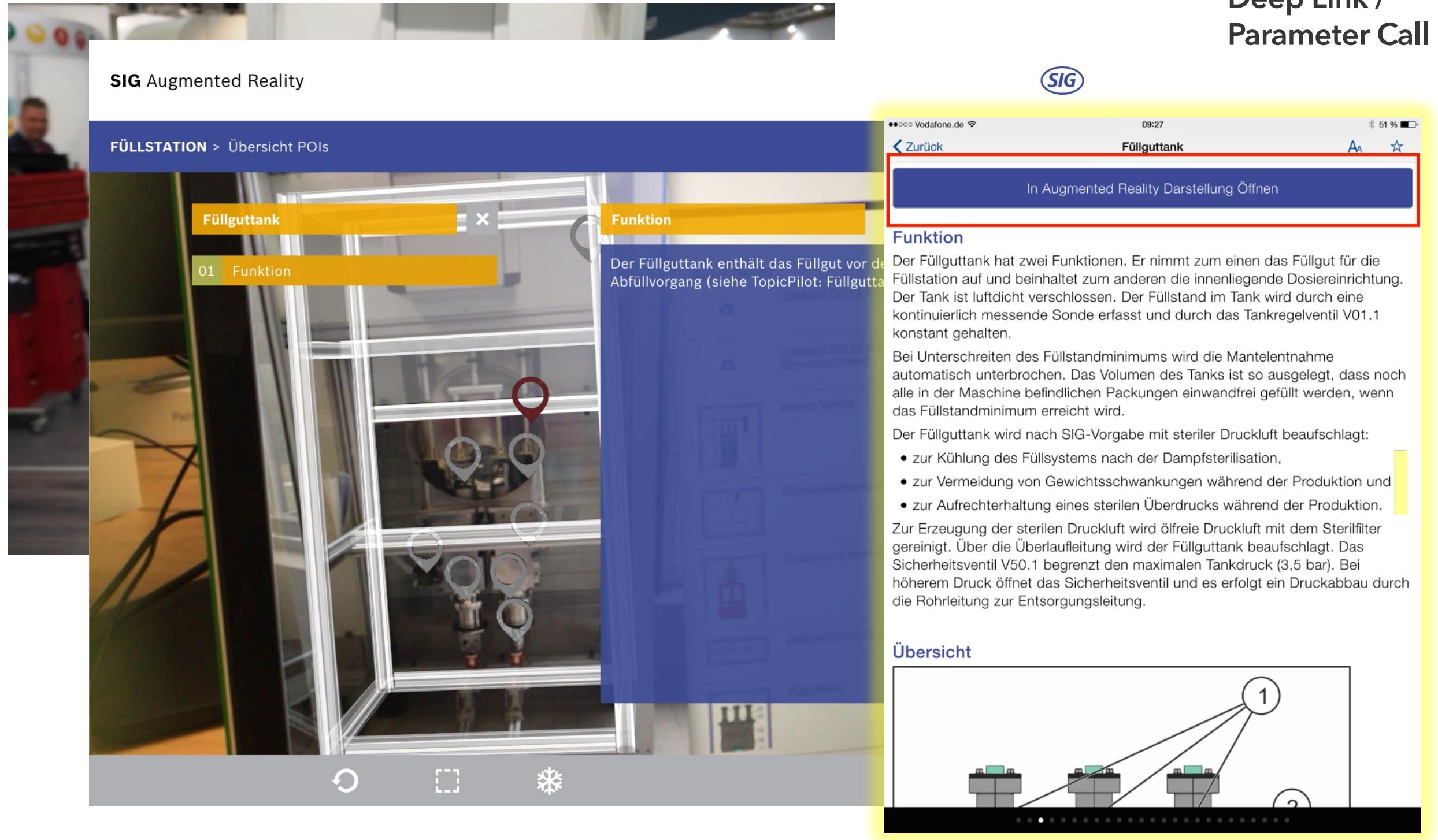


CD Methods

Content Request & Delivery

Object Recognition and CDP

CDP Request:
Deep Link /
Parameter Call



CD Methods

CDP: Facets in Documents

The screenshot shows the Schema Content Delivery Server interface. On the left, there's a sidebar with icons for home, search, and help. The main area has a blue header "SCHEMAPortal". Below it, there are two tabs: "INHALTSVERZEICHNIS" and "SCHEMA". The "INHALTSVERZEICHNIS" tab is active, showing a search bar and a tree view of document structures. One node, "Bedienungsanleitung T3-B", is expanded, revealing sub-nodes like "Montage", "Bedienung", and "Fehlerbehebungen". A red callout box highlights this tree view with the text "Navigating the document structure; then faceted filter". To the right, the "SCHEMA" tab is also active, showing a search bar and a list of documents. One document, "Bedienungsanleitung T3-B", is selected. The right side of the interface features a "Filterkriterien" section with a facet for "Bodenständer" (Floor stand) applied. A red callout box highlights this section with the same text "Navigating the document structure; then faceted filter".

*Schema
Content Delivery
Server*

www.pi-fan.de

CD Methods

Content Delivery Portal (PI-Fan)

INHALTSVERZEICHNIS

Suche

Bedienungsanleitung T3-B
Teleskopstange und Standplatte montieren

Glossar

SCHEMA

Bedienungsanleitung T3-B / Montage / Teleskopstange und Standplatte montieren

Teleskopstange und Standplatte montieren

Bodenständer montieren

[www.pi-fan.de]

Schema
Content Delivery
Server

1. Befestigen Sie die Justierschraube 1 an der Teleskopstange 2, wie in Abbildung 1 zu sehen und ziehen Sie die Justierschraube handfest an.

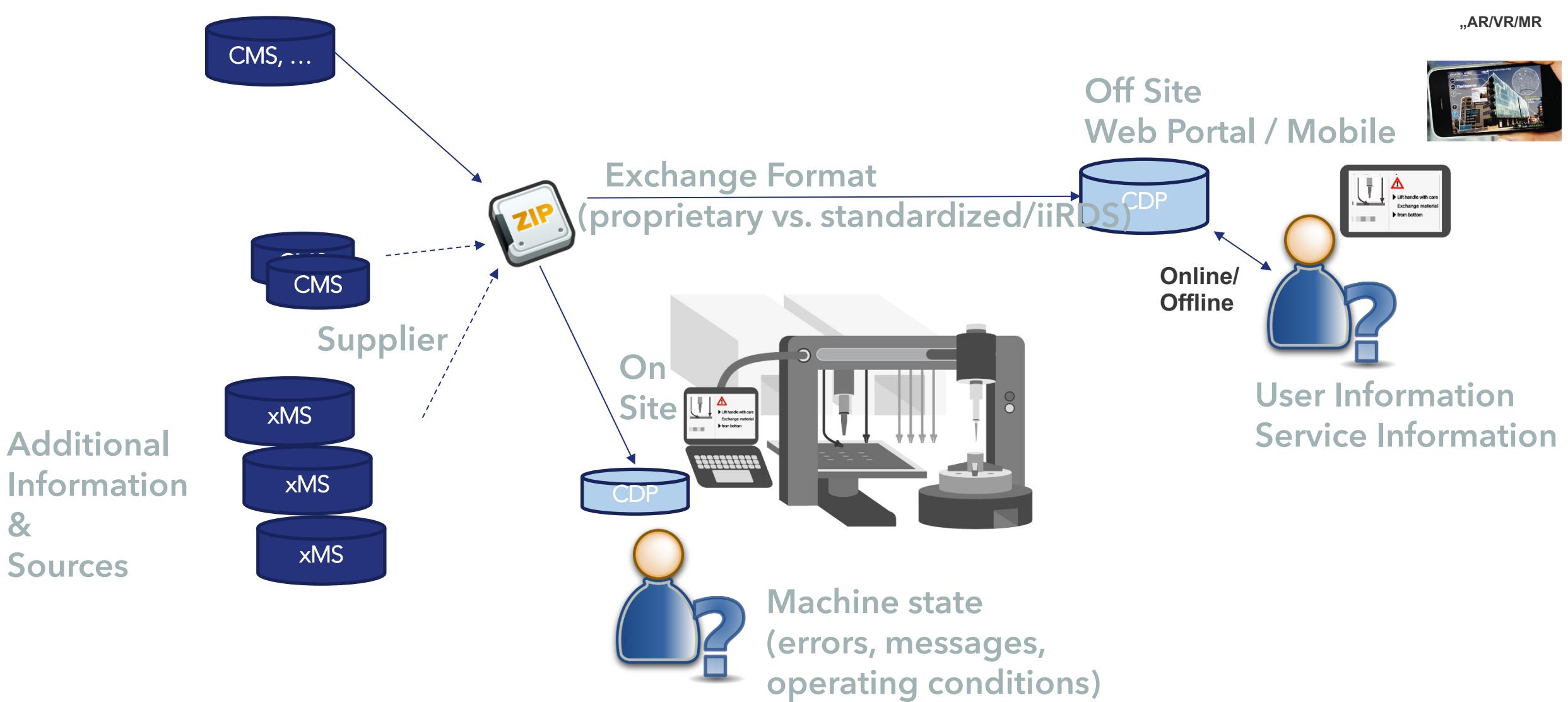
2. Stecken Sie die Teleskopstange 2 in die runde Aussparung an der Oberseite des Bodenständers 3.

3. Befestigen Sie die Teleskopstange 2 am Bodenständer 3, indem Sie die Befestigungsschraube 4 durch den Bodenständer stecken, und handfest anziehen.

→ Die Teleskopstange ist nun am Bodenständer befestigt.

CD Methods

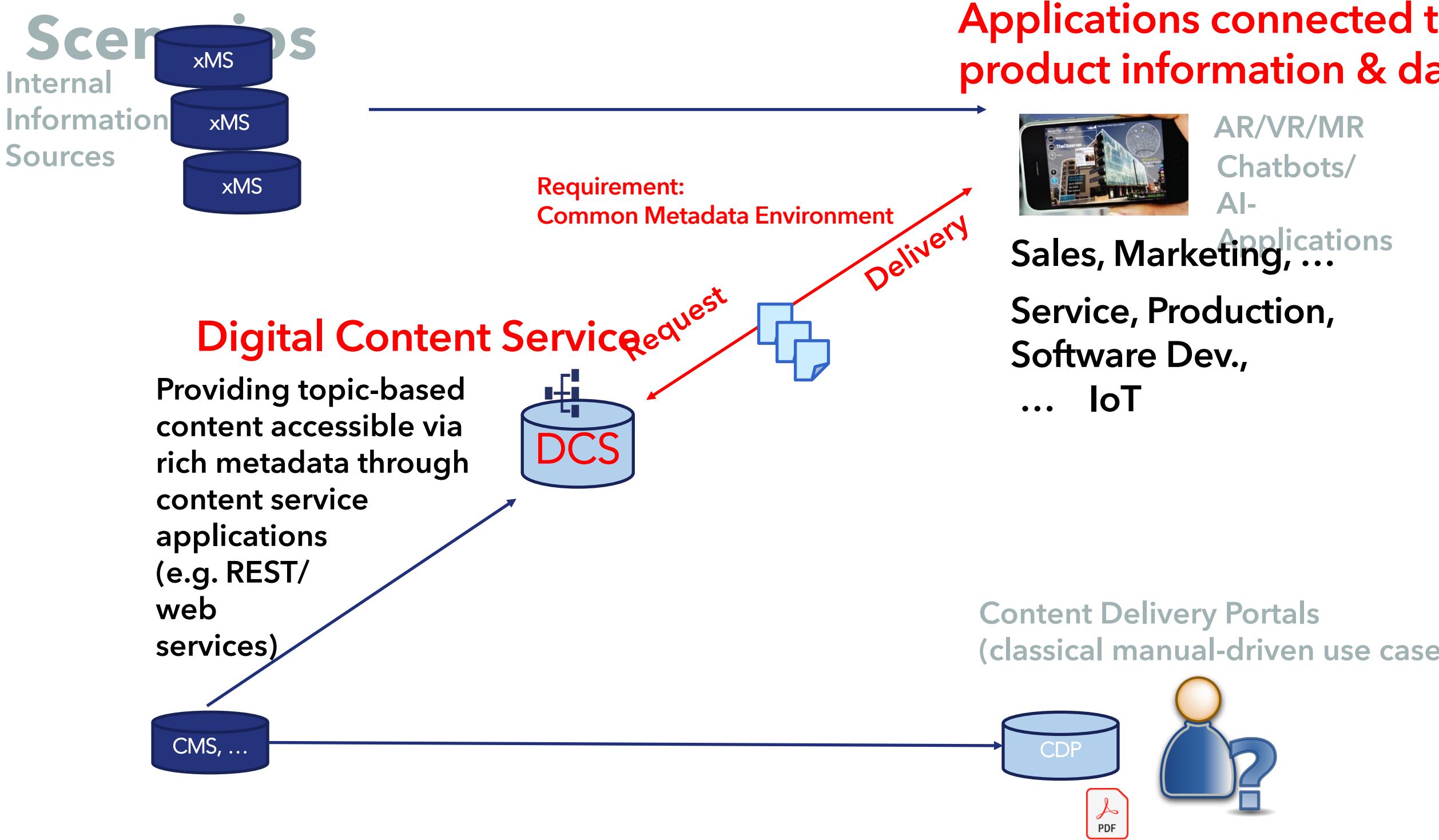
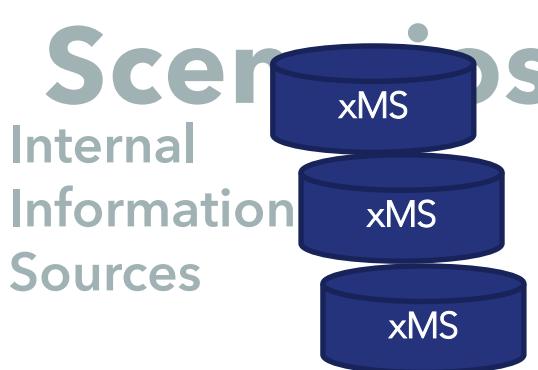
CDP environments in industrial applications



CD Methods

- Content provisioning for data integration
- Web interfaces /API
- Standard Formats (XML, HTML, PDF, iiRDS)
- Requires classified topic based on variants and configurations!

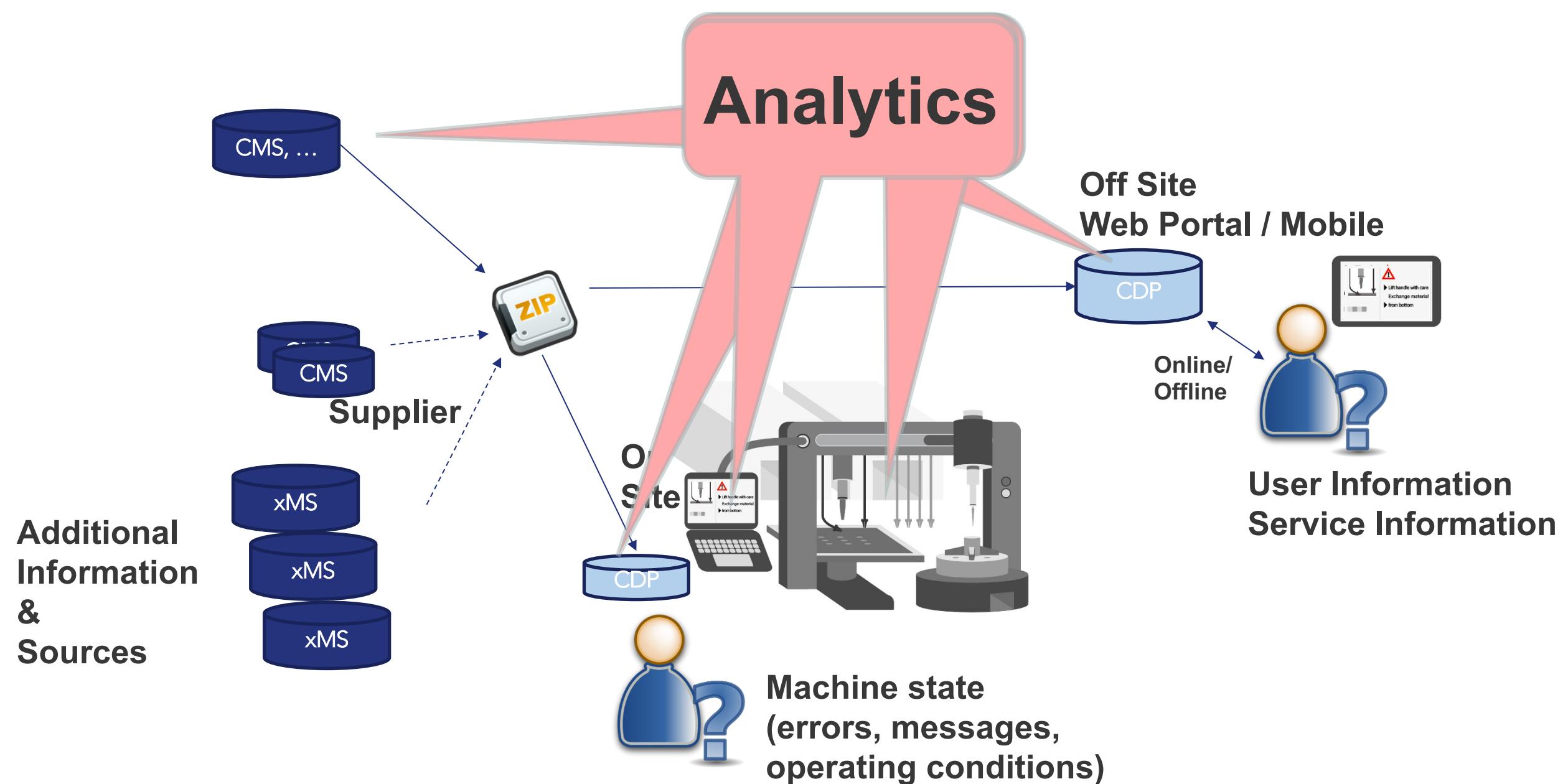
Digital Content Services in Integrated Scenarios



CD Environment

Analytics

CDP and analytics in industrial applications



CMS & CDP Analytics

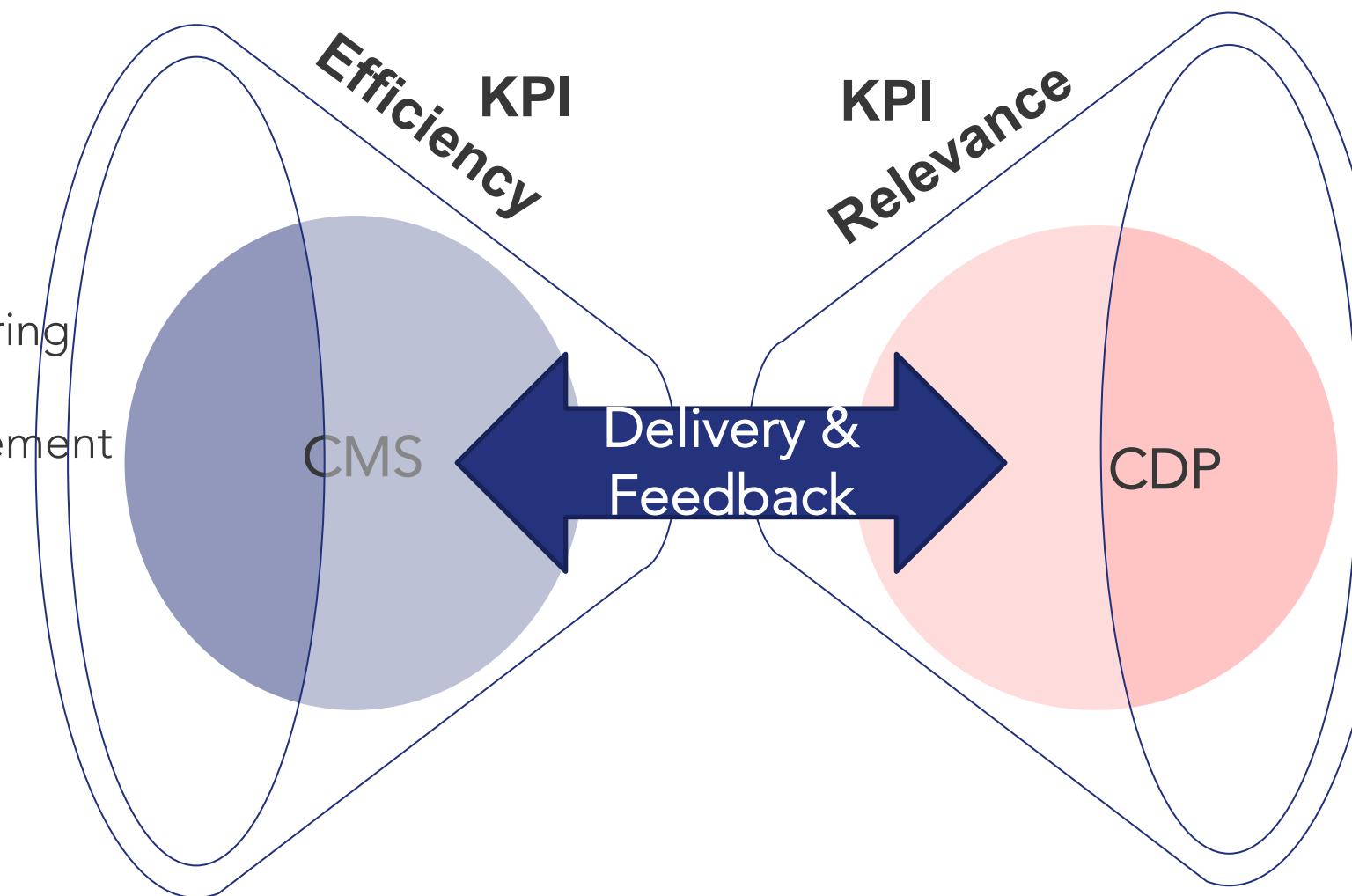
Overview of Content System Analytics

CMS Analytics (REx)

- Metrics:
 - Reuse Rates (Abundance)
 - Redundancy
 - Document Sharing factor
 - Variant management
 - Correlations; Distributions
 - ...

Artificial Intelligence

- Quality assurance:
 - Similarity analysis
 - Classification quality
 - ...



CDP Analytics (CoReAn)

Indirect feedback

- Metrics:
 - visiting time,
 - Visit frequency
 - search behaviour
 - search terms
 - ...

Direct feedback

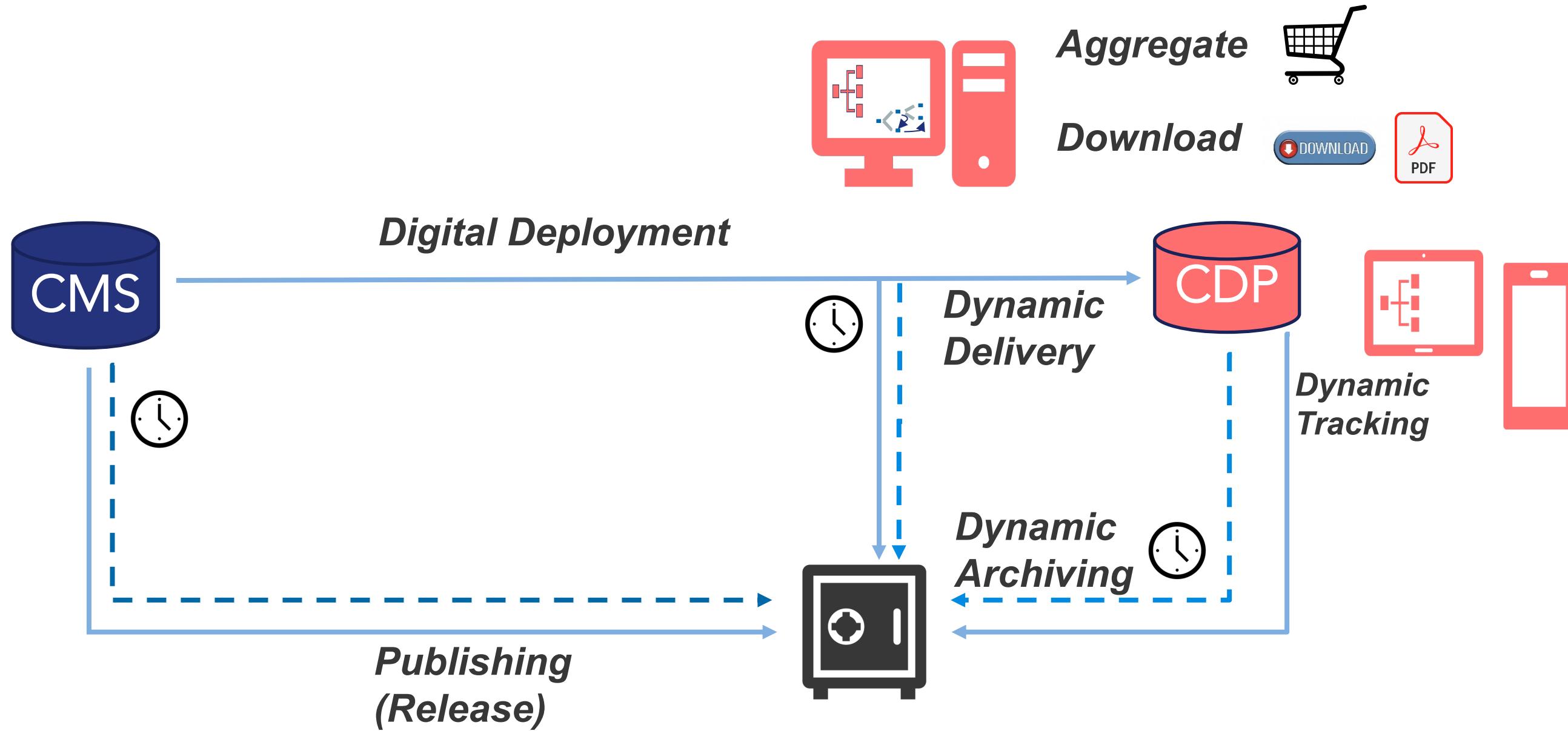
- Rating
- Satisfaction

- Improve:
 - Product
 - Information
 - Terminology (Harvesting)

CMS - CDP

Archiving Services

Trusted Delivery



Content Delivery

Summary (CDP)

- Technology of CDP is available for delivery of document packages and faceted search for contained topics and documents;
Source of **facets are mostly taxonomies** from **CMS**
- Remark**: Dynamic aggregation, **variant management** is (at the moment) mostly done in CMS, not in CDP; **configuration management** needs new approaches because of its more dynamic and complex structure
- Delivery use cases for successful applications have to be clearly explored and defined
- Delivery can be developed in addition as **Digital Content Service** (DCS) for various external and internal applications and media

Content Management & Delivery for Digital Information Services

Deep(er) dive into Metadata

- How to handle complexity of content by methods & systems
 - reduce external complexity for information users



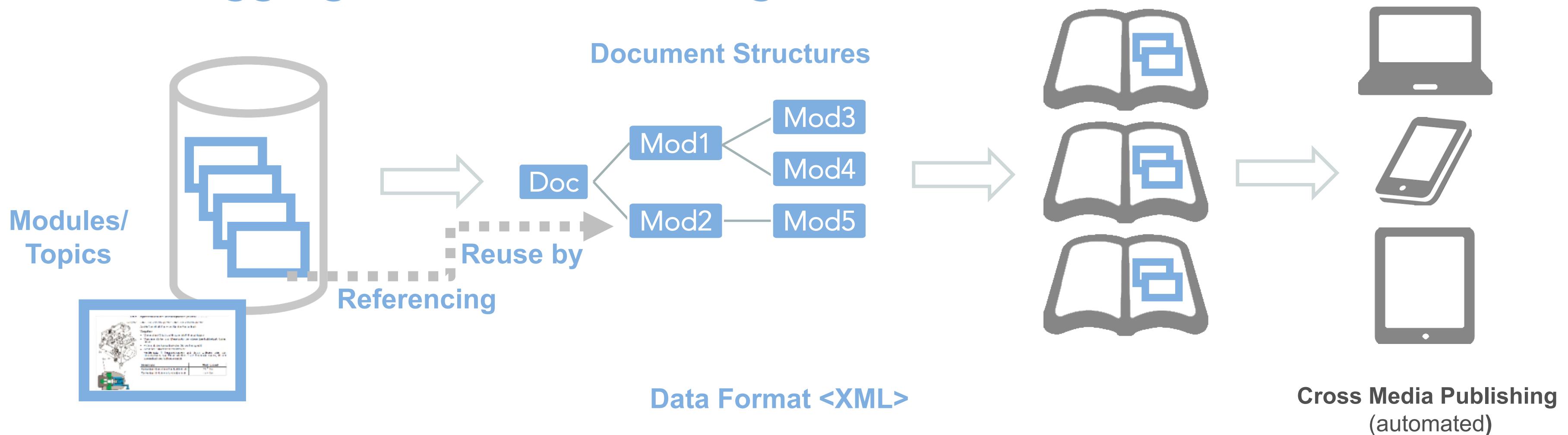
- manage internal complexity for information engineers & architects

CM Methods

Referencing modules/topics

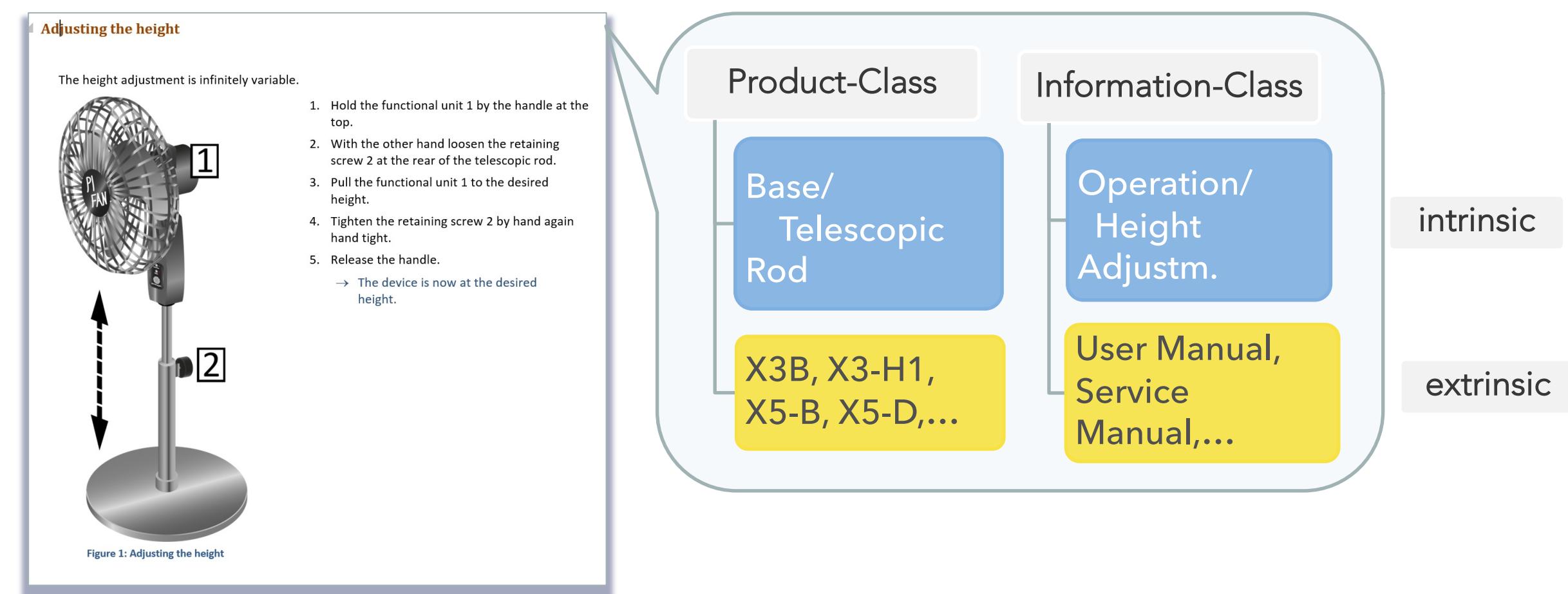
- permits controlled processes
- avoids uncontrolled redundancies
- defines and populates document structures by topics

Reuse, Aggregation and Publishing



CM Methods

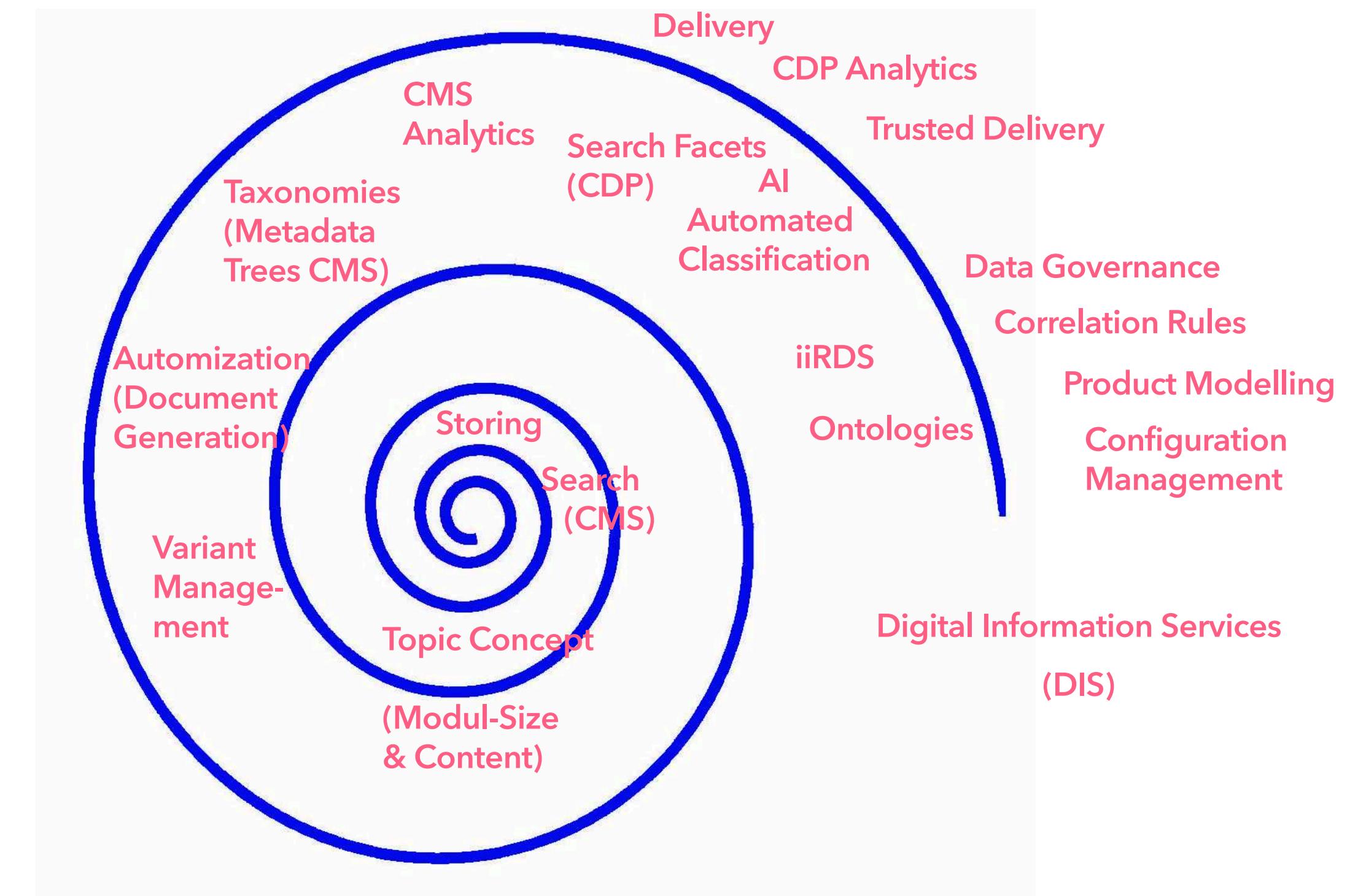
Basic Dimensions of Module Classification (PI-Class®)



Topic: self-contained information unit;
topic concept and content is defined by (intrinsic) PI-classes

Metadata Evolution

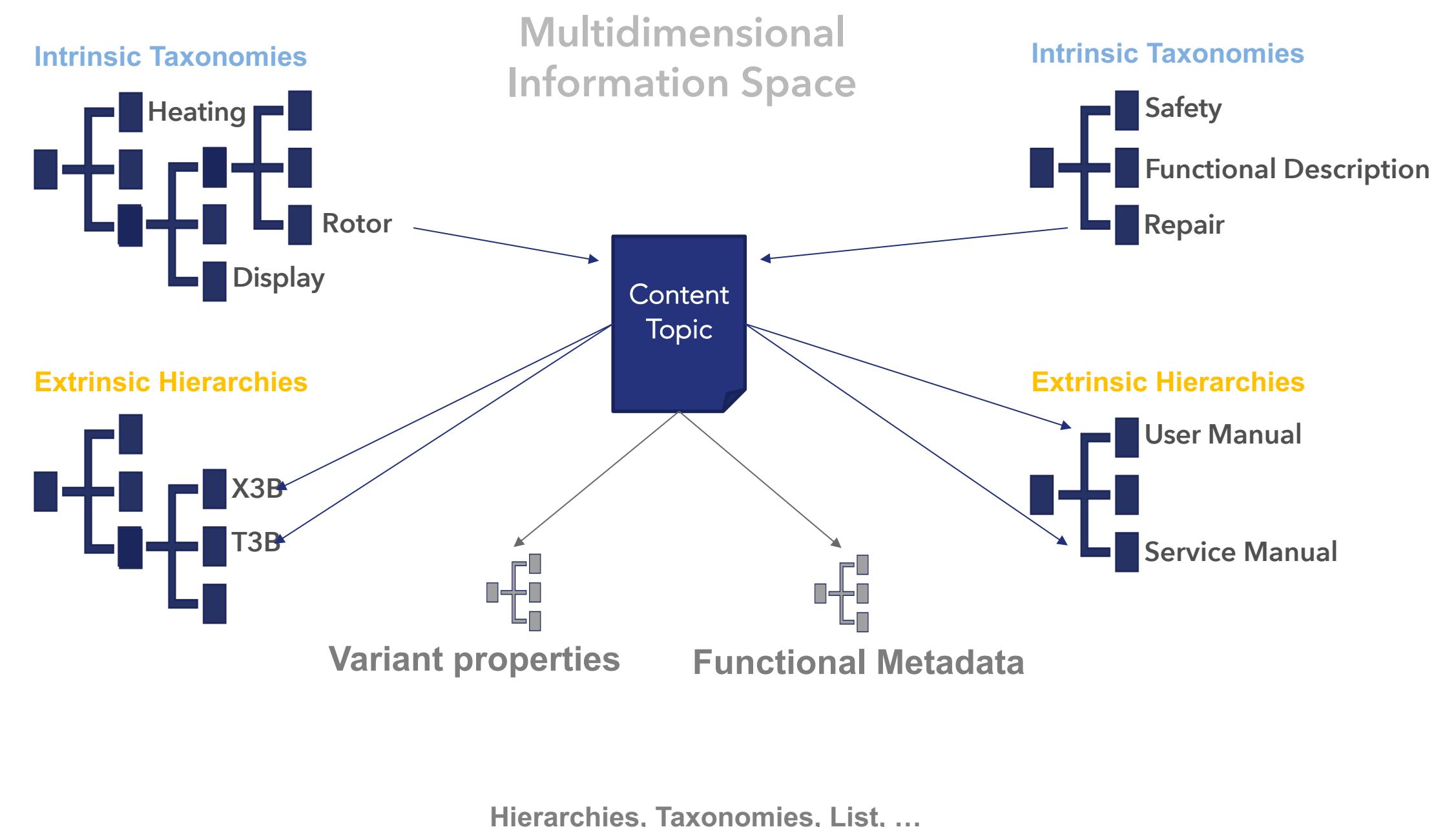
Overview: From CMS via CDP to DIS



CM Methods

Metadata
for identifying
and addressing
modules/topics

CMS „Taxonomies“ from Topic Classification



CM Methods

Dependency on:

- Stake Holder
- Process Owner & Driver
- Information Sources & Systems

Information Environment and Dependencies

**Engineering,
Development,
PLM, ERP**

or TC

**Prod.
Management,
Sales
or Tc**

**ERP, Engineering,
PLM, PIM/PDM**

**Tech. Comm.
Standards, iiRDS**

Information Class

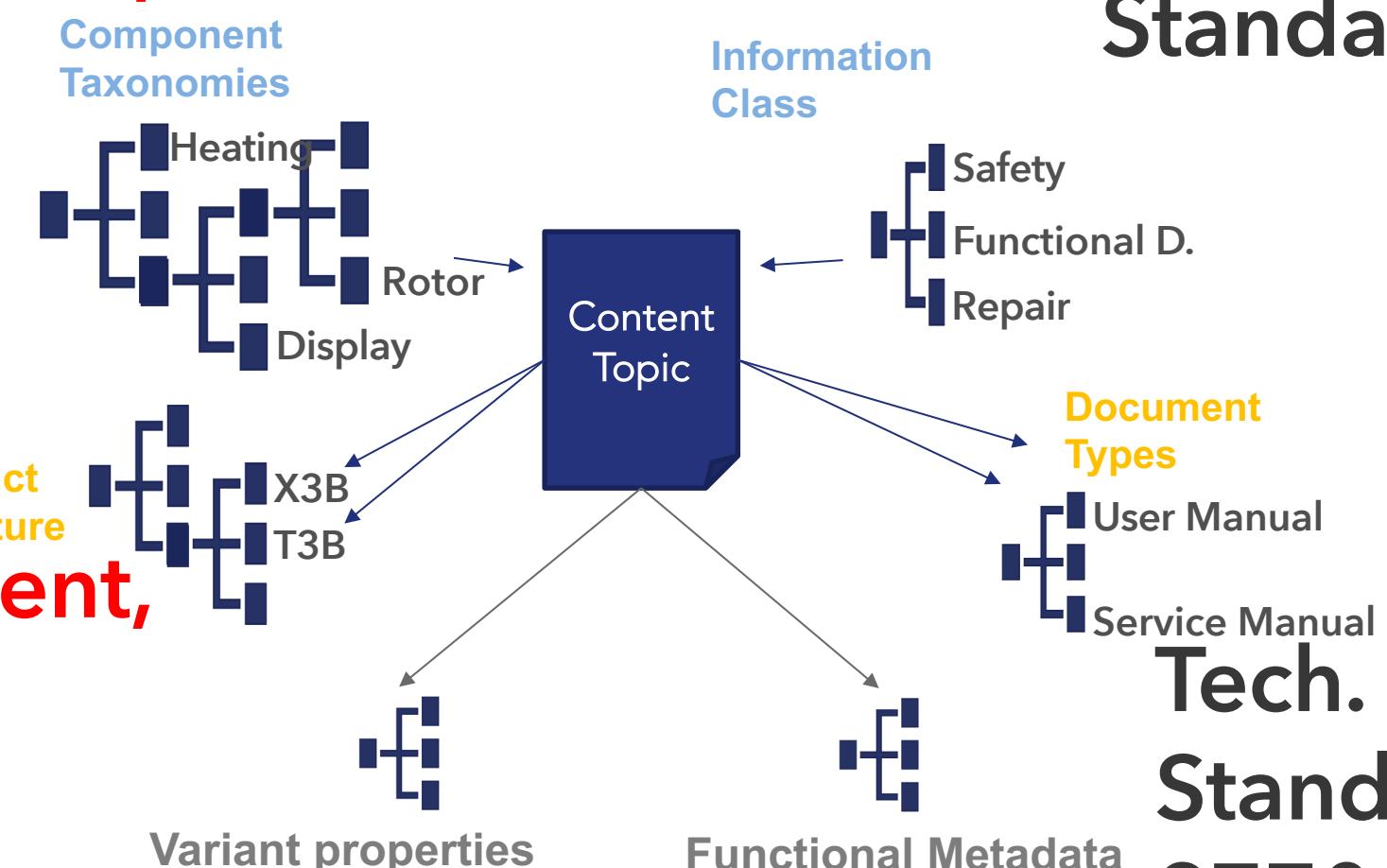
**Tech. Comm.
Standards, VDI
2770**

Safety
Functional D.
Repair

Document Types
User Manual
Service Manual

Functional Metadata

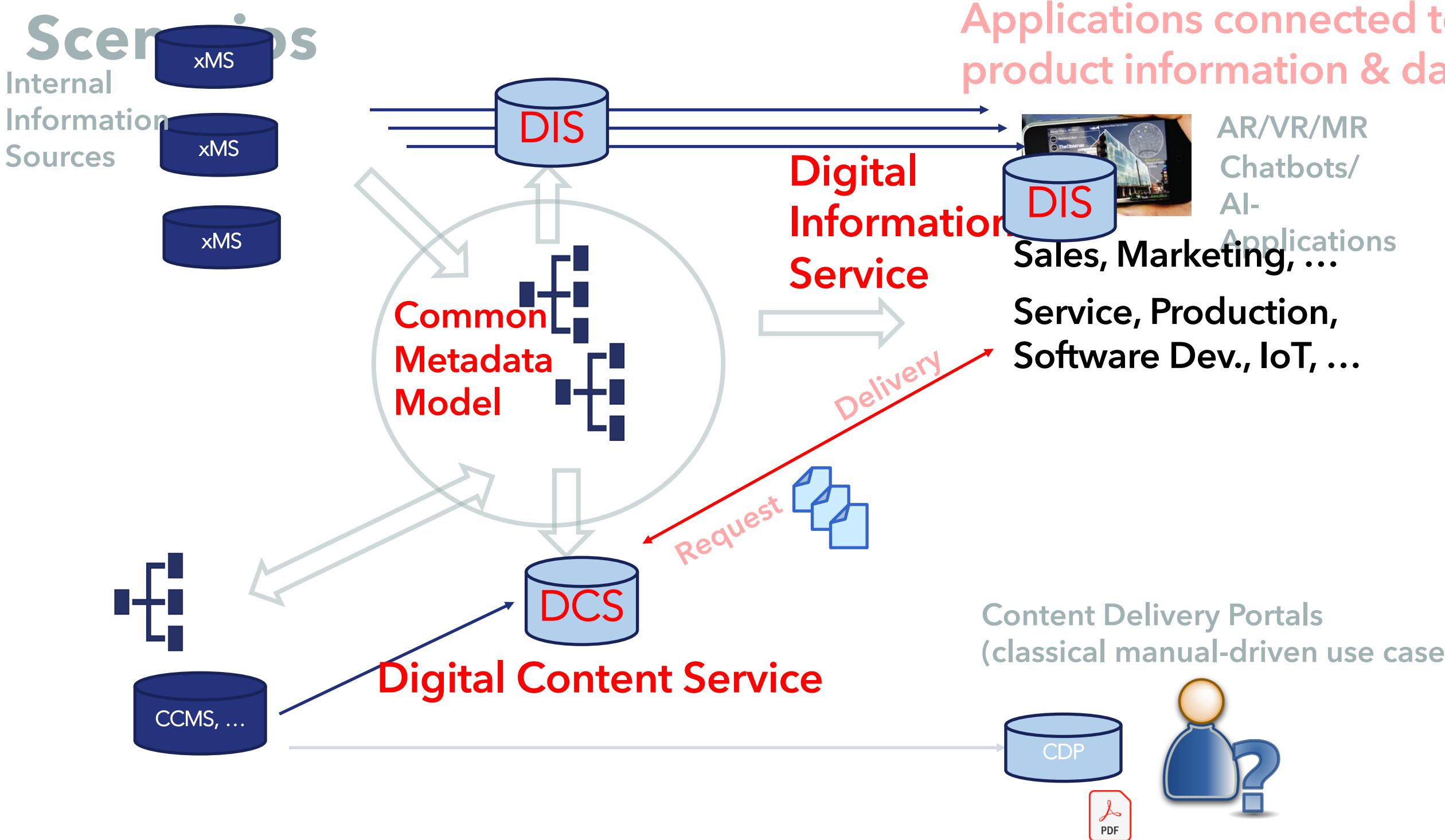
**Service, Production,
Software Dev., ... IoT!**



CD Methods

- Content provisioning for data integration
- Web interfaces /API
- Standard Formats (XML, HTML, PDF, iiRDS)
- Requires classified topic based on variants and configurations!

Digital Content Services in Integrated Scenarios

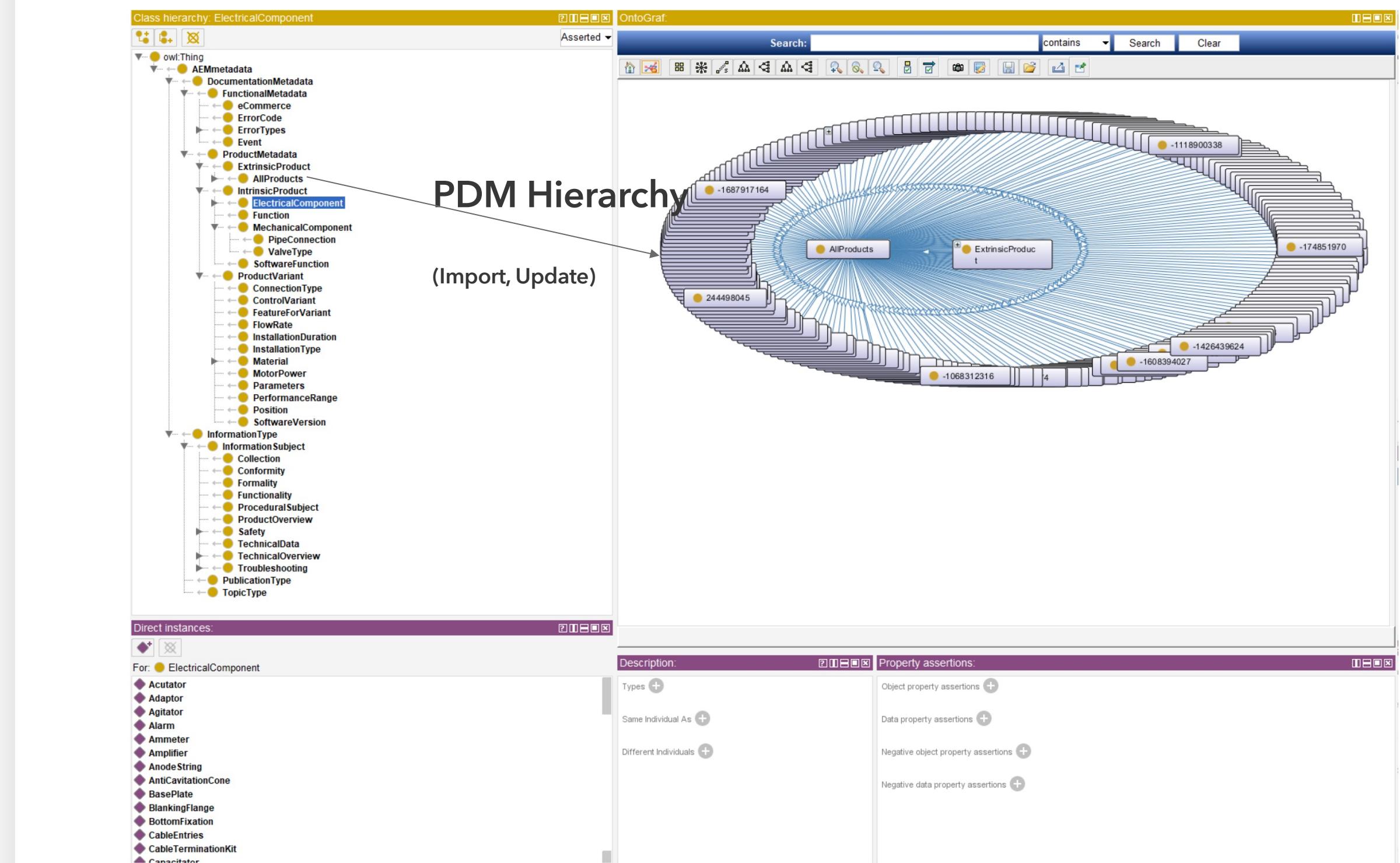


CM Methods:

Metadata Model

Application of PI-Class Method

Process Integration: Data Governance



CM Methods

Metadata exactness
and company awareness
influences also
variant handling of topics
in CMS

Configuration-specific Information by Features

- Product features included or in addition to (extrinsic) product classes / names: T3B, TP-DH2,
- Example PI-Fan: Type TP-DH2 (Combination type)
 - Table Fan (T)
 - Continuous Switch (P)
 - Display (D)
 - Heating (H)
 - 2-Level Heating (2)
- Goal: Facilitate planning of new variants/configurations and metadata handling in CMS

CM Methods

Extrinsic product variant
retrieved by usage
or described by product
types (for retrieval)

Variant Management (Topic variants)

Extrinsic Classification as variant property

The diagram illustrates the extrinsic classification of product variants based on the method of adjustment. It features three main sections, each with an image of a fan control device and descriptive text:

- Adjusting the intensity**: A small switch with five positions (0, 1, 2, 3, 4, 5) is shown. A callout bubble lists variant properties: T3B, TAB, TB5, T35, T3X5B,
- Adjusting the intensity**: A larger switch with five positions (0, 1, 2, 3, 4, 5) is shown. A callout bubble lists variant properties: TPB, TAMP,
- Adjusting the intensity**: A digital control panel with a seven-level slider and a display showing 'Max' is shown. A callout bubble lists variant properties: T7B, TFX,

Below the sections, three ellipses indicate additional variants.

Adjusting the intensity
The intensity of the fan can be adjusted in five levels.

Adjusting the intensity
The intensity of the fan can be adjusted continuously.
Turn the level knob until the intensity of the fan is set as desired.

Adjusting the intensity
The intensity of the fan can be adjusted in seven levels.

- Turn the level knob until the intensity of the fan is set as desired.

CM Methods

Extrinsic product variant
collection (of all products)
for filtering

Variant Management (sub-modular; one topic)

Extrinsic Classification as Variant Property



Adjusting the intensity

The intensity of the fan can be adjusted in five levels.
The intensity of the fan can be adjusted continuously.
The intensity of the fan can be adjusted in seven levels.

- Turn the level knob until the intensity of the fan is set as desired.

...
...
...

T3B, TB5,
T445, TX5B,...

TPB, TAMP,

T7B, TFX,..

CM Methods

Topic **planning** according
to configuration variants

Variant Management by Properties (submodular)

Product features as variant property



levels = 5

levels = Cont

levels = 7

Adjusting the intensity

The intensity of the fan can be adjusted in five levels.
The intensity of the fan can be adjusted continuously.
The intensity of the fan can be adjusted in seven levels.

- Turn the level knob until the intensity of the fan is set as desired.

...
...
...

CM Methods

(„Profiling“) →
variant management on sub topic level

Where does system complexity appears
for writers?

→
Handling of content variants
systematically by
classification and var. parameters

System examples for handling complexity in CMS

The screenshot shows a CMS interface with a navigation bar at the top: task > taskbody > steps > step. Below this, there's a tree view with nodes: - taskbody, - steps, and several numbered steps (1-16). Each step has a command (cmd) and a sub-step (step). Step 2 is highlighted with a blue border. A sidebar on the right contains sections for CONDITIONS, Product (DDE, DDA selected), Otherprops (controlvariant:FCM, controlvariant:AR, feature:DLD, dosingheadmaterial:PVC, dosingheadmaterial:PV, dosingheadmaterial:stainl, performance-range:60-120, performance-range:120-200), and tracking (No Markup). The main area displays a numbered list of steps:

1. Put on the stipulated personal protective equipment.
2. Set adjusting knob to 0 %.
3. Switch off the power supply.
4. Set pump to "Stop" operating state using the [Start/stop] key.
5. Make system pressureless.
6. Take suitable steps to ensure that the returning liquid is safely collected.
7. Empty dosing head and flush it if necessary.
8. Press the [Start/stop] and [100%] keys at the same time to put the diaphragm into "out" position.
 - a. If the "Stop after power failure" alarm is active, acknowledge the alarm by opening the "Alarm" main menu. Otherwise the diaphragm cannot be moved.

STEP RESULT:
Symbol ("Diaphragm position out") must be displayed
9. Dismantle inlet, outlet and deaeration lines.
10. Unscrew valves on inlet and outlet side.
11. Disconnect FlowControl signal connection.
this control variant is not available for the DDE. it has to be manually de-selected, automatic is preferable.
12. Disconnect DLD signal connection.
this step is only valid for the DDA with control variant AR, not the DDE-AR. the added "@product=DDA" leads to this step being output for the DDA even if controlvariant:AR is not selected and for the DDE-AR if AR is selected.
13. Remove screws.
14. Remove dosing head together with cover plate.
15. Remove screws together with washers.
16. Remove dosing head.

CM Methods

How to Aggregate Documents

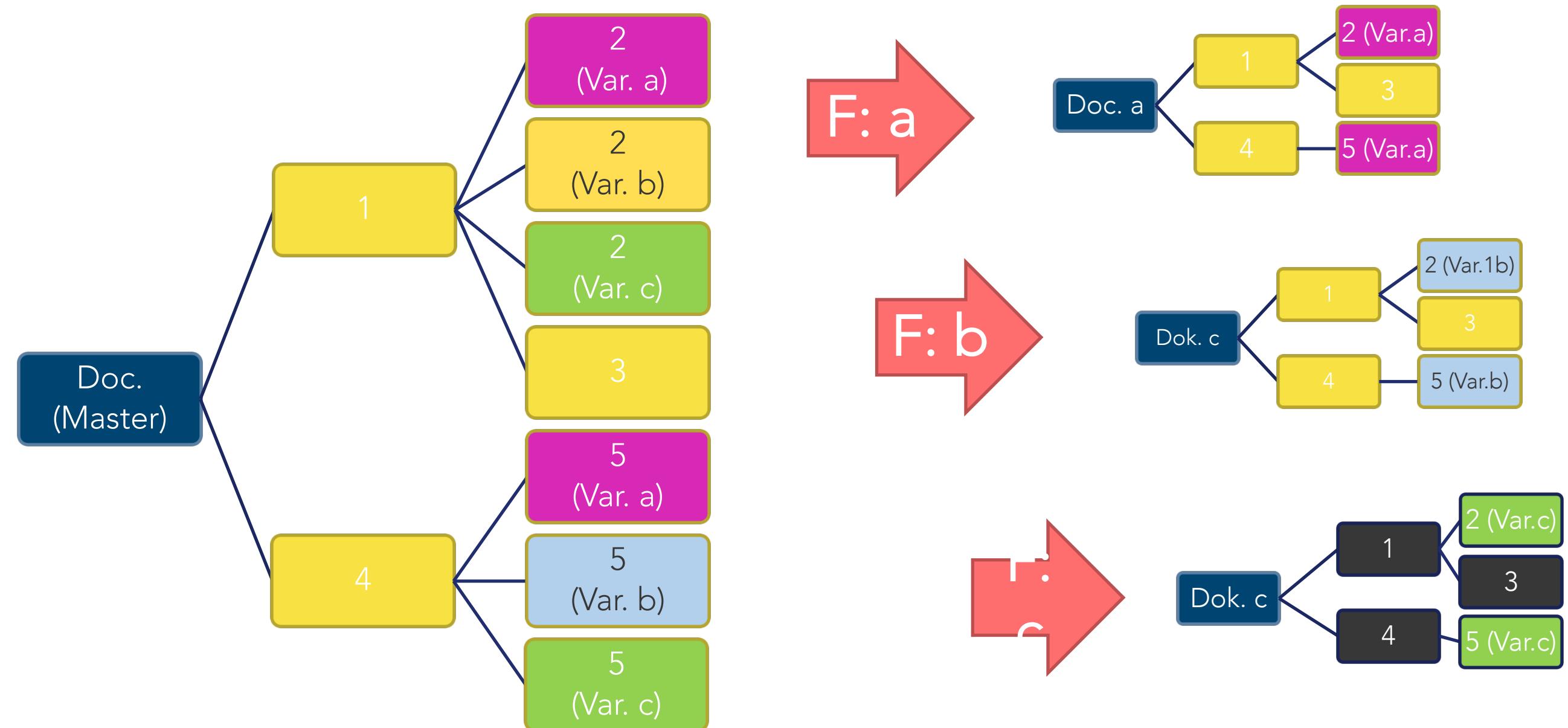
- Manually assembling (67%)
- Filtering of master documents (by reduced set of meta data) ** (44 %)
- Copying and modifying documents / templates * (41 % / 23%)
- Automated Assembling (by full set of metadata) *** (27%)

* , ** , *** systemized, rules-based, automated
(x%) according to tekom CMS Study 2018

CM Methods

Document Filtering

Filter criteria in many cases correspond to extrinsic classification (validity for end-products: **T3B, X5B, X5-DH2**)



CM Methods

Filtering of sub-topic elements

DE German (Germany) | xml_1425885888178.xml

Datei Bearbeiten Suchen Ansicht Einfügen Entities Tabelle Extras Formatieren Fenster Hilfe LiRS AcrolingIQ

text _comment B I U

Extrinsic classification on sub-topic level

```

<?xml version="1.0" encoding="UTF-8"?>
<docu langcode="zh">
    <descriptive-info>
        <safety>
            <prod-safe-desc func="general">
                <text>
                    <comment>S</comment>
                </text>
                <heading>设备的使用范围</heading>
                <paragraph><emphasis>规定使用</emphasis></paragraph>
                <comment>WTN, WKN</comment>
                <paragraph valid="EWTN305610237 EWTNes305610213 EWTNes305610237 SWTNes3010101 SWTNes301020001 SWTNes301020057 SWTNes301020088 SWTNes301020103 SWTNes301020106 SWTNes301020136 SWTNes301020147</paragraph>
                <comment>类似于家庭的环境中用于红酒或食品的冷却。包括在下列情况中的使用</comment>
                <comment>WT</comment>
                <paragraph valid="WVT205021136">设备仅适合在家庭或类似于家庭的环境中用于红酒的存放。包括在下列情况中的使用</paragraph>
                <comment>alle außer Weingeräten</comment>
                <paragraph valid="">设备仅适合在家庭或类似于家庭的环境中用于食品的存放。包括在下列情况中的使用</paragraph>
                <comment>S</comment>
                <list listtype="marked">
                    <item>· <paragraph>在私人餐厅, 早餐店中;</paragraph> <item>
                    <item>· <paragraph>在别墅、宾馆、旅店和其他宿营地中供客人使用;</paragraph> <item>
                    <item>· <paragraph>在承办酒席时, 和类似的批发服务</paragraph> <item>
                <list>
                <comment>integriert Unterbau</comment>
                <paragraph valid="UIG1313237 UIG131340001 UIG131340136 UIG1323101 UIG132320001 UIG132320136 UIK144440001 UIK1510147 UIK1550001 UIK1550101 UIK1620101 UIK1640137 UIK164040001 UIK164040136">设备适用于集
                <comment>S</comment>
                <paragraph>仅在普通的家用范围内使用该设备。不允许其他的使用方式。</paragraph>
                <comment>S</comment>
                <paragraph><emphasis>可预见误用</emphasis></paragraph>
                <paragraph>严禁下列应用:</paragraph>
                <list listtype="marked">

```

CM Methods

Rules-based publishing

Document structure =
Set of
Classification Selectors
(Rules)

Automized document creation (metadata)

The screenshot shows the COSIMA software interface. On the left, there is a classification tree under 'Dokumentstruktur' (Document Structure) with various categories like 'EG-Konformitätserklärung', 'Wartung', 'Richtlinien', and 'Antriebsgruppe'. On the right, there is a table titled 'Publikationskonfiguration - BA_EMtec_LBH_L_556_1289_31680, 1' with columns for 'L', '556', '556_1289', and 'BA_EMtec_LBH_L...'. A red box highlights the '556' column. A red arrow points from the '556' column to a list of classified module/topics on the right, which are referenced by metadata. The list includes items such as '154953, 3, de_DE', '124747, 10, de_DE', '107980, 8, de_DE', '124751, 9, de_DE', '124809, 5, de_DE', '145671, 4, de_DE', '124829, 7, de_DE', '124831, 7, de_DE', '124757, 6, de_DE', '124754, 9, de_DE', '124752, 9, de_DE', '124753, 7, de_DE', '124756, 3, de_DE', '124758, 8, de_DE', '124851, 4, de_DE', and '124759, 9, de_DE'.

Classification (extrinsic, Var. Parameters)

Classification (intrinsic)

Classified Module/Topic Are referenced by metadata: Automated population of document structure (map)

CD Methods

Facetted search/request and topic delivery

Customer-dependent Configuration !

Component

Hydraulic system

Oil Pump

Information

Procedure

Testing

Machine

Z-006

Hydraulic system

The hydraulic oil sample is taken via a test connection on the variable displacement pump.

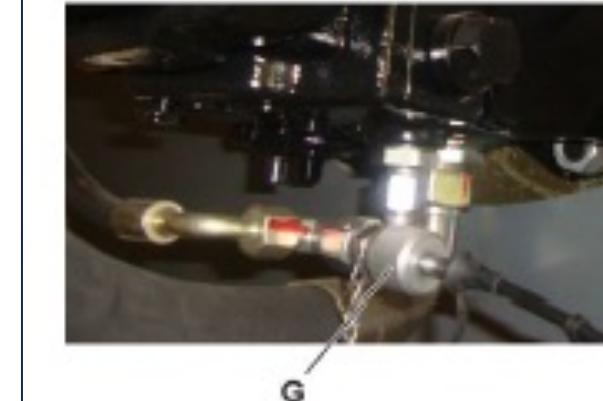


Fig. 250: Sampling point for hydraulic oil

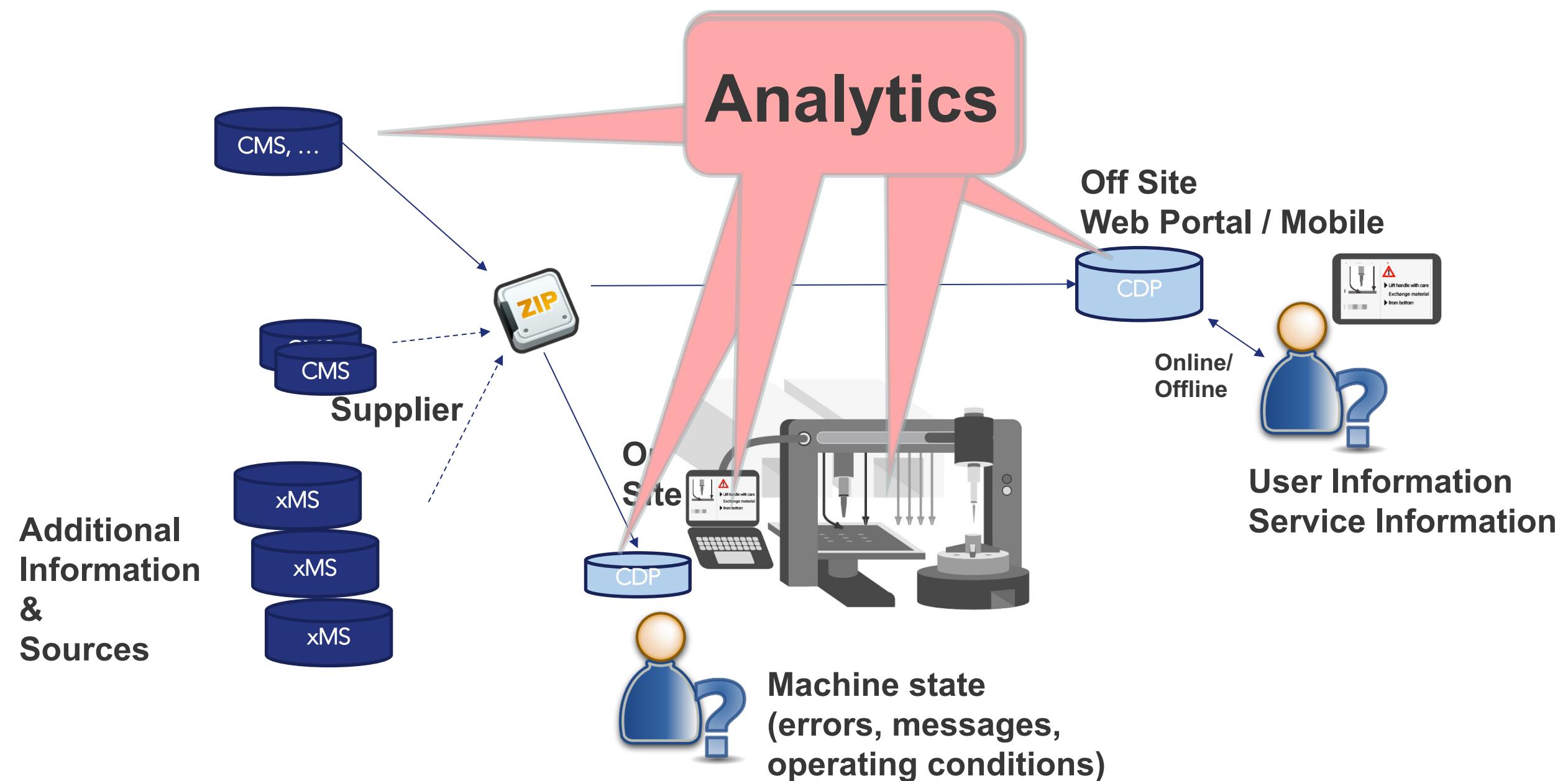
- ▶ Start the engine and wait 3 minutes.
▷ The hydraulic oil is circulated.
- ▶ Engage the parking brake and secure the machine against rolling away.
- ▶ Connect the test line to the test connection G.
- ▶ 0.2 l Drain the hydraulic oil into the receptacle.
- ▶ Fill the sample container.
- ▶ Remove the test line and seal the test connection.

$a_1 | b_3 | \dots | x_5 | y_1 | z_5$

CD Environment

CDP and Analytics in Industrial Applications

Analytics



Additional
Information
&
Sources

Machine state
(errors, messages,
operating conditions)

- Analytics

CMS & CDP Analytics

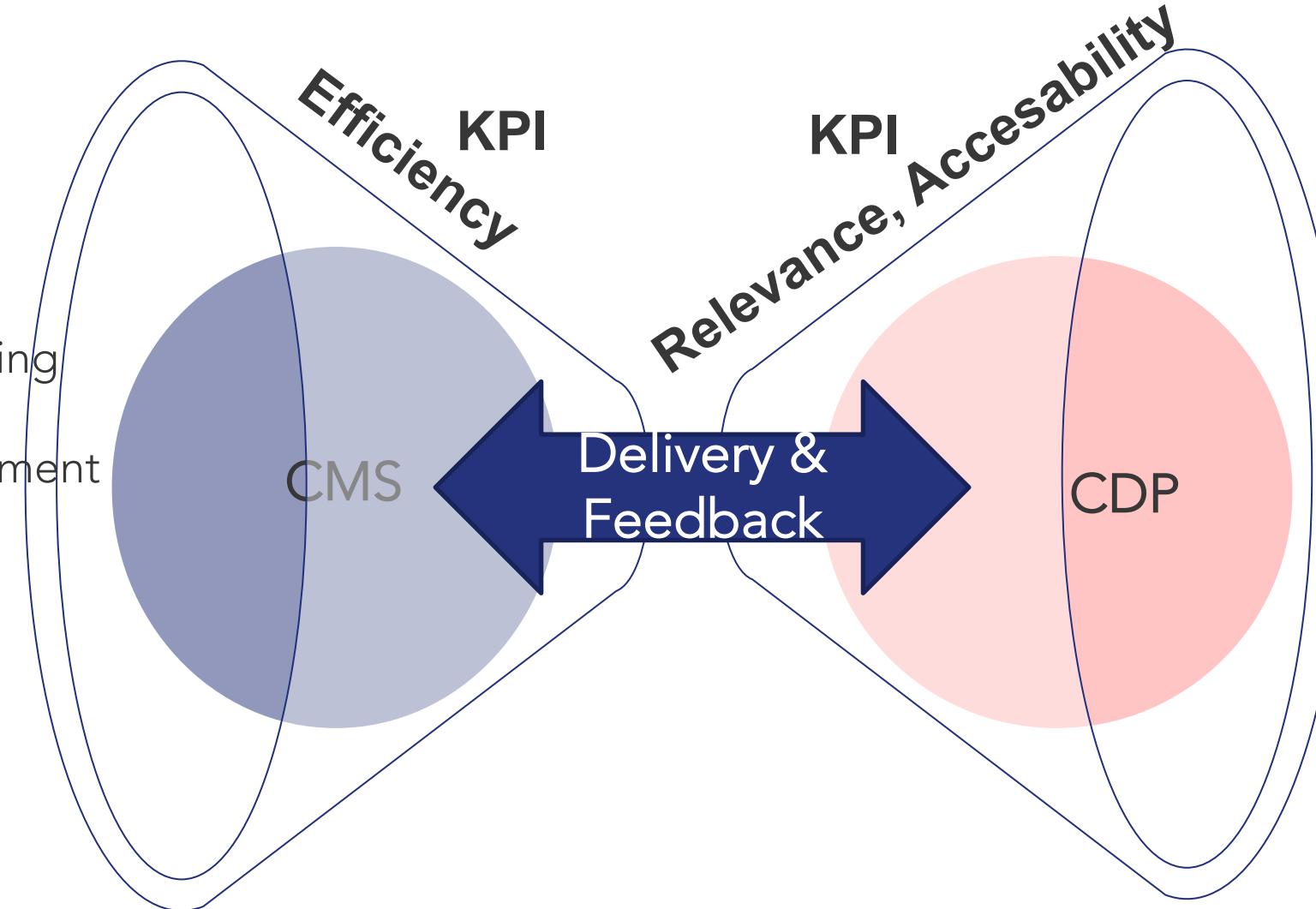
Overview of Content Intelligence

CMS Analytics (REx)

- Metrics:
- Reuse Rates (Abundance)
 - Redundancy
 - Document Sharing factor
 - Variant management
 - Correlations; Distributions
 - ...

Artificial Intelligence

- Quality assurance:
- Similarity analysis
 - Classification quality
 - ...



CDP Analytics (CoReAn)

Indirect feedback

- Metrics:
- visiting time,
 - Visit frequency
 - search behaviour
 - search terms
 - ...
- Direct feedback
- Rating
 - Satisfaction
- Improve:
- Product
 - Information
 - Terminology

CM Methods

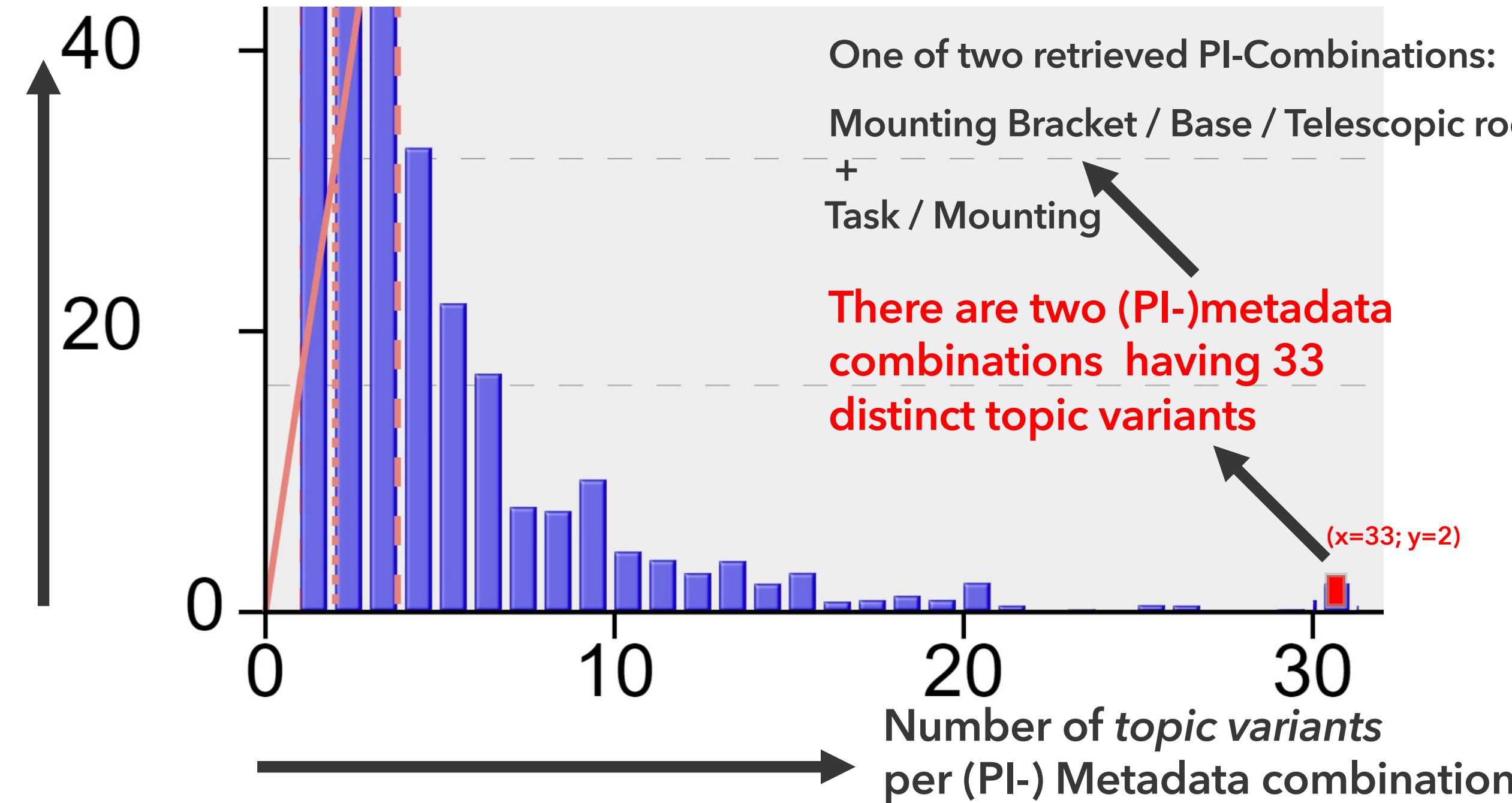
Analyzing the origins of large numbers of topic variants



Driver of product complexity and / or (necessary?) content complexity

Systematic Variant Analysis

Number of (PI-) metadata combinations



CM Methods

Example detected by REx
method:
All topics have the same
(intrinsic) classification
but differ in
(extrinsic) product classes

Analyzing Content Variants (by content)

<p>Objektgültigkeit: Produkt A I-Klassifizierung: Reinigung ID</p> <p>1 Reinigung</p> <table border="1"> <tr> <td style="text-align: center;">i</td> <td>Bei der Reinigung die Schutzklasse beachten. Zugelassene Reinigungsmittel:<ul style="list-style-type: none">▪ Ethanol 95%ig</td> </tr> </table>	i	Bei der Reinigung die Schutzklasse beachten. Zugelassene Reinigungsmittel: <ul style="list-style-type: none">▪ Ethanol 95%ig	<p>P_ Objektgültigkeit: Produkt D I-Klassifizierung: Reinigung ID</p> <p>1 Produkt reinigen</p>		
i	Bei der Reinigung die Schutzklasse beachten. Zugelassene Reinigungsmittel: <ul style="list-style-type: none">▪ Ethanol 95%ig				
<p>Objektgültigkeit: Produkt B I-Klassifizierung: Reinigung ID</p> <p>1 Reinigung</p> <p>Zur Pflege:<ul style="list-style-type: none">▪ Das Produkt außen mit einem weichen Lappen reinigen.</p>	<p>V_ Objektgültigkeit: Produkt E I-Klassifizierung: Reinigung ID</p> <p>1 Reinigung</p> <p>1. Zur äußereren Reinigung folgende Energiequellen abschalten:</p>				
<p>Objektgültigkeit: Produkt C I-Klassifizierung: Reinigung ID</p> <p>1 Reinigung</p> <table border="1"> <tr> <td style="text-align: center;">!</td> <td>HINWEIS! Sachschaden durch unsachgemäße Reinigung.<ul style="list-style-type: none">▪ Führungselemente nicht reinigen.▪ Produkt nur mit werkstoffsicheren Reinigungsmitteln und weichen Lappen reinigen.</td> </tr> </table>	!	HINWEIS! Sachschaden durch unsachgemäße Reinigung. <ul style="list-style-type: none">▪ Führungselemente nicht reinigen.▪ Produkt nur mit werkstoffsicheren Reinigungsmitteln und weichen Lappen reinigen.	<p>Y_ Objektgültigkeit: Produkt F I-Klassifizierung: Reinigung ID</p> <p>1 Reinigung</p> <table border="1"> <tr> <td style="text-align: center;">!</td> <td>HINWEIS! Sachschaden durch unsachgemäße Reinigung.<ul style="list-style-type: none">▪ Führungselemente nicht reinigen.▪ Produkt nur mit werkstoffsicheren Reinigungsmitteln und weichen Lappen reinigen.</td> </tr> </table>	!	HINWEIS! Sachschaden durch unsachgemäße Reinigung. <ul style="list-style-type: none">▪ Führungselemente nicht reinigen.▪ Produkt nur mit werkstoffsicheren Reinigungsmitteln und weichen Lappen reinigen.
!	HINWEIS! Sachschaden durch unsachgemäße Reinigung. <ul style="list-style-type: none">▪ Führungselemente nicht reinigen.▪ Produkt nur mit werkstoffsicheren Reinigungsmitteln und weichen Lappen reinigen.				
!	HINWEIS! Sachschaden durch unsachgemäße Reinigung. <ul style="list-style-type: none">▪ Führungselemente nicht reinigen.▪ Produkt nur mit werkstoffsicheren Reinigungsmitteln und weichen Lappen reinigen.				

CM Methods

New Roles and Competencies (beside linguistics)

- Metadata modeling (driver for model-based authoring)
- Interface & communication with data sources and SMEs
- CCMS configuration & implementation architecture
- Variant manager (tracking and dev. of rules for creating variants)
- Analytics (CCMS, CDP)
- Delivery Experts:
Interface & communication with information sinks (apps) and SMEs

Digital Information Services

Business and Use Cases for Content Delivery

Smart Fields



Digital Information Service (for maintenance)

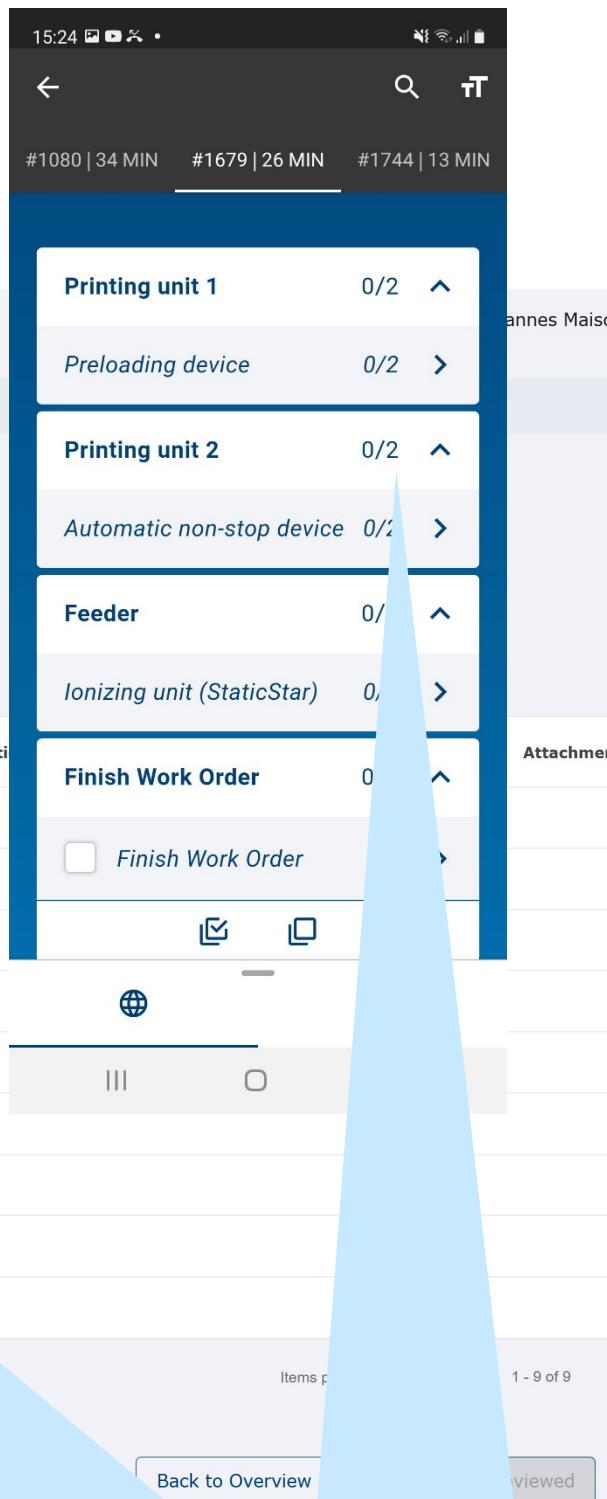
CDP and CMS information is connected to maintenance processes

Maintenance planning and tracking

The screenshot shows the 'Review Work order' page from the HEIDELBERG software. At the top, it displays the work order details: Work Order 921, Equipment Hero Demo Equipment, Serial Number ID0002_2, Status CREATED, and Planned execution date Mon, Jun 21, 2021 10:17 AM. Below this, there are tabs for Overview, Activities Details (which is selected), Report Details, and Parts Consumption. The main table lists maintenance activities across different equipment and points:

Maintenance Point	Activity ID	Activity type	Status
Printing unit 1 » Automatic non-stop device » Automatic	WT1FS.B04.0032-00001DEU	Cleaning	Created
Printing unit 2 » Automatic non-stop device » Drive chai	WT1FS.B04.0034-00000DEU	Cleaning, Lubrication	Done
Printing unit 2 » Automatic non-stop device » Auxiliary p	WT1FS.B04.0042-00000DEU	Check-up	Done
Feeder » Suction head » Suction head	WT1FS.B04.0050-00000DEU	Check-up	Created
Printing unit 2 » Automatic non-stop device » Drive chai	WT1FS.B04.0035-00000DEU	Check-up, Adjustment	Done
Printing unit 1 » Pile guidance and pile transport » Pile c	WT1FS.B04.0013-00000DEU	Cleaning, Lubrication	Done
Printing unit 1 » Pile guidance and pile transport » Side :	WT1FS.B04.0006-00000DEU	Lubrication	Done
Printing unit 2 » Automatic non-stop device » Auxiliary p	WT1FS.B04.0041-00000DEU	Cleaning, Lubrication	Done
Printing unit 1 » Preloading device » Lateral sheet stops	WT1FS.B04.0001-00000DEU	Check-up	Done

Source: Docufy

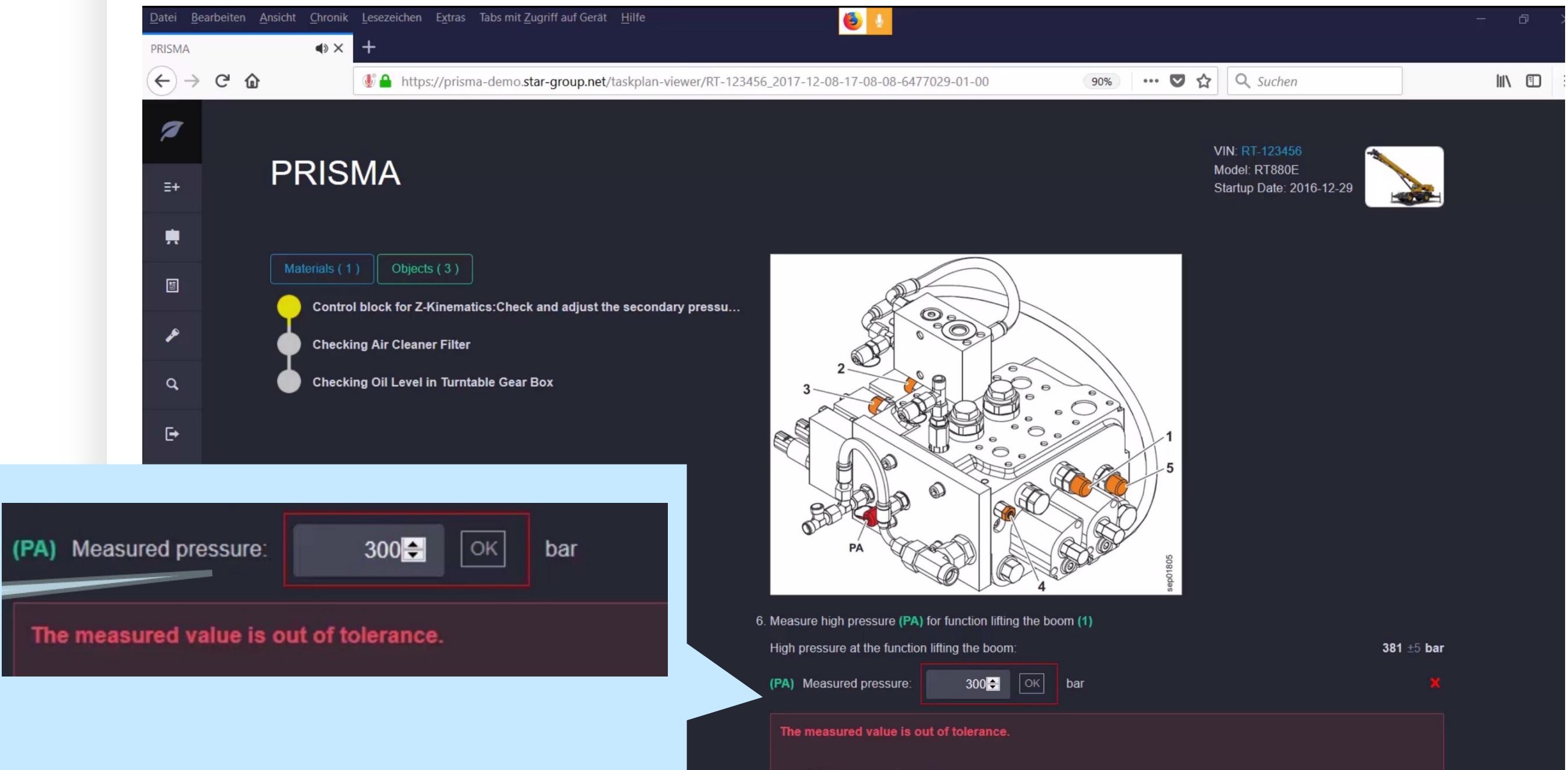


Retrieval/request by (PI-)Classification

Digital Service Information Service

Interactive Data from CMS & Engineering:
Sensing & archiving
of data setting

Access to granular service information & data



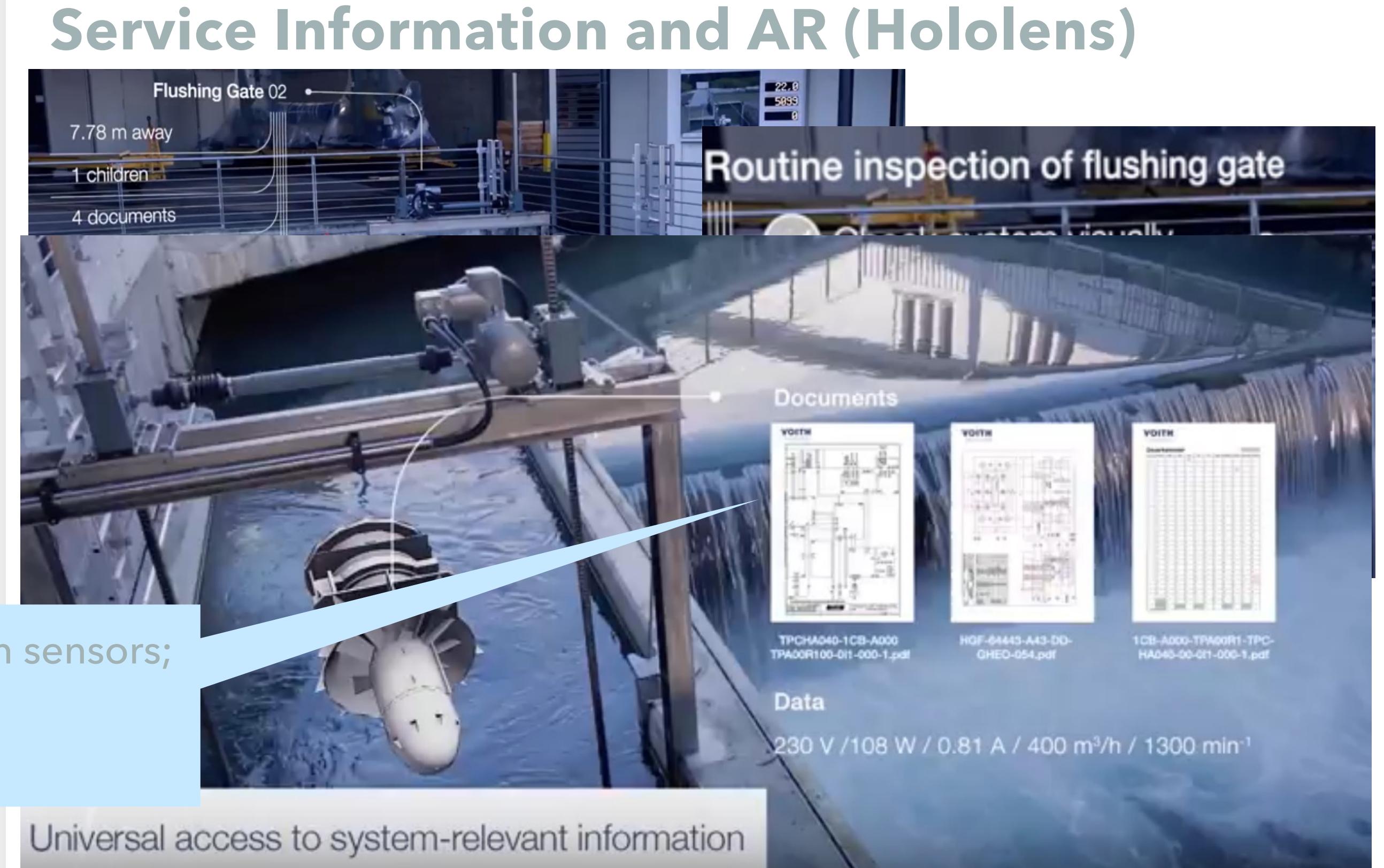
Source: STAR AG

Digital services as an extended product portfolio

Source: Voith Hydro

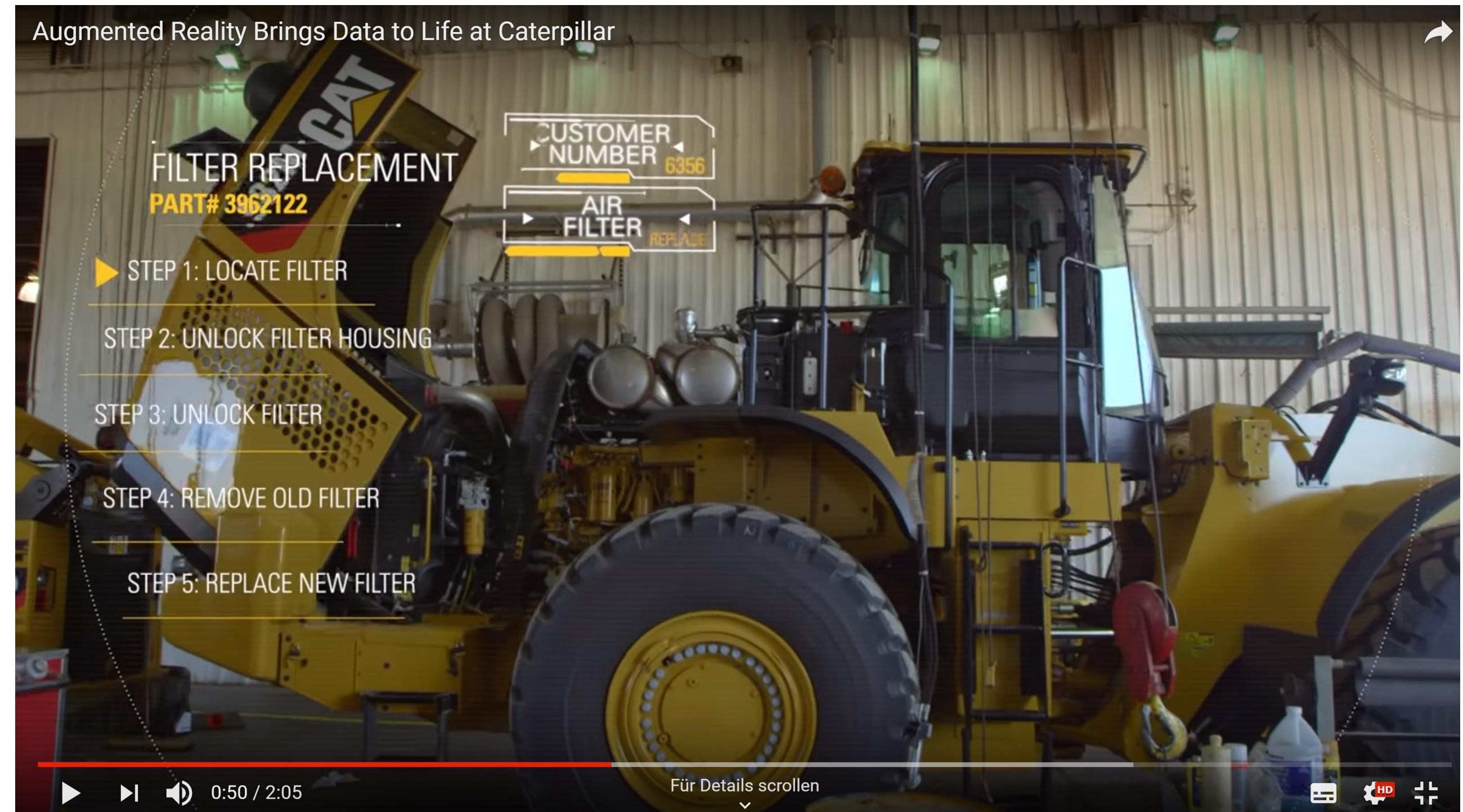
<https://www.youtube.com/watch?v=nyDZ7Q4AFu8>

Interactive data from system sensors;
Content integration from
various sources;



DIS

Maintenance

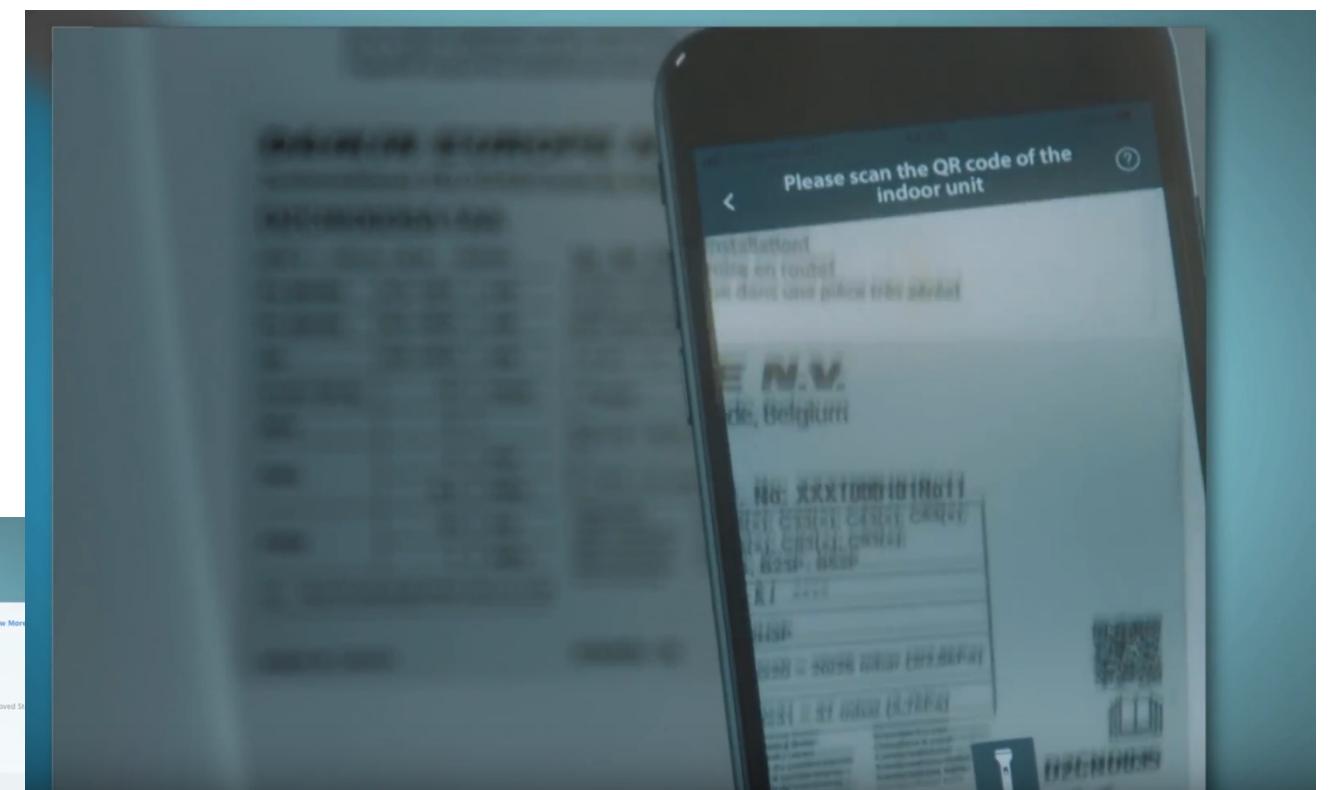
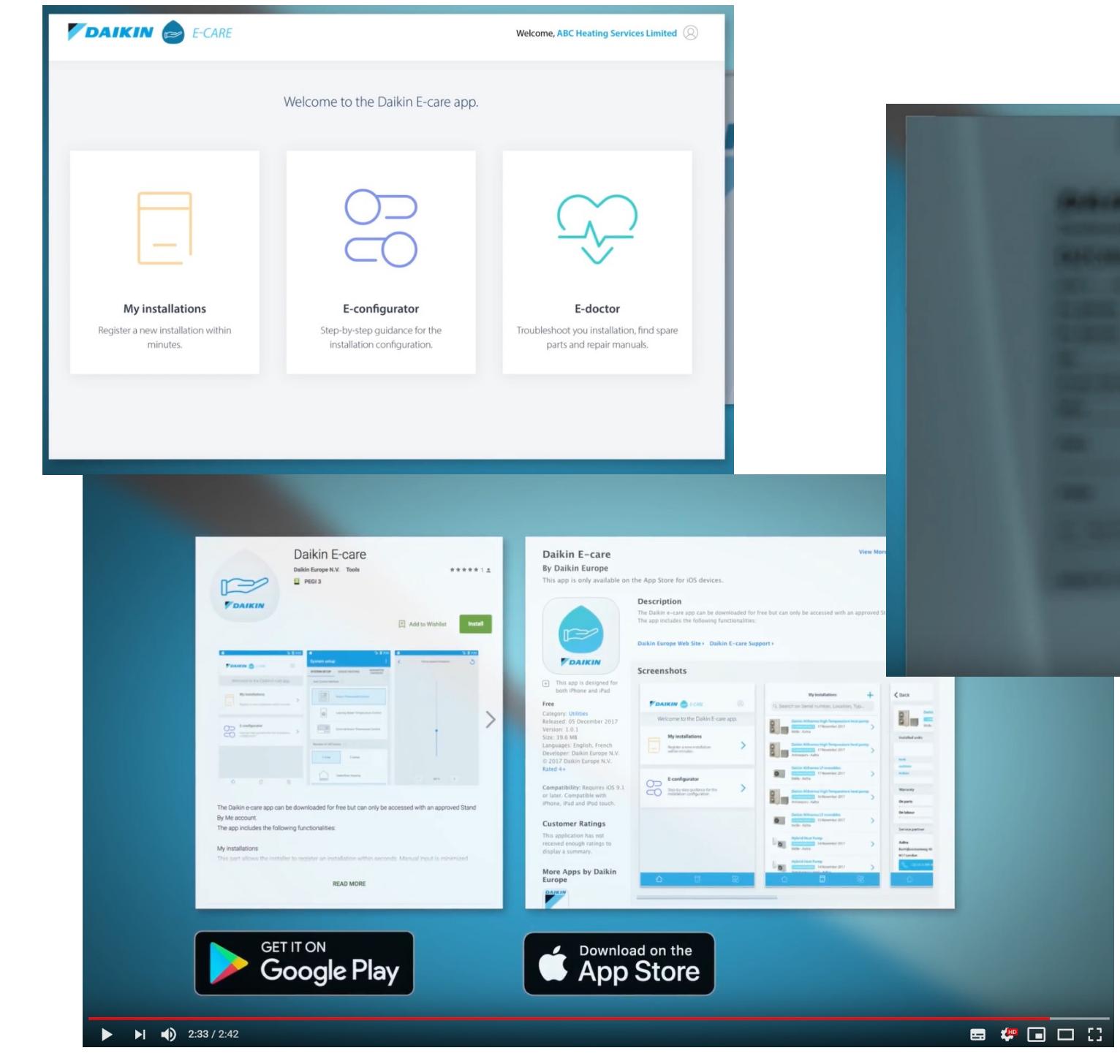


<https://www.youtube.com/watch?v=VGtCQWROytw>

DIS

Reseller support (Heating, AC)

Installation, Configuration, Troubleshooting



DIS

Installation, Configuration, Troubleshooting

Reseller support
(Heating, AC)

→ [Youtube Daikin e-doctor](#)

The screenshot shows the Daikin e-doctor app interface. At the top, there's a header with the unit type "ESIE-17-21B_2018_02". Below it, a section titled "How can we help you?" contains three cards:

- Error & symptom based troubleshooting**: An exclamation mark icon. Description: "I want to find the cause of an error code or malfunction".
- Component check**: A magnifying glass icon. Description: "I want to check the performance of individual components".
- Component repair**: A wrench icon. Description: "I want to repair or replace malfunctioning components".

Below these cards is a note: "Additional information". Further down, the unit type is again listed as "ESIE-17-21B_2018_02" and the unit ID "EHVZ08S18DA9WG". A message says "Please add the unit(s) you want to troubleshoot".

On the right side of the screen, a detailed view of error code **C0-00 – Flow sensor malfunction** is shown. It includes:

- TRIGGER**: "Water flow sensor detects water flow 45 seconds after the water pump has stopped."
- EFFECT**: "Unit will stop operating."
- RESET**: "Manual reset via user interface."

A notice at the bottom states: "It is recommended to perform the checks in the listed order." Below this are two steps:

- 01**: "Check the water pressure. See [Water circuit](#).
Possible cause: Water pressure is too low.
- 02**: "Check the water flow. See [Water circuit](#).
Possible cause: Water flow is too low.

DIS

Service (von Ardenne)

Remote Assist (including video + AR)



Thank you for your attention!

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