Hochschule Karlsruhe
University of
Applied Sciences

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

I4ICM

Agenda

- Introduction
- Content Management Concepts
- Content Delivery Concepts

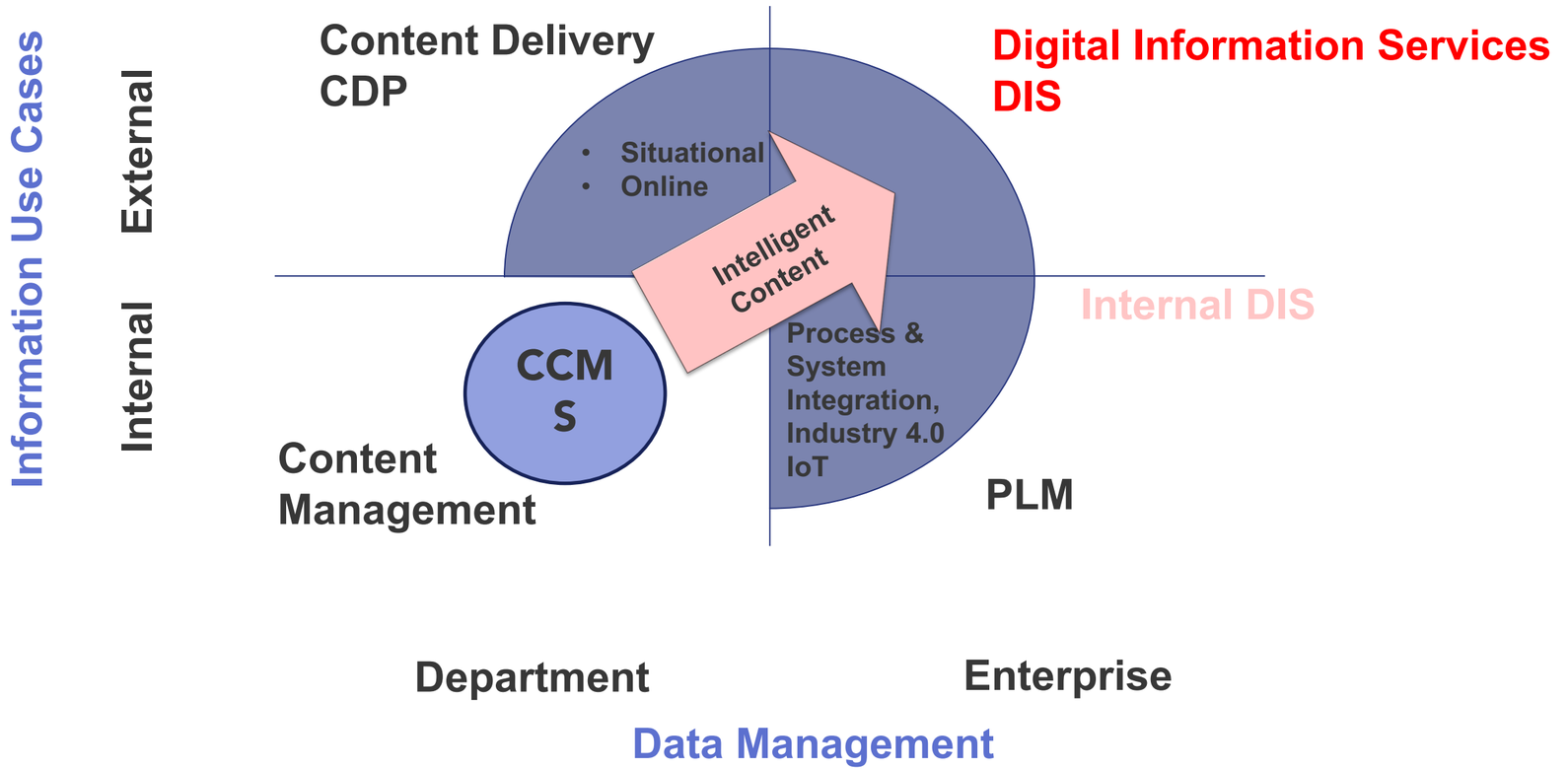
- Content Management Deep Dive
- Delivery for Digital Information Services

Introduction

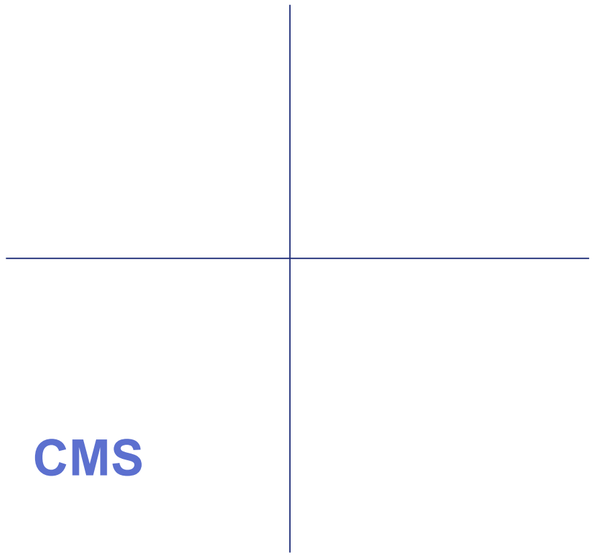
Content Technologies and Digital Information Services

Introduction

Evolution of (Technical) Information Perspectives



Introduction



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
- Automization of CMS processes (generating, publishing)

Introduction

Manuals & data on configurable products

CMS

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

Web

Introduction

Manuals & data sheets for highly configurable products

CDP

CMS (Publishing)

Application area

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:

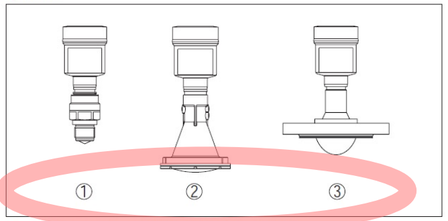


Fig. 2: Antenna systems LEVEL TRANSMITTER 8139

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.

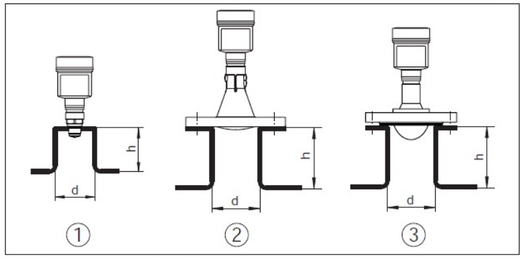


Fig. 17: Socket mounting with deviating socket dimensions with different versions of LEVEL TRANSMITTER 8139

1 Thread with integrated horn antenna
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Thread with integrated horn antenna

Socket diameter d		Socket length h	
40 mm	1½"	≤ 150 mm	≤ 5.9 in
50 mm	2"	≤ 200 mm	≤ 7.9 in

58499-EN-190321

Complexity for Content users:

Collection of variants 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	PFA	-40 … +130 °C (-40 … +266 °F)
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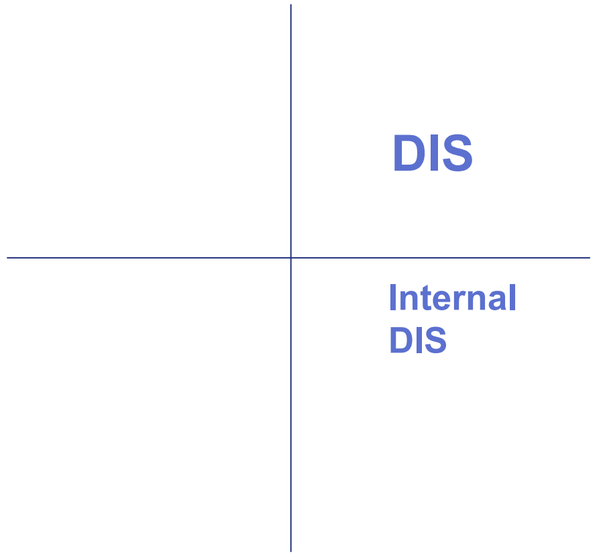
Derating, ambient temperature

Introduction

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



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

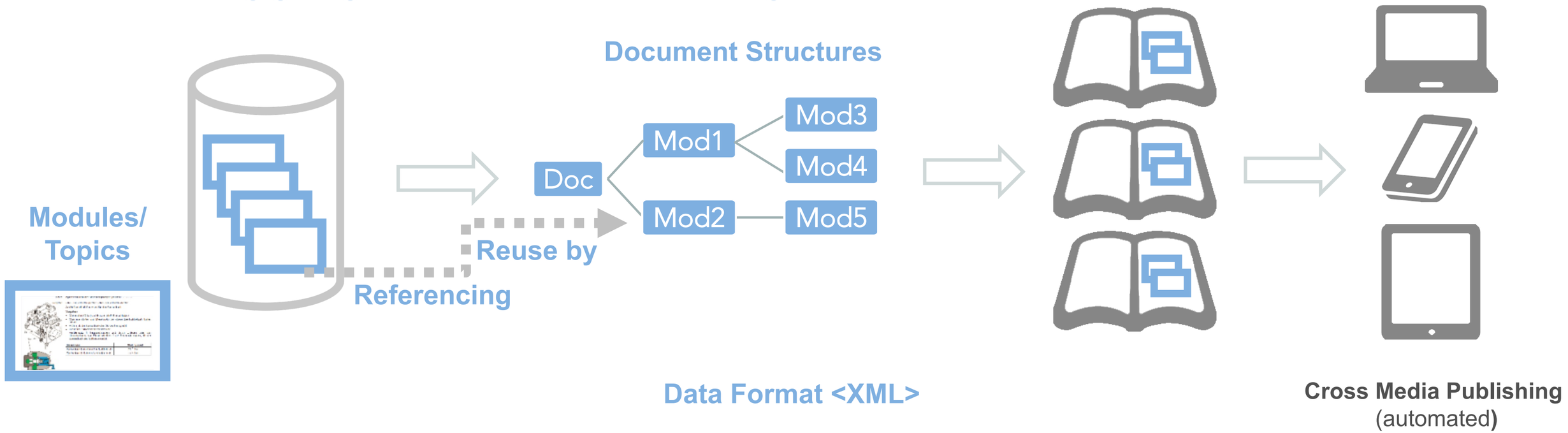
Creating (native-) intelligent content

CM Methods

Referencing modules/topics

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

Reuse, Aggregation and Publishing



CM Methods

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**

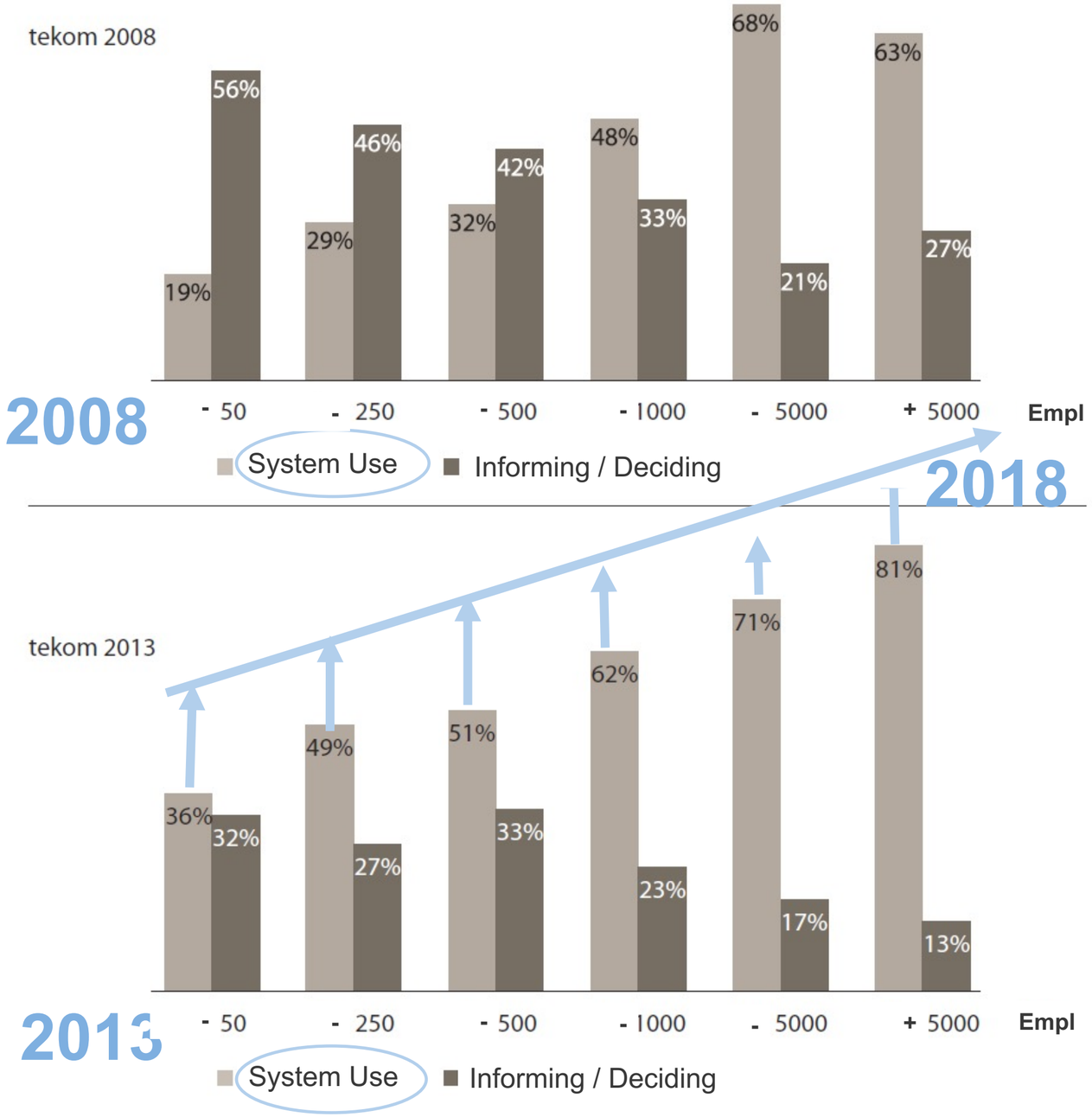
– Variant management (product & media variants, configuration)

– Version management (change Management)

– Translation management (internationalization, globalization)

– Cross media & publishing management

Increasing Use of CMS



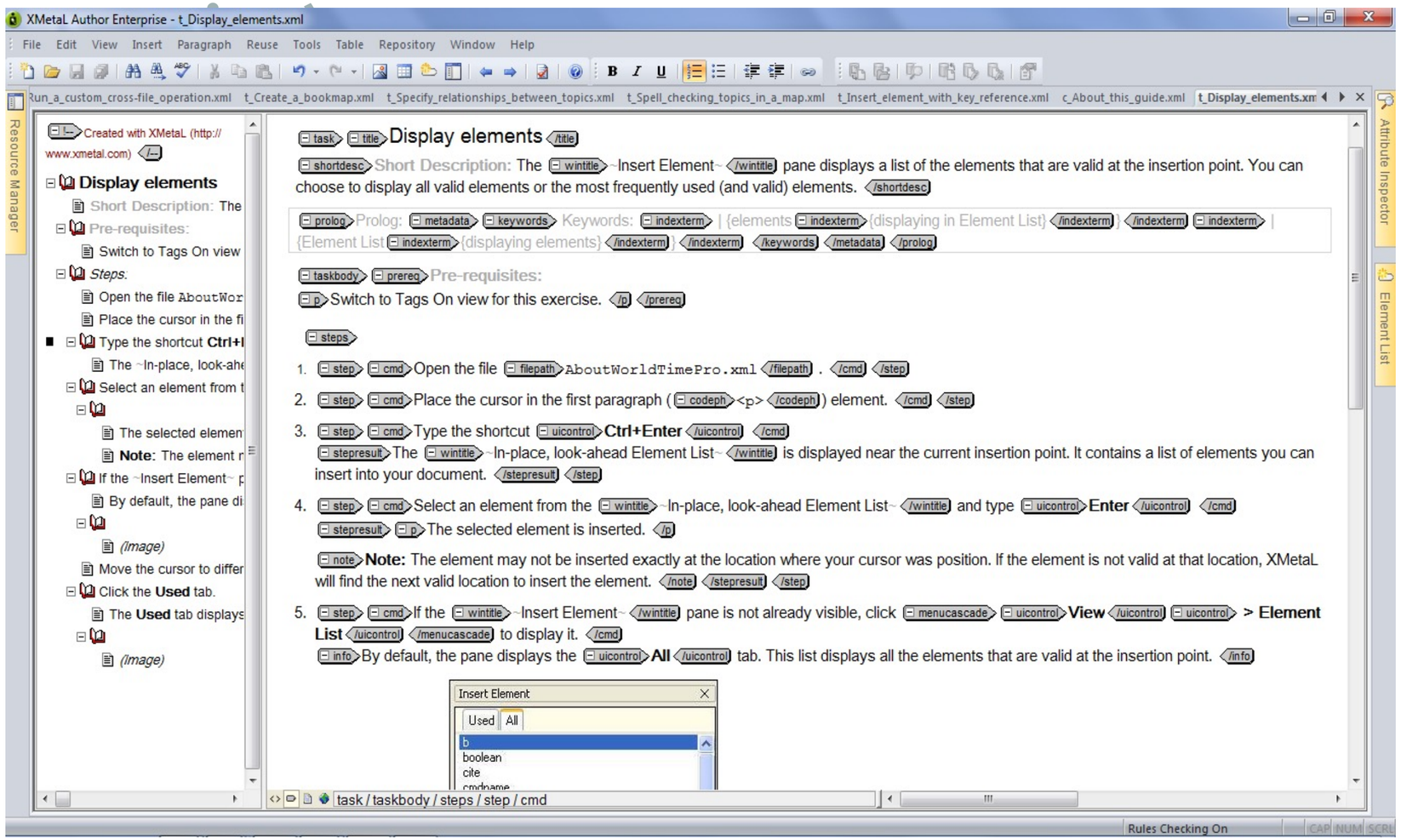
Evolution of CMS distribution in German speaking countries for various company sizes

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

©tekom/tcworld
Straub/Ziegler 2008/2013

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)

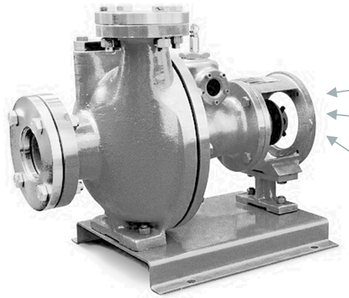
CM Methods

How to turn topics into intelligent content

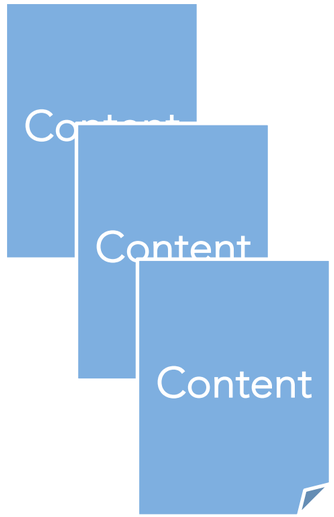
Metadata Enrichment by Semantic Metadata for Modular Content (PI-Class®)

Product Classes

Physical & Virtual Objects
(Product Components)



Content Objects
(Modular Topics)



Information Classes

- Operation
- Dismount
- Repair

CM Methods

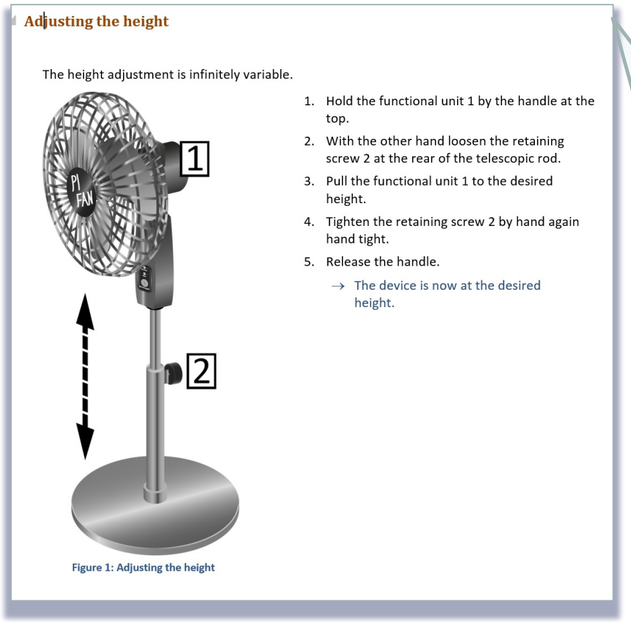
Metadata

for identifying

and addressing

modules/topics

Basic Dimensions of Topic Classification (PI-Class®)



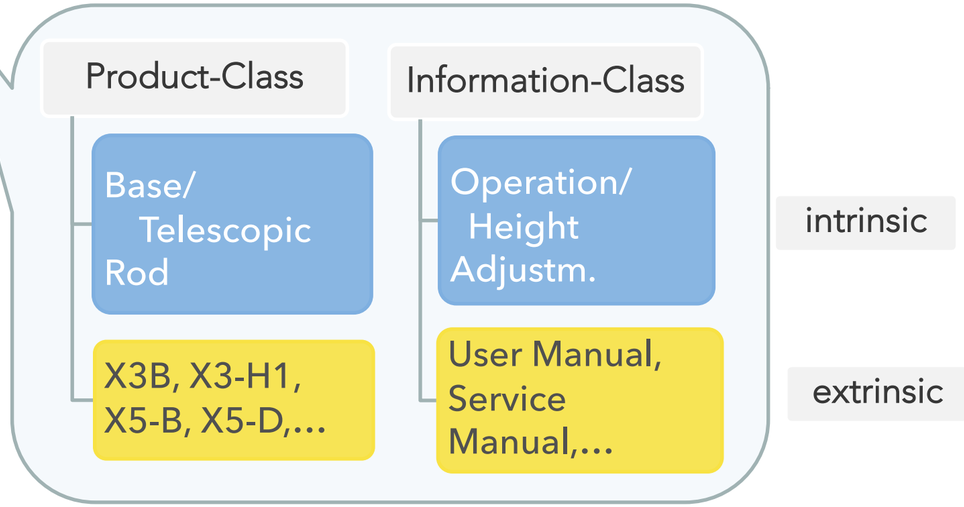
Adjusting the height

The height adjustment is infinitely variable.

1. Hold the functional unit 1 by the handle at the top.
2. With the other hand loosen the retaining screw 2 at the rear of the telescopic rod.
3. Pull the functional unit 1 to the desired height.
4. Tighten the retaining screw 2 by hand again hand tight.
5. Release the handle.

→ The device is now at the desired height.

Figure 1: Adjusting the height

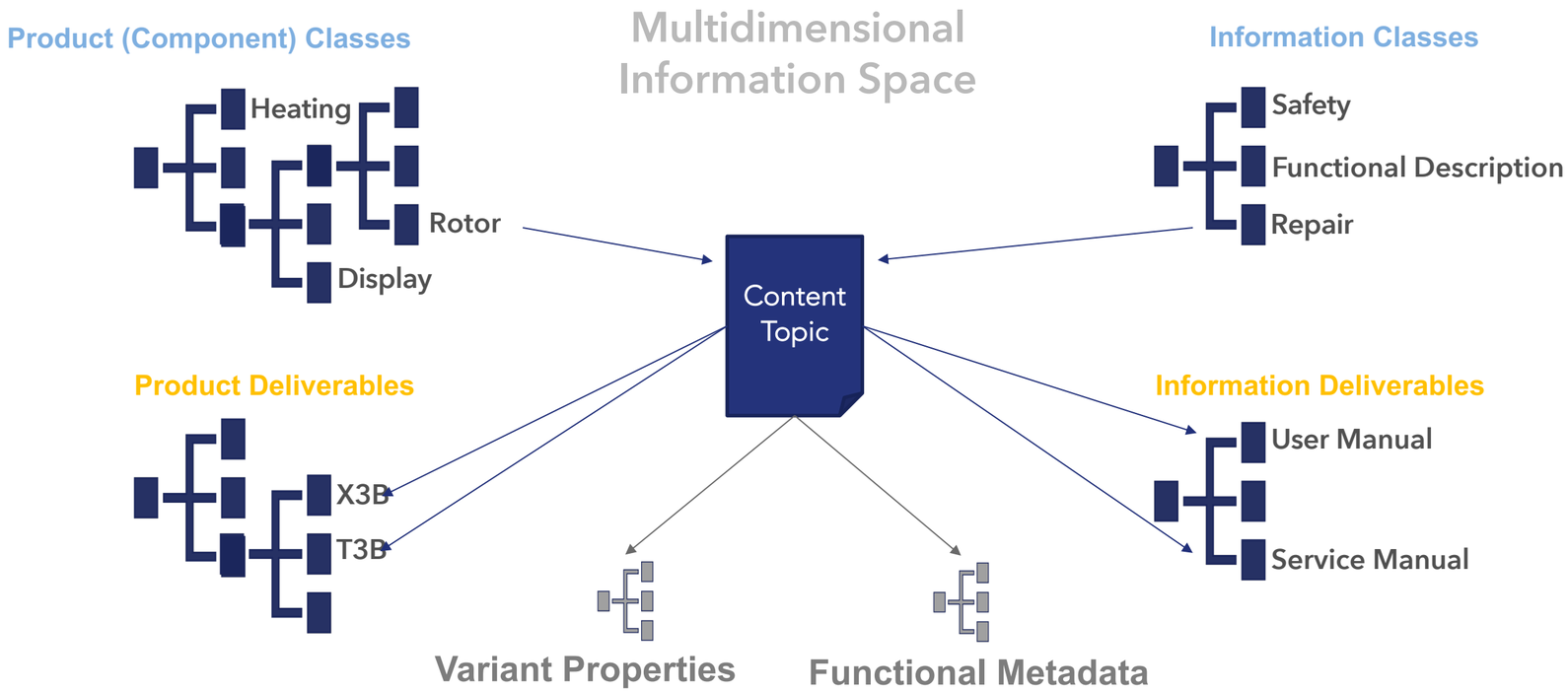


Topic: self-contained information unit;
topic concept and content is defined by (intrinsic) PI-classes

www.pi-fan.de

CM Methods

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

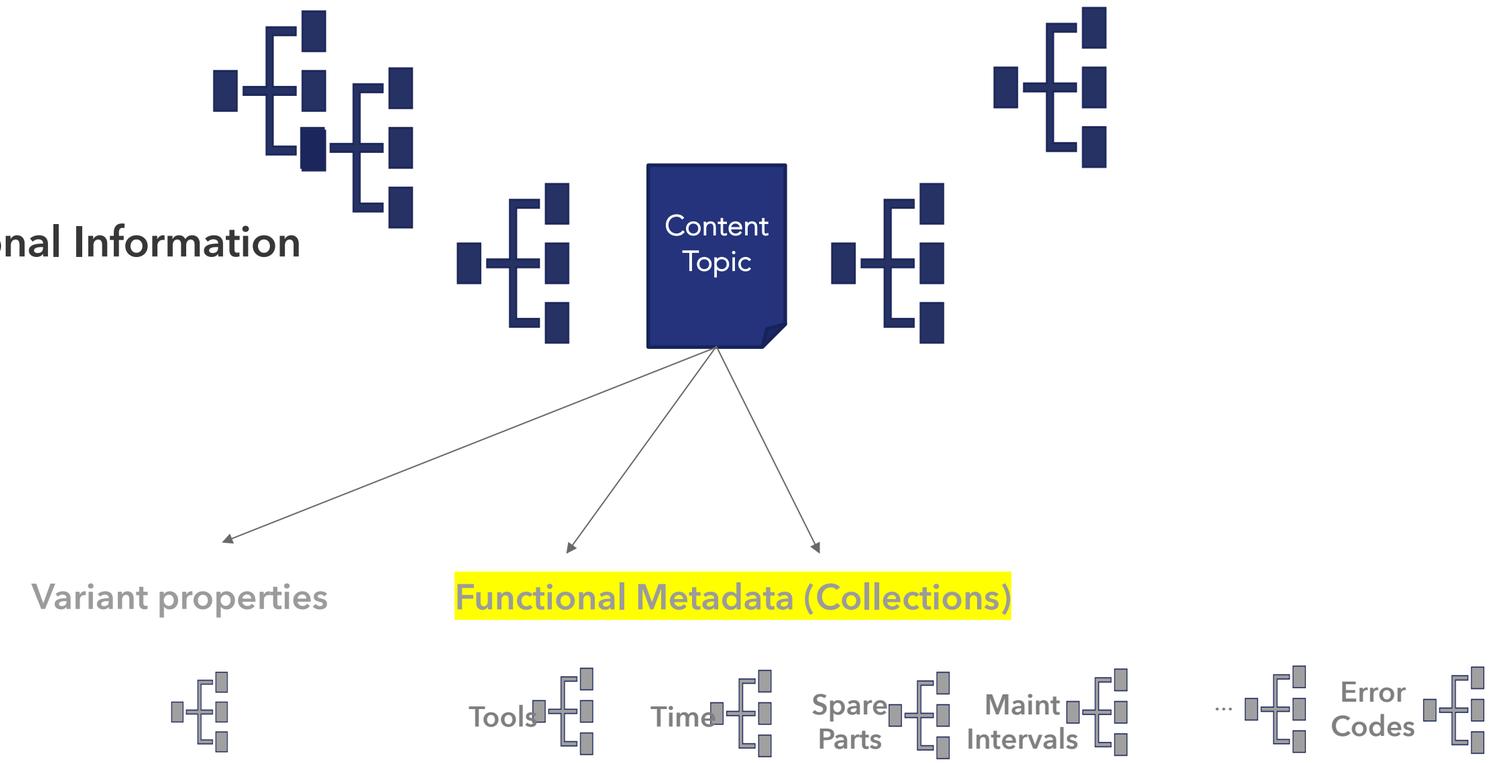


Hierarchies, Taxonomies, List, …

CM Methods

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

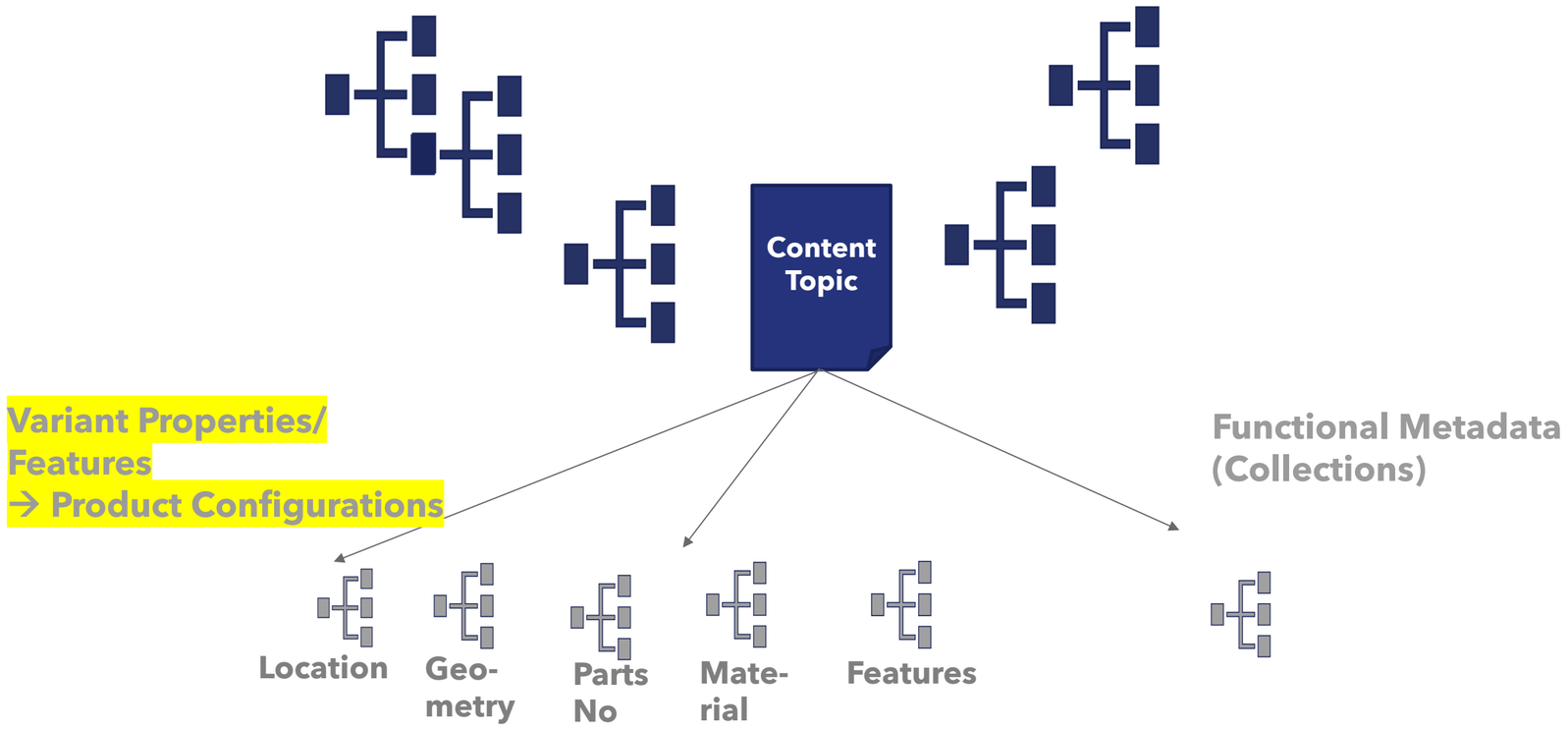
: Multidimensional Information



CM Methods

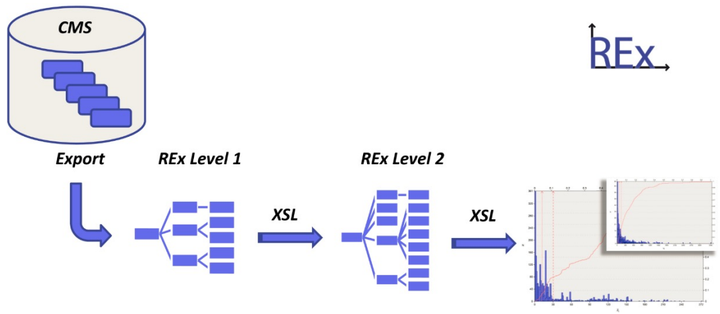
CMS „Taxonomies“ from Topic Classification

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 managment (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)

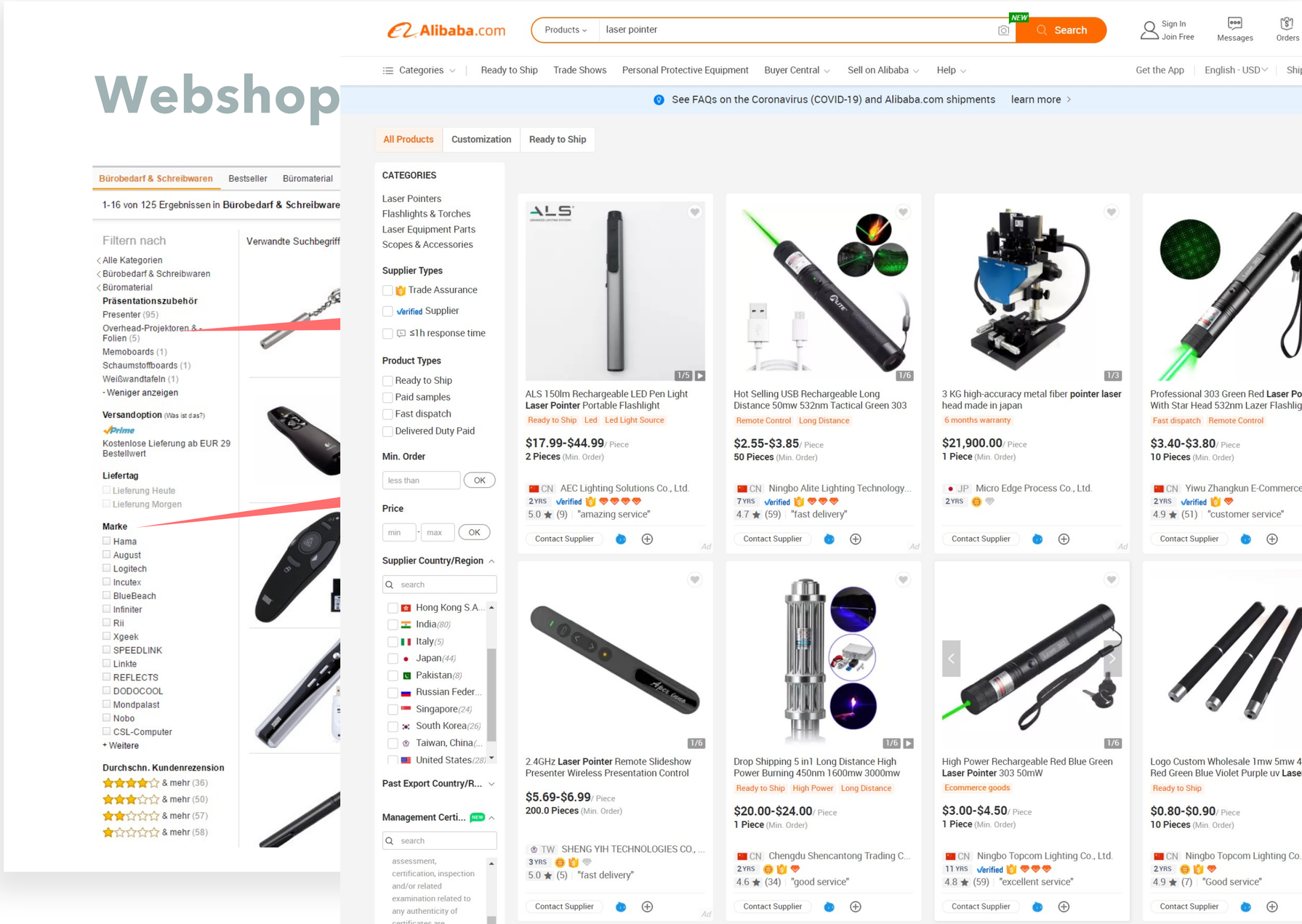
- Highly structured content, enriched by semantic metadata has been created, but often only used for (automated) PDF/print production.
  (Even though CMS can produce all types of media)
- Latest delivery technologies benefit from and require such structured
  content packages
- New media (e.g. chatbots,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

Intelligent Content Delivery

Making use of native intelligence of content

CD Methods

Webshop



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

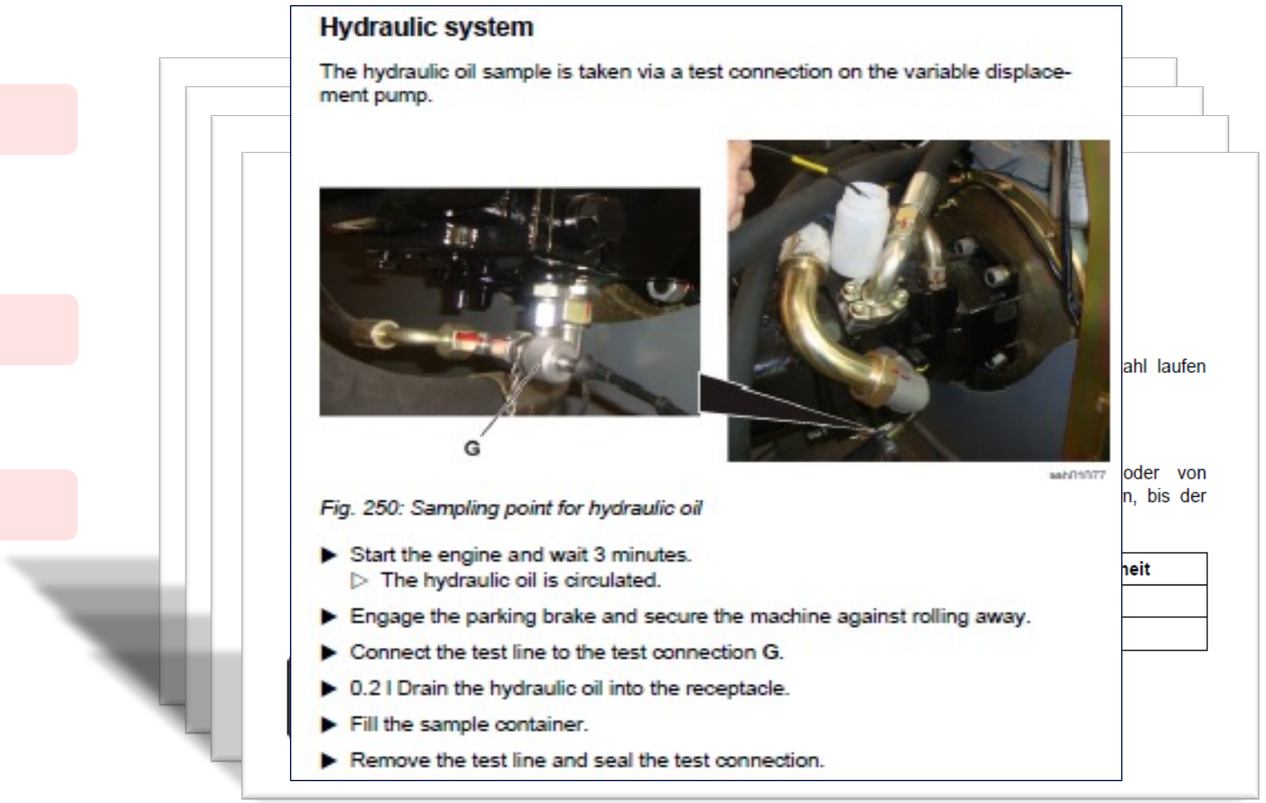
Testing

Machine

Z-006

Document

Service



CD Methods

Facetted search/request and topic delivery

Customer-dependent Configuration !

Component

- Hydraulic system
  - Oil Pump

Information

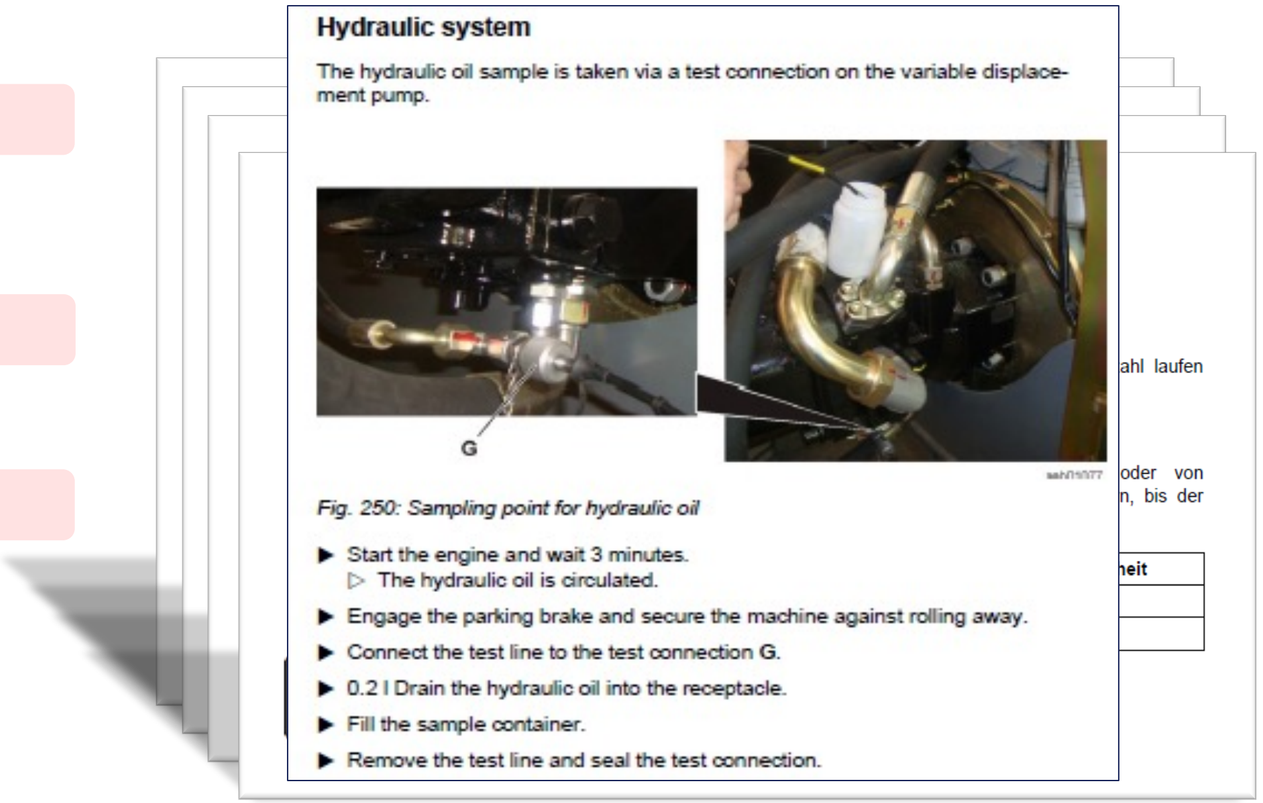
- Procedure
  - Testing

Machine

Z-006

Konfiguration

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



CD Methods

Need for changing concepts of topic creation and metadata handling

Application area

3.2 Principle of operation

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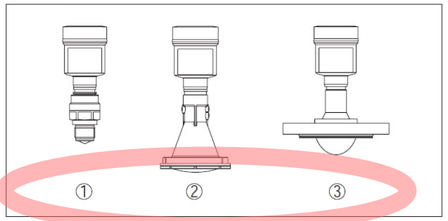

Fig. 2: Antenna systems LEVEL TRANSMITTER 8139

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.

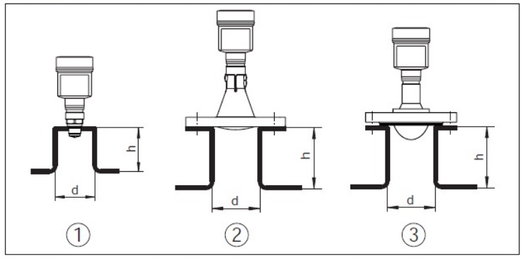

Fig. 17: Socket mounting with deviating socket dimensions with different versions of LEVEL TRANSMITTER 8139

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Thread with integrated horn antenna

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58499-EN-190321

Selection/Generating of publication depending on parameters

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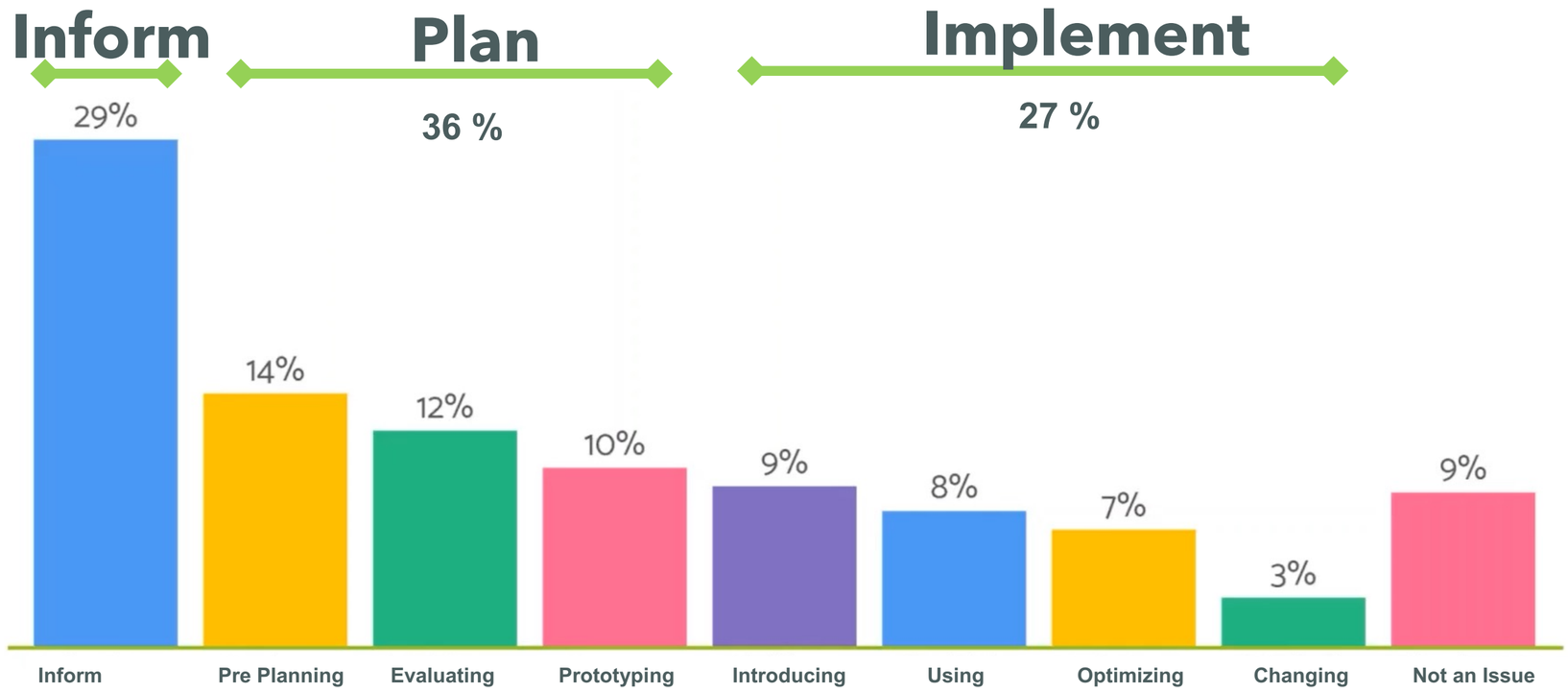
Derating, ambient temperature

CDP Market

Content Delivery: System Introduction Phases



Ziegler/Steurer

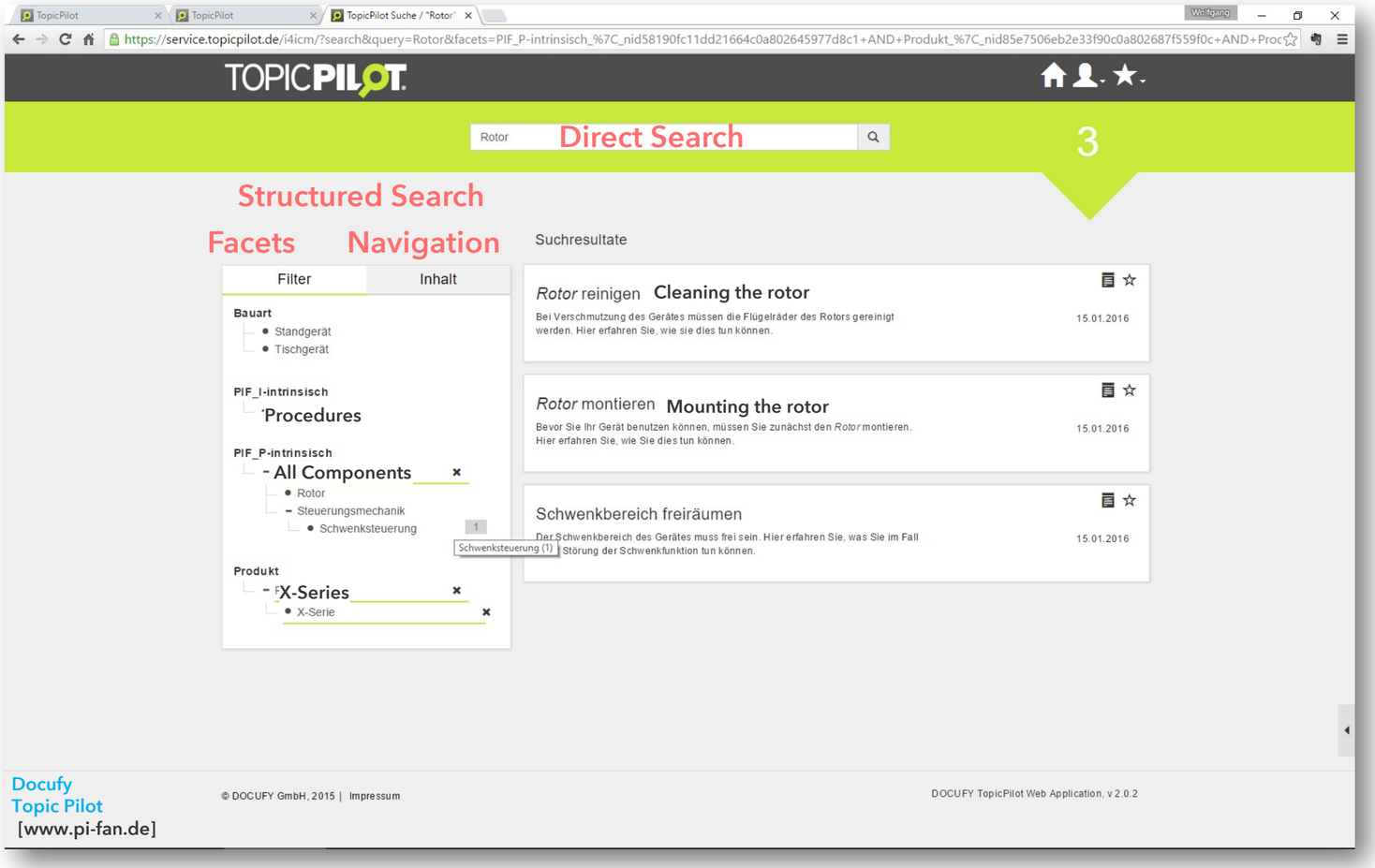
CDP Scenarios, tekom 2020
02.11.2020

CD Methods

(Demo

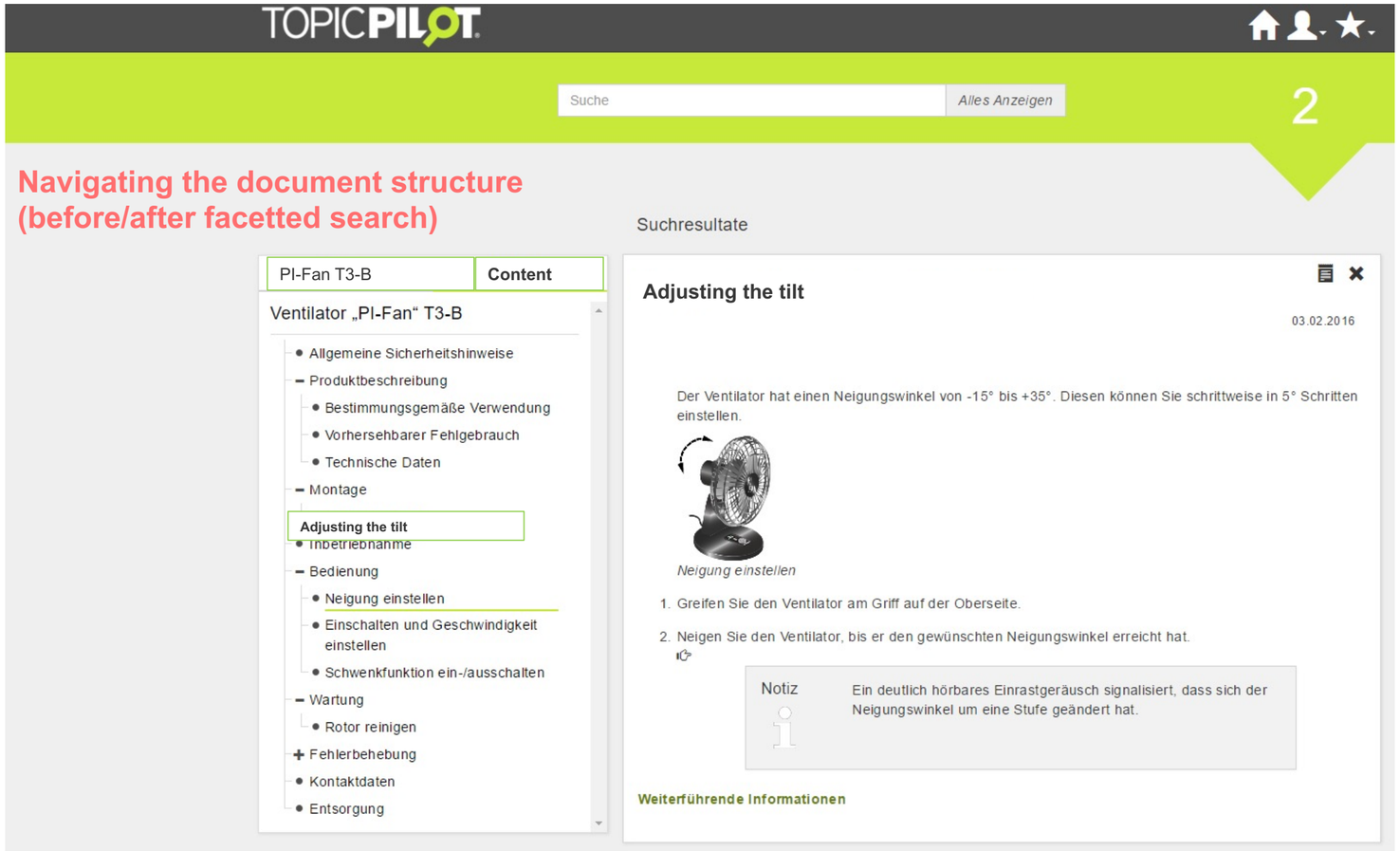
PI-Fan reference model)

Content Delivery Portal (PI-Fan)



CD Methods

Content Delivery Portal (PI-Fan)



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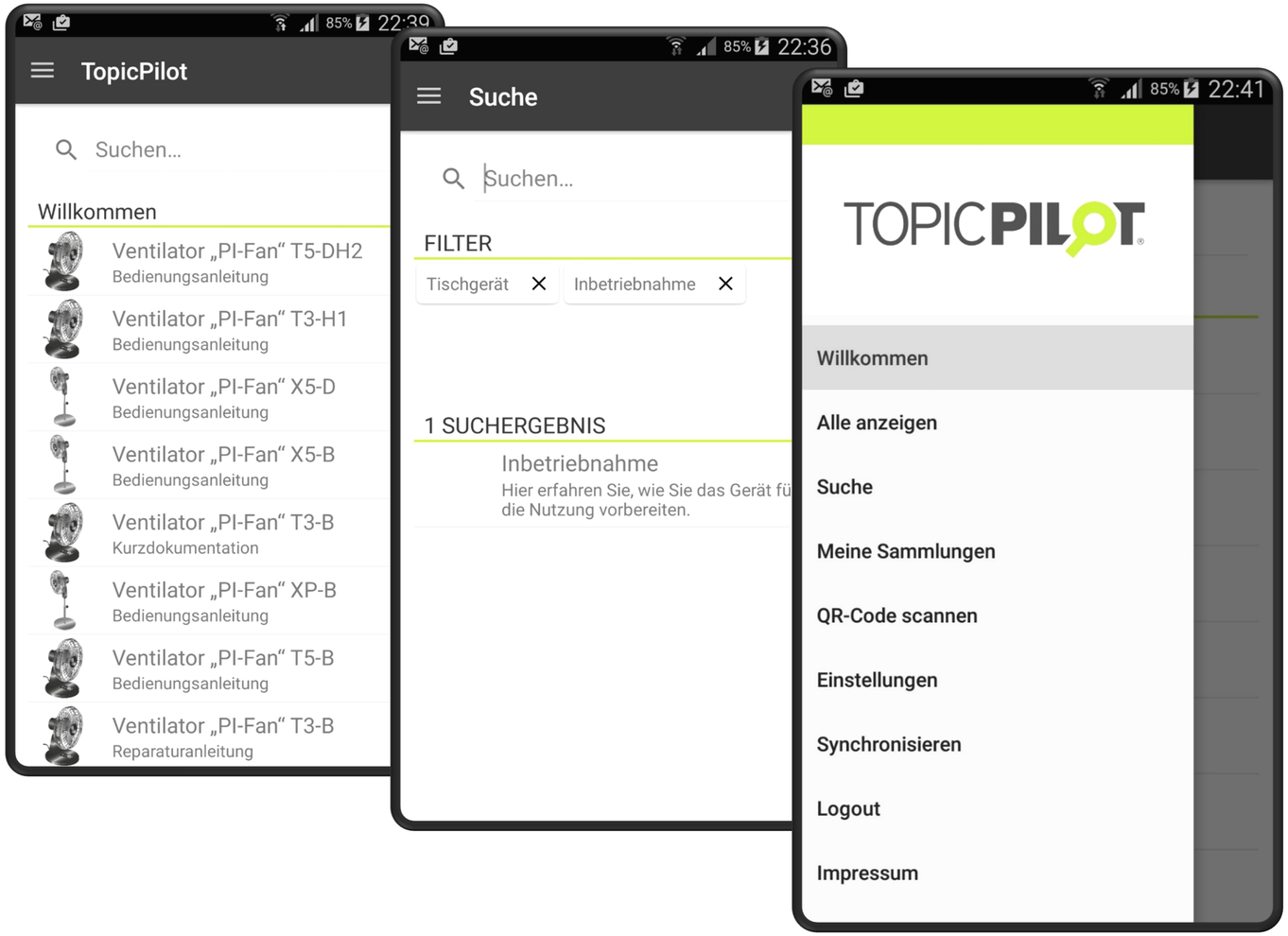
CD Methods

App Delivery Application including Search



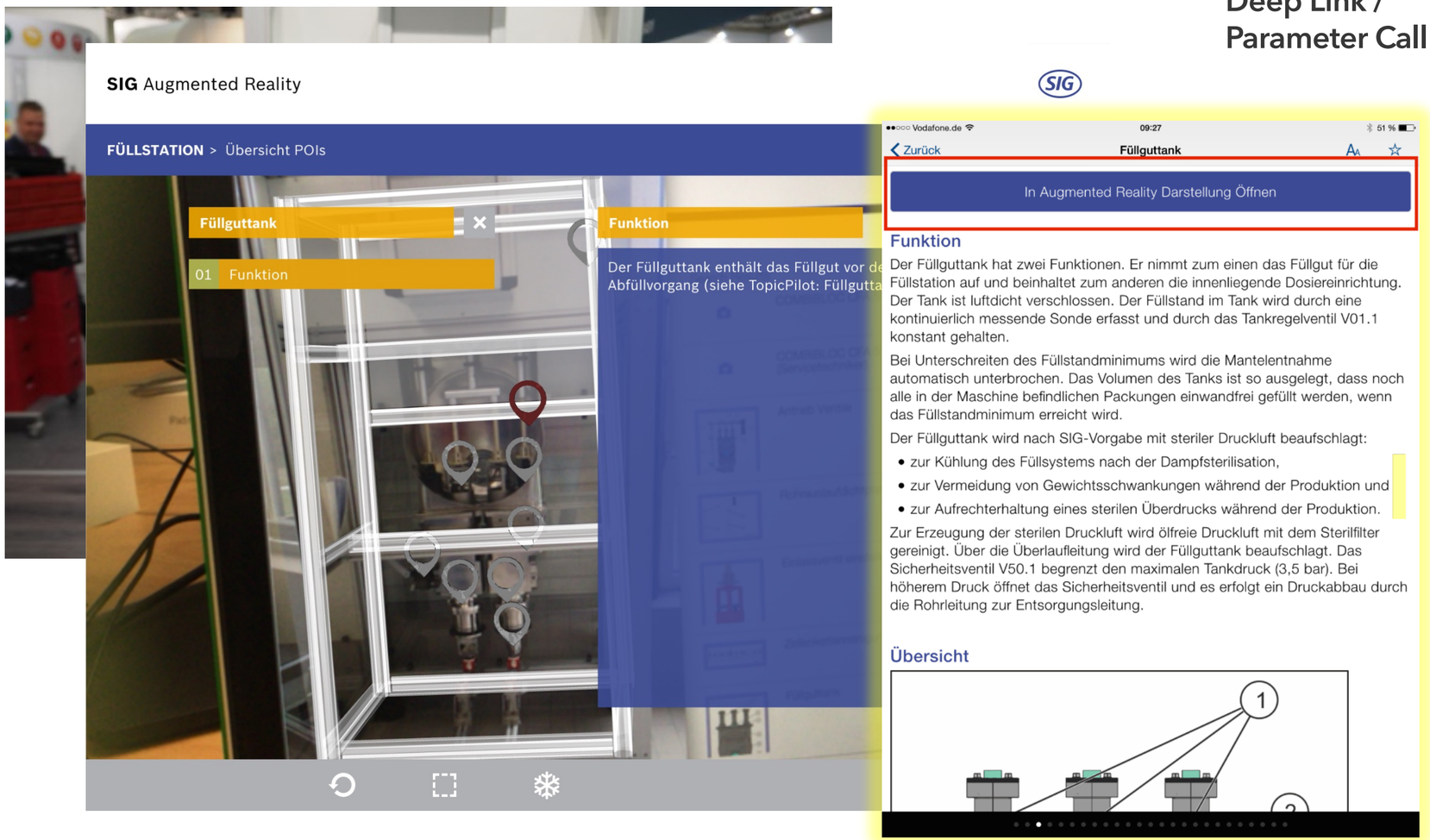
CD Methods

Content Request &

Delivery

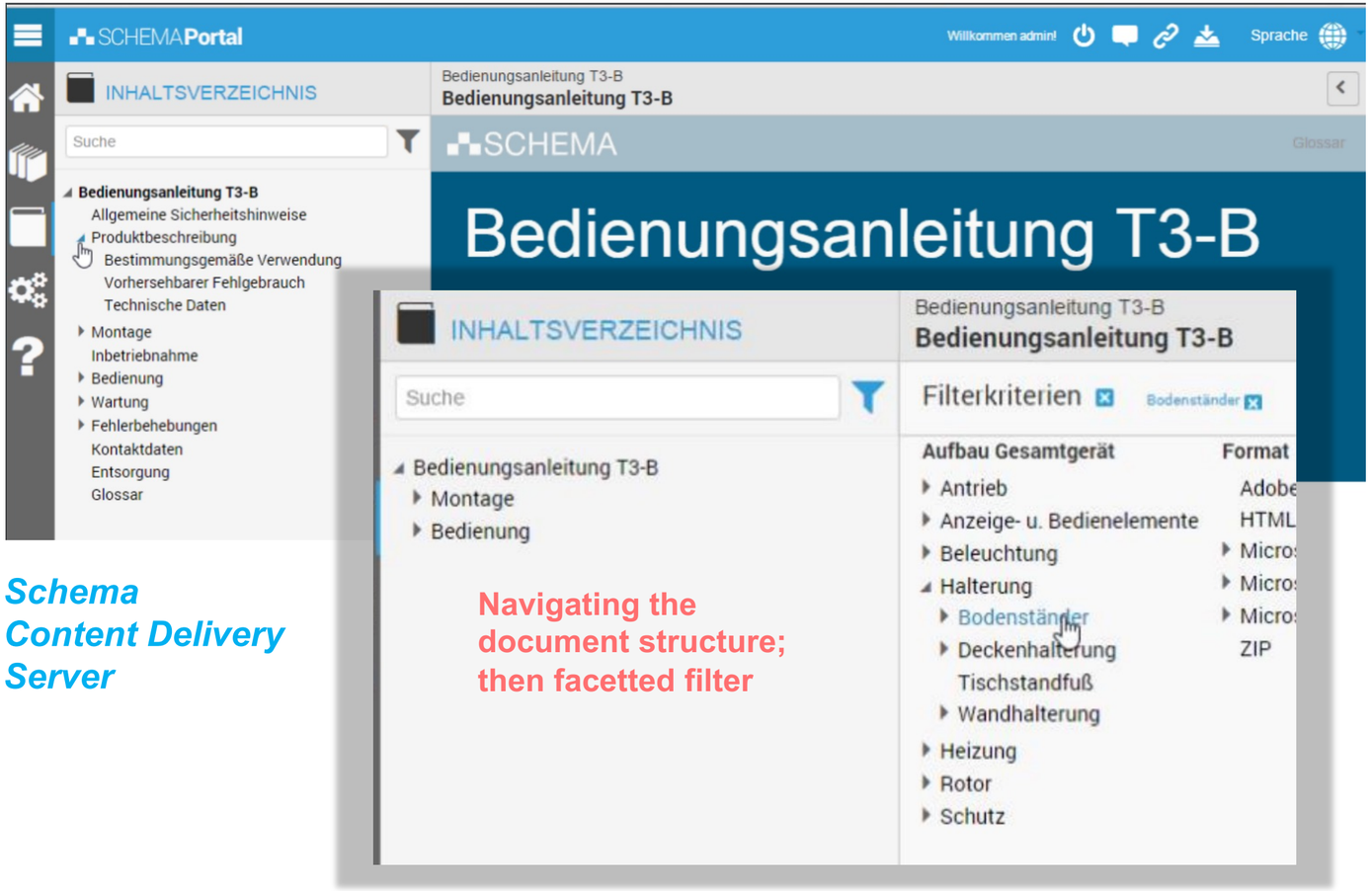
Object Recognition and CDP

CDP Request:
Deep Link /
Parameter Call



CD Methods

CDP: Facets in Documents



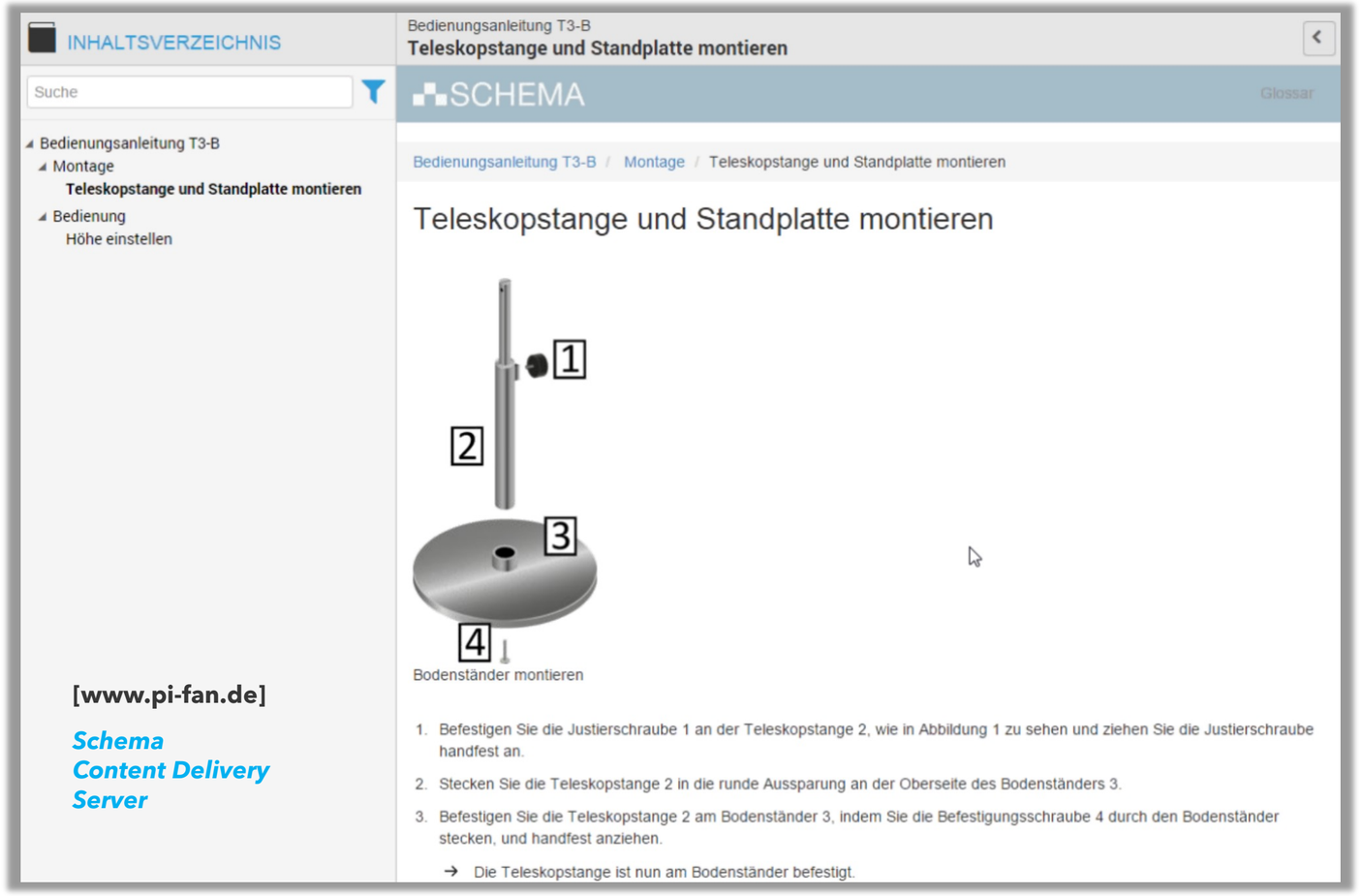
Schema Content Delivery Server

Navigating the document structure; then facetted filter

www.pi-fan.de

CD Methods

Content Delivery Portal (PI-Fan)

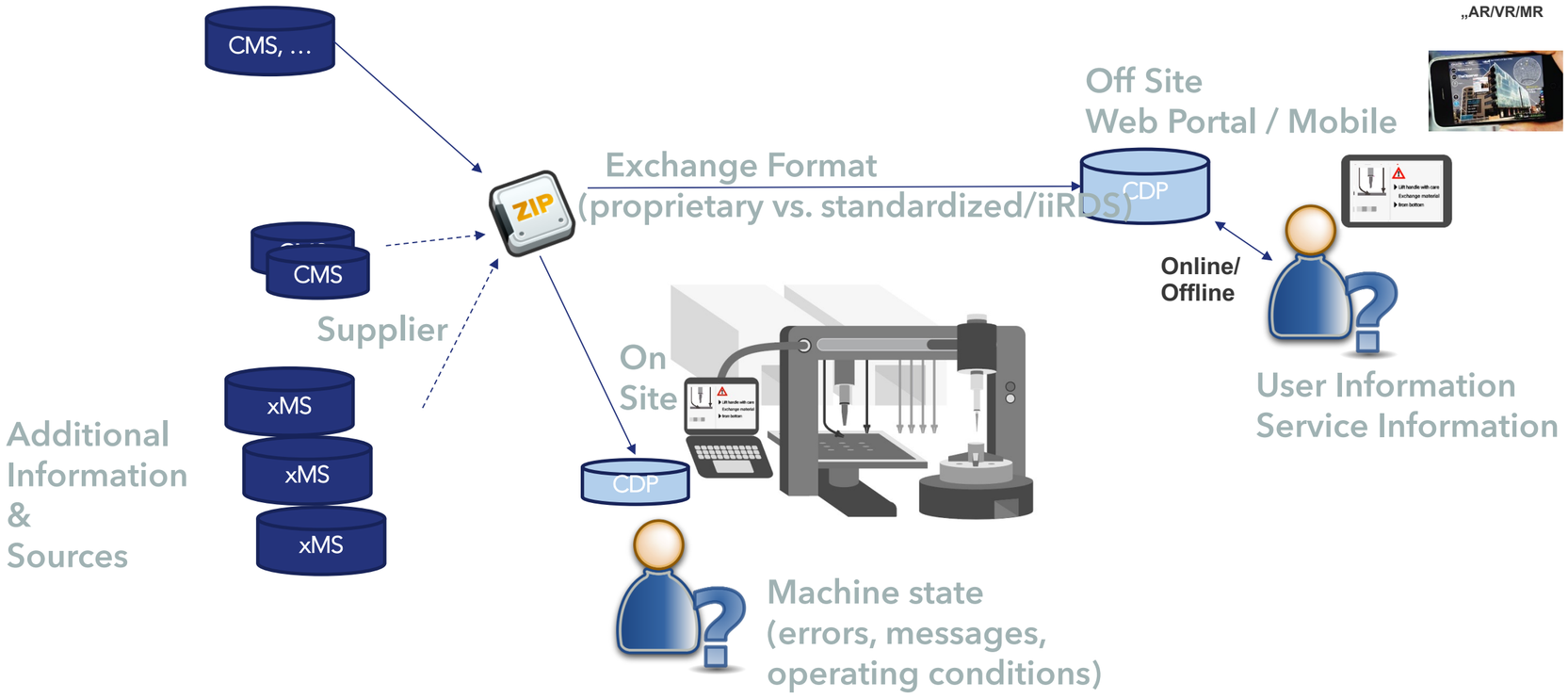


[www.pi-fan.de]

Schema Content Delivery Server

CD Methods

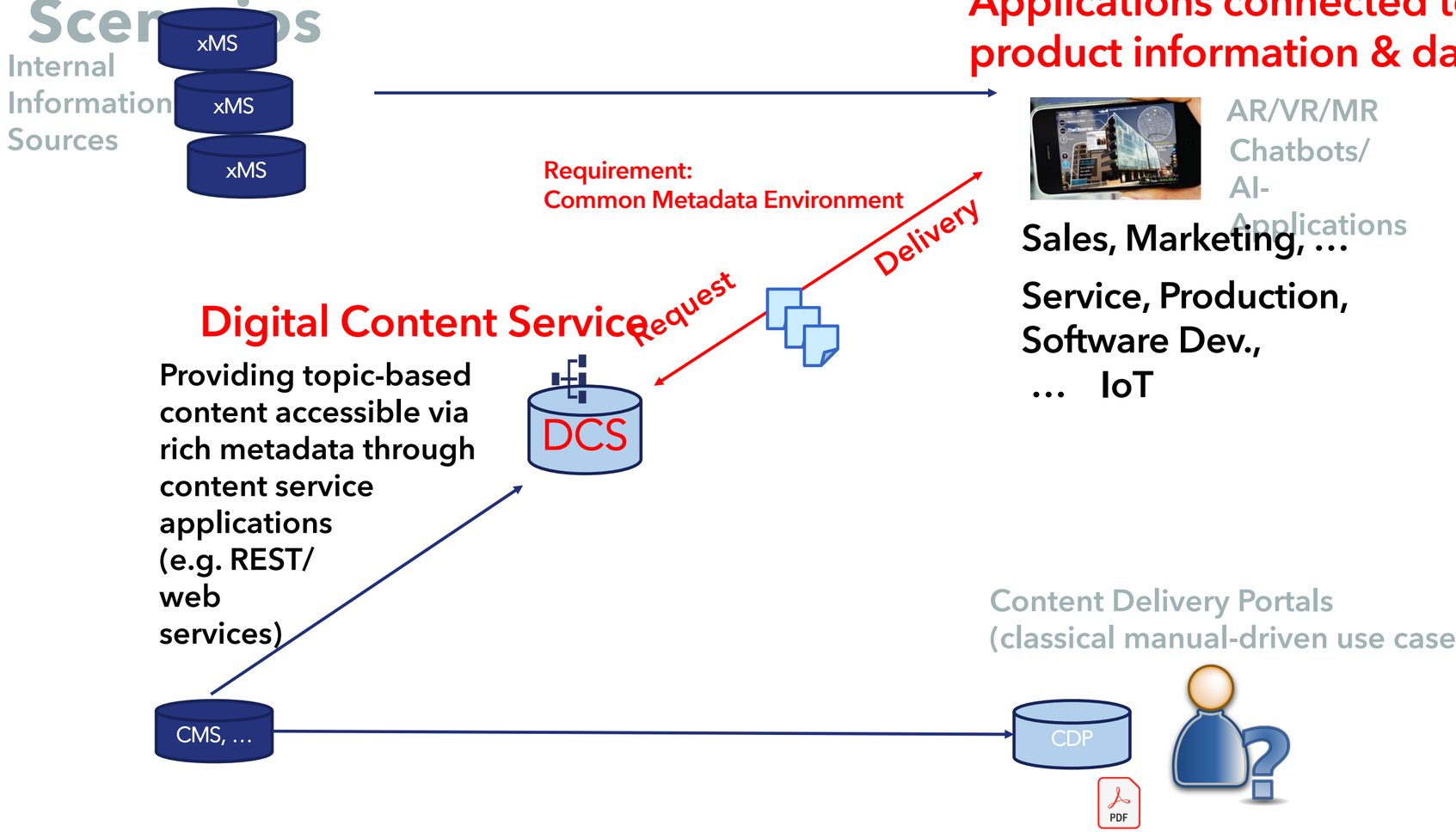
CDP environments in industrial applications



CD Methods

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

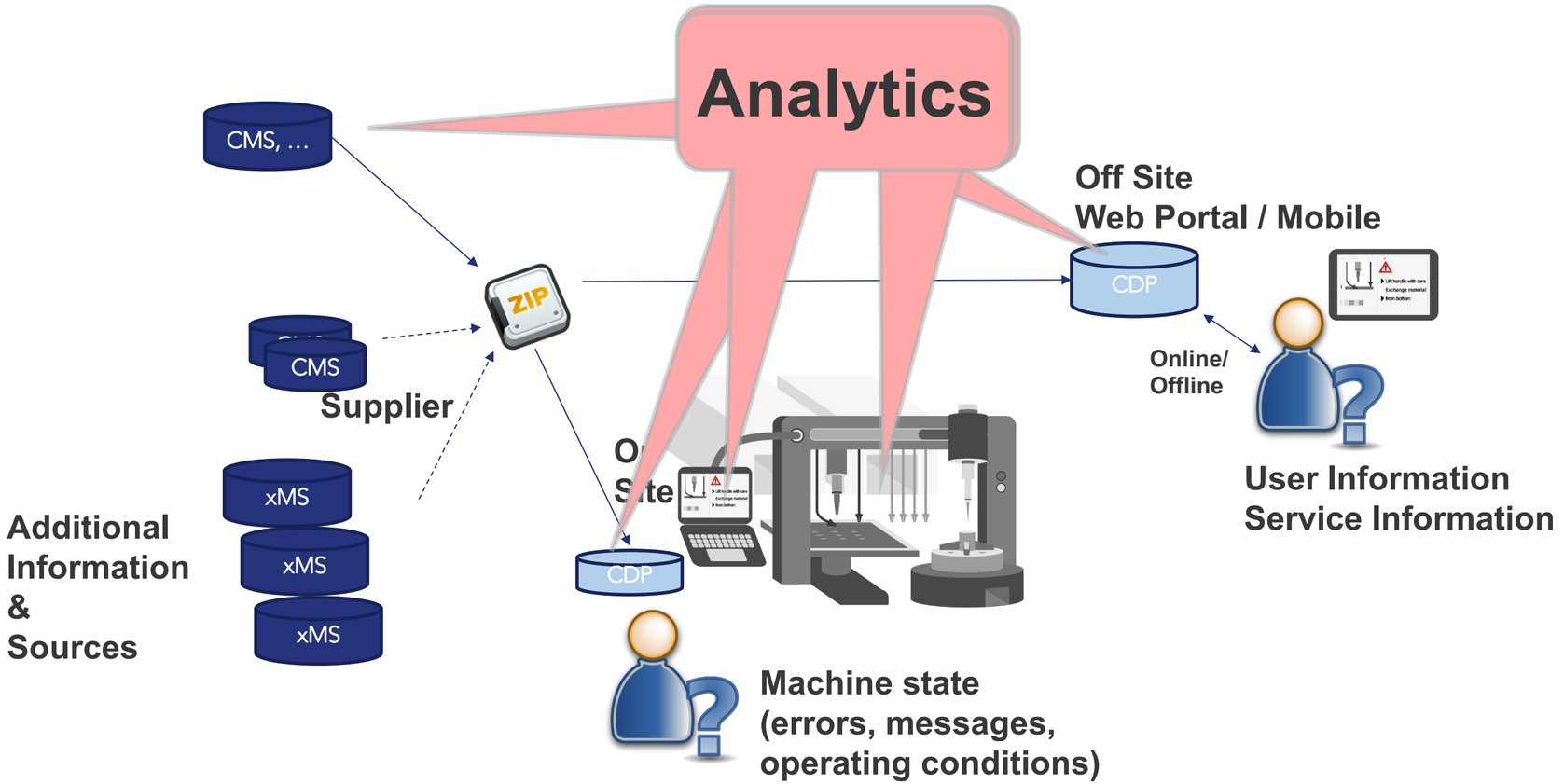
Digital Content Services in Integrated Scenarios



CD Environment

Analytics

CDP and analytics in industrial applications



CMS & CDP Analytics

Analytics

Overview of Content System Analytics

CMS Analytics (REx)

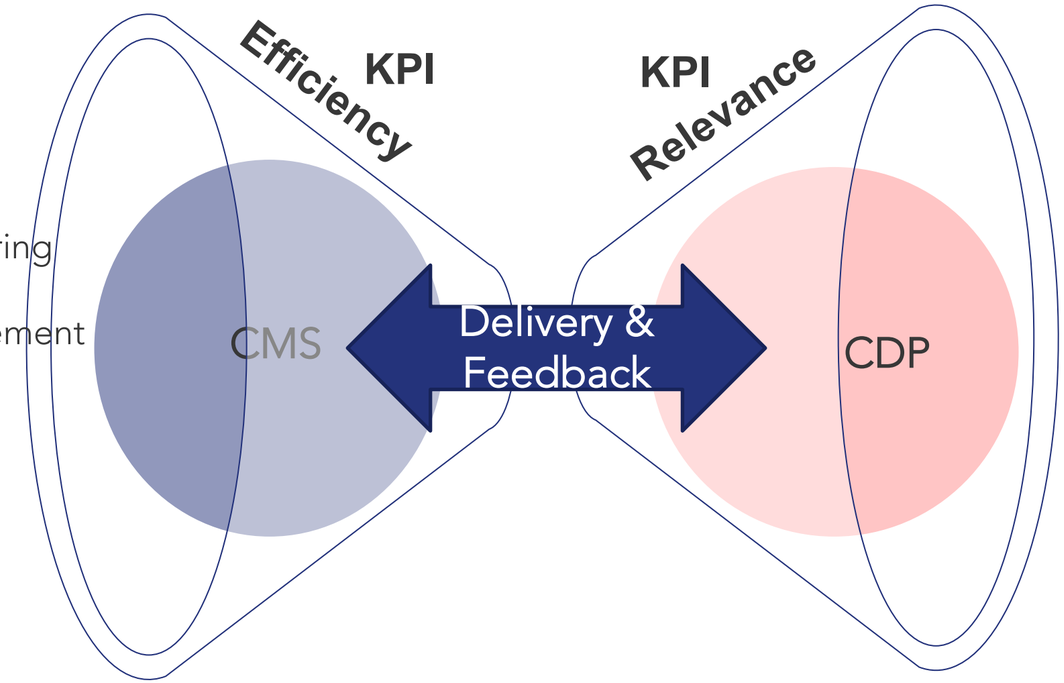
→ Metrics:
- Reuse Rates (Abundancy)
- Redundancy
- Document Sharing factor
- Variant management
- Correlations; Distributions

…

Artificial Intelligence

→Quality assurance:
- Similarity analysis
- Classification quality

…



CDP Analytics (CoReAn)

Indirect feedback

→ Metrics:
- visiting time,
- Visit frequency
- search behaviour
- search terms
- …

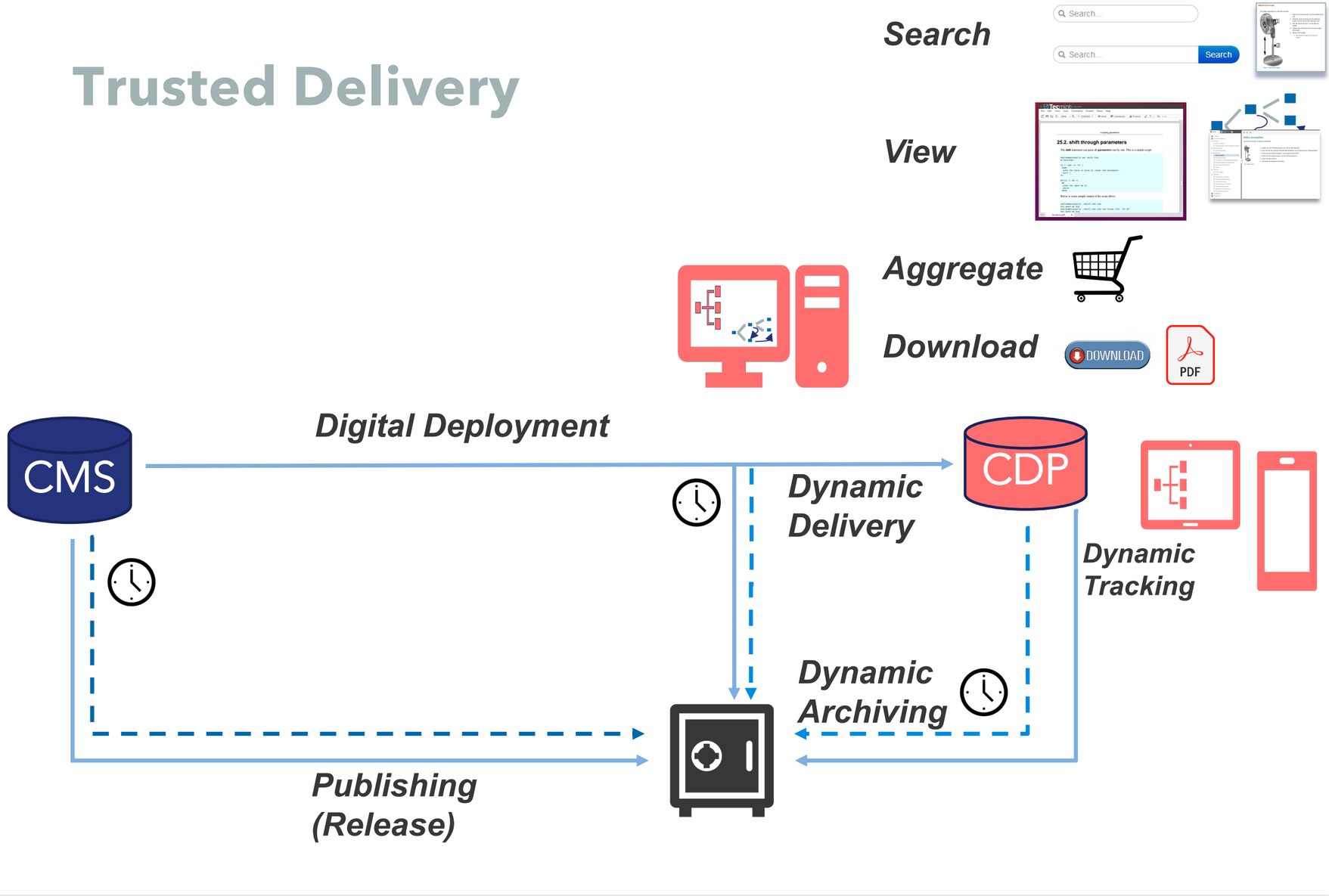
Direct feedback
- Rating
- Satisfaction

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

CMS – CDP

Archiving Services

Trusted Delivery



Content Delivery

Summary (CDP)

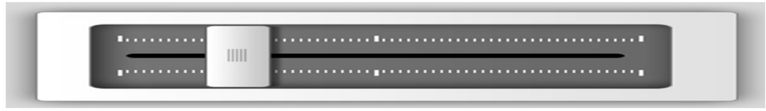
- Technology of CDP is available for delivery of document packages and facetted search for contained topics and documents;
  Source of **facets are mostly taxonomies** from **CMS**
- Remark**:Dynamic aggregation, **variant management** is (at the moment) mostly done in CMS, not in CDP; **configuration 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



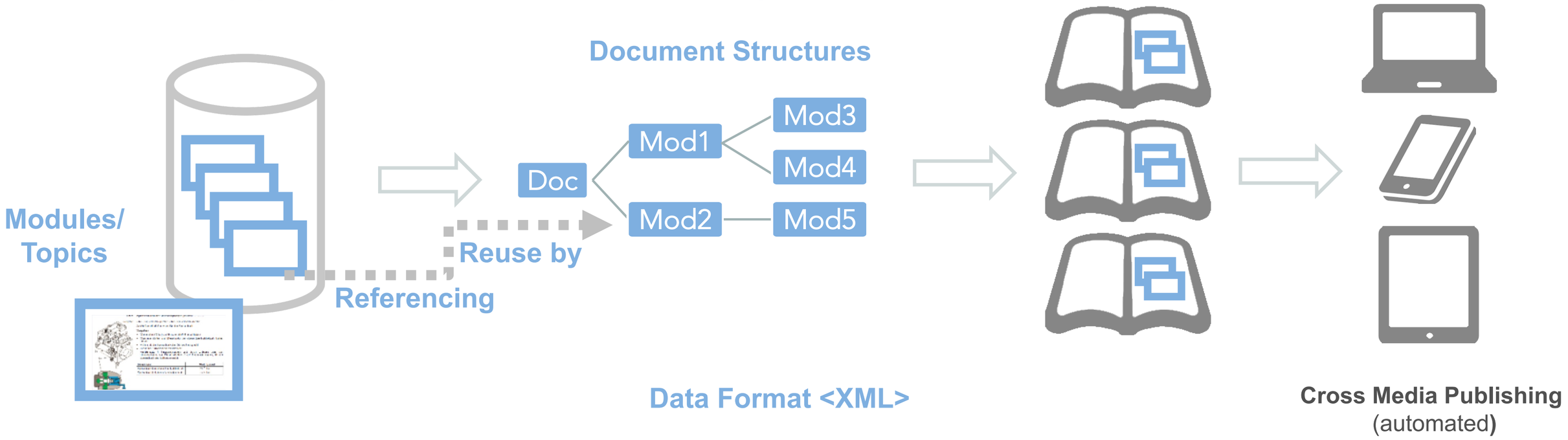
– manage internal complexity for information engineers & architects

CM Methods

Referencing modules/topics

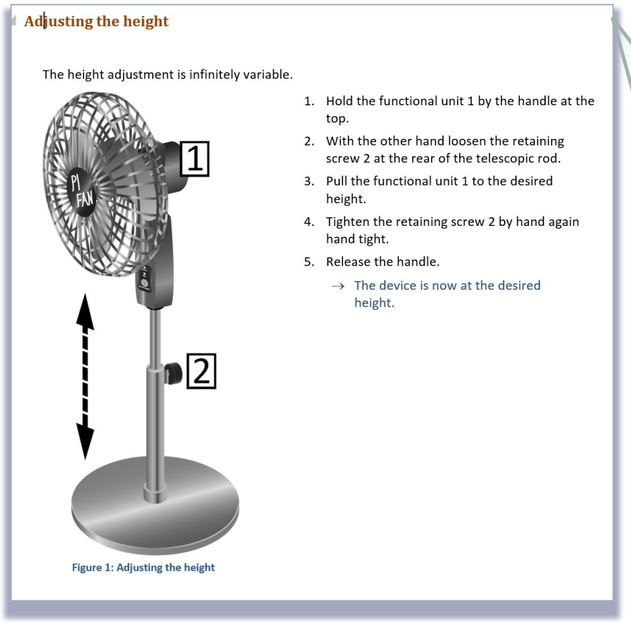
- permits controlled processes
- avoids uncontrolled redundancies
- defines and populates document structures by topics

Reuse, Aggregation and Publishing



CM Methods

Basic Dimensions of Module Classification (PI-Class®)



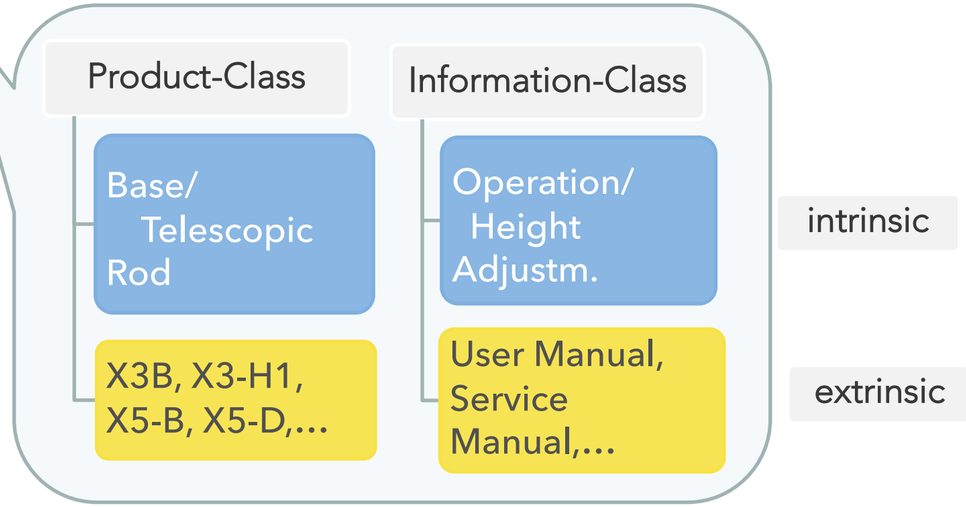
Adjusting the height

The height adjustment is infinitely variable.

1. Hold the functional unit 1 by the handle at the top.
2. With the other hand loosen the retaining screw 2 at the rear of the telescopic rod.
3. Pull the functional unit 1 to the desired height.
4. Tighten the retaining screw 2 by hand again hand tight.
5. Release the handle.

→ The device is now at the desired height.

Figure 1: Adjusting the height

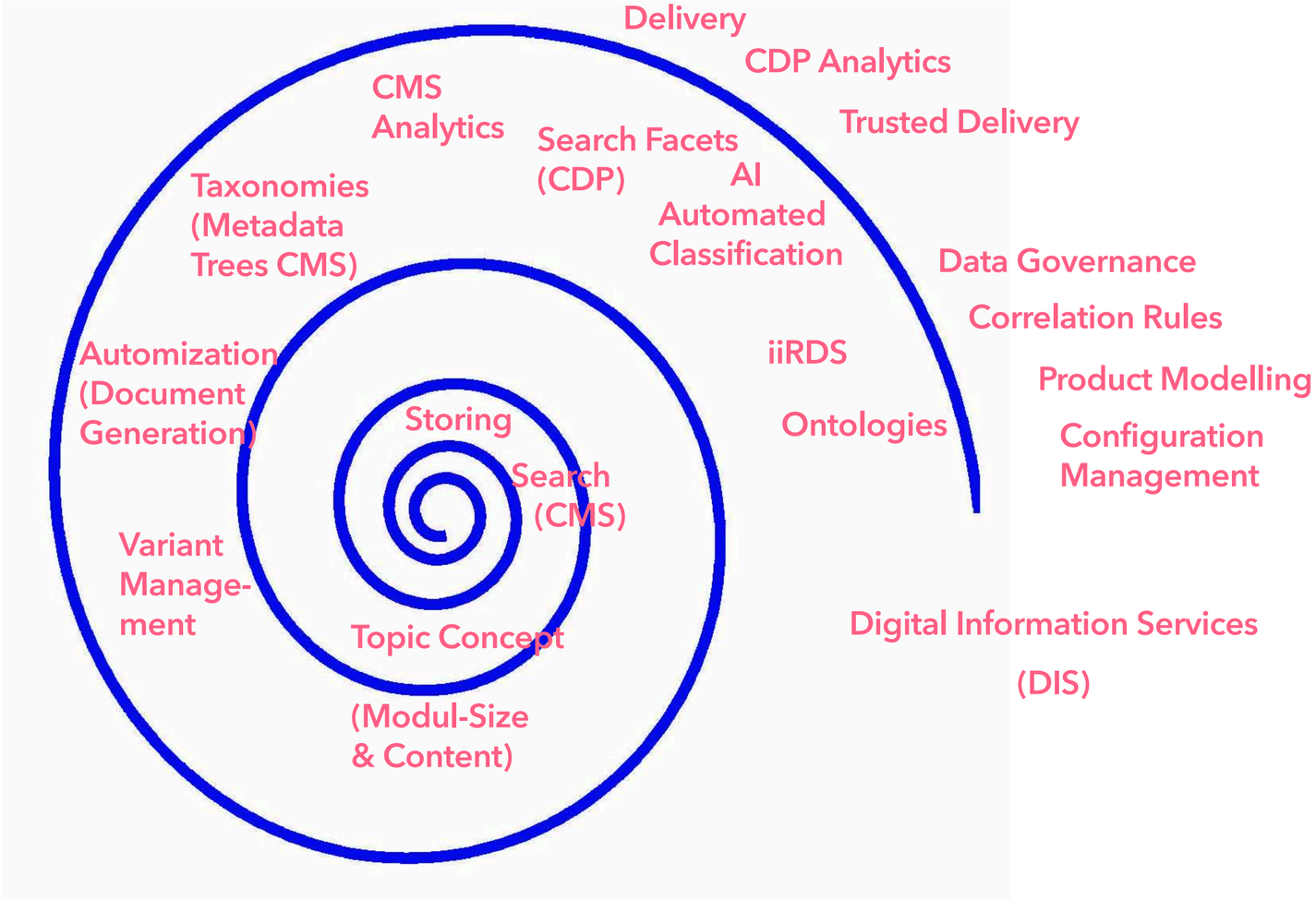


Topic: self-contained information unit;
topic concept and content is defined by (intrinsic) PI-classes

www.pi-fan.de

Metadata Evolution

Overview: From CMS via CDP to DIS



CM Methods

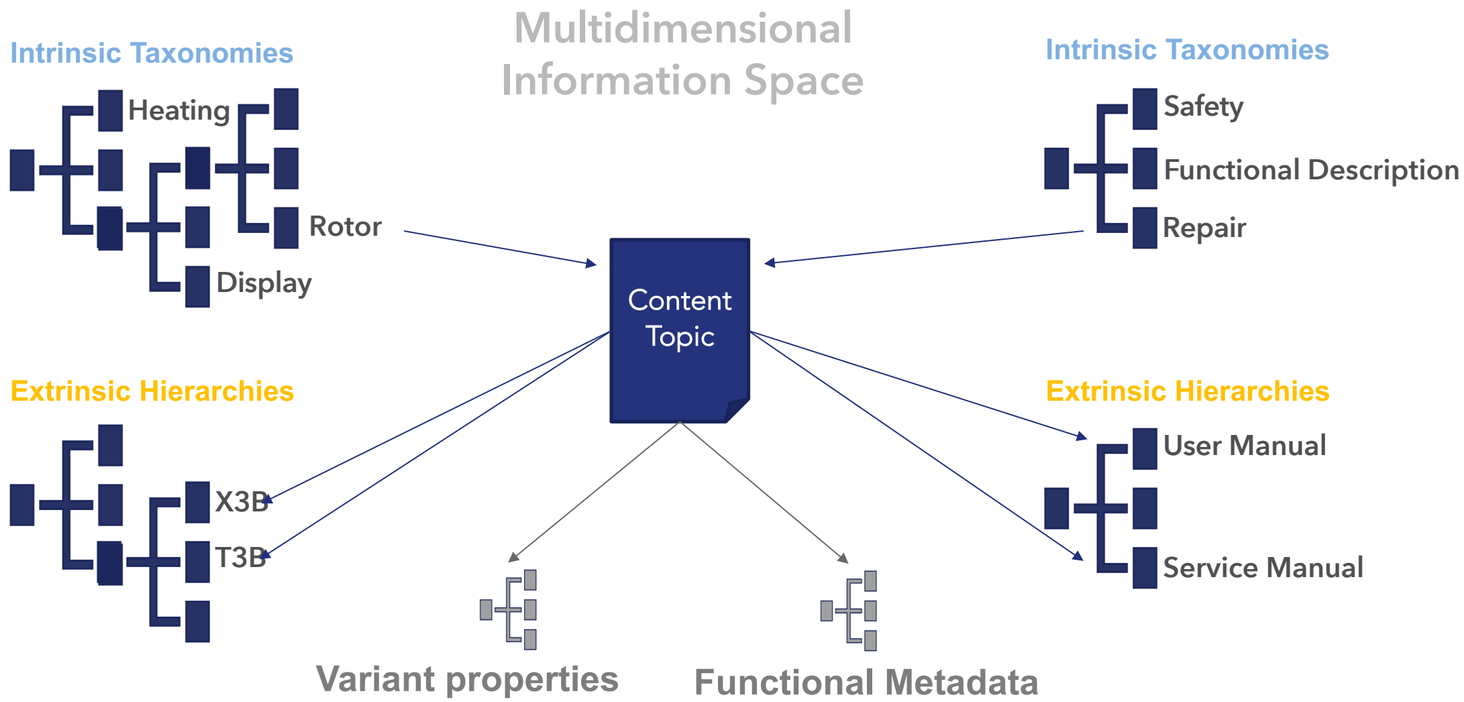
Metadata

for identifying

and addressing

modules/topics

CMS „Taxonomies“ from Topic Classification



Hierarchies, Taxonomies, List, …

CM Methods

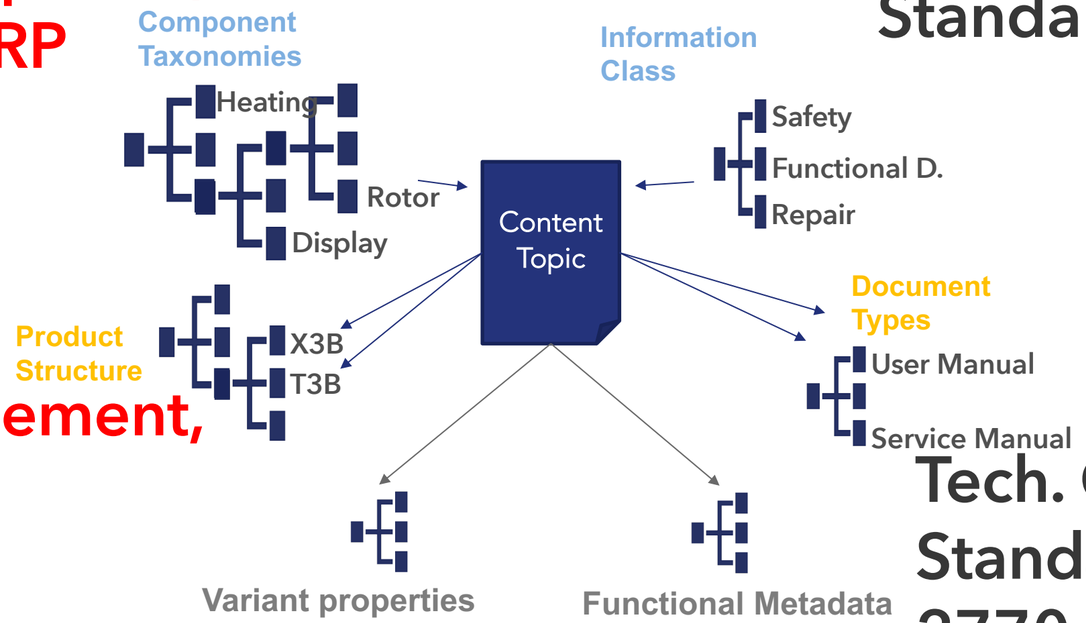
Depency on:

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

Information Environment and Dependencies

Engineering, Development, PLM, ERP or TC

Tech. Comm. Standards, iiRDS



Prod. Management, Sales or Tc

Tech. Comm. Standards, VDI 2770

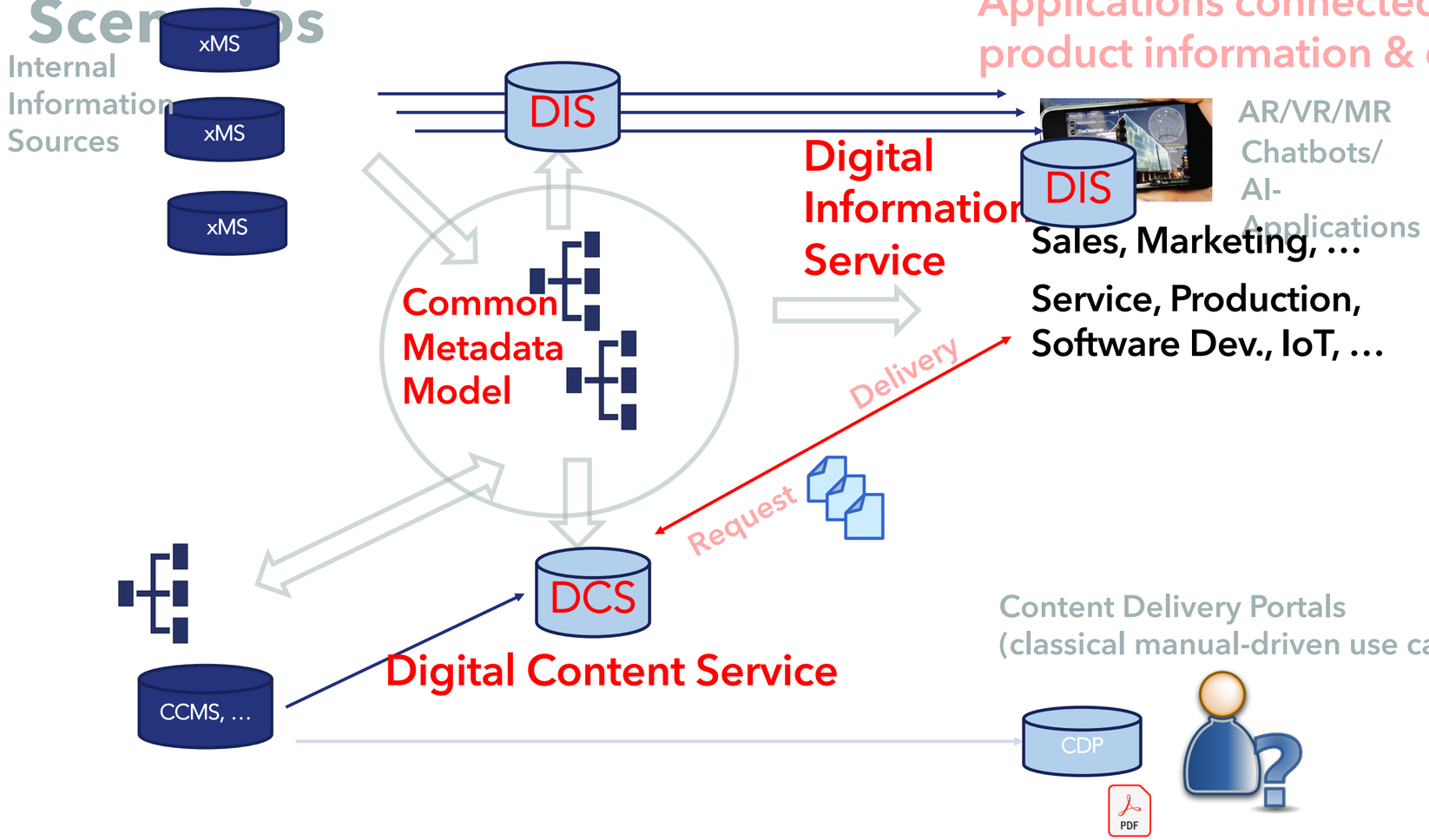
ERP, Engineering, PLM, PIM/PDM

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

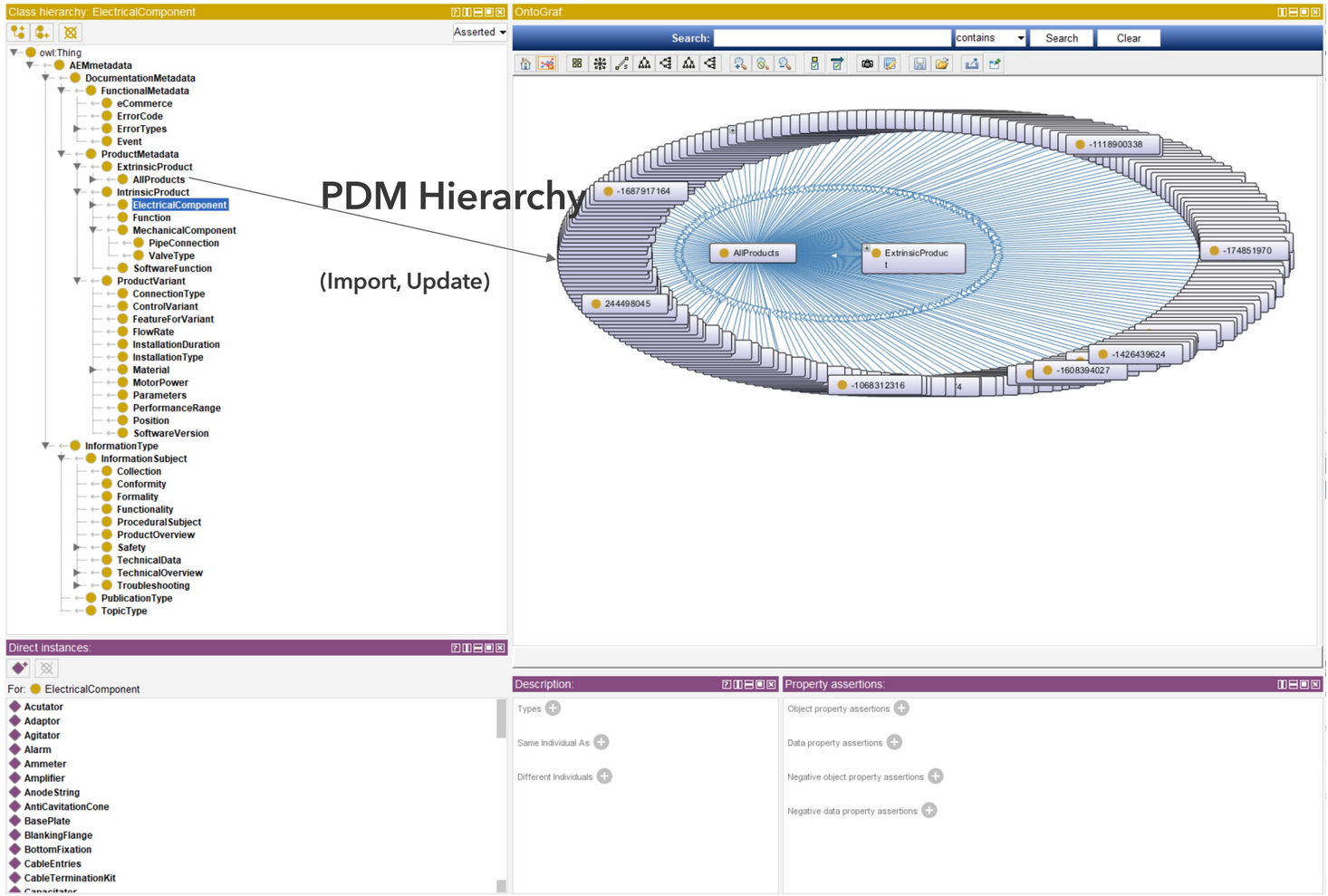


CM Methods: Metadata Model

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)

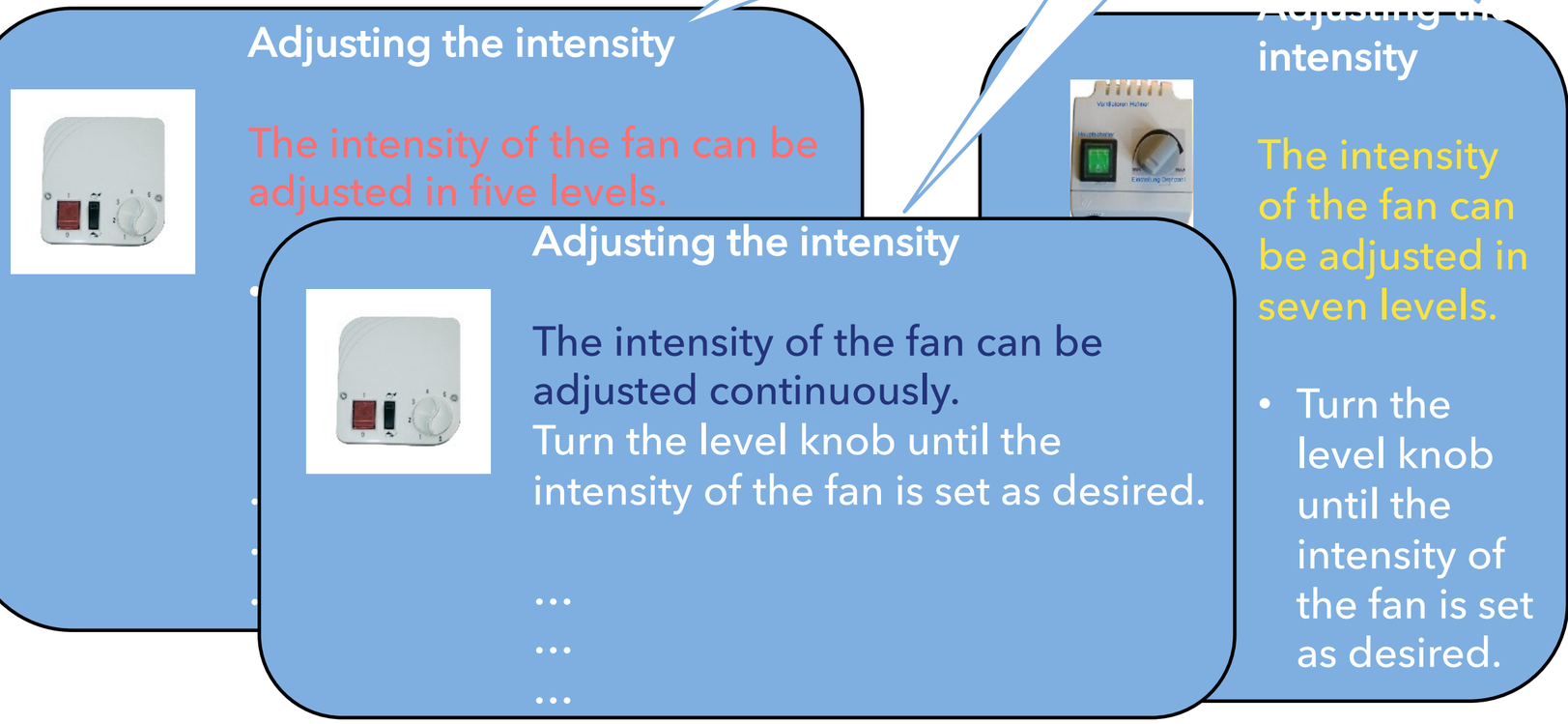
Variant Management (Topic variants)

Extrinsic Classification as variant property

T3B, TAB, TB5, T35, T3X5B,…

TPB, TAMP, ….

T7B, TFX,..



CM Methods

Extrinsic product variant

collection (of all products)

for filtering

Variant Management (sub-modular; one topic)

Extrinsic Classification as Variant Property

T3B, TB5, T445, TX5B,…

TPB, TAMP, ….

T7B, TFX,..

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

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“) →

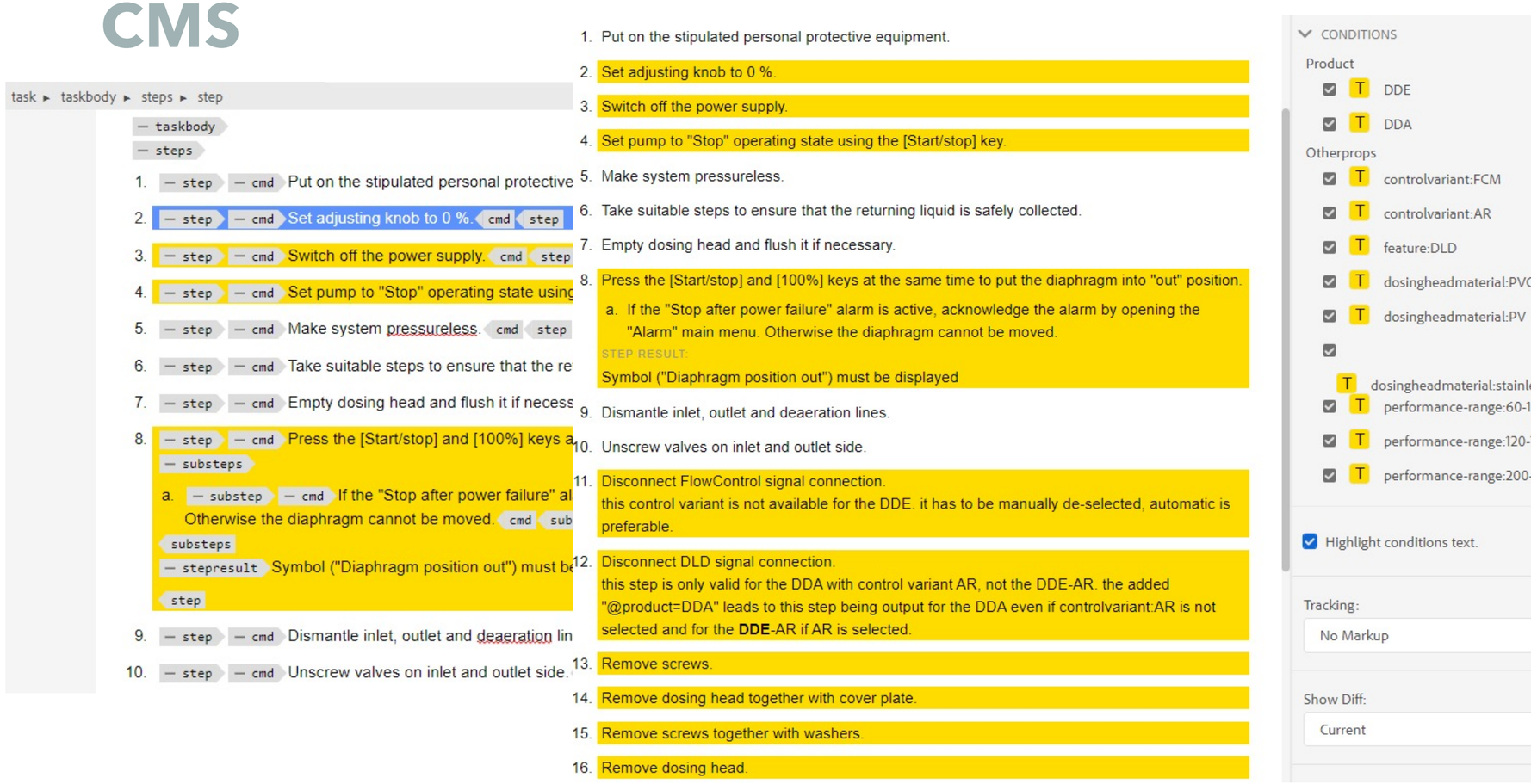
variant management on sub topic level

Where does system complexity appears for writers?

→

Handling of content variants systemetically by classification and var. parameters

System examples for handling complexity in CMS



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%)

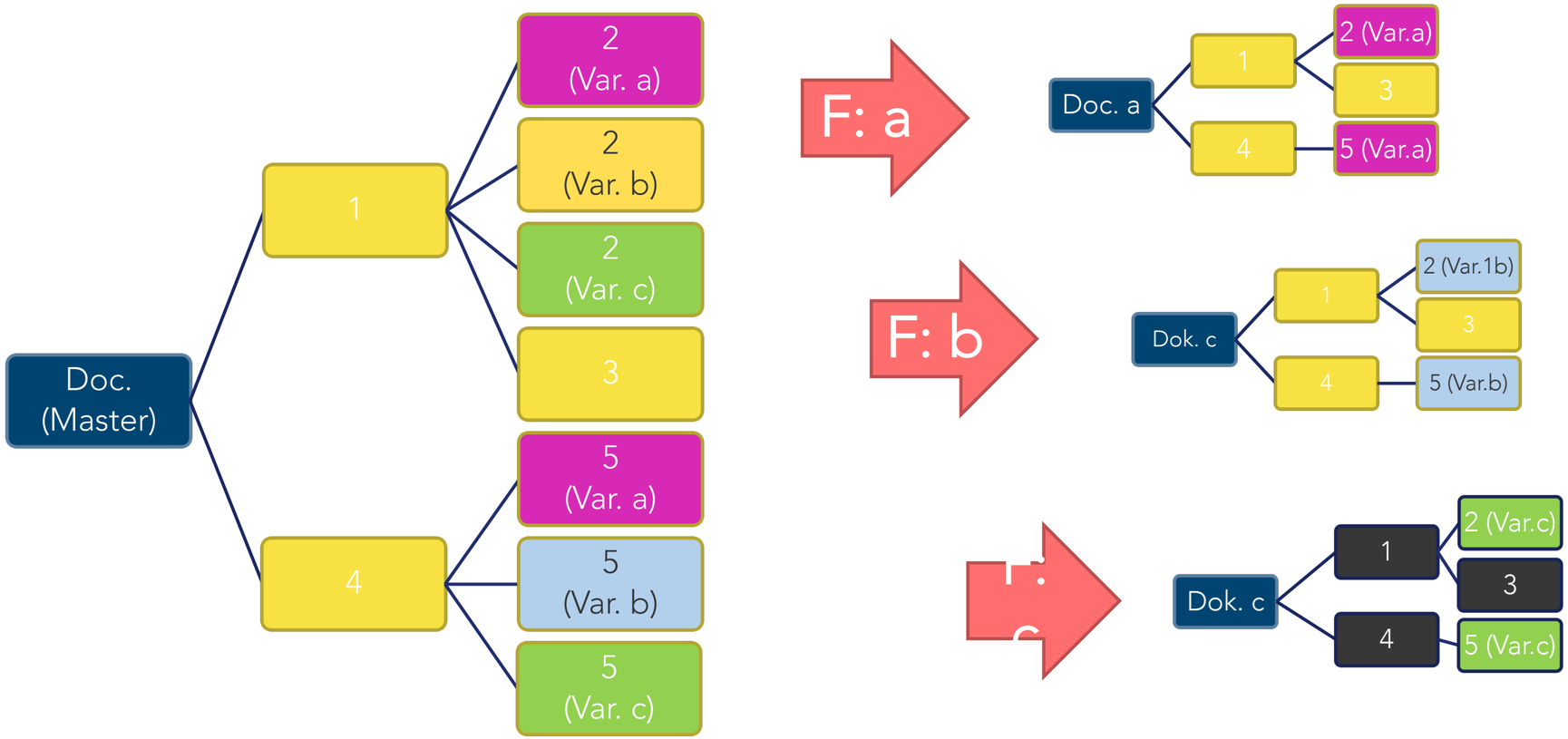
*,**,*** systemized, rules-based, automized

(x%) according to tekom CMS Study 2018

CM Methods

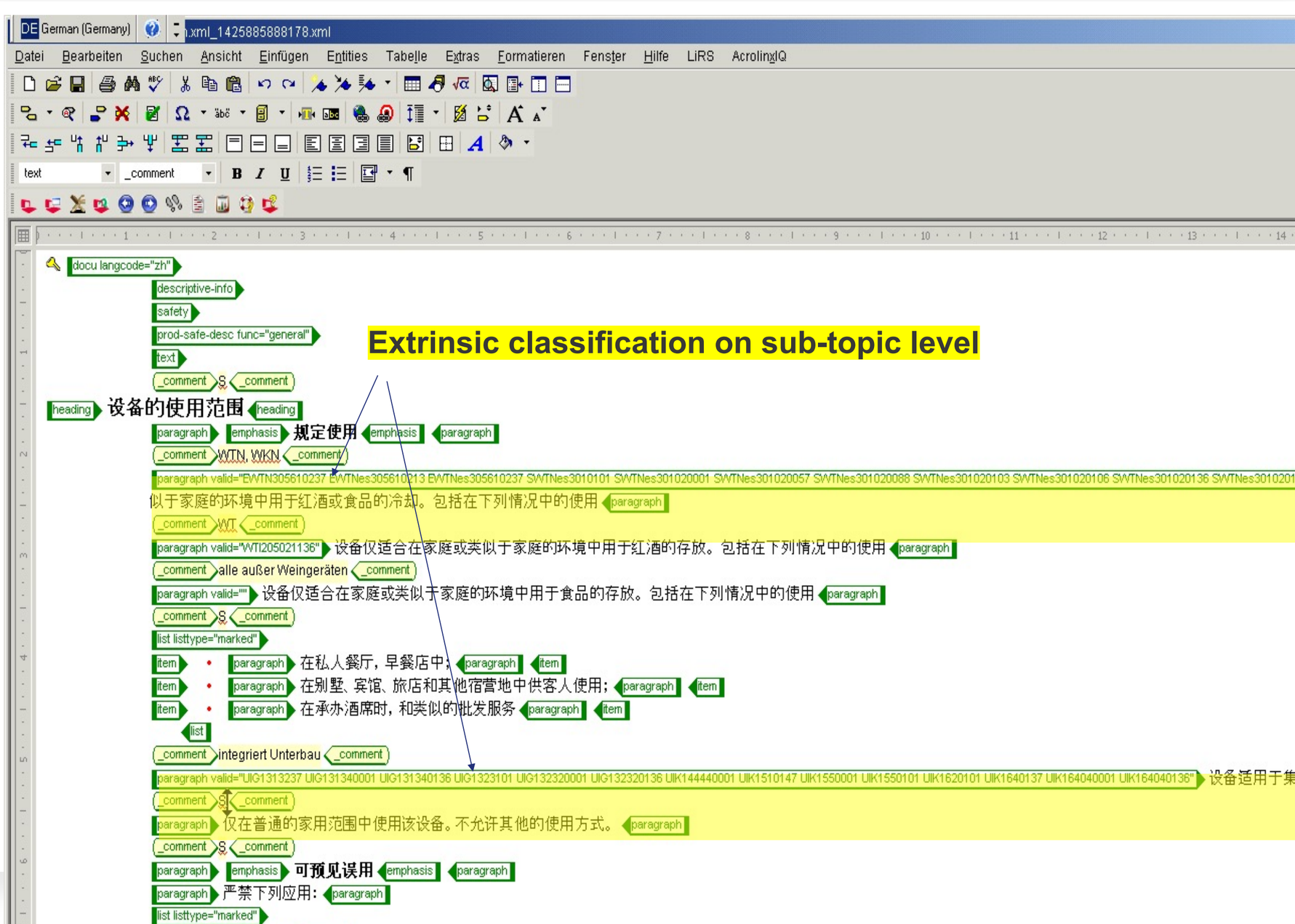
Document Filtering

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



CM Methods

Filtering of sub-topic elements

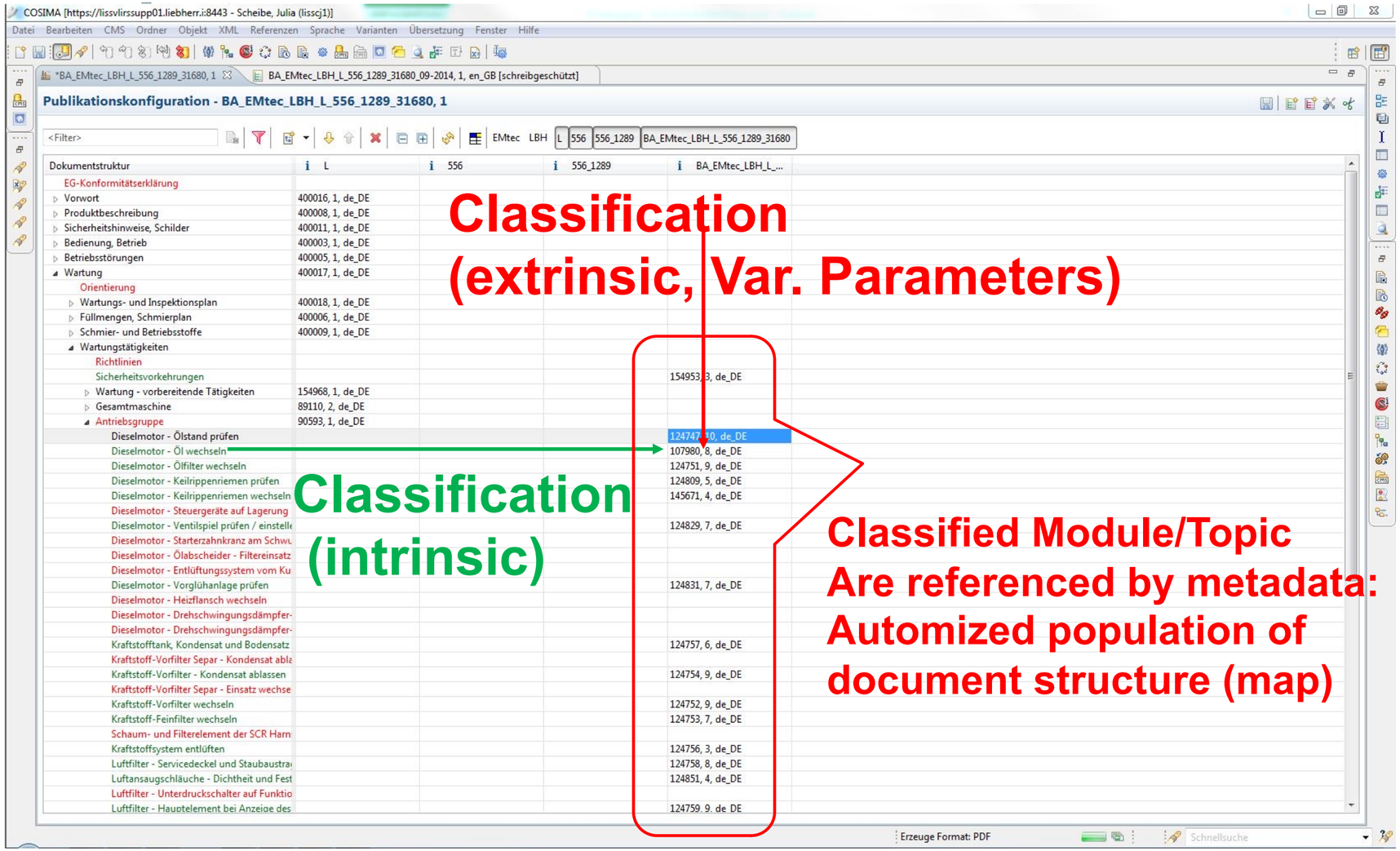


CM Methods

Rules-based publishing

Document structure = Set of Classification Selectors (Rules)

Automized document creation (metadata



CCMS: Docufy / Cosima

CD Methods

Facetted search/request and topic delivery

Customer-dependent Configuration !

Component

- Hydraulic system
  - Oil Pump

Information

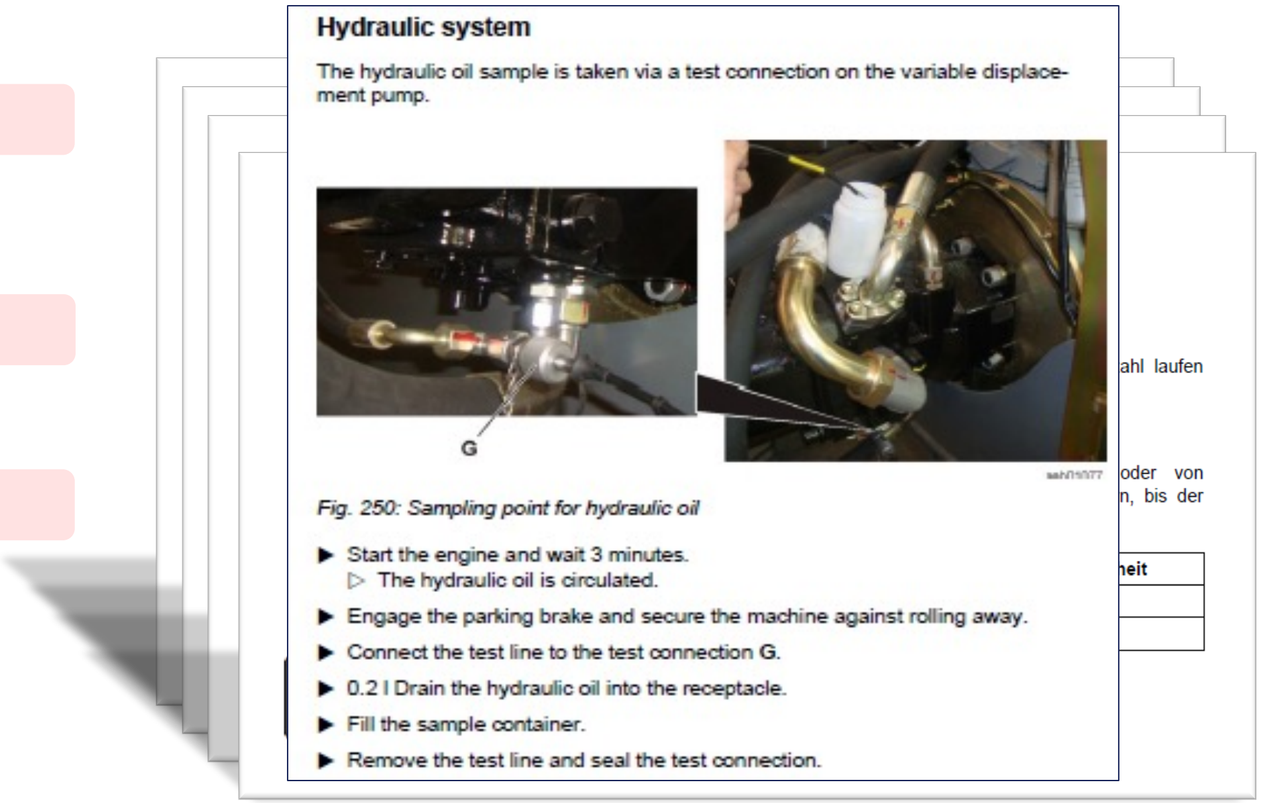
- Procedure
  - Testing

Machine

Z-006

Konfiguration

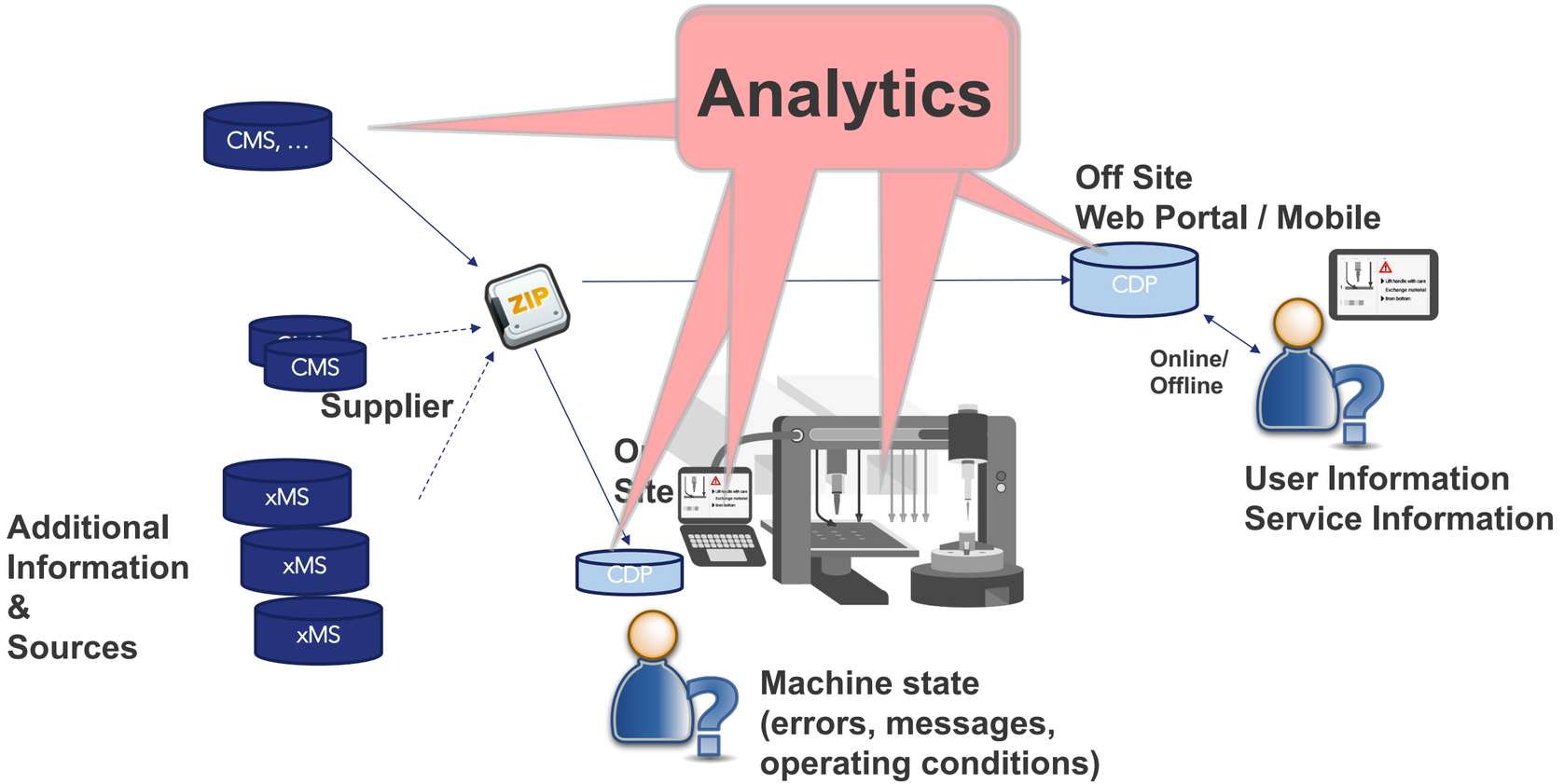
$a_1 |b_3 | \dots |x_5 |y_1 |z_5$



CD Environment

Analytics

CDP and Analytics in Industrial Applications



- **Analytics**

CMS & CDP Analytics

Overview of Content Intelligence

CMS Analytics (REx)

→ Metrics:
- Reuse Rates (Abundancy)
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- Document Sharing factor
- Variant management
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Artificial Intelligence

→Quality assurance:
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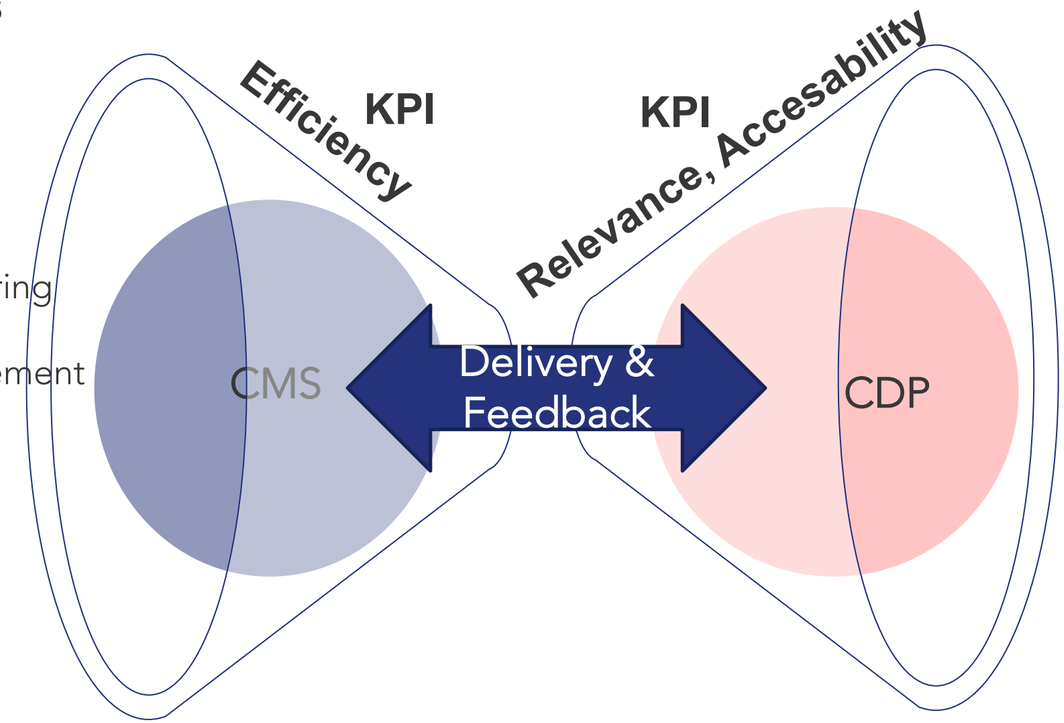


CDP Analytics (CoReAn)

Indirect feedback

→ Metrics:
- visiting time,
- Visit frequency
- **search behaviour**
- **search terms**
- …

Direct feedback
- Rating
- Satisfaction

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

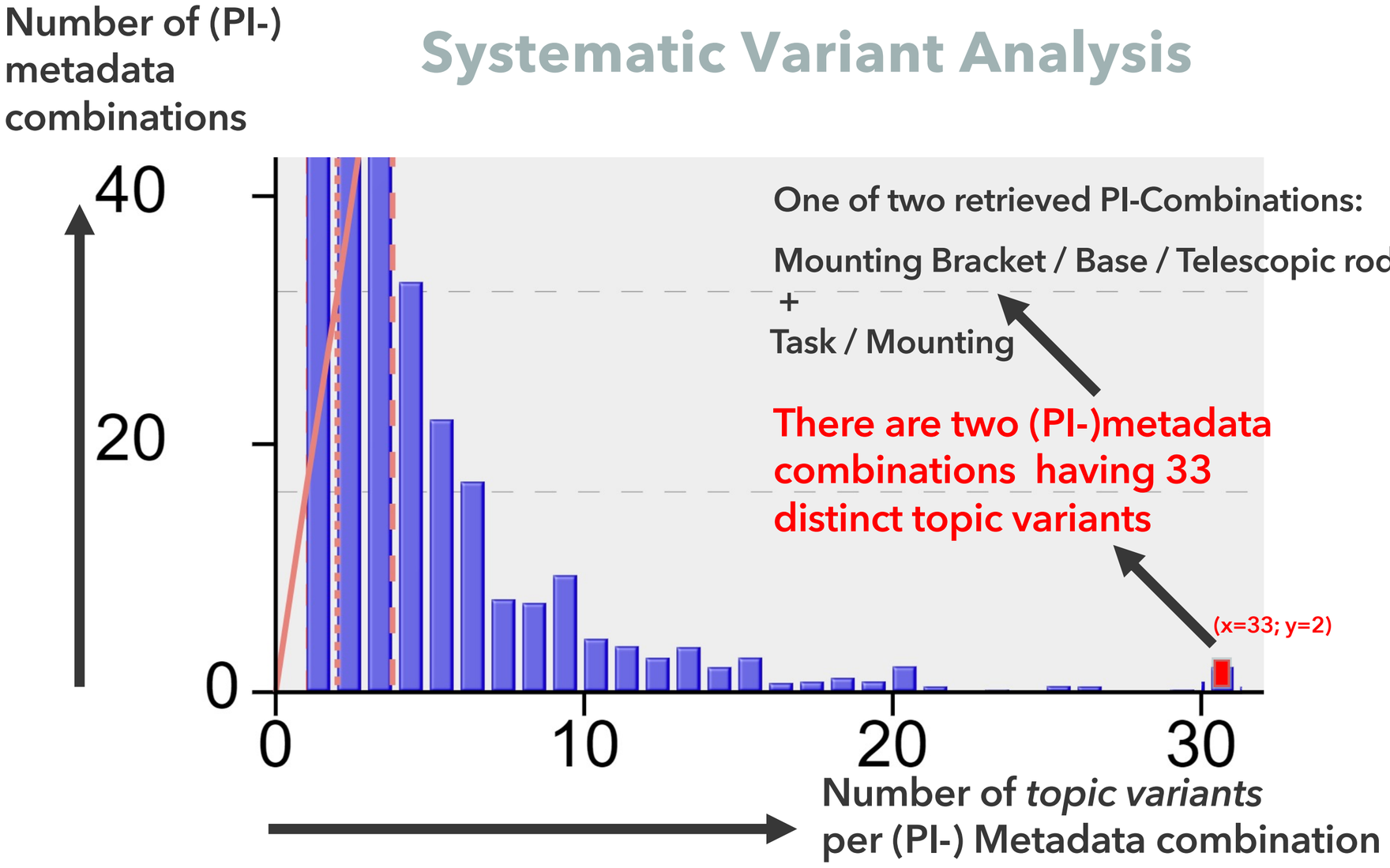
CM Methods

Analyzing the origins of large numbers of topic variants

⇨

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

Systematic Variant Analysis

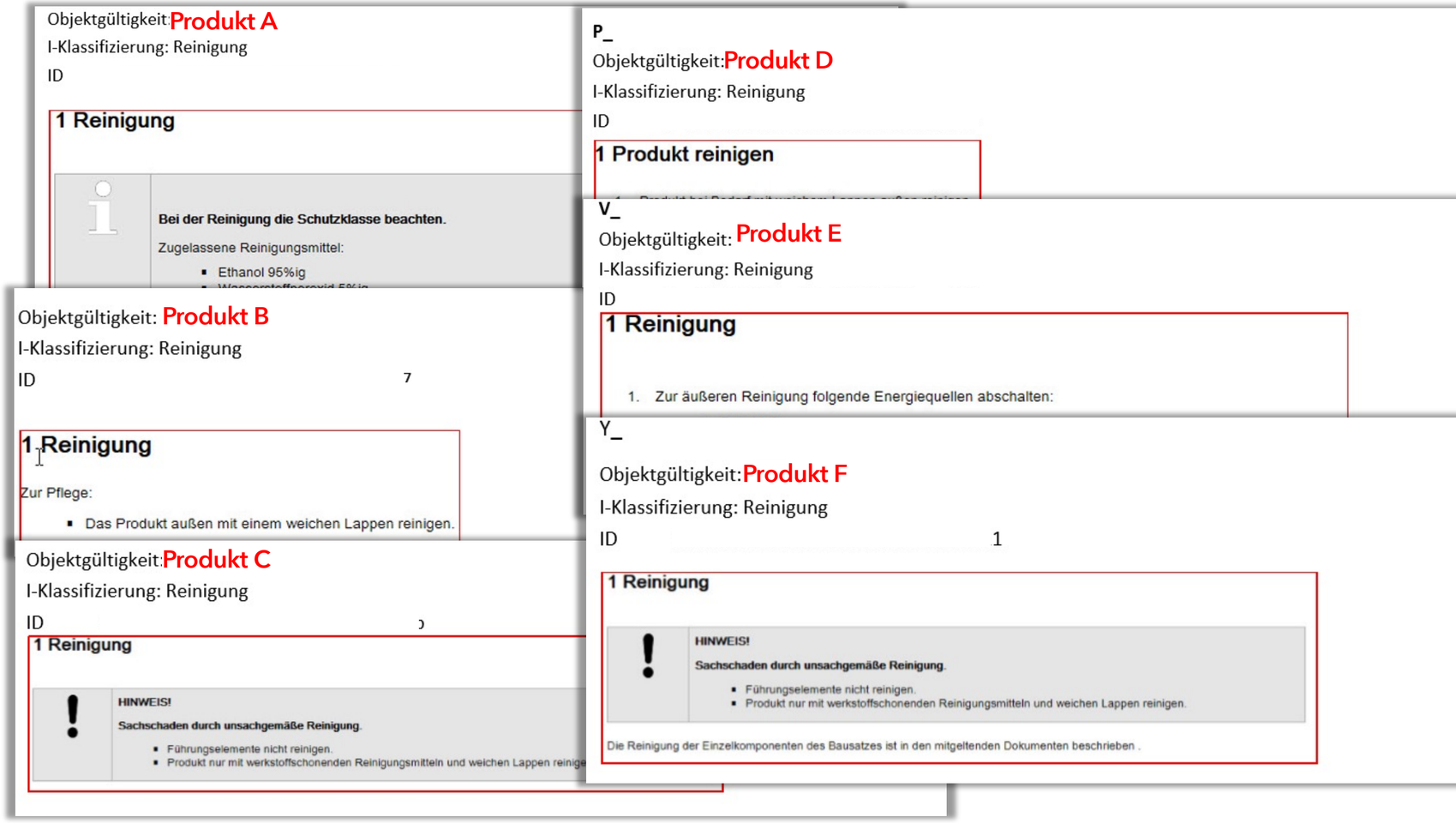


CM Methods

Example detected by REx method:

All topics have the same (intrinsic) classification but differ in (extrinsic) product classes

Analyzing Content Variants (by content)



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

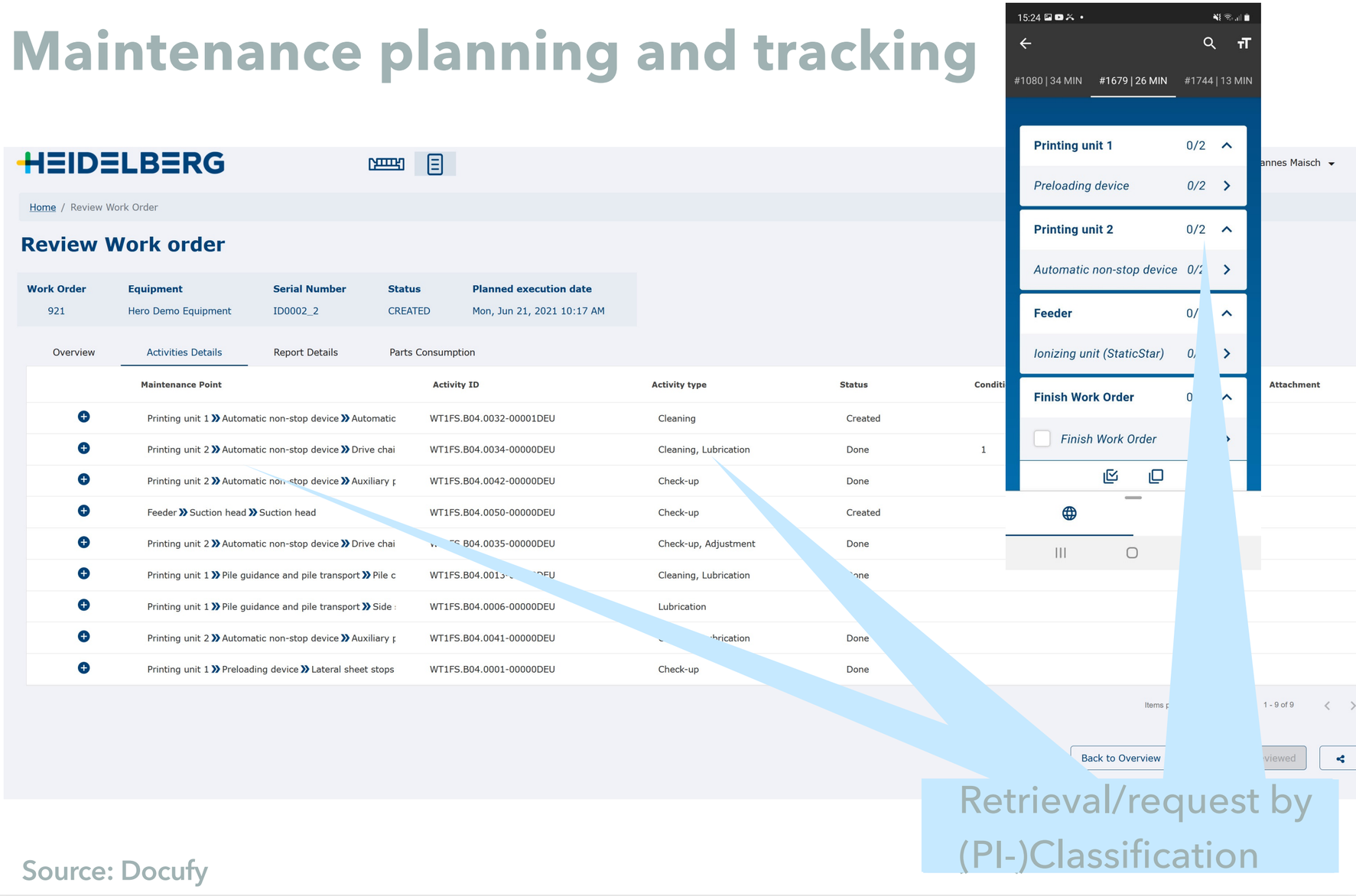
Business and Use Cases for Content Delivery


Smart Fields
Drone
Satellite
Cloud
Silos
Self-propelled sprayer
Harvester
Cell telephony
Tractor
Sensors

Digital Information Service (for maintenance

CDP and CMS information is connected to maintenance processes

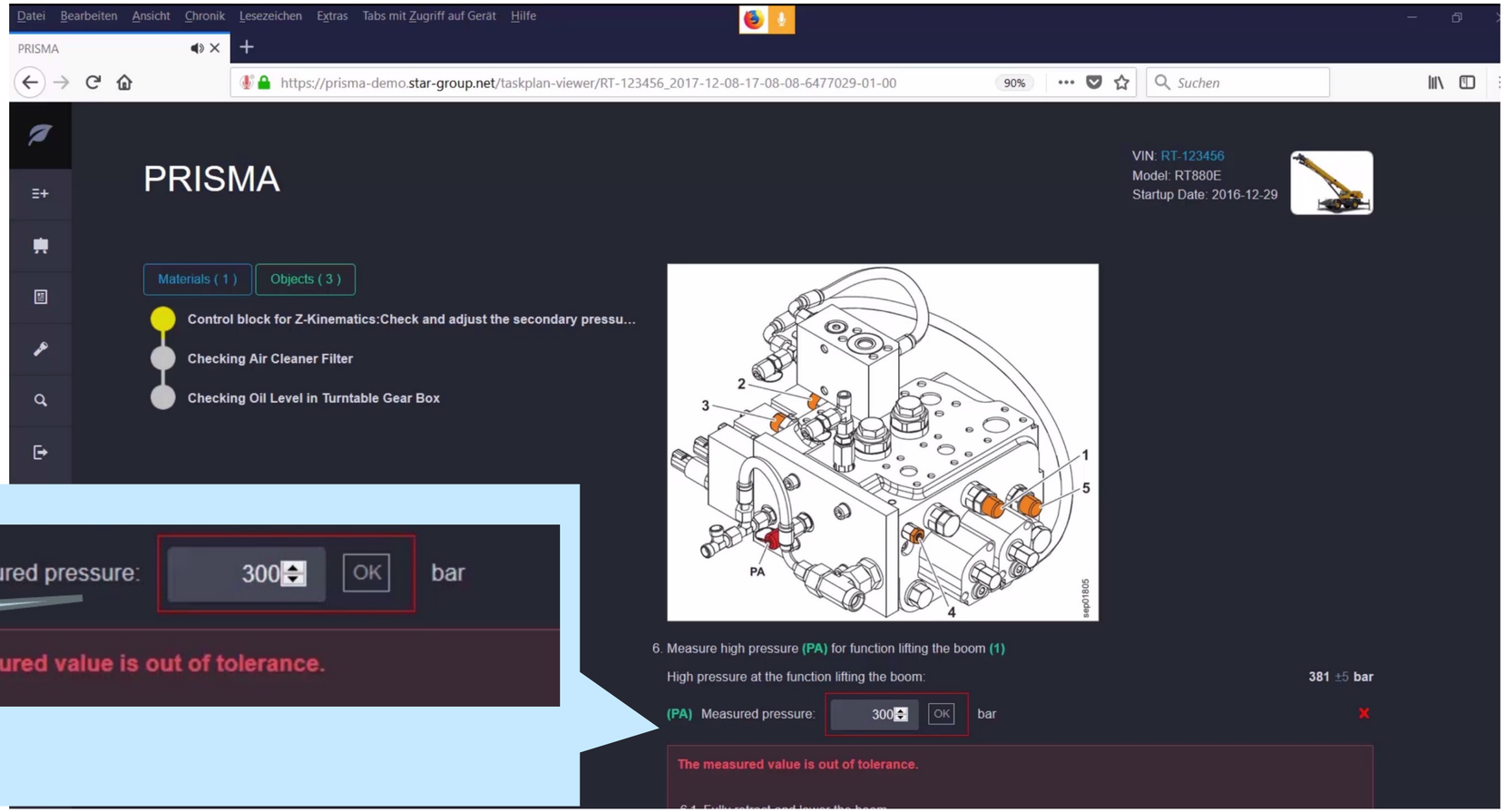
Maintenance planning and tracking



Source: Docufy

Digital Service Information Service

Access to granular service information & data

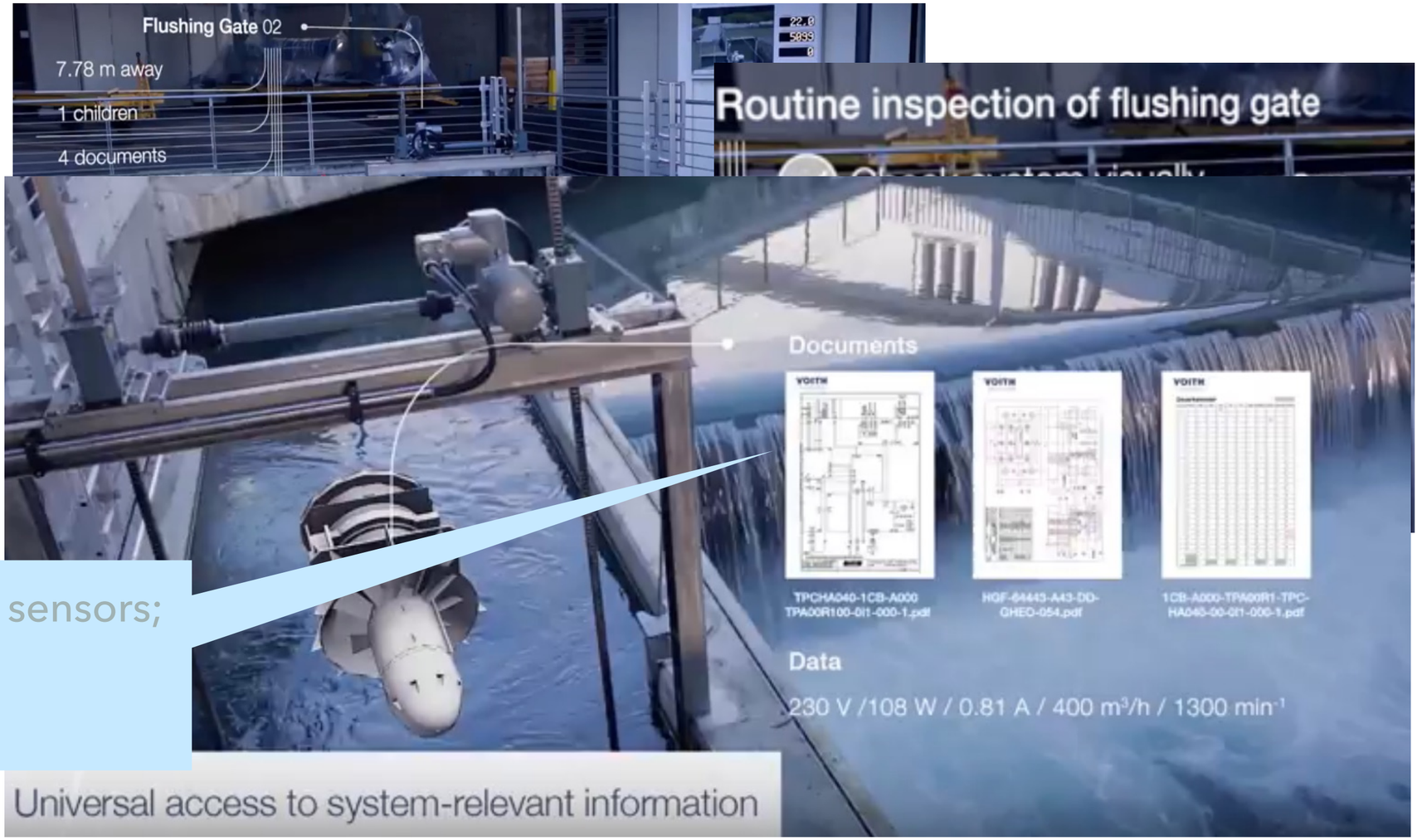


Interactive Data from CMS & Engineering: Sensing & archiving of data setting

Source: STAR AG

Digital services as an extended product portfolio

Service Information and AR (Hololens)



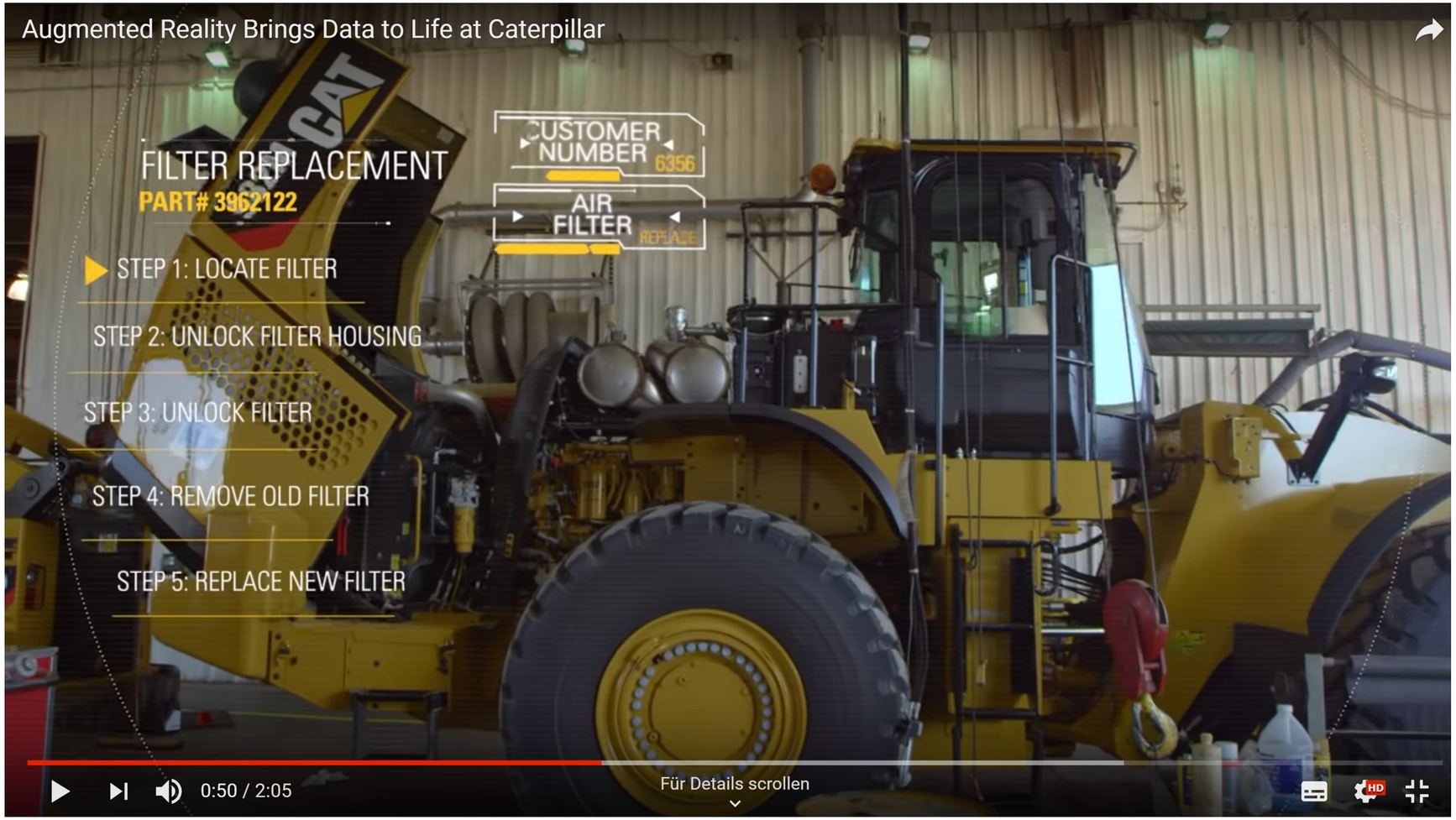
Source: Voith Hydro

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

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

DIS

Maintenance



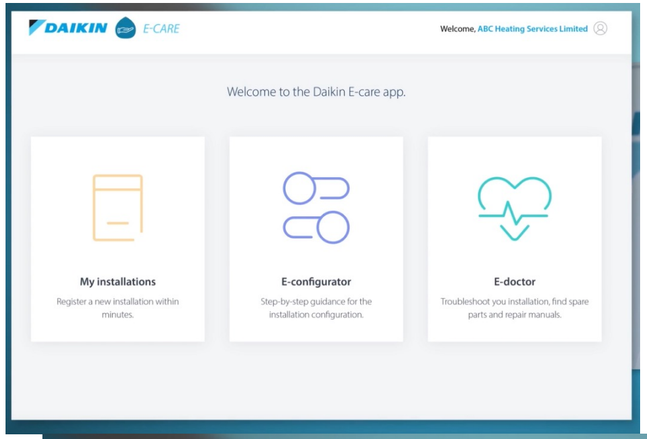
https://www.youtube.com/watch?v=VGtCQWROytw

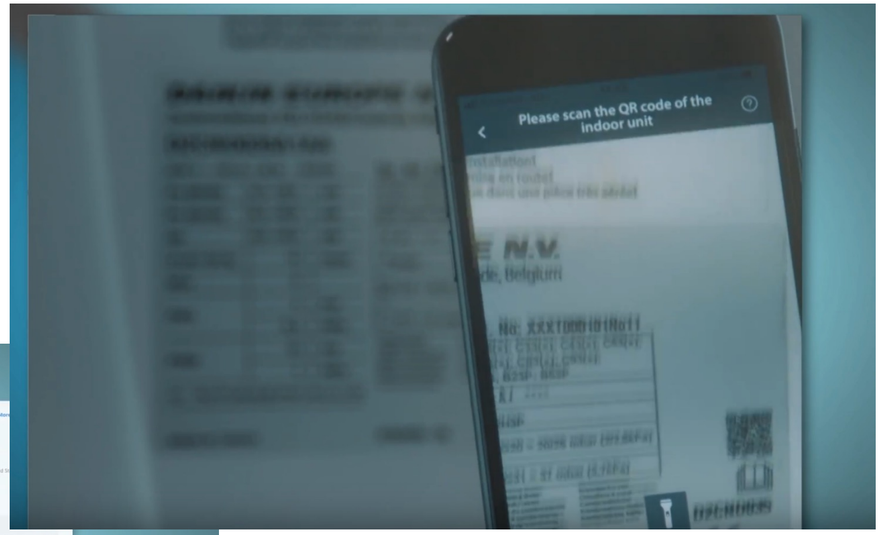
DIS

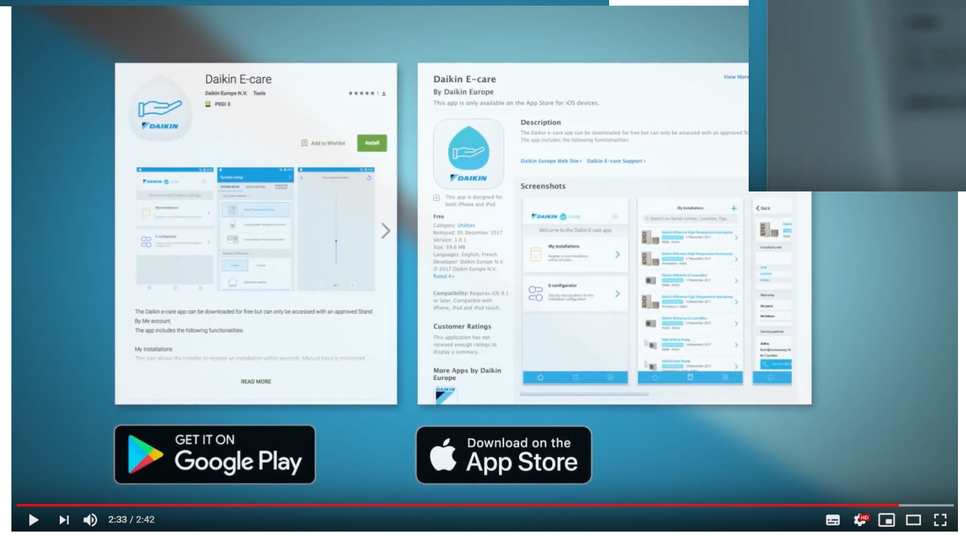
Reseller support

(Heating, AC)

Installation, Configuration, Troubleshooting







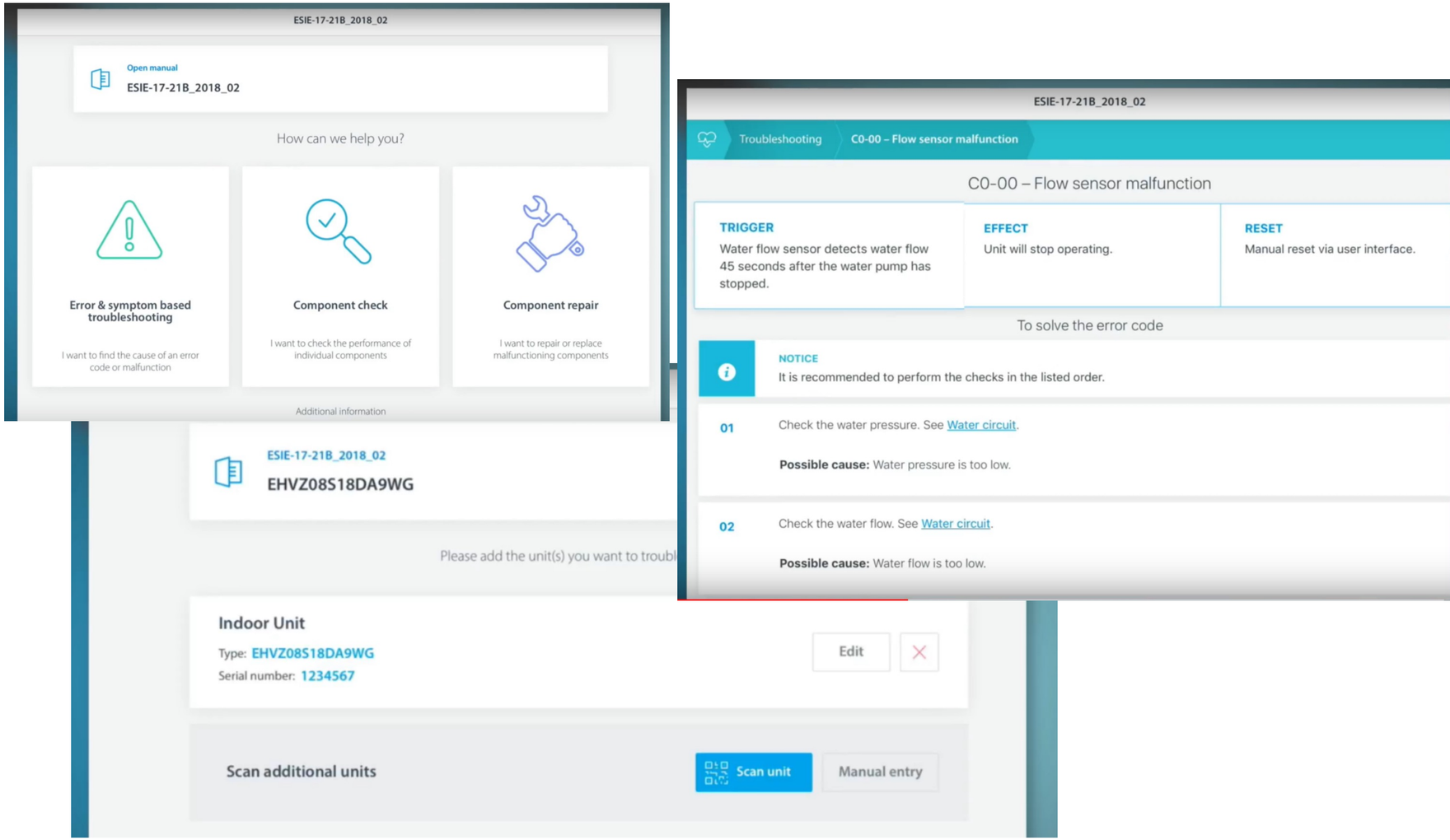
DIS

Reseller support

(Heating, AC)

→ [Youtube Daikin e-doctor]

Installation, Configuration, Troubleshooting



DIS

Service (von Ardenne)

Remote Assist (including video + AR)

Thank you for your attention!

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Institute for Information and Content Management