Hochschule Karlsruhe
Technik und Wirtschaft
UNIVERSITY OF APPLIED SCIENCES

I4ICM

Rules-Based Content Correlations

Making microDocs work
by Semantic Correlation Rules

Prof. Dr. W. Ziegler, Karlsruhe Univ. Appl. Sciences & I4ICM

Prof. Dr. W. Ziegler

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- Karlsruhe Univ. Appl. Sciences
  Hochschule KA (HSKA), Information Management & Media

- Institute for Information & Content Management (I4ICM)
  Research Transfer: PI-Class, REx, CVM, Content Delivery, microDocs

Agenda

Research & Development of Semantic Correlation Rules (SCR)

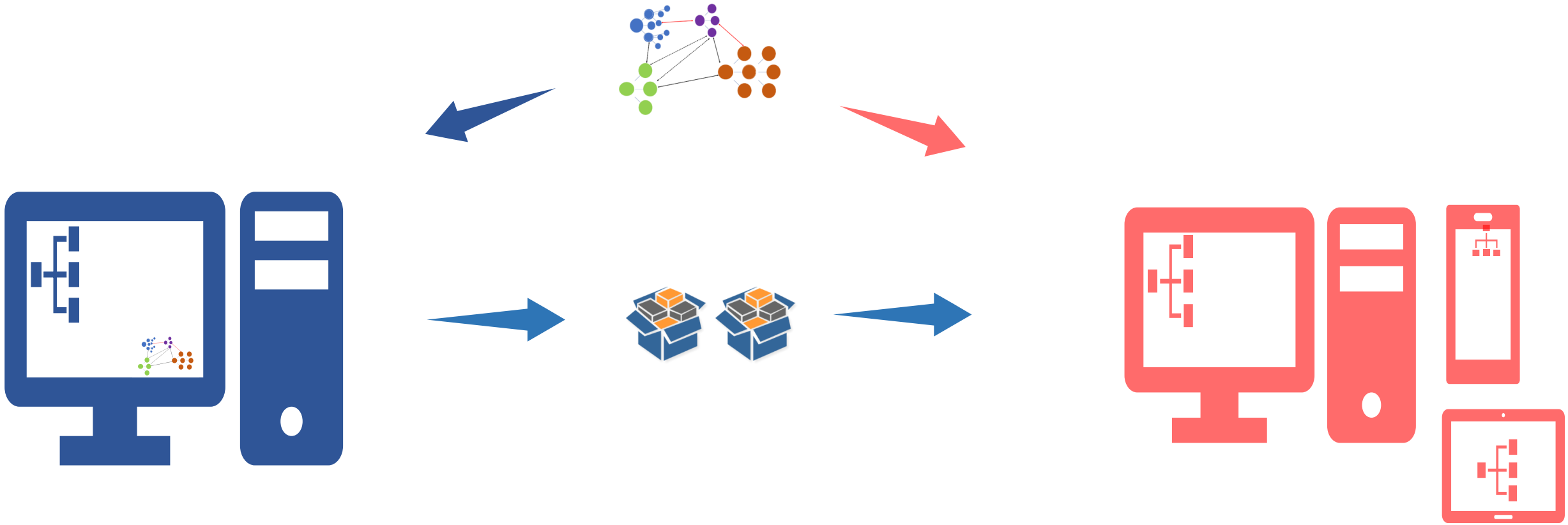
- (Re-)Introducing microDocs
- How to implement microDocs by SCR
- How SCR are implemented
- Summary

Re-Introducing microDocs

CMS

SMS

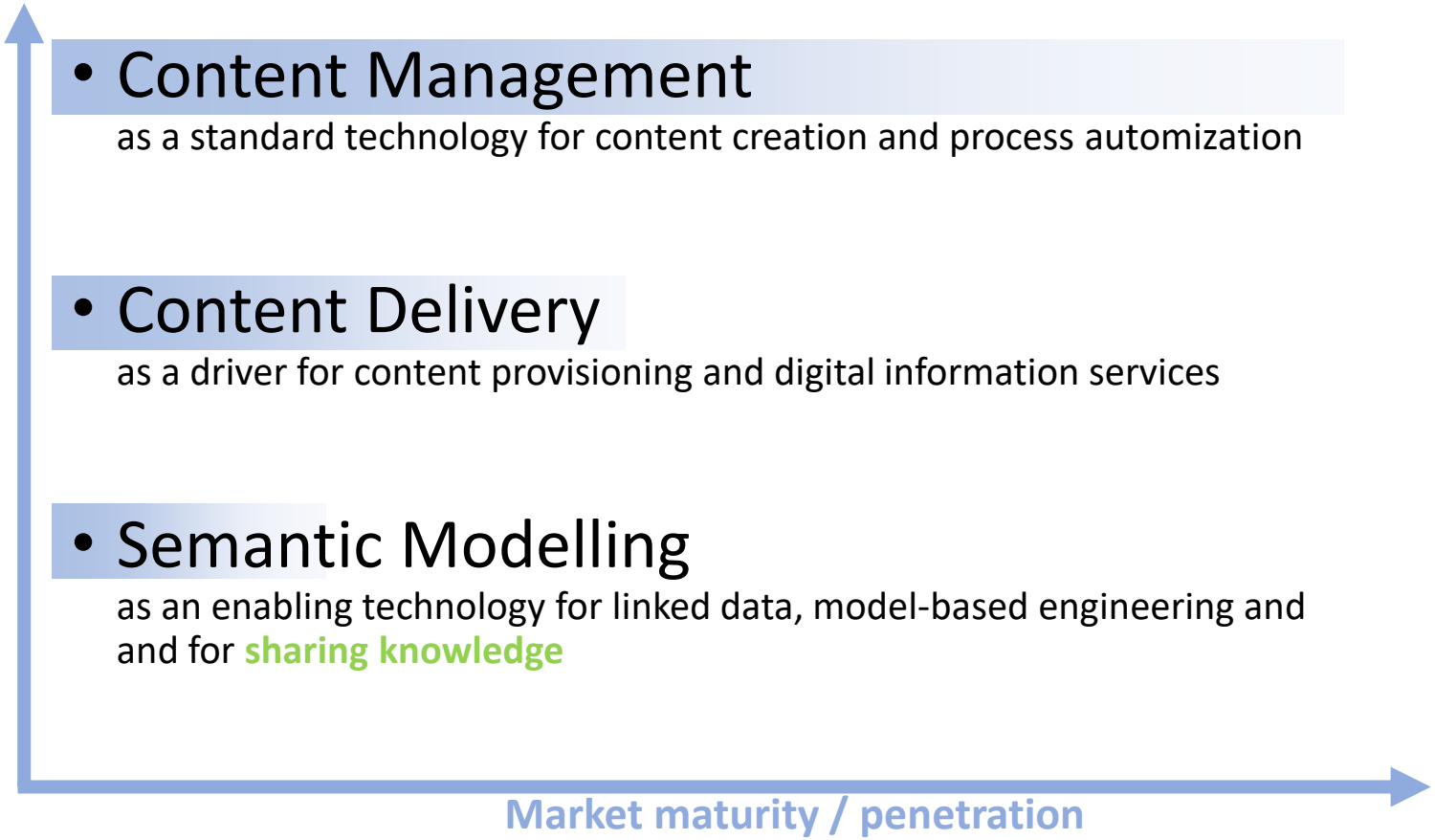
CDP



Introduction

Recent Situation in Information Management

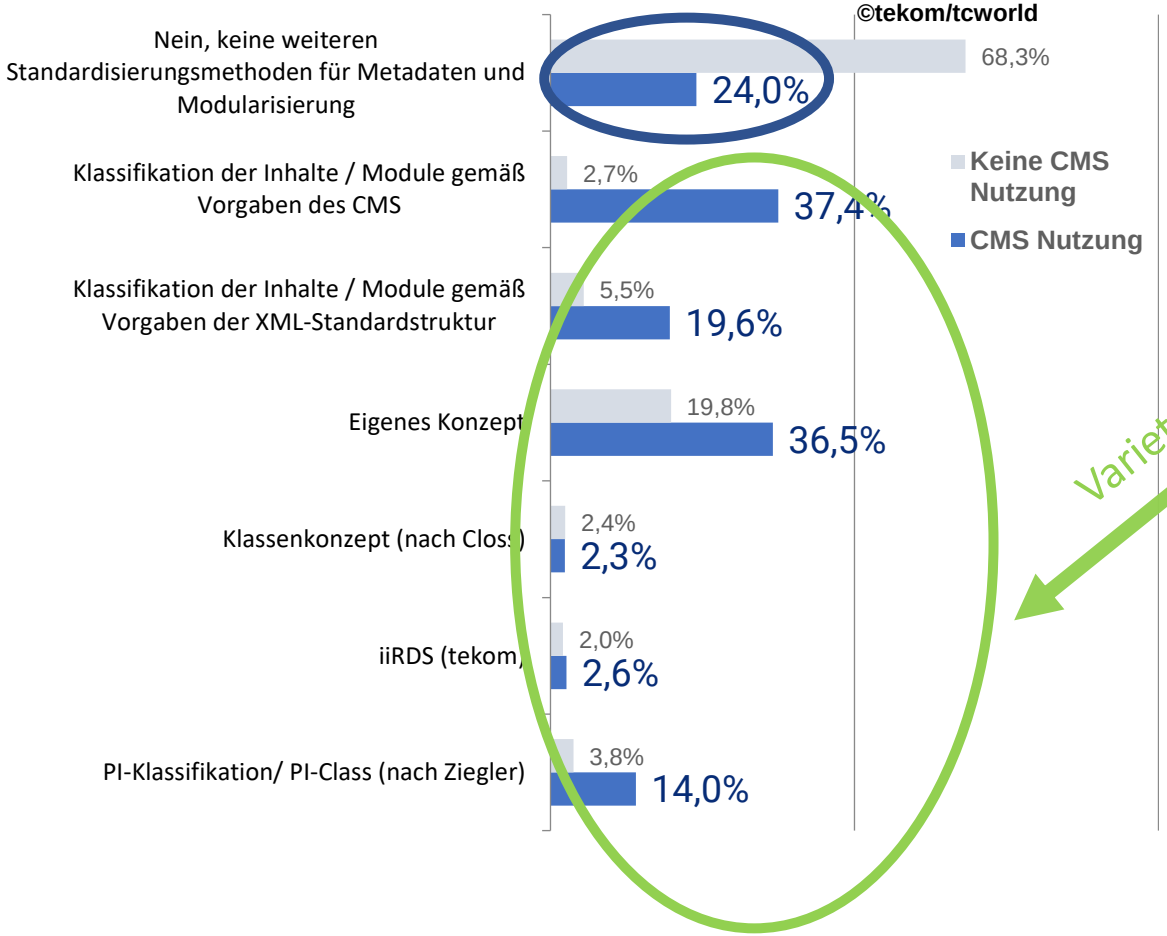
- **Content Management**
  as a standard technology for content creation and process automization
- **Content Delivery**
  as a driver for content provisioning and digital information services
- **Semantic Modelling**
  as an enabling technology for linked data, model-based engineering and and for **sharing knowledge**



How Metadata are used in CCMS

Standardization of Metadata

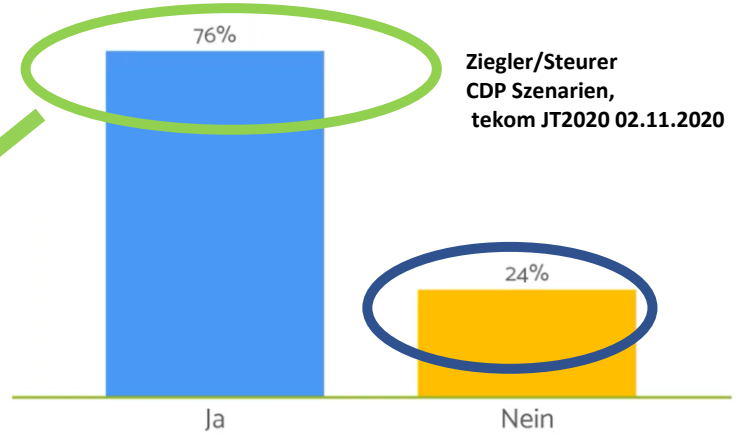
Straub/Ziegler 2019
©tekom/tcworld



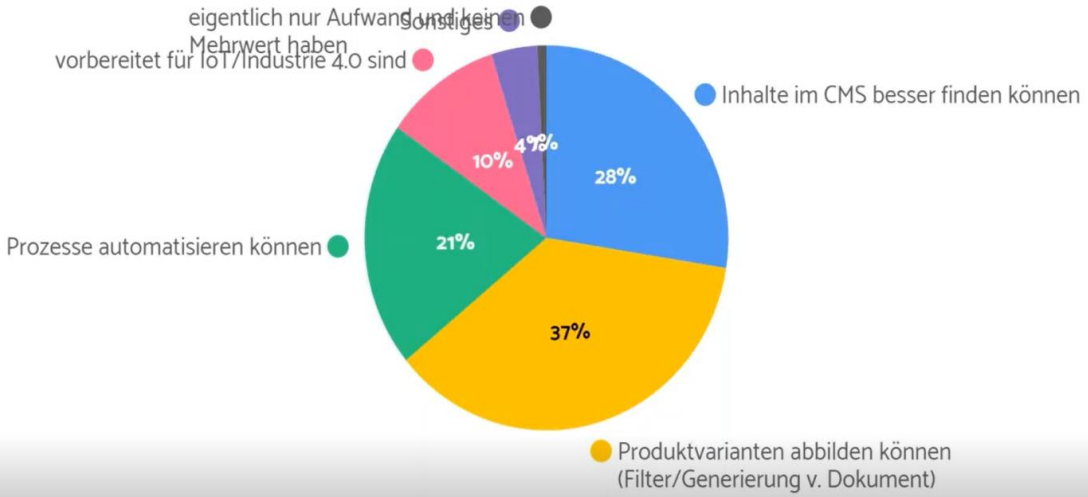
Variety of different metadata concepts and system implementations

Use of Metadata

Ziegler/Steurer CDP Szenarien, tekom JT2020 02.11.2020

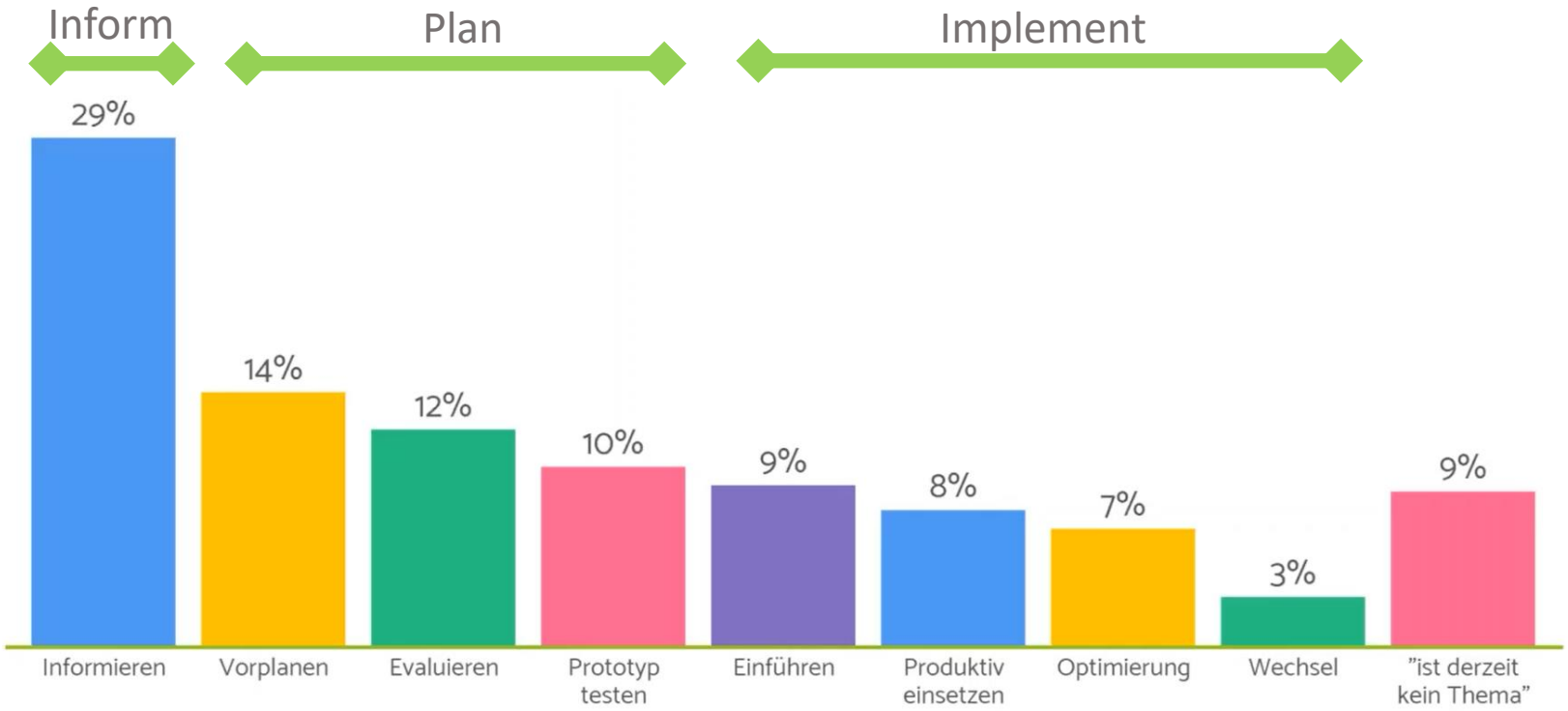


Ziegler/Steurer CDP Szenarien, tekom JT2020 02.11.2020



Introduction

Content Delivery: System Introduction Phases



Introduction

Metadata are used for

- **search facets for retrieval**
- **object identification**
- **API parameter call & deep linking**

Content Delivery

Machine

Z-006

Configuration

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

Component

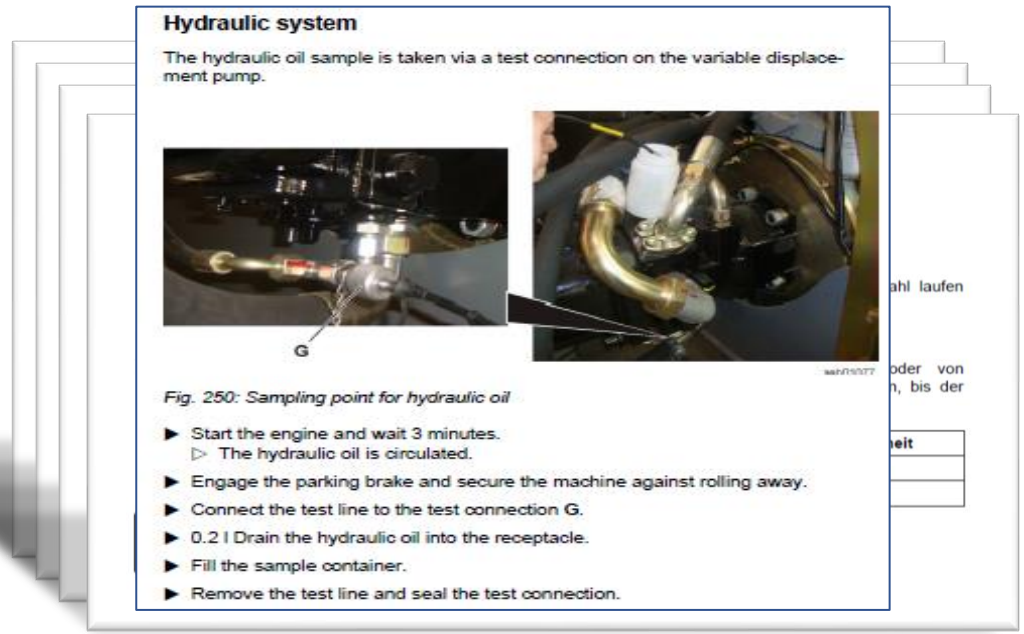
Hydraulic system

Oil Pump

Information

Procedure

Testing

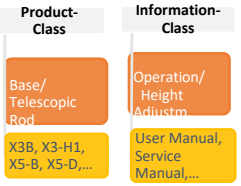


Retrieved Objects in CDP

microDocs

Single topic

Lack of context



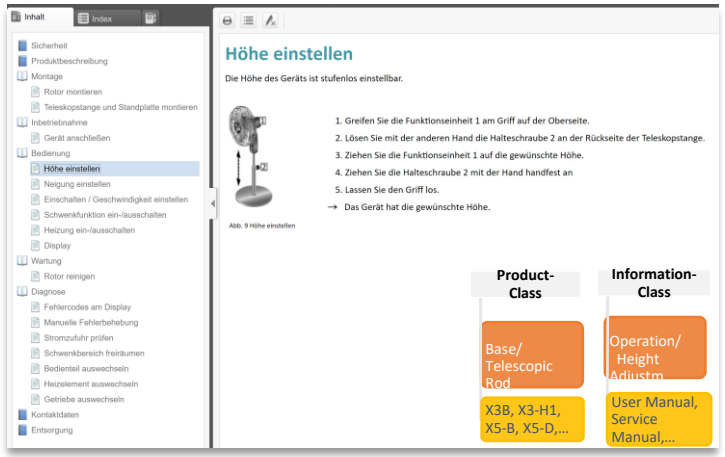
What is needed?

A structured set of topics
with relevant context
and sufficient content

Relevance and sufficency ist defined by use cases!

Document
(complete topic assembly)

Abundance of content



X3B

User Manual,

Future Content Access

microDocs (2019)

microDocs

Definition

A microDoc is a (sub-)set of topics required by predefined use cases and connected by a logical concept as a dynamic publication in search media

The logical concept, the relevant context and the amount of required content can be derived at different levels from rules and semantic models.

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I4I CM

How to implement microDocs by Semantic Correlation Rules (SCR)

Defining microDocs through Correlation Rules

SCR aim to express explicitely the hidden experience of users and knowledge of encountered groups

Use Case Harvesting & Knowledge Sources

Use Cases are typically reported and described by

- Service-technicians
- Help-Desks
- Direct and indirect user feedback
- Training staff
- Developers, engineers (prospective)
- UX professionals, Web analytics experts
- Regulatories, standards & laws experts
- Admins (IT), Configurator
  …
- Content architects and writers
  (by exchanging knowledge with other groups)

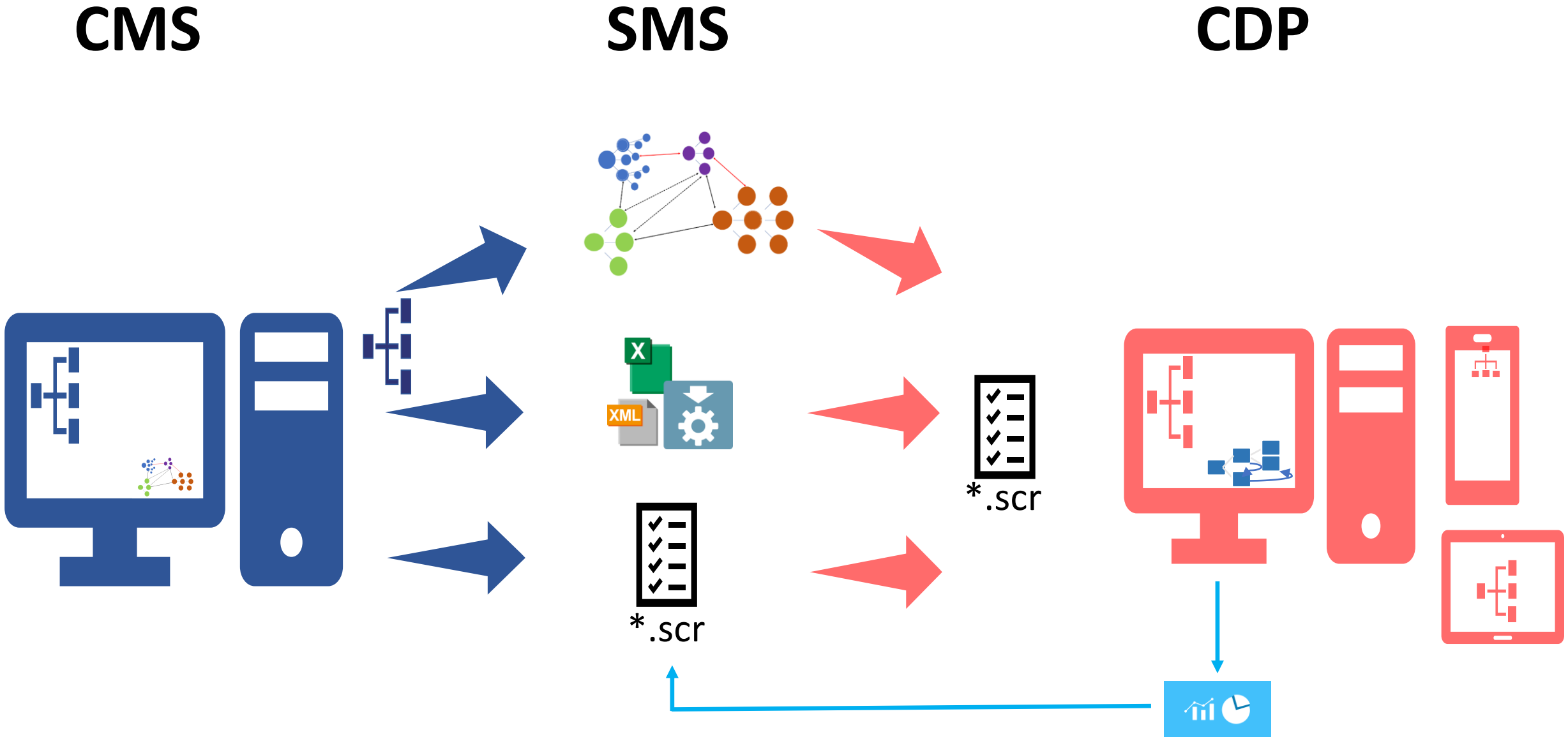
Implementing microDocs

The principles of SCR address the „logical concept“ of mDocs as sharable knowledge

Semantic Correlation Rules Requirements

SCR should…

- … describe correlations of (information) objects in a simple, but formalized and standardized way (→XML/RDFS/OWL) using existing object metadata
- … be independent of specific content and explicite (CMS) linking processes
- … be (able to be) modelled in different system environments
- … be interpreted in search and delivery environments (e.g. as microDocs)


CMS
SMS
CDP
X
XML
*.scr
*.scr

SCR

Correlation Rules

applied for demonstration

purposes to the

PI-Fan reference content

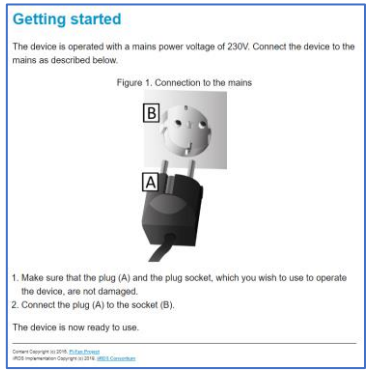
(***www.pi-fan.de***)

&

PI-Class + iiRDS Classification

Test and Demo Case

Primary Object



Getting started

The device is operated with a mains power voltage of 230V. Connect the device to the mains as described below.

Figure 1. Connection to the mains

1. Make sure that the plug (A) and the plug socket, which you wish to use to operate the device, are not damaged.
2. Connect the plug (A) to the socket (B).

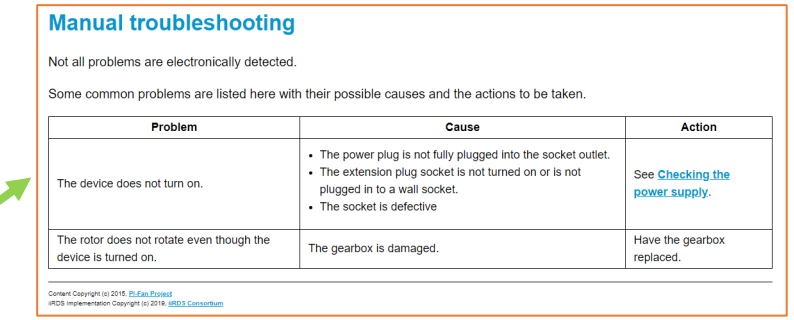
The device is now ready to use.

PI-Class:
P: Connection
I: Task/Getting started

iiRDS:
TopicType: Task
Lifecycle: PuttingToUse
Subject: Functionality
Component: Connection

Secondary Objects

Correlated with



Manual troubleshooting

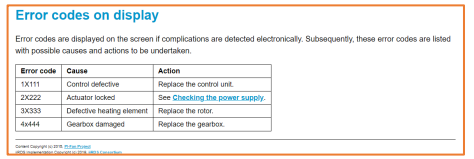
Not all problems are electronically detected.

Some common problems are listed here with their possible causes and the actions to be taken.

Problem	Cause	Action
The device does not turn on.	• The power plug is not fully plugged into the socket outlet. • The extension plug socket is not turned on or is not plugged in to a wall socket. • The socket is defective	See Checking the power supply.
The rotor does not rotate even though the device is turned on.	The gearbox is damaged.	Have the gearbox replaced.

PI-Class:
P: PI-Fan
I: Diagnostics/
ManualDiag

iiRDS:
TopicType: Reference
Lifecycle: Fault
Subject: ManualCheck
Component: PI-Fan



Error codes on display

Error codes are displayed on the screen if complications are detected electronically. Subsequently, these error codes are listed with possible causes and actions to be undertaken.

Error code	Cause	Action
1X111	Control defective	Replace the control unit.
2X222	Actuator locked	See Checking the power supply.
3X333	Defective heating element	Replace the rotor.
4x444	Gearbox damaged	Replace the gearbox.

PI-Class:
P: PI-Fan
I: Diagnostics/
Errorcodes

iiRDS:
TopicType: Reference
Lifecycle: Fault
Subject: --
Component:
DisplayOperatingElement

Contact data

Our website:

www.pi-fan.de

www.pi-class.i4icm.de

Copyright:

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Contributors to the PI-Fan Project (1.0):

W. Ziegler

Contributors to the PI-Fan Project (1.1):

R. Gruenert, W. Ziegler

PI-Class:
P: PI-Fan
I: Descriptive/ContactData

iiRDS:
TopicType: Reference
Lifecycle: --
Subject: ContactInformation
Component: PI-Fan

Use Case

Demo Case

applied to the
PI-Fan reference content
&
PI-Class

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Correlated with

Secondary Objects

Getting started

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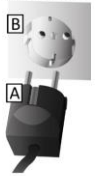

1. Make sure that the plug (A) and the plug socket, which you wish to use to operate the device, are not damaged.
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```
<NamedIndividual rdf:about="http://www.i4icm.de/PI-Fan/OutRule1">
    <rdf:type rdf:resource="http://www.i4icm.de/scr#OutRule"/>
    <scr:selects rdf:resource="http://www.i4icm.de/PI-Fan/ManualDiagnostics"
    <scr:selects rdf:resource="http://www.i4icm.de/PI-Fan/PI-Fan"/>
    <scr:Strength rdf:datatype="http://www.w3.org/2001/XMLSchema#integer">10
</NamedIndividual>
```

Primary Object

```
<NamedIndividual rdf:about="http://www.i4icm.de/PI-Fan/InRule1">
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    <scr:hasCorrelation rdf:resource="http://www.i4icm.de/PI-Fan/OutRule2"/>
    <scr:hasCorrelation rdf:resource="http://www.i4icm.de/PI-Fan/OutRule3"/>
    <scr:selects rdf:resource="http://www.i4icm.de/PI-Fan/Connection"/>
    <scr:selects rdf:resource="http://www.i4icm.de/PI-Fan/GettingStarted"/>
</NamedIndividual>
```

Secondary Objects

Manual troubleshooting

Not all problems are electronically detected.

Some common problems are listed here with their possible

Problem	
The device does not turn on.	• The power pl • The extensio plugged in to • The socket is
The rotor does not rotate even though the device is turned on.	The gearbox is


```
<!-- http://www.i4icm.de/scr/scr#OutRule1 -->

<NamedIndividual rdf:about="http://www.i4icm.de/scr/scr#OutRule1">
    <rdf:type rdf:resource="http://www.i4icm.de/scr#OutRule"/>
    <scr:selects rdf:resource="http://iirds.tekom.de/iirds#Fault"/>
    <scr:selects rdf:resource="http://iirds.tekom.de/iirds#GenericReference"/>
    <scr:selects rdf:resource="https://www.i4icm.de/pifan#ManualCheck"/>
    <scr:selects rdf:resource="https://www.i4icm.de/pifan#PIFan"/>

    <scr:Strength rdf:datatype="http://www.w3.org/2001/XMLSchema#integer">10</scr:Strengt
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```
<!-- http://www.i4icm.de/scr/scr#InRule1 -->

<NamedIndividual rdf:about="http://www.i4icm.de/scr/scr#InRule1">
    <rdf:type rdf:resource="http://www.i4icm.de/scr#InRule"/>
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    <scr:hasCorrelation rdf:resource="http://www.i4icm.de/scr/scr#OutRule2"/>
    <scr:hasCorrelation rdf:resource="http://www.i4icm.de/scr/scr#OutRule3"/>
    <scr:selects rdf:resource="http://iirds.tekom.de/iirds#Functionality"/>
    <scr:selects rdf:resource="http://iirds.tekom.de/iirds#GenericPuttingToUse"/>
    <scr:selects rdf:resource="http://iirds.tekom.de/iirds#GenericTask"/>
    <scr:selects rdf:resource="https://www.i4icm.de/pifan#Connection"/>
</NamedIndividual>
```

Contact data

Our website:

www.pi-fan.de

www.pi-class.i4icm.de

Copyright:

Contributors to the PI-Fan Project (1.0):

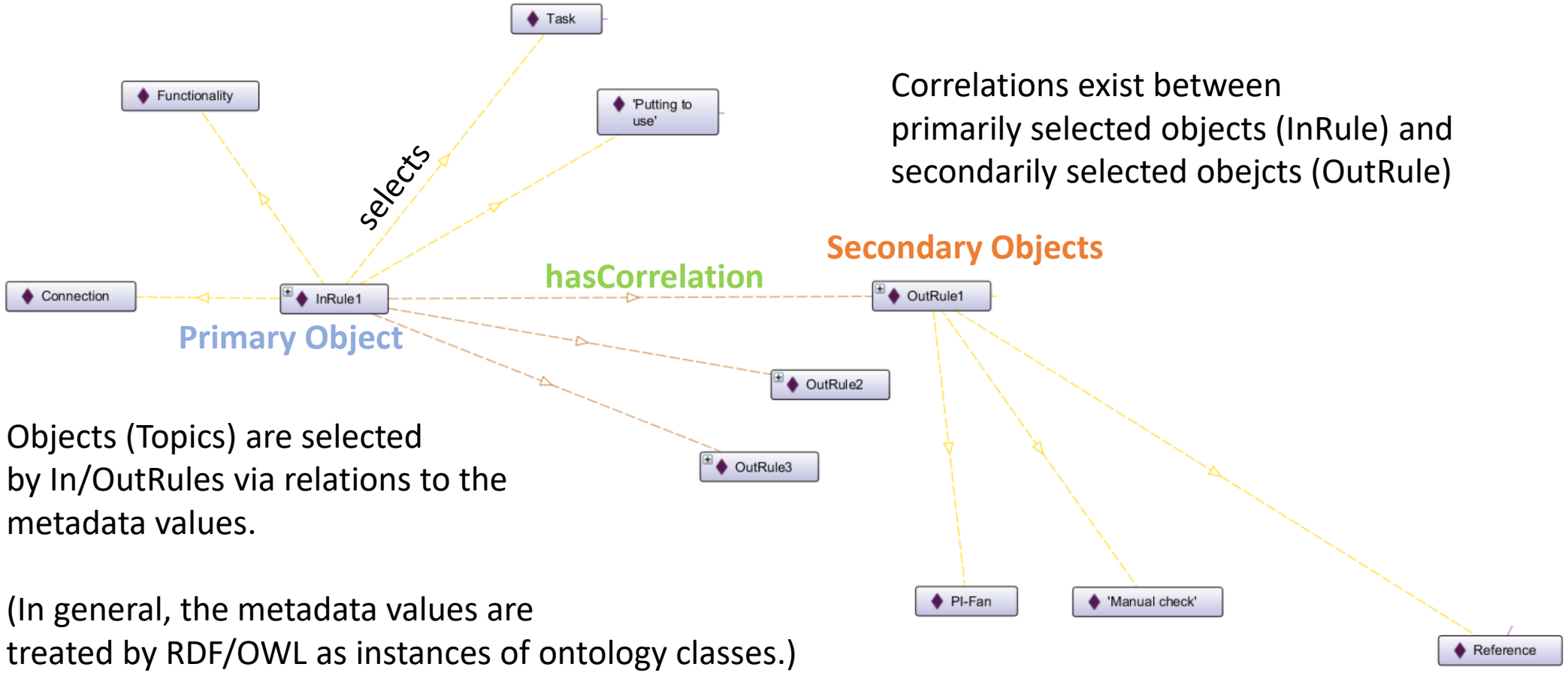
W. Ziegler

Contributors to the PI-Fan Project (1.1):

R. Gruenert, W. Ziegler

Correlations: generalized, untyped relations

RDF/Ontology Visualization in Protégé

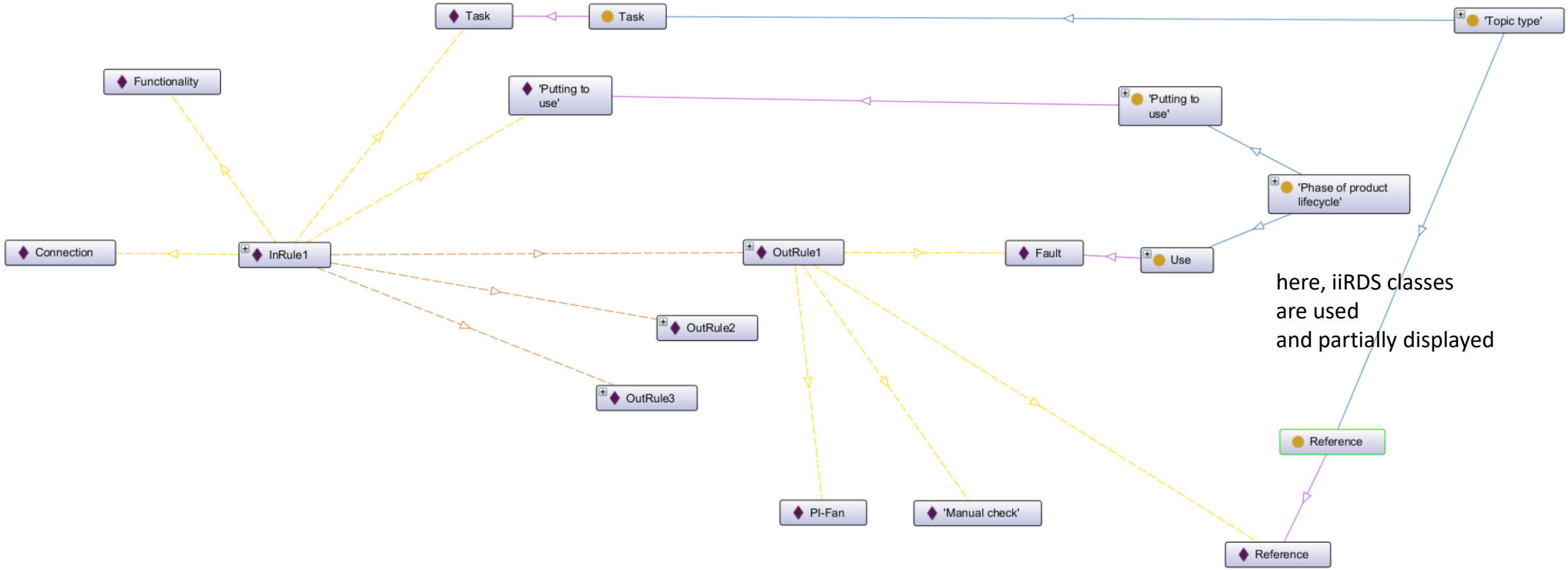


Correlations exist between
primarily selected objects (InRule) and
secondarily selected obejcts (OutRule)

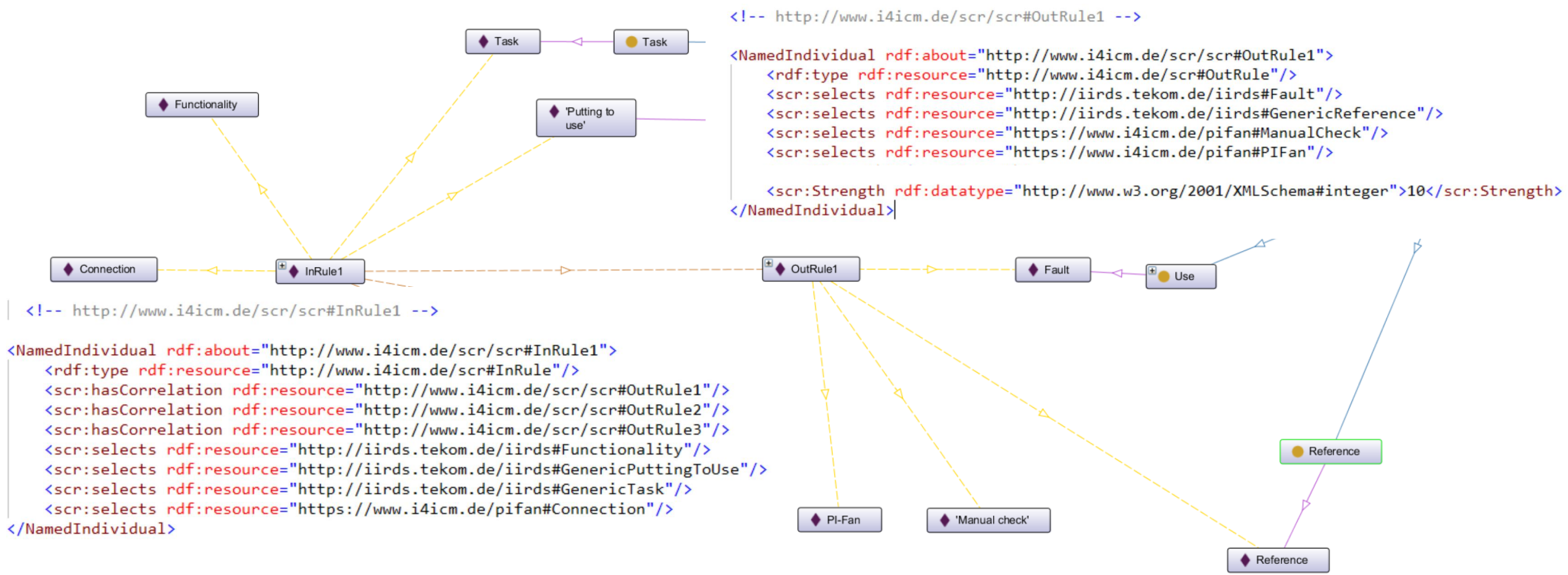
Objects (Topics) are selected
by In/OutRules via relations to the
metadata values.

(In general, the metadata values are
treated by RDF/OWL as instances of ontology classes.)

Metadata as instances of metadata classes given by custom/standardized (CCMS) ontologies



Implementation of SCR as RDF/OWL-rules (using iiRDS classes)




```
<!-- http://www.i4icm.de/scr/scr#OutRule1 -->

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    <scr:selects rdf:resource="https://www.i4icm.de/pifan#ManualCheck"/>
    <scr:selects rdf:resource="https://www.i4icm.de/pifan#PIFan"/>

    <scr:Strength rdf:datatype="http://www.w3.org/2001/XMLSchema#integer">10</scr:Strength>
</NamedIndividual>
```

```
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<NamedIndividual rdf:about="http://www.i4icm.de/scr/scr#InRule1">
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    <scr:hasCorrelation rdf:resource="http://www.i4icm.de/scr/scr#OutRule2"/>
    <scr:hasCorrelation rdf:resource="http://www.i4icm.de/scr/scr#OutRule3"/>
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    <scr:selects rdf:resource="http://iirds.tekom.de/iirds#GenericTask"/>
    <scr:selects rdf:resource="https://www.i4icm.de/pifan#Connection"/>
</NamedIndividual>
```

Documentation

In-code documentation (see scr.owl file)

RDF explanations on usage of classes, relations, instances and data properties

- Classes
  - scr
  - InRule
  - OutRule
- Relations
  - hasCorrelation
  - selects
  - equals
- Instances
  - (scr.root)
- Properties
  - ID
  - ReleaseDate
  - Role
  - Scope
  - Strength
  - Title
  - Version

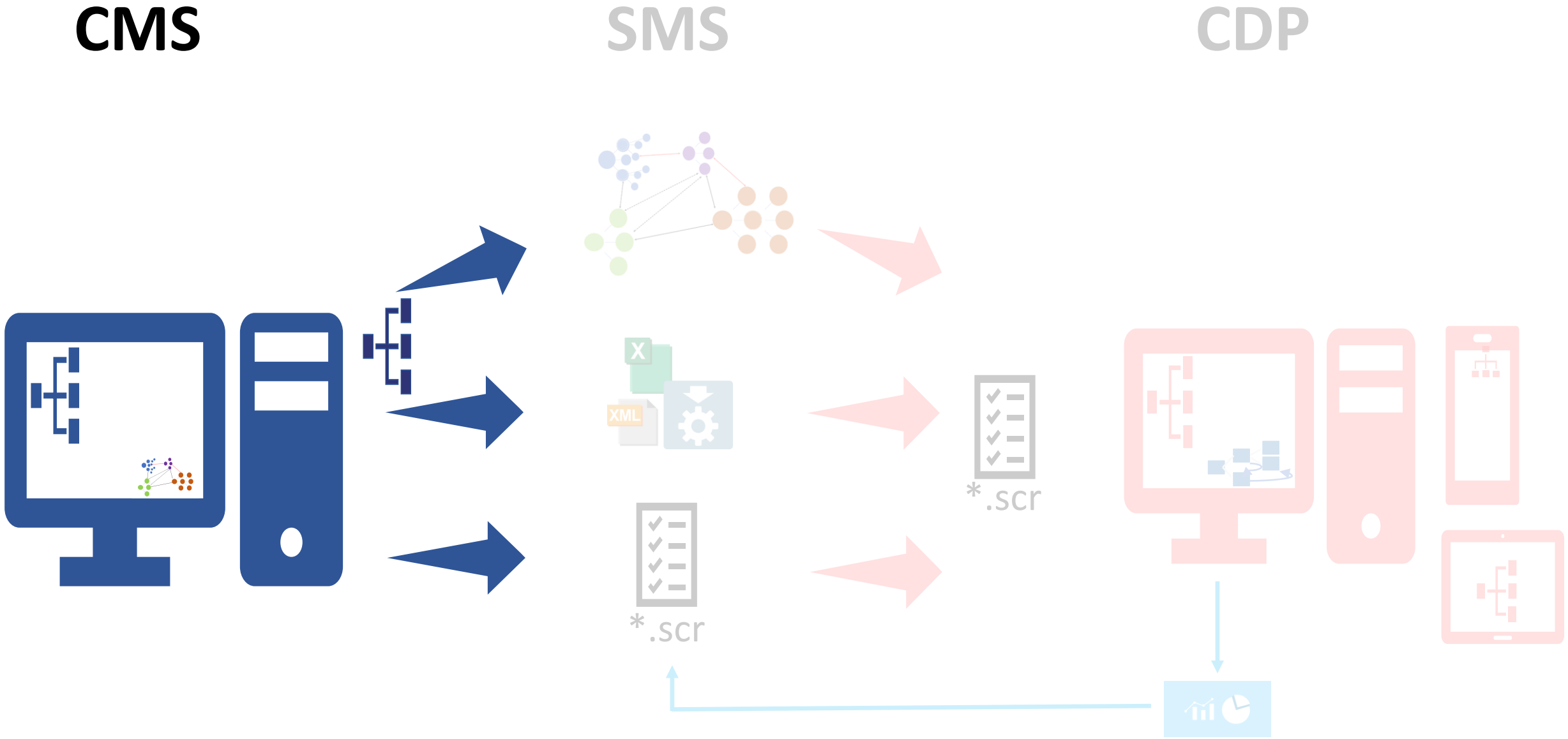
Documentation

hasCorrelation

- Untyped correlation pointing from InRules to OutRules.
- The correlation describes the binding of secondary objects (information deliverables; often topics) to primary objects within a delivery scenario.
- In general, there are 1:N correlations as relations from InRules to OutRules, so that a certain number of information deliverables are displayed as microDocs. MicroDocs are therefore bound to the primarily requested object.
- Subtypes of the relation might be typed in further scr versions.

How (and where)
Semantic Correlation Rules
have been implemented

(2020)


CMS
SMS
CDP
X
XML
*.scr
*.scr

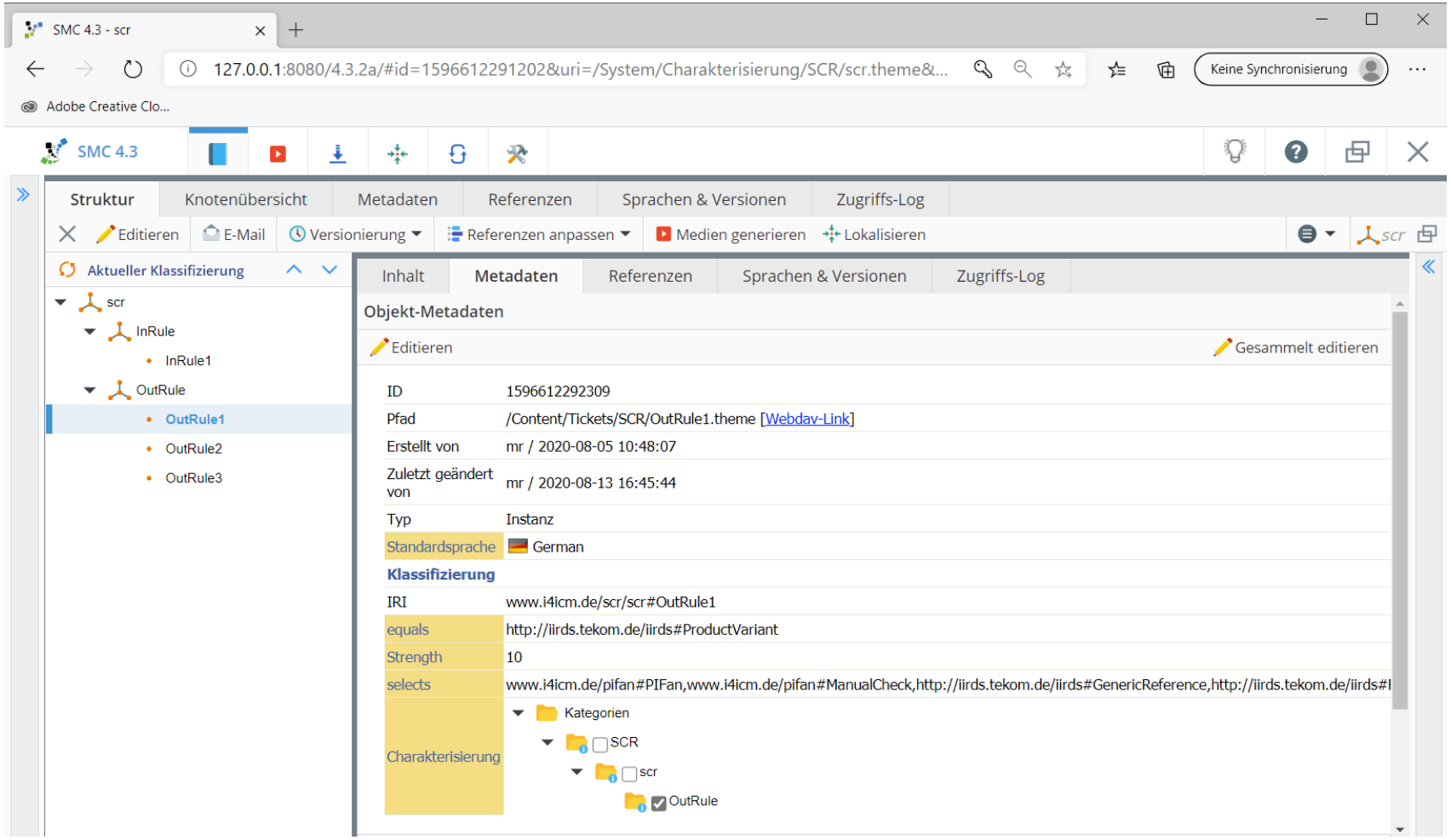
microDocs

CCMS

Smart Media Creator

(Expert Communication Systems)

System implementation & visualization



microDocs

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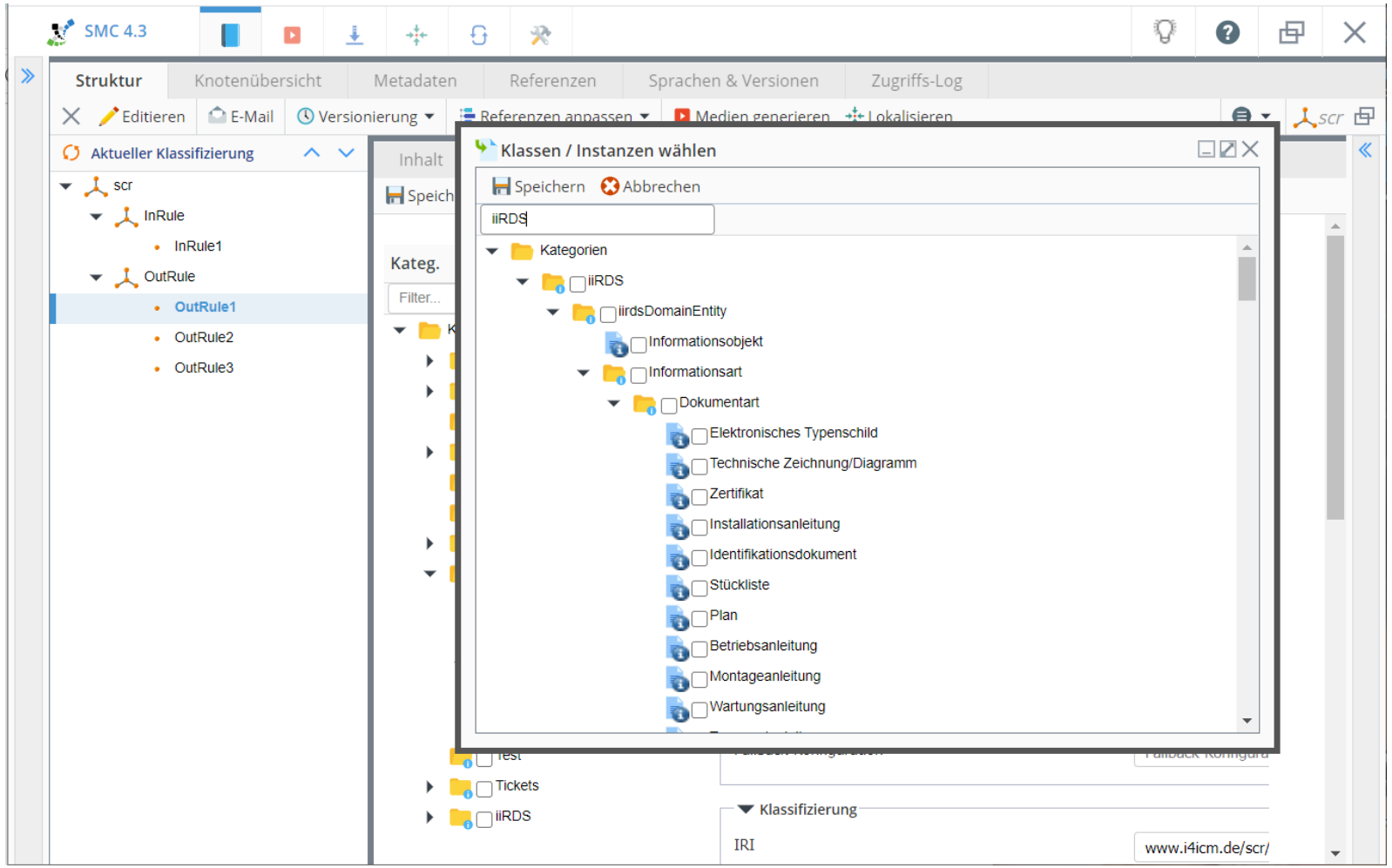
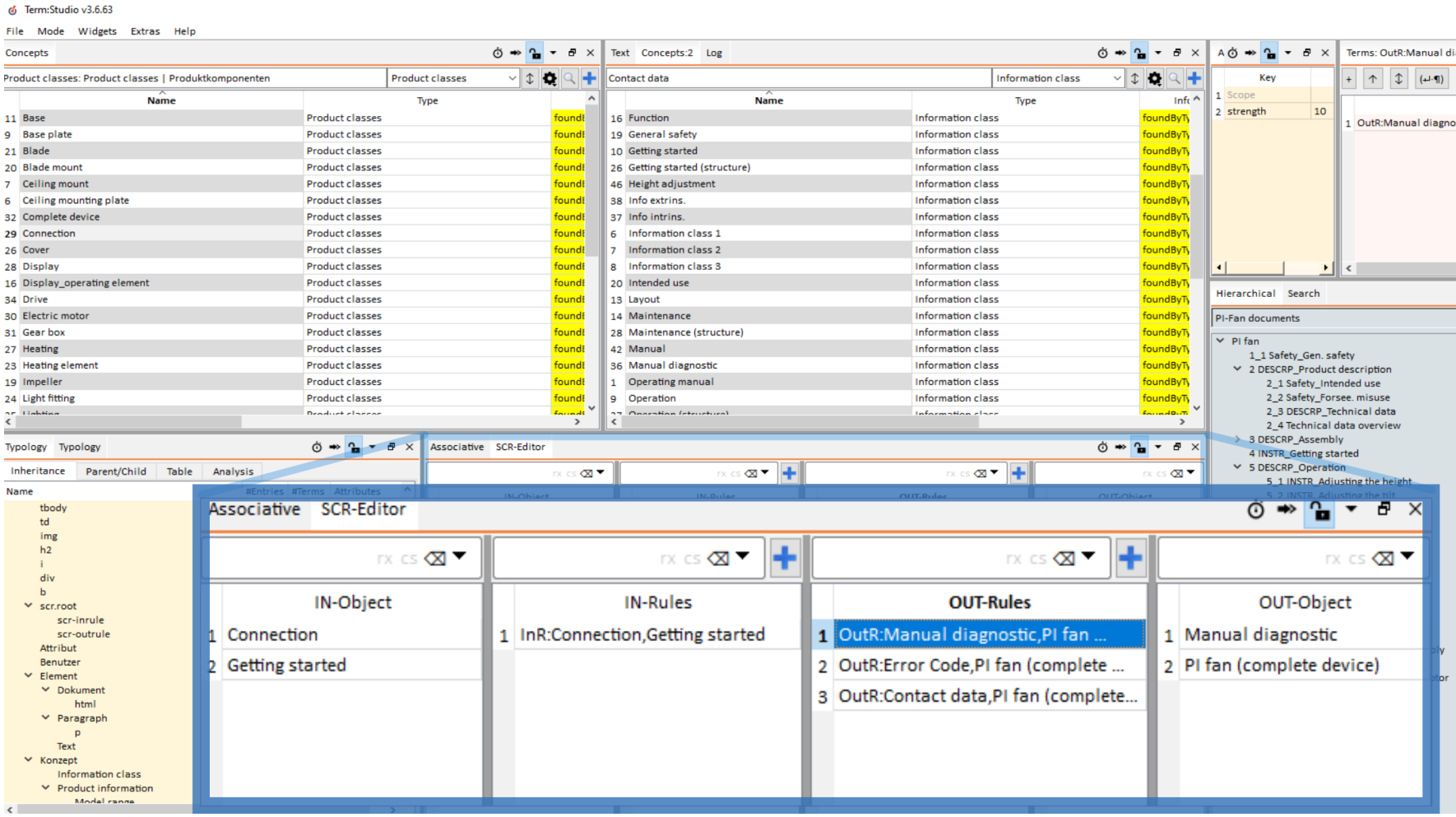


microDocs

System implementation & visualization

CCMS

Klar: Suite (Klarso)

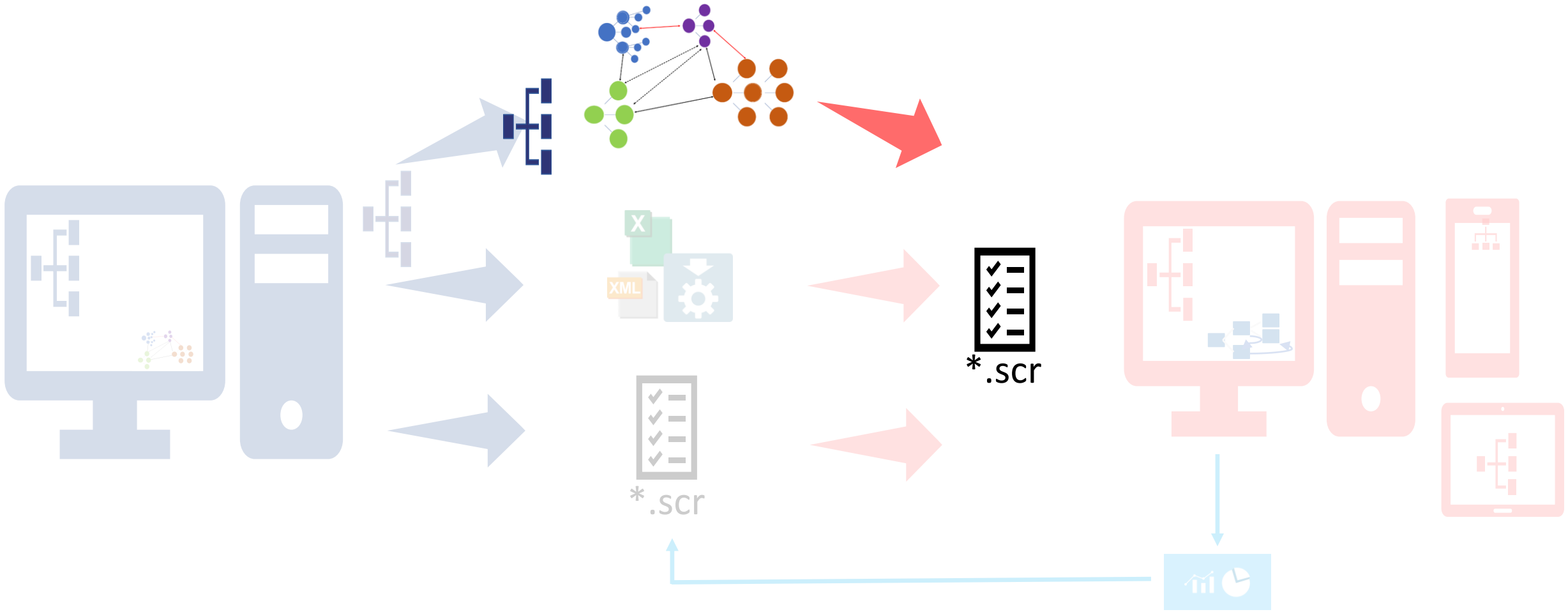


CMS

SMS

Semantic Modelling Systems

CDP



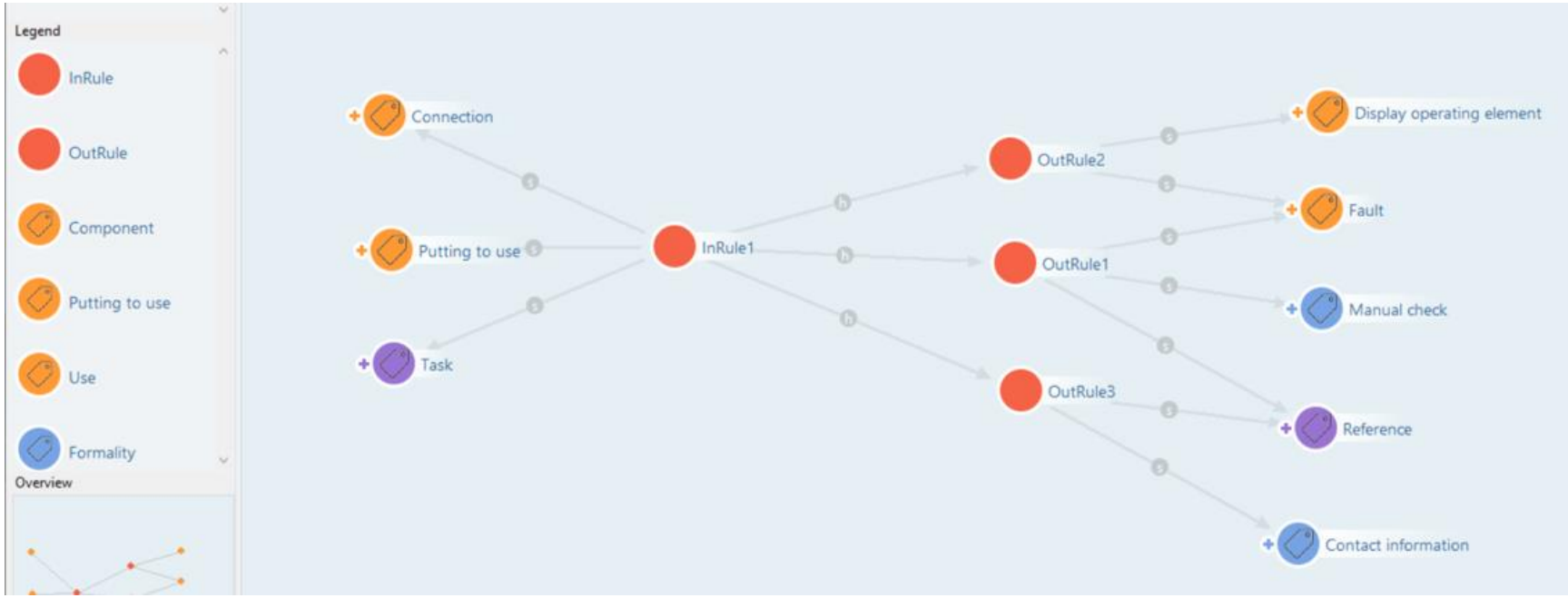
microDocs

System implementation & visualization

SMS

I-Views/Empolis

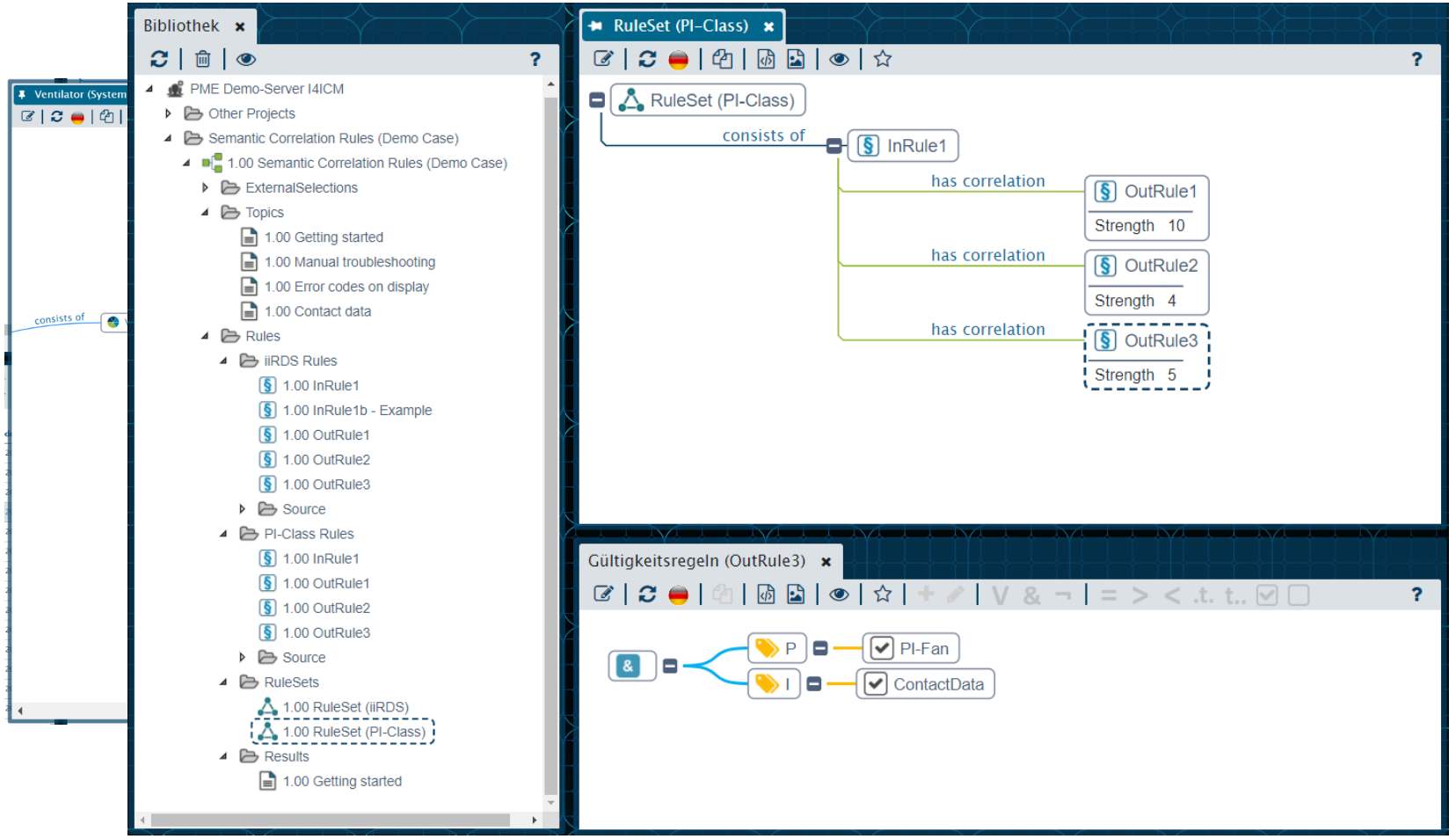
iiRDS Modell + SCR



microDocs

SMS: Ontolis

System implementation & visualization

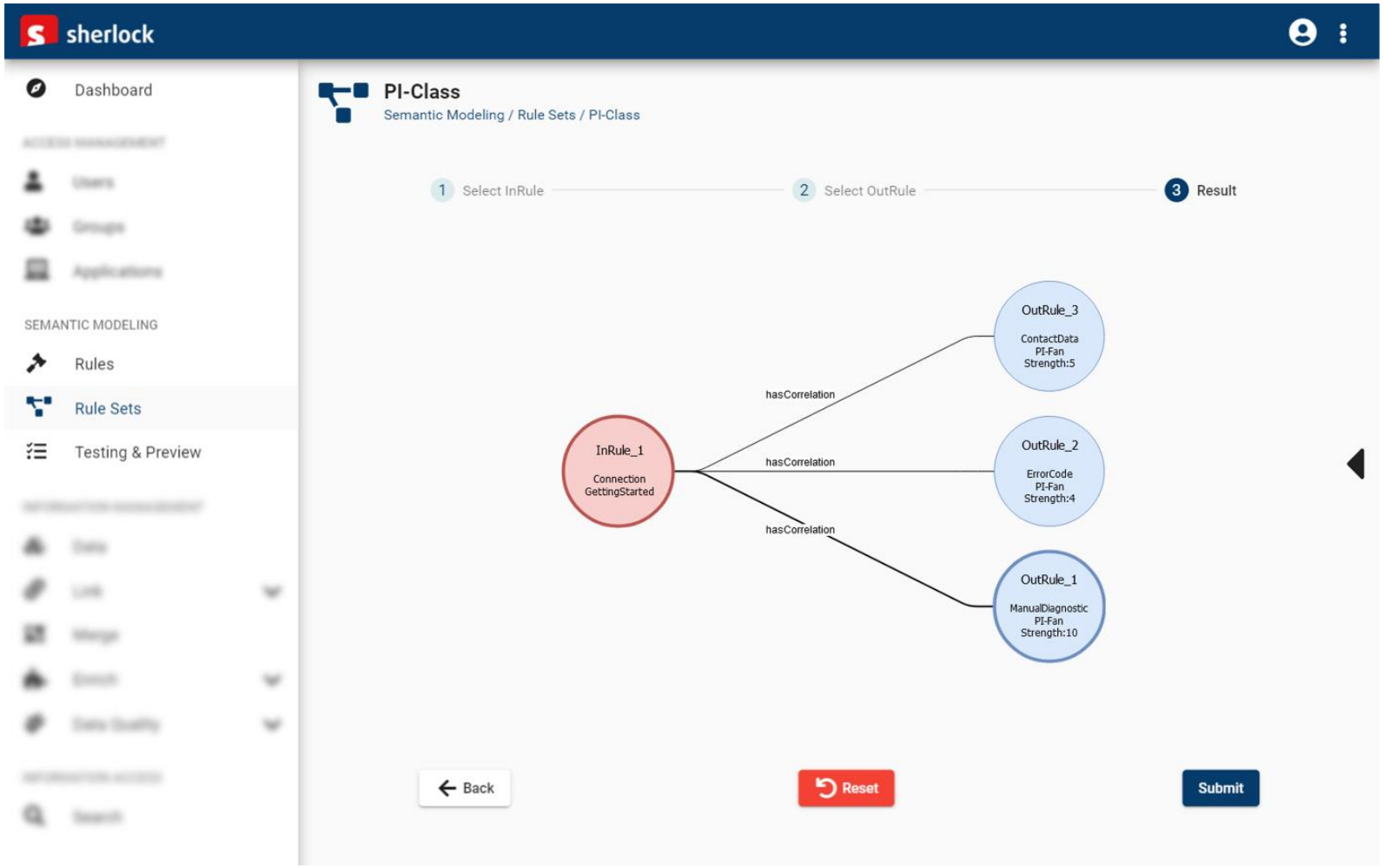


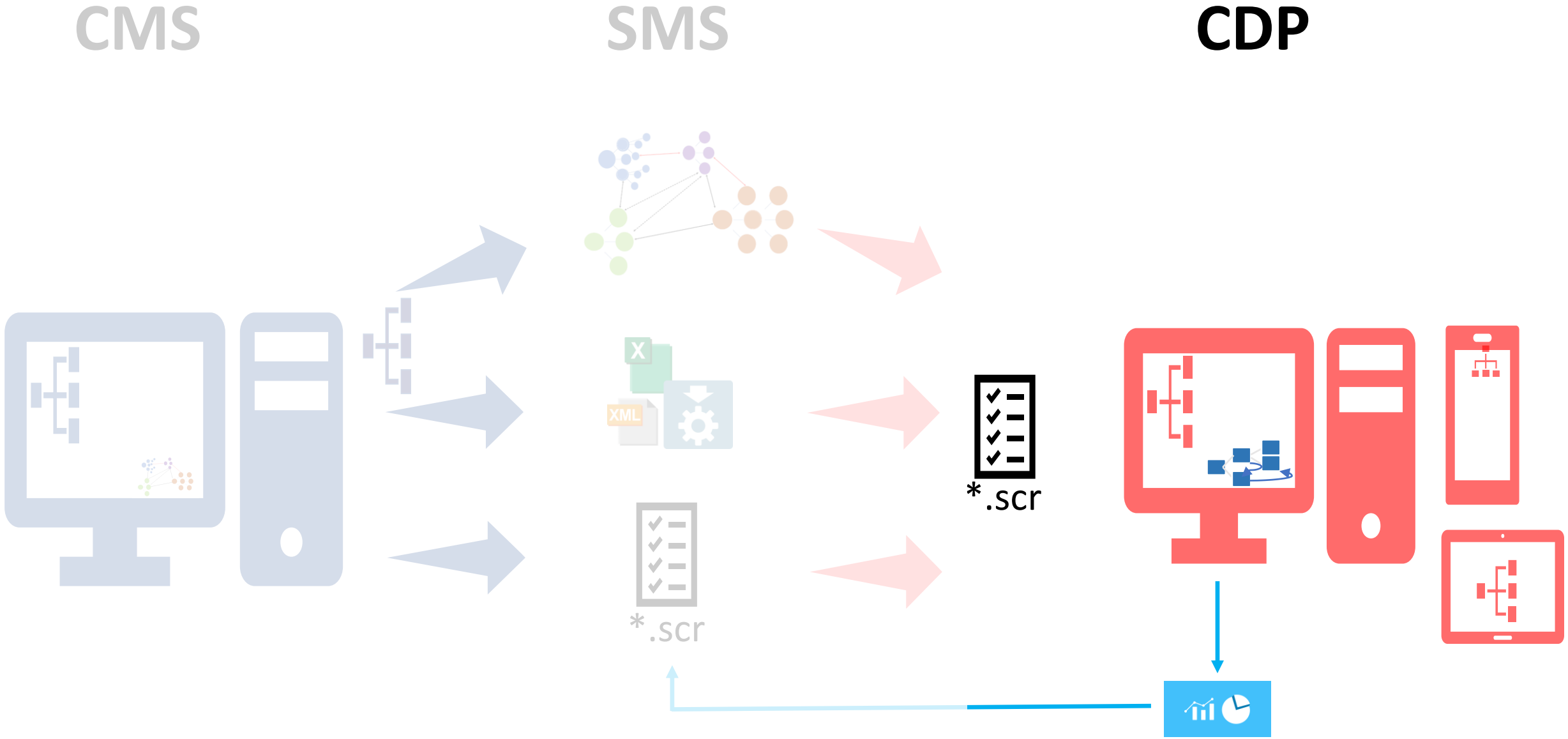
microDocs

SMS: Sherlock

Fischer Information Technologies

System implementation & visualization




CMS
SMS
CDP
X
XML
*.scr
*.scr

SCR processing

CDP

Sherlock (CDP-GUI)

Fischer Information Technologies

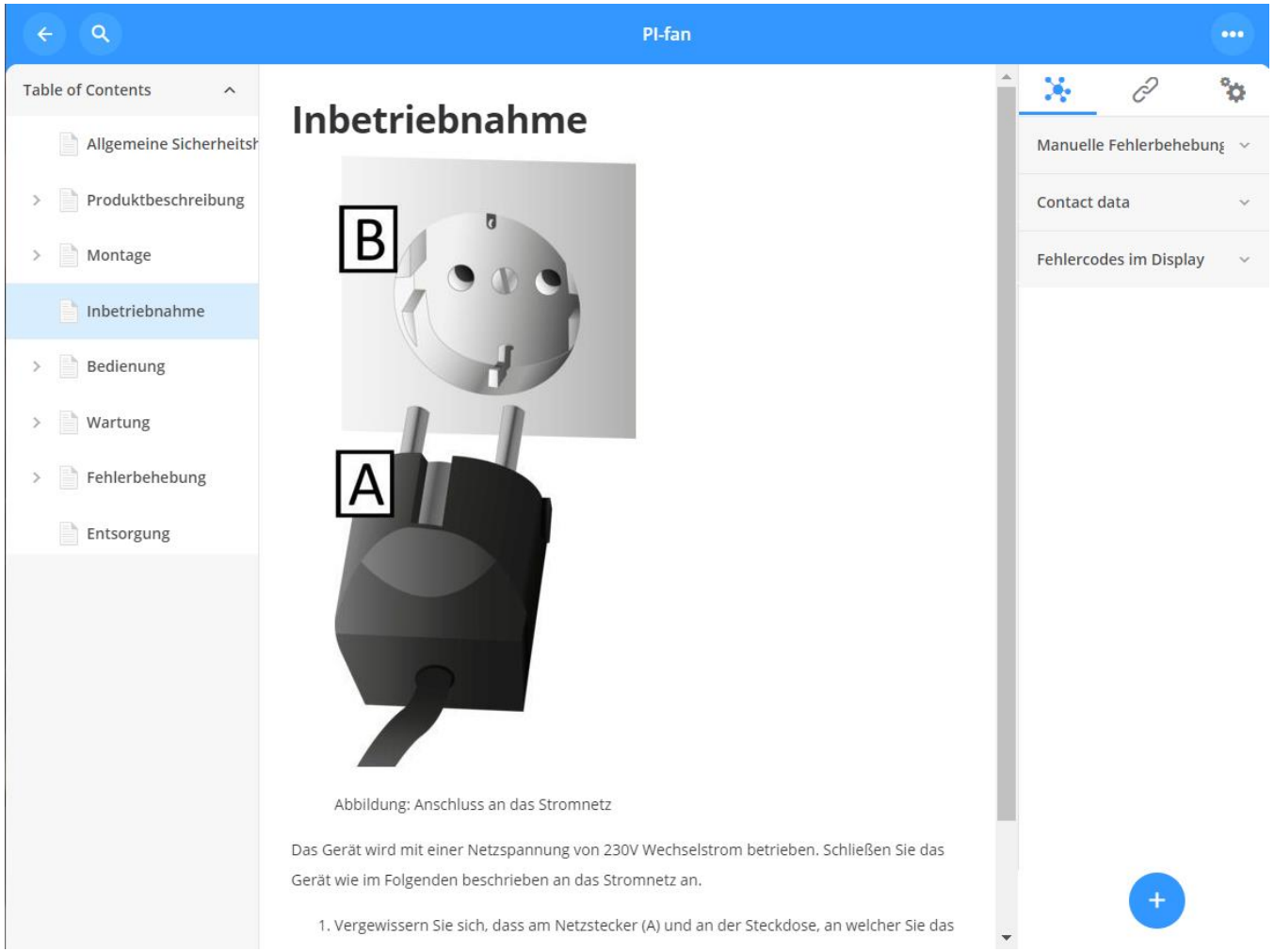
System implementation & visualization

SCR processing

CDP: CDS

Expert Comm. Systems

System implementation & visualization

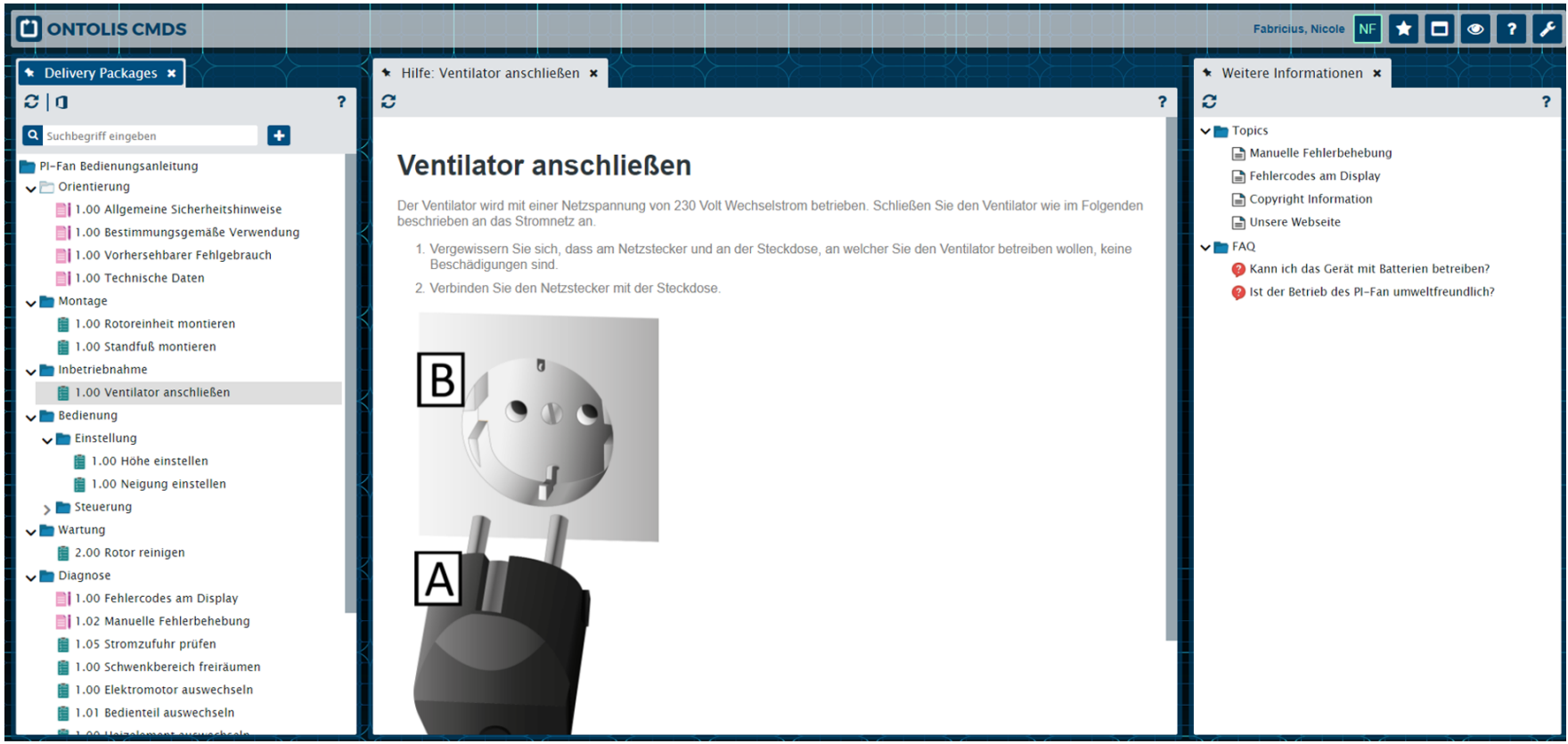


SCR processing

CDP:

CMDS (Ontolis)

System implementation & visualization

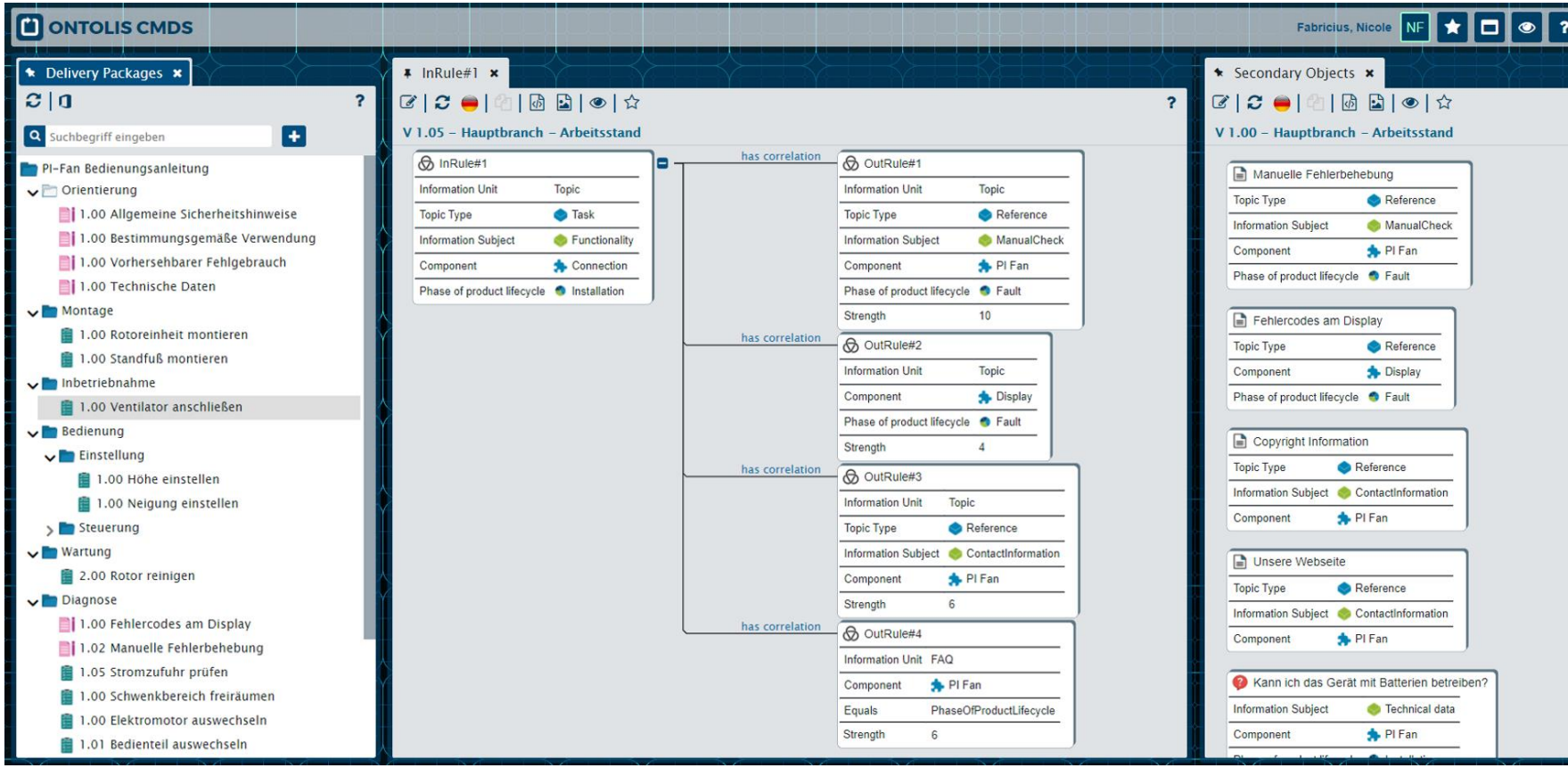


SCR processing

CDP:

CMDS (Ontolis)

System implementation & visualization

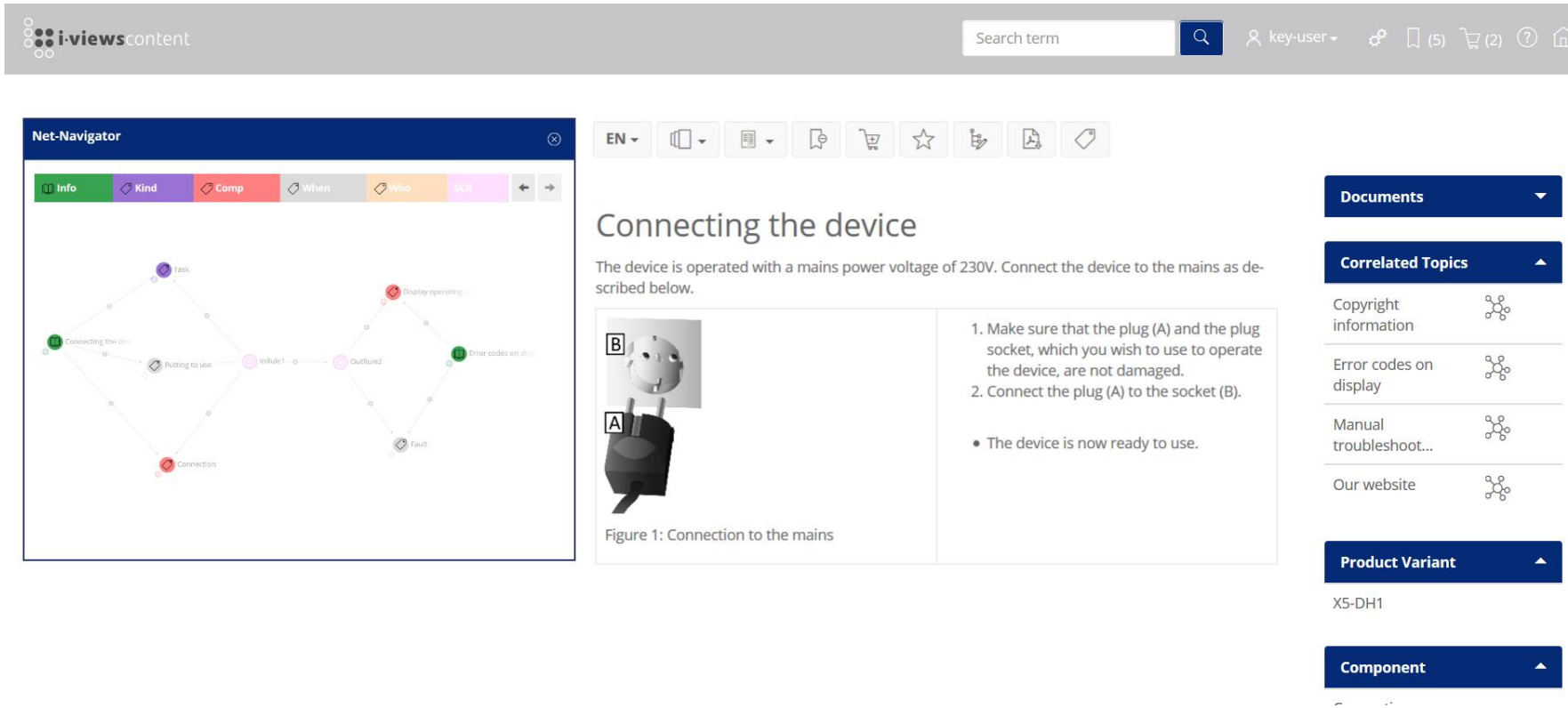


SCR processing

CDP: I-Views Content

Basis: iiRDS + SCR

System implementation & visualization

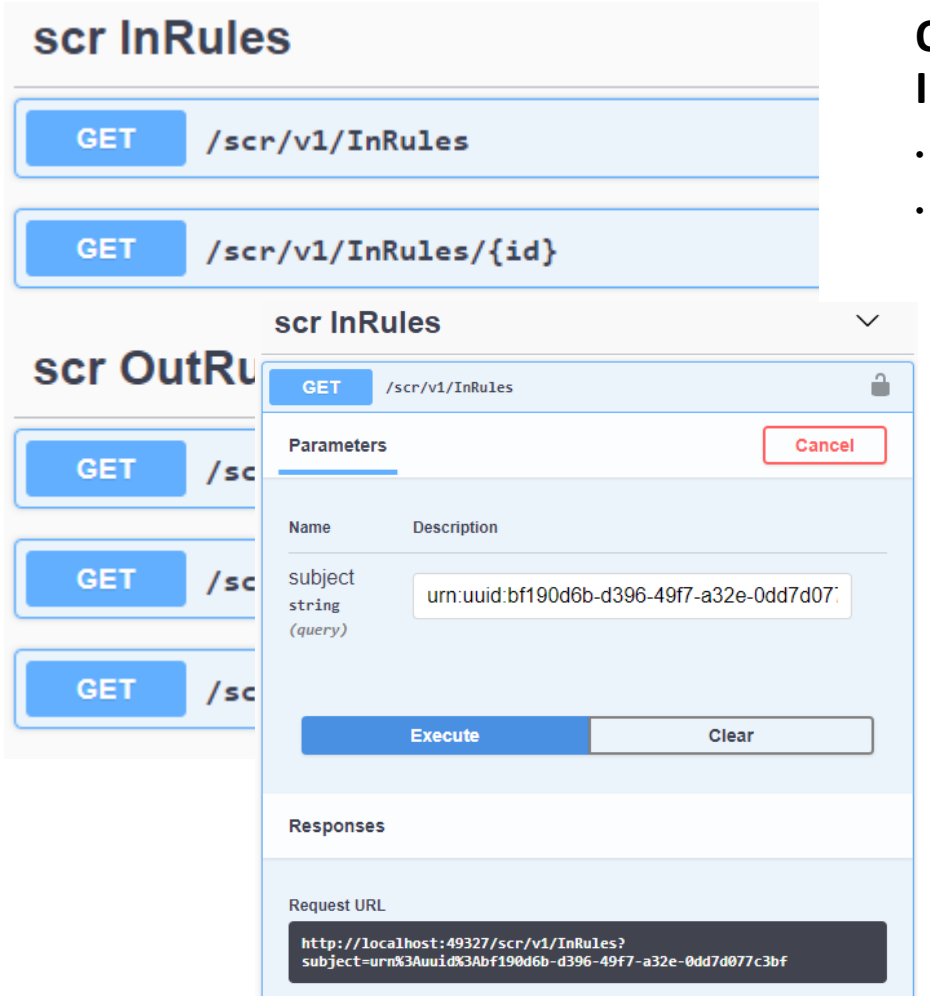


SCR processing

C-REX.net IDS API

Basis: iiRDS + SCR

SCR API (Content Service / headless CMS/CDP)



Querying scr:InRules correlated to Information Unit

- subject – ID of certain iiRDS information Unit
- Result is JSON, with meta information of scr:InRule


```
{
 "items": [
  {
   "hasCorrelation": [
    { "id": "http://www.i4icm.de/scr/scr#OutRule1"},
    { "id": "http://www.i4icm.de/scr/scr#OutRule2"},
    {"id": "http://www.i4icm.de/scr/scr#OutRule3"}
   ],
   "selects": [
    {"id": "http://iirds.tekom.de/iirds#GenericFunctionality"},
    {"id": "http://iirds.tekom.de/iirds#GenericPuttingToUse"},
    {"id": "http://iirds.tekom.de/iirds#GenericTask"},
    {"id": "https://www.i4icm.de/pifan#Connection"}
   ],
   "titles": [
    {"language": "de","value": "Dynamische Beziehungen (SCR)"}
   ],
   "id": "http://www.i4icm.de/scr/scr#InRulePiFan"
  }
 ]
}
```

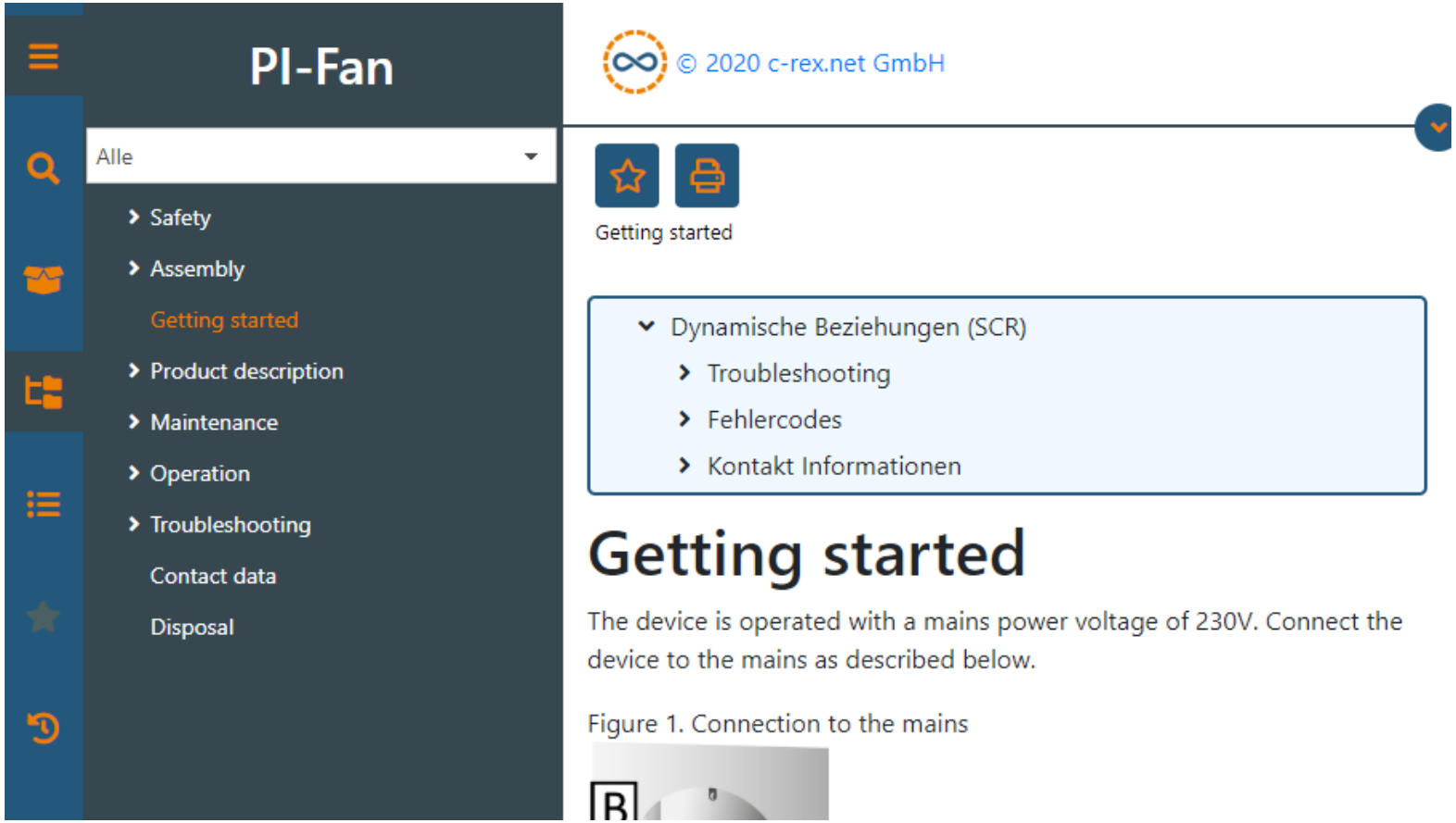
SCR processing

CDP/DCS

Digital Content Service

C-REX.net IDS

Practice Innovation



SCR

In Preparation

- … more to come

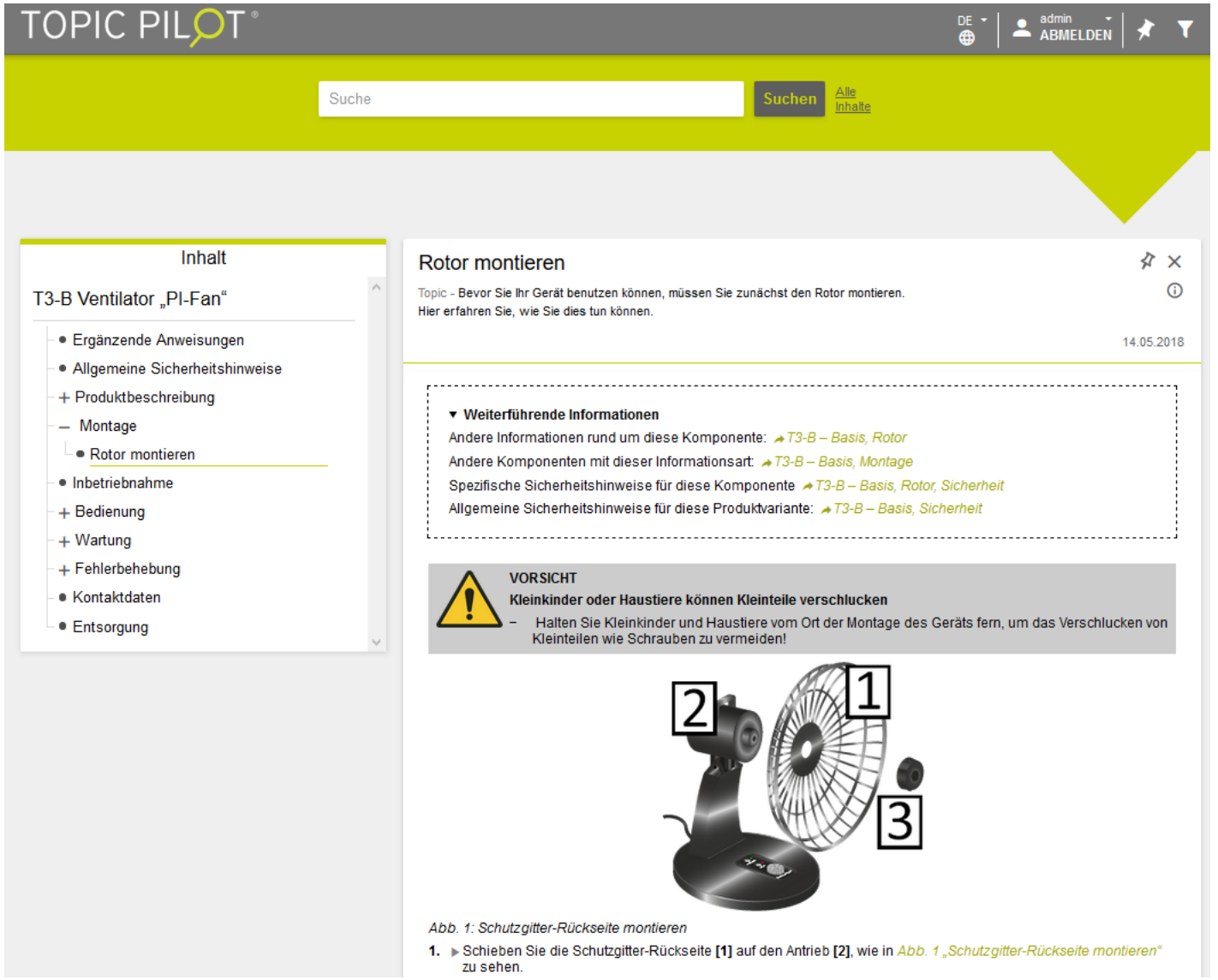
microDoc (Draft)

CDP

Classification-based Rules

for Linking

(Topic Pilot /Docufy 2019)



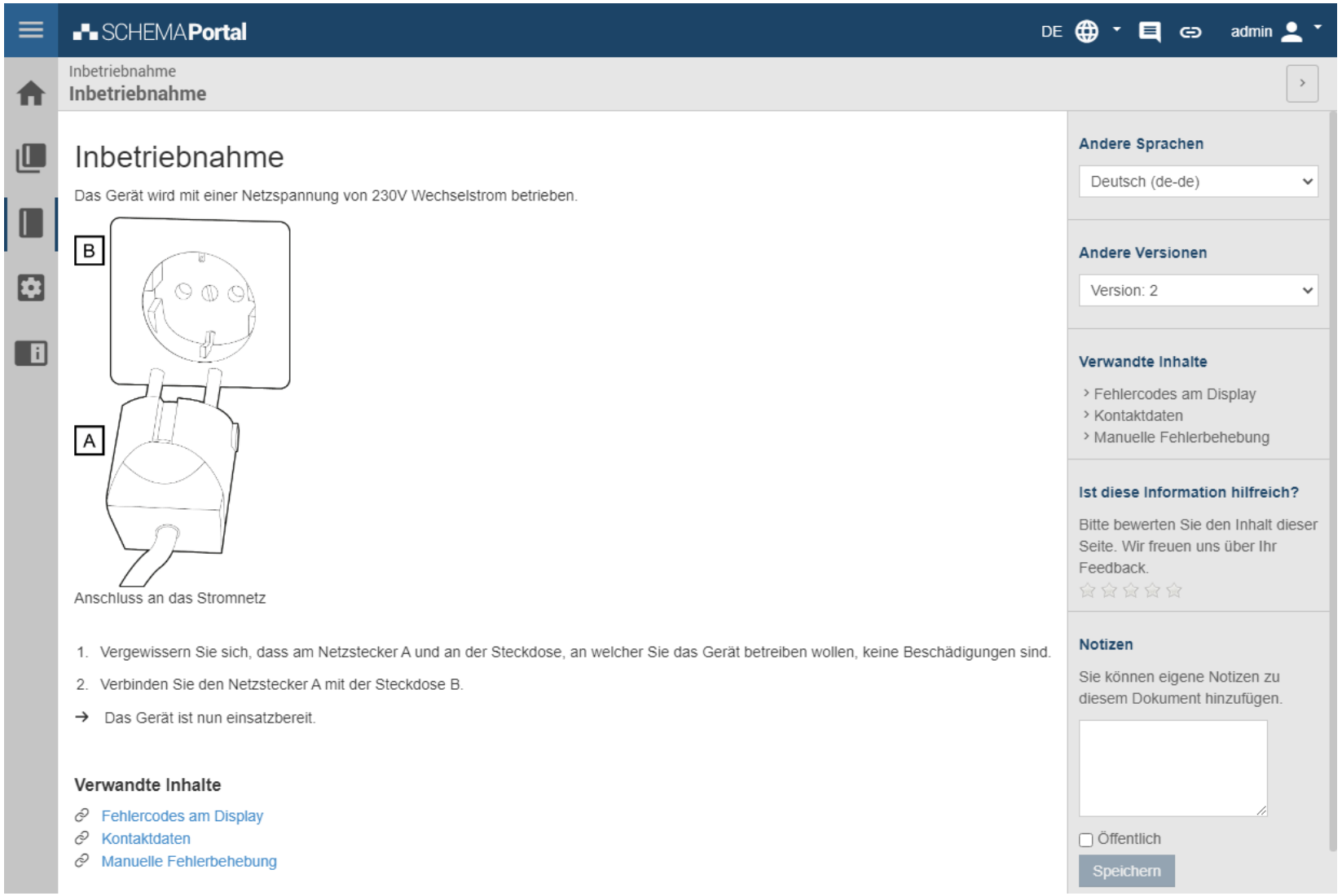
microDoc (Draft)

CDP

Classification-based Rules

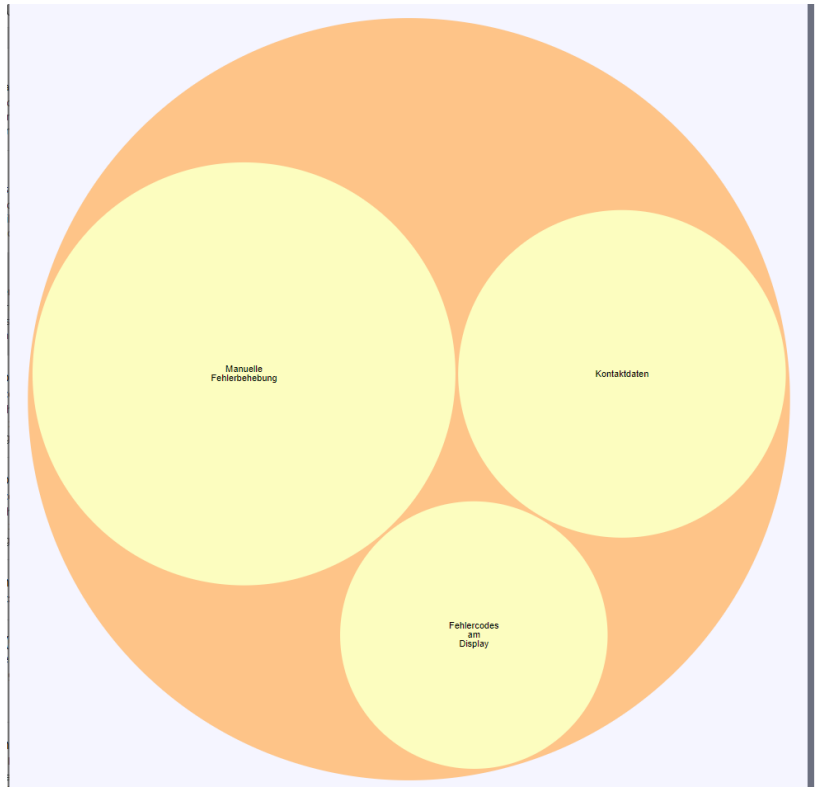
for Linking

(CDS / Schema 2019)



microDoc

Visualization



Installation

Getting started

The device is operated with a mains power voltage of 230V. Connect the device to the mains as described below.

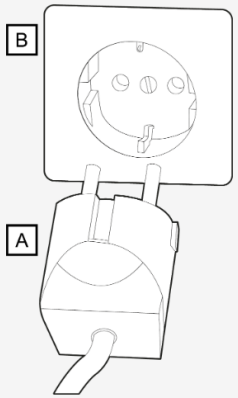


***Abb. 1** : Connection to the mains*

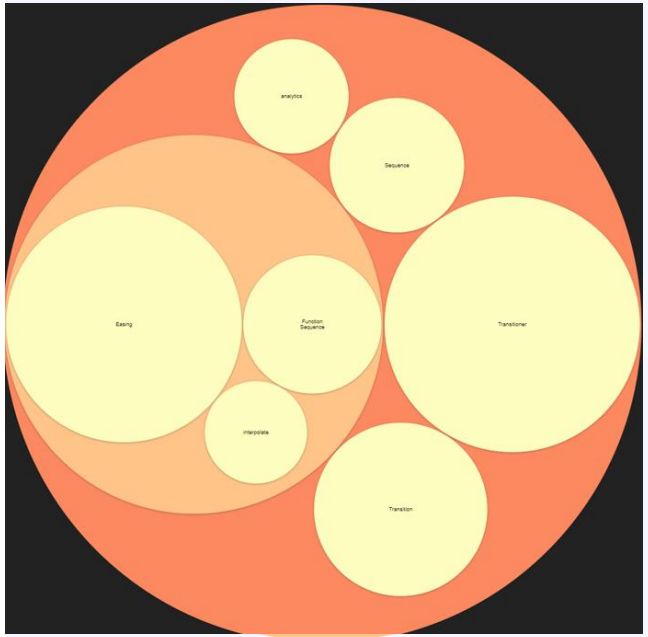
Make sure that the plug [A] and the plug socket, which you wish to use to operate the device, are not damaged.

VConnect the plug [A] to the socket [B] .

The device is now ready to use.

microDoc

Visualization



Höhe einstellen

Die Höhe des Geräts ist stufenlos einstellbar.

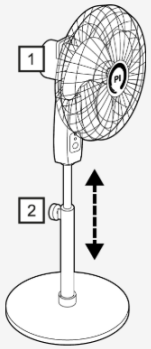


***Abb. 1** : Höhe einstellen*

Greifen Sie die Funktionseinheit 1 am Griff auf der Oberseite.

Lösen Sie mit der anderen Hand die Halteschraube 2 an der Rückseite der Teleskopstange.

Ziehen Sie die Funktionseinheit 1 auf die gewünschteHöhe.

Ziehen Sie die Halteschraube 2 mit der Hand wieder handfest an.

Lassen Sie den Grifflos.

Das Gerät hat nun die gewünschte Höhe.

Summary

Summary

Semantic Correlation Rules

- are a technical and standardized implementation of microDocs
- store and apply knowledge from relevant use cases for information delivery (and other tasks…)
- describe class-to-class relations (e.g. links) between objects

Summary

SCR aspects and features

- Adaptable to user- and industry-relevant use cases of information requests and delivery events
- Compatible with widely adopted CMS technologies for semantic metadata (taxonomy, classifications, properties)
- Easy-to-use creation tools and interfaces; import/export mechanisms
- „(Ultra-)Light-weight ontology“:
  Easy modelling without deep knowledge of semantic technologies
- First implementations in CDP;
  import mechanisms and management by CDP;
  Processing and integration depth depend strongly on CDP!
- Starting point of for more complex semantic modelling;
  integration into semantic models and modelling tools
- Allows for systematic improvement of correlations and subsequently content, systems and products
- Allows for sharing and using knowledg of critical use cases

Ressources

Legal issues (free to use, but references are mandatory)

Version 1.0.0 of Semantic Correlation Rules (SCR)

Intent:

Provide a generic object correlation mechanism for implementing microDocs concepts in delivery scenarios.

Typically used in content delivery portals (CDP) or other kinds of search portals.

Karlsruhe Univ. of Applied Sciences &

Institute for Information and Content Management (I4ICM)

Ressources

https://www.i4icm.de/

→ Publikationen

wolfgang.ziegler@i4icm.de

wolfgang.ziegler@hs-Karlsruhe.de

Literature & Downloads

- W. Ziegler, "Regelmäßig Verbindungen schaffen", technische kommunikation, Vol. 6, S. 18-25 (2020)
- W. Ziegler, Extending intelligent content delivery in technical communication by semantics: microdocuments and content services: Proceedings of the ETLTC 2020 conference. Aizuwakamatsu, Japan (2020) https://doi.org/10.1051/shsconf/20207703009
- W. Ziegler, „Delivery zwischen Kontext und Content" technische kommunikation, Vol. 6, p. 58-61 (2019)

- SCR Downloads https://www.i4icm.de/downloads/scr/1.1.0/ https://www.i4icm.de/scr/
  - SCR Definition in OWL/RDF notation (Base classes and relations): SCR.owl
  - Example of SCR-file for the PI-Fan using iiRDS: PI-Fan.iiRDS.scr.owl
  - Example of SCR-file for the PI-Fan using PI-Class: PI-Fan.PI-Class.scr.owl

    The corresponding complete files including correlations and classes/instances are also included for information purposes
- PI-Downloads (https://www.i4icm.de/downloads/)
  - PI-Fan classes/instances (slightly modified for demonstration purposes) using the PI-Class classification schema
  - PI-Class core classes of the PI-Classification methodology
- iiRDS Downloads
  - PI-Fan Reference content using iiRDS https://iirds.org/material-downloads/sample-content/
  - iiRDS Definition https://iirds.org/material-downloads/iirds-version-1-0-1/

Feedback

wolfgang.ziegler@i4icm.de
wolfgang.ziegler@hs-Karlsruhe.de

Acknowledgement

- The author/speaker thanks all cooperation partners for use cases, helpful discussions and system implementations!
- Support was also provided by HSKA (research sabbatical)