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COMPLEX DOCUMENTS **MADE EASY.**

tekom iiRDS

intelligent information Request and Delivery Standard

a new information exchange standard of Industry 4.0 and Internet of Things

Jörg Plöger, joerg.ploeger@schema.de

It is a Journey

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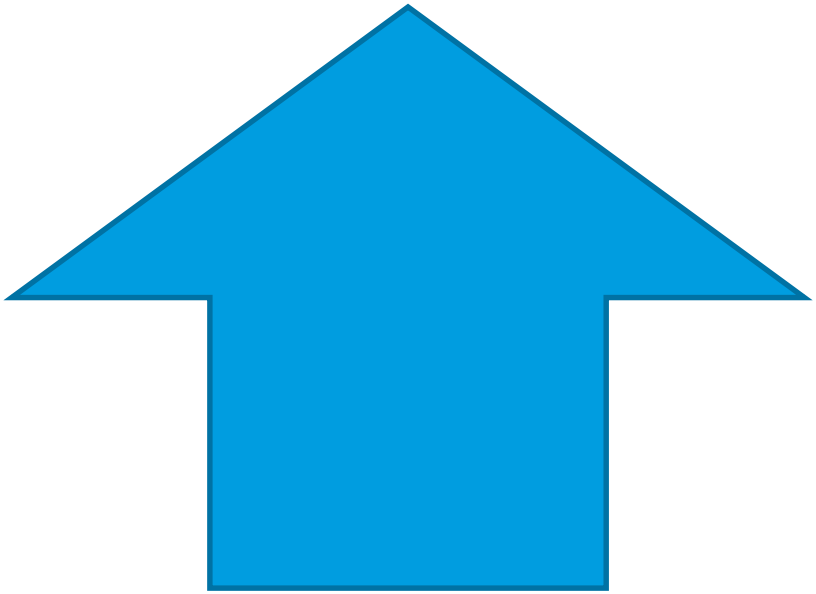

Who is who

Jörg Plöger

SCHEMA Group

tekom Germany

Working group Information 4.0

tekom Working Group „Information 4.0“

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- **Over thirty experts from various field of expertise:**
  - Industry Experts
    - Machine Building and Systems Engineering
    - Power Plants
    - Electronics / Electro technical Industries
  - Software
    - Software Vendors
    - CCMS
    - Content Delivery Systems
    - Enterprise Search
    - Semantic Graphics Database
  - Consulting and Academia
    - Universities
    - Consulting Service Providers

Digitization is invading our daily life

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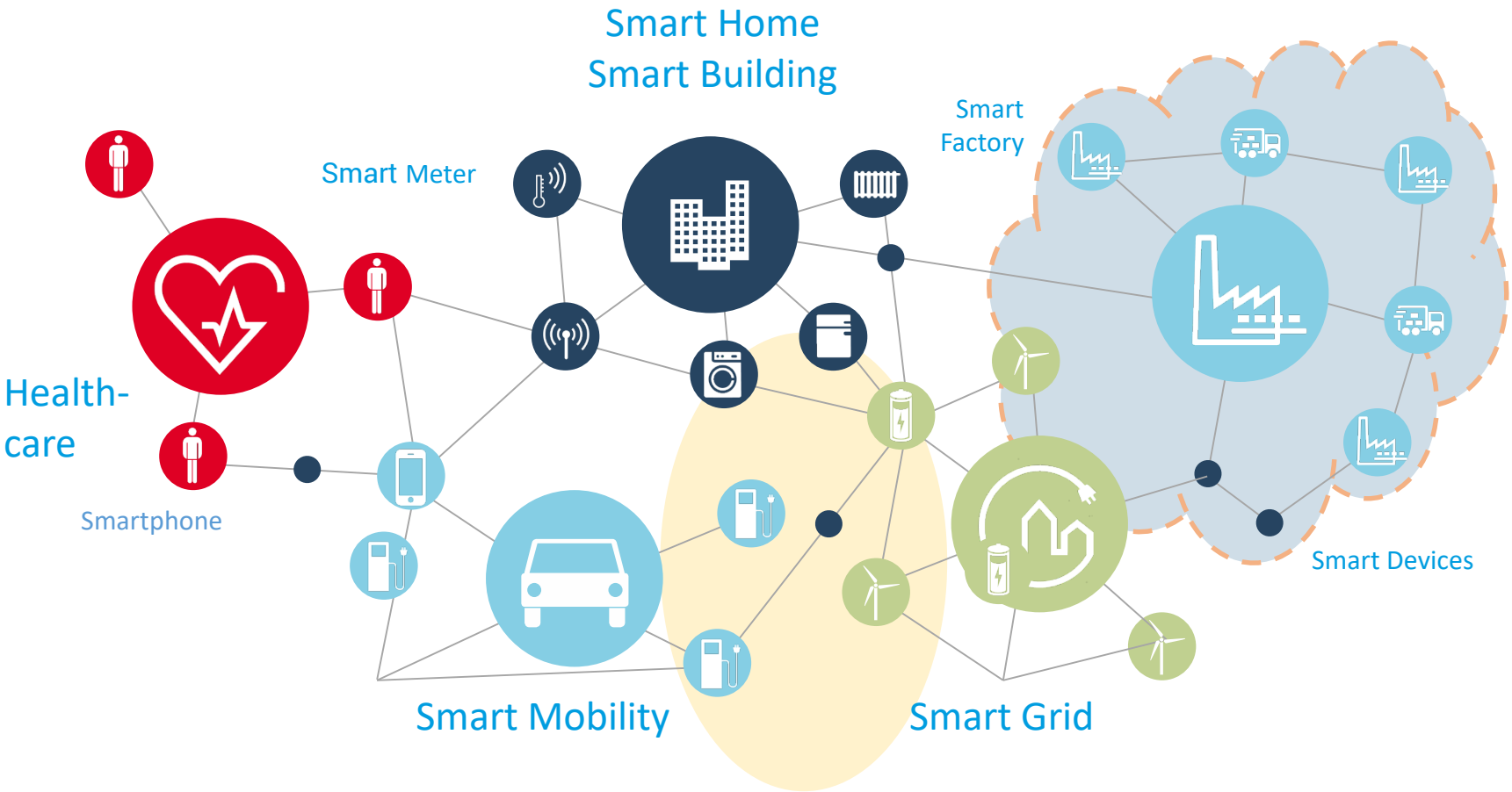
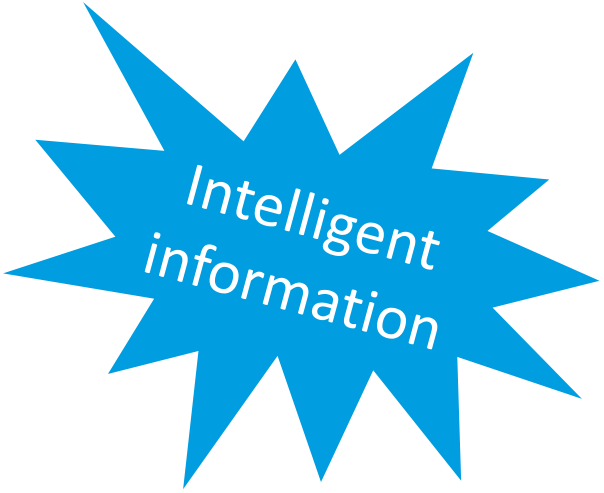


Source: HEIDELCOM, 2017

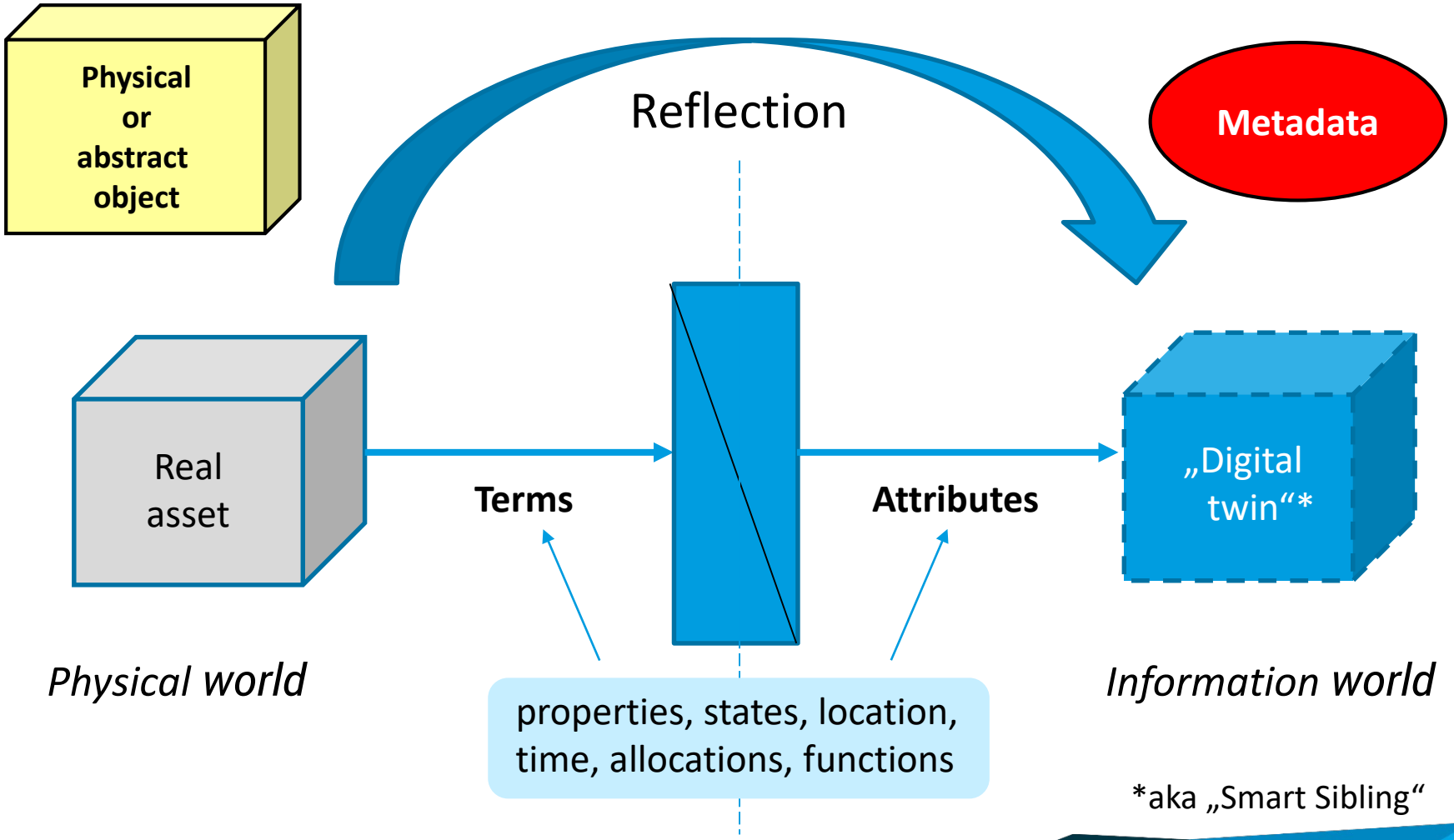
What (Smart) Users want

- The right information
- for the right person
- at the right place
- at the right time (immediately)
- on the most suitable device



tekom wants to offer a state-of-the-art concept to generate, convey and connect intelligent information

Digitization: Things become „assets“



*aka „Smart Sibling“

Source: HEIDELCOM, 2017

Intelligent information is contextual

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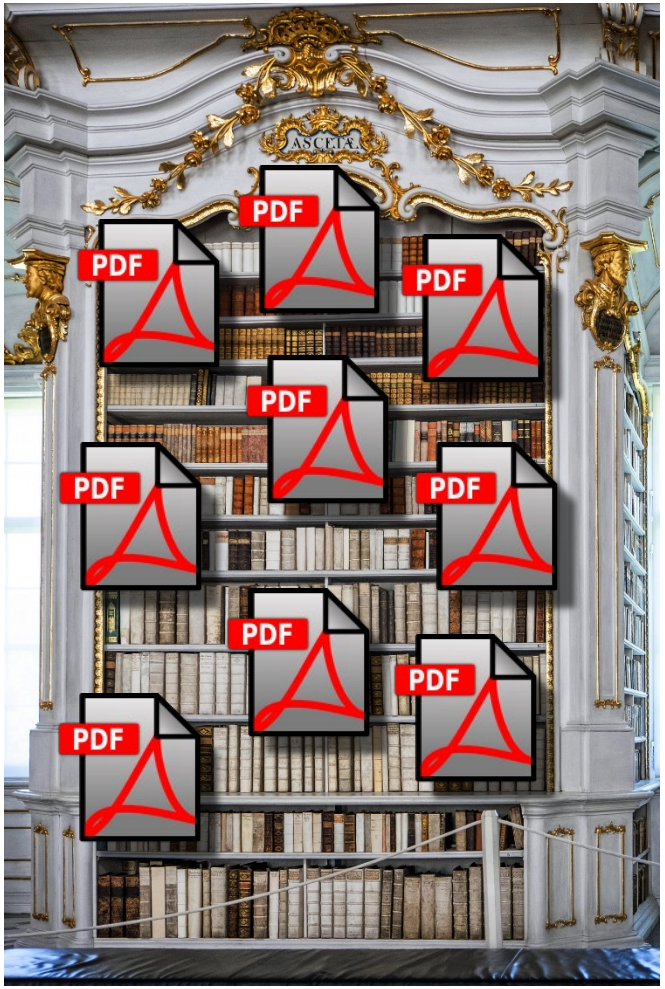
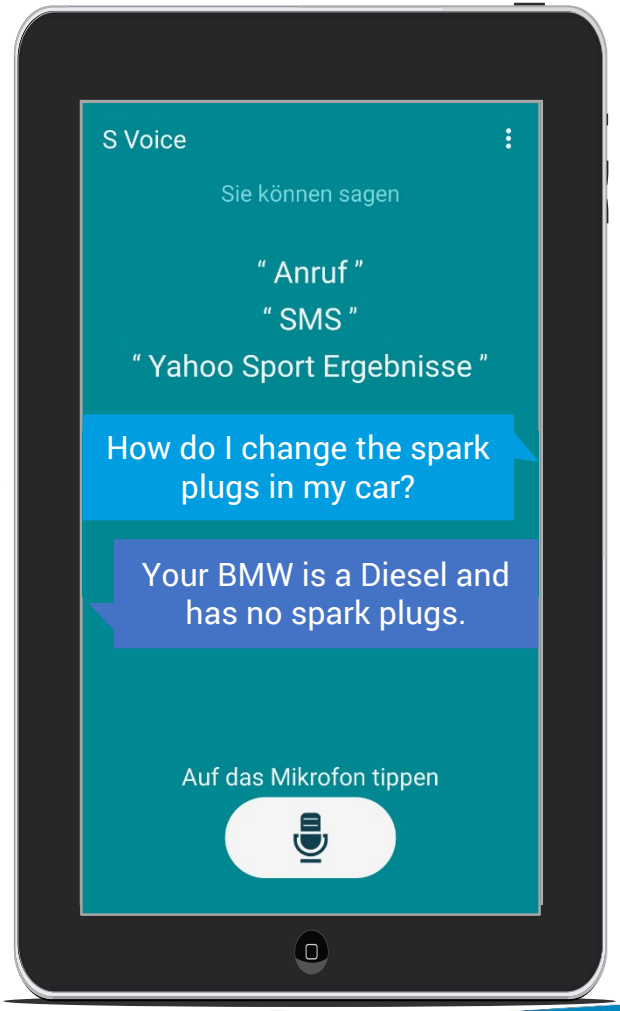
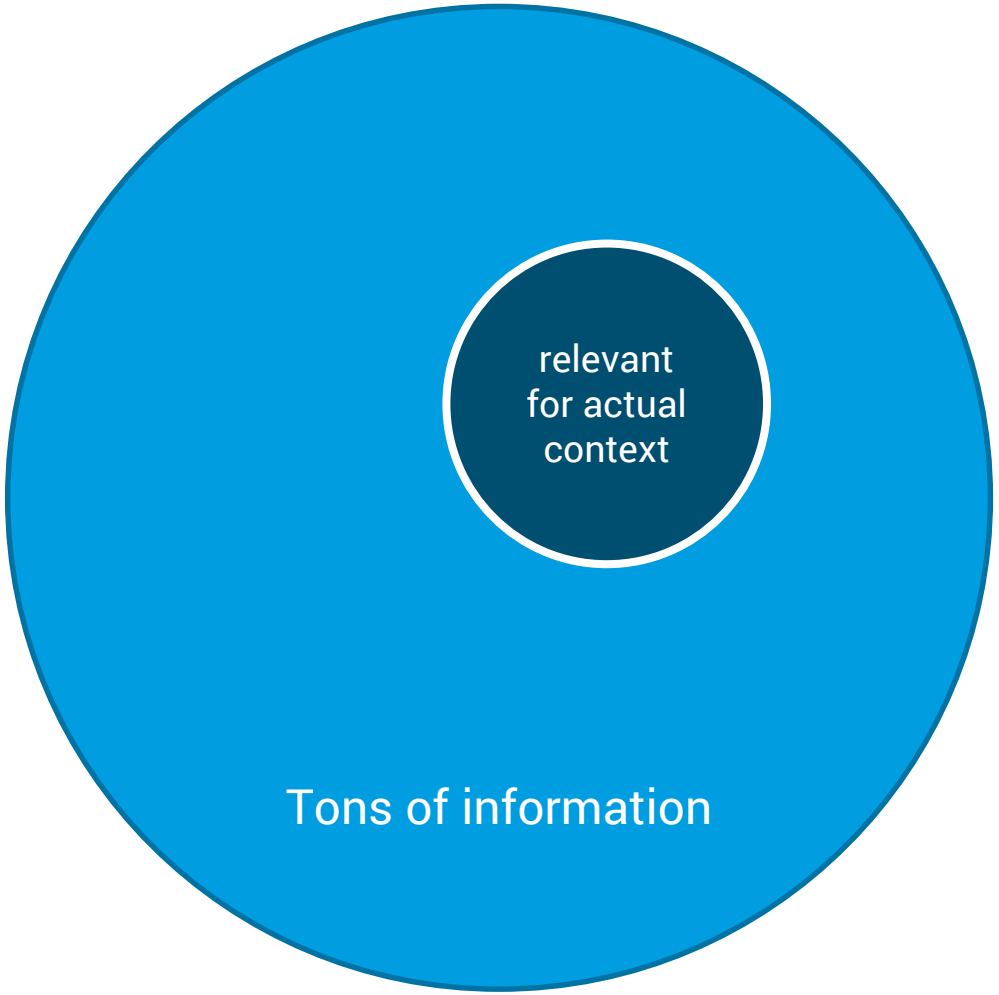




Intelligent information allows limiting the flood of information



Context-driven retrieval is based on meta data

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Context-driven retrieval is based on meta data

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Intelligent information can be meshed

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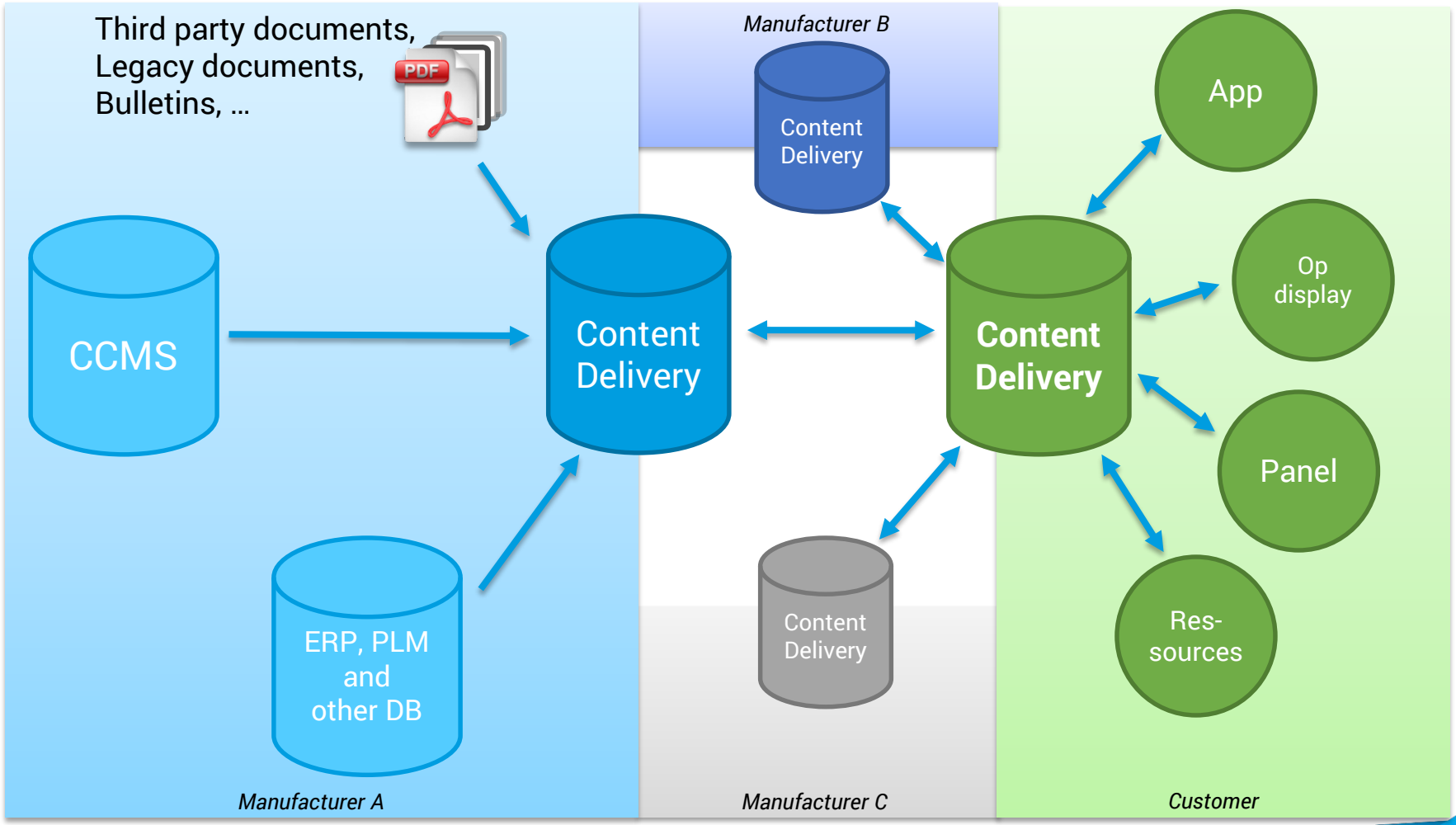

tekom iiRDS Technical Scenario
Information Request and Delivery

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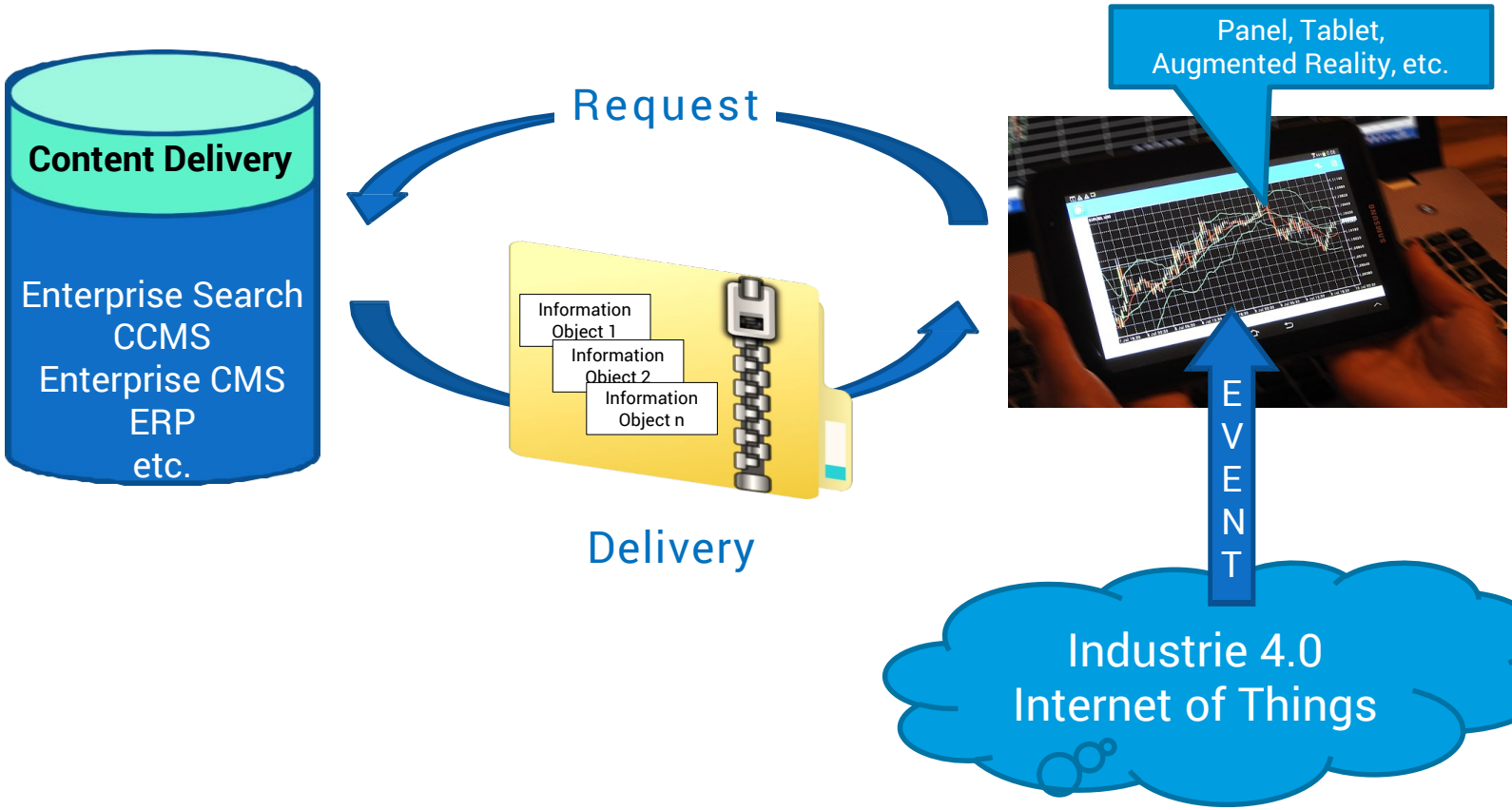

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Use cases for information request & delivery

Use Case 1/7

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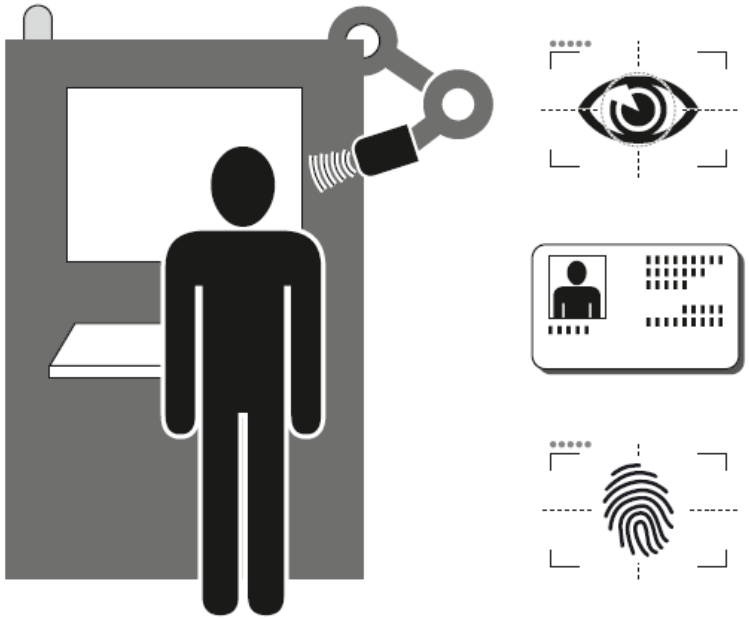
Person recognition

- Machine recognizes user, e.g. over (iris) scanner, ID card, fingerprint sensor etc.



Use Case 2/7

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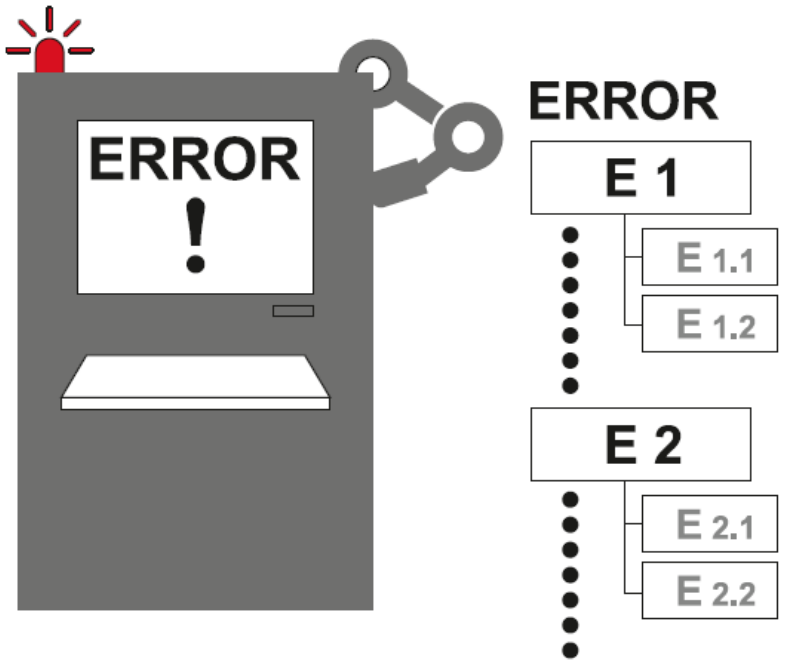
Error messages

- Machine shows malfunction
- Machine displays error messages by priority
- Machine gets associated documentation content from data pool (e. g. Content Delivery Portal, CDP)



Use Case 3/7

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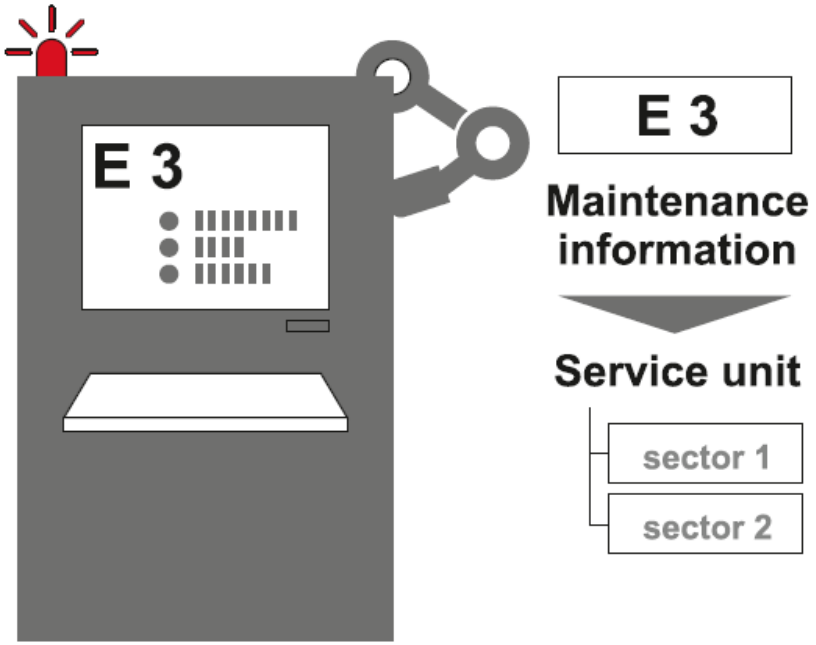
Information for non-scheduled maintenance

- Machine detects itself that maintenance work is required for a specific component
- Machine selects content related to the maintenance of this component from data pool.



Use Case 4/7

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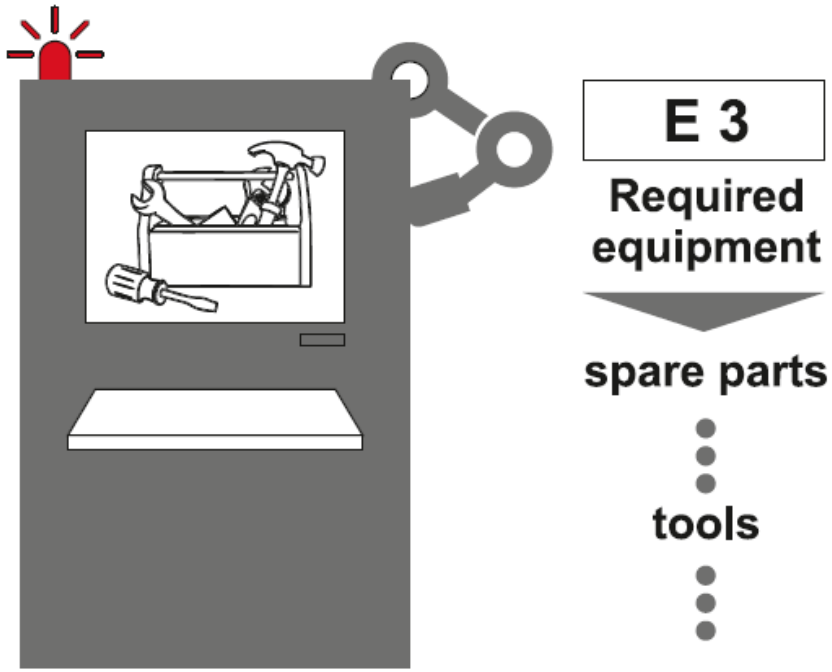
Spare parts information for maintenance planning

- Machine shows notification for required maintenance
- Machine retrieves instructions for the required maintenance tasks and information about required supplies for the tasks:
  - Spare parts
  - Lubricants
  - Tools
- For maintenance planning, e.g. wind turbine on the sea



Use Case 5/7

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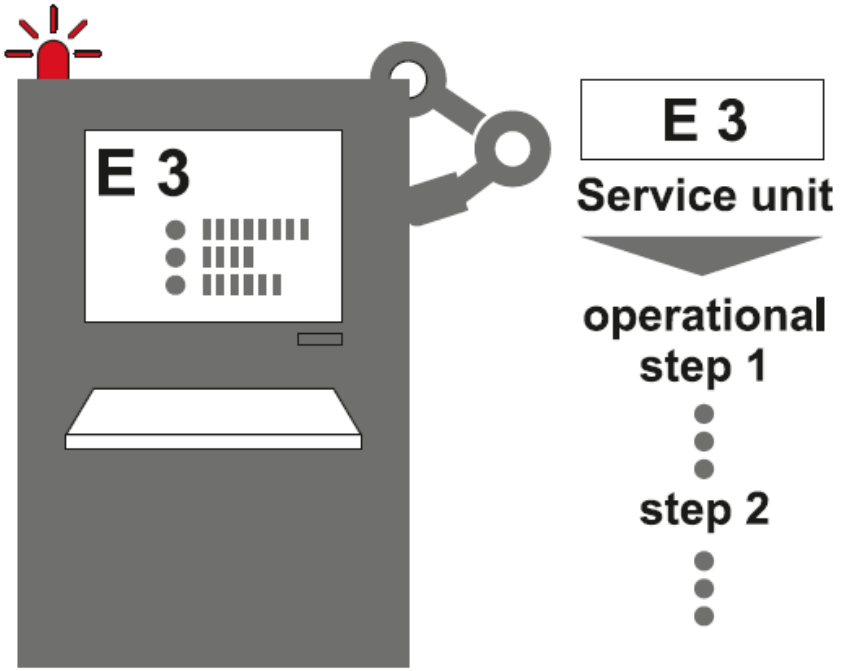
Information for scheduled maintenance

- Machine keeps maintenance plan for preventive maintenance
- For the components that are installed in this variant
- Machine retrieves instructions for the required maintenance tasks and information about duration of tasks and involved downtime
- Maintenance can be scheduled, downtimes can be reduced (production optimization)



Use Case 6/7

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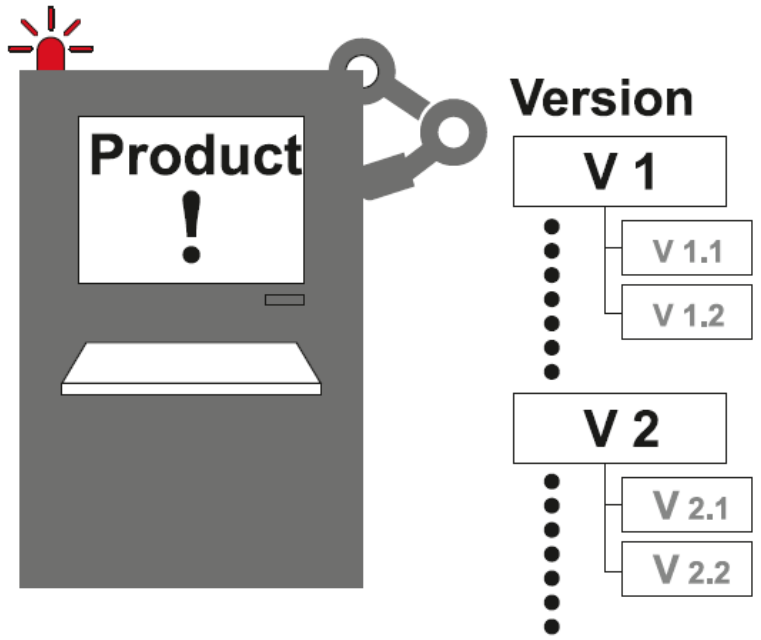
Information matches technical design

- Documentation content matches delivered version and variant
- Even after modification or update to machine, the information is up-to-date and matches the system



Use Case 7/7

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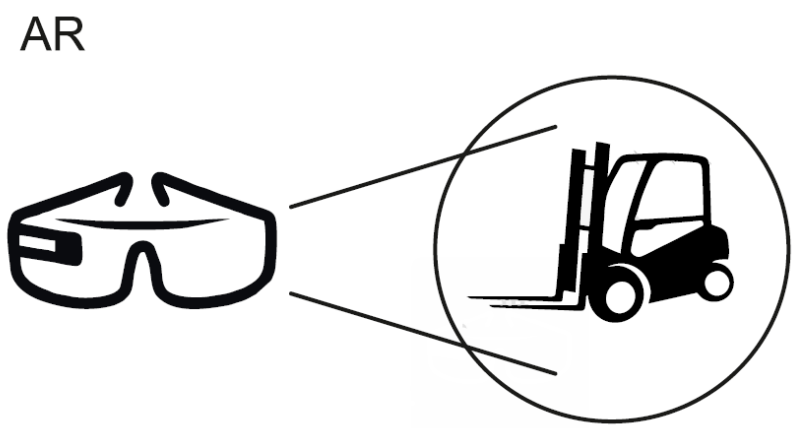
Using augmented reality

- Information and instructions are retrieved from the data pool based on the recognized component or system
- “Data glasses” show information the technician can select.
- Augmented reality synchronized with information on a different device



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What‘s behind it?

The power of ontologies

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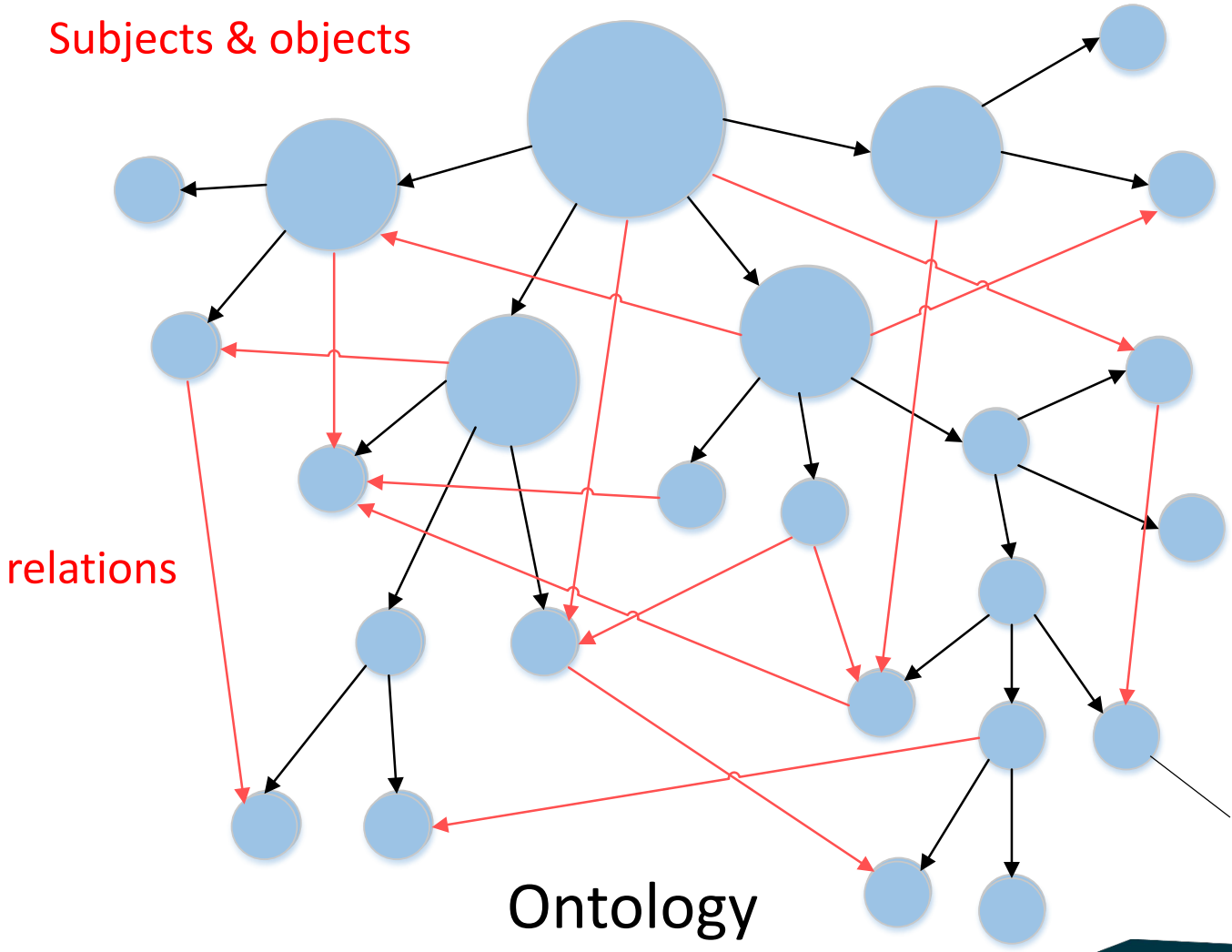

iiRDS as an Ontology

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An ontology is a formal naming and definition of the types, properties, and interrelationships of the entities that really or fundamentally exist for a particular domain of discourse.[1]

- Domain = technical communication
- iiRDS defines the vocabulary for the entities of technical communication: topics, fragments, documents, and metadata describing them.
- Standardized relations between these entities. Example: A topic relates to a specific component.
- Standard for intelligent information for the connected industry

1https://en.wikipedia.org/wiki/Ontology_(information_science)

iiRDS implemented as RDFS

Resource Description Framework (RDF) is a family of World Wide Web Consortium (W3C) specifications[2]

- Formal language for defining ontologies
- Defines classes, properties, and relations for the entities (resources) that are described in the ontology.
- Enables statements about the resources in the form of subject-predicate-object expressions = triples
- Abstract model, serialization into multiple file formats possible. Examples: Turtle, JSON-LD, RDF/XML. iiRDS uses RDF/XML.

2 https://en.wikipedia.org/wiki/Resource_Description_Framework

Example for an „RDF triple“ of iiRDS

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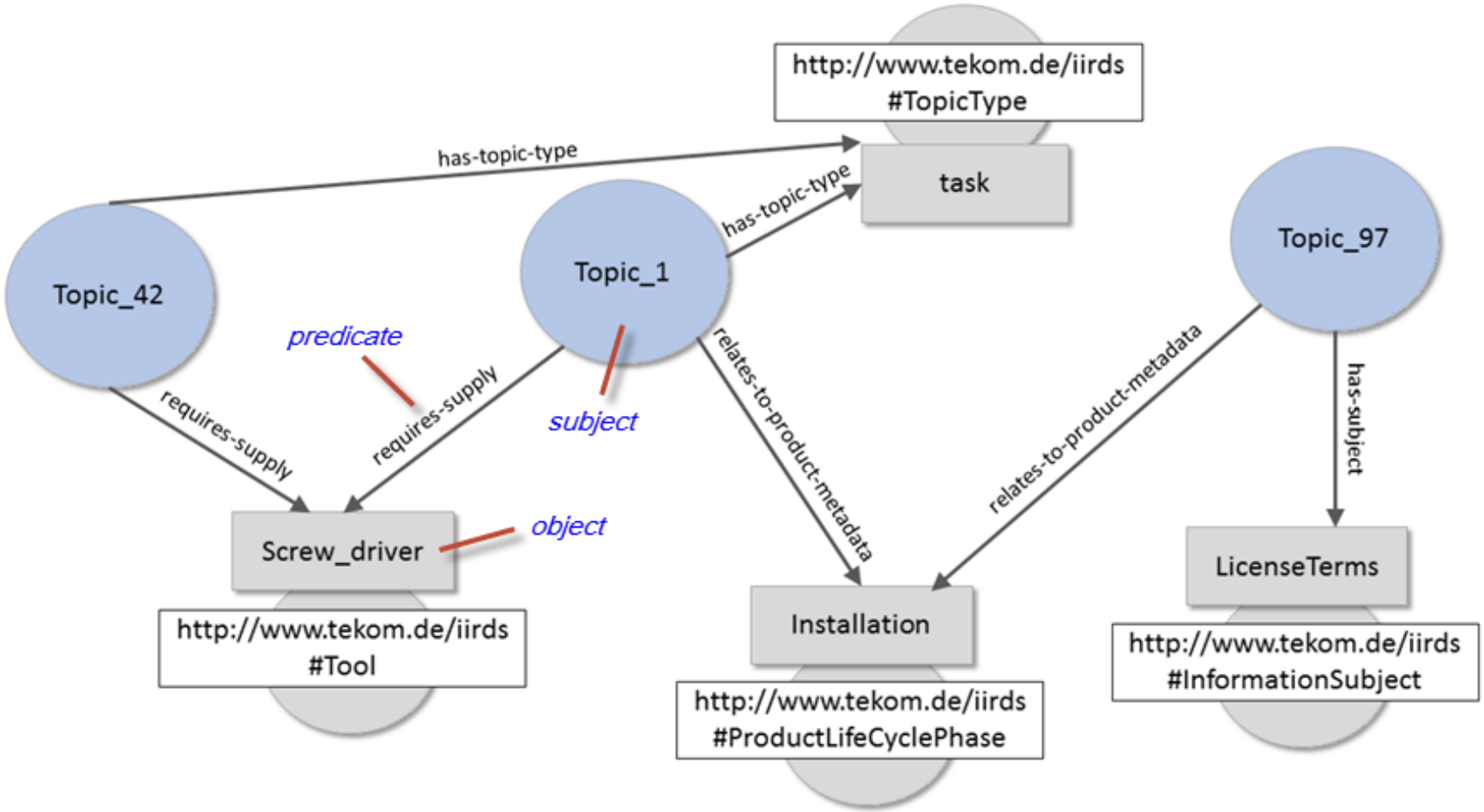

iiRDS Package

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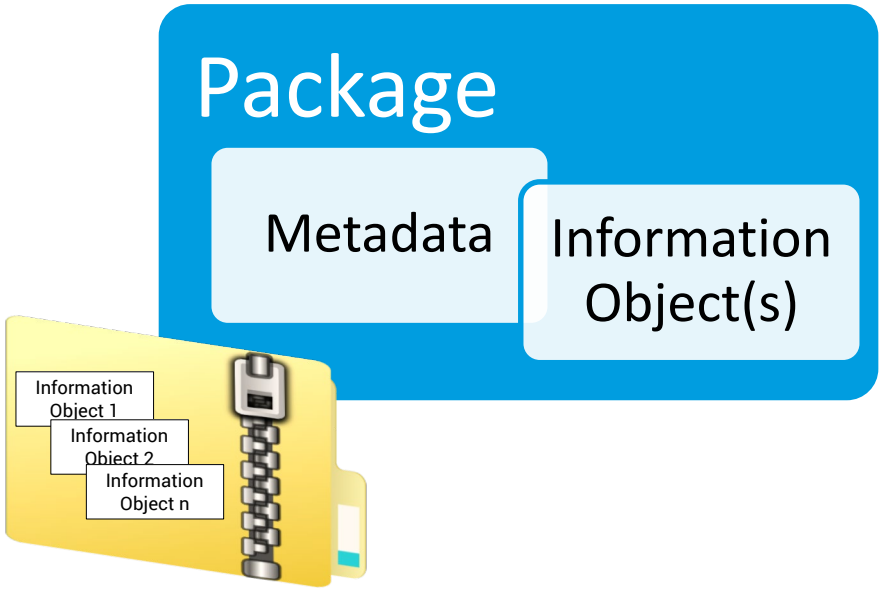
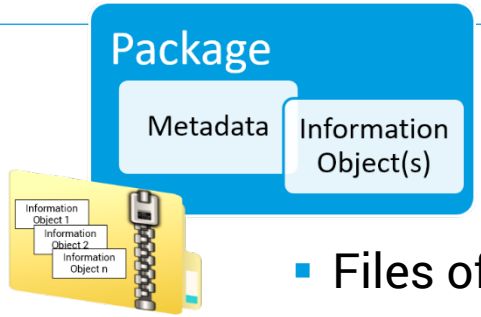


iiRDS Package – Overview



Meta data

- Meta data provides contextual information on the content in the package.
- Meta data is stored separately.
- Content is adressed through references.
- References cannot only address files but also point into files.
- Meta data is defined using an **RDF Schema**

Content

- Files of any type
  - text, graphics, video, audio, system configuration, patch
- Files
  - of any format (unrestricted package)
  - or from a set of given formats (iiRDS/A package)
- Meta data embedded in files is not relevant for iiRDS processors

iiRDS content formats?

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- Source formats are very different
- No painless and lossless transformation
- Intelligence is within the meta data, not structured vs. unstructured
- Mimetypes for easy processing
- Why bother if source and target systems know each other

➔ **No format restrictions!**

iiRDS content formats?

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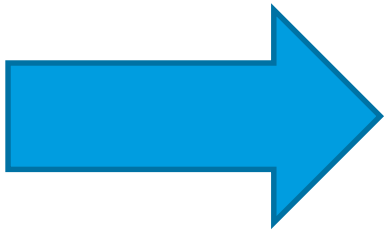

- Knowing the mimetype does not mean knowing how to process
- Some scenarios rely on target systems handling any incoming information
- Large scale scenarios with 1.000s of suppliers need guidance
- Archiving becomes legally challenging

➔ **Format restrictions!**

iiRDS is not …

… for content creation

- No one needs to know RDF
- No one needs to manually create /A-formats

… a display format

- It will need at least one more step to be able to display iiRDS-Content „nicely“

… a format for storing

- Even if you use iiRDS as a exchange format it makes no sense to use it as a content storing format

Licensing and Status

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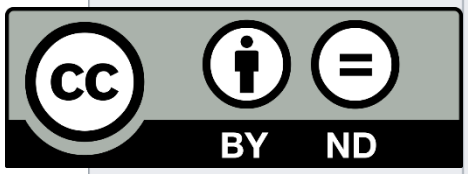
- iiRDS is an open source project, which is protected by a Creative Commons license

	Acronym	Allows Remix culture	Allows commercial use	Allows Free Cultural Works	Meets 'Open Definition'
Attribution + NoDerivatives	BY-ND	No	Yes	No	No

- Version 0.9 was published by RfC on October 24, 2017
- The source data is kept on a separate server in Germany hosted by tekom

Summary

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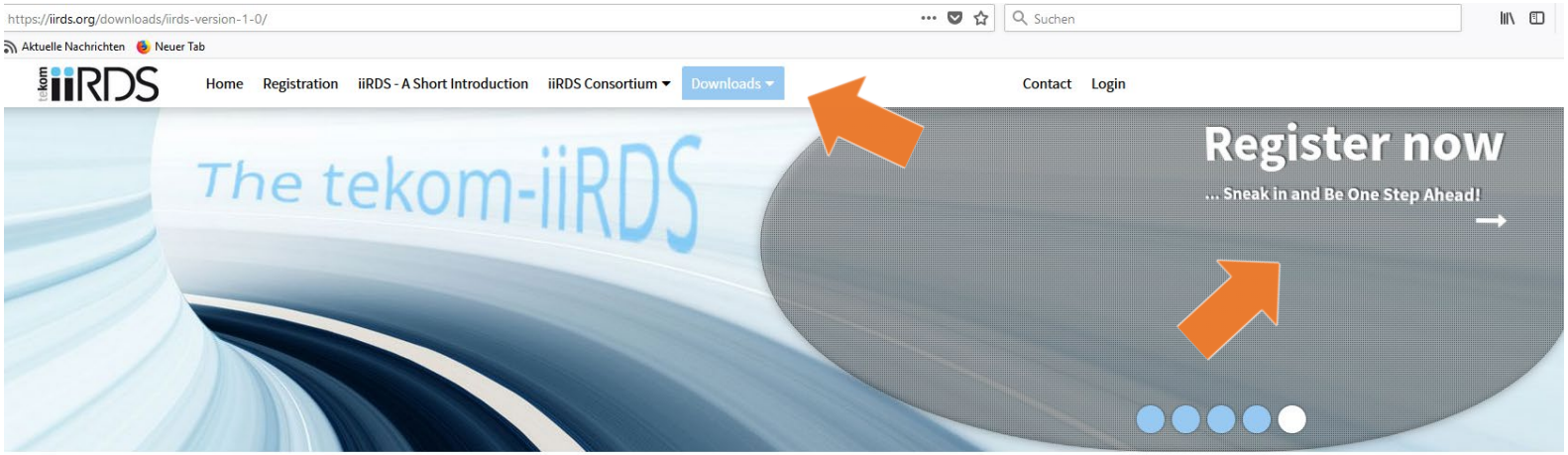
iiRDS is a …

- standardized Metadata Ontology, plus a
- standardized Container Format

which together enable (dynamic) information request and delivery processes between any type of user and the (information-)system

Give it a try: https://iirds.org

Download area on website



iiRDS Version 1.0

On this page, you can find the most current version of the iiRDS Standard.

Version 1.0 was published on **April 18, 2018**.

Please find the RDF schemes available for download below as well as the standard itself which will open in a new window by clicking on the button.

Please log in

Please log in / register to access the downloads.

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How Robots and Content Delivery Systems interact thanks to iiRDS

A prototype implementation with SCHEMA's partner doctima

A Prototype Implementation

by SCHEMA's partner doctima

Technical documentation for a Smart Factory?

Autonomous?

Maintenance?

Safety Advice?

The Use Case: Inside a Smart Factory

SCHEMA doctima

Information Repository

Robot

Digital Factory Items

Operational Disruption

Maintenance, Lubrication

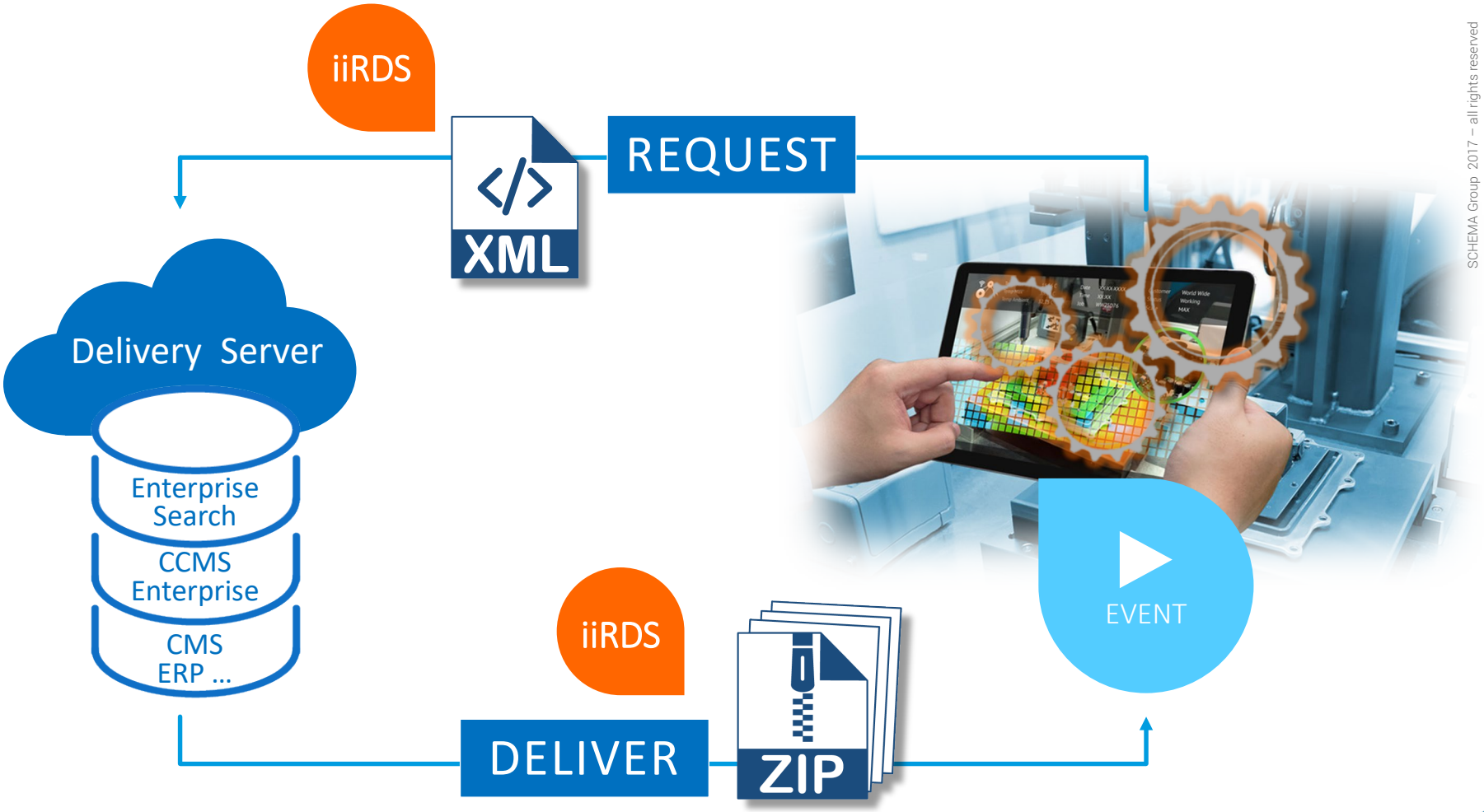
Events

Operator

Service technician

Persons involved

Information Request and Delivery



The Basic Principle

Matching information to a concrete situation by Metadata and Taxonomies…

Component	Braccio Tinker-Kit
Role	Maintenance Engineer
Language	German
Lifecycle state	Maintenance
Topic Type	Task
Information Subject	Lubrication

The smart factory can…

- anticipate which information will be needed,
- retrieve and present that information at the right moment to the right person,
- merge that information into operational dialogs.

Conclusion

- In our example, iiRDS serves as a basis for information exchange between
  - SCHEMA CDS
  - doctima robot demo (www.doctima.de)
  - Others may follow: Mobile app, ERP, PPS, …

Do you want to learn more on the information technology used in this use case? Come to SCHEMA's booth!

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Explore our blog http://blog.schema-inc.com