



FALCON

**Feedback mechanisms Across the Lifecycle for
Customer-driven Optimization of iNnovative product-
service design**

Exploring the Integration of Social Media Feedback for User-oriented Product Development

ICED 2017, Vancouver

Quan Deng, Marco Franke, Karl Hribernik, Klaus-Dieter Thoben

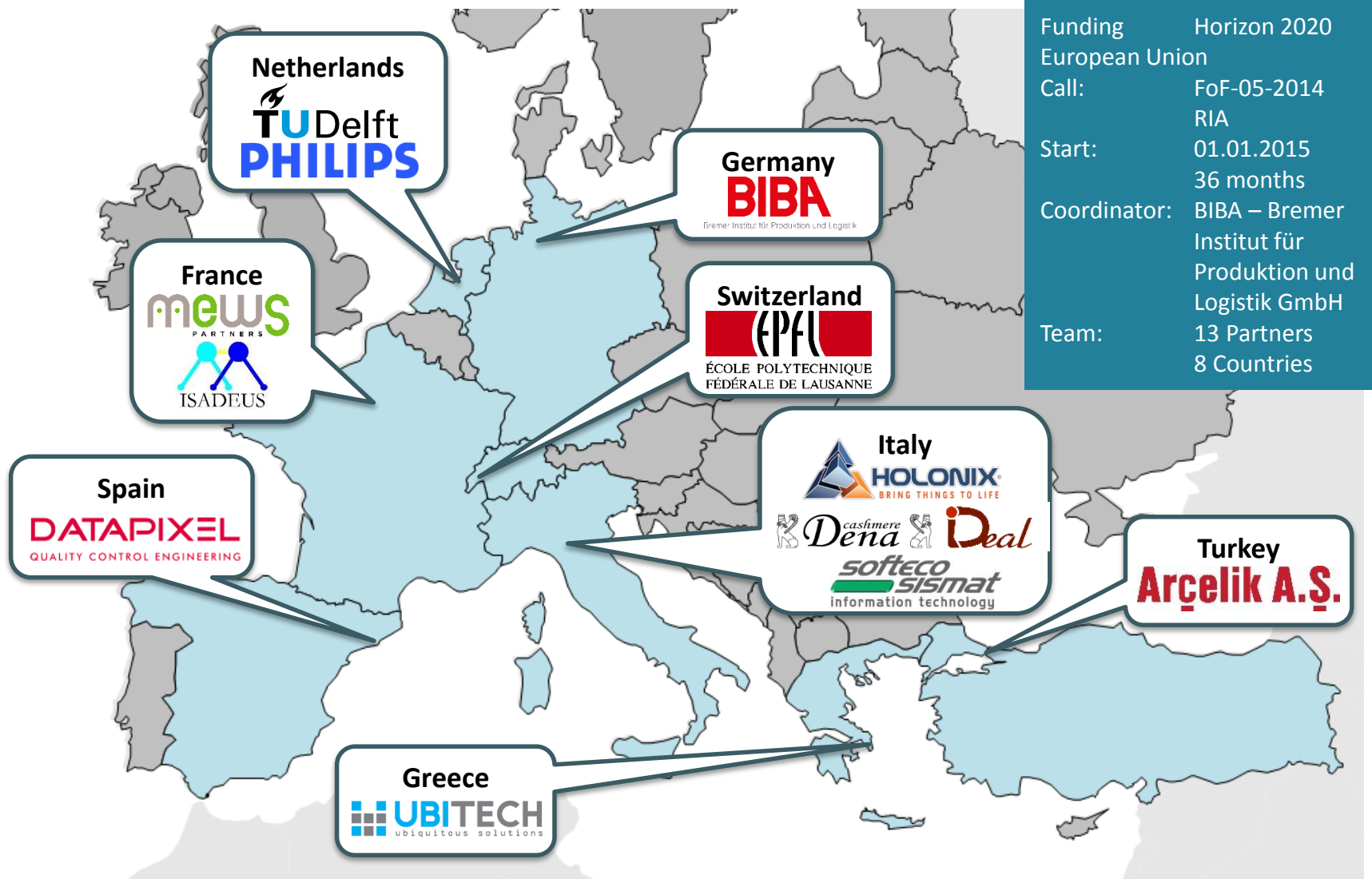


Horizon 2020
European Union Funding
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BIBA - Bremer Institut für Produktion und
Logistik GmbH, Germany
University of Bremen, Germany

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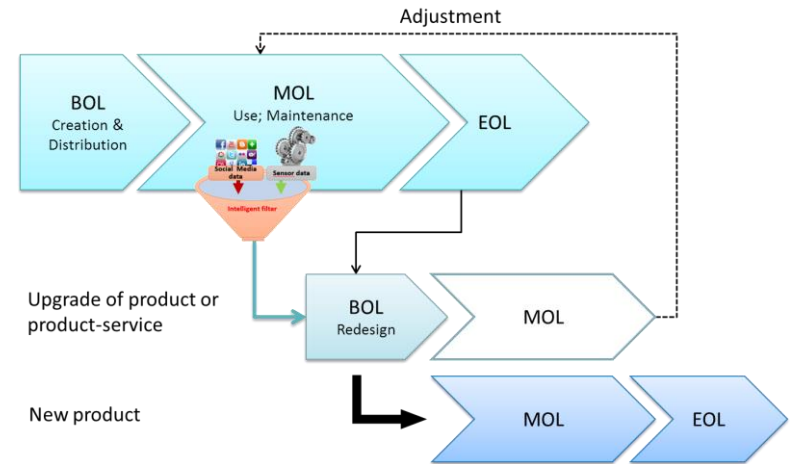
Consortium & Project Details



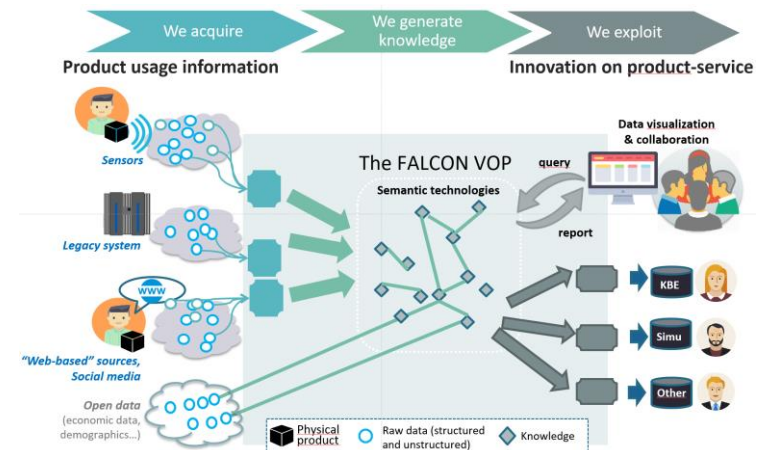
The FALCON Project



- FALCON's mission is to investigate how and which sources of PUI (Product Usage Information) can be used to (re-)design or improve PSSs (Product Service Systems)
- Sources of PUI are CPS/IoT, social media and equivalents
- The project is developing the FALCON Virtual Open Platform (VOP) for collaborative PSS (re-)design, improvement, manufacturing and lifecycle management
- The FALCON VOP facilitates the use of PUI in design, simulation, forecasting, LCA and other applications
- It leverages semantic representation, natural language processing, sentiment analysis and knowledge-based engineering to support these activities



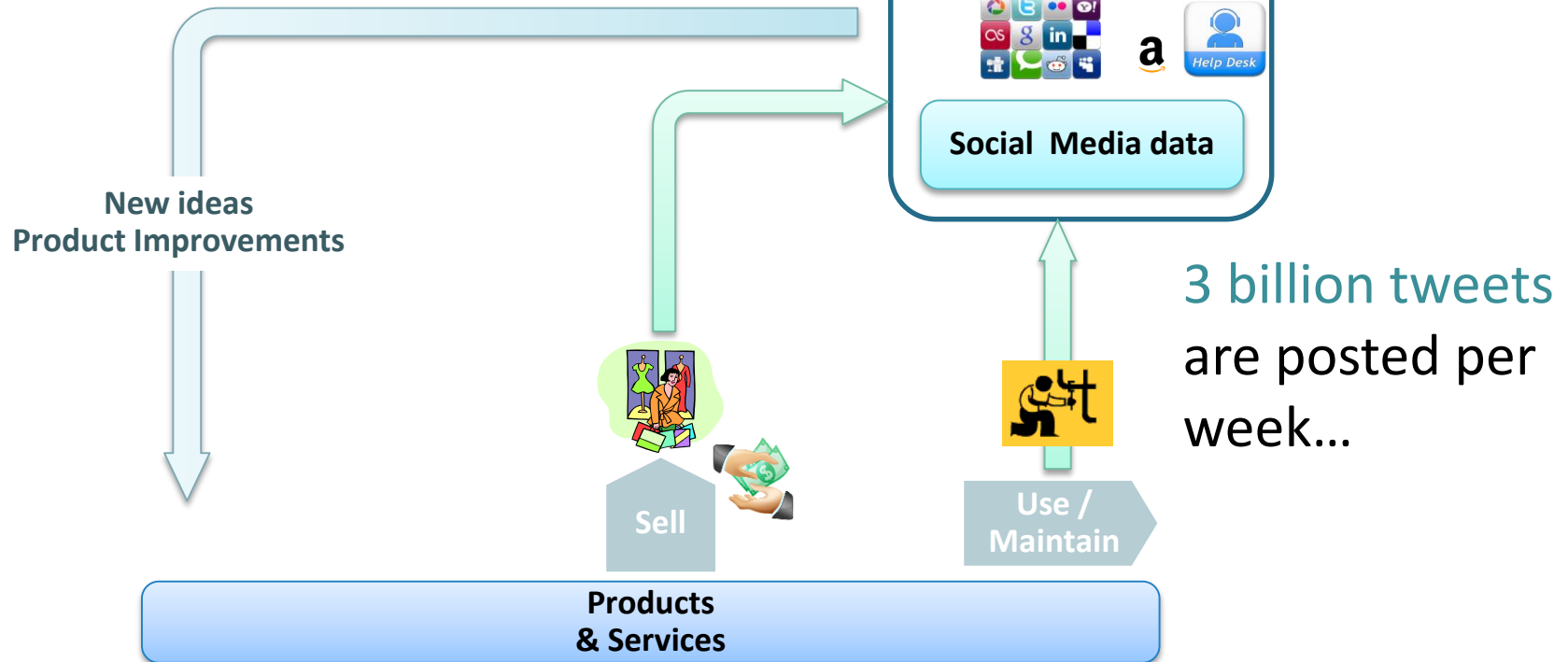
PUI loops investigated in FALCON



The overall FALCON approach

Background & Motivation

Nearly Half of the
World's Population Is
Online



- **Question:** How to flexibly and efficiently use distributed social media feedbacks to support product development in various domains?
- **Problem:** Usage of social media feedback text for product development is limited and inflexible
- **Objective:** Provide a **unified practicable and flexible** mechanism to scan social media sources to acquire product development related knowledge for the support different design tasks in various domains
- **Input:** **Social media** and **equivalent PUI sources** (e.g. helpdesks)
- **Output:** Extracted knowledge elements (in the form of ontology triples) that designers interest in

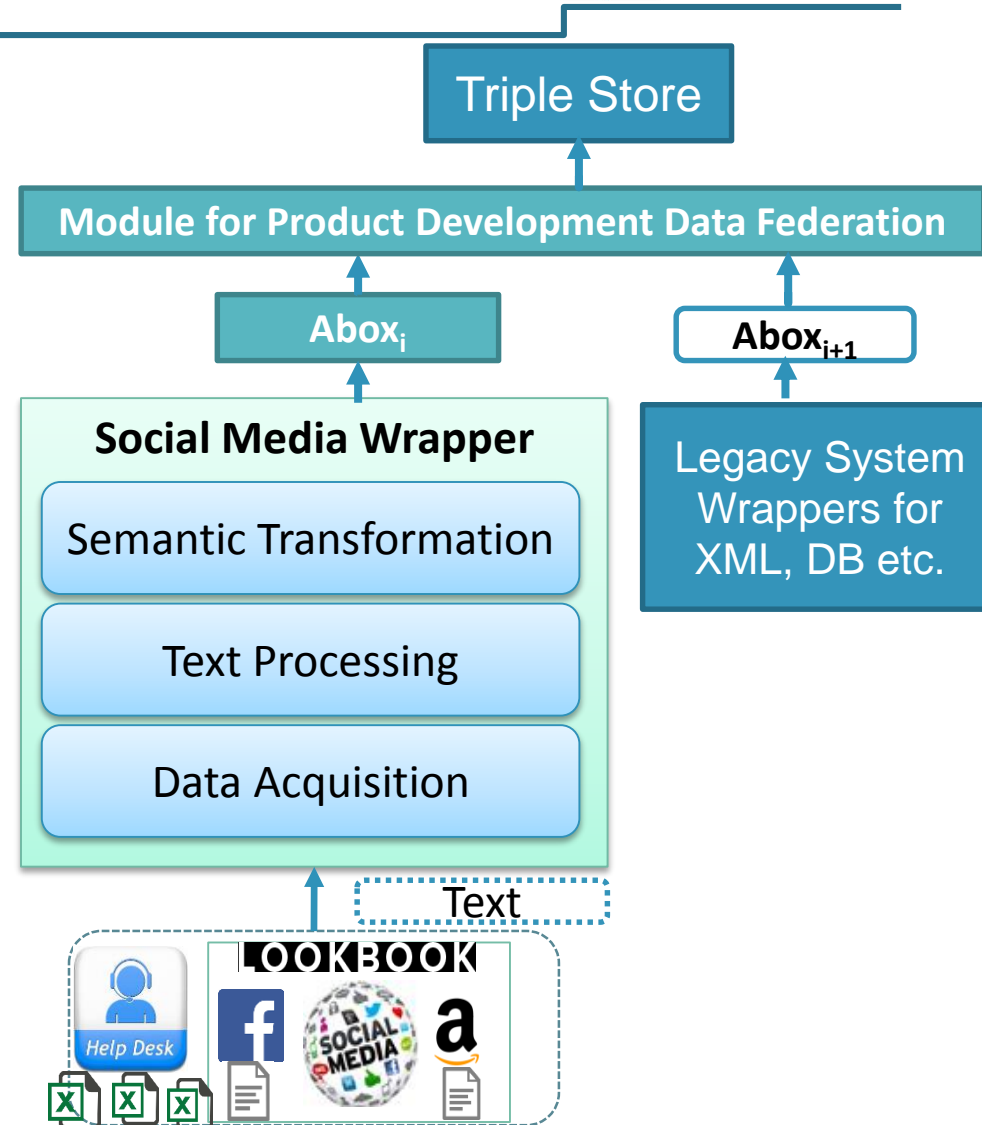
Social Media Wrapper Approach

Capabilities

- Extracts knowledge from texts in Social Media Texts for semantic enrichment

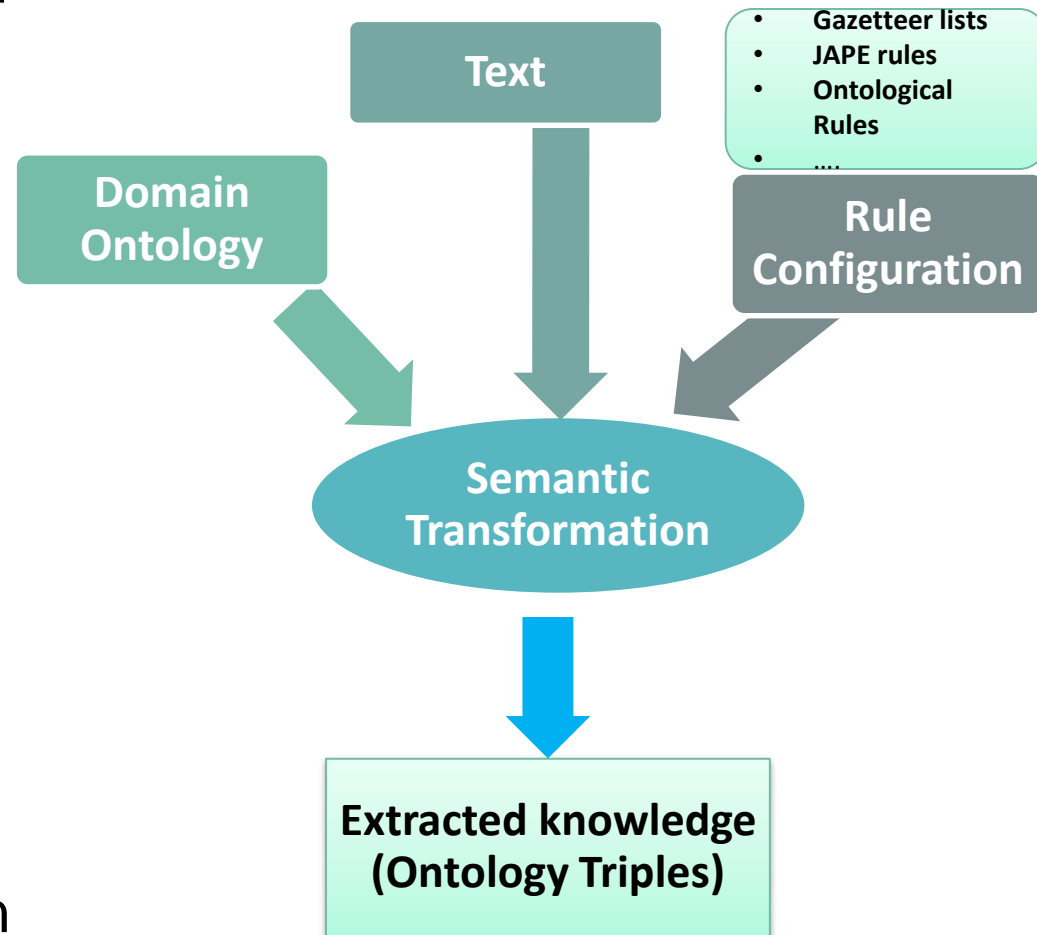
Achievements

- Prototypical development of Social Media Wrapper with data acquisition functionality for Facebook, Lookbook etc.
- Development of Natural Language Processing (NLP) methods in combination with ontology to extract knowledge from social media texts in English & German (extensible with other languages)
- Initial evaluations with FALCON domain ontologies in different use cases and social media texts from social media and helpdesk
- Integration with FALCON Virtual Open Platform via the Data Federation Module



Social Media Wrapper Approach: Semantic Transformation

- Gather Information based on given Ontology to meet different information needs
- Rule Configurations to guide semantic transformation: flexible to choose the right interpretation for texts
- Based on NLP tool: GATE
- Extract Factual & Feature-based Sentiment Information



DENA Use Case: Extracting textile-related knowledge from lookbook based on FALCON Ontology for the Fashion domain



HYPE 35

SAVE



Kinga Garlińska
24 year old girl
Cracow, Poland
+ Fan



Simply look.

August 29, 2016 · 2



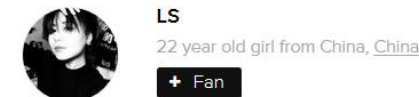
Items in this look

- 1 **Shirt** [Zara in Zara Shirts](#)
- 2 **Schoes** [Zara](#)
- 3 **Choker** [Zara in Zara Chokers](#)

Brands in this look



People you may like



"Which fashion style of a specific **garment category** (dress, etc.) is trendy in a specific set of **countries**?"

#minimal #kingacreations #ootd #casual #sporty #zaralook #jeans #shirt

Source	Vote	Category	Country	Brand	W_Fashion	Gender
"Lookbook"	"35"	dena:SHIRT	dena:Poland	dena:Zara	dena:Casual	dena:Female

- Proposed an approach to link the information and knowledge from MOL (Middle of Life) phase i.e. social media feedback to support product design
- Flexible, highly configurable and general enough to be adopted in different application domains to support different product design tasks
- Support different interpretations on texts for different product design contexts
- Ontology based semantic integration allows product designers to reach a holistic view on feedback information that distributed in different sources
- Evaluated in 4 use case scenarios including Healthcare Products (Philips), Clothing Textiles (Dena) etc. to facilitate the use of feedback text in Facebook, Lookbook, Customer service....

Thank You!

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Arçelik A.Ş.

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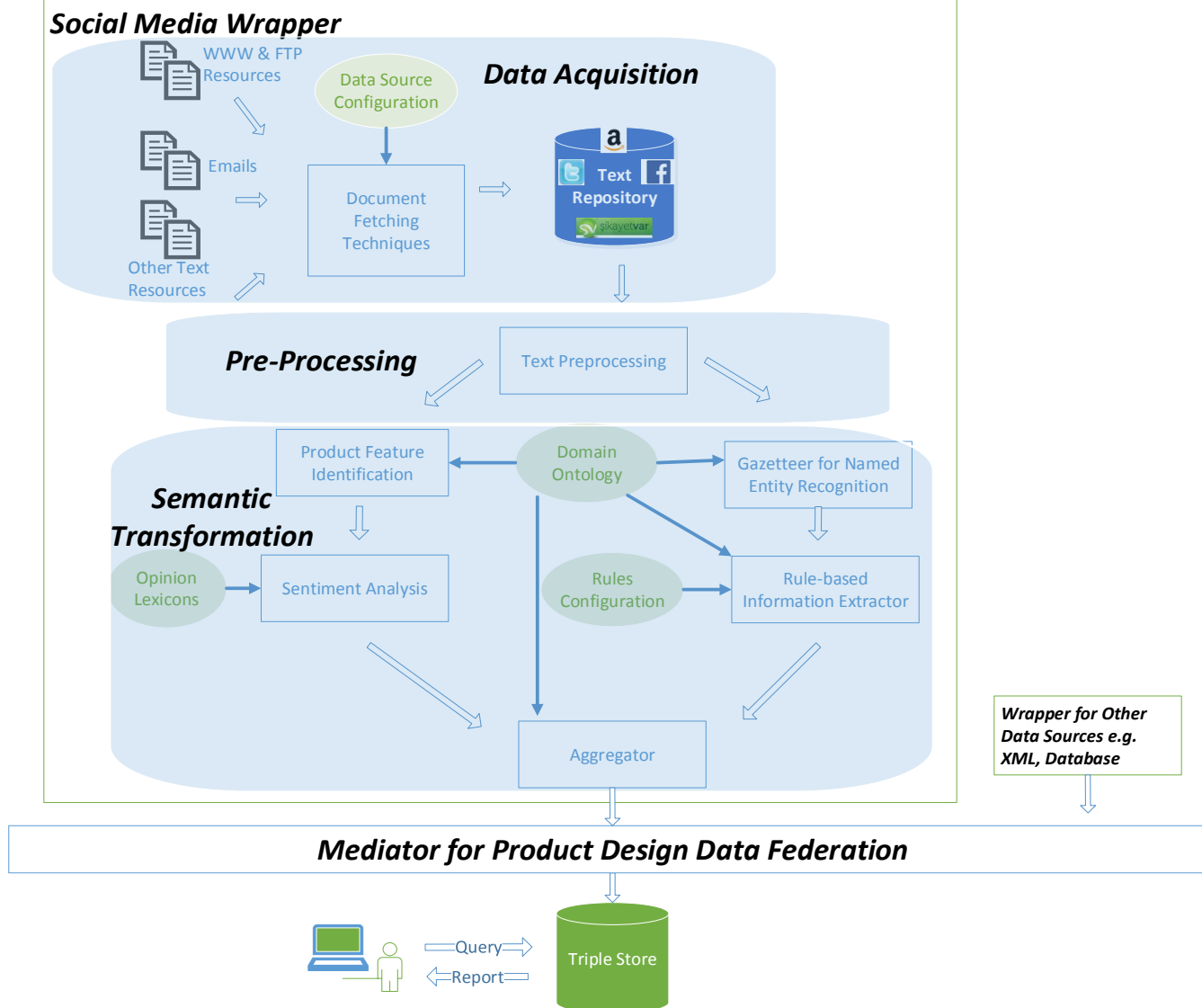
- Objective: Innovative product-service design using manufacturing intelligence
- Theme: FoF-05-2014
- Call: Factories of the Future
- Lead: BIBA – Bremer Institut für Produktion und Logistik GmbH
- Duration: 36 Months
- Start: 2015/01

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BACKUP

Social Media Wrapper Approach



Technical Achievements

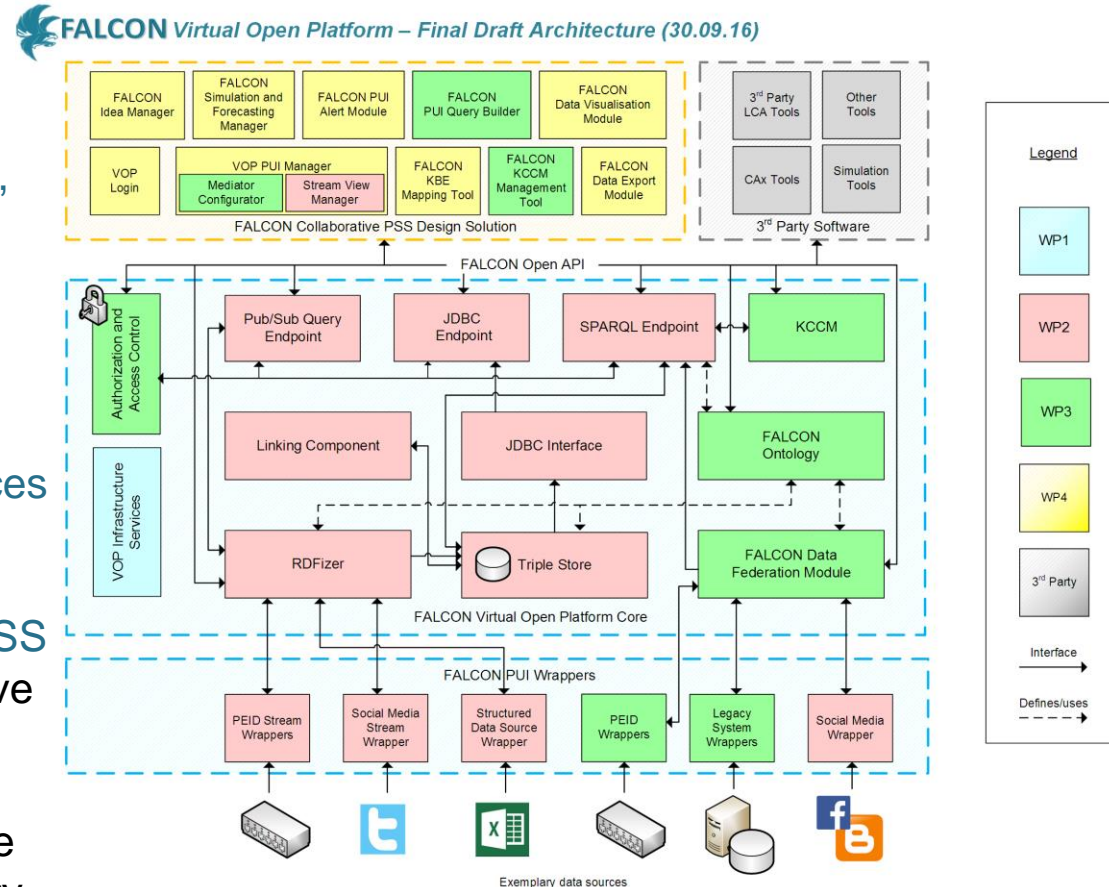
FALCON VOP Architecture



The three layers cover:

1. The acquisition of PUI (FALCON PUI Wrappers) from social media, PEIDs and legacy systems (streaming and non-streaming)
2. The semantic enrichment and storage of PUI, the General FALCON Ontology and domain extensions, as well as core services for the platform (FALCON Virtual Open Platform Core)
3. The collaborative use of PUI in PSS (re-)design (FALCON Collaborative PSS Design Solution)

The FALCON VOP Core furthermore offers an open API for interoperability with 3rd party software, such as CAx, LCA and simulation



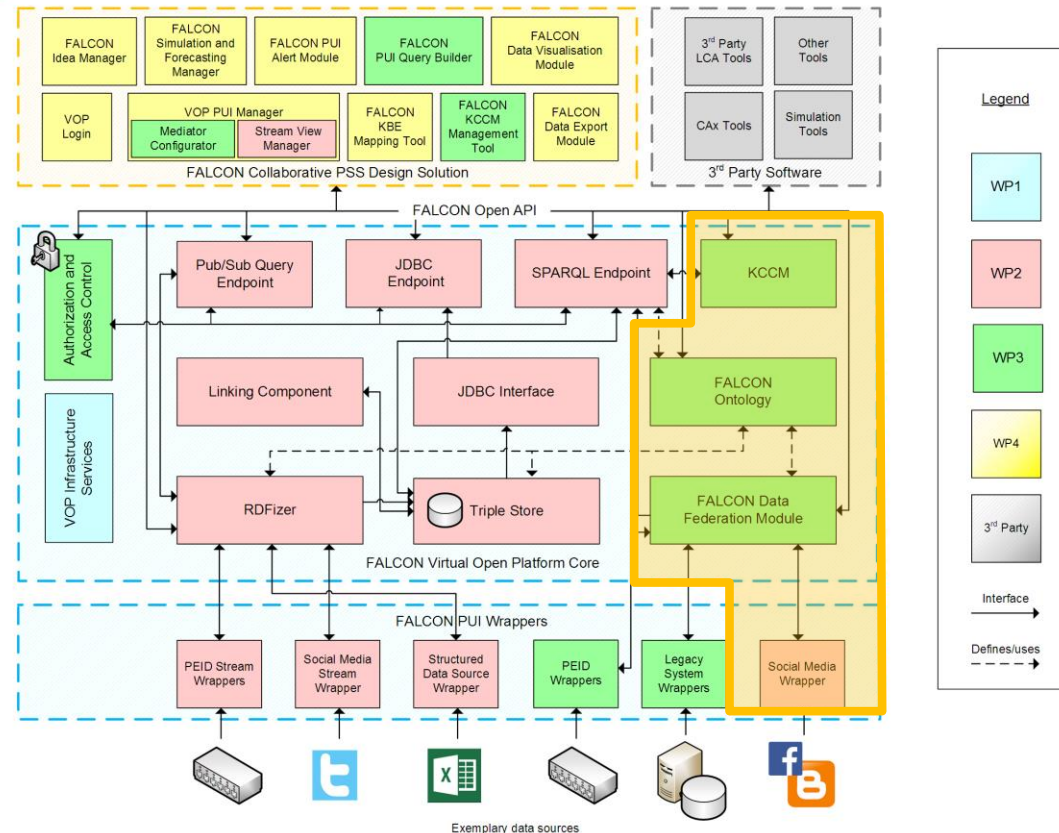
Technical Achievements

FALCON VOP Architecture



Closer look at core modules developed by BIBA exemplifying innovation in FALCON which cover PUI acquisition through to analysis:

 **FALCON Virtual Open Platform – Final Draft Architecture (30.09.16)**



1. Social Media Wrapper

For extracting PUI from social media via Natural Language Processing

2. Data Federation Module

For semantically enriching the PUI acquired by wrappers (e.g. Social Media Wrapper) based on FALCON Ontology and storing it in the Triple Store

3. KCCM

Used to post-process semantically enriched PUI stored in the Triple Store and provides functionality for PUI analysis in PSS (re-)design

Exemplary Use Case – High-tech Business Scenario



■ PUI Sources

- Logfiles (structured text) contain errors and calibration events assigned to timestamps
- Social media and equivalent PUI sources (e.g. helpdesks) contain timestamps and corresponding error descriptions as plain text
- Wrappers (Social Media and Legacy System) connect PUI Sources to the FALCON VOP

■ Application of Semantic Mediation

- The FALCON Ontology defines 'error', 'calibration', 'error description', etc.
- The FALCON Data Federation Module links the errors and calibration information from the logfiles with the error descriptions extracted from the helpdesk and user forums
- The combined PUI is stored in the Triple Store

■ Potential product-service offer:

- The KCCM can analyze the PUI to
 - Identify correlations between users' observations and complaints and the technical behavior of the system,
 - Identify correlations between system calibrations and errors
- Offer proactive services to (re-)calibrate the system before errors occur – improve customer satisfaction

