Institute for Data, Process, and Knowledge Management (DPKM)

**WU** WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Vision

The Institute for **Data, Process and Knowledge Management** is dedicated to pioneering research at the intersections of *data management and integration*, *the semantic web*, and *artificial intelligence* to tackle intricate challenges within the business and knowledge management domains.


Knowledge Management
Socio-technical aspects of AI

| Data Management | Knowledge Graphs | Semantic Systems |
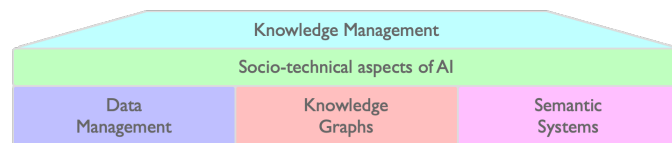
Axel Polleres — Data Management Group
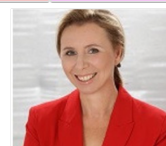
Marta Sabou — Semantic Systems Group
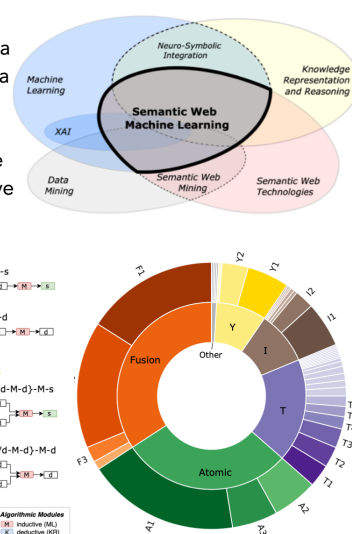
Project Highlight: CRISP

The **Crisis Response and Intervention Supported by Semantic Data Pooling (CRISP) Project** represents a data-driven approach to Crisis Response and Intervention. It considers both the short-term management of disasters as well as long-term economic impact assessments, at fine-grained regional and temporal granularity.
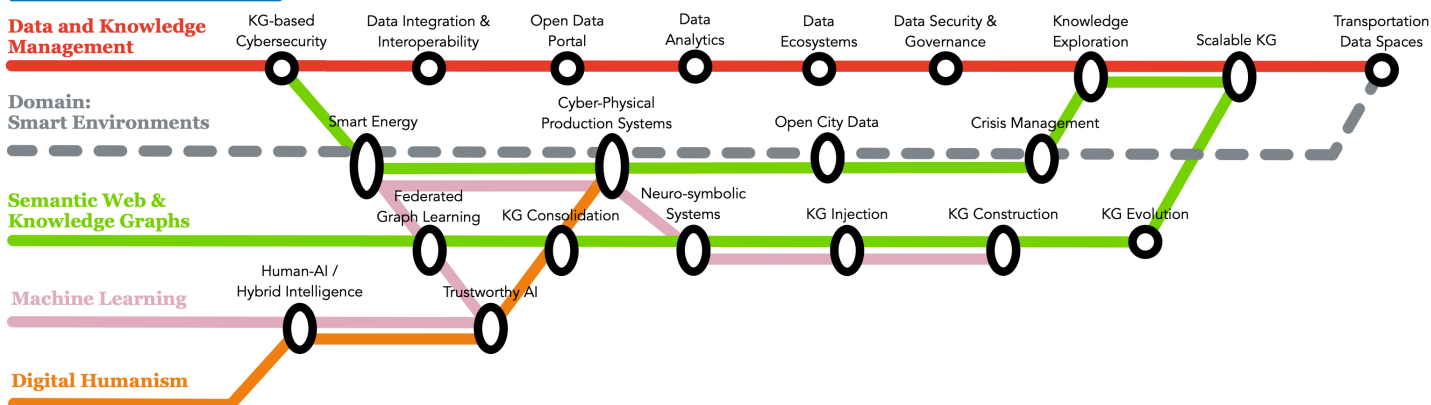

https://www.crisp-project.org
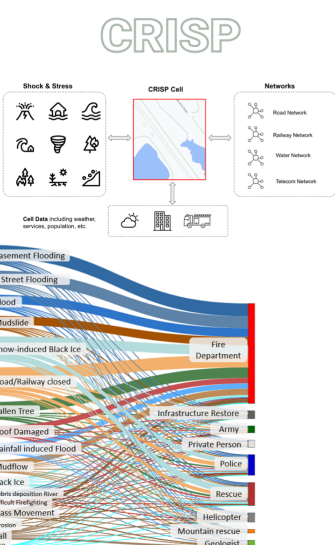
Research Highlight: SWeMLS

Semantic Web Machine Learning (SWeML) Systems. We developed a classification system and identified a set of patterns for systems which make use of a Semantic Web knowledge structure and a machine learning sub-system in order to solve a specific task.

Atomic-Patterns
A1: s-M-s
A2: d-M-s
A3: s-M-d

Fusion-Patterns
F1: d/s-M-d
F2: d/s-M-s
F3: d/s-M-d/s

T-Patterns
T1: {d-M-d/s}-M-s
T2: {d/s}-M-d-M-s
T3: {s-M-d/d}-M-s
T4: {s-M-d/d}-M-d
T5: {d-M-s/s}-K-s
T6: {d-M-d/s}-M-d

I-Patterns
I1: s-M-d-M-s
I2: s-M-d-M-d

Y-Patterns
Y1: {s-M-d/d-M-d}-M-s
Y2: {s-M-d/d-M-d}-M-d

Data Structures: s symbolic, d data
Algorithmic Modules: M inductive (ML), K deductive (KR)

https://w3id.org/semsys/sites/swemls-kg

Research Map

Data and Knowledge Management: KG-based Cybersecurity · Data Integration & Interoperability · Open Data Portal · Data Analytics · Data Ecosystems · Data Security & Governance · Knowledge Exploration · Scalable KG · Transportation Data Spaces

Domain: Smart Environments: Smart Energy · Cyber-Physical Production Systems · Open City Data · Crisis Management

Semantic Web & Knowledge Graphs: Federated Graph Learning · KG Consolidation · Neuro-symbolic Systems · KG Injection · KG Construction · KG Evolution

Machine Learning: Human-AI / Hybrid Intelligence · Trustworthy AI

Digital Humanism

Other Projects

SENSE project aims to advance and strengthen the scientific and technology level of explainable Cyber-physical Systems (ExpCPS) through: (i) the extension of standard Digital Twin architectures; (ii) novel ExpCPS methods based on semantic technologies lead to semantics-based explainability systems (i.e., SENSE systems); (iii) personalized and interactive user interfaces.

https://sense-project.net

ORE project focus on an approach to semantic validation by formally representing the modeling constraints from unstructured documents as explicit, machine-actionable rules. Furthermore, we aim to support the capture of the trace of the rule extraction process, to make sure that the process and results are auditable. We exemplify an adaptation of the approach in the concrete context of the OPC UA industrial standard

https://semantic-systems.org/ore/

TEAMING.AI project aims to make a breakthrough in smart manufacturing by introducing greater customisation and personalisation of products and services in AI technologies. Through a new human and AI teaming framework manufacturing processes will be optimised: the greatest strengths of both these elements can be maximised while safety and ethical compliance guidelines are examined and maintained.

https://www.teamingai-project.eu/

The SEPSES (Semantic Processing of Security Event Streams) project aims to tackle these challenges by applying an innovative interdisciplinary approach at the intersection of state-of-the-art semantic technologies and security research. It will thereby bring meaning to disparate log data and make security information machine-interpretable in near (near) real-time.

https://sepses.ifs.tuwien.ac.at/

Contact

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