Paper Summary

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Title: Ontological Approach in the Smart Data Paradigm as a Basis for Open Data Semantic Markup

Authors: Julia Rogushina

DOI: n/a

Year: 2023

Publication Type: Conference Paper

Discipline/Domain: Computer Science / Information Systems

Subdomain/Topic: Smart Data, Semantic Markup, Ontologies, Open Data

Eligibility: Eligible

Overall Relevance Score: 88

Operationalization Score: 85

Contains Definition of Actionability: Yes (implicit, linked to “Smart Data” as actionable knowledge)

Contains Systematic Features/Dimensions: Yes

Contains Explainability: Yes

Contains Interpretability: Yes

Contains Framework/Model: Yes

Operationalization Present: Yes

Primary Methodology: Conceptual with Applied Case Study

Study Context: Semantic markup and ontological structuring in Smart Data processing for open data reso

Geographic/Institutional Context: Institute of Software Systems, National Academy of Sciences of Ukraine

Target Users/Stakeholders: Researchers, ontology engineers, open data curators, semantic web develop

Primary Contribution Type: Conceptual framework with practical application

CL: Yes

CR: Yes

FE: Yes

TI: Partial

EX: Yes

GA: Yes

Reason if Not Eligible: n/a

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Ontological Approach in the Smart Data Paradigm as a Basis for Open Data Semantic Markup

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Julia Rogushina

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Year:

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Publication Type:

Conference Paper

Discipline/Domain:

Computer Science / Information Systems

Subdomain/Topic:

Smart Data, Semantic Markup, Ontologies, Open Data

Contextual Background:

The paper is situated within the Smart Data paradigm, focusing on transforming raw, often unstructured c

Geographic/Institutional Context:

Institute of Software Systems, National Academy of Sciences of Ukraine; case study on the Great Ukrain

Target Users/Stakeholders:

Researchers, semantic data engineers, open data platform managers, cultural heritage digitization projec

Primary Methodology:

Conceptual framework with applied implementation case study.

Primary Contribution Type:

Conceptual modeling + applied system implementation.

General Summary of the Paper

The paper explores how unstructured or semi-structured data can be transformed into Smart Data—data

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Eligibility

Eligible for inclusion: **Yes**

How Actionability is Understood

Smart Data is defined as data that has been processed into “actionable insights or knowledge” to support

- Trusted, contextualized, relevant, cognitive, predictive, and consumable data.
- Structured or semi-structured representation enabling machine-actionable use.

> “Smart data mines semantics from Big data and provide information that can be used to make decision

> “…transform input ‘raw’ data into machine-understandable, machine-processable, and machine-actiona

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What Makes Something Actionable

- **Semantic enrichment** via ontologies and metadata.
- **Contextual relevance** to specific tasks or domains.
- **Feasibility of processing** (appropriate ontology expressiveness and size).
- **Trust and quality** of data (FAIR principles).
- **Goal alignment** with user needs and analysis objectives.
- **Explainability and interpretability** via formalized semantics.

How Actionability is Achieved / Operationalized

- **Framework/Approach Name(s):** Semantic markup using ontology-based Smart Data transformation;
- **Methods/Levers:** Ontology selection/reduction; task thesauri; semantic templates; linking markup tag
- **Operational Steps / Workflow:**
  1. Retrieve relevant external ontology.
  2. Transform/reduce ontology to task needs.
  3. Map ontology elements to markup tags.
  4. Implement markup in SMW (categories, templates, semantic properties).
- **Data & Measures:** Metadata completeness, ontology expressiveness, query support.
- **Implementation Context:** Great Ukrainian Encyclopedia portal (e-VUE).

> “…formalize models for such special cases of ontologies as Wiki ontology and task thesaurus.” (p. 14)

> “…retrieval of external domain ontology… transformation according to semantic markup requirements…

Dimensions and Attributes of Actionability (Authors’ Perspective)

- **CL (Clarity):** Yes — Clear semantic markup rules and ontology alignment.
  > “Understandability of the markup language… standardized notations…” (p. 6)
- **CR (Contextual Relevance):** Yes — Ontology must be relevant to task domain.
- **FE (Feasibility):** Yes — Ontology size/complexity must allow efficient processing.
- **TI (Timeliness):** Partial — Discusses ongoing enrichment but not explicit temporal constraints.

- **EX (Explainability):** Yes — Formal semantics enable reasoning.
- **GA (Goal Alignment):** Yes — Ontology and markup designed per specific information needs.
- **Other Dimensions:** Interoperability (FAIR principles), standard compliance.

Theoretical or Conceptual Foundations

- DIKW pyramid adapted for Big Data.
- FAIR data principles.
- Ontology theory (Gruber 1993).
- Semantic Web standards (RDF, OWL).

Indicators or Metrics for Actionability

- Degree of semantic enrichment.
- Ontology-task alignment (coverage and absence of redundancy).
- Query expressiveness in SMW.

Barriers and Enablers to Actionability

- **Barriers:**
  - Overly large or irrelevant ontologies.
  - Lack of domain standards in ontology form.
  - Computational overhead in complex reasoning.
- **Enablers:**
  - Ontology reduction methods.
  - Use of open knowledge sources.
  - SMW semantic templates.

Relation to Existing Literature

Builds on semantic markup and ontology integration in Smart Data, extending concepts with a formal mo

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Summary

This paper positions “actionability” within the Smart Data paradigm, framing it as the transformation of ra

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Scores

- **Overall Relevance Score:** 88 — Strong conceptualization of actionable data via Smart Data, with sys
- **Operationalization Score:** 85 — Clear, task-oriented methods for achieving actionability through onto

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Supporting Quotes from the Paper

- “Smart data mines semantics from Big data and provide information that can be used to make decisions
- “…transform input ‘raw’ data into machine-understandable, machine-processable, and machine-actiona
- “…retrieval of external domain ontology… transformation according to semantic markup requirements…
- “Understandability of the markup language… standardized notations…” (p. 6)

Actionability References to Other Papers

- DIKW hierarchy (Hey, 2004)
- FAIR data principles (FAIR_data, 2021)
- Gruber (1993) on ontology specifications
- Semantic Web foundational works (RDF, OWL)
- Zeng (2017) on Smart Data for digital humanities