Knowledge Elicitation and Ontology-Based Visualization of Business Ecosystems: A Case Study from the Green Energy Ecosystem

Alican Tüzün[1,2][0009−0009−8017−5487] and Georgios Meditskos[1][0000−0003−4242−5245]

[1] School of Informatics, Aristotle University of Thessaloniki, Thessaloniki, Greece
[2] Josef Ressel Centre for Data-Driven Business Model Innovation, University of Applied Sciences Upper Austria, Wehrgrabengasse 1-4, 4400, Steyr, Austria
lncs@springer.com
http://www.springer.com/gp/computer-science/lncs

Abstract. The abstract should briefly summarize the contents of the paper in 150–250 words.

Keywords: Business Ecosystem · Knowledge Representation · Ontology · Wind Energy · Green Energy.

1 Introduction

1.1 P1: Challange

To make critical decisions, organizations need to understand not only their internal operations but also the external environment where they operate or may operate.

1.2 P2: Business, Wind Energy Ecosystems

A business ecosystem is a ecosystem that consists not only the businesses but includes other types of organizations such as non-profits. Wind energy ecosystem on the other hand context specific ecosystem that consists of organizations that are related to wind energy production, distribution and maintenance. However such ecosystems are not easy to understand and analyze due to the complex nature of the interactions between the organizations. Therefore, to understand this ecosystem, one need to capture the interactions between the organizations and represent them in a structured way.

1.3 P3: Knowledge Representation, Ecosystem Knowledge

One way of structring such interactions is to use ontologies. Ontologies are

1.4

- **P1: Challenge**
- **P2: Business, Green, Wind Energy Ecosystems**
- **P3: Knowledge Representation, Ecosystem Knowledge**
- **P4: Ecosystem interactions**
- **P5: Related Work and why they are insufficient**

Research Question

How can organizational interactions in the wind energy ecosystem systematically captured and explicitized into structured, formal knowledge representations to enable data-driven decision making?

2 Methology

2.1 Semi-Structured Survey

2.2 Term Disambiguation

2.3 OWL2 & Ontological Commitments

- **ClassAssertion**
- **ClassHierarchyAssertion**
- **ClassDisjointnessAssertion**
- **ObjectPropertyAssertion**
- **PropertyCharacteristicAssertions**
- **Methodological Limitations**

2.4 Query Language

- **SPARQL**
- **Fuseki Server**

2.5 Relationship Visualization

- **js and d3.js**

Table 1. Relationships and Theoretical Foundations

Relationship Type	Theoretical Foundation	Logical Charecteristics
Product & Service Delivery	Supply Chain Management (Chopra & Meindl, 2016); Value Chain Analysis (Porter, 1985); Business Ecosystems (Adner, 2017)	Irreflexive, Transitive
Payment	Business Model Ontology (Osterwalder & Pigneur, 2005); Value Network Analysis (Allee, 2008); Input-Output Economics (Leontief, 1986)	Irreflexive
Data	Knowledge-Based View (Grant, 1996); Digital Ecosystem Theory (Tiwana, 2013)	Irreflexive
Information	Knowledge-Based View (Grant, 1996)	Irreflexive
Collaboration	Resource-Based View (Barney, 1991)	Irreflexive, Symmetric
Conflict	Stakeholder Theory (Freeman, 1984)	Irreflexive,ASymmetric
Competition	Porter's Five Forces (Porter, 1979)	Irreflexive, Symmetric
Coopetition (Implicit)	Coopetition Theory (Brandenburger & Nalebuff, 1996)	Irreflexive

3 Results&Discussion

3.1 Survey Results&Discussion

3.2 Ontology Development

3.3 Information Retrieval with Sparql

3.4 Visualization Results

4 Conclusion

5 Appendix

A Semi-Structured Survey

B Github Repo

References