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

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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

Main idea: Conventional modeling approaches does not leverage semantics, therefore the visualizations gets too complex such that decision makers cannot comprehend. However with the SPARQL querries, one can easily semantically query the information (e.g traversing the graphs) and visualize whatever needed for the decision maker. With the former methodologies it is not possible.

Sub effect: Because of the formality, one can also use the symbolic logic therefore can infer new relationships within the data, which is also not possible with the conventional methods. Sub effect: Formal and needed representations reduces the ambiguity and the complexity of the data, therefore the decision makers can easily understand the data and make decisions.

Analogy: To go through something with a fine-tooth comb

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. However, visualizing and understanding these complex environment still remains a challenge. And proposed solutions are nearly to unusable for business developer managers and business strategists, where most lacks semantic interoperability and are not based on business understanding but rather on technical understanding.

To cite Visual decision support for business ecosystem analysis Visual Analysis of Venture Similarity in Entrepreneurial Ecosystems

1.2 P2: Business, Wind Energy Ecosystems

A business ecosystem is a ecosystem that focuses on organicism world view, where Moore directly borrows from biological ecosystems, emphasizing interdependence, co-evolution and emergent behavior.

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 structure is to use ontologies. Ontologies are

1.4 P4:Ecosystem interactions

1.5 P5:

- **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**

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

2.4 Query Language

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

2.5 Relationship Visualization

- **js and d3.js**