Improving Natural Language Specifications with Ontologies

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The hardest part of the software task is arriving at a complete and consistent specification, and much of the essence of building a program is in fact the debugging of the specification. “

[Brooks 1987]
Specifications - Ferrari

- shift-levers on steering wheel
- 450 hp
- bright leather
- aluminum rims
- 335/45 tires
- cup holder
What the Customer Wanted
That’s a Lamborghini
Faulty Specs = Unexpected Results

... cause customer dissatisfaction, lead to an error prone development process and therefore cost time and money.
We developed automatic UML creation: SENSE/SALE. Then we realized that manual tasks could be moved to software: pre and post-processing. AutoModel was born.
Ontologies offer world knowledge to a computer system. They provide semantics and therefore the meaning of a sentence.
"Tom saw the plane flying."
"Tom saw the plane flying.
Tom saw the mountains flying."
Related Work

Formal Specifications
Domain Specific Ontologies
Ambiguities
Psychological Approaches
Problems with Specifications

Automatic specification processing is not easy:
Humans use natural language which is ambiguous and error-prone.
Software-engineers use models.
Computers need “processable” language.
Standard Procedure

Requirements Documentation

- Elicitate User Needs
- Document as Specs
- Requirement Model
- Discuss Specs

Analysis

- Examine Specs
- Adjust Specs
RESI Pre-Processing

Requirements Documentation

Elicitate User Needs → Annotate Specs

Graph Representation

RESI

Ontology

OntologyA → Examine Specs
OntologyB
OntologyC
OntologyD

Adjust Specs

Requirement Model → Generate UML
Nominalization
Incomplete process words
Nouns w/o reference index
Incompletely specified conditions
Modal operators
Implicit assumptions
Every pallet must be returned after transport.
"The customer id is entered."
The customer receives an id card."
If the customer returns the tape on time, he gets his deposit back.
Case Study

OMG’s UML specification
W3C’s HTML specification
Ludo Game specification
Ontologies are a perfect vehicle to solving the challenges that come with the pre and post-processing of natural language.
If it’s not working, it better be the customer’s fault.