

Towards a Universal Syntax of Software Requirements

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Abstract. The variety and complexity of natural languages can often result in missed or poorly implemented requirements. We intend to discover whether there exists a possible syntactic structure, or rules for syntactic structures, which lend themselves to more understandable requirements sentences. Below, we propose analyzing English-language requirements statements used in the industry and determining whether there exists some correlation between statement complexity and the success rate with which the requirements are implemented. In doing so, we hope to determine whether there is an ideal English syntax for capturing software requirements such that they are more easily understood by stakeholders, and consequently have a better chance of successful implementation.

Keywords: Software Requirements, Requirements Engineering, Requirements Syntax, Requirements Language

1 Introduction

A poor understanding of requirements at any phase of a project leads to missed or incorrectly implemented requirements. Consequently, such projects incur additional expense due to rework, business adoption fails, and return on investment is lower. Furthermore, virtually all current software development projects are global in nature, involving distributed teams with various sociolinguistic backgrounds. Business stakeholders, requirements practitioners, test resources, and support personnel often possess varying degrees of ability in the language in which the requirements on any given project are written. Requirements written in a manner such that they are easily understood by speakers of various languages can help avoid expensive misunderstandings. To do so requires balancing the complexity of the requirements statement in order to facilitate better comprehension with the need to fully communicate the requirement. We propose to determine whether there is a way to a structure requirements statement such that it facilitates enough of an understanding for speakers of various languages while preserving enough meaning to ensure that the requirement is correctly implemented. In doing so, the scope of the proposal is focused on the syntax of individual requirements statements written in English to determine which structures facilitate better understanding of the requirement and implementation of requirements. To further this end, both empirical research and

leverage of current literature in linguistics is needed in order to determine answers to the following questions:

- Are there valid syntactic structures in English that lend themselves to better comprehension by speakers of various languages?
- What is the best tradeoff between syntactic complexity, understandability, and semantic completeness in order to ensure that requirements are implemented correctly?
- Are certain structures more easily understood by those with computer science/development backgrounds?
- Are there any side benefits to developing certain structures (e.g., can they be used to develop knowledge bases or facilitate requirements reusability?)

1.1 Data That Can be Provided by Practitioner

As industry practitioners, we have access to and will provide the following data in order to assist with the study:

- Examples of requirements written for various types of audiences—including requirements written in English for non-English speaking audiences.
- Requirement authors and developers that can be interviewed or surveyed.
- Supplemental material provided in addition to requirements statements (use cases, models).
- Approximate number of review cycles required for each document.

1.2 Background Expertise Required by Researcher

We are looking for researchers with expertise in, experience with, or a strong desire to learn the following subject matter:

- Basic understanding of linguistics and formal languages. Some work in or a strong desire to learn about psycholinguistics or computational linguistics.
- Familiarity with methodologies for analyzing document complexity, analyzability, and associated metrics.