



Ph.D. DISSERTATION DEFENSE

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Date:	Tuesday, March 28th, 2023	
Time/Location:	3:00 PM (ET) – Zoom	
Title:	Structural Complexity of System Requirements and its Implications for the Development Process	
Chairperson:	Prof. Roshanak Nilchiani - School of Systems and Enterprises <i>Stevens Institute of Technology</i>	
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ABSTRACT

Over time, engineered systems have become more and more complex due to ever increasing performance and property demands. This increase in demands and complexity causes numerous challenges, resulting in frequent cost and schedule overruns which can be detrimental for the development projects and entire institutions. The complexity of systems depends on the number of elements and their respective interactions. One factor that greatly influences these aspects and the system as a whole are requirements, which are defined at the beginning of the development process. Thus, addressing and possibly measuring complexity from the requirement stage onwards is crucial. This dissertation presents a novel approach that allows for the analysis of complexity based on textual requirements. By extracting the structure from a set of requirements through the application of Natural Language Processing, an analysis foundation is generated. The structure contains three levels: 1) a hierarchy level, 2) a requirement level, and 3) a term/entity level. The structural elicitation has been tested successfully in a case study including a current research development project of an unmanned arial vehicle. With the foundation of the requirement structure, complexity analyses are possible, which have been tested in an additional case study that assessed the effects of different factors on human effort. The results indicate that higher complexity measures correlate with higher effort and thus potential development time/cost. Furthermore, implicit analyses and connection inference is enabled by the approach.