

Complexity Measures to Predict System Development Project Outcomes

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Abstract. While it is broadly accepted that complexity makes system development harder, there is no concrete understanding of which types of complexity have the most significant impact. Looking beyond current literature which describes complexity or measures the complexity of a system, this research seeks complexity measures that directly affect development project outcomes: project cost overrun, project schedule delay, and system performance shortfalls. A set of complexity measures was developed based on a comprehensive literature analysis and ranking via a trade study. The effect of those measures on project outcome was studied for 75 systems development efforts, primarily in the aerospace and defense sector. The findings indicate that among the dozens of complexity measures discussed in the literature, the three measures with the most significant impacts on development outcomes in these projects were: number of hard-to-meet requirements, degree of cognitive fog, and stability of stakeholder relationships.