

# Scope Attributes and Systemic Effect in Estimation Practices for Software Projects

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**Abstract.** Estimation in software projects allows organizations to predict scope, needed resources, and schedule leading to better performance. Inaccurate estimates may cause misalignment – amongst stakeholders and between the situation and design of the project – reducing performance and confidence in the development process. This paper focuses on software estimation, in particular attributes of scope and their usefulness to estimation. Scope is the tangible outcomes of project tasks. Attributes of scope include software functionality, dependence, and newness. A study of estimation practices began with semi-structured interviews conducted with leading software industry organizations. The interviewed practitioners characterized key steps involved in estimation and evaluated their organization's use of scope attributes. In addition, interview questions probed the consideration of scope topology and systemic effect. Findings from these interviews suggest that subjective assessment remains the most common method for estimation. Additionally, release level estimation processes are reported as informal and intuition-based, lacking analysis of systemic characteristics of scope especially dependence. Dependencies are often missing or insufficiently considered during estimation yet considered only by some at later stages of development. Findings from the interviews also suggest that estimation relies on priorities of perceived value rather than systemic criticality and project target feasibility. The next stage of this research proposes an expanded survey released to a wider practitioner population. Additionally, the findings suggest a need for longitudinal empirical studies to determine how knowledge of dependencies and analysis of systemic effect are imbued in organizations and become useful in estimation processes.

**Keywords.** Model-based Project Management, Scope Attributes, Software Estimation, Transdisciplinary Engineering Teams

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