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Nine Management Guidelines for Better Cost Estimating

The accurate prediction of information systems development costs is a critical issue for both managers of computing resources as well as other managers. When estimators underestimate these costs, managers may authorize new projects

that waste limited resources, fail to make their expected contributions, and ultimately destroy the credibility of estimators and developers. When estimators overestimate these costs, managers may refrain from developing new projects that would have been beneficial. Thus, the inaccurate estimation of the costs of proposed information systems can have a substantial, harmful impact on an organization.

Moreover, huge overruns resulting from inaccurate estimates are believed to occur frequently. In fact, the study reported in this article found that nearly two-thirds of all major projects substantially overrun their estimates.

This article reports results from a study of the cost estimating practices reported by 115 computing managers and professionals. The study sought to better understand the cost estimating process in general. The results presented here, however, are done so as prescriptions to computing managers in order to enable them to direct their subordinates to improve the accuracy of the process.¹ Only a few prescriptive articles on the subject have appeared [4, 8] despite the abundance of past studies.

Past Studies

Prior research on cost estimating has

largely focused on the study of algorithmic techniques [7]. Much of this research has identified several factors which are believed to affect systems development and which therefore must be considered while estimating development costs [3, 5, 16]. These factors include system size and complexity, personnel capabilities and experience, hardware constraints, the use of modern software tools and practices, users' understanding of information technology, the volatility of their requirements, and many others. To use an algorithmic technique, the estimator quantifies each factor for the proposed system based on historical data about past development projects or on intuition and experience [2, 16]. The estimator then mathematically projects the cost of the new system based on the factors [5, 9-12, 15-19, 21, 22].

There have been few objective studies of these methods. Often the developers of a method describe their own techniques and report their own assessments of accuracy [12, 18, 21, 22]. Such reports may be self-serving and biased. In other studies, researchers have tried to predict the duration of projects after their completion and hence with full knowledge of the projects' final scope [13]. Such research may appear unrealistic to experienced estimators who recognize that the

full knowledge of the project's final scope is rarely available during estimating. These observations coincide with those of Sheil [20] that such research has been ineffective due to unsophisticated experimental techniques and a shallow view of the nature of programming. Hence, astute managers may distrust the findings and be reluctant to apply them.

This suggests that to understand cost estimating, another research approach is warranted. It suggests that perhaps a study of the actual experiences of practicing computing managers and other computing professionals might provide the guidance in the cost estimating process that previous studies have not.

The Current Study

To take another approach, the authors developed a questionnaire based on their recent case study of the cost estimating process [14] and other software development cost estimation literature [1-3, 5, 6, 9-13, 15-19, 21]. Many of the questions required responses on five-point Likert-type scales. Other questions required respondents to report the proportion of large projects for which they carried out certain estimating practices. Respondents answered the questions in terms of what their organization defined as "large projects" to prevent

them from thinking about trivial tasks which they might routinely handle without formal cost estimation. (Some companies consider such large projects to be those estimated to exceed an arbitrary figure such as \$50,000 [14].)

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