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The Development of an Instrument to Measure Software Project Risk

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Companies in the U.S. spend over \$250 billion each year on software development projects, yet many of these projects are not considered to be successful. In 1995 alone, American companies spent an estimated \$59 billion in cost overruns on software projects and another \$81 billion on canceled software projects. To reduce the high failure rate associated with software projects managers need better tools to assess and manage the risks associated with software development projects. However, before such tools can be developed there must be a better understanding of the dimensions of software development risk. Currently no one has rigorously and extensively identified the potential risk factors that can plague a software development project.

There are two primary objectives of the proposed research. The first objective involves the clarification and definition of the software development risk construct through the identification of its many dimensions. The second objective involves the grounded development and validation of an instrument to enable the identification of the risk factors that may be associated with a given software development effort.

A rigorous instrument development process will be used to develop and validate an instrument that can be used to measure software development risk. The instrument development process will consist of four steps. In this study of software development project risk the first step has been completed and an investigation of the previous research in this area has been conducted. This process has produced a list of 7 major categories of threats to successful software development.

The next step to be completed will involve verifying that the dimensions resulting from Step 1 are an accurate representation of software project risk. This verification will take place by conducting a focus group with project managers. The participants of the focus group will be asked to evaluate the representativeness of the proposed dimensions. Then an initial list of items intended to tap into each of the major dimensions of software risk will be generated. This initial list of items will be refined by having groups of experts identify and correct weaknesses. Specifically, subjects with project management experience will be used to identify those items that do not appear consistent with the construct's dimensions and to help eliminate/reword ambiguous items. Finally, a Q-sort technique will be used to have experts systematically assess the validity of the items intended to measure each of the dimensions of risk. The Q-sorting process will result in a comprehensive list of risk items that represent the identified dimensions of the software development risk construct.

After the Q-sort, the items will be ordered randomly on an instrument and distributed to a small group of IS project managers. The goal of this step is to obtain a general assessment of the instrument's appearance, to further eliminate items that do not contribute significantly to the value of the instrument, and to assess the reliability of the measurement scales. A second small sample of IS project managers will be used to retest the reliability of the scales on the instrument. The results of this step will be an instrument that contains a set of reliable and internally consistent scales to measure each of the dimensions of software development risk.

The objective of this final stage of the research is to further establish the reliability and validity of the instrument. In this step, the instrument will be mailed out to approximately 2000 software project managers. With an approximate return rate of twenty percent this should produce 300-400 usable questionnaires from project managers. The data collected from these managers will be used in a principal components analysis (PCA) to further validate the factor structure of the software project risk construct.

The PCA will also allow convergent and discriminant validities to be assessed. The results of this step will be a validated instrument designed to measure software development risk.