The Impacts of Handoffs on Software Development

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Introduction

• This years COCOMO conference deals with software sizing issues.

• Many of the failures of software cost estimation have been because of the difficulty in measuring the size of a software development system (Verner and Tate 1987).

• Lines of Code has been shown to be a poor measurement. Function Point Analysis is an improvement.

• Fundamental flaws in the construction of function points prevent them from being valid measures (Kitchenham, Pfleeger et al. 1995, Kitchenham 1997).
Software Sizing

• Calibration using historical data is a methodology to solve the software sizing problem.

• Results of calibration are equivocal. For every study that had success in using calibration, another study showed failure using the methodology.
Team Size

“While the Boeing Model and other contain team size as an explicit software development attribute, it is surprising that neither the Walson-Felix study nor Boehm’s COCOMO Model directly identify team size as a significant factor in productivity assessment. Undoubtedly, its effect is included indirectly in other factors that may be closely correlated with team size. For example project size is usually considered a significant factor which is highly correlated with team size.” (Conte, Dunsmore, and Shen, 1986 p.258).
Testing Conte’s Assumption

- A correlation was conducted between max team size and system size (in lines of code) on a large data set.
- No significant correlation was found.
- The correlation was +0.07.
Analysis

• If there was a significant correlation between team size and project size, then current software sizing problems can be solved by replacing team size for project size.
• But team size and project size are not significantly correlated.
• In addition, Braind (1998) found that KLOC, team size, and RELY, STOR, and TIME best explain costs of military projects.
Team Size

- From the literature on software cost estimation, team size is an important metric left out of COCOMO.
- The Cooperative Program Model (COPMO) (Thebaut and Shen 1984) modeled team size with some success, but the model had limited use.
Reformulating Team Size

- Based on the work of Brooks, Abdel-Hamid, and the idea of COPMO, an extension to COCOMO II was created.
- Theoretically, the effects of team size are reformulated as inter-group coordination and intra-group communication.
Process Structure

- Different process structures will affect the amount of inter-group coordination. We investigate the impact of three different process structures.

- Three-Tier, Two-Tier, and One-Tier
One-Tier

Desired System — All Systems Development — Delivered System
COCOMO II Extension

Project Characteristics
- System Size
- Scale Factors
- Effort Multipliers

COCOMO II Outputs
- Effort
- Schedule
- Work Breakdown Structure

Software Development Process Structure
- One-Tier Structure
- Two-Tier Structure
- Three-Tier Structure

Decision Support Systems
- Team Size
- Requirements Team Size
- Design Team Size
- Implementation Team Size
- Integration Testing Team Size
- Customer Acceptance Team Size

Adjusted Outputs
- Effort
- Schedule
Project Tool

• At this point a DSS project that performs the calculations will be demonstrated.