

Enhancing Cost Estimation Models with Task Assignment Information

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Intensity

Number of time units devoted to t

Total duration of t

- High intensity: sharp focus and few or no hiatuses
- Low intensity: may have sat untouched for long periods of time.
- Development effort decreased as intensity increased

Concurrency

- Average number of developers working on task t during any given time unit
- Teams took less time to complete a module when members were able to work more independently

Fragmentation

- Degree to which a team's time is fragmented over multiple tasks:

$$\frac{\text{Total number of reported tasks for all developers}}{\text{Number of developers reporting work on } t}$$

- Fragmentation increased development effort

Improving Cost Estimates

- COCOMO I model augmented with task assignment metrics
 - linear model
 - prediction accuracy improved from PRED(.30) of 31% to PRED(.30) of 49%
- Limited usability
 - More data
 - Ratio scales

Suggested Approach

- Compare to norms
- Adjust if factor in Upper or Lower Quartile
- Monitor and calibrate

	Effort Adjustment Factor		
Metric	Very Low	Typical	Very High
Intensity	1.3	1	0.7
Concurrency	0.9	1	1.3
Fragmentation	0.9	1	1.4

What Results Should You Expect?

- Data set divided in half
 - Half used to create the EAFs
 - Linear regression used to estimate factors.
 - 3, 4, 5 levels of each metric were evaluated.
 - 4, 5-level models rejected; added complexity, no significant improvement
 - Other half used for evaluation

Improved Estimates

criterion: PRED (30%)

Intermediate COCOMO I 29 %

Augmented 35 %

Improvement 6 %

COCOMO Post Arch. 37 %

Augmented 43 %

Improvement 6 %