Software Cost Estimation

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Stage 3  external enhancement & exploration
experimental validation by outside groups

- Question:
  - Are software cost estimating models generalizable to environments in which they were not developed?
  - Are non-SLOC-based models as accurate as SLOC-based models?
- Result:
  - Selected 4 models for comparison:
    - Function Points (Nonproprietary, Non-SLOC-based)
    - ESTIMACS (Proprietary, Non-SLOC-based)
    - COCOMO (Nonproprietary, SLOC-based)
    - SLIM (Proprietary, SLOC-based)
  - All models show need for calibration to be generalizable.
- Are nonproprietary models as accurate as proprietary models?
  - No significant difference between proprietary and nonproprietary models.
  - Function points model validated by data.
- Are non-SLOC-based models as accurate as SLOC-based models?
  - Establish parameters for applying models to completed projects through interviews and surveys.
  - Get datasets for 16 projects from data-processing applications company.

Stage 3 (cont.)

- Question:
  - Cost estimation using function points is accused of having poor interrater reliability; the extent to which independent counts of similar points agree. Experimental comparison to other counting methods, Kemerer (1987, 1993).
  - What is the interrater reliability of a newer, alternative function point counting method?
  - What is the intermethod reliability of these two methods?
- Result (Enhanced method):
  - Get datasets for 27 projects from a large engineering company.
  - Two methods selected for evaluation: Function-Point Method and ER modeling method.
  - IFPUG 3.0 IFPUG 3.0 -- Albrecht Standard method of deriving function point counts selected as “Standard.”
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  - Price-S (RCA) -- ER modeling method has potential for FP count automation.
- Intermethod reliability also seemed to be strongly correlated.
- Intermethod reliability is found to be high using the Albrecht Standard method and the Entity-Relationship method.

Timeline

- 1960s: basic research
- 1980s: enhancement & exploration (internal)
- 1990s: enhancement & exploration (external)
- 2000s: enhancement & exploration (internal)
- 2010s: appearance of a usable system
- 2015: SLOC basic research
- 2020: SLOC enhancement & exploration (external)
- 2025: SLOC enhancement & exploration (internal)
- 2030: SLOC basic research
**Timeline**

1960s: basic research

Delphi (Rand)

Mid-1970s: appearance of a usable system

Late-1970s: development & extension

1980s: enhancement & exploration (internal)

1990s: enhancement & exploration (external)

Popularization of concept

**Boehm (2003)**


**Software engineering has changed:**

- Software much bigger part of systems than 30 years ago
  - Affects cost, schedule, value
  - High proportion of software failures caused by value-oriented issues
    - Lack of user input
    - Incomplete or changing requirements
    - Lack of resources
    - Unrealistic expectations and time frames
  - Value considerations must be integrated into existing and emerging SE principles and practices

**Value-Based SE**

*Value-Based SE maturity means making room for emerging challenges*

- **Value-Based Agenda**
  - Requirements engineering
  - Architecting
  - Design & development
  - Verification & validation
  - Planning & control
  - Risk management
  - Quality management
  - People management

- **Principles & practices to address challenge areas of SE as they emerge**

- **Candidate Foundation Elements**
  - Benefits realization analysis
  - Stakeholder value proposition elicitation & reconciliation
  - Business case analysis
  - Continuous risk & opportunity management
  - Concurrent system & software engineering
  - Value-based monitoring & control
  - Change as Opportunity

**Stage 4: popularization**

*model, no - concepts, yes*

- Boehm’s roadmap for realizing benefits of value-based software engineering

**Stage 4b and up**

*many related areas in earlier stages of maturation original question becomes subset of the problem*