

Estimation Tools

Seminar on Software Cost Estimation

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Contents

- **Tool categorization**
- Statistics about tool usage in industry
- Accuracy and precision
- Tool demonstration
- Conclusions / discussion

Tool Categories

- **Project planning (management)**
- **Cost estimation**
- Statistical analysis
- Methodology (process) management
- Year-2000 analysis
- Quality estimation
- Risk analysis
- Portfolio analysis
- Assessment support
- Project measurement
- Complexity analysis
- Value analysis
- Budget support
- Variance-reporting
- Project milestone tracking
- Defect-tracking and –measurement
- Function point analysis
- Source code counting

Sizes of Functionality

Category	Lagging	Average	Leading Companies
Project planning	Fp 1,000	Fp 1,250	Fp 3,000
Project cost estimating			3,000
Year 2000 analysis			2,000
Quality estimation			2,000
Assessment support		500	2,000
Project measurement			1,750
Risk analysis			1,500
Resource tracking	300	750	1,500
Cost variance reporting		500	1,000
Function point analysis		250	750
...
Function point subtotal	1,800	5,350	30,250

Tool Costs

Category	Low-cost	Median-cost	High-cost
Cost estimating	\$250	\$2.500	\$15.000
Quality estimating	150	500	5.000
Project planning	100	500	1.500
Risk analysis	0	500	1.500
Year 2000 analysis	350	750	1,500
Project measurement	75	500	1.250
Project tracking	100	300	1,000
Defect tracking	200	500	1.000
Function point analysis	50	500	750
Source code counting	0	250	500
...
Total	\$1.350	\$12.300	\$45.000

Benefit / ROI over 4 Years

Tool-Category	Year 1	Year 2	Year 3	Year 4	Total
Quality estimating	\$3.00	\$4.50	\$12.00	\$18.00	\$37.50
Cost estimating	2.50	5.00	12.00	17.50	37.00
Project measurement	1.50	3.50	8.50	13.00	26.50
Project planning	1.50	4.00	8.00	12.50	26.00
Defect tracking	2.00	3.00	7.00	13.00	25.00
Year 2000 analysis	15.00	5.00	2.00	0.00	22.00
Project tracking	1.75	3.50	6.00	10.00	20.50
Function point analysis	1.75	3.00	4.50	8.00	17.25
Risk analysis	1.50	2.50	3.50	5.50	13.00
Source code counting	1.00	1.00	1.00	1.00	4.00
...
Total	\$43.30	\$54.75	\$102.50	\$156.00	\$356.55

Training Costs

A study by Hewlett Packard says:

- Unless \$1.00 was spent on training users for every \$1.00 spent on CASE tools themselves, the tools did not improve performance significantly.
- A general rule of thumb for software training is that users of application packages need about one day of instruction for every 3000 function points in the package.

Accuracy and Precision

- **Accuracy:** how close to the mark a measurement is
3 is a more accurate representation of pi than 4.
- **Precision:** number of significant digits
3.14 is a more precise representation of pi than 3.
- Measurement can be precise without being accurate and accurate without being precise.
- False precision is the enemy of accuracy.
- Effort estimate of 40 to 70 mm might be both the most accurate and the most precise you can make
Simplifying it to 55 man-months,
it looks more precise, but it's really less accurate.

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Tools Demonstration

- Reference project
- Sparx Systems Enterprise Architect
- Construx Estimate Professional
- Tassc Estimator

Enterprise Architect

- Full UML modeling tool
- Inventive idea: Use Case Metrics
- Allow a rough estimate very early
- Is not very accurate, requires calibration

Construx Estimate

- Pure estimating and planning tool
- Combines several models:
Slim, Cocomo and Monte Carlo Simulation
- Estimates costs, effort, schedule and peak staff also in a constraint way
- Supports calibration, based on many factors, includes a lot documentation and case studies

Tassc Estimator

- Manager Edition:
complete estimation and scheduling tool
- Accompanies complete development process
- Continual refinement of estimates
- Includes a nice tutorial

Conclusion

- Using a tool is half the way for good estimates
- There is no tool owning all functionality
- Start using tools early
- Use more than one tool at the same time
- Avoid the change of tools
- There is no need to know all these formulas
But know your tools well!
- Don't rely on tool results without thinking about it
- Remember the difference between accuracy and precision
- Tools usually are more conservative and accurate than manual estimates

References

- [Construx] <http://www.construx.com/resources/estimate/>
- [Jones98a] Jones, T.C. (1998). Estimating Software Costs. New York: McGraw-Hill.
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- [Seeds] NASA. SEEDS: Strategic Evolution of ESE Data Systems. Survey of Cost Estimation Tools. Deliverable 34.05.01, November 30, 2001.
- [Sparx] <http://www.sparxsystems.com.au>
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