



The Next Generation in Software Estimating

Bruce Fad , PRICE Systems, L.L.C., SCEA 2002



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True S – The Next Generation of Software Estimating

- Why True S
- What's New!
- New Architecture
- New simpler Methodology for estimating new application developments
 - Basic relationship
 - Impacts on productivity
- Higher level elements allow for multiple levels of indenture
- Other improvements in the pipeline
- True S – Wrap Up



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True S

- 25+ years experience with software development and software estimating
- Extensive cost research efforts in the last 6 years focusing on the areas where existing methods are lacking.....
 - Software measurement
 - Reuse
 - Capacity analysis
 - Productivity analysis
 - COTS

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True S – Combining the best of the best

- We've studied....
 - Existing PRICE algorithms
 - Data in PRICE database
 - USC CSE data analysis
 - Data from NASA, SMC, ISBSG, and other commercial and DoD sources
 - Third party analyses of competing products
 - Extensive literature search of Object oriented software, software reuse, COTS, and other factors that drive productivity
 - Requirements from existing clients and prospects



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Old vs. New

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- Desk top
- Single User
- Phase Based
- Complex relationships
- Reuse hard to describe
- Optimal resource used
- Limited levels
- Stand alone product
- Single way to specify project/product/team complexity

True S

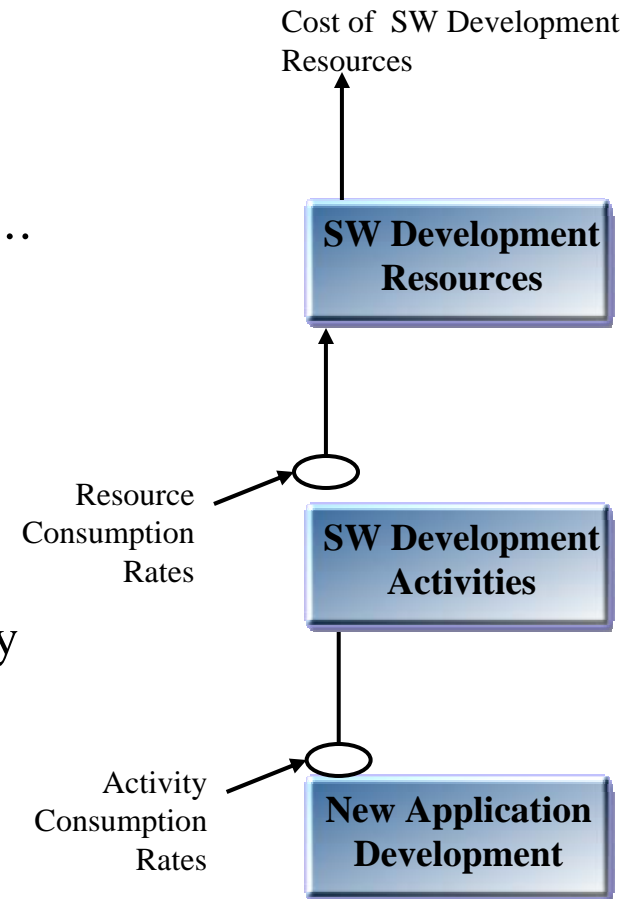
- Client Server
- Collaborative
- Activity Based
- Easy to understand
- Smarter size/reuse
- Input resource avail
- Unlimited levels
- Integrated framework
- Separate queries for project/product/team complexities

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A New Architecture

- New Application Development
 - Analog to Development CSCI
- SW Development Activities such as....
 - Design Software
 - Analyze requirements
 - Test Software
- Development Resources such as...
 - Programmers
 - Software Engineers
- Activity Consumption Rates driven by 'size' factors such as...
 - SLOC,FPs,POPs,
 - Functional Complexity,
 - Reuse
- Resource Consumption Rates driven by factors such as...
 - Productivity
 - Development Complexity



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Basic Methodology for Estimating the cost of Developing New Applications

- $\text{Effort} = \text{Size} * \text{Baseline Productivity} * \text{Productivity Adjustments}$
- $\text{Team size} = \text{function}(\text{size}, \text{functional characteristics}, \text{operating specification})$
- $\text{Schedule} = \text{Effort} / \text{Team Size}$



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Productivity Adjustment is based on

- Size
- Reuse
- Functional Characteristics (APPL)
- Programming language
- Operating specification (PLTFM)
- Utilization
- Development Team Characteristics
- Organizational Characteristics
- Project Characteristics
- Internal Integration difficulty



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Size impacts on productivity

- Size input is now four inputs (units can be SLOC, FP or POPs)
 - NewCode – code being developed from scratch
 - AdaptedCode – Code that is being reused but changed
 - ReusedCode – Code that is being reused with no changes
 - DeletedCode – Code that is being deleted
- SizeForIntegration =
NewCode+AdaptedCode+ReusedCode-DeletedCode
- SizeForProductivityImpact =
NewCode+AdaptedCode+ReusedCode



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Reuse Impacts on Productivity

- Reuse Inputs relate to Size inputs
- NewCode
 - %New (how much are you starting with)
 - % Design Repeat (how much copy/paste can you do)
- AdaptedCode
 - % Design reuse
 - % Code Reuse
 - % Test Reuse



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Programming Language

- Two Productivity Impacts
 - Productivity of the language
 - Technology Improvement

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Language Productivity

- Every language has a baseline productivity
- Every language has a baseline set of capabilities that the user can specify (through user interface) whether they are being used or not
 - Database capability
 - Menu generation
 - Screen generation
 - SQL capability
 - Report Generation
 - Class Libraries
 - Graphical capabilities
 - Other code generation



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New languages Added

- VBScript
- JavaScript
- Visual J++
- Prolog
- DBase
- Framework
- Symphony
- Teamwork
- Lotus Script
- Word
- Excel
- Informix GL
- FoxPro
- Paradox
- ObjectView
- FrontPage

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Development Team Characteristics

- Rank the following from Very High (1) to Very Low (5)
 - Quality of analysts and designers
 - Quality of programmers
 - Team experience with Language
 - Product familiarity
 - Hardware platform familiarity
 - Team continuity
- Responses feed productivity relationships



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Organizational Characteristics

- PROFAC Analog with respect to productivity impact
- Calibrated quantity
- Rescaled to make parameter value selection more intuitive
- Improved guidance through Knowledge Bases to help clients without calibration data make good selection



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Project Complexity

- Rank the following from 1 to 5
 - Multi Site Development (1 is nominal, 5 is multi-national with many communication challenges)
 - Design for Reuse (1 is none, 2 is nominal, 5 is reuse across multiple projects)
 - Rank Tools for (1 is fully integrated, 3 is standard tool set, 5 indicates Flinstone like tools)
 - Design
 - Code
 - Test
 - Use of object oriented technologies
- Each of these feeds a relationship that impacts productivity

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Schedule and Team Size

- For Each activity calculate Optimal Team Size as a Function of ...
 - Size
 - Operational Specification
 - Functional Characteristics
- Optimal Schedule....
 - Duration(in months) = Activity Requirement/(Team Size * Hrs per month)
- Schedule Constraints impact productivity as they do in PRICE S
- Resource constraints are handled through the closed loop analysis in the framework.



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Resource capacity as an input

- Specify maximum resource availability
 - per software development resource
 - per time period
- Resource analysis will indicate situations where understaffing and/or idle capacity exist
- Scenarios will allow for dynamic analysis of trade off between
 - schedule
 - content
 - quality
 - cost



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Higher Level Elements

- Unlimited levels of indenture
- Allow integrations of components with multiple languages
- Account for other activities
 - Plan and Oversee
 - Plan Software Development
 - Analyze and Design System
 - Perform CSCI/HWCS Test and Integration
 - Higher Level SW Integration
 - Higher Level Qualification Testing
 - QA/CM/PM
- Account for Other Resources
 - Tech Authors, CM, QA,PM



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Other Improvements in the Pipeline

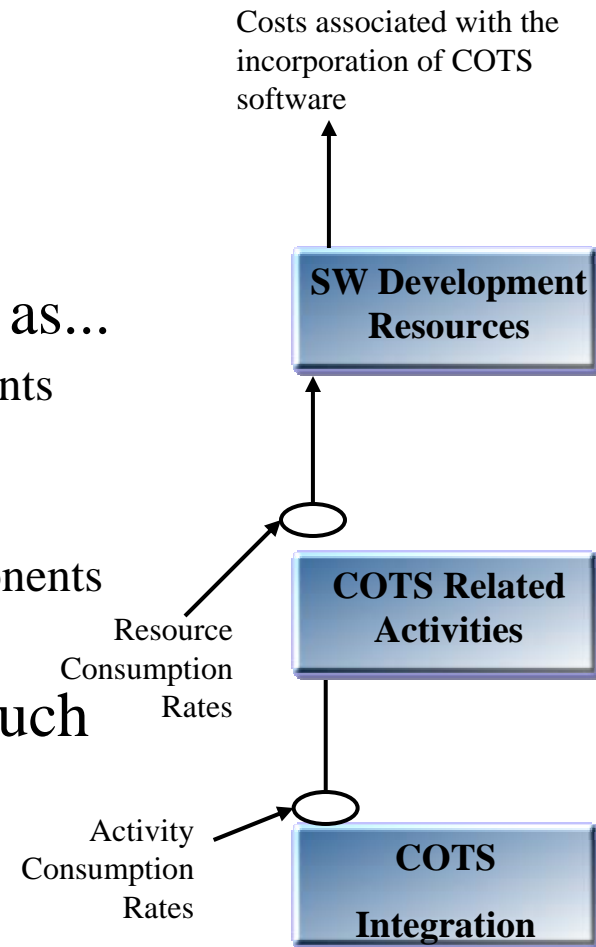
- Estimating from Requirements
- Full integration with the Hardware model through the TruePlanning Framework
- Completely new COTS estimating methodology

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New COTS Model

- COTS Integration
 - Analog to Furnished CSCI
- COTS Related Activities such as...
 - Evaluate and select COTS components
 - Develop Glue Code
 - Tailor the COTS Components
 - Integrate and Test with other components
 - Evaluate and integrate upgrades
- SW Development Resources such as...
 - Programmers
 - Software Engineers
 - Systems Analysts



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True S – The Best Software Estimating Solution for the Future

- Client/Server, Collaborative Solution
- Addresses real world software estimating challenges
 - Software size
 - Reuse
 - COTS
 - Productivity
 - Resource Constraints
- Integrated framework – integrates your software estimates with
 - Other PRICE estimating catalogs
 - Your own catalogs
 - Estimating catalogs from other vendors

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Questions

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