

A hand holding a magnifying glass over a document with a large dollar sign. The document has a grid pattern and some faint text. The magnifying glass is focused on the dollar sign.

Accuracy
Speed
Confidence

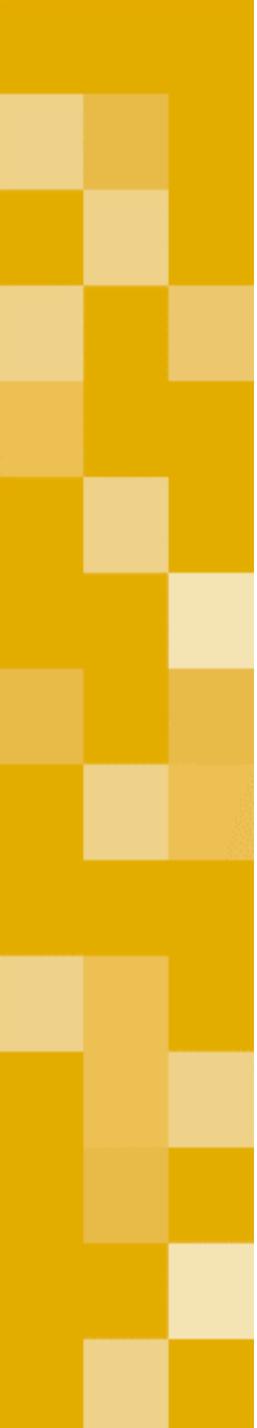
PRICE



PRICE

Faster Decisions. Better Decisions.™

Our mission is to provide collaborative planning, cost forecasting, and budgeting solutions that empower our clients to sustain profitable growth through faster, better decisions.



Cataloging: An Activity Based Approach to Software Estimating

Arlene F. Minkiewicz
Chief Scientist
PRICE Systems, L.L.C
STC 2002
May 2, 2002

PRICE

FASTER DECISIONS. BETTER DECISIONS.™

Presentation Overview

- **Challenges of Software Estimation**
- **Activity Based Solution**
- **Predictive Modeling Solution**
- **Software Catalog Solution**
 - What is a software estimation catalog
 - Merging Activity Based thinking with predictive modeling
- **Value added with Software Estimation Catalogs**

Challenges of Software Estimation

- Reliable software cost estimates are the cornerstone for effective software project management
- The best estimates come from understanding :
 - The activities required to develop software
 - The resources required to accomplish these activities
- A detailed analysis is required to come to this understanding

This understanding comes at a high price –
but can we afford not to do it?

Addressing these challenges

- Activity Based Thinking adds tremendous value to the software estimation process **but...**
 - Individual organizations do not have the time or money to perform detailed activity based analyses of their software development organizations
- Predictive cost modeling (parametric estimating) provides software estimates with less emphasis on detailed organizational analysis **but...**
 - Lacks the breadth and common understanding of an activity based approach

A software estimation catalog provides the best of both worlds by merging these two methodologies

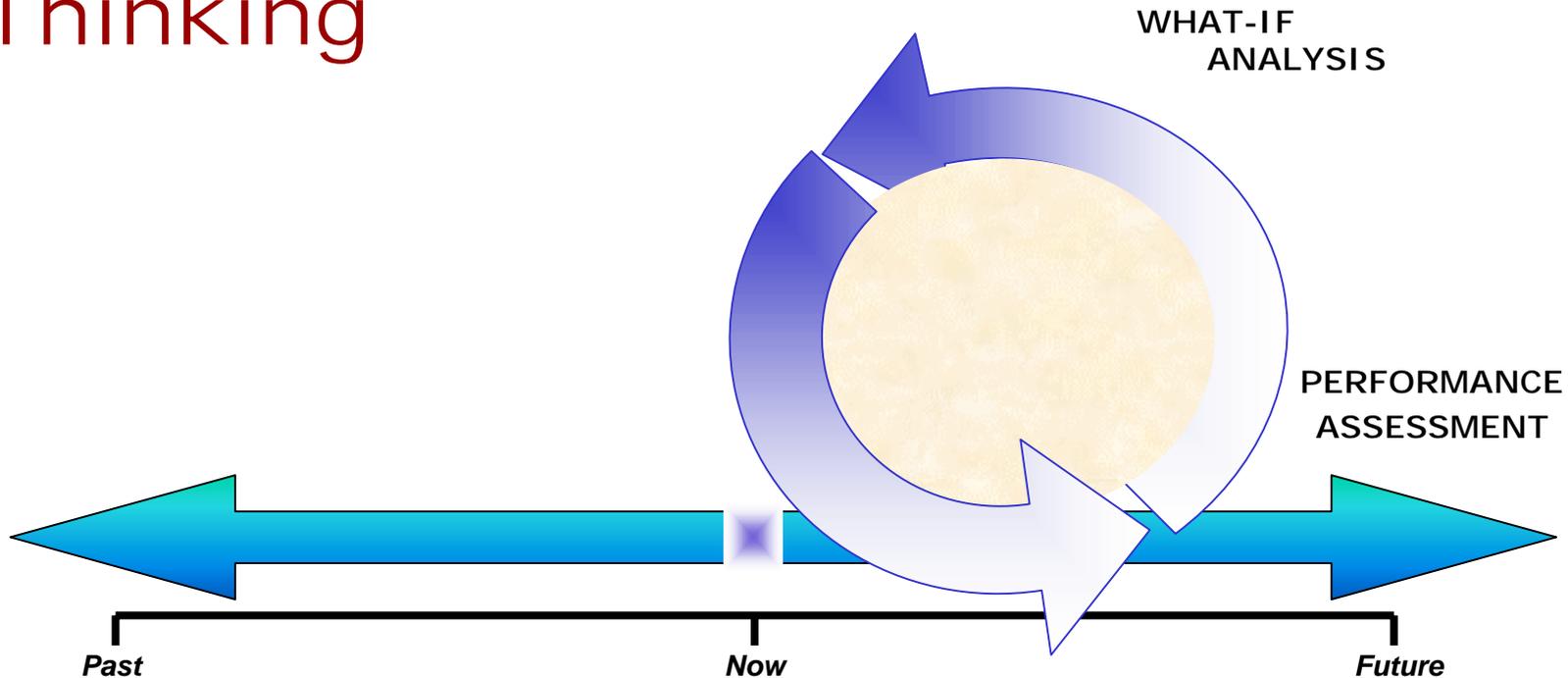
PRICE

FASTER DECISIONS. BETTER DECISIONS.™

Activity Based Solution – What is Activity Based Thinking?

- Activity Based thinking forces Financial and Cost Analysts to think of the costs of running a business in terms of how those costs relate to the specific products and services that the business delivers to its customers. Activity Based Thinking is focused on the causal relationship between the cost of doing business and the outputs of the business

Activity-Based Thinking



Historical View

- Uses known resource costs
- Uses known driver quantity
- Uses known outputs
- Calculates costs

Predictive view

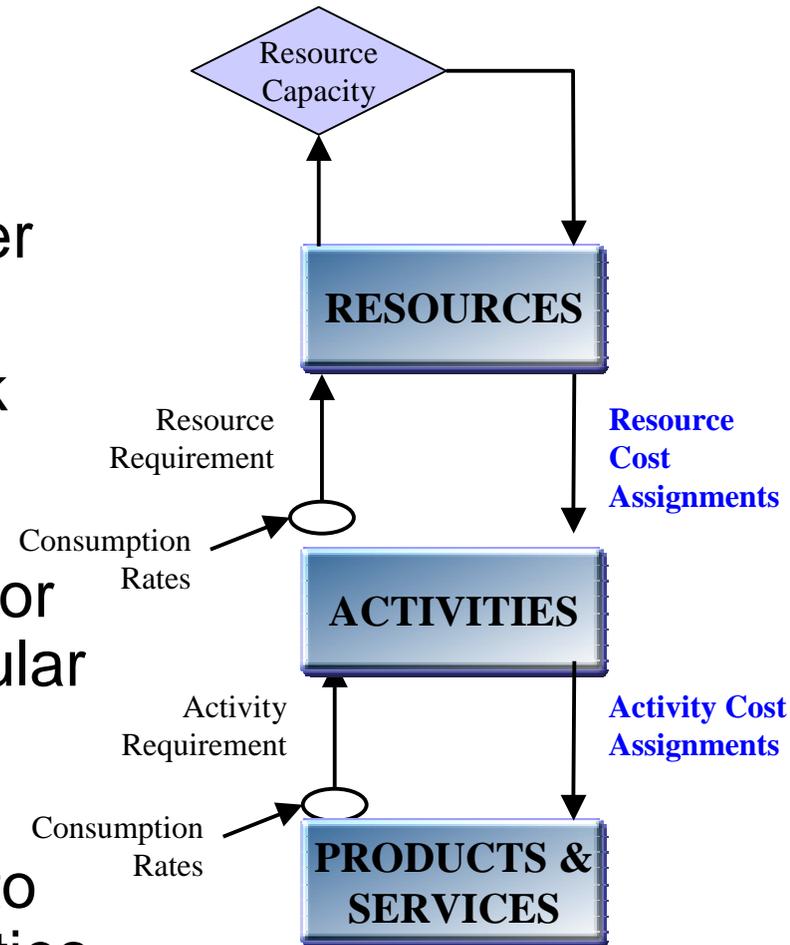
- Begins with output requirements
- Uses consumption rates
- Predicts activity & resource requirements
- Requires capacity analysis
- Predicts resource costs

PRICE

FASTER DECISIONS. BETTER DECISIONS.™

Activity Based Concepts

- Cost Object - Product, Service or Customer that your business must deliver or maintain
- Activity - the specific work tasks that must be accomplished in order to deliver a specific product or service or satisfy a particular customer
- Resource - the physical entities that are required to accomplish specific activities



PRICE

FASTER DECISIONS. BETTER DECISIONS.™

Strengths and Weaknesses of Activity Based Solutions

- Strengths
 - Costs are driven to specific products and services
 - Costs are driven to specific activities
 - Facilitate operational and strategic planning
 - Common terminology for technical and financial personnel
 - Strong business case for adoption
- Weaknesses
 - Cost driver relationships are simplistic often fail to model the real world
 - The linear nature of AB models limits modeling of learning and economies and diseconomies of scale
 - Still immature in many markets

Predictive Modeling Solution – What is Predictive Cost Modeling

- Operations Research Discipline
- Relies on mathematical models of real life situation and then the abstraction of these situations to new projects and technologies
- Relies heavily on historical data
 - Data is reviewed
 - Important cost drivers are identified
 - Regression analysis is used to determine cost estimating relationships
 - Results can then be refined with additional data and extrapolated to new projects, technologies and processes

Strengths and Weaknesses of Predictive Cost Modeling

- **Strengths**

- 25+ years of successful use in the Aerospace and Defense industry
- Cost estimating relationships are rich, well developed and reference complex cost drivers
- Many proven models exist
- Model building capabilities are well developed

- **Weaknesses**

- Allocation of overheads not adequately addressed in existing models
- Historical cost collection not consistent with model output
- Misunderstanding of parametric estimating leads to mistrust of parametric estimating – value not effectively communicated to the organization
- Terminology and complexity often segregates the estimators from the rest of the financial people in an organization

Software Catalog Solution – What is a Software Estimation Catalog?

- Collection of Activity Based Predictive Models
- Based on a study of many software development projects the catalog knows
 - Information about the generic software development project:
 - Activities
 - Resources
 - Cost Drivers
 - Relationships
 - Information about those factors that result in deviations from the generic case
 - Additional Cost Drivers
 - Additional Relationships

Basic Premise of the Software Estimation Catalog

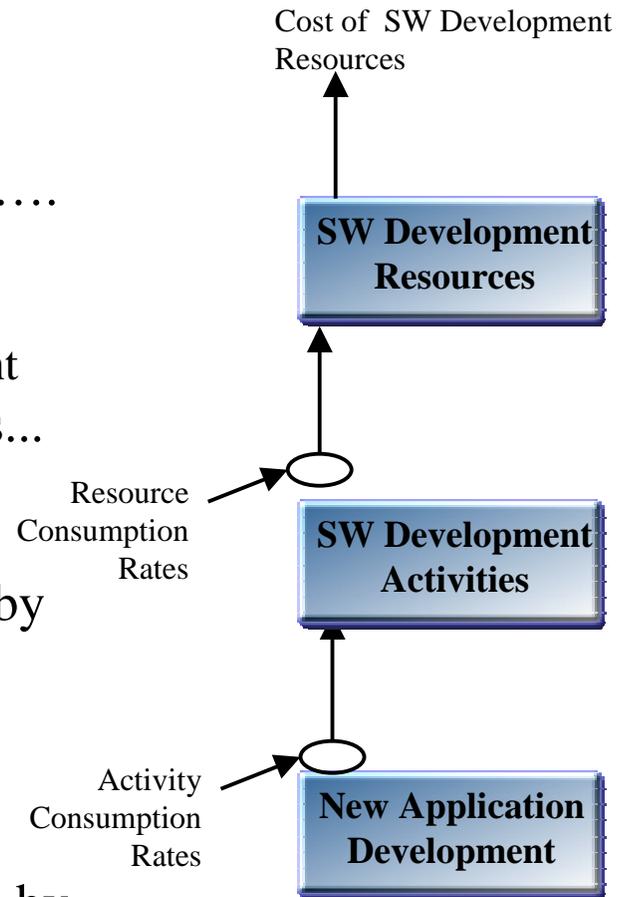
- At the top level there is much commonality in the activities performed during software development
- Activity Based Modeling helps us identify those activities and resources
- Historical analysis of many projects will show how software development projects consume activities
- Predictive Cost modeling helps us use this historical analysis to identify basic consumption rates and identify those factors most likely to impact consumption rate

Merging Activity Based Thinking with Predictive Cost Modeling

- Begin with an **activity based approach**. Describe each activity in the SD process as having ...
 - Activity Requirement (size)
 - Consumption Rate (hrs/size)
 - Consumption rates are generic – determined through analysis of many software development projects
 - Resource requirement = size * hrs/size
- Add **predictive modeling** by including additional ...
 - Cost drivers
 - Relationships that describe how cost drivers impact 'generic' consumption rate

Software Catalog Solution

- New Application Development
 - Analog to Development CSCI
- SW Development Activities such as....
 - Implement and test software
 - Plan and oversee the project
 - Perform Configuration Management
- SW 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



Benefits of Software Estimation Catalogs

- Activity Based analysis done for software development in general without the cost for individual organizations to perform this analysis
- Predictive cost modeling to determine consumption rates
- Predictive cost modeling to identify relevant cost estimating relationships – tailoring the generic AB model with the specific cost driving factors of each project, market and software development organization

Value added to software project managers

- The power of an activity based solution
 - Improved visibility of the costs of processes
 - Better strategic and operational information to facilitate better decision making
 - Better resource consumption and capacity analysis
 - Language that transcends differences in the project management and financial worlds
- The power of predictive modeling solution
 - Rich and powerful cost estimating relationships
 - Powerful forecasting capability that facilitates planning for new products, processes and technologies
 - Facilitates implementation of activity based solution without the cost of activity based analysis

A hand holding a magnifying glass over a document with a large dollar sign. The document has a grid pattern and some faint text. The magnifying glass is focused on the dollar sign.

Accuracy
Speed
Confidence

PRICE