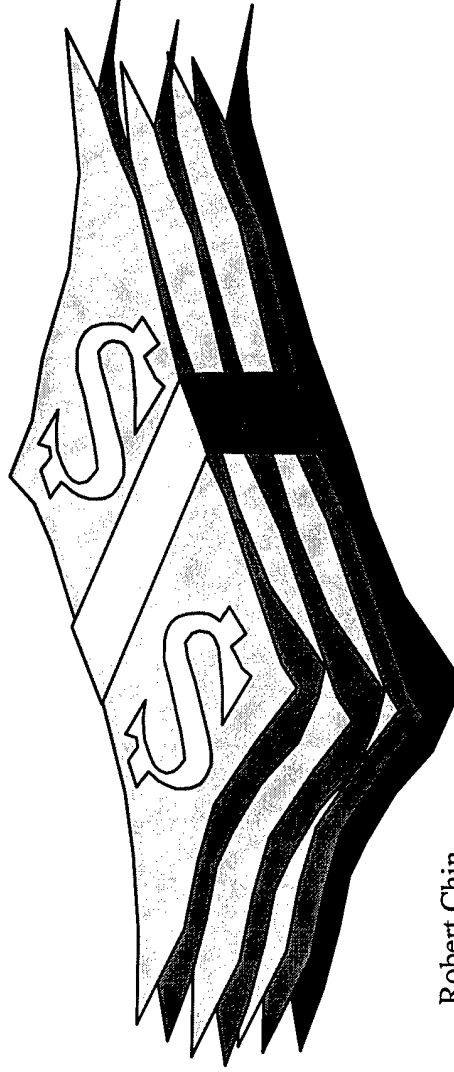
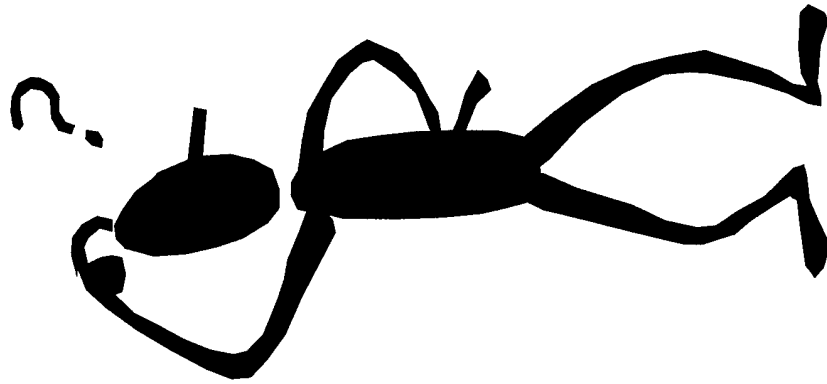


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Establishing a Software Cost Estimating Process

Society for Software Quality
Washington DC Area Chapter
RoundTable - 24 January 2000



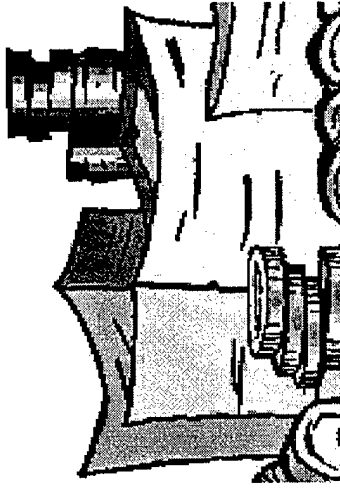
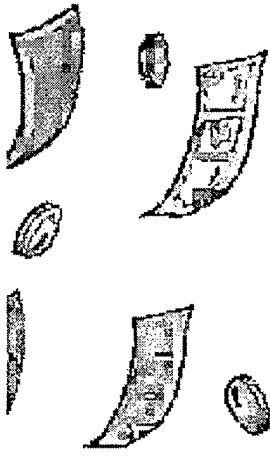
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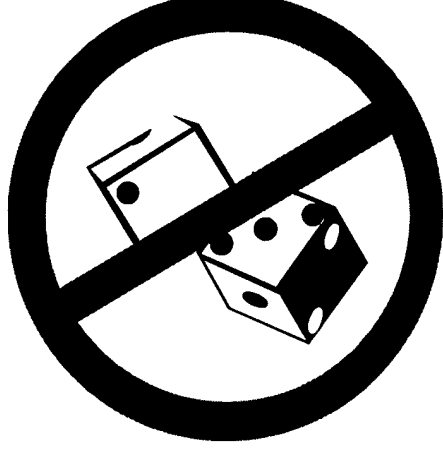
Presentation Outline

- Introduction
- Working Group Plan
- Where are we? - A Survey
- Developing a Process
- What's Next? - Miles to Go



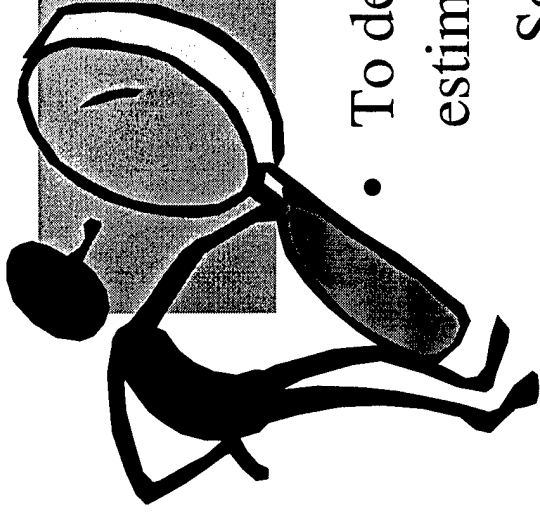
Introduction

- Many software-intensive programs are experiencing cost and schedule over-runs
- The senior leadership believes that poor software cost estimates are a major contributor
- A Software Cost Estimating Working Group was chartered in February 1999 to establish a formal process to develop credible estimates



Working Group Plan

- A relatively short timeframe and a shoestring budget (part-time personnel/local travel only) dictated our approach
- Seek and sort out best practices to incorporate into process
- Identify the tools, data and documents to support the process
- Working group composition
 - Electronics / Software Engineers
 - Cost Analysts / Industrial Engineers / Operations Research Analysts
 - Advisory Group (Software and Cost Managers)

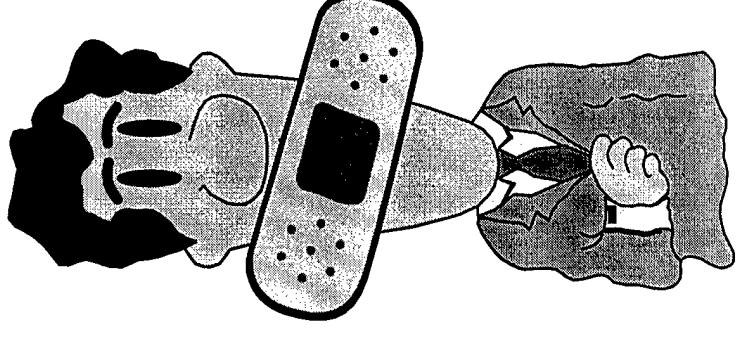


Where are we? - A Survey

- To determine how projects are developing software cost estimates. We asked about:
 - Software effort type (i.e., Concept Exploration, System Development, System Enhancement, Corrective Maintenance)
 - Sizing techniques used
 - Effort/Cost and schedule techniques used
 - Level of satisfaction with cost estimating techniques
 - Project characteristics (e.g., application domain, software size, language(s), SEI-CMM level of developer/maintainer)

Where are we? - A Survey

- Ground Rules
 - All survey participants (projects and individuals) shall remain anonymous outside the core Working Group members
 - No attribution of survey responses



Where are we? - Survey Results

- Survey Project Characteristics
 - Total Lines of Code ranged from 4,000 - 1,500,000 for 25 projects
 - Programming Languages: Ada, Fortran, C, C++, Assembly Language, PL/1, Pascal, Microcode
 - Application Domain: Mission Computer, Navigation, Flight Control, Communications, Mission Planning, Test Software, Weapons Targeting and Control, and Display Processing

Where are we? - Survey Results

- Most projects do not have a formally documented process for estimating software costs (3 of 25 projects)
- Projects that maintain a historical data base of completed and on-going software efforts produce the best estimates
- Training to perform software cost and schedule estimates is lacking
- Most projects lack historical data to perform software cost estimates, but are beginning to collect historical data
- Estimating software size is the most critical and least well performed activity

Where are we? - Survey Results

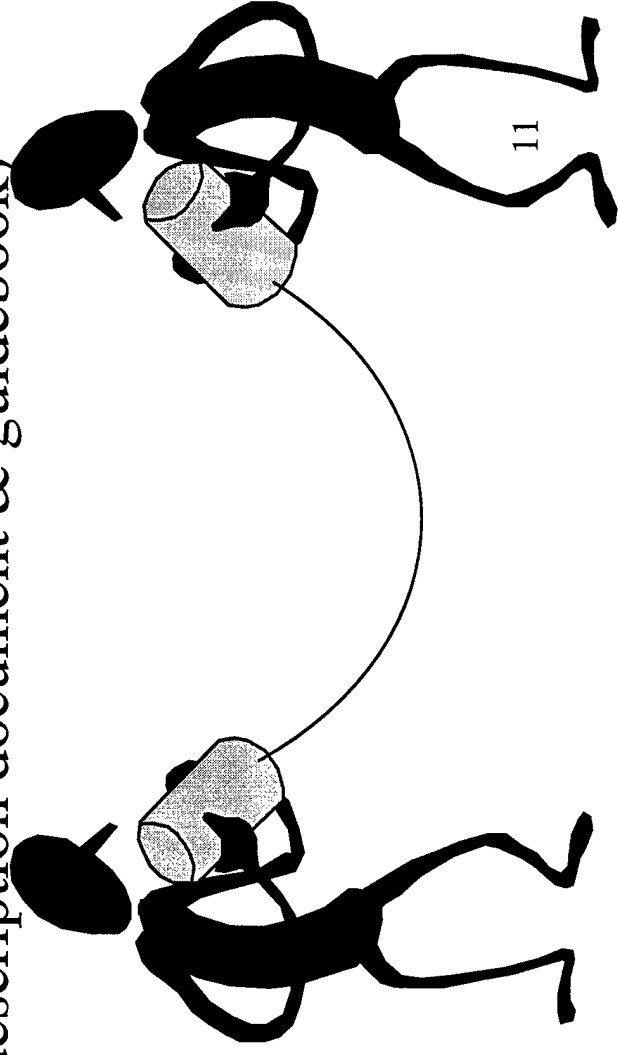
- Changes (e.g., requirements, schedule, funding, facility resources, etc.) during project execution often render initial estimates obsolete.
- Sizing techniques that worked best are: Analogy, Expert Judgement (i.e., Delphi Technique) and Decomposition
- Effort/schedule estimating techniques that worked best are:
Analogy, Decomposition and Expert Judgement
 - Suspect that parametric models did not produce better results due to lack of historical data to calibrate models

Developing a Process - Approach

- The working group developed a process framework that projects/organizations tailor to meet their need because “One size does not fit all” .
- The role and activities of each organization involved in developing an estimate was described in a deployment flowchart and companion description document.
 - Describes “what” needs to be done.
- An estimating guide was developed to specify the “how to” part of the process.
 - For the folks who will be developing estimates

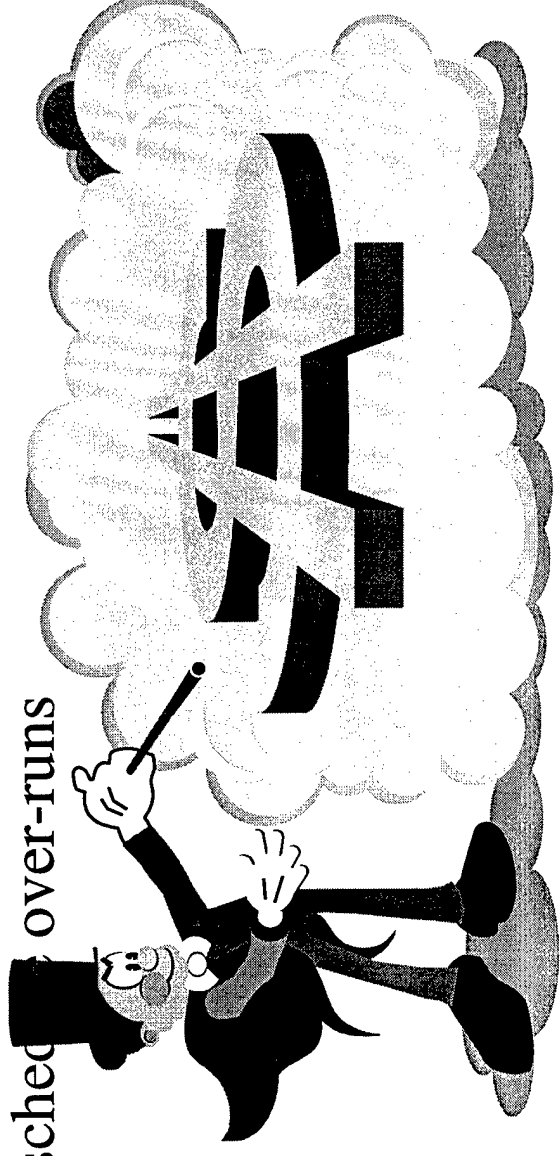
Developing a Process - Working Group Interaction

- Although English was everyone's primary language we had to learn each others "software" and "cost" dialects
 - Cost folk's experience was primarily with hardware
- Drawing pictures (i.e., process flowchart) and writing things down (process description document & guidebook) helped communication



Developing a Process - Expectation Control

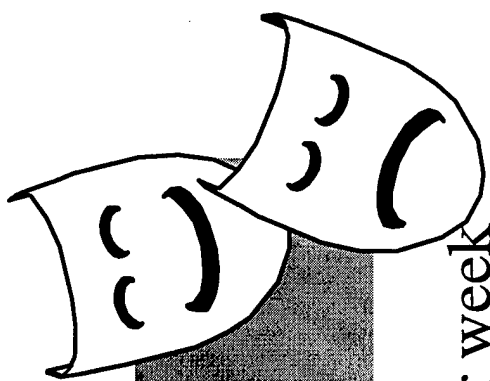
- Some managers understood that it would take literally years of collecting and analyzing actual data to gradually improve estimates
- However, other managers were seeking a Silver Bullet
- Improving software estimates is an evolutionary process
- Software estimate is only one of several contributors to cost and schedule over-runs





What's next? - Miles to go

- Develop training materials to implement the process
- Software estimating process needs to be tested
 - Pilot project with two independent estimating teams
- Provide training, tools and collect estimate vs. actual data to support the process
- Establish a measurement and analysis program to assess process performance and provide feedback for process improvement
- Integrate the software estimating process with on-going corporate Software Business Process Re-engineering initiatives (i.e., reach Software Engineering Institute Capability Maturity Model Level 5)

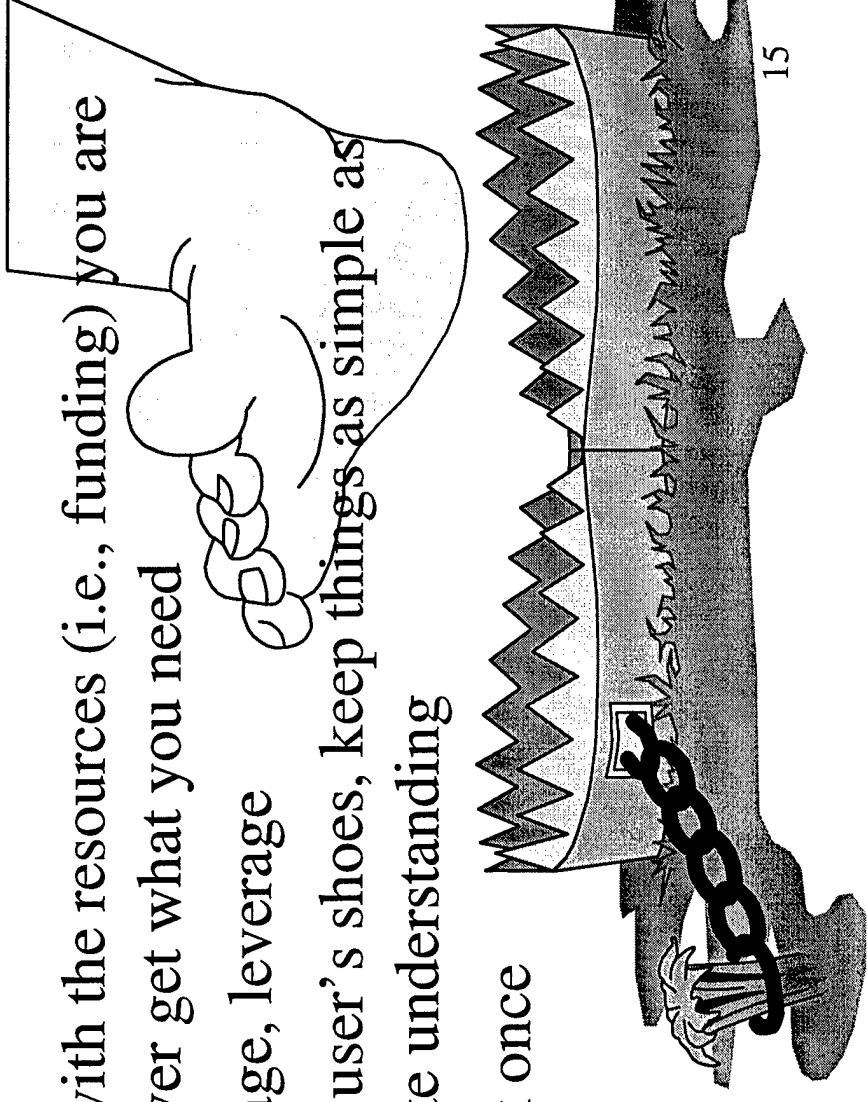


Lessons Learned

- Assign a staff with a dedicated number of hours per week authorized by management in writing. Do not assign as a collateral duty.
- Clearly define the scope and document your plan
 - Disseminate widely to manage expectations early
- If you do a survey, keep it short. Responses should not require a lot of “leg-work” or research
 - You can always follow-up for more info
 - Do surveys verbally, but give folks a heads-up
- Verify quality of materials/data sources before incorporating it into your plan

Lessons Learned

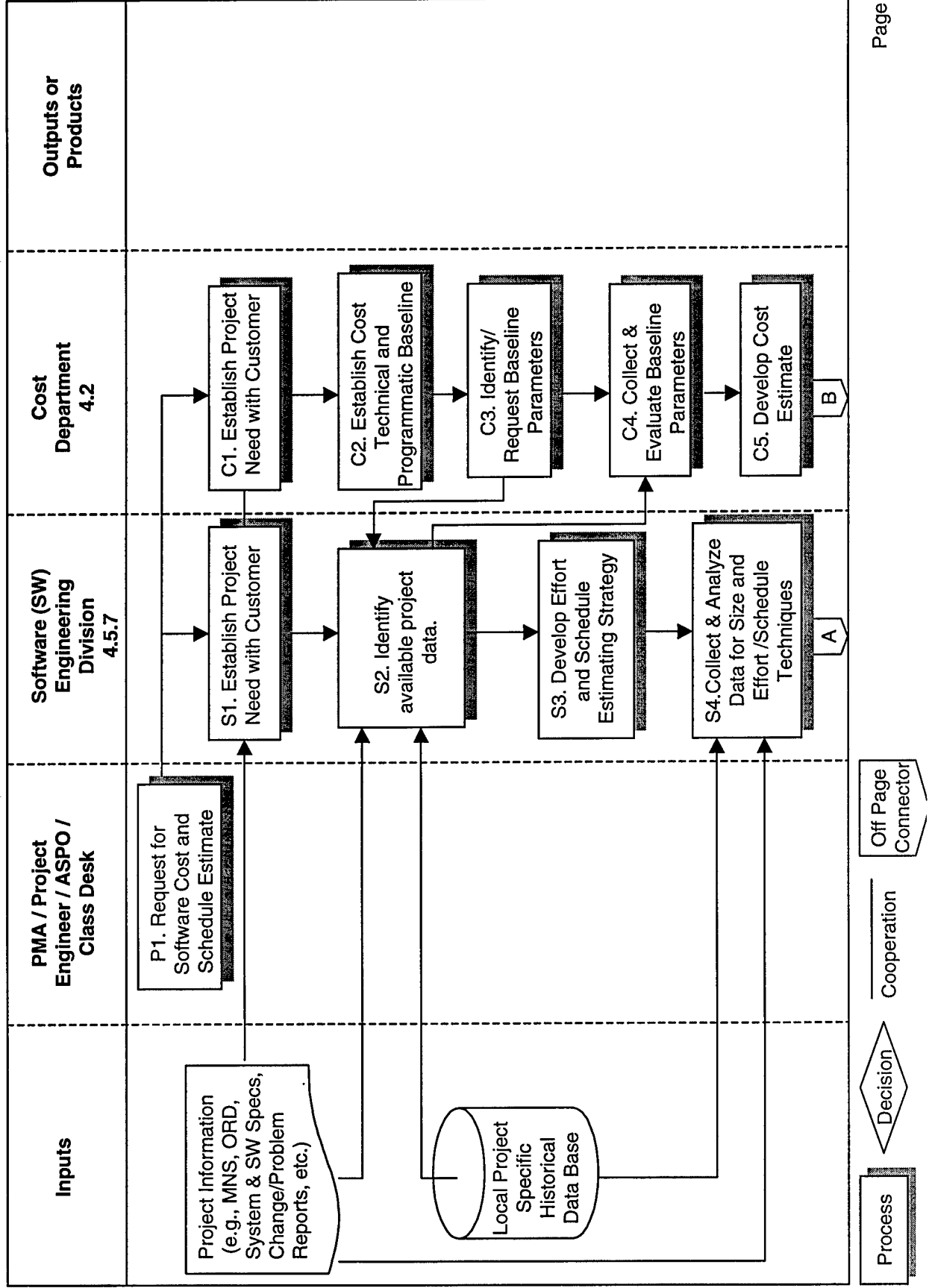
- The 20/80 percent rule is true (i.e., 20% of the people do 80% of the work)
- Do what you can with the resources (i.e., funding) you are given, you will never get what you need
 - leverage, leverage, leverage
- Put yourself in the user's shoes, keep things as simple as possible to facilitate understanding
- Think twice, speak once



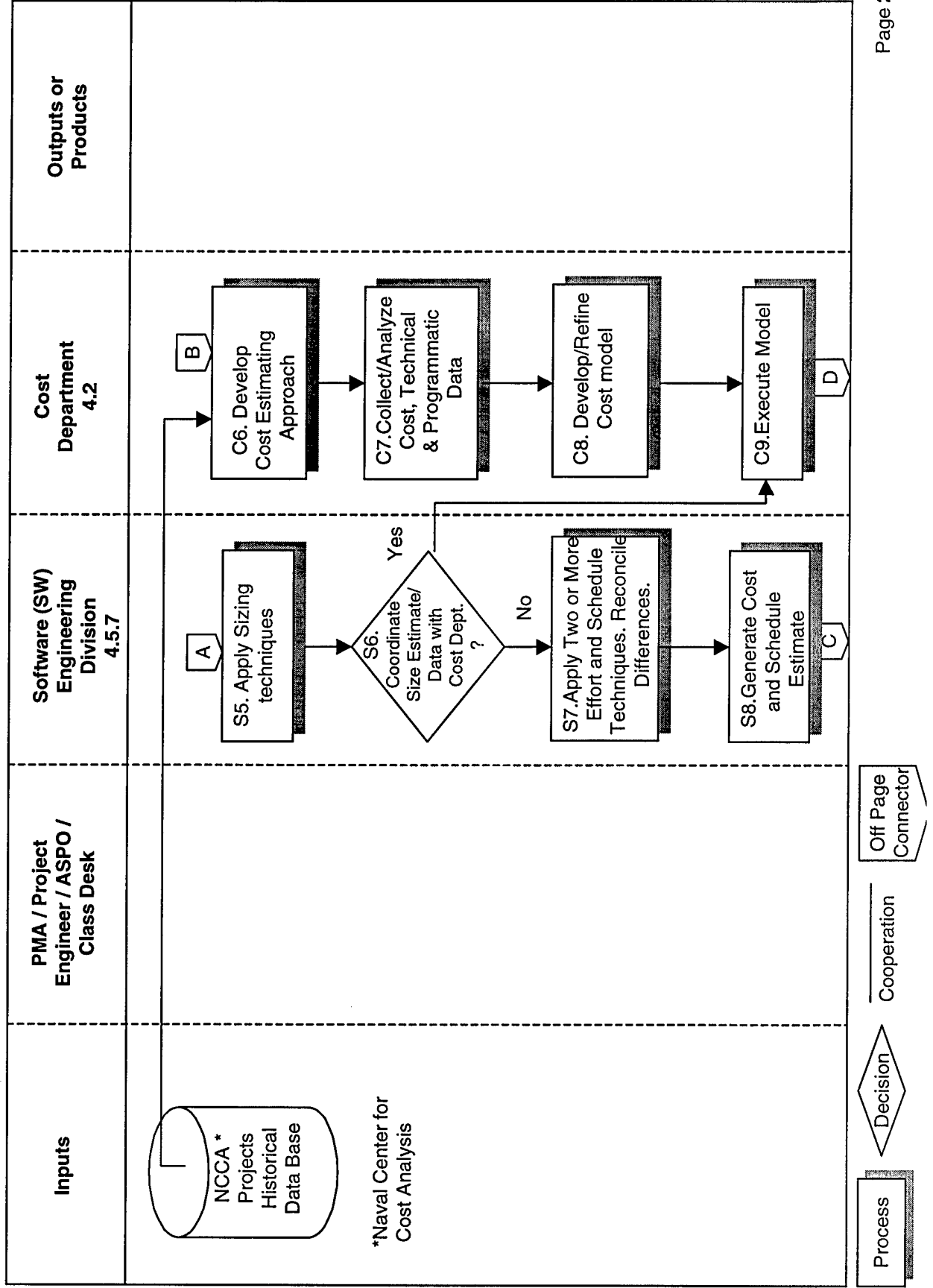
Back-Up Materials

Software Cost Estimating Process

Updated: 6/17/99



Software Cost Estimating Process



Software Cost Estimating Process

