

Ship Operating & Support Cost Estimating

PricewaterhouseCoopers' Capability & Experience

**Presented to OASN (RD&A) ARO
3 August 2001**

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PRICEWATERHOUSECOOPERS 

Agenda

- **About PricewaterhouseCoopers**
- **Our Understanding of Your Need**
- **Our Approach**
- **Examples**
- **Our Qualifications**

Who We Are



- More than 150 Years of Service to Clients
- World's Largest Professional Services Firm
- Over 155,000 Partners and Employees
- 867 offices in 152 Countries
- More than \$17 Billion in Annual Revenues
- Our clients come from all industries, from the automotive sector to entertainment companies to federal and state governments

Management Consulting Services

We are a leading global consultancy with 40,000 consultants, and as part of the world's largest professional service organization, we provide a full range of business advisory services

Motivated professionals

Our professionals bring with them world class training and skills, and work in empowered teams to make things happen with breadth and depth of experience

Integrated service offerings

The Management Consulting practice of PwC helps clients maximize their business performance through the seamless integration of strategy, process improvement and technology solutions

Long term relationships

Our clients are leading global, national and local organizations, and public institutions, including over 250 of the world's 500 largest companies

Industry expertise

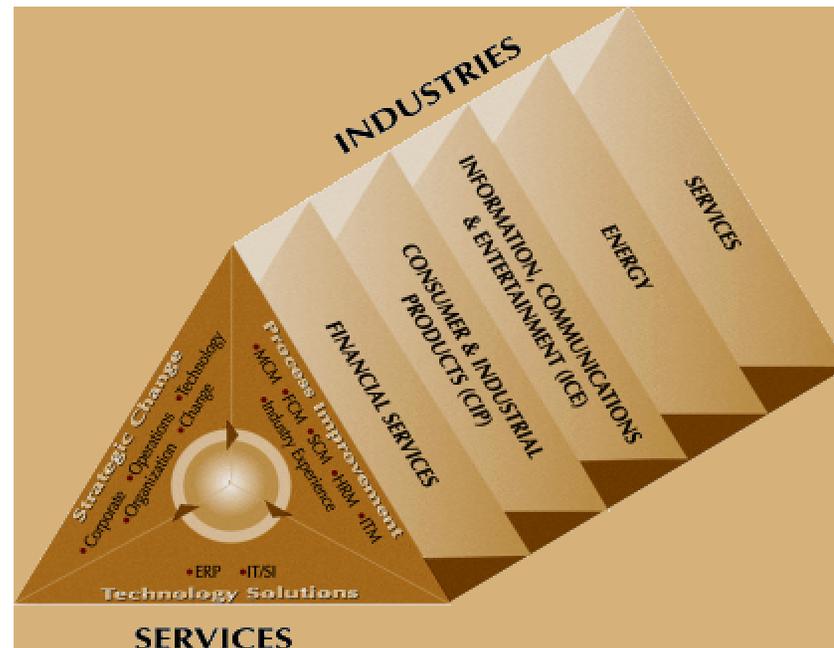
We have consultants with the in-depth knowledge of industry-specific issues, which combined with our integrated service offerings, provides the power to transform organizations

Our Service Offerings

We deliver seamless integration of strategy, process and technology services

Strategic Change

- Corporate Strategy
- Technology Strategy
- Organizational Strategy
- Operations Strategy
- Change Strategy



Technology Solutions

- Package Selection and Implementation
- Enterprise Resource Planning
- Information Technology
- Systems Integration
- E-Business Services
- Application / Process Outsourcing
- Data Warehousing & Decision Support systems

Process Improvement

- Market & Customer Management
- Supply Chain Management
- Financial & Cost Management
- Human Resources Management
- Information Technology Management

Industry Expertise

We have deep knowledge of the industry sectors, which coupled with our integrated service offerings, provides the unique capability to deliver leading edge solutions that are tailored to address industry-specific issues

Consumer and Industrial Products

- Automotive
- Consumer Packaged Goods
- Industrial Products
- Pharmaceuticals
- Retail & Distribution
- Technology
- Aerospace & Defense

Energy and Mining

- Upstream Oil & Gas
- Downstream Oil & Gas
- Petrochemicals & Chemicals
- Utilities
- Mining

Financial Services

- Banking
- Capital Markets
- Insurance
- Investment Companies
- Real Estate

Information, Communications and Entertainment

- Media
- Technology
- Telecommunications
- Entertainment

Services

- Education & Not-for-Profit
- Government
- Healthcare
- Engineering & Construction
- Hospitality
- Transportation

Our Understanding of PMs' Needs

- In addition to traditional cost analysis tools, PMs need to know:
 - Underlying Business Process Drivers
 - Underlying Technology Drivers
 - Underlying Policy Drivers

PMs Need Defensible Analyses

Our Basic Approach

➤ Identify Cost Drivers

- Fixed vs Variable
- Direct vs Indirect
- Different Costs for Different Purposes

➤ Identify Cost Factors

- Operating Tempo
- Maintenance Philosophy
- Budget
- Training

➤ Relate Cost Factors to Cost Drivers within Process and Policy Context

➤ Analyze

- Ad Hoc
- Modeling & Simulation Tools

Examples of PwC O&S Cost Estimating Projects

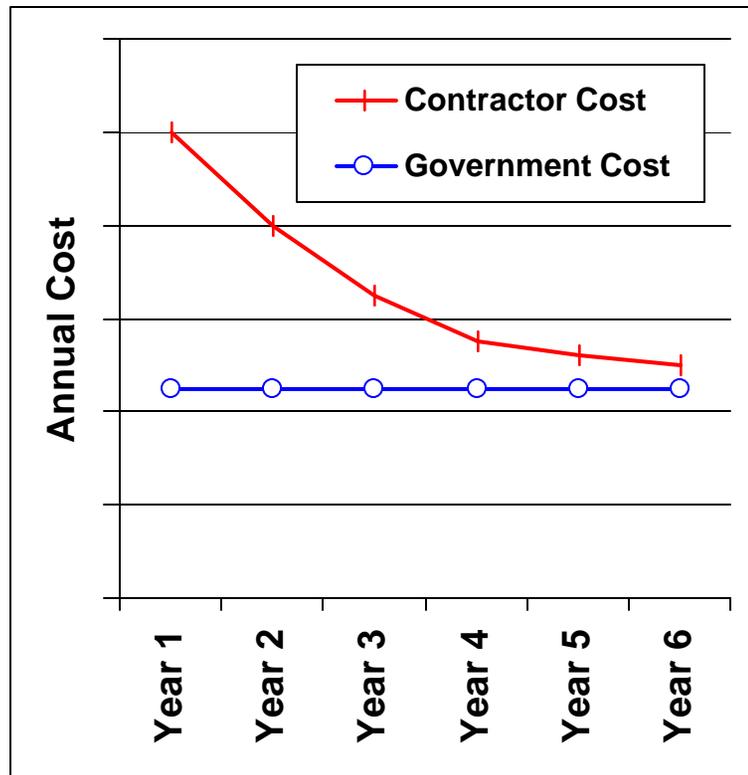
- B-2 System Support Manager
- Public and Commercial Shipyard Costs
- Visibility and Management of Operating and Support Costs (VAMOSOC)
- BPR support to NAVAIR 6.0

Cost Analysis Support for B-2 System Support Manager

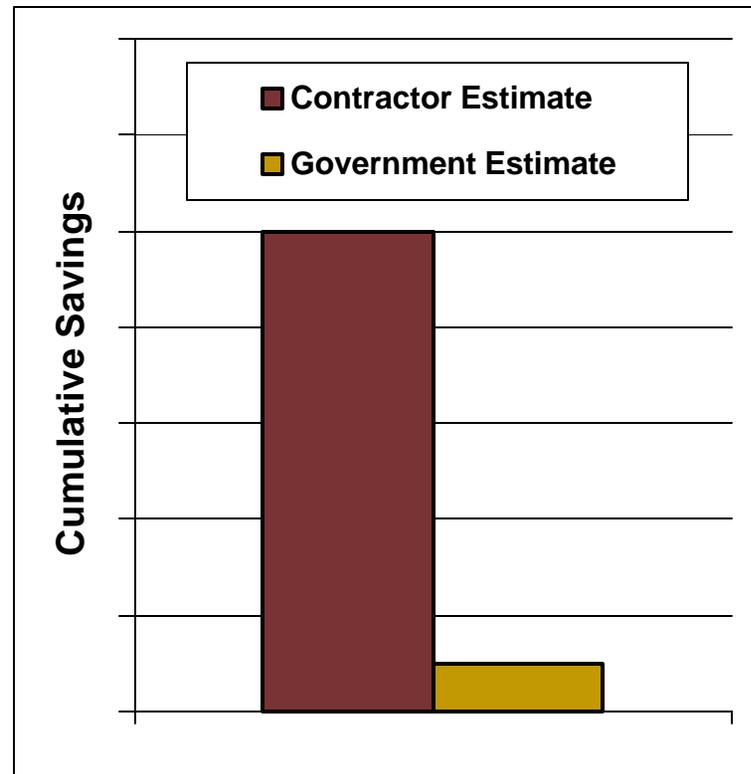
- Cost of ownership and total ownership cost (TOC) analysis
- “Cost of Stealth” and F-117/F-22 comparative analyses
- LO maintenance by enlisted versus contractor personnel
- Programmed depot maintenance (PDM) alternatives study
- Analysis of PDM reduction in TOC sharing
- Operations and maintenance simulation
- TOC of LO material/process improvements
- Assessment of deployable shelter requirements
- Commercial small fleet support benchmarking
- Overhead allocation at Birk Flight Test Facility

Business Case Analysis

Assessing Contractor Estimates



Example 1:
Comparison of Costs



Example 2:
Comparison of Estimates

Cost Comparisons

Reasons For Cost Growth

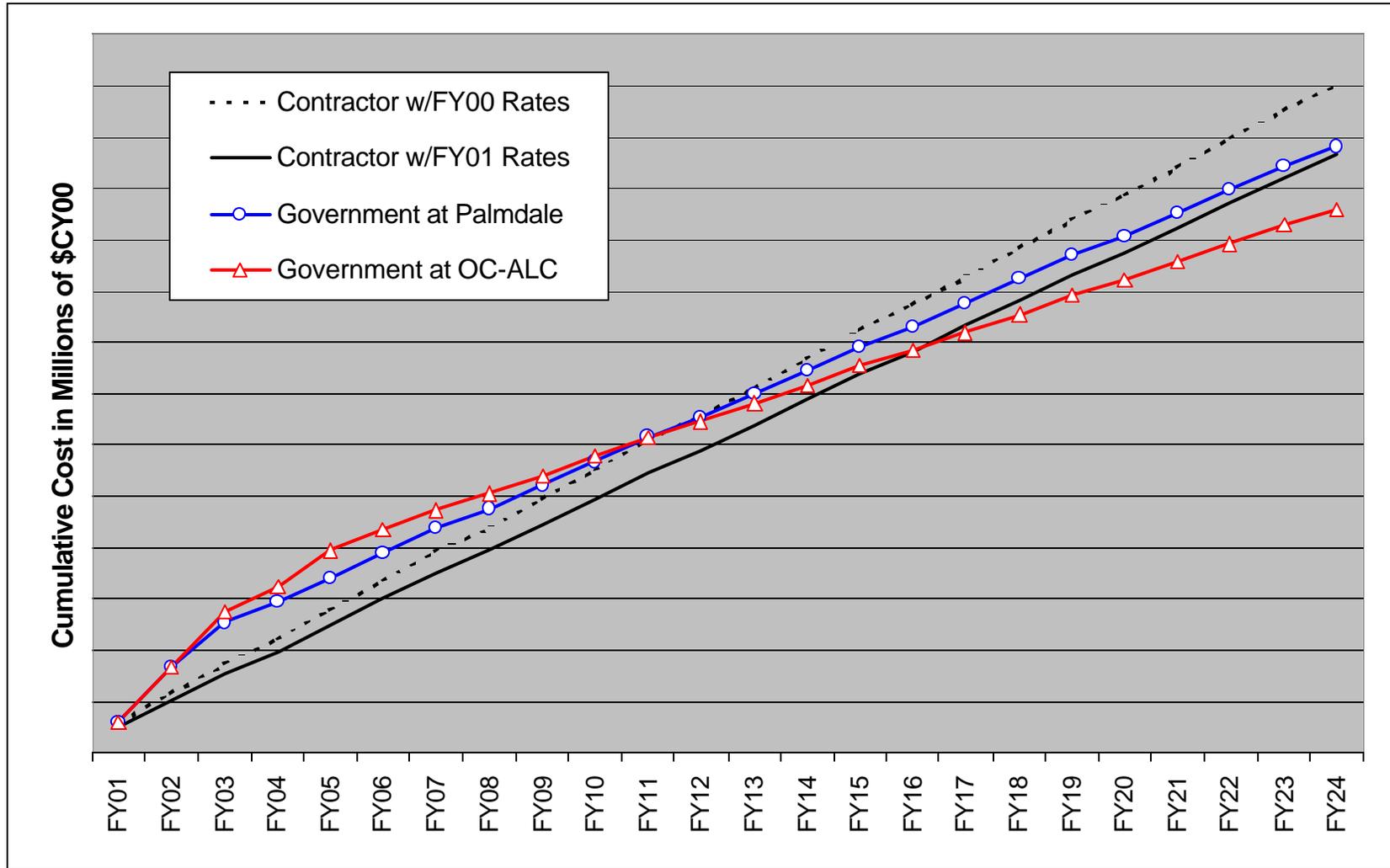
Cost Element	% of Delta	Explanation
Labor Rate	30.7%	Off-site rate not realized
Shifted Indirects	11.5%	Contractor accounting change
Other Direct Support	4.7%	Contractor increases
Surface Restoration	0.8%	Work content changes
Over and Above	2.0%	Updated estimating factor
Inspection Program	0.7%	Added Government Reqts
Negotiated Maintenance	7.8%	Added Government Reqts
Security and Fire	11.3%	Omission and Added Reqts
Engineering Design and Test	15.5%	Omission
Product Support	15.0%	Omission

Notes:

- Figures are contributions by element to unit cost growth from 1994 study to 1999 contractor proposal
- Includes increases due to baseline surface restoration, over-and-above, inspections, and negotiated maint
- Does not include changes due to fuel, surcharges, and material costs

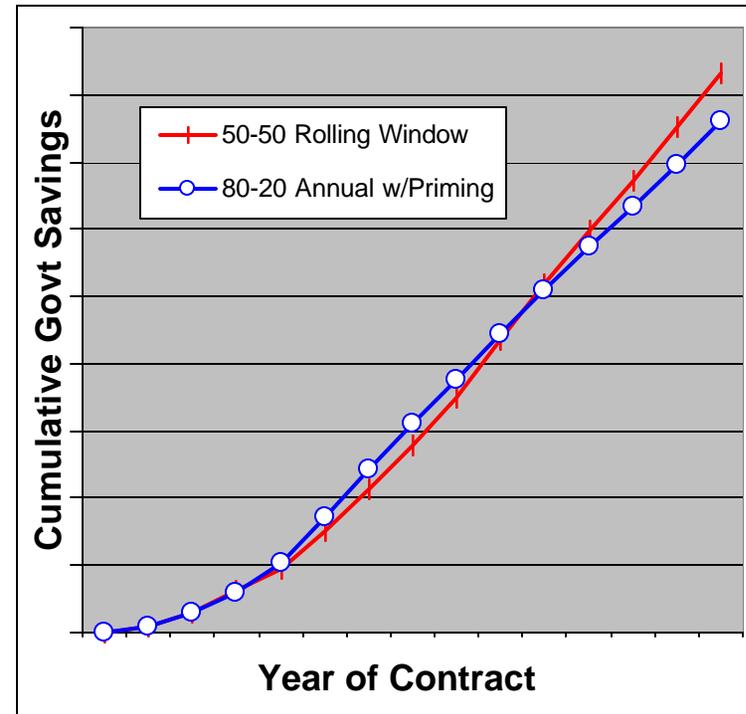
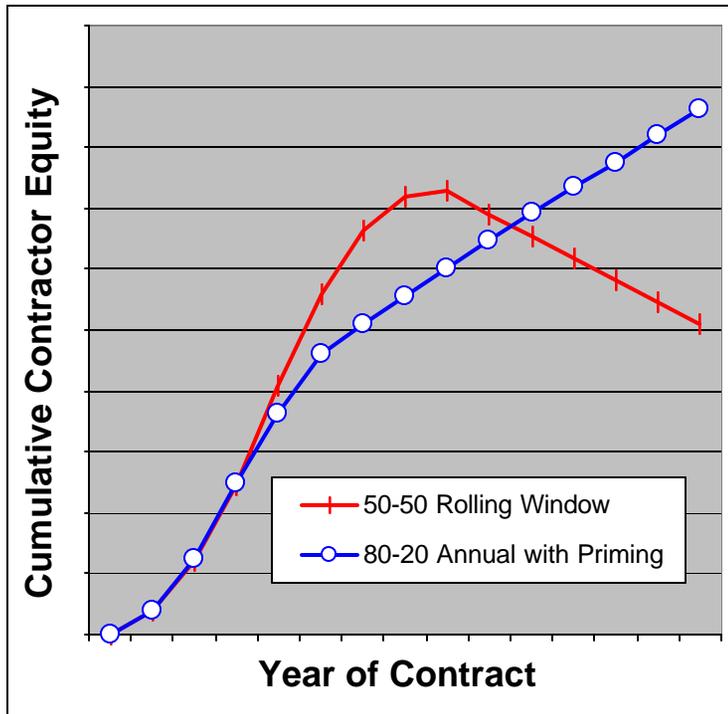
Business Case Analysis

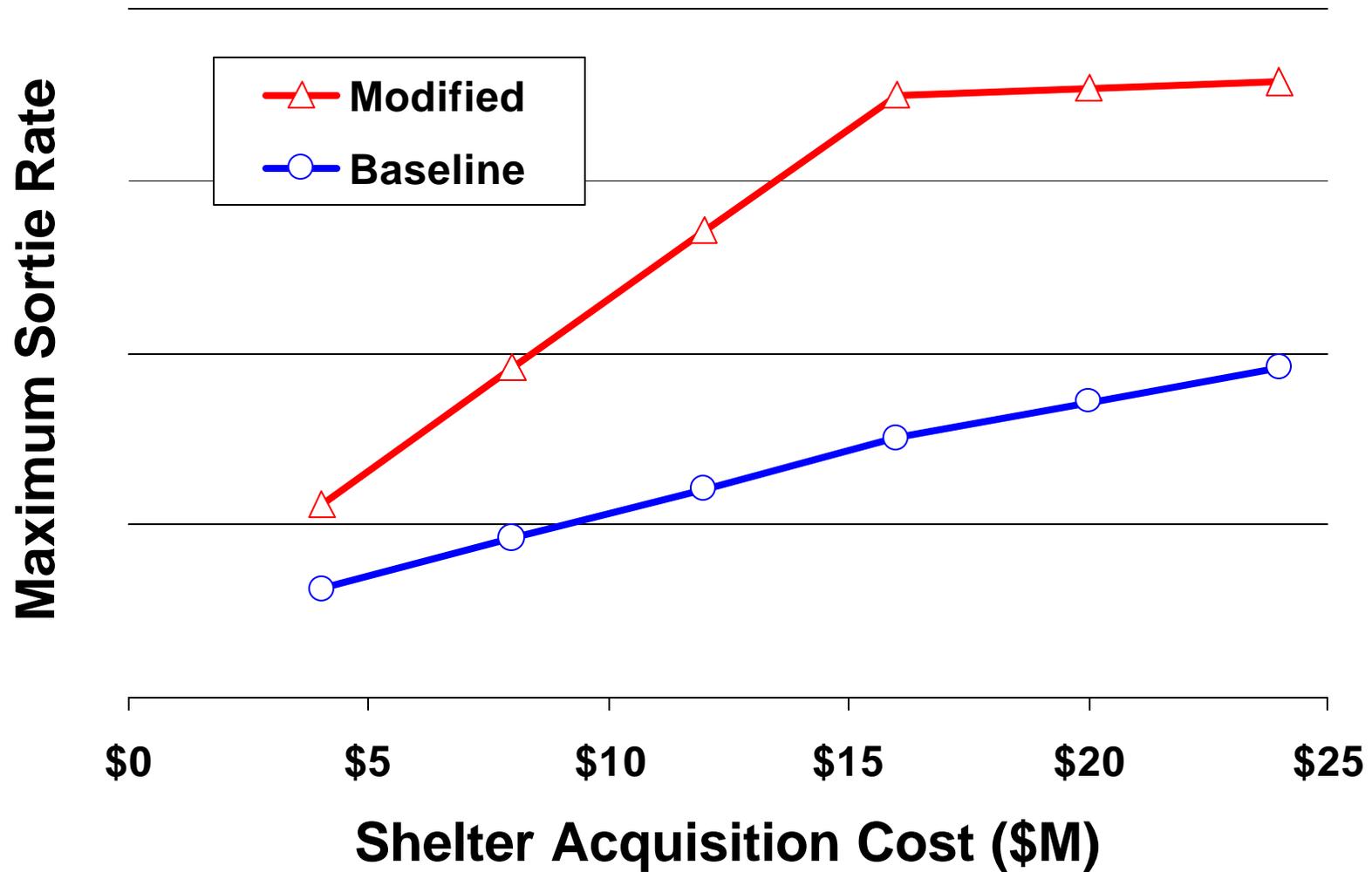
Source of Repair Alternatives

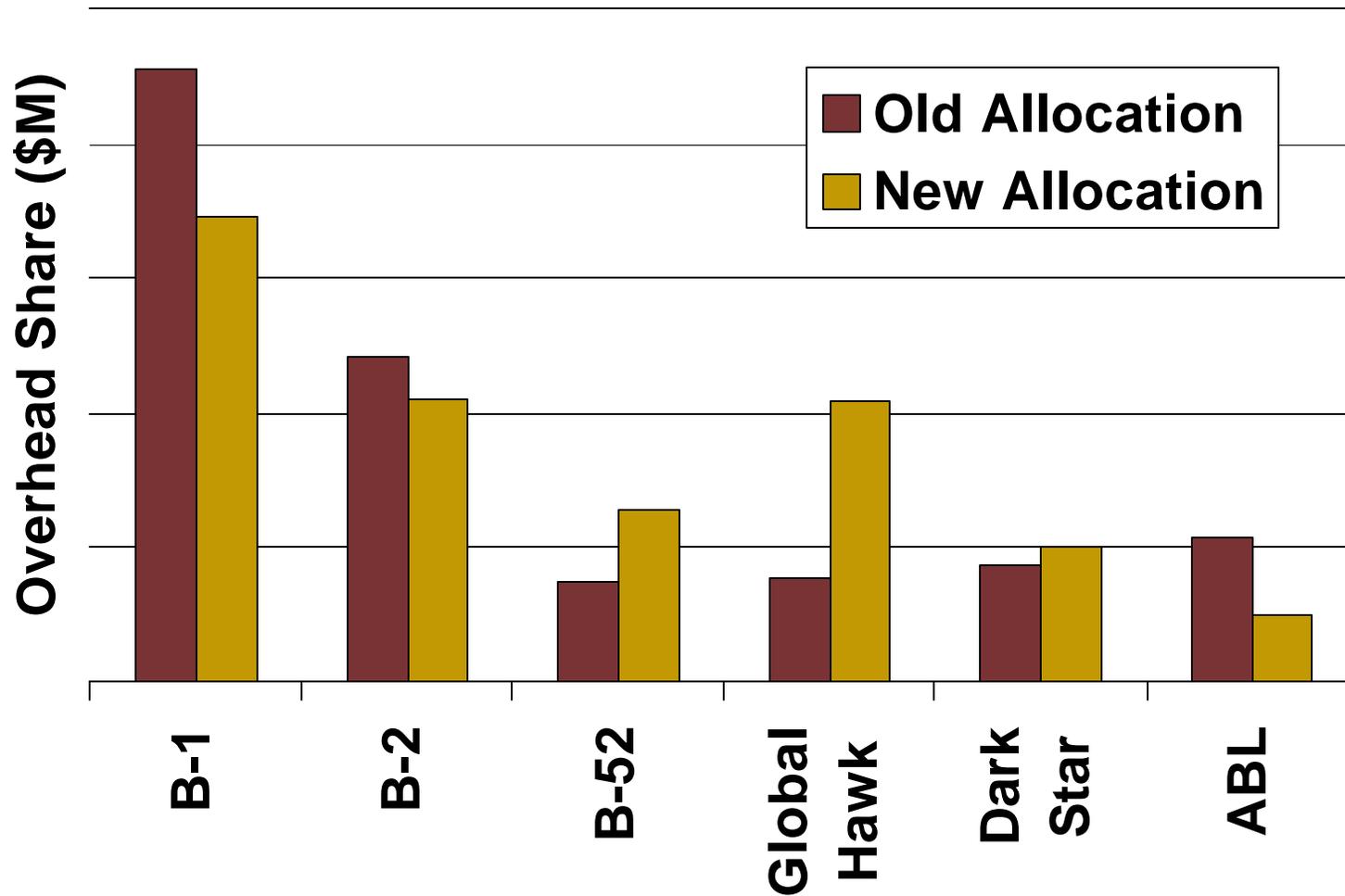


Business Case Analysis

Developing a Contracting Strategy



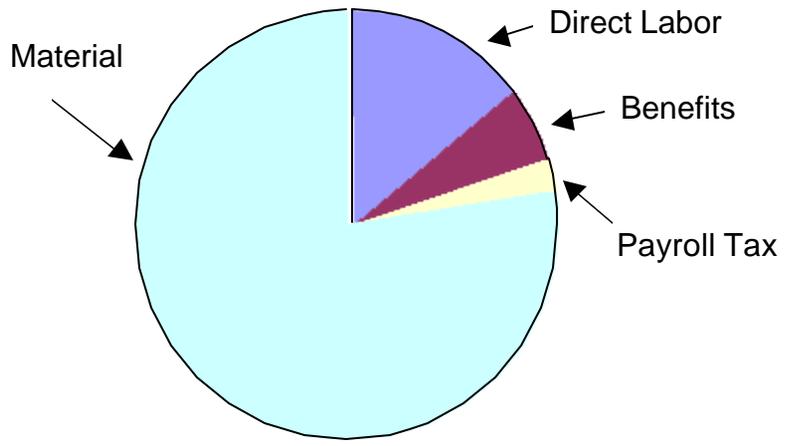
*Modeling and Simulation***RAINMAN - Shelter Study Results**

*Overhead Allocation Study***Flight Test Center Customer Charges**

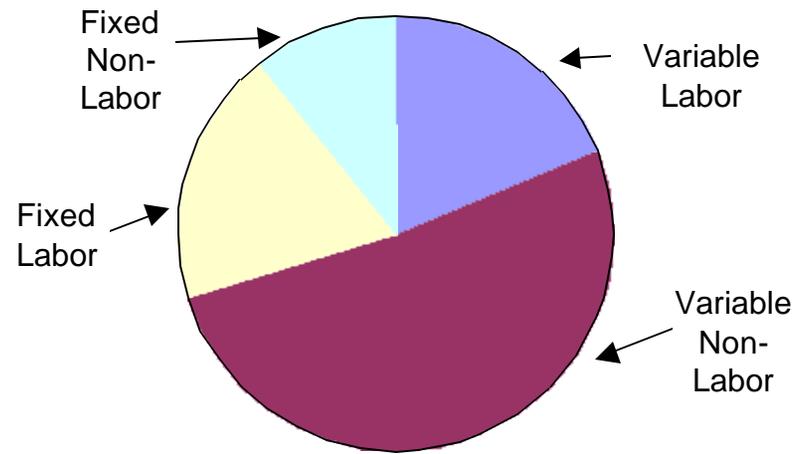
Cost Analyses for Public and Commercial Shipyards

- Developed Cost, Productivity, and Revenue Model for Commercial Shipyard
- Developed Outsourcing Decision Model for SSN Depot Maintenance Work
- Estimated Costs Associated with Ship Maintenance at Public Shipyards

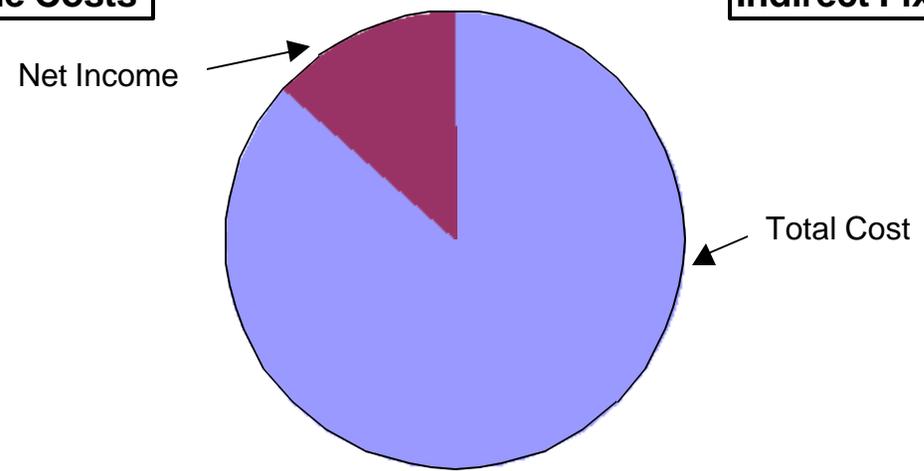
Commercial Shipyard Financial Analysis



Direct Variable Costs



Indirect Fixed and Variable Costs



Operating Phase Net Income

Detailed Information Purposely Removed

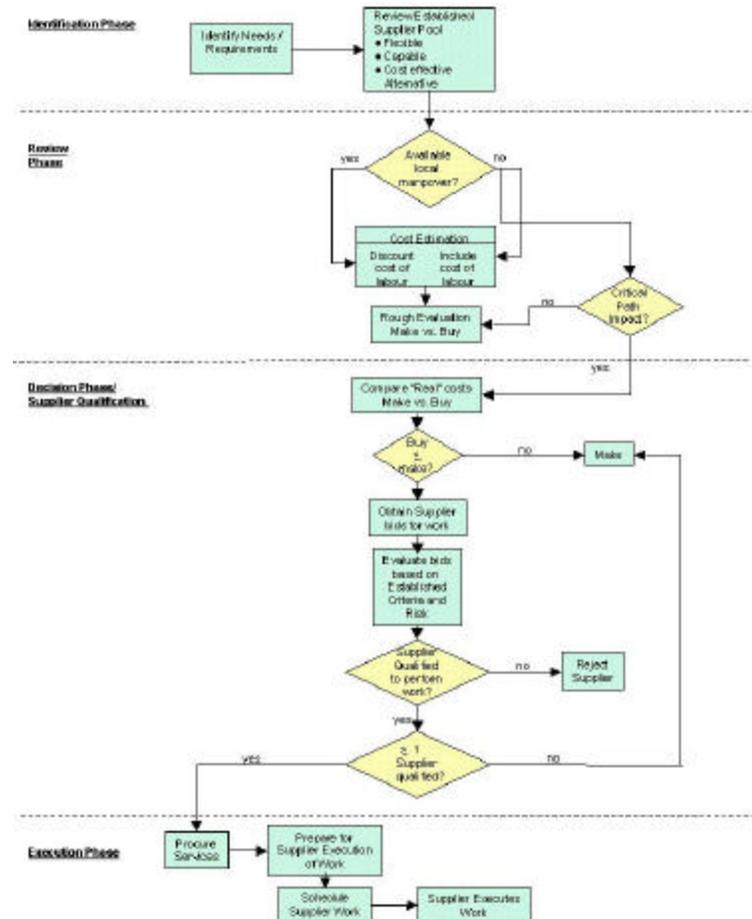
SSN Tank Maintenance - Outsourcing Decision Model

Critical Factors in Outsourcing:

- Supplier Quality
- Internal Dedicated Support
- Risk Management Plans
- Contingency Plans
- Assessing Additional Costs

Contractor Evaluation:

- Evaluate contractors based on past performance on comparable Shipyard work.



SSN Tank Maintenance - Outsourcing Decision Model

Additional Costs:

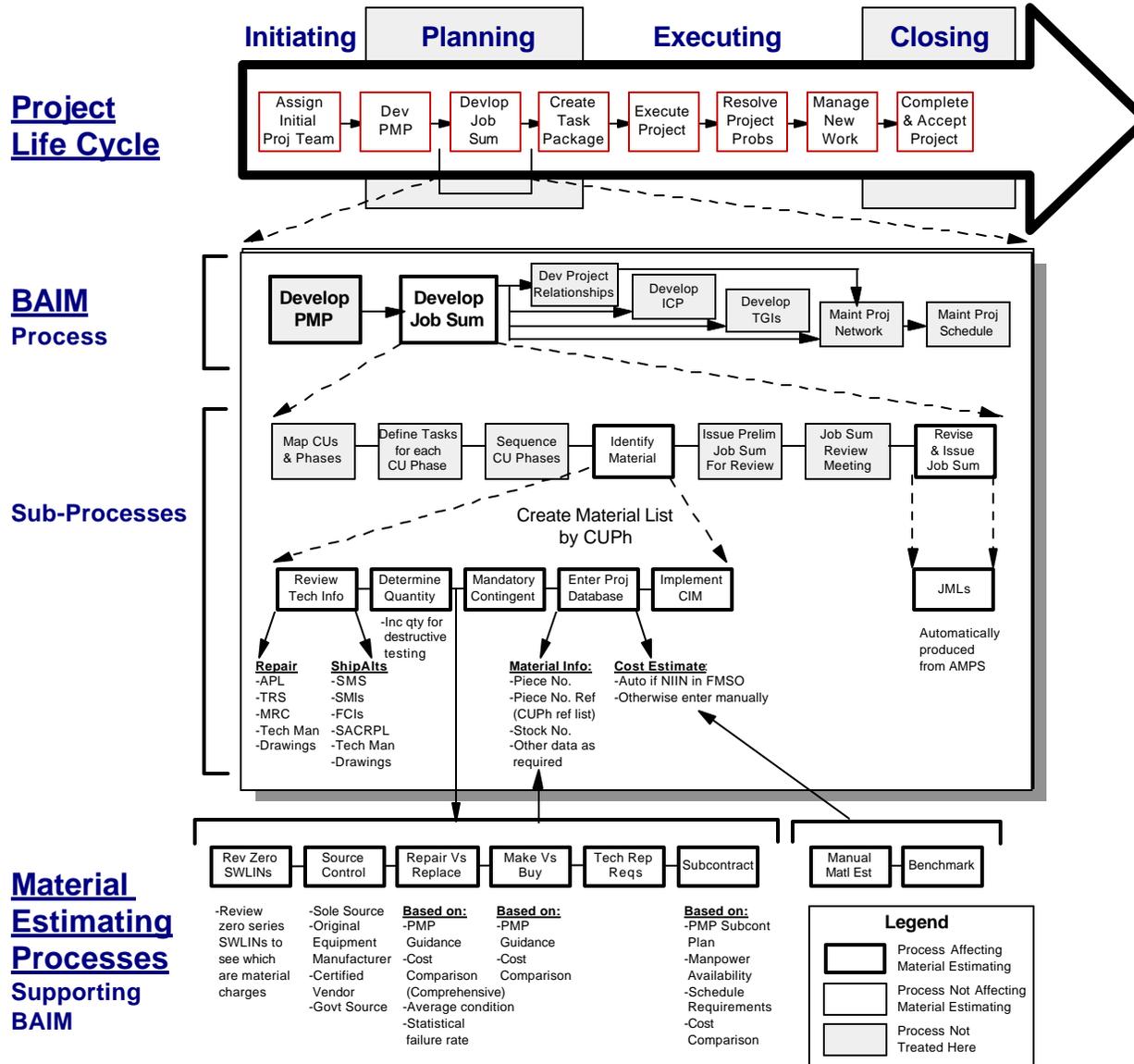
- **Major Risks & Impact on Critical Path Work**
- **Work Disruption to Critical Path Work**
- **Support Equipment to complete Work**
- **Resources**
 - Direct Cost of Labor
 - Opportunity Costs - Other Shipyard Work
- **Materials**
- **Costs: Large Overhead + Direct Cost of Schedule Delays**

SSN Tank Maintenance - Outsourcing Decision Model

S

- **Estimated Manpower Shortfall**
- **Supplemental Contract Labor Required**

Public Shipyard Material Cost Estimating



Navy VAMOSC

- Performed Independent Verification and Validation (IV&V) of the Visibility and Management of Operating and Support Cost (VAMOSC) System from March 1999 to February 2000.
 - Verify cost-data-production processes
 - Compare PwC's independently determined values to VAMOSC
- Managing Operating and Support of VAMOSC System since June 2000.
 - Collecting and processing all ship, shipboard system, aircraft, and USMC ground equipment cost data
 - Implementing improvement plans based on IV&V results and customer feedback.

PwC Consultants are VAMOSC Subject Matter Experts

Other PwC Qualifications

Total Ownership Cost for Avondale Industries, LPD-17 Program Dec 97 to Apr 98

Requirement: The client required guidance and cost model development during the detailed design phase of the LPD-17, an amphibious assault ship.

Solution: PwC developed a conceptual approach for maturing LPD-17 TOC models and giving Avondale's engineers the tools needed to account for TOC during the design phase. PwC developed a TOC roadmap and PC-based tool for assessing TOC initiatives.

Total Ownership Cost for B-2 Jan 98 to Present

Requirement: The B-2 client needed to adopt the evolving Air Force Reduction in Total Ownership Cost (R-TOC) methodology and apply it to the B-2.

Solution: PwC developed detailed processes to implement the evolving Air Force policy on Total Ownership Cost monitoring and management. PwC reviewed the results of Air Force R-TOC pilot programs to identify best practices and developed and implemented an executable R-TOC methodology tailored to the client's needs. PwC developed the *Total Ownership Cost Reduction Information Management System (TOCRIMS)* which enables automated development of cost requirements documentation, tracking of those requirements through the budget process, and generation of analyses and reports in various TOC and COO formats. PwC used life cycle cost methodology to study various worksite and workforce alternatives for B-2 programmed depot maintenance (PDM).

PwC Cost Estimating Team

Albert T. Leung

Having worked as a civilian in the Office of the Secretary of Defense for Program Analysis and Evaluation, and the Office of the Assistant Secretary of the Navy for Financial Management, Mr. Leung has extensive knowledge in the complex operations of the U.S. Department of Defense and the inner-workings of the government. Mr. Leung has successfully led a number of issue teams and working groups in support of program reviews and process improvement efforts. While on the OSD PA&E staff Mr. Leung was the Cost Analysis Improvement Group's (CAIG) subject matter expert in the Total Ownership Cost initiative, and weapons systems operations and support costs. His practical experience ranges from weapons systems cost analysis, to the Congressionally mandated Quadrennial Defense Review, and most recently, to the Navy's Visibility and Management of Operating and Support Costs (VAMOSOC) program.

M.S., Engineering Mechanics, Virginia Polytechnic Institute and State University, 1993.

B.S., Engineering Science and Mechanics; Minor, Mathematics, Virginia Polytechnic Institute and State University, 1992.

Michael E. Dwyer

Mr. Dwyer has experience in weapon system acquisition and support. Mr. Dwyer has managed a variety of projects for U.S. Air Force and U.S. Navy clients. His areas of expertise include cost analysis, aircraft sustainment and logistics, modeling and simulation, and aircraft propulsion systems. Mr. Dwyer has also conducted research and written technical papers related to aircraft performance modeling, optimal control, and flight mechanics.

M.S., Aerospace Engineering, Virginia Polytechnic Institute and State University, 1993.

B.S., Aerospace and Ocean Engineering, Virginia Polytechnic Institute and State University, 1986.

PwC Cost Estimating Team

William J. Swahl

Mr. Swahl is Director of the shipyard practice at PricewaterhouseCoopers based in Fairfax, VA. His thirty-four year career in the maritime industry has extended from initial training as a coppersmith apprentice to senior executive shipyard positions. His excellent managerial track record includes commendations from clients and previous employers for instilling a “can do” professional attitude in staff and co-workers, and citations for maintaining the highest standards of workmanship, along with under-budget, on-time performance on commercial and Navy contracts. Mr. Swahl's last industry position was Vice President and General Manager of an East Coast ship repair company with divisions from New York to Georgia.

For 11 years Mr. Swahl has provided advisory services in the areas of operations management, project management, shop floor control, team building, strategic planning, change management, organizational restructuring, contract management, bid preparation, and naval shipyard reuse (privatization). He has served numerous government clients including the Secretary of the Navy, the Naval Sea Systems Command, the city of Philadelphia, the Philadelphia Shipyard Development Corporation, and the government of Latvia. His private sector clients include Meyer Werft (Germany), Vancouver Shipyard (Canada), General Dynamics, Newport News Shipbuilding, Phillyship, and Southwest Marine. He has contributed to books and articles on shipyard management.

Business Administration, Widener University, Chester PA.

Management Development Program, Sun Company.

Labor Relations, Management Effectiveness, Human Relations, Sun Institute

Coppersmith Certification, four-year apprenticeship program.

PwC Cost Estimating Team

Erik L. Burgess

Mr. Burgess has extensive experience in providing technical consulting and engineering support to defense, intelligence community, and other government clients. His areas of expertise are cost/benefit analysis, requirements development and management, risk modeling, statistical analysis of schedule and cost, system acquisition and source selection, and system integration for military and reconnaissance satellites, launch vehicles, and logistics processes.

M.S., Mechanical Engineering, Massachusetts Institute of Technology, 1991.

B.S., Mechanical Engineering, Massachusetts Institute of Technology, 1991.

Intermediate Systems Acquisition, Defense Systems Management College, 1998.

Todd R. Foust

Mr. Foust has provided defense and utility clients with a broad range of cost-benefit analysis and business process redesign services, including ship and ship system cost estimating using the Navy's Visibility and Management of Operating and Support Costs (VAMOSOC) system. Mr. Foust was an officer in the U.S. Navy's nuclear submarine force for five years.

M.B.A., Strategy and Operations Management, School of Management, Yale University, 1998.

B.S., Marine Engineering, Maine Maritime Academy, 1989.

PwC Cost Estimating Team

Anne M. Woods

Ms. Woods has more than 16 years of experience in engineering and project management with U.S. Department of Defense contractors. She has served the B-2 Advanced Technology Bomber, System Support Division at Tinker Air Force Base in various business process reengineering projects in support of depot activation. Ms. Woods has project management experience with production of military aircraft, and a strong background in engineering that includes avionics, engines, flight test, low observables, weapons systems, and wind tunnel test experience. Her areas of expertise include business process reengineering, benchmarking, maintenance management, logistics, and simulation and modeling.

B.A.E., Bachelor's of Aerospace Engineering, Georgia Institute of Technology, 1983.

Cheryl A. Dalby

Ms. Dalby has supported a variety of projects involving performance improvement, financial services, cost analysis, and requirements definition and design for custom system development for U.S. Air Force clients.

B.S., Accounting, University of Central Oklahoma, 1989.

A. S., Medical Technology, Northern Oklahoma Jr. College, 1978.