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# Parametric Cost Estimating

## a Joint Industry / Government Initiative

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*Expanding Parametric Cost Estimating*

*Marty Deutsch*

*Lockheed Martin Astronautics*

*9-10 Sept. 1997*

A decorative graphic at the bottom of the slide consists of a blue grid pattern. The grid lines are more densely packed on the left side and become more widely spaced as they move towards the right, creating a perspective effect that suggests depth and expansion.

# Initiative Overview

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Parametric Practitioners Met in Feb. 1994

- ▶ Establish an Initiative to Study Ways to Expand the Use of Parametrics
- ▶ Limited Use of Complex Parametric Cost Models to Prepare Proposals Submitted to the Government for Contracts
- ▶ Most Proposals Are Based on Very Detailed, Voluminous Data

# Initiative Overview

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- ▶ Sometimes This Detailed Data Is Based on Unsupported Engineering Estimates
- ▶ Parametric Cost Models, Based on Verifiable Historical Data, Can Be Used to:
  - Produce Better Estimates
  - With Reduced Cycle Times
  - At Lower Cost

The Purpose of This Initiative Is to Pursue These Opportunities!

# Accomplishments to Date

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- Formed Joint Industry/Government PEI Executive Steering Committee and Working Group
- Conducted PEI Planning Workshop to Develop Action Plan ( Apr'94 )
- Developed & Distributed Parametric Cost Estimating Handbook ; Available on the World-Wide-Web ( Oct'95 )
- Developed & Provided Briefings to Acquisition Executives and Workforce on Parametric Estimating Opportunities
- Issued Bimonthly Parametric Newsletter to Communicate and Share Lessons Learned
- Established Reinvention Laboratory to Test Expanded Use of Parametrics; 13 Contractors Participating

# Accomplishments to Date

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- Promoted and Stated PEI at Professional Estimating Conferences
  - Society of Cost Estimating and Analysis ( SCEA )
  - International Society of Parametric Analysts ( ISPA )
  - Space Systems Cost Analysis Group ( SSCAG )
- Provided Introductory Parametric Estimating Training to Lab Sites
- Conducted October 1996 Workshop to Present Lab Site Results
- Obtained DoD Endorsement Letters (DOD, USAF, DCMC, DCAA)
- Recommended Formal Training Requirements to Defense Acquisition University ( Apr'97 )
- Developed SOW & Issued RFP for Second Edition of Handbook
- Provided FAR Part 15 Rewrite Comments ( include Parametrics )

# Reinvention Laboratory

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- In July 1995, the Director, Defense Contract Audit Agency (DCAA) and Commander, Defense Contract Management Command (DCMC) sponsored a Reinvention Laboratory to Test the Expanded Use of Parametric Estimating.
- The Primary Objectives of the Lab Are to:
  - Achieve Recognition of Parametric Cost Estimating As an Acceptable Estimating Technique
  - Expand the Use of Parametric Estimating Techniques on Proposals Submitted to the Government
  - Provide Real-Time Feedback and Recommendations
  - Teams Use IPT Concepts to Evaluate Parametric Tools

# Reinvention Laboratory Participants

## Pilot Sites

Boeing (Seattle, WA)  
Boeing North American (Downey, CA)  
GE Aircraft Engines (Evendale, OH)  
Lockheed Martin (Denver, CO)  
Lockheed Martin (Orlando, FL)  
Lockheed Martin (Ft. Worth, TX)  
McDonnell Douglas (St. Louis, MO)  
McDonnell Douglas (Mesa, AZ)  
Motorola (Scottsdale, AZ)  
Northrop Grumman (Baltimore, MD)  
Northrop Grumman (Rolling Meadows, IL)  
Raytheon ECI Division (St. Petersburg, FL)  
Raytheon HRB Systems (State College, PA)

## Working Group

Air Force

Army

Navy

NASA

DCAA

DCMC

DSMC

Industry

# Working Group Members

- Carole Adams (Air Force Institute of Technology)
- Ronald Brandstetter (GE Aircraft Engines)
- Dean Boyle (DCMC Northrop Grumman)
- **Jim Collins (Northrop Grumman ESSD)**
- Gary Constantine (Raytheon E-Systems)
- Karen Davies (DCAA)
- Marty Deutsch (Lockheed Martin Astronautics)
- **David Eck (DCAA Headquarters)**
- Mel Eisman (RAND Corporation)
- Jim Gleason (US Army Materiel Command)

*\* Co-Chairs of Working Group*

- Virgil Hertling (US Air Force Headquarters)
- Joe LeCren (NASA Headquarters)
- Paul Lubell (Northrop Grumman ESSD)
- John Matherne (Army Logistics Management College)
- Don Reiter (DCMC Headquarters)
- Bernie Rudwick (Defense Systems Management College)
- Lester Richmond (Lockheed Martin Tactical Aircraft Systems)
- Marcia Rutledge (Space & Naval Systems Command)
- George Salantai (McDonnell Douglas Aerospace)
- LCDR Jack Stem (Naval Air Systems Cmd)

# Executive Steering Committee Members

- Elliott Branch
  - Department of the Navy
- Scott Carson
  - Boeing Defense & Space Group
- John Falconi
  - GE Aircraft Engines
- Joe Fowler
  - Lockheed Martin Tactical Aircraft Systems
- Richard Janda
  - Lockheed Martin Astronautics
- Tom Luedtke
  - NASA
- Brig. General Timothy Malishenko
  - Department of the Air Force

- Colonel Elton D. Minney
  - Department of the Army
- Richard Pemble
  - Raytheon E-Systems, ECI Division
- Robert Spiker
  - Northrop Grumman ESSD
- Michael Thibault
  - Defense Contract Audit Agency
- Gary Thurber
  - Defense Contract Mgmt Command
- Rick Weis
  - McDonnell Douglas Aerospace
- Chris York
  - McDonnell Douglas Helicopters

# Fall 1996 Workshop

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- Held October 16-17 at DLA HQ Complex, Ft. Belvoir, VA
- Over 240 in Attendance
  - All Major Buying Activities, DCAA, DCMC and Many of the Top DoD Contractors
  - Senior Executives from all 3 Services and NASA, DCAA, DCMC, and the Director of Defense Procurement all Voiced Strong Support for the Initiative
- Reinvention Lab Site Presentations on Tools Tested
- Attendee Feedback Very Favorable
- Workshop Results Documented and Publicized in December 1996 Newsletter

# Fall 1996 Workshop

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- Reinvention Lab Site Presentations Focused On:
  - Description of the Parametric Tools Tested
  - Type of Proposals Techniques Being Tested On
  - Calibration / Validation Processes Performed to Date
  - Anticipated Benefits including Customer Satisfaction, Reductions in Proposal Preparation Costs and Reductions in Proposal Preparation Cycle Time
  - Early Lessons Learned
- Presentations Showed Many Opportunities to Improve the Estimating Processes by Expanding the Use of Parametrics



# Anticipated Benefits

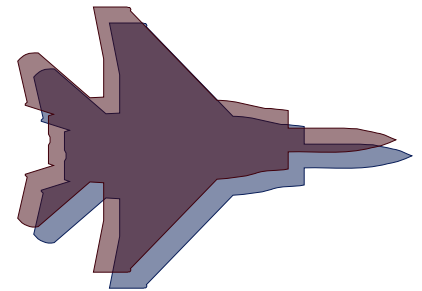
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- Lab Sites Report the Following Opportunities:
  - Enhanced Customer Satisfaction (Cost Estimates Supported by Verifiable Data)
  - More Reliable Estimates (Increased Use of Historical Data)
  - Potential 25 - 60% Reduction in Proposal Preparation Costs (DoD Spends Over \$1 Billion in B&P Costs Annually)
  - Potential 25 - 60% Reduction in Proposal Preparation Cycle Time

# Applications Being Tested

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- In-House Models & CERs to Estimate the Costs of:
  - Jet Engines on New Development Proposals
  - Engineering Design on Engineering Change Order Proposals
  - Software Development Costs
  - Manufacturing Labor and Material for Aircraft and Space Vehicles
  - Tooling Material and Technical Publications
  - Low-Value Material for Jet Aircraft

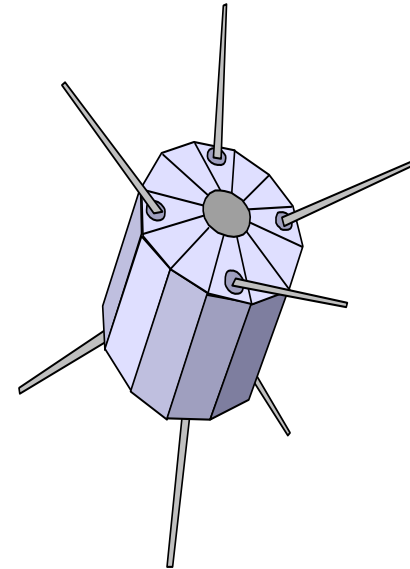


# Applications Being Tested

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- Commercial Models to Estimate the Costs of:

- Major Subcontractor Assemblies for Aircraft
- Spacecraft Components and Subsystems
- Radar Jamming Devices and Radar Systems
- Software Development, Integration and Testing
- Hardware for Space Shuttle Orbiter Spares



- Other Potential Applications:

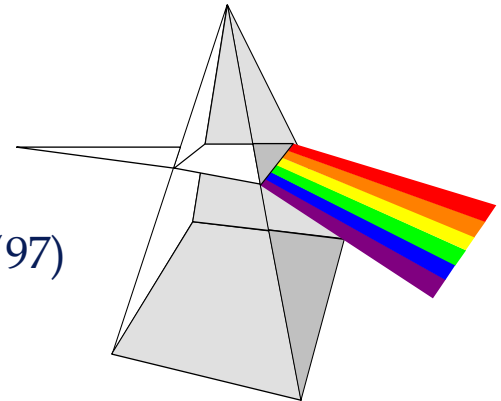
- Use of Parametric Models To Help Prepare Forward Pricing Rate Proposals

# Key Priorities for 1997

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- **Executive Steering Committee Visits to Lab Sites**

- Lockheed Martin, Ft. Worth, TX (29 Jan '97)
- McDonnell Douglas, Mesa, AZ (12 Feb '97)
- Motorola, Scottsdale, AZ (13 Feb '97)
- Northrop Grumman ESSD, Baltimore, MD (17 Mar '97)
- GE Aircraft Engines, Evendale, OH (30 Apr '97)



- **Document and Publicize Best Practices at Lab Sites**

- Detailed Description of Models Being Tested (including Key Cost Drivers and Input / Output Data)
- Calibration / Validation Processes
- Estimating Policies and Procedures
- Regulatory / Cultural Challenges
- Customer Acceptance
- Best Practices / Lessons Learned

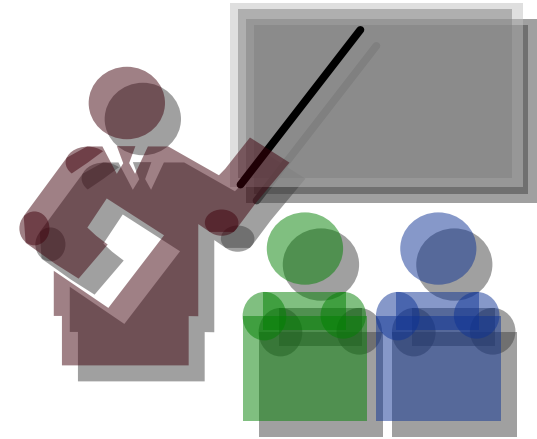
- **Status PEI at National Estimating Conferences**

- Panels and Exhibit Booths
- ISPA (28-30 May); SCEA (23-25 June)

# Key Priorities for 1997

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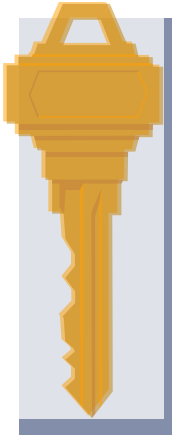
- **Develop and Deliver Long-Term Training**
  - Recommended Training Course Elements
    - Parametric Estimating Applications
    - Benefits of Parametrics
    - Cost Modeling
    - Data Collection and Normalization
    - Calibration / Validation Techniques
    - Case Studies
  - Commercial Model Training Needs are being Assessed
  - Briefed Defense Acquisition University on Requirements (28 Apr)
  - Develop / Deliver Long-Term Training Course based on Handbook, Survey Results, and Pilot Course Feedback



# Key Priorities for 1997

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- Update and Publish Second Edition of the Handbook
  - Update will include
    - More examples on parametric techniques, particularly calibration and validation
    - Comparison of parametric estimating techniques to other estimating techniques
    - New chapters on in-house models, regulatory issues, technical evaluations, price / contract analyst evaluations, forward pricing rate proposals, and cost estimating relationships
- Improve Existing Internet Web Site
  - <http://mijuno.LARC.NASA.gov/dfc/societies/ispa.html>



# Executive Support

"We need to encourage the use of parametric estimates throughout our organizations. *More opportunities for using parametrics need to be explored.* . . . By ensuring that we have properly calibrated and validated parametric models, we greatly increase the likelihood that estimating systems will be based on credible, auditable data, used in a consistent manner to provide results. *I am confident that in the not too distant future parametrics will routinely be a way of reliably predicting future costs when pricing many of our contracts.* . . ."

Ms. Eleanor Spector  
Director, Defense Procurement  
PCEI Workshop - Oct '96



# Reinvention Lab Status at Astronautics

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- PRICE H Calibration of Flight Systems Programs
- Completed Calibration Summer 1997
- Complete Validation Fall 1997
- Supported Handbook Update Summer 1997
- Support Development of Formal Training Course
- Implement Parametric Process in JPL Proposals
- Document Commercial Model Calibration, Validation, & Forward Estimating Processes

# Parametric Estimating Handbook

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- Parametric Cost Estimating Handbook Developed, Distributed and Available on the World-Wide-Web
  - <http://sea02www.navsea.navy.mil/webdata/pceh/pceh.html>
- RFP for Second Edition was Released 27 June 1997
- Selected Subcontractor for Handbook Update
  - Anticipated Completion is January 1998