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The Current State of Cost Estimating in the U.S. Federal Gov't and Future Trends

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ICEAA International Cost Estimating and Analysis Association

Agenda

- ICEAA Background
- Better Buying Power
- Contractor/Supplier Should Cost Initiatives
- Data Driven Estimation
  - CSDR – CCDR – SRDR
  - CARD
  - CADE
- JCL
- Agile Acquisition/Estimating
- GAO Cost Estimating and Assessment Guide
- Estimation in the Commercial Sector
- ICEAA Activities and Future Trends

The International Cost Estimating and Analysis Association (ICEAA)

- ICEAA was formed by the merger of the International Society of Parametric Analysts (ISPA) and the Society of Cost Estimating and Analysis (SCEA) in November 2012.
- Mission: ICEAA is a non-profit organization dedicated to advancing, encouraging, promoting and enhancing the profession of cost estimating and analysis, through the use of parametrics and other data-driven techniques.
- Approximately 2,000 members worldwide across 20 U.S. Chapters, U.K., Continental Europe, Australia and Japan

ICEAA Products, Publications, Activities

- *The Cost Estimating Body of Knowledge* (CEBoK®) is ICEAA's official training course material and serves as the official reference material for certification.
  - Certified Cost Estimator/Analyst (CCEA®)
  - Professional Cost Estimator/Analyst (PCEA®)
- *Journal of Cost Estimating & Analysis*, a professionally refereed journal dedicated to promoting excellence in cost estimating, cost analysis, and cost management. Its objective is to improve the theory and practice of cost estimating, analysis, management, and research results among cost educators and practitioners around the world.
- *ICEAA World*, a magazine filled with important association news, book reviews, feature articles and chapter updates.
- *Cost Estimating Newsbrief* delivering all the important cost-related news from around the world straight to members' inboxes every week.
- Annual Professional Development & Training Workshop
- Chapter Workshops

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Better Buying Power (BBP)

- Led by Under Secretary of Defense for Acquisition, Technology and Logistics, Frank Kendall
- BBP is the implementation of best practices to:
  - Strengthen the U.S. Defense Department's buying power
  - Improve industry productivity
  - Provide an affordable, value-added military capability to the Warfighter

Better Buying Power History
BBP 1.0 - 2010

- Deliver the warfighting capability we need for the dollars we have
- Restore affordability to defense goods and services
- 23 initiatives organized into 5 focus areas:
  - Target Affordability and Control Cost Growth
  - Incentivize Productivity and Innovation in Industry
  - Promote Real Competition
  - Improve Tradecraft in Acquisition of Services
  - Reduce Non-Productive Processes and Bureaucracy

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Better Buying Power History
BBP 2.0 - 2012

- 36 initiatives organized into 7 focus areas
- Change in emphasis from specific “best practices” to an increased emphasis on helping acquisition professionals think critically and make better decisions

Better Buying Power History
BBP 3.0 - 2015

- Focuses attention on the overriding concern that U.S. technological superiority is at risk
- Provides specific initiatives for focus areas
  - Remove barriers to commercial technology utilization
  - Use Modular Open System Architecture
  - Cybersecurity
- Strengthens and expands “should cost” based cost management

Better Buying Power Successes

- F-22 System Program Office realized a 15% efficiency ($32M savings) during increment 3.2A negotiations using Should Cost analysis
- U.S. Army Stryker considerable savings by combining buys into a single contract, gaining economies of scale and 5% savings in production of JTRS Handheld radios through incentives to incorporate commercial components
- Advanced Extremely High Frequency (AEHF) Satellite realized $1.6B in savings due to Block Buy; 49% reduction in testing time; $300M in savings through a consolidated sustainment approach
- Joint Light Tactical Vehicle (JTLV) for U.S. Army and Marine Corp reduced the estimated average unit manufacturing cost by 60% with a potential savings of $19B. Additionally, the implementation of a COTS-based acquisition strategy lowered the engineering, manufacturing and development costs by over $400M

Contractor/Supplier Should Cost Initiatives

- A capable "should cost" model:
  - Provides credible and defendable estimates of manufacturing and assembly costs
  - Allows for the evaluation of alternatives that directly impact the cost to manufacture
  - Facilitates proactive, real time cost impact assessments of design alternatives for today's global sourcing environment
  - Facilitates vendor negotiations by allowing you to determine ***What is the right price you should be paying for any given outsourced commodity?*** and ***What is the total cost of that commodity in real terms?***

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Should Cost – Basis for Vendor Negotiations

- Provide the Commodity Manager with:
  - Access to variables that have not been typically available
  - Understand the driving pricing criteria and interactively obtain the best price possible.
  - Maximize profitability
  - Optimization of critical cost driving parameters such as
    - Selection of optimum materials
    - Manufacturing processes / operations trade offs
    - Set-up and tooling amortization impacts
    - Lot sizing impacts
    - Automation levels utilized
    - Labor rates and efficiencies
    - Supplier Differences
    - Etc…

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Contractor/Supplier Should Cost Initiatives

- Debbie Wilson of Gartner may have said it best.

"*When price negotiations are conducted with accurate cost models in hand, I firmly believe that they yield superior results. That's because fact-based discussions support joint problem-solving and relationship building with key suppliers far better than just using a heavier hammer or an alternative supplier's hard luck…*"

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Data Driven Estimation

- "Show me the data!"
  - Information includes:
    - Use of defined estimating methods
    - Historical data from past programs
    - Use of objective scope measures and complexity factors where appropriate
  - Rationale addresses:
    - Complete description of the estimating approach
    - Explanation of the applicability of the historical information
  - Estimating process must be documented, consistent and repeatable

Data Driven Estimation
Cost and Software Data Reporting (CSDR)

- The CSDR system is the primary means that DoD uses to collect and program managers use to report actual cost, software, and related business data defense contracts.
- The repository of collected data serves as the primary contract cost and software data repository for most DoD resource analysis efforts, including cost database development, applied cost estimating, cost research, program reviews, analysis of alternatives, and life cycle cost estimates.
- The two principal components of CSDR are Contractor Cost Data Reporting (CCDR) and Software Resources Data Reporting (SRDR).

Data Driven Estimation
Contractor Cost Data Reporting (CCDR)

- The CCDR system collects data on the development, production, and sustainment costs incurred by contractors.
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Data Driven Estimation
Software Resources Data Reporting (SRDR)

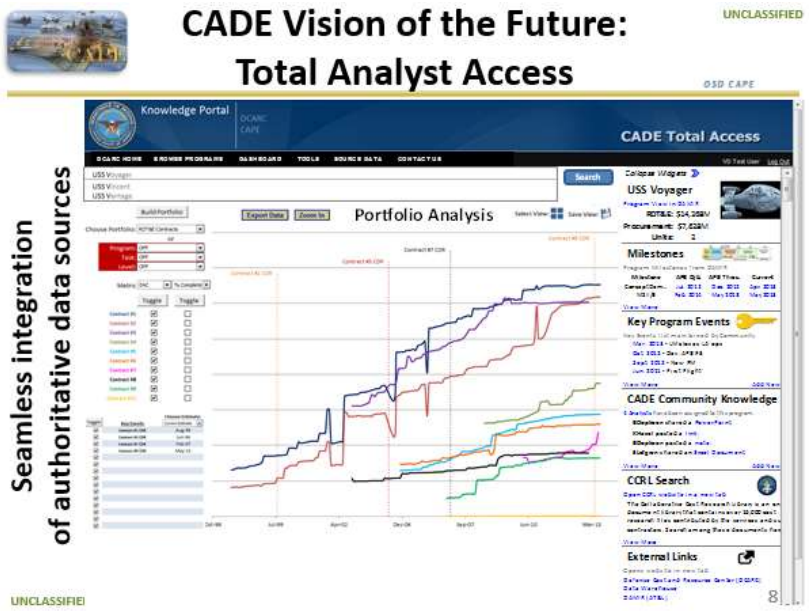
- The SRDR system collects software metrics data to supplement the actual Contractor Cost Data Reporting (CCDR) data in order to provide a better understanding and improved estimating of software intensive programs
- SRDRs are required on all major contracts and subcontracts, regardless of contract type, for contractors developing/producing software elements within Acquisition Category I and IA programs and pre-Major Defense Acquisition Program and pre-Major Automated Information System programs subsequent to Milestone A approval for any software development element with a projected software effort greater than $20M Then year dollars.
- The SRDR requirement on high-risk or high-technical-interest contracts priced below $20 million is left to the discretion of the DoD Program Manager (PM) based upon the advice of the Cost Working-level Integrated Product Team (CWIPT). These requirements must also be approved by the Deputy Director, Cost Assessment.

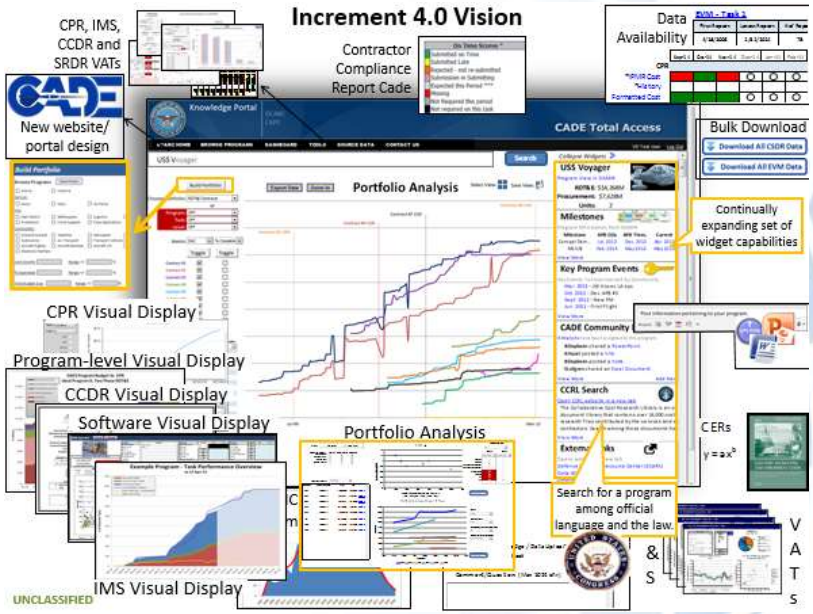
Data Driven Estimation
Cost Analysis Requirements Description (CARD)

- On 9 June 2015, the Director of Cost Assessment and Program Evaluation (CAPE) signed and issued DoD Instruction (DoDI) 5000.73, "Cost Analysis Guidance and Procedures." CAPE anticipates issuing the final CARD guidance by October 2015.
- The CARD provides a complete, detailed description of the acquisition program that is used to prepare the Independent Cost Estimate (ICE), Program Office Estimate (POE), DoD Component Cost Estimate (CCE), DoD Component Cost Position (CCP), and other cost estimates, as required.
- The CARD succinctly describes the key technical, programmatic, and operational characteristics of an acquisition program.
- The foundation of a sound cost estimate is a well-defined program, and the CARD is used to provide that foundation along with supporting data sources.

Data Driven Estimation
Cost Assessment Data Enterprise (CADE)

- An OSD CAPE initiative with the goal to increase analyst productivity and effectiveness by collecting, organizing and displaying data in an integrated single web-based application.





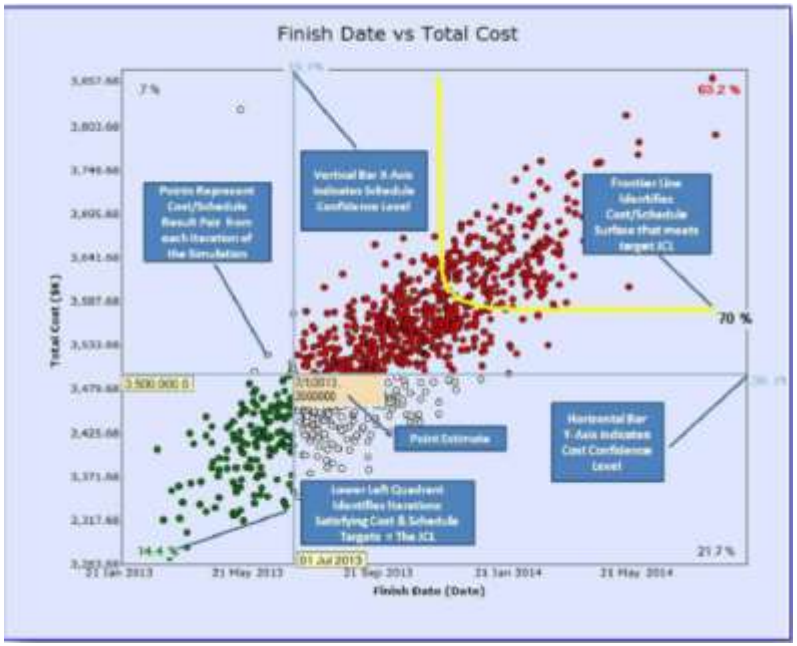
IEEAA International Cost Estimating and Analysis Association

OSD: Office of the Secretary of Defense
CAPE: Cost Assessment and Program Evaluation; Provides the Department of Defense with timely, insightful and unbiased analysis on resource allocation and cost estimation problems

Joint Confidence Level (JCL)

- According to NASA Guidance:
  - Joint Confidence Level (JCL) is an integrated uncertainty analysis of cost and schedule. The result of a JCL indicates the probability that a project's cost will be equal to or less than the targeted cost AND that the schedule will be equal to or less than the targeted finish
  - JCL analysis provides a cohesive and holistic picture of the project's ability to achieve cost and schedule goals by systematically integrating technical, cost, schedule, and risk data.
  - As an integrating framework, a JCL can show the impacts of risk to a project as well as highlight the relationship between cost and schedule. This relationship can be extremely important in situations with constrained budgets.
  - A complete JCL analysis can also facilitate transparency with stakeholders on expectations and probabilities of meeting those expectations..

Joint Confidence Level (JCL)



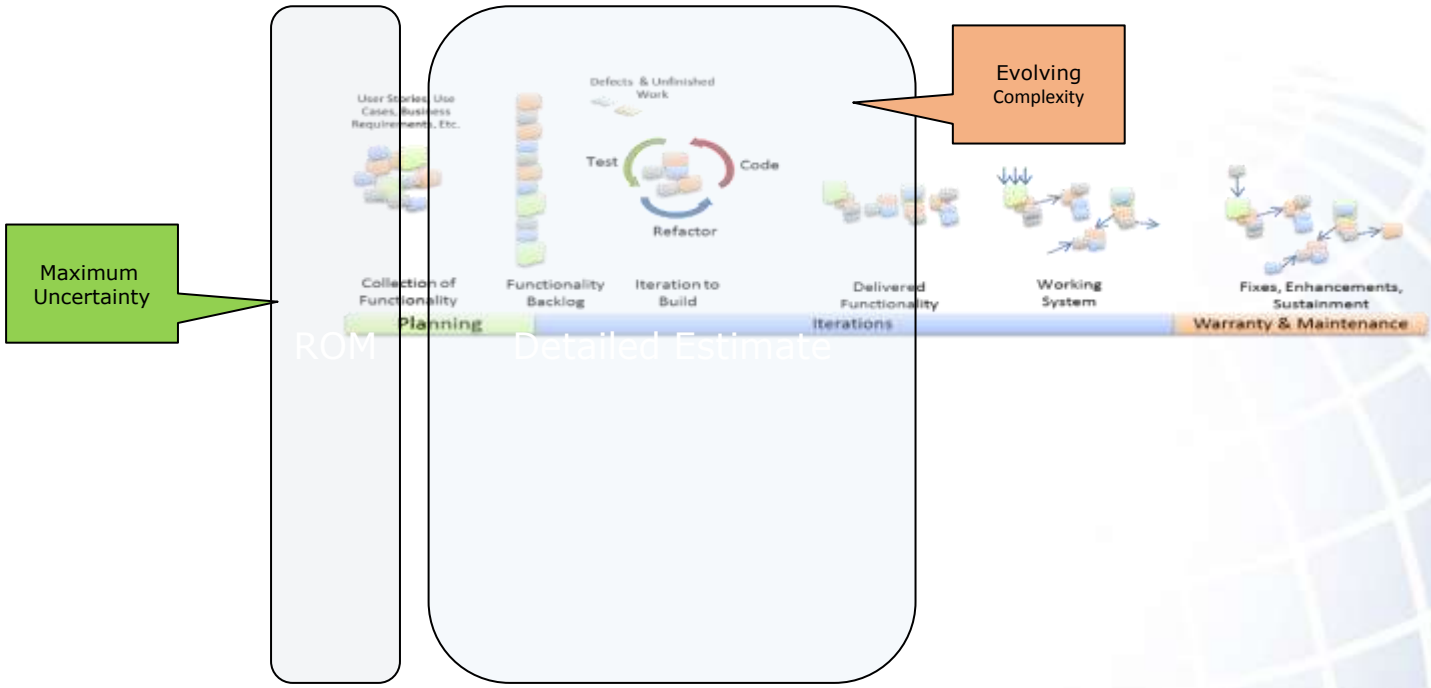
- Each dot in the scatter plot represents a result from the simulation calculation (Cost, Schedule).
- Scatter plot shows iterations of cost and schedule risk analysis.
  - Cross-hairs can be moved to a date and cost to obtain their joint confidence.
- Analysis results valid only for plan the inputs are based on, and represents a snapshot in time.

Agile Acquisition

- Agile acquisition is a strategy for providing multiple, rapid deliveries of incremental capabilities to the user for operational use and evaluation. The incremental deliveries, sometimes called spirals, spins, or sprints can be a few weeks or months to develop, and are built with continuous user participation and feedback.
- Agile acquisition is generally appropriate for two types of system development:
  1. enterprise systems with a high degree of functional requirements uncertainty, even if the purpose and intent of the system is known; and
  2. small, tactical systems that may have a short life, but an immediate and pressing need. These are cases where the fielding of blocks of an entire system is not feasible because total system requirements cannot be defined at the beginning, but immediate user needs can be partially satisfied with rapidly deployed incremental capabilities.

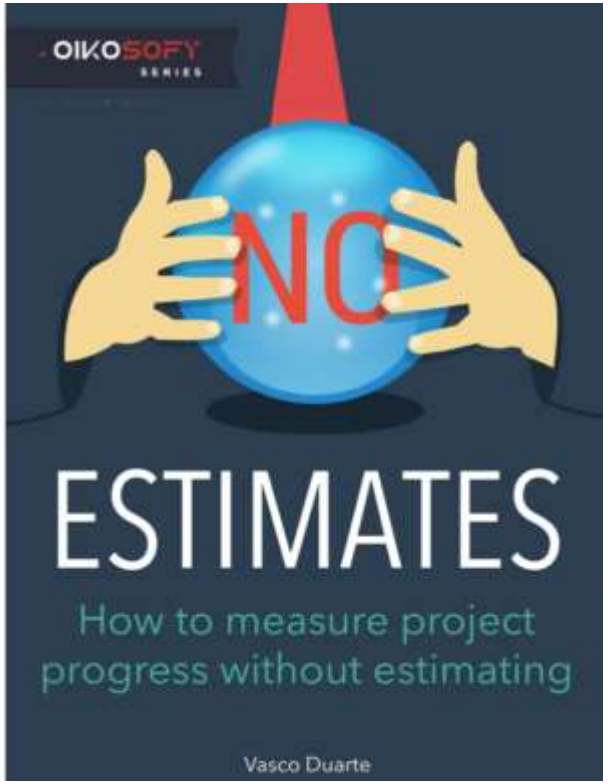
Estimation of Agile Software Development

- Estimating Agile Shouldn't Be More Difficult… It's Just Another Methodology



Cost Estimation Approach Remains the Same

Agile Bashing of Estimating

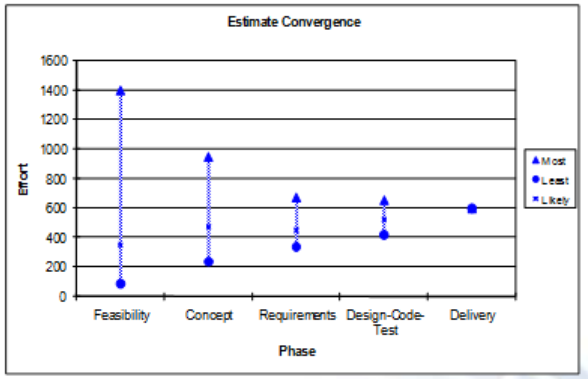


Root Causes Of Bad Estimates In Agile Projects

- Team not really doing Agile
- Immature process
- Management gets in the way
- Bad Story Counting
- Bad User Stories
- Teams combine iterations
- Lack of good definition for “Done”
- Product Owner or Customer non-responsive

Are Agile Estimates Different? – a Little
(Source: Galorath)

- Traditional Estimate Phases
  - During Feasibility
  - During Concept
  - After Requirements
  - After Design
  - After Drops if Incremental



Estimates typically become more accurate and less uncertain as the project progresses…

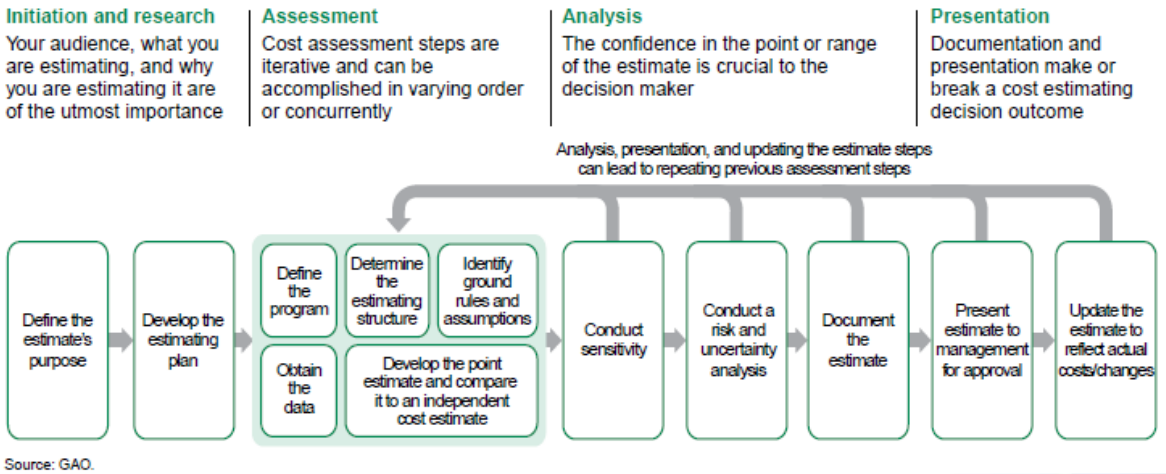
- Agile Estimate Phases
  - During Feasibility – Planning is the same– Usually analogous
  - During Concept – Forecasts use Features, User Stories, etc.
  - After Requirements – This phase does not really exists
  - After Design – No, team is busy working
  - Estimate Each Release – Working Estimates Are Critical

Reality Of Estimating Agile Projects

- Estimates still need to be generated for the total project
  - Funding needs to be set aside
  - Some assurance to management that it is feasible
- Consider Two Deliverable Estimates:
  - Planning Estimate – High level Rough Order Magnitude
    - High level features, analogies to other projects, etc.
  - Working Estimate - Iteration Planning
    - Story Point count of User Stories or Features
    - Refined over time as backlog burns down and discovery is made
- A third (and internal) is the Sprint Planning Estimate
    - Commitment driven based upon team's capacity
    - These are not management delivered estimates

GAO Cost Estimating and Assessment Guide:
Best Practices for Developing and Managing Capital Program Costs

- The methodology outlined in the Cost Estimating and Assessment Guide is a compilation of best practices that federal cost estimating organizations and industry use to develop and maintain reliable cost estimates throughout the life of an acquisition program.



Source: GAO.

Estimating in the Commercial Sector

- Estimating has been a well practiced process in Government, Defense, Aerospace and Automotive Sectors for some time.
- There is increasing adoption of estimating process and tools for software and IT systems in sectors such as banking, finance, insurance and the like.

ICEAA Activities and Future Trends

- Increased calls for ICEAA certified people in government & contractor requirements
- Formation of Special Interest Groups (SIGs)
  - First two identified:
    - Parametric SIG
    - Space Systems Cost Analysis SIG
- Development of Additional Training & Certification Specialties
  - Software Estimating Training and Certification
    - ICEAA/NESMA/IFPUG
  - Parametrics
- Cost Community Round Table

Conclusions

- Fiscal austerity continues to drive focus on affordability, best value, ROI, etc. in all areas of government and industry
- Estimation continues to be a high area of focus in the U.S. Federal Government with many initiatives (processes, methods, tools) which then drives government contractors to respond accordingly
- There is increased adoption of formal estimation processes/methods/tools in the commercial sector
- Expanding need for training and certification of cost estimators and analysts