

# FAA National Software Conference, June 2001

## Constructive COTS Cost Model



FAA  
Software  
Engineering  
Resource  
Center

*Solving today's problems ...  
Learning to prevent tomorrow's*

### Constructive COTS Cost Model (COCOTS)

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### Constructive COTS Cost Model (COCOTS) Problems / Issues

- We do not have an accurate way to estimate either acquisition costs or total life cycle costs for systems that include significant suites of Commercial-Off-the-Shelf (COTS) hardware, software and system products.
- The FAA has been surprised by the continuous flow of COTS upgrades and end-of-life issues and their impact on the operation and maintenance of COTS-intensive systems.
- We do not have an effective way of comparing either developmental vs COTS solutions or multiple COTS solutions.

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### COCOTS Opportunities

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- The changing structure of the FAA (business areas) will emphasize life cycle cost planning.
- Increasing complexity and effectiveness of available COTS provides new technology (e.g., secure web-based communications) to solve FAA problems.
- COCOTS is ready to provide pilot project support for COTS-Intensive system acquisition and is being extended to support life cycle costing.

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### Developing and Supporting COTS-Intensive Systems

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Adaptation      ○ ← Adaptation Data

Custom            □      ?      ○      GUI

Product Line    ~~□~~      ?      ?      ○

Commercial COTS    ~~□~~      ~~□~~      ~~□~~      ~~□~~      DBMS, OS, GUI, ORBs, CPU, LAN, etc

Flight data processor

**Support**

X - Not FAA responsibility

? - TBD - FAA or vendor

□ New application

□ Contractor product line component

□ Changed contractor product line component

□ Glue

○ NDI Component

○ Generated code

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### COTS

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#### COTS Characteristics

A COTS product *typically*...

- is sold, leased, or licensed to the general public
- is provided by a commercial entity in the business of making a profit from the product
- the commercial entity provides product support and evolution and retains intellectual property rights
- multiple, identical copies are available
- integrators use the product without modification of its internals

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### COTS (cont.)

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- COTS has total life cycle impact and critical business and management implications
- COTS Software is not static -- it continually evolves in response to the market
- Required Skill sets are significantly different than FAA legacy systems and they continue to change
- Limited visibility into new technologies and new COTS products
- Limited knowledge of COTS behavior, quality, reliability, robustness

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### COCOTS Approach

- Extend COCOTS to include the FAA AMS Life Cycle
- Validate model through pilot use on NAS projects
- Solve issues regarding life-cycle costs of using COTS/NDI products in NAS systems
- Establish working relationships with DoD and private sector – extend lessons learned and data collection (currently 20 Data Points)

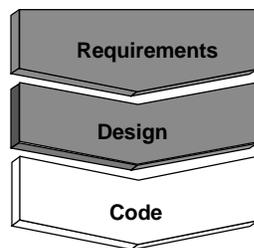
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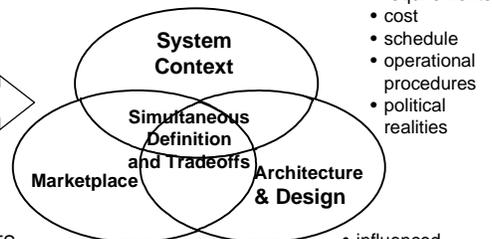


### Essential Paradigm Shift

#### *Traditional Development Approach*



#### *Required COTS Approach*



- COTS products
- NDI
- standards

- requirements
- cost
- schedule
- operational procedures
- political realities

- influenced by products

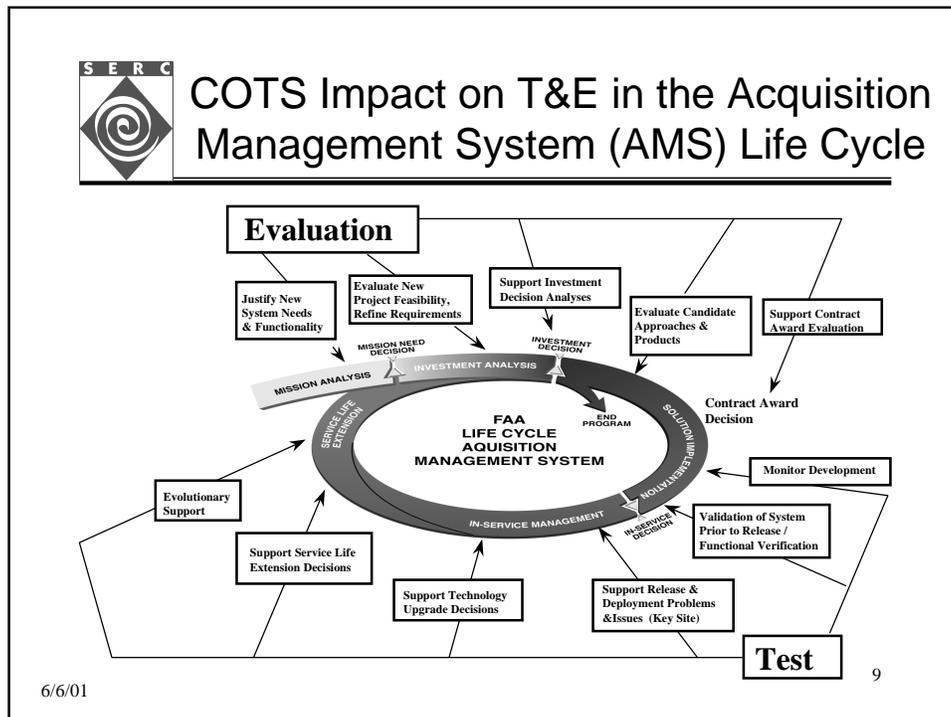
***Affects business, contractual, & engineering activities***

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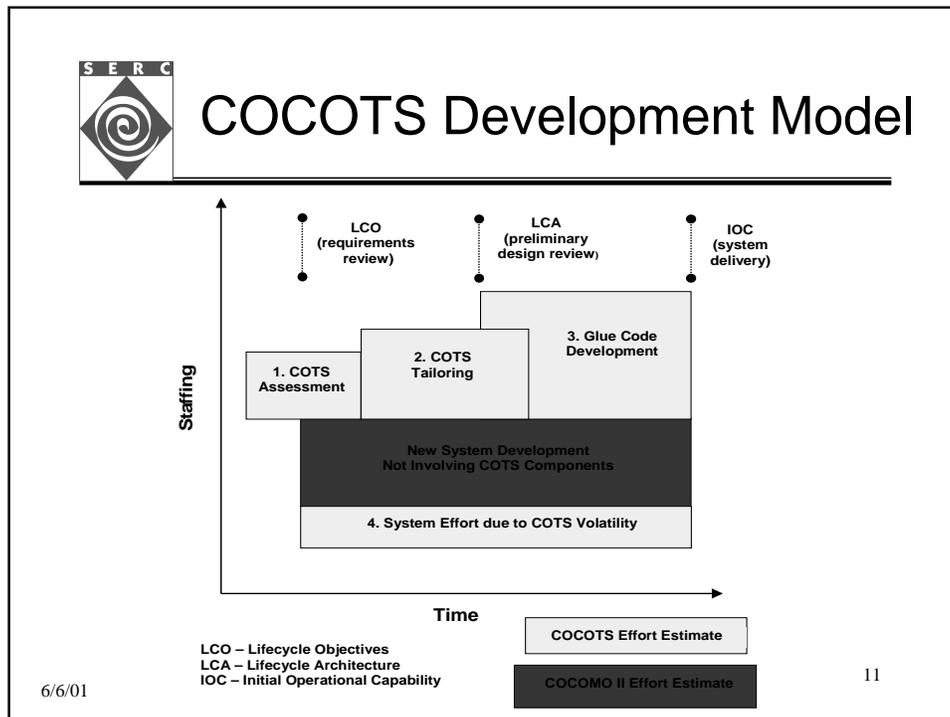
## Constructive COTS Cost Model



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- The diagram is titled 'Who will be doing the COCOTS work?' and lists the following roles and responsibilities:
- SERC will provide project leadership
  - Develop the COCOTS model - University of Southern California, led by Dr. Barry Boehm
  - Accumulate and validate the COCOTS data points – SERC and Software Metrics Inc. (SMI)
  - Establish pilot application projects – SERC and application projects teams
  - COCOTS tools, queries & technical infrastructure - additional application teams
  - Cost modeling process improvements and best practices – AIO and application teams
- The diagram also includes the SERC logo and the date '6/6/01'.

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## Constructive COTS Cost Model



**Constraints on COTS Solution Feasibility**

- **Technical**
  - Requires the flexibility to synchronize requirements with the characteristics of COTS.
- **Economic**
  - Can reduce cost and duration of development, but can result in complex changes to total life cycle costs.
- **Strategic Values (Perishable)**
  - Reduce cost and time of development
  - Can extend system growth due to evolution of COTS
  - Can share maintenance costs across all users.

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### COCOTS' Most Important Benefit

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Historically the FAA has evaluated the cost of acquiring COTS-Intensive systems rather than the total cost of ownership.

COCOTS is being extended to cover life cycle costing to avoid the pitfalls intrinsic to this approach.

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### COCOTS Outputs

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- COCOTS provides cost basis to evaluate requirements and COTS trade-offs early in NAS acquisitions
- Training Program for FAA NAS program management
- DOT/DOD partnership in COTS usage in critical Federal systems
- On-going evolution of a COCOTS tool set for cost containment, cost projection(s) and project life cycle management

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### COCOTS Customers

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- FAA NAS systems project management
- Federal systems managers
- Large system program integrators (non-Government)
- Budget Analysts, Program Managers, Program Engineers
- Enterprise Planners, Procurement Planners, OMB etc.

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### COCOTS Linkage to the Evolving NAS

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- More accurate budget, life cycle and project life modeling
- Increased span of control vis-a-vis diverging upgrade/version cycles
- Iterative toolset adaptable to a changing model(s) throughout NAS Program life cycle
- Cost analysis of diverse version control issues

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