AO Cost Workshop
Step 1 Cost Data
and
AO Price Evaluation

17 April 2008

Ball Aerospace & Technologies Corp.
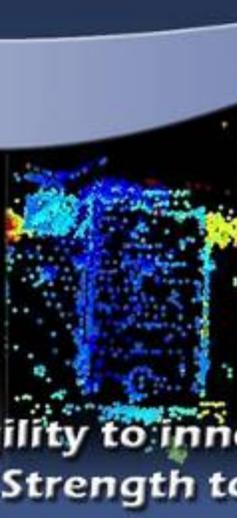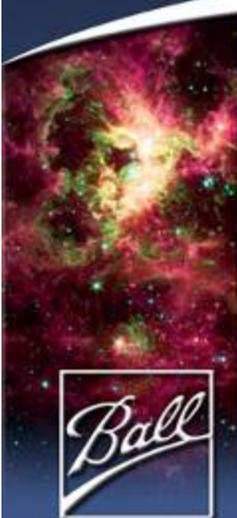
*Agility to innovate, Strength to deliver.*

The AO Cost Equation

- Science Objectives and Mission Requirements integral to Estimating Cost

Science Objectives	$+$ Define	Mission Requirements	$=$ Drive	Cost Estimate
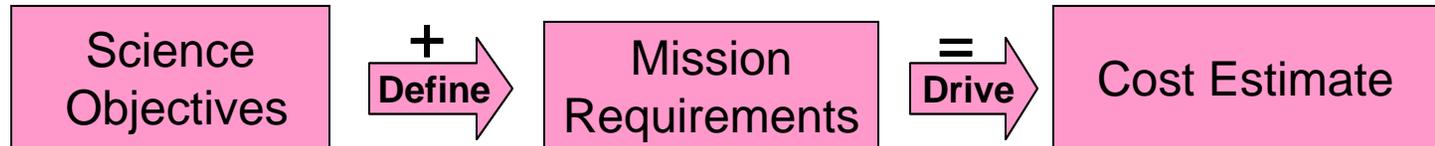
- Mission Requirements (implementation changes) likely to continue to evolve
    - Multiple AOs, Multiple PIs, limited missions, limited AO response time and resources
    - "Cost cap" environment encourages "stuffing of scope" in order to maximize mission value
    - Quantifying unknowns (risk reserves) difficult in environment of changing requirements
- Step 1 AO cost data based on risk-averse generic design(s), derived from historical analogs
    - Analogs contain "spent" historical reserves originally held by centers as "contingency"
    - Caps include center contingency (30%) - yet risk evaluation is part of AO process
    - Detailed tables and MELs by WBS, time phased, supplied within a dynamic Step 1
    - "Correct" at the top level, but not verifiable at the detailed level
- Resulting detailed data yields a high degree of False Precision (accuracy)

Step 1 Inappropriate Time to Evaluate Detailed Cost Data

Step 1 Cost Evaluation Criteria

- Components of a good cost estimate are Reasonableness, Completeness, and Credibility

  - Completeness and Credibility require detailed data that is tied to likely execution scenario

- Detailed data requires well-defined program Scope and Risk

  - Completeness and credibility likely to be unattainable with data of suspect precision

- Based on what is known at time of Step1 Selection

  - Completeness and Credibility require program definitization that may not exist until Step 2

  - Analogs, with embedded "spent reserves", are representative of likely mission costs

  - Identifying and quantifying specific threats to Step 1 pricing should occur during Step 2

  - Analogs can be analyzed to assess applicability to proposed candidate missions

- Top level cost data (for an analog or model) has comparable utility to more detailed data (of the same analog or model) in a Step 1 evaluation process

- "Reasonable expectation" of fitting within a cost cap is the appropriate criteria at Step 1

Evaluation Standard in Step 1 Should Be Cost Reasonableness

Cost Data Appropriate to Assess Step 1 Reasonableness

- Evaluation Phase (Ph A)

  - Cost detail reasonable since Phase A represents real outlays planned to be expended in support of a specific scope of work – e.g., defining the mission

  - Phased $ by calendar month, identifying staffing mix and levels

- Execution phases (Ph B/C/D/E)

  - Cost detail need only be summarized at "Level 2" as part of Step 1 submission

    - Mission level – Program Office (PM, SE, MA), Launch Vehicle, Post-Launch

    - Major deliverable level - Bus, Instrument 1, Instrument 2

    - Specify assumed GFE (if applicable)

  - Parametric or analog data, with model inputs, as a complement to Level 2

- Inflation – tie estimate to same year dollars as cap – organization differences are not material

- Strictly <u>limit</u> the data accepted (ceiling, not floor) – over-delivering encourages "false precision"

- Clearly define reserve methodologies - $ within cost cap or spread among elements, pricing of schedule reserve

Tailor Required Cost Data to Evaluate Reasonableness

Recommended B/C/D/E Step 1 Cost Table

Mission Element	Total Price
Launch Vehicle	
PI Mgmt team (PM, Science)	
Industry Team (PM, SE, MA)	
Bus	
Instrument 1	
Instrument 2	
Instrument n	
Observatory I&T	
Flight System GSE	
Launch System GSE	
Post-Launch Support	
Total	

PI Team Cost Data Appropriate to Evaluate Reasonablenss

Step 1 Data Requirements

Recommended AO Cost Maturity Model

	Science Objectives		Mission Requirements		Cost Estimate
Generic	Science Objectives	**Define** ➤	Mission Requirements	**Drive** ➤	Cost Estimate
Step 1 Evaluation	Merit		Achievability		Reasonableness
Step 2 Evaluation	Relative Priority		Executability		Completeness Credibility
Specific	Science Objectives	**Define** ➤	Mission Requirements	**Drive** ➤	Cost Data
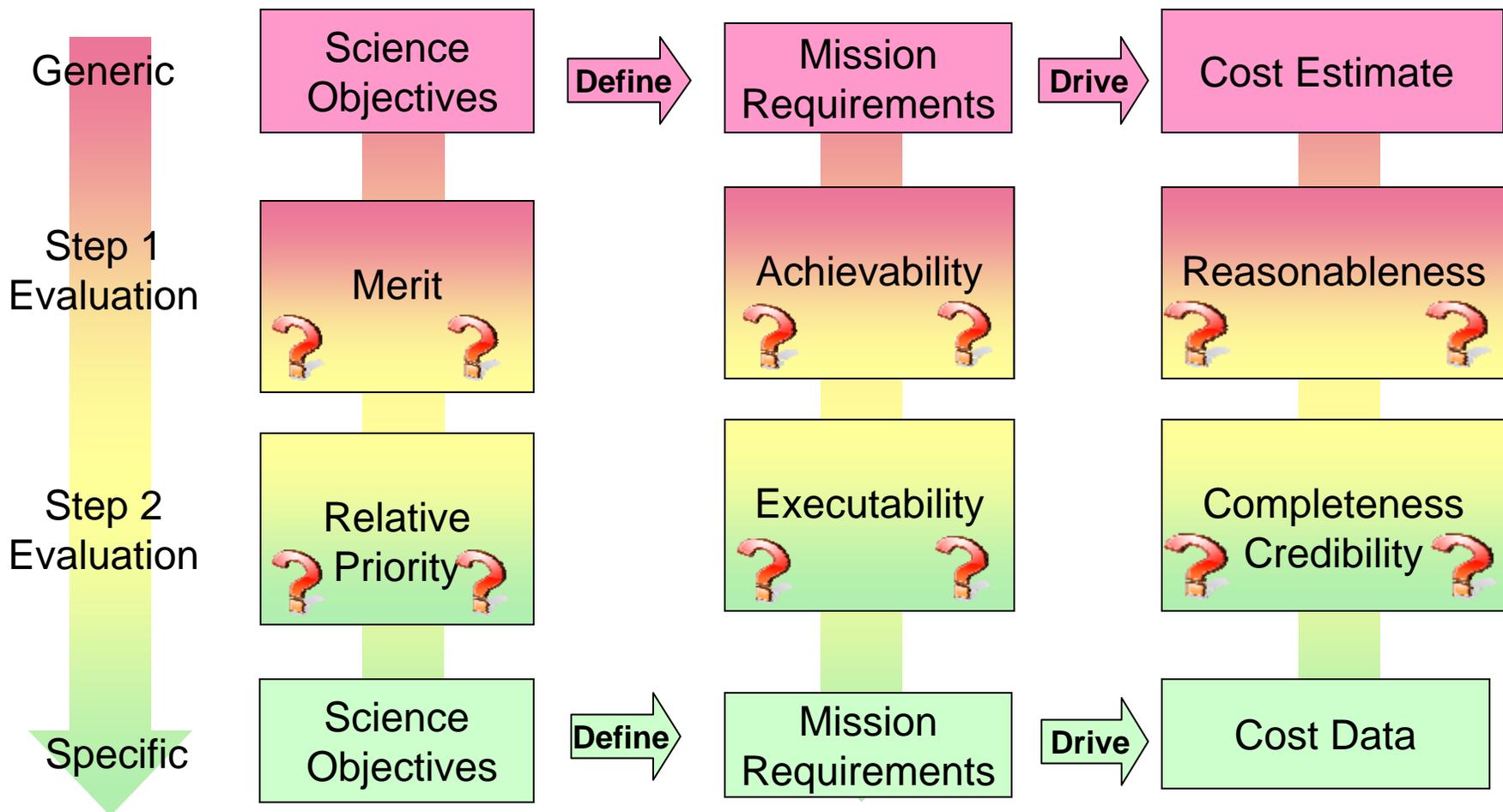
Plan to Advance from "Reasonable" to "Complete and Credible"

Step 1 Data Requirements

Discussion
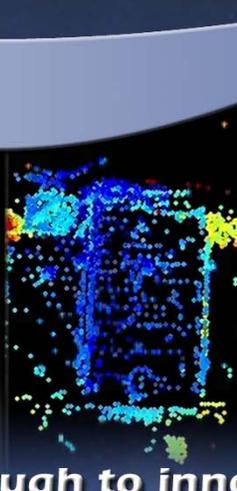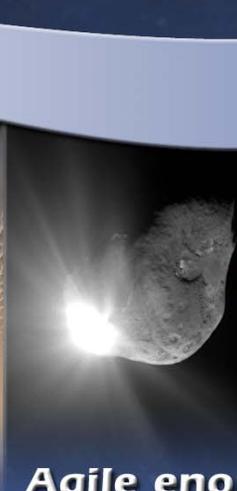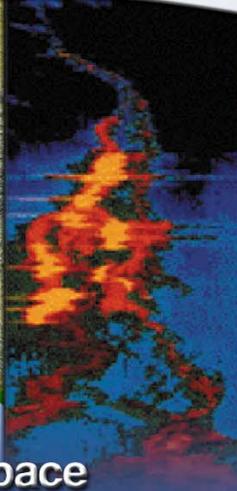
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