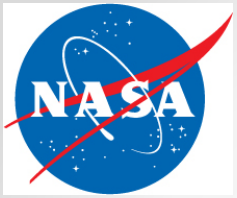

Standardizing Assumptions in Multi-Team Study Situations

Keith Warfield
Jet Propulsion Laboratory
California Institute of Technology

May 1, 2012

The Problem

- **NASA Program Offices engage several different Concurrent Engineering (CE) teams to conduct related mission studies for a larger common purpose**

- **Program Offices must combine the different CE team results into one cohesive roadmap, technology survey or portfolio report**
  - Conclusions and recommendations dependent on a comparative assessment of the missions studied by the different CE teams
  - Each CE team has developed their own methods for studies

- **The resulting products are not usually directly comparable**

The Approach

- **Develop a standard cross-team set of assumptions**
  - Will make the Program Office's job of comparing easier and less open to error
  - Must protect center proprietary models or other competition sensitive information

- **As an initial test case we developed a set of standard assumptions between IDC and Team X for a set of X-ray and Gravity Wave studies**

Study Key Assumptions

- **Mass Margin – 53% of CBE**
- **Power and other margins – follow Center best practices**
- **Cost Reserves – 30% of Phases A-E (w/o L/V)**
- **WBS per 7120.5D**
- **In-house builds**
- **All Technology is at TRL 6**
  - Teams will note where technology is not currently at TRL 6 and does not have a funded path to TRL 6 in time for this mission as a risk
- **NLS II Launch vehicles only**

Study Key Assumptions (cont'd)

- **Sparing, design units, and parts class determined by mission class**

	Low $ Bin	Med $ Bin	High $ Bin
	<$600M	$600M-$1.2B	$1.2B-$2B
Redundancy	Weak selective redundancy, mostly single string. Only Class B parts, no Class S parts.	Strong selective redundancy. Only Class B parts, no Class S parts.	Fully redundant for all credible failures. Mostly Class B parts, may have some Class S parts.
Model Philosophy (EDU's, ETU's, Qual Units)	No or minimal reliance on EDU's and ETU's. Typically no Qual Units, all Protoflight Qual.	Minimal use of ETU's. Qual Units only where unavoidable, elsewhere Protoflight.	Near-ubiquitous use of EDU's and ETU's. Qual Units where required.
Sparing Philosophy	Only long lead mission critical components.	Only long lead components.	Almost all components.

How Will This Benefits CEWG ?

- **Establishes the first cut on common initial assumptions**
  - A wider discussion of these assumptions is needed to ensure acceptance and usability in other CE teams
  - Additional assumptions will be needed in future multi-center studies but should build from and add to this initial set

- **Demonstrates the value of multi-team communication to NASA Programs and enables greater collaboration where not competition sensitive**

- **The "Baseball Card"**
  - Standardizing assumptions and aligning WBS's are the first steps making the CE teams more translatable for NASA
  - The next big area of alignment is in key parameter outputs
  - A set of standard design parameters should be defined and reported by all CE teams as study output – the study "Baseball Card"