FIRS Architecture Assessment Plan: Getting to August and Beyond

FIRS STDT Meeting

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FIRS Architecture Decision Statement

- What are we trying to do here?
  - Recommend a basic mission architecture concept for the FIR Surveyor detailed study plan due August 26, 2016
  - Study schedule does not allow a full quantitative analysis of well-developed competing architectures
  - We understand this to be a preliminary assessment that will likely be refined during FY 2017
- What is success? How about:

  "The process will be successful when the STDT has reached consensus on a single FIRS mission architecture concept or else has significantly narrowed the range of concept options"

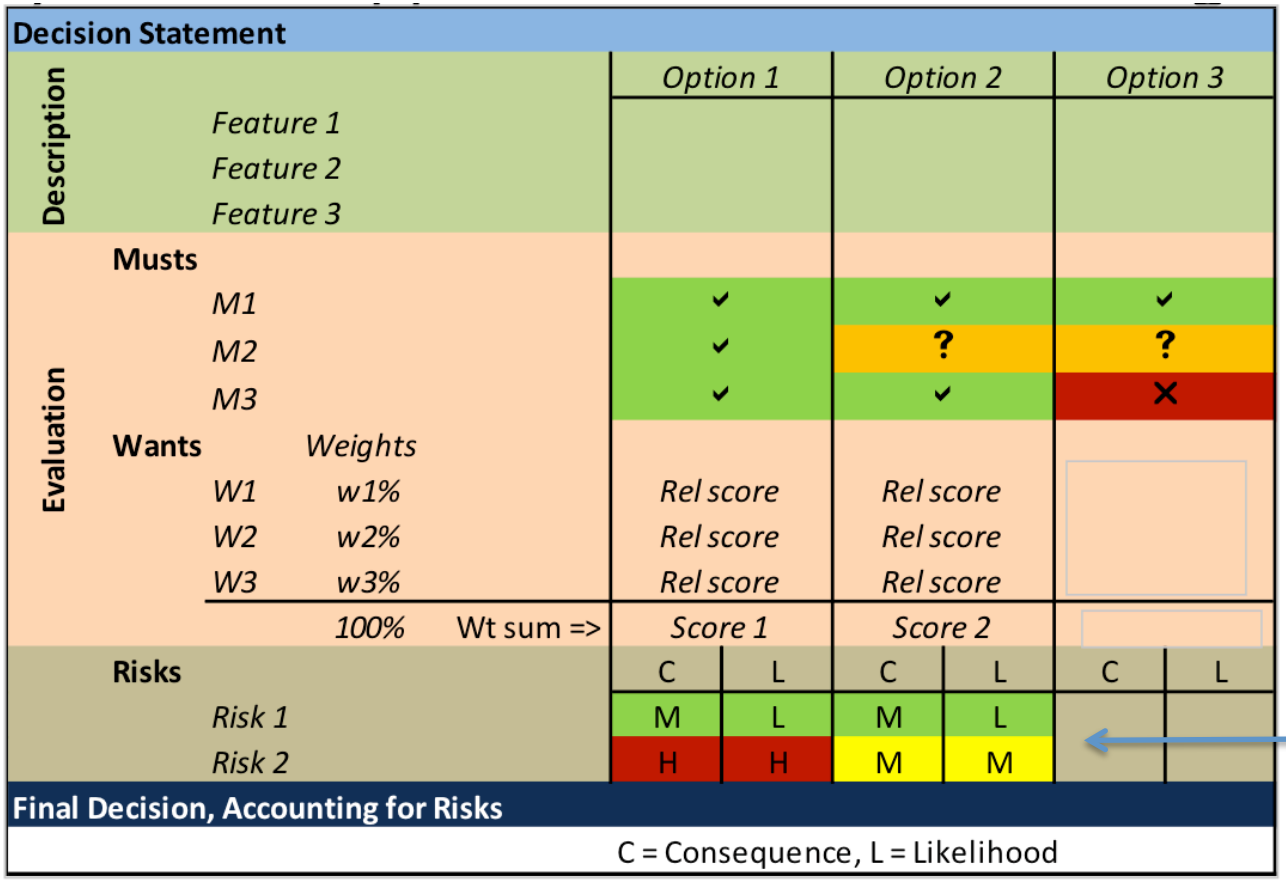
  - Is this definition OK with the SDT and the Study Office?

FIRS Architecture Assessment (repeat)

1) Define science, performance, and program requirements, separate into Musts and Wants
   - Requirements defined before August meeting
   - Apply weights to the Wants (start before Aug meeting)
2) Develop basic mission concepts with some performance estimates before August meeting
3) Evaluate how well each mission architecture concept meets the requirements
   - Quantitative scoring based upon Musts and Wants
   - Asses risks and opportunities of each architecture
4) Make a rational decision based on scores. Goal is consensus but dissents will be allowed and noted. Process will be documented as part of FIRS study

Recommended Assessment Approach

- Adapted from Kepner-Tregoe methods. The Rational Manager, Kepner and Tregoe, 1965 (New edition…)

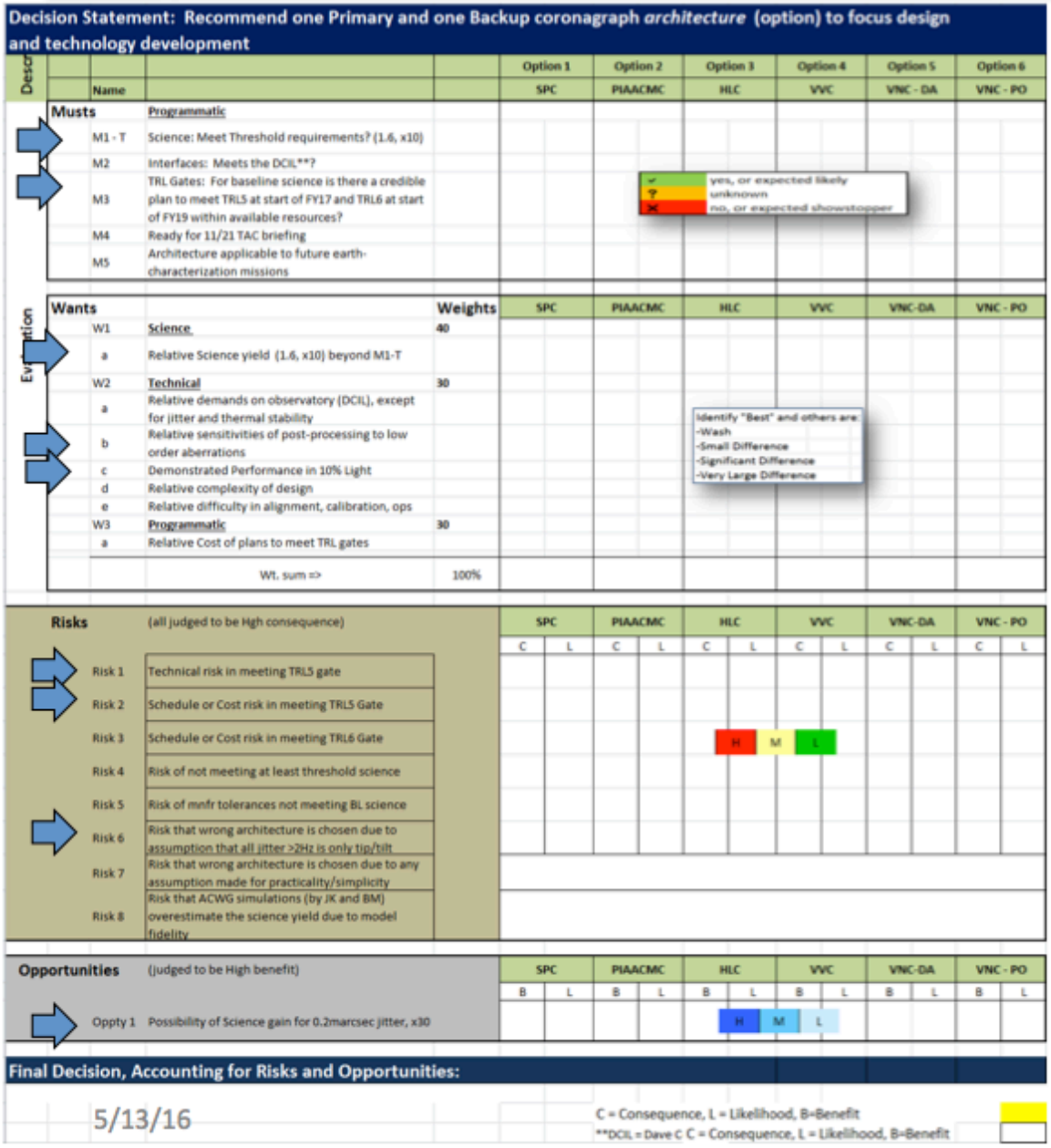


Decision Statement									
Description				Option 1		Option 2		Option 3	
	Feature 1								
	Feature 2								
	Feature 3								
Evaluation	**Musts**								
	M1			✔		✔		✔	
	M2			✔		?		?	
	M3			✔		✔		✕	
	Wants	*Weights*							
	W1	w1%		Rel score		Rel score			
	W2	w2%		Rel score		Rel score			
	W3	w3%		Rel score		Rel score			
		100%	Wt sum =>	Score 1		Score 2			
	Risks			C	L	C	L	C	L
	Risk 1			M	L	M	L		
	Risk 2			H	H	M	M		
Final Decision, Accounting for Risks									
C = Consequence, L = Likelihood									

From Gary Blackwood, JPL

Risk is the chance that we will not get what we expect

Example Evaluation: WFIRST Coronagraph



Indicates Sig. Discriminator

Science Threshold

This is more detailed than what we will do for FIRS

Science Beyond Threshold

Where is Science Considered?

Where is Technology Plan and Risk Considered?

Risk of not meeting Threshold

Oppty: Science if Jitter lower, Speckle subtraction better

From Gary Blackwood, JPL

Step 1: Define Science Requirements

- STDT defines science & performance requirements before August
  - Quantitative performance requirements need to flow from your science requirements and science questions
  - Separate into Musts (absolute requirements) and Wants
  - Both Musts and Wants could include sensitivity, spatial resolution, spectral resolving power
  - Consider key program requirements (e.g. launch, lifetime) as well
- Understand the relative values of the Wants Ideal to have a handful of key requirements (< 10)
- Do some preliminary weighting (of Wants) before August meeting
- Question: Are we ready to get quantitative like this?

Step 2: Define Mission Architectures

- STDT defines >1 mission architecture concepts that have some chance of meeting eventual science needs:
  - Must define well enough to understand basic performance capabilities and risks
    - *More defined than just 'Interferometer' and 'Filled Aperture'*
  - Do not need final values yet: performance & risk ranges OK
  - Do in parallel with science requirements
- STDT should agree very soon (May?) on the basic performance parameters that need to be evaluated (e.g., spatial & spectral resolution, sensitivity, mapping speed, etc.)
- Document the major features and performance estimates of each architecture before August meeting
- Question: Is this realistic to do in time?

Step 3: Weighting Requirements

- STDT needs to weight the different science and performance requirements:
  - e.g., are spatial resolution and sensitivity (above the minimums) equally important? Is mapping speed the most important?
- Establishing science & technical figures of merit before the meeting would be helpful!
- Obvious weights should be done before August meeting
- We can finalize the harder weights during the August meeting via discussion
- Question: How much can be done before August?

Step 4: Architecture Assessment

- STDT will assess the performance of the different architectures during the August meeting:
  - Score each architecture against the requirements
  - Evaluate any obvious major risks (e.g. technical readiness) and opportunities
- Scoring will be done by group discussion
  - Everybody can provide information or argue for a rating value on a rational basis
  - Poll the group after arguments aired: ask for agreement on a score and also ask for any dissents
- Entire rating process will be recorded by a neutral third party, including scores, dissents, and actions
- Results and dissents will be included in FIRS study docs
- Questions?

Working version of Consensus (NASA policy)

- Prefer consensus in the time available, else, dissent will be captured and we will move on
  - Will follow 7120.5E, Ch 3.4, "Process for Handling Dissenting Opinion"
    - Three options: (1) Agree, (s) Disagree but fully support the decision (agree that the process was followed well), (3)Disagree and raise a dissenting opinion
    - Treat (1) and (2) as consensus for STDT
    - Dissents (3) will be documented and delivered to senior NASA management (APD DD) per 7120.5E

What Happens After August Assessment

- Preferred architecture(s) will be included in the Detailed Study Plan due August 26
  - Describes concept maturity and plans for maturing concept
- Further architecture refinement and assessment may be needed depending on August results
- We currently expect to refine the architecture assessment at some level in mid-FY2017 (early CY 2017):
  - Is the concept still responsive to the requirements?
  - Any further refinement or assessment needed?