TRADE STATEMENT: Recommend a development strategy to enable a starshade science flight mission

				Basic Ground			Extended Ground		Space					Evaluation Team		
				1a	1b	4a	2c	2d	2a	2b	6a	6b				
Description				Ground validation at half scale	Same as 1a, Rndzvous recast as tech demo	Ground validation at full scale	Long Baseline Facility	Extended Desert Testing	mDOT	Virtual Space Tele-scope	ISS Depoy-ment demo	ISS Diffrac-tion Demo	1b =1a except for a semantic difference. For 1a, Enabled flight is a class C science mission. For 1b, Enabled flight is a Class C tech demo. There are subvariants of 4a that remain options for future programatic and technical consideration			
				Arenberg	Arenberg	Lisman	Cash/ Harness	Warwick	D'Amico	Shah	Warwick	Noecker				
Evaluation	***MUSTS***															
	Technical															
	M1	Achieves TRL-6 by starshade KDP-C for the N=3 critical technologies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Subcategories conditional upon the evolution of the design.	x		
	M2	Compatible with Rendezvous-CS technical needs		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Interpretation: Are there any technology development efforts in the Option that are inconsistent or incompatible with the WFIRST Rendezvous mission technology needs?	x		
	M3	Forward traceable to expected HabEx and LUVOIR technical needs		U	U	U	U	U	U	U	U	U	No showstopper, incomplete information on large mission studies			x
	M4	Likely to convince responsible critics at KDP-C to proceed with a starshade flight mission		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Consider WFIRST Starshade Rendezvous to be a tech/science demo similar to that of the WFIRST coronagraph			
	Schedule															
	M7	Schedule-compatible with Rendezvous-CS launch within WFIRST prime mission (assume: LRD of Starshade Rendezvous by late fy28)		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Assume WFIRST LRD late fy25, 6 year mission If NAS DS released Feb 2020 => Phase A start Oct 2022 3 year GO overlap, prefer earlier (fy27) per WFIRST FSWG		x	
	M8	SSWG completes recommendation by November		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
	Cost															
	M9	Total cost of technology development strategy *< 10% of LCC (~$100M)*		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
															x	
	WANTS (DISCRIMINATORS)		***Weights***											CTT	TMT	SCI
	Technical		*High*													
	W1	Relative degree to which the strategy exceeds TRL6 at KDP-C for N=3 critical technologies		sig	sig	sig	sm/sig	sm/sig	best	sm/sig	small	small	Options 2a and 6b better bridge the scaling difference between XRCF and a science flight mission starshade size	x		
	W2	Admits enhancing Starshade technologies		wash	wash	wash	wash	wash	wash	wash	wash	wash	Exceeds Must of N=3	x		
	W3	Minimize the number N of critical enabling technologies		wash	wash	wash	wash	wash	wash	wash	wash	wash	Strategies/architectures that reduce the total enabling technologies	x		
	Schedule		*Med+*													
	W4	Enables Earliest launch within WFIRST prime misssion		small	small	best	small	small	sig	sig	sig	sig	Rankings are based on all technologies completed for each option		x	
	W5	Exceed TRL gates at key intermediate milestones (2020 DS, KDP-A, KDP-B, KDP-C)		sm/sig	small	best	U	U	U	U	U	U	Maximize TRL prior to 2020 Decadal Survey. Ahead of the game		x	
	Cost		*Med*													
	W6	Lowest cost of tech development strategy		best	best	best	sm/sig	sm/sig	sig	sig	sig	sig	Total cost of development strategy excludes phase A/B costs but includes any TRL6 and tech demo costs during phase A/B		x	
	W7	Relative leverage of other programs outside of SMD/STMD		small	small	small	small	small	small	small	best	best	Cost effectiveness, alignment with NASA and non-NASA roadmaps		x	
	Other / Programmatic		*Med*													
	W8	Closest alignment to strategy in which STMD would invest		small	small	small	small	small	best	best	small	small			x	
	W9	Maximizes even playing field for industry in potential prime contract for science mission		best	best	small	U	U	U	U	U	U			x	
Risk Evaluation	***RISKS***															
	R1	Risk that proposed demonstration will not function as planned		L	L	L	L/M	L/M	M	M	M/H	H				
	R2	Risk that the results from the proposed demonstration may have high uncertainty or ambiguity		L	L	L	M/H	M/H	M	L/M	M	H				
	R3	Risk that the option is dependent on the launch of another mission we risk a schedule delay from that LRD		n/a	n/a	n/a	n/a	n/a	M	M	M	M				
	R4	Risk that the cost impact if the siderostat if the cost ends up being on the high end.		n/a	n/a	n/a	M	M	n/a	n/a	n/a	n/a				
	R5	Human safety risk		L	L	L	L	L	L	L	M	H				
	R6	Risk of early commitment to a particular design		L	L	M							Edge scatter validating that we have the right optical models and scalability			
	R7	Risk that the responsible critics will not be technically convinced at KDP-C on account that there is a large gap between XRCF and starshade flight mission size (75mm to 26m) as it relates to optical performance verification		L/M		L/M	L/M	L/M	L	L/M	L/M	L	Long baseline demos will not have resolution In their results to effect the material			
	OPPORTUNITIES															
	O1	Enables the technology more than starshade science flight missions		L		L	L	L	M/H	M	L	M	mDOT orbits are more general for autonomous flying			
	O2	Programatic and technical benefit of committing to a design before start of Phase A		L		M										

Yes	Yes, or expected likely
U	Unknown
No	No, or expected showstopper
	Point not yet in consensus

Identify "Best" and others are:
-Wash
-Small Difference
-Significant Difference
-Very Large Difference