

Technology Item	Heritage or Comments	Current TRL	Foreseen TRL by end of Phase A (2026)	Development plans for the baseline design
Camera detectors	<b>Option 1</b> ) several 50-150 Mpixels CMOS (Sony IMX411, Pyxalis GP4600). Current baseline.	4-5	6	<b>Option 1</b> ) Performance demonstrated for the operational environment. Flight model qualified for nanosat with a smaller format (50Mpixels). Option 1 will require a 2x2 GP4600 mosaic for the FPA or small reduction of science.
	<b>Option 2</b> ) A single new gigapixel visible CMOS (30k x 30k). Desired option.	3	5	
Camera electronics	CMOS TDI platform product families for line scanning in Earth observation	6	8	
Camera system	<b>Options 1</b> ) 2x2 detector array or single detector if FOV reduction is scientifically acceptable.	7	8-9	
	<b>Option 2</b> ) a single sensor and electronics. Implemented in Earth observation	7	8-9	
Camera WFS	Gaia. But modifications to fit Theia optics are necessary.	6-9	6-9	Use of the corner of the gigapixel detector
FPA metrology laser source	Meteosat Third Generation (MTG)	9	9	
FPA metrology optical components	High NA single/multimode fibers required and commercially available on ground. Space qualification is being addressed by fiber manufacturers.	5	6-7	Work on radiation hardening data with companies like Nufern. Data on Gamma and Proton irradiation exist (Alam 2006, SPIE 6308, 630808)
FPA metrology electronics	Laboratory benches.	4		Laboratory work foreseen for FPA calibration
FPA metrology system	Laboratory benches, but not yet for Theia FPA scale.	4		
Telescope metrology laser source	Tesat LISA, MTG.	9	9	
Telescope metrology picometer interferometers	Interferometers performing at the level required by Theia already flying (Gaia-BAM).	5	5-6	Independent active actuators (piezo) coupled to standard nm laser metrology to maintain position. However, TMA design with gigapixel array (Option 1 & 2) will relax the needs for metrology of the telescope structure considering few tens of mK environmental stability. Telescope metrology is also relaxed with alternative design with only one mirror (Formation Flying, deployable boom).
Telescope metrology electronics and optoelectronics components	Based on Actel RTG4 and Gooch & Housego.	5		
Telescope metrology system	Each actuator with its own metrology at TRL >5.	4		
Telescope structure	Ceramics telescopes have been used in Herschel, Gaia, Euclid.	9	9	
Telescope optics	Several flying TMA. Design similar to Euclid. Straylight needs assessment.	5	8	Laboratory tests and optical design analysis
Thermal control system	Euclid, Ariel	6-7	8	Optimize V-groove passive cooling configuration coupled to e.g. active JT coolers
Fine Guidance Sensor	Euclid, Ariel	6-7	8	Similar to existing FGS designs