# Science Traceability Matrix

National Aeronautics and Space Administration

| Science Goal | Measurement Objective | Measurement Requirement | Instrument | Instrument Requirement | Data Product | Mission Requirement |
|---|---|---|---|---|---|---|
| *The specific science questions the mission intends to answer.* | *What would need to happen during the mission to accomplish the measurement objective (and therefore the science objective)* | *What the measurement must include in terms of content, precision, quality.* | *What instrument would be needed to carry out the measurement.* | *How and how well the instrument would need to perform.* | *What will be the output (the product) of this measurement (for example, a map or a spectrum)* | *What would need to happen during the mission to accomplish the measurement objective (and therefore the science objective)* |
| Determine the epoch (era) of formation of Psyche by measuring the relative ages of regions of its surface. | Count and measure the number and size of craters larger than 1 kilometer and larger than 1 meter. | Map 50% of the surface at 200 meter-per-pixel resolution or better (this means that one pixel of an image would see something about as large as two football fields, end-to-end). Map 30% of the surface at 20 meter-per-pixel resolution or better (this means that one pixel of an image would see something about as small as a semi-truck). For each resolution the area must be continuous and not in separate patches of images. | Imager | Spectral Range: A clear filter for topography and crater counting with a wavelength of 540 (280 FWHM, or Full-Width at Half-Maximum, which is a measurement of width)<br><br>Spatial Resolution: 20 meter-per-pixel reolution for crater age determination and topography. IFOV (Instantaneous Field of View, a measure of spatial resolution) of 50 microradians; FOV (Field of View, a measure of the area seen by the imager at any given time) of 4.6 x 3.4 degrees. | Map of the surface at the resolutions and coverage specified. | 1. Transport the spacecraft to the asteroid Psyche:<br>a. Enter into near-circular, near-polar orbit<br>b. Provide a 365-day stay with sufficient lighting for surface imaging<br>2. Provide at least four orbital altitudes (distances from the surface) at Psyche for measurements & observations.<br>3. Achieve observing geometry (the angle that the imager views the surface) for stereo-imaging capability for topography.<br>4. Provide imaging of >80% of surface topography<br>5. Deliver science data to science community. |