



November 8, 2019

SMD/Director, Astrophysics Division

TO: Prof. Fiona Harrison, Co-Chair Astro2020 Decadal Survey
Prof. Robert Kennicutt, Co-Chair Astro2020 Decadal Survey

RE: NASA assessment of large mission concept studies

The NASA Astrophysics Division sponsored four large-scale mission concept studies as part of NASA's preparations for the Astro2020 Decadal Survey.

The four large mission concept studies, led by community-driven Science and Technology Definition Teams (STDTs) are: Habitable Exoplanet Observatory (HabEx), Large Ultraviolet Optical Infrared Surveyor (LUVOIR), Lynx X-ray Observatory (Lynx), and Origins Space Telescope (Origins).

As part of the process of developing and preparing the STDT Final Reports for submission to NASA and the 2020 Decadal Survey, the NASA Astrophysics Division tasked an independent assessment team called the Large Mission Concept Independent Assessment Team (LCIT) to conduct a technical, risk, and cost assessment of the four concept studies.

The objectives of the LCIT in conducting this cost and technical credibility analysis were to:

- Provide feedback to the STDTs (based on their Interim and draft Final Reports) that could be used to improve the STDT Final Reports before they are submitted to the 2020 Decadal Survey, and
- Provide the NASA Astrophysics Division Director confidence in the STDT Final Reports and the science, technical, cost and risk conclusions in the STDT Final Reports.

The LCIT was not to evaluate the scientific merit of the concepts, but only assess if the science objectives can be accomplished by the mission concept given the observatory and instrument specifications and requirements.

Each STDT Final Report includes multiple architectural choices for the mission concepts. The LCIT assessed specific architectures, and they did not assess all of the architectures that the STDT Final Reports includes.

The technical, risk, and cost conclusions included with each STDT Final Report has been developed by the organizations which are best qualified to develop such conclusions, that is the STDTs and the Center-based Study Teams. The report of the LCIT is an external, independent, non-advocate assessment of each study's conclusions.

Both the STDT advocate assessments and the LCIT non-advocate assessments represent legitimate attempts to estimate the technical, cost, and schedule resources required to implement the mission concept. Any difference represents the normal uncertainty in assessing the resource requirements for mission concepts in pre-Phase A that have not been funded to conduct the full suite of necessary trade studies. The TRACE assessment will represent a third independent assessment of these mission concepts.

Enclosed with this memorandum is the Public Final Report of the Large Mission Concept Independent Assessment Team.

Please contact me if you have any questions about this Report.

A handwritten signature in blue ink, appearing to read 'P. Hertz', with a stylized flourish at the end.

Paul Hertz
Director, Astrophysics Division
Science Mission Directorate