

The National Academies of
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AIR FORCE STUDIES BOARD

&

INTELLIGENCE COMMUNITY STUDIES BOARD

(U) Acquisition Strategies for Future Space Optics

(U) Dissemination Activities Overview



(U) Committee Members and Staff

(U) Future Optics Study Committee

(U) Dr. Robert Erlandson, JHU Applied Physics Lab

(U) Dr. Lee Feinberg, NASA JWST Optics Program manager

(U) Dr. William Jeffries, SRI CEO, Former NIST Director

(U) Letitia A. Long, Former NGA Director

(U) Dr. L. Roger Mason, Jr., (Study Chair), Intelligence Community Studies Board

(U) Dr. Brian Shaw, NDU Provost and former National Intelligence Officer

(U) National Academies Staff

(U) Dr. Joan Fuller, Deputy Executive Director, Engineering and Physical Sciences Division

(U) Dr. John Montgomery, Study Director (former NRL Director)

(U) Steven Darbes, Research Associate

(U) Dr. George Coyle, Dissemination Lead

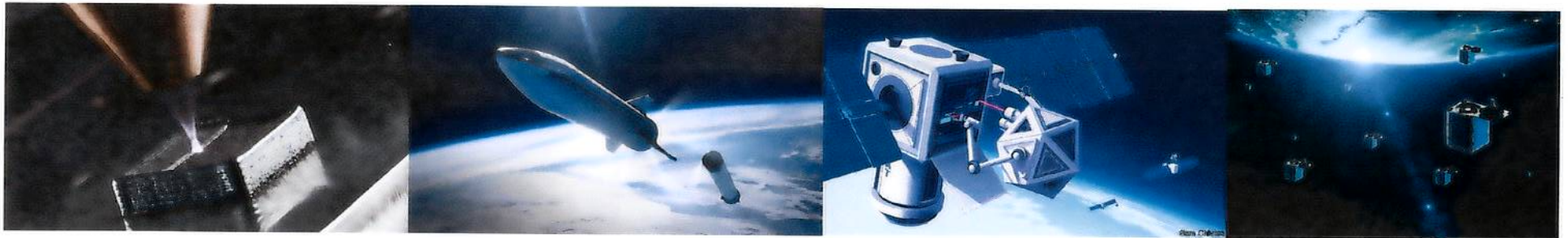
(U) Study Background

(U) In collaboration with the Intelligence Community Studies Board (ICSB), the Air Force Studies Board (AFSB) executed a Congressionally requested classified study on space optics in 2018.

(U) While the full report is classified, a portion of the statement of task was unclassified as are the findings and recommendations for that task item.

(U) The study committee identified commercial and non-defense investments in both infrastructure and emerging technology as areas appropriate for collaboration and strategic partnerships.

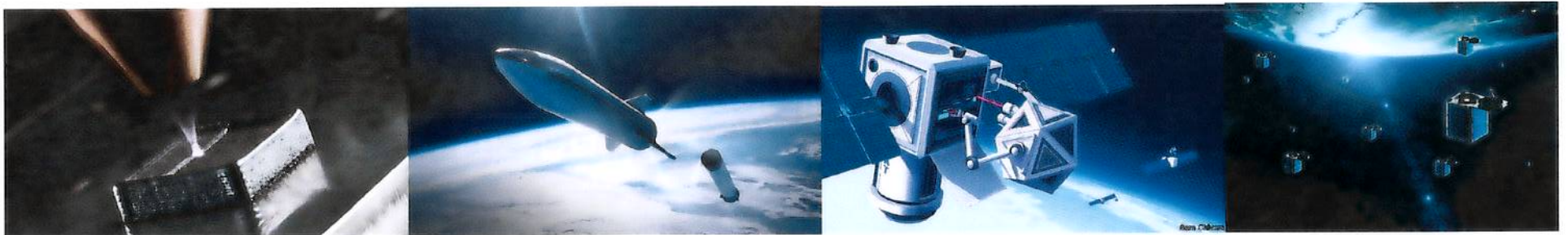
- Additive manufacturing, commercial launch, on-orbit sustainment, small satellites, etc.



(U) Task Statement

(U) Congressionally directed study requesting the National Academies to evaluate the following

(U) Task 4: Evaluate opportunities to better inform future technology decisions.



(U) Task 4 Summary

(U) Future technology decisions can be further informed by commercial launch provider plans, collective interagency investments with NASA and DARPA and exploring ideas for revolutionary mirror design concepts.

(U) Leveraging commercial space launch

(U) Commercial launch investments in larger fairings, volume and lift capacity simplify large optics paths and reduce government capital investments if sustained.

(U) Opportunity for increased inter-agency collaboration

(U) NASA experience with JWST, other programs and decadal study results offer reciprocal synergies.

(U) DARPA's work on robotic servicing is foundational to future assembly on orbit options.

(U) Common technology needs create opportunities for combined investments and rationalized, interdependent technology roadmaps.

(U) Revolutionary Mirrors

(U) Industry ideas for revolutionary mirrors show interest and imagination that could benefit multiple government space missions.

(U) Examples include magnetic membranes, inflatable apertures, cured liquid mirrors and holographic lens.

(U) Task 4: Recommendations

No.	Type	Finding or Recommendation
4.1	R	(U) The opportunity exists to increase interagency collaboration for large optics with NRO, NASA, DARPA and other labs who share relevant mission needs that require large optics. Lessons learned from adjacent space vehicles like James Web Space Telescope (JWST) and space robotics programs at NASA (Restore-L) and DARPA (RSGS) provide valuable insight that will inform NRO programs in this area. The future looking NASA Decadal studies will provide additional insight from which to build collective interagency technology development and investment plans that increase leverage across existing resources. Furthermore, more formalized collaboration through a large optics technology working group from multiple agencies can be valuable to sustain the technical exchange and problem solving efforts.
4.2	R	(U) Early efforts to forge new partnerships with new entrant commercial launch providers are well placed and it's desirable to increase the understanding of future plans dealing with larger volume launch vehicles with heavy lift capacity to mitigate some of the earlier constraints or complexity with aperture size. The market economics of these companies are driving capability enhancements that will be of dual use to NRO needs assuming that the investments are sustained over the necessary time horizon. If these commercial investments cease, then the government will have to make alternative investments that will increase costs and schedule.
4.3	R	(U) The infrastructure to engineer, develop, manufacture, transport and launch large optics space vehicles poses new challenges than the earlier classes of satellites. A detailed system study of anticipated infrastructure changes to accommodate these new satellites should be conducted in the near term so that necessary modifications can be addressed in time (e.g., size capacity and redundancy of the vehicle used to transport the space vehicle).

(U) Dissemination Activities

(U) The committee members are currently finalizing plans with the sponsor for a series of follow-on dissemination meetings that will focus on deeper discussions designed to highlight opportunities for collaboration and strategic partnerships.

(U) Dissemination Plan:

- (U) Solicit feedback from relevant boards in DEPS.
- (U) Committee will identify themes and potential participants for follow-on dissemination meetings.
- (U) AFSB and ICSB staff will work with the sponsor to schedule dissemination meetings and determine classification level for each discussion.
- (U) Convene meetings to connect relevant parties in a classified or unclassified space.
- (U) No written products will be produced from the dissemination activities.