Thomas J. Colvin, Ph.D.

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Rational Futures

SELECTED EXPERIENCE

NASA

Senior Policy Advisor — Mar 2022 - Apr 2025

Produced two cost-benefit analyses of space debris mitigation, tracking, and cleanup. These have received international acclaim, guided technology investments at NASA, and changed NASA's policy on debris cleanup.

Led two NASA-wide Tiger Teams to develop strategies for space sustainability in Earth orbit and on the Moon. Resulted in a congressionally approved reorganization of NASA to increase flexibility and accountability.

Organized a workshop with 20 world-leading experts to design a technology development plan for a high-energy laser system.

Created 5 funding solicitations for technologies related to orbital debris.

IDA Science and Technology Policy Institute

Research Staff — Aug 2018 - Mar 2022

Led multi-disciplinary teams of researchers on ~20 studies to support senior decision-makers in the White House, NASA, and DOD. Topics included:

- Civil space, Commercial Space, Extreme Space Weather, Quantum, AI, China, Terrestrial Mining, Energy Markets, Resilience to Electromagnetic Pulses, Proposed Regulations, etc.

Supported the development of 10 national policy and strategy documents.

Department of Defense

Operations Research Analyst — Sep 2017 - Aug 2018

Provided analysis to affect long-term DOD planning regarding:

- Disruptions to DOD operations caused by additive manufacturing.
- Enterprise-wide investments in artificial intelligence (AI).

U.S. Agency for International Development

Research Advisor — Sep 2016 - Aug 2017

Managed portfolio of 27 research grants across six South Asian countries.

EDUCATION

Stanford University — *Ph.D. in Aeronautics and Astronautics*

Jun 2010 - Aug 2016

Ohio State University — *B.S. in Physics*

Sep 2003 - Mar 2008

SKILLS

Provided analyses and advice to White House, DoD, and NASA leadership for 7.5 years.

Deep expertise in space technologies and operations; experience in directed energy and economics; and familiarity with artificial intelligence (AI), quantum technologies, and advanced manufacturing.

Scoped and led ~30 studies that analyze the implications of emerging technologies.

Led the creation of 2 Agency strategies and contributed to 10 National policy documents

Built trusted relationships with stakeholders from White House and Agency leadership to bench-level engineers and system operators.

Awarded NASA's prestigious Exceptional Technology Achievement Medal

Eligible for TS//SCI

SELECTED RESEARCH PUBLICATIONS

Colvin, Thomas J. and Jericho Locke. 2024. "Exploring the Use of a Ground-Based Laser System to Deorbit Small Orbital Debris." Annual Directed Energy Science and Technology Symposium

Colvin, Thomas J. and Jericho Locke. 2024. "A Cost and Benefit Analysis of Orbital Debris Remediation, Mitigation, Tracking, and Characterization". 75th International Astronautical Congress (IAC)

Locke, Jericho, Thomas J. Colvin, et al. 2024. "Cost and Benefit Analysis of Mitigating, Tracking, and Remediating Orbital Debris." NASA Office of Technology, Policy, and Strategy.

Colvin, Thomas J, John Karcz, and Grace Wusk. 2023. "Cost and Benefit Analysis of Orbital Debris Remediation." NASA Office of Technology, Policy, and Strategy.

Crane, Keith W, Thomas J. Colvin, Abby R. Goldman, Emily R. Grumbling, and Andrew B. Ware. 2021."Economic Benefits and Losses from Foreign STEM Talent in the United States." Science and Technology Policy Institute.

Colvin, Thomas J, et al.. 2021. "Assessing Potential Demand for Orbital Outposts." Science and Technology Policy Institute

Colvin, Thomas J, Keith W. Crane, Rachel Lindbergh, Rina L. Zhang. 2021. "Encouraging Non-Federal Investment in Lunar Surface Capabilities." Science and Technology Policy Institute.

Crane, Keith W, et al. 2021. "Environmental Costs of Solar and Wind Power and Utility-Scale Batteries." Science and Technology Policy Institute.

Colvin, Thomas J. 2020. "Rough Cost and Performance Estimates for Sending Starship to TLI and Mars." Science and Technology Policy Institute.

Colvin, Thomas J, Cara P Cavanaugh, and Rachel Lindbergh. 2020. "Rapid Technical Assessment of FCC's Proposed Rules for Orbital Debris." Science and Technology Policy Institute.

Colvin, Thomas J, Keith Crane, and Bhavya Lal. 2020. "Assessing the Economics of Asteroid-Derived Water for Propellant." Acta Astronautica 176 (May): 298–305.

Colvin, Thomas J, Keith W Crane, Rachel Lindbergh, and Bhavya Lal. 2020. "Demand Drivers of the Lunar and Cislunar Economy." Science and Technology Policy Institute.

Colvin, Thomas J, Irina Liu, Talla F. Babou, and Gifford J Wong. 2020. "A Brief Examination of Chinese Government Expenditures on Artificial Intelligence R & D." Science and Technology Policy Institute.

Liu, Irina, Evan Linck, Bhavya Lal, Keith W. Crane, Xueying Han, and Thomas J. Colvin. 2019. "Evaluation of China's Commercial Space Sector." Science and Technology Policy Institute.

Colvin, Thomas J, Keith Crane, and Bhavya Lal. 2019. "Assessing the Economics of Asteroid-Derived Water for Propellant." In Proceedings of the 70th International Astronautical Congress (IAC), Washington D.C., United States, 21-25 October 2019, 21–25.

Reeves, Geoffrey, Thomas J Colvin, and Jericho Locke. 2019. "Next Step Space Weather Benchmarks." Science and Technology Policy Institute, no. December.

Colvin, Thomas J, Talla F. Babou, Keith W Crane, Irina Liu, and Gifford J Wong. 2019. "A Tentative Framework for Examining U.S. and Chinese Expenditures for Research and Development on Artificial Intelligence." Science and Technology Policy Institute.

Lal, Bhavya, Benjamin A Corbin, Roger M Myers, Keith W Crane, Thomas J Colvin, and Cara P Cavanaugh. 2018. "An Assessment of the Ability of the United States and Other Countries to Extract and Utilize Asteroid-Based Natural Resources Bhavya Lal." Science and Technology Policy Institute.

Colvin, Thomas J. 2016. "Compact Envelopes: An Efficient and Provably Safe Approach to Air and Space Traffic

Integration." In Stanford University Dissertation Publishing.

Colvin, Thomas J, and Juan J Alonso. 2015. "Near-Elimination of Airspace Disruption from Commercial Space Traffic Using Compact Envelopes." In AIAA Space 2015 Conference and Exposition, 1–13.

Colvin, Thomas J., and Juan J Alonso. 2015. "Compact Envelopes and SU-FARM For Integrated Air-and-Space Traffic Management." In 53rd AIAA Aerospace Sciences Meeting.

Colvin, Thomas J. 2008. "Using the Stochastic Variational Method in Momentum Representation to Solve Nuclear Few-Body Problems." Undergraduate Honors Thesis, The OSU Knowledge Bank.

Colvin, Thomas J. 2007. "Study of K-Short Production With The BABAR Experiment." In SLAC Technical Notes, SLAC-TN-07.

NATIONAL AND AGENCY STRATEGIC DOCUMENTS TO WHICH I HAVE CONTRIBUTED

[Emerging Strategy Awaiting Review by NASA Leadership]	[2025]
NASA Space Sustainability Strategy, Volume 1: Earth Orbit	2024
National Cislunar Science & Technology Strategy	2022
National Orbital Debris Implementation Plan	2022
National Orbital Debris Research and Development Plan	2021
Common Technology Roadmap for Development of Nuclear Reactors for Space Exploration and National Defense	2020
In-Space Servicing, Assembly, and Manufacturing National Strategy	2020
Research and Development Needs for Improving Resilience to Electromagnetic Pulses	2020
Implementation Plan for the National Space Weather Strategy	2020
Federal Operating Concept for Impending Space Weather Events	2019
Executive Order 13865: Coordinating National Resilience to Electromagnetic Pulses	2019
National Space Weather Strategy and Action Plan	2019