

ZACHARY GALLAGHER PIRTLE

Curriculum vitae

Professor of Practice
College of Global Futures
Deputy Director
Consortium for Science, Policy and Outcomes
Arizona State University

Based in Washington DC
zachpirtle@gmail.com
Rev. 5.27.02026

EDUCATION

- 2020 Ph.D, Systems Engineering
George Washington University, Washington, DC
Dissertation Title: *Generative Independence: A Programmatic Analysis Framework for Complex Systems Engineering*
Committee: Zoe Szajnfarder (GWU, Chair), Jay Odenbaugh (Lewis and Clark), Thomas Mazzuchi (GWU) and Jay Falker (NASA)
- 2009 M.S. in Civil and Environmental Engineering
Arizona State University, Tempe, Arizona
- 2007 B.A. in Philosophy.
Arizona State University, Tempe, Arizona
- 2007 B.S. in Mechanical Engineering,
Arizona State University, Tempe, Arizona

ACADEMIC AND PROFESSIONAL APPOINTMENTS

- 2026-present **Deputy Director**, Consortium for Science, Policy, and Outcomes, Arizona State University. Based at ASU's Washington DC building.
- 2026-present **Professor of Practice**. College of Global Futures. Arizona State University. Based at ASU's Washington DC building.
- 2020-2026 **Program Executive, Program Management Engineer**. Exploration Science Strategy Integration Office, Science Mission Directorate, NASA Headquarters
- 2022-2025 **Senior Policy Analyst**. Office of Technology, Policy and Strategy, Office of the Administrator, NASA Headquarters

- 2021 **Study Team Member and Independent Assessment Policy Lead**, Agency-Commissioned Special Study Team on Cost Analysis and Program Evaluation, NASA Headquarters, March-June
- 2020-2022 **Professorial Lecturer**. Department of Engineering Management and Systems Engineering, George Washington University.
- 2018-2020 **Operations Research Analyst, Exploration Portfolio**, Strategic Investments Division, Office of the Chief Financial Officer, NASA Headquarters
- 2016-2020 **Programmatic Assessment Team Lead** (part-time) and Board Member, NASA, Independent Standing Review Board for the James Webb Space Telescope
- 2016-2018 **Life Cycle Review Engineer and Policy Lead**, Exploration Systems Development (ESD), Programmatic and Strategic Integration, NASA
- 2016 **Science Budget Account Manager** (detail), Office of the Chief Financial Officer, Budget Division, NASA Headquarters
- 2012-2016 **Program Management Engineer for Program Integration**, Exploration Systems Development (ESD), Programmatic and Strategic Integration, NASA
- 2011 **Rotational PMF Engineering Assignment**, Joint Polar Satellite System (JPSS) Program Office, NASA Goddard Space Flight Center
- 2010-2012 **Presidential Management Fellow**, Exploration Systems Mission Directorate, NASA Headquarters
- 2009-2010 **Consultant and Synthesis Report Author**, Consortium for Science, Policy and Outcomes, Clean Air Task Force, Washington, DC
- Fall 2009 **Mirzayan Science and Technology Policy Fellow**, National Academy of Engineering, Washington, DC
- 2008-2009 **Fulbright García-Robles Scholar**, U.S. Department of State / COMEXUS, Zacatecas & Mexico City, Mexico
- 2007-2008 **Graduate Research Assistant**, Center for Earth Systems Engineering and Consortium for Science, Policy, and Outcomes (CSPO), Arizona State University, Tempe, AZ
- 2005-2007 **Research Intern**, Center for Nanotechnology in Society / CSPO, Arizona State University, Tempe, AZ
- 2004-2005 **Project Development and Stress Engineering Intern**, Honeywell Aerospace, Tempe, AZ

PUBLICATIONS

PEER REVIEWED BOOKS

- Pirtle, Zachary. (Book proposal contracted, final peer review of manuscript pending). *An Epistemology of Engineering Practice: How Engineer's Know*. Springer Press's series on Philosophy of Engineering and Technology (POET).
- Pirtle, Zachary and Oliver Shuey and Michael Poznic. (in preparation). *Conceptual Foundations of Engineering: Integrating Knowledge and Responsibility*. Book volume drawing from the 2024 Forum on Philosophy, Engineering and Technology.
- Pirtle, Zachary, and David Tomblin, Guru Madhavan (editors). 2021. *Engineering and Philosophy: Reimagining Technology and Social Progress*. Published in June 2021 by Springer Press series on Philosophy of Engineering and Technology (POET). ([link](#)).

REFEREED JOURNAL ARTICLES

- Stacey, M., Eckert, C., [Pirtle, Zachary G.*](#), Poznic, M., Schuelke-Leech, B.A. and von der Tann, L., 2025. Methods as a form of engineering knowledge. *Design Science*, 11, e12.
- Durán, Juan M; and [Pirtle, Zachary](#). 2020. Epistemic Standards for Participatory Technology Assessment: Suggestions Based Upon Well-Ordered Science. *Science and Engineering Ethics*. 26:3, 1709-1741.
- Pirtle, Zachary; and Moore, Jared; 2019. Where Does Innovation Come From?: Project Hindsight, TRACES, and What Structured Case Studies Can Say About Innovation. *IEEE Technology and Society Magazine*. 38:3, 56-67.
- Pirtle, Zachary; and Odenbaugh, Jay; Hamilton, Andrew; Szajnfarder, Zoe; 2018. Engineering Model Independence: A Strategy to Encourage Independence Among Models. *Techné: Research in Philosophy and Technology*. 22:2, 191-229.
- Wiltshire, T.J., Butner, J.E. and [Pirtle, Z.](#) 2017. Modeling Change in Project Duration and Completion: Scheduling Dynamics of NASA's Exploration Flight Test 1 (EFT-1) Activities. *Nonlinear dynamics, psychology, and life sciences*, 21(3), 335-358.
- Tomblin, David; [Pirtle, Zachary](#); and Farooque, Mahmud; Sittenfeld, David; Mahoney, Erin; Worthington, Rick; Gano, Gretchen; Gates, Michele; Bennett, Ira; Kessler, Jason; 2017. Integrating Public Deliberation into Engineering Systems: Participatory Technology Assessment of NASA's Asteroid Redirect Mission. *Astropolitics*. 15:2, 141-166.
- Bertrand, Pierre; [Pirtle, Zachary](#); and Tomblin, David; 2017. Participatory technology assessment for Mars mission planning: Public values and rationales. *Space Policy*, 42.

Pirtle, Zachary; and Meyer, Ryan; Hamilton, Andrew; 2010. What does it mean when climate models agree? A case for assessing independence among general circulation models. *Environmental Science & Policy*. 13:5, 351-361.

BOOK CHAPTERS

Pirtle, Zachary, 2022. Humans, Machines, and an Ethics for Technology in Dune. In: K. Decker (editor) *Dune and Philosophy: Minds, Monads, and Muad'Dib*, Wiley-Blackwell, pp.76-86.

Older, Malka; and Zachary Pirtle. 2021. Imagined Systems: How the Speculative Novel Infomocracy Offers a Simulation of the Relationship Between Democracy, Technology, and Society. In: Zachary Pirtle et al (eds): *Engineering and Philosophy: Reimagining Technology and Social Progress*, Springer Press, pp. 323-339.

Pirtle, Zachary; and David Tomblin, Guru Madhavan. 2021. Reimagining Technology and Social Progress. In: Zachary Pirtle, David Tomblin, et al (eds): *Engineering and Philosophy: Reimagining Technology and Social Progress*. Springer Press.

Pirtle, Zachary; and Odenbaugh, Jay; Szajnfarder, Zoe; 2018. "The One, the Few or the Many?": Using Independence As a Strategy in Engineering Development and Modeling." *The Future of Engineering: Philosophical Foundations, Ethical Problems and Application Cases*. Springer Press, pp. 13-31.

Pirtle, Zachary; and Tomblin, David; 2017. Well-Ordered Engineering: Participatory Technology Assessment at NASA. In: Pitt, JC. and Shew, A. (eds). *Space For the Future: A Companion for the Philosophy of Technology*, Routledge Press, pp. 314-325.

Pirtle, Zachary, and Zoe Szajnfarder. 2017. On Ideals for Engineering in Democratic Societies. In: Michelfelder D., Newberry B., Zhu Q. (eds) *Philosophy and Engineering: Exploring Boundaries, Expanding Connections*, vol 26, Springer, https://doi.org/10.1007/978-3-319-45193-0_8

Pirtle, Zachary; 2013. Engineering Innovation: Energy, Policy, and the Role of Engineering. In: D. Michelfelder et al (eds). *Philosophy and Engineering: Reflections on Practice, Principles and Process*, Springer, pp. 377-390.

Pirtle, Zachary; 2010. How the models of engineering tell the truth. In: van de Poel, Ibo and David Goldberg. *Philosophy and Engineering: An Emerging Agenda*, Springer, pp. 95-108.

EDITOR REVIEWED (NON-REFEREED) ACADEMIC ARTICLES

Pirtle, Zachary G., 2025. Science and Society in the Long View: Neal Stephenson's Anathem as a Simulation of the Governance of Science. *SFRA Review*. 55:2. Pp. 35-54. Science Fiction Research Association.

Pirtle, Zachary; 2021. Book Review of Social Science for What? Battles over Public Funding for the ‘Other Sciences’ at the National Science Foundation: by Mark Solovey. *Journal for Responsible Innovation*.

Pirtle, Zachary; Unity of Engineering Disciplines. 2020. *The Bridge: Linking Engineering and Society*. National Academy of Engineering. Available at: <https://www.nae.edu/244705/Unity-of-Engi>

PUBLISHED NASA RESEARCH REPORTS AND INTERNAL POLICY MEMOS

Pirtle, Zachary, Hernandez, A. and Riegle, N. 2024. Responsible Exploration: Ethical, Legal, and Societal Implications of the Artemis campaign and NASA’s Moon to Mars Architecture. 2024 Moon to Mars Architecture Concept Review White Paper. [Link](#)

Marissa Herron and [Zachary Pirtle](#). 2024. Memo on proposed approaches for lunar site preservation. Internal memo to the Deputy Administrator.

Ray, Grace and [Zachary Pirtle](#). 2024. Memo on proposed mechanisms for NASA’s policy processes to consider Ethical, Legal and Societal Implications. Internal memo to the Deputy Administrator.

Pirtle, Zachary and Amanda Hernandez. 2024. Memo on organizing, implementing and assessing a workshop at the International Space University theme day workshop on the Ethical, Legal and Societal Implications of Space Exploration. Internal memo to the Deputy Administrator.

Pirtle, Zachary, Amanda Hernandez and Natasha Riegle. 2024. Memo on NASA partnering with the National Science Foundation on how to foster a community of researchers focused on Ethical, Legal and Societal Implications of Space Exploration. Internal memo to the Deputy Administrator.

Pirtle, Zachary, McBrayer, K. and Beauchemin, A., 2023. Artemis, Ethics and Society: Synthesis from a Workshop. NASA Office of Technology, Policy, and Strategy. Report ID 20230012799. [Link](#)

Pirtle, Zachary, and Katie McBrayer. 2023 Recommendations to the Administrator for NASA research and policy on the Ethical, Legal and Societal Implications of Moon to Mars exploration. Internal memo to the Deputy Administrator.

OTHER PUBLICATIONS

Tiffany Smith and [Zachary Pirtle](#). 2024. Engineering A Bridge Across Cultures: Insights to Support Dialogue with Engineering Professionals on Ethical and Social Design Considerations. *2024 ASEE Annual Conference and Exposition*. American Society for Engineering Education.

Pirtle, Z., Farooque, M., Gano, G., Guston, D., Kaminski, A., Kessler, J., Mahoney, E., Sittenfeld, D., Tomblin, D. and Worthington, R., 2015. The public informing upstream engineering: A participatory technology assessment of NASA's asteroid initiative. In *AIAA SPACE 2015 Conference and Exposition*, p. 4651.

Smith, M., Mcconnaughey, P.K., Hill, W.C., Dumbacher, D. and Pirtle, Z.T.. 2012. A Technical Integration Approach for NASA's Deep Space Human Exploration Programs. Paper IAC-14-B3. 1, 65th International Astronautical Congress, Toronto, Canada.

Pirtle, Zachary. 2007. Climate Models as Heuristics. *The Triple Helix: Undergraduate Journal for Science, Society and Law*.

Pirtle, Zachary. 2006. Nanotechnology: Constructing a Proactive Science Policy toward Democracy. *The Triple Helix: Undergraduate Journal for Science Society and Law*.

OTHER WRITING

2016 "Rogue One as an Engineering Ethics Case Study." 2016 blogpost on my website, scifipolicy.com. Had over 100 thousand reads within a week of the release of the *Rogue One: A Star Wars Story* movie. [Link](#).

ACADEMIC AND PROFESSIONAL PRESENTATIONS

INVITED ACADEMIC LECTURES

2026 Panelist, online webinar: "How do Moon Missions Reflect Changes in Science's Social Contract." Hosted by *Issues in Science and Technology* magazine. May 20th [Link](#)

2026 Invited Keynote Speaker: Ethics, Epistemology and Engineering Workshop. Hosted by the Center for Science, Ethics and Public Policy. University of Delaware. April 24-26.

2025 Plenary session presenter and participant. "Parallel Paths in Systems Engineering: Uncertainty and Evaluation Across Multiple Engineering Life Cycles." Science funding workshop, Hosted by the The Consortium for Socially Relevant Philosophy of/in Science and Engineering (SRPoiSE) and the Ann Johnson Institute on issues in science funding policy. Virtual. July 10.

2024 Requested speaker to a special plenary session of the Philosophy of Science Association Outreach and Engagement Committee. Title: "Philosophy of Science as an Influence in NASA's Artemis and Ethics Report." PSA biennial meeting 2024, New Orleans, LA. , November 14.

2024 "Reflections on Responsible Exploration." Invited to give the George H. and Faye C. Sparks Forum on Ethics and Engineering, by the Georgia Tech School of Public Policy. October 30.

- 2024 “It’s Nowhere Near Enough: Philosophy of Engineering Use Cases in Practice to Date.” Special Session on Engineering and Philosophy organized by Daniel Marom for the 2024 Forum on Philosophy, Engineering and Technology. Karlsruhe Institute of Technology. September 17.
- 2024 Invited keynote Bovay lecture on Engineering Ethics. Texas A&M University. Titled: “Reflections on Engineering and Society in the New Era of Space Exploration.” Invited by the Department of Philosophy, Texas A&M. April 8.
- 2024 Pirtle, Zachary, with Jacques Arnould (CNES) and Roberta Gregori (ESA). July 11th. Formulated and led Ethics Theme Day lectures with Workshop at the International Space University, titled “Responsible Lunar and Martian Exploration: Drawing on Diverse Perspectives on Ethical, Legal, and Societal Implications (ELSI) of Exploration.” ISU Space Studies Program 2024, Rice University, Houston Texas.
- 2023 Artemis, Ethics and Society briefing to Johns Hopkins University-led Lunar Surface Innovation Consortium in Pittsburgh, PA, November 2023.
- 2023 Artemis, Ethics and Society briefing to the Lunar Exploration and Analysis Group annual meeting at the Johns Hopkins University, Applied Physics Lab, September 2023.
- 2023 “What do Maintainers Know and How do they Know it? Revised Perspectives on Engineering Maintenance.” Invited briefing to the Maintenance Special Interest Group of the Society for Philosophy and Technology. March 9.

CONFERENCE PRESENTATIONS

- 2024 “Toward a more reflective engineering: Reflections on the Forum on Philosophy, Engineering and Technology.” International Network for Engineering Studies annual meeting. Virtual. Nov 13.
- 2024 “How Engineering Knowledge Gets ‘Validated’: Peer Review via Systems Engineering Life-Cycle Reviews.” Research presentation at the Forum on Philosophy, Engineering, and Technology. Karlsruhe Institute of Technology, Germany. Sept 17.
- 2023 “How do engineers model engineering work? Contrasting cost and schedule models to understand modeling practices in complex system developments.” Forum on Philosophy, Engineering and Technology, TU Delft. April.
- 2022 Engineering Model Independence: A Strategy to Encourage Independence Among Models. Conference: Beyond Models: Workshop on Model Independence in Physics. June 14-15. Uni. Bonn.

- 2022 “Philosophy of Science in Government?: Working with Practitioners on Deliberations of Public Values in Engineering.” Institutions and the Scientific Research Agenda, hosted by the Center for Philosophy of Science, University of Pittsburgh.
- 2021 (with Martin Stacey, Claudia Eckert, et al.) “Knowledge for Practicing Engineers and Philosophers: Reconsidering Walter Vincenti’s What Engineers Know and How They Know It.” Annual Meeting of the Society for Philosophy and Technology. June
*Substantially updated and presented at fPET 2023 with same title.
- 2020 “Philosophy into Engineering Practice: Reflections on pushing two disciplines together, via fPET and my career”. Presented at the IEEE Society for Societal Implications of Technology, International Symposium on Technology and Society. (Online, hosted by Arizona State University.)
- 2020 “Engineering Humility: Potential Connections between Epistemology and Values-focused Deliberation.” Forum on Philosophy, Engineering and Technology. (Online, hosted by Universidad Tecnica Federico Santa Maria.)
- 2020 Ambassador on the prospects for philosophy of engineering in the United States. Forum on Philosophy, Engineering and Technology. (Online, hosted by Universidad Tecnica Federico Santa Maria.)
- 2018 “Epistemology driving policy?: Project Hindsight and the role of empirical studies in informing debates on the linear model of innovation”. Forum on Philosophy, Engineering and Technology. May 28. University of Maryland College Park.
- 2018 “Project Hindsight Reconsidered: Reflecting on How Engineers can Study the Sources of Innovation.” IEEE Society for Social Implications of Technology, International Technology and Society Symposium, George Washington University. Nov. 13-14.
- 2016 (with David Tomblin) “Well Ordered Engineering? Using Participatory Technology Assessment to Inform Major Engineering Decisions”. 2016 Forum on Philosophy, Engineering and Technology. Friedrich Alexander University, Nuremberg, Germany. May 19.
- 2016 Plenary kickoff session speaker. “What do Maintainers know and how do they know it? Lessons from NASA exploration systems.” Maintainers 1 conference by Lee Vinsel and Andrew Russell. Stevens Institute of Technology.
- 2016 (with Jay Odenbaugh and Zoe Szajnfarber) “Independent, Parallel Paths in Systems Engineering: Principles for Developing System and Technology Portfolios.” 2016 Forum on Philosophy, Engineering and Technology. Friedrich Alexander University, Nuremberg, Germany. May 19.
- 2016 (with Andrew L. Hamilton and Zoe Szajnfarber) “Engineering Model Independence: What should be the Strategy of Model Building in Engineering Systems?” Council on

- Engineering Systems Universities (CESUN) 2016 symposium at George Washington University.
- 2015 “Dissimilar Development Strategies for Space Science” Technology Management and Policy Graduate Consortium, Carnegie Mellon University, June.
- 2015 Tomblin, David, Victoria Friedenson, and Z. Pirtle et al. “Citizen Deliberations about Planetary Defense: A Participatory Technology Assessment of NASA’s Asteroid Initiative”, presented at the 2015 Planetary Defense Conference. April 13-17, Frascati, Italy.
- 2014 “Independence as an Epistemic Strategy in Engineering” at the Forum on Philosophy, Engineering and Technology, May 28. Virginia Tech.
- 2009 (invited speaker). “La nanotecnología en México: la evaluación de tecnología y los impactos sociales” Fourth Congress on Nanotechnology. University of Guadalajara, Lagos de Moreno. July.
- 2007 “The Philosophy of Science and the Epistemology of Engineering” Workshop on Philosophy and Engineering, October 29-31. Technical University of Delft, Netherlands.
- 2007 (with Ryan Meyer) “Are General Circulation Models Robust?: A Discussion of Model Independence and Robustness” Annual Meeting of the Society for Social Studies of Science, October, Montreal, Canada.
- 2007 “The Model Based Approach to Engineering Theory” Biannual Meeting of the Society for Philosophy and Technology, July, Charleston, South Carolina.
- 2007 “Models and Predictions: Philosophical Views on the Use of Models in Policy” STGlobal: Science and Technology in Society Interdisciplinary Graduate Student Conference, April, Washington D.C.

RESEARCH POSTERS:

- 2014 “Path Dependence, Social Construction and Hierarchy in Systems Engineering,” 4th International Engineering Systems Symposium. Stevens Institute for Technology, Hoboken, NJ. June.
- 2008 “Governance with Models: Examining Robustness Surrounding the Levees in New Orleans” to be presented at Gordon Research Conference on Governing Emerging Technology, August, Big Sky, Montana
- 2007 (With Ryan Meyer) “Are GCMs Philosophically Robust?: A discussion of model independence and robustness” Presented at Southwest Hydrometeorology Symposium, September 20, Tucson, AZ

- 2007 “The Social Influences on Scientific Significance: Kitcher, the Unity of Science, and Democratized Science Policy” Presented at Celebrating Honors Thesis Symposium, April 2007, and ASU SOLUR Undergraduate Research Symposium, March
- 2006 “Ways of Arguing with Intelligent Design: Philosophers on Demarcation” Presented at American Association for the Advancement of Science annual meeting in San Francisco, February 2007 and ASU SOLUR Undergraduate Research Symposium, March

PODCASTS

- 2024 NASA podcast *Small Steps, Giant Leaps. 2024*. Pirtle interviewed by Teresa Carey. “Episode 121: The Artemis and Ethics Report Explained.” [Link](#)
- 2024 Issues in Science and Technology podcast. Pirtle interviewed by Lisa Margonelli. “Zach Pirtle Explores Ethics for Mars Landings.” [Link](#).
- 2020 Wisdom@Work podcast interview, by philosopher David Storey on non-academic careers for philosophers. [Link](#)

STUDENT AND EARLY CAREER MENTORING AND SUPERVISION

Ph.D. Dissertation Committee member:

- **Kendall Giles**, Virginia Tech, Department of Science, Technology, and Society – Member. Dissertation on how the NIST Responsible AI Framework reflects and shapes theories from Science and Technology Studies. 2024-present.

Presidential Management Fellow (PMFs) mentoring: developmental assignments to NASA

- **PMF fellow from** U.S. Department of Justice – M.S. level detailee, June–Dec 2025. Assigned and oversaw policy workstreams leading to co-authorship of internal NASA memos and the *Responsible Exploration* white paper (2024).
- **PMF fellow from** U.S. Department of Energy – PMF detailee, six-month assignment in 2018. Guided qualitative coding analysis that contributed to *Durán and Pirtle (2020)*. Now a senior leader at the U.S. Department of Commerce.
- **PMF fellow from** U.S. Department of Agriculture – PMF detailee, mentored in 2019. Oversaw workflow, research framing, and professional development in NASA policy.

Graduate Student Mentoring:

- **Anna Wieger**, George Washington University – Graduate-level intern, Space Policy M.A. program. Guided research activities on NASA policy and acquisition systems; has since become a major contributor to NASA through Booz Allen Hamilton.

- **Pierre Bertrand**, MIT Technology and Public Policy MS Program – Summer 2016 full-time research intern; supervised qualitative analysis of NASA’s ECAST Citizen Forum on the *Journey to Mars* initiative, resulting in *Bertrand et al., Space Policy*, 2017.

Undergraduate Intern Mentoring:

- **James Bessoir**, Cornell University; Fall 2016 policy intern; conducted analytical review of contemporary science-fiction depictions of commercial spaceflight and presented findings at NASA HQ.
- **Victoria Nilsen**, George Washington University; Summer 2019 intern. I was supervisor and guided work leading to a widely shared book review on U.S. presidential transitions and space policy. VN later joined NASA as a civil servant.

TEACHING

EMSE 6801 Systems Engineering 1. Fall 2020, Fall 2021, Fall 2022. Graduate level introduction to Systems Engineering which I tailored to include a sociotechnical perspective. 12–18 master’s and Ph.D. students each semester. Received highly positive student evaluations. For the George Washington University Department of Engineering Management and Systems Engineering.

INVITATIONS TO SPEAK TO STUDENTS

July 2025, hosted 20 MIT science policy students and 50+ University of Virginia science policy students at NASA HQ for an overview of science policy and career paths.

July 2025, spoke to approximately ten students from James Madison University and Morgan State University’s Science Policy programs.

2011-present near-annual talks speaking to ASU’s Science Outside the Lab program that brings graduate students to DC to learn about policy activities. Received high marks from students.

ACADEMIC SERVICE

- 2025- present Co-chair, Steering Committee, Forum on Philosophy, Engineering and Technology
- 2024-present Associate Editor, *Engineering Studies* (journal).
- 2018-2024 Advisory Editor, *Engineering Studies* (journal).
- 2026 Co-chair with STS scholar David Tomblin and NAE engineer Guru Madhavan of the 2026 conference of the Forum on Philosophy, Engineering and Technology, University of Maryland College Park
- 2024 Co-chair with philosopher Prof. Rafaela Hillerbrad, 2024 annual conference of the Forum on Philosophy, Engineering and Technology. September. Karlsruhe Institute of Technology, Germany.
- 2018 Co-chair, with Guru Madhavan. 2018 annual conference of the Forum on Philosophy, Engineering and Technology. May. University of Maryland College Park

REFEREEING

Engineering Studies; Journal for General Philosophy of Science; Journal for Responsible Innovation; European Journal for Philosophy of Science; Journal for Science and Engineering Ethics; Techne: Research in Philosophy and Technology; Studies in History and Philosophy of Science, Astrobiology.

LANGUAGE SKILLS

Fluent Spanish speaker and writer

AWARDS

- 2025 NASA Group Achievement Award for the NASA Moon to Mars Ethical, Legal and Societal Implications Team.
- 2024 NASA Excellence in Innovation award, for leadership in conducting the OTPS Artemis and Ethics Workshop.
- 2021 NASA Early Career Achievement Medal. Across NASA, I was one of four to receive this award for accomplishments performed during my first ten years of service. My award was “For outstanding leadership in helping formulate NASA’s deep space exploration programs, with innovative application of the program management discipline.”
- 2012 NASA Headquarters Graduate Study Program. Competed for NASA to fund my PhD in systems engineering. Assessed how my PhD study aligned with NASA strategic goals.
- 2010 Presidential Management Fellow. This was how I entered the federal civil service. It is a highly competitive fellowship.
- 2008 Fulbright Scholar in Philosophy to Mexico.

NATIONAL SERVICE

- Nov 2024-2026: Helped architect Commercial Lunar Payload Services (CLPS) 2.0 acquisition strategy to evolve commercial lunar delivery contracts for higher reliability and insight.
- 2021-2026: Policy lead for NASA Inspector General and HQ responses on commercial acquisition, data-buy policy, and insight/oversight balance.
- 2020-2026: Lunar Technology development policy lead for SMD’s Technology Federation; aligned lunar investment priorities across NASA science programs.
- Apr 2023: Formulated and led NASA’s Ethical, Legal, and Societal Implications (ELSI) workshop, convening 35 external humanities and social science scholars and 20 NASA leaders to shape agency policy for Moon to Mars exploration.

Jun 2022-Dec 2024: Directed multi-directorate study on how exploration programs should integrate ELSI considerations into mission architecture, resulting in NASA guidance for responsible exploration in section 4.6 of its Architecture Definition Document.

2023-2024: Led preparation and peer review of four OTPS policy memos and the white paper “Responsible Exploration: Ethical, Legal, and Societal Implications of the Artemis Campaign and NASA’s Moon to Mars Architecture” (Dec 2024).

2023: Briefed senior NASA leadership and external policy audiences on responsible exploration research and inter-agency coordination for lunar sustainability.

2018-2020: Led OCFO’s oversight for Gateway and Human Landing System Acquisition Strategy Meetings, resulted in maintaining core cost control approaches such as tailored JCL and Agency Baseline Commitment methodologies.

2019: Co-chair of two person Exploration Mission-1 readiness assessment, a major study quantifying uncertainty across SLS, Orion, and Ground Systems to forecast launch delay risks, outbriefing to the NASA administrator.

2020: Served as programmatic assessment lead for the SLS and EGS rebaseline review, synthesizing technical and cost data into agency-level JCL briefings for the Associate Administrator.

2016-2020: Served as Board Member for the Independent Standing Review Board for the James Webb Space Telescope, provided expert assessment on how to resolve major schedule challenges that provided NASA with confidence to proceed to complete the satellite.

Fall 2017: Directed analysis and authored the decision memo for the Exploration Mission-1 schedule adjustment, establishing the approved ESD budget and schedule profile adopted by the Agency Program Management Council.

2017-2018: Conducted comparative cost assessment of Exploration Systems Development (ESD) production and operations versus Apollo; briefed findings to HEOMD leadership and informed congressional context on long-term cost competitiveness.

2016: Supported development of the Internal Science Funding Model, providing budget and policy guidance that led to Mission Support Council approval; transformed how NASA civil servants received funding

2015-2016: Served as technical monitor for NASA’s first in-depth study of ESD production and operations costs, shaping long-term affordability strategy and organizational planning.

2014-2015: Assessed life cycle costs and strategy for Mars mission planning, coauthoring a major presentation on mission planning and capability integration.

2014-2015: Defined best practices for human spaceflight programmatic analysis by leading a cross-NASA center workshop on life cycle review methods

- 2014: Critically assessed NASA's novel new systems engineering approach in coauthored NASA's first public description of the ESD integration model (Smith et al 2014).
- 2013-2015. Led programmatic assumptions for human spaceflight program confirmations (KDP-C) for Space Launch System, Orion spacecraft and ground operations; agency signed KDP-C decision memos in 2014–15.
- 2014-2015: Led Participatory Technology Assessment (PTA) partnership with the ECAST network on the Asteroid Initiative, pioneering citizen deliberation in NASA engineering decision-making.
- 2012: Authored a white paper (2012) advocating expansion of the Presidential Management Fellowship (PMF) program to recruit more STEM professionals, which NASA then successfully lobbied OPM for; led to increasing STEM finalists from ~2% to ~15% of the annual PMF cohort.
- 2011-2012: Culture change for cost control: Served as requirement owner for the ESD Level 1 "Design to Cost" requirement (R-21); led its transformation into a technical performance metric (TPM) and roll-out for cost control efforts.
- 2011-2012: Lead presenter for the Integration section of the ESD Monthly Program Status Reviews, briefing senior management and program directors on progress, risks, and performance metrics.
- 2010-2012: Managed the \$15M annual PSI integration budget, overseeing project modifications, grant assessments, and contract analyses to ensure alignment with strategic priorities.
- 2011: Developed the Cost Analysis Requirements Document for JPSS's initial cost estimate; served as liaison between NOAA's estimating team and NASA's program office.
- 2011: Collaborated with Program Systems Engineering to draft the JPSS systems architecture document and Level 2 mission technical requirements.
- 2011: Supported the Free Flyer Satellite Project in planning mission objectives and drafting the Request for Proposals for the Total Solar Irradiance Sensor spacecraft.
- 2010: Provided analysis for Human Exploration Capabilities programs during the transition from the cancelled Constellation program to SLS and Orion.
- 2010: Supported the Human Exploration Framework Team affordability sub-team, developing workforce and in-house innovation planning concepts that led to the creation of the Advanced Exploration Systems (AES) program's civil servant-intensive operations model.
- 2009: Supported development of the National Academy of Engineering's Center for Engineering, Ethics and Society research agenda; coordinated stakeholder outreach across the National Academies.

- 2008: Led independent science and technology policy research assessing Mexico's national nanotechnology strategy and its alignment with development goals.
- 2005-2007: Served as the first employee of the NSF-funded Center for Nanotechnology in Society at ASU; supported establishment, program management, and research planning for the \$10M+ center.
- 2004: Performed finite element analysis (FEA) on structures and airframe valves for the Joint Strike Fighter environmental control system, supporting qualification and development testing

SPACE MISSION AND HARDWARE DEVELOPMENT OVERSIGHT WITH COMMERCIAL LUNAR PAYLOAD SERVICES

Served as program executive for following flights and their associated NASA payloads:

- 2025-2026: Firefly Aerospace Blue Ghost Lunar Lander for delivery of Canadian Space Agency micro-rover and other science payloads.
- 2025-2026: Blue Origin Mark 1 Lunar Lander for delivery of VIPER rover. \$190M CLPS award.
- 2025-2026: VIPER rover, negotiated post-cancellation strategy and new public-private lunar delivery model. Supported program restart with new CLPS award. Program was then at \$515M life cycle cost.
- 2020-2026: Astrobotic Griffin Lunar Lander. Task Order 20A. Value: Then \$318M for CLPS delivery
- 2021-2026: Intuitive Machines Nova-C Lunar Lander for delivery of the Lunar Vertex payload suite, estimated 2026. Then ~\$90M.

MEDIA ENGAGEMENT

- 2024: Social media coverage of NASA Artemis, Ethics and Society work. Media coverage of this podcast included a [NASA tweet](#) on it, that's had more than 19k impressions; and a [NASA LinkedIn post](#) with a 3500+ likes.
- 2024: Interviewed and briefly quoted for BBC radio show Sideways, for an episode on Space Ethics. [Link](#).
- 2024: Highlight in Guru Madhavan's book, focusing on my modeling work. Title: *Wicked problems: how to engineer a better world*. WW Norton & Company.
- 2021: Arizona State University Full Circle news article on Zach Pirtle as an alumni, by Joe Kullman. [Link](#).

