Innovative collaborations: Engaging the public on the evolution of NASA's space telescopes and complexities of in-space servicing

Heidi Segars (1), Julie Van Campen (2)

1. University of North Carolina at Chapel Hill, 2. NASA Goddard Space Flight Center

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PROJECT OVERVIEW & OBJECTIVES

Overview

This project is a series of public engagement collaborations developed by the authors to introduce the complex landscape of repairing and upgrading space telescopes to the general public. The three collaborations include:

- Develop a fulldome planetarium show highlighting the evolution of NASA's space telescopes in collaboration with the Morehead Planetarium and Science Center in North Carolina.
- Develop a case study highlighting the complexities of robotic servicing for missions like HWO for the National High School Ethics bowl in collaboration with the University of North Carolina Parr Center for Ethics.
- On-site exhibits and special event programming for the North Carolina Museum of Natural Sciences.

Objectives

- Invite the general public into conversations about astrophysics mission concept design through enriching educational content
- Advance NASA's "commitment to building an inclusive open science community"
- Continue work in Open Science for HWO in early mission stages, facilitating open and accessible dialogue "as early as possible in the scientific process"
- Inspire people of all ages and backgrounds to share a deeper and fuller investment in NASA's space exploration as a whole
- Forge collaborations between NASA (specifically the newly-formed HWO project office) and academic institutions to reach a broad audience
- Advance NASA's commitment to "partnering with a wide variety of domestic and international partners"
- Disseminate engaging educational content through channels within both NASA and participating community partners

UNC PARR CENTER FOR ETHICS

UNC | COLLEGE OF ARTS AND SCIENCES
Parr Center for Ethics

Mission

*"To nourish and foster **ethical reflection** and **moral sensitivity** on campus and beyond, guided by the conviction that ethics is **everywhere**."*

Outreach

- Co-curricular programming for UNC undergraduate students
- Speaker series events
- Philosophy discussions with K-12 schools, assisted living facilities, and by mail with correctional facilities
- Ethical Dilemma Video Series (https://ed.ted.com/lesson_collections/UiA7oNKFpJAokzYPOnbK) (in collaboration with Ted-Ed)
- National High School Ethics Bowl (NHSEB) program

NATIONAL HIGH SCHOOL ETHICS BOWL

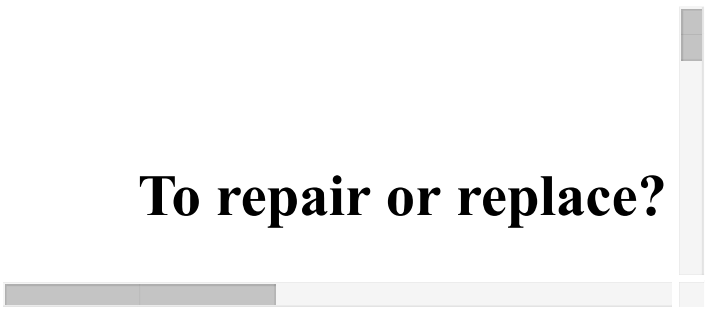
*"The Ethics Bowl format is rooted in **ongoing dialogue and deliberation**: a series of **two-way exchanges between equals**. It is designed to get students **thinking, talking, and ultimately working together** on some of the **toughest moral issues of our time**."*

- More than 4,000 students, 375 schools, and 34 states
- Distinct from Speech and Debate: students defend a position of their choice rather than an assigned viewpoint
- Fosters "ethical awareness, critical thinking, civil discourse, civic engagement, and an appreciation for multiple points of view" (from NHSEB program survey data)
- Centers on the evaluation of case studies

NASA collaboration project

Develop a case study highlighting the complexities of robotic servicing for missions like HWO

- Designed for the 2025 National Championship case set
- Recent draft of case study below



MOREHEAD PLANETARIUM

MOREHEAD PLANETARIUM+ SCIENCE CENTER

Mission

*"To serve **North Carolina and beyond** by bringing together the unique resources of the University of North Carolina at Chapel Hill to **engage the public for an enhanced understanding of science**."*

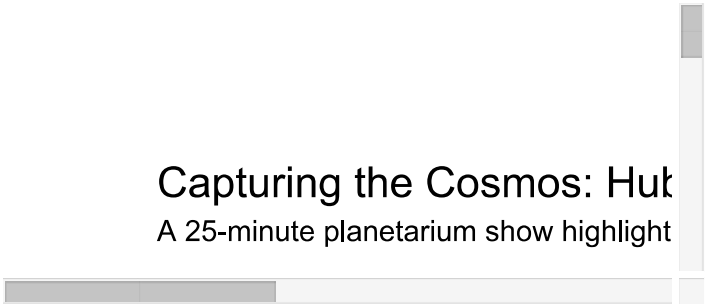
Outreach

- K-12 activities (standard curriculum, summer, live demos)
- Community education and professional development events
- On-site interactive exhibits
- Mobile programming (includes mobile dome that reaches all of NC's 100 counties)
- VR and AR experiences
- Fulldome shows
  - Designed by in-house production team
  - Productions around 25 minutes
  - Often distributed/leased to planetariums across the country and around the world

NASA collaboration project

Develop a fulldome show highlighting the evolution of NASA's space telescopes

- Recent prospectus draft below



NC MUSEUM OF NATURAL SCIENCES

NORTH CAROLINA
Museum of Natural Sciences

Mission

"To illuminate the natural world and inspire its conservation."

Outreach

- On-site exhibits and events
- Small group, school group, summer camp, and special event programming (on-site and online)

NASA collaboration project

Engage the public with in-space servicing through an exhibit at the 2025 Astronomy Days (February 1-2, 2025)

- Illustrate differences in capabilities between NASA's astrophysics flagships
- Demonstrate benefits and challenges of in-space servicing, both human and robotic
- Gather poll data from museum visitors: Would you rather see NASA build new space telescopes or invest in maintaining existing space telescopes?

TRANSCRIPT

ABSTRACT

The history of servicing for NASA's astrophysics flagship missions offers compelling insights into the complexities of how to produce the best science possible, at the right time, from a limited budget. Examples include Hubble's successfully serviceable architecture, enabling five servicing missions, and the single-launch James Webb Space Telescope. Given this background and the rapid advancements in new technologies, deciding if and how to incorporate robotic servicing capabilities for science missions like the Habitable Worlds Observatory (HWO) is one of the most timely and exciting debates in NASA mission design today.

While the images from NASA's telescopes have generated a lot of excitement globally, there is a void in the information available to the public about the various factors and decisions that go into supporting these large missions, both before and after launch. My work with the HWO Servicing Working Group this summer opened my eyes to a unique opportunity to build on the public's interest in space science broadly by delving into the intricacies of robotic servicing for missions like HWO. In short, I believe the general public would be receptive and eager to learn more about the technological, ethical, and logistical challenges "behind the camera."

This project aims to apply my research on the past, present, and future landscape of robotic servicing and create a variety of educational content to share these ideas with a broad audience. The outreach materials will invite the general public into conversations about the cost-benefit tradeoffs of fixing and upgrading observatories rather than disposing and replacing them. I am collaborating with institutions such as the Morehead Planetarium, the North Carolina Museum of Natural Sciences, and the Parr Center for Ethics at the University of North Carolina at Chapel Hill. Additionally, general feedback and perspectives on in-space servicing will be gathered during outreach events.

The poster presentation will detail the project described above, highlight its value, and feature current work to date in alignment with efforts of the AAS "to create a world where all people value and benefit from a scientific understanding of our universe."

REFERENCES

Mission. (n.d.). Parr Center for Ethics. Retrieved December 30, 2024, from https://parrcenter.unc.edu/mission/

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