

## 24th SYMPOSIUM ON SPACE ACTIVITY AND SOCIETY (E5)

New architectural, Strategic and Design Approaches to the Future of Human Space Flight (1)

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## GRAND CHALLENGES AS A DRIVER AND UNIFIER OF THE GLOBAL INNOVATION SYSTEM

**Abstract**

We live in an age where individuals and organizations are more connected and problems more complex than ever before. Methods of work are evolving, expertise is distributed, innovation systems are dynamic, and problems are highly linked and multi-faceted. In this environment, today's systemic, multi-sector challenges are largely beyond the reach of any single organization to address. However, this environment also presents an opportunity for achieving ambitious, transformative goals of global importance through new collaborations with distributed traditional and non-traditional partners that could be game changing.

The US federal government has begun to explore how Grand Challenges—bold, but achievable science, technology, and innovation goals—might unify public and private constituencies around a clear “call to action” and spur significant developments in a wide range of domains. NASA is exploring how a new era of challenges that demand the best in us, as global citizens, might ignite collaborative partnerships with individuals and organizations that aren't in our existing gravity field.

Grand Challenges are not just science or technology endeavors; they are social concepts: unlocking vast amounts of human capital, fueled by a shared sense of ambition and a unique sense of participation. To achieve its objectives, a Grand Challenge needs to attract new partners. It also needs to provide outcomes that benefit all - and a way of measuring outcomes: to do this it needs to be co-designed with potential partners. Potential partners abound for high-impact, multi-disciplinary collaborations including governments, industry, universities, non-profits, philanthropists, entrepreneurs, space enthusiasts, and the world's premier scientists, engineers, citizens, and businesses.

Grand Challenges have been in use by the private and nonprofit sectors for many years. The US Department of Energy, USAID, Grand Challenges Canada, Gates Foundation, National Academies of Engineering, and others have developed Grand Challenge approaches to catalyze breakthroughs in a variety of areas of global importance. This paper will address the following questions:

- How can Grand Challenges act as both a driver and catalyst for innovation?
- What is the role for Grand Challenges in space-related activities?
- How might a Grand Challenges approach enable more progress in space activities than traditional approaches alone?
- What are examples of the impact Grand Challenges have shown?
- How might a collaborative, inclusive process that uses elements of social movement theory ensure the Grand Challenges succeed beyond our wildest expectations?