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Surviving and Thriving in the Next 50 Years of Space Exploration – Leading scholars gather on the 50th anniversary of Sputnik –

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Space visionaries, including Professor Freeman Dyson, Nobel Laureate John Mather, Astronomer Royal Martin Rees, and Apollo Astronaut Rusty Schweickart, craft a vision for the longer-term future of space exploration.

Leading visionaries, space scientists and entrepreneurs from around the world met in Boston to discuss the future of space exploration. Gathered on the 50th anniversary of the space age, following the launch of Sputnik in 1957, and the 40th anniversary of the Outer Space Treaty, they set a vision for the next 50 years in space. In his opening address, President A.P.J. Abdul Kalam of India stated that “The best thing space can do is enhance the quality of life of those on Earth” and that in the longer term, humanity has to “build the way for an alternative habitat in our galaxy”.

Since 1957, the world has witnessed many feats: the first artificial satellites, the first visits to space, footsteps on the Moon, a permanent International Space Station, and now the emergence of the private space industry. With this heritage, which was based upon a robust body of research, humankind can look to the future with confidence. The participants imagined the next 50 years in space, identifying 5 key ideas that will be critical if we are to survive and thrive in face of the changes ahead:

- 1. Space Governance.** In anticipation of emerging space activities, a system of laws, regulations and agreements are needed in space. Particular areas that need addressing include: (1) prohibiting space weapons; (2) managing traffic of space vehicles to avoid collisions and ensure uninterrupted services; (3) managing the global environment and security; and (4) enabling and encouraging private and national space utilization.
- 2. Public participation.** To ensure the long-term sustainability of human endeavors in space, the public can be, and should be, directly integrated with space missions. We would like more communication of the benefits of space exploration to society, emphasizing that survival is the foremost incentive – both in terms of space providing knowledge of our environment and natural disasters, and through the potential of self-sustaining settlements off our home planet.
- 3. Resources and Energy.** Material resources, energy sources and other sources of economic value in space need to be identified. These assets have the potential to improve the quality of life on Earth, and will require the development of new space technologies and infrastructure.
- 4. Biotechnology.** The coming biotechnology revolution that will change the health and survival capabilities of the human race should be fully exploited. Developments in biotech may allow humans to live in space without harmful effects of space radiation or bone degradation. This will have profound effects on the limits of human experience and our presence in the solar system.
- 5. Strategy.** While long term strategic visions are difficult, we nevertheless believe that a 50-year global plan should be formed that can provide guidance for the future of human endeavors in space. Concurrently, a process of 10-year rolling plans, considering the needs of all peoples, are necessary to ensure the sustainable progress towards the longer-term goals.

This workshop was sponsored by the Boston University Center for Space Physics and the Frederick S. Pardee Center for the Study of the Longer-Range Future, with support from the Secure World Foundation, General Dynamics, and Hamilton Sundstrand. **Quotes and a list of participants in this vision follow on the next page.**

Contributors to this declaration:

- **Prof. Freeman Dyson**, Institute for Advanced Studies, Princeton University
- **Prof. Martin Rees, Lord Rees of Ludlow** Astronomer Royal, President of the Royal Society & Master of Trinity College Cambridge University
- **Dr. John Mather**, NASA Chief Scientist & Nobel Laureate in Physics (2006)
- **Dr. Russell “Rusty” Schweickart**, Apollo Astronaut & Chairman of the Association of Space Explorers
- **Prof. Stas Barabash**, Swedish Institute of Space Physics
- **Prof. Roger Bonnet**, President of COSPAR (the Committee of Space Research) and former Director of Science, European Space Agency (ESA)
- **Dr. Chris Boshuizen**, Executive Director, Space Generation Advisory Council (SGAC)
- **Prof. Supriya Chakrabarti**, Department of Physics, Boston University and Conference Chairman
- **Dr. Jean-Jaques Favier**, Director of Strategy, Centre National pour l’Etude Spatial (CNES), former shuttle Astronaut
- **Ambassador Tom Graham**, Chairman of Cypress Fund for Peace and Security & former Arms Control Ambassador for the United States.
- **Prof. Jeff Hoffman**, Center for Space Studies, MIT & former NASA astronaut
- **Dr. Sergei Khrushchev**, Senior Fellow, Thomas J. Watson Jr. Institute for International Studies, Brown University. Son of former Chairman of the USSR, Nikita Khrushchev
- **Mr. Eric Knight**, CEO Up Aerospace, Inc.
- **Dr. Matthew Koss**, Holy Cross College
- **Dr. Virender Kumar**, Counsellor for space, Embassy of the Republic of India
- **Dr. Mark Lupisella**, NASA Goddard Spaceflight Center & The Secure World Foundation
- **Dr. William Marshall**, Chairman, Space Generation Advisory Council (SGAC), NASA/Ames Research Center
- **Prof. Keith Mason**, CEO, UK Science and Technology Facilities Council
- **Ms. Angela Peura**, Space Policy Institute, George Washington University
- **Dr. Shanti Rao**, NASA/Jet Propulsion Laboratory
- **Prof. Roald Sagdeev**, Distinguished Professor of Physics, University of Maryland, former Director of the USSR Space Research Institute
- **Mr. Shi Sheng**, Beijing University of Aeronautics and Astronautics
- **Dr. Bill Stoeger**, Vatican Observatory
- **Dr. Ighor Uzhinsky**, Senior Technical Project Manager, ATK Launch Systems, Science and Engineering Programs
- **Yevgeny Zvedre**, Senior Counsellor (Science and Technology), Embassy of the Russian Federation

Contributors to the symposium, The Future of Space Exploration, Solutions to Earthly Problems.

- **His Excellency, Dr. A. P. J. Abdul Kalam**, President of India
- **Gen. James A. Abrahamson**, former director, US Strategic Defense Initiative Organisation
- **Dr. Mark Bullock**, Southwest Research Institute
- **Dr. Frank Cheng**, Taiwan
- **Ms. Erin Daly**, Graduate Student, Department of Philosophy and Religious Studies, University of North Texas
- **Dr. Steven Dick**, NASA Historian, NASA
- **Ms. Susan Eisenhower**, President of the Eisenhower Institute, granddaughter of US President Eisenhower
- **Ms. Tiffany D. Frierson**, University of Memphis, Tennessee
- **Dr. Robert Frodeman**, Chair, Philosophy and Religion Studies, U of North Texas
- **Dr. David Fromkin**, Director of Pardee Center for the Study of the Longer-Range Future at Boston University.
- **Dr. Charles Harper, Sr.**, Templeton Foundation

- **Dr. Peter Hays**, National Defense University SAIC, US Air Force Lt Col (ret'd)
- **Professor John Logsdon**, Director, Space Policy Institute, George Washington University & NASA Advisory Committee
- **Prof. Michael Mendillo**, Boston University
- **Dr. Harrison Schmitt**, Apollo Astronaut & Chairman of the NASA Advisory Council

Further quotations

His Excellency, A.P.J. Abdul Kalam, the President of the Republic of India, who addressed the conference, emphasized that "We should not take the principles of war to space"

Peter Hays, "The Outer Space Treaty is like the Articles of Convention, because it isn't seen to work. What is it about the Outer Space Treaty that isn't working?"

Freeman Dyson, IAS, "Biotechnology is a critical enabler for space and will bring space to the common man"

The Space Generation Advisory Council, representing the visions from hundreds of students and young professionals from around the world to the conference concluded that the key vision for space should be that "Humanity becomes an interplanetary species with the first child born on another world."

Amb. Tom Graham. "You're going to have to do more than amend the Outer Space Treaty. Several treaties, in fact, like the ITU charter."

Eric Knight, "A convention shouldn't just be of an elite group."

Dr. Roger Bonnet, "These problems affect everyone. We want to encourage access to all places of the Earth."

Prof. Supriya Chakrabarti, "These are the same ideas that we had at Berkeley in the 1970's. We're talking about coming up with rules of the road that we can all live with."

Prof. Jeff Hoffman, "There's a risk in trying to set up governance of something we don't have the capability of doing yet. Suborbital space tourism, for example. The FAA is setting up rules now, but they wouldn't have worked if they wrote the rules 15 years ago."

Dr. Bill Stoeger, "We need agreement on some basic principles, and to agree on our understanding of them. Then, when you focus on individual issues, like Near Earth Objects or regulating private enterprise, these principles come into effect. A piecemeal or ad-hoc regulation will cause trouble."

Prof. Matthew Koss: "The idea is investment -- getting everyone involved, and not just those who want to be in space themselves."