

AN OVERVIEW OF THE SPACE EXPLORATION INITIATIVE; Mark Craig, NASA

The Space Exploration Initiative (SEI) is the term used to describe an integrated set of long-term activities that will ultimately establish a permanent human presence on the Moon, to be followed by the human exploration of Mars. The SEI responds directly to the National Space Policy goal of expanding human presence and activity beyond Earth orbit into the Solar System. The SEI concept was first enunciated by President George Bush on July 20, 1989, in a speech commemorating the twentieth anniversary of the first Apollo lunar landing. Recently, in its final report, the Advisory Committee on the Future of the U.S. Space Program (the Augustine Committee) supported the President's view that Mars should be the long-term magnet for the human space program. The committee's report recommended that a "Mission From Planet Earth" be established with funds to begin laying the foundation for lunar and Mars missions on a schedule that will enable real progress and significant periodic technical achievements. Continuing support can be found for human exploration of the Solar System because exploration is a human imperative that adds to our knowledge, enriches the human spirit, and provides an array of practical benefits.

President Bush has made a number of policy decisions regarding the SEI. First, the President has announced that the U.S. will return humans to the Moon before the end of the first decade of the 21st century while the first human mission to Mars would arrive before the year 2019. In February 1990 the White House issued a Presidential policy directive that outlined the approach to be taken on SEI. The directive said that the near-term focus would be on technology development and that such development would be done in parallel with mission concept and system analysis studies. The directive also stated that selection of a baseline architecture or approach to exploration will occur after several years of defining two or more reference architectures and that the SEI will include robotic science missions serving as reconnaissance spacecraft for later human missions as well as to test technologies and operational procedures while gathering valuable scientific information. The Presidential policy directive stated that NASA will be the principal implementing agency for the SEI while the departments of Energy and Defense will have major roles in the conduct of technology development and concept definition. A national endeavor, SEI will draw upon the best in government, industry, and academia. The President's latest SEI policy decision came in March of 1990. In this decision the White House announced that the United States would seek an exploratory dialogue with other nations on possible international cooperation on SEI.

Consistent with the policy framework outlined by the President, NASA will spend several years conducting technical analyses to better understand the challenges associated with SEI. These challenges include mission architecture definition, life sciences research, technology development, management structure development, transportation systems definition, and the evaluation of science requirements and opportunities. The overall national strategy is for NASA and others to do their homework, to conduct preliminary technical studies so that realistic SEI program options can be devised for consideration at an appropriate time in the near future by the country's political leadership -- the National Space Council, the President, and the Congress. Specific challenges in this area include: defining the requirements for a Heavy Lift Launch Vehicle (HLLV) to support SEI, understanding the cost associated with various program pathways and development options, ensuring that Space Station Freedom is available and capable of supporting the life sciences research and technology development critical to the success of the SEI, and selecting and developing a set of new technologies to support the SEI. Expeditions to Mars as well as development of a permanent lunar outpost constitute formidable challenges to the U.S. space community. Our approach is to take the time now to better understand the challenges prior to making any specific and formal program decisions.

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Since the President's speech of July 20, 1989, much progress has been made. In particular, advances in understanding mission architectures, in devising and implementing strategies for technology development, in defining science requirements, and in the conduct of life sciences research have occurred despite rather modest funding levels. Responding directly to the President's speech, NASA undertook and completed a "90-Day Study" of a number of mission architecture options for human exploration of the Moon and Mars. Then, responding to a request from the Vice-President NASA established a nationwide Outreach Program to solicit SEI related ideas from the public. Now completed, this activity collected over 2500 ideas from scientists, engineers, and innovators from throughout the U.S. To assess and distill the results of the Outreach effort, NASA established a "Synthesis Group", that in March 1991 will produce several alternative SEI architectures, technology priorities associated with these architectures, and a list of candidate near-term program milestones. The Synthesis products will provide the SEI development options that the President's policies on SEI call for as the focal point for near term SEI analysis. This analysis will lead to the selection, at some future time, of a single SEI architecture for implementation. Other near-term activities include the development of SEI related Memoranda of Understanding (MOUs) between NASA and the Departments of Energy and Defense, discussions with the National Science Foundation (NSF) regarding cooperation on SEI, and the development of a NASA Advisory Council, Exploration Task Force to address the rationale for space exploration. In addition, during 1990 NASA continued its own in-house studies on SEI. Efforts were directed at preparing an integrated SEI plan, one that ties together the many elements associated with a return to the Moon and journey on to Mars. The objectives were to deepen NASA's understanding of technical parameters and to better understand how various SEI elements fit together. The integrated plan was prepared in the context of the agency's FY 1992 budget request and in preparation for receiving the results of the Synthesis Group's analysis.

In 1991 NASA hopes to continue the progress made so far on SEI. With the Presidential directives as guidance and building upon the work already done, the agency will direct its efforts at expanding the understanding of SEI technical parameters. One specific task to be accomplished includes incorporation of the Synthesis Group's output, with a focus upon both technology development and mission architecture analysis. In addition, the integrated plan will be iterated and cooperation with other agencies will be pursued. In addition, NASA will respond to the SEI-related recommendation of the Augustine Committee to consolidate SEI activities within NASA under a single Associate Administrator for Exploration.

The Augustine Committee report also stated that NASA should consider the planning and execution of space science as its most important objectives. SEI is being framed to respond to this objective. Working Groups have been established to insure that the scientific community plays a leading role in defining the "enabling" science (science whose objectives are to collect information critical to the success of future human missions) and "enabled" science (science which can be accomplished due to the presence of human missions).

The human exploration of the Solar System will be one of mankind's magnificent accomplishments, and take place in the 21st century. In returning humans to the Moon and sending them on to Mars, SEI represents a major advance in the human experience. Much work needs to be done before it can happen. In 1991 and the years ahead, NASA expects to make significant progress in making SEI a programmatic reality.

This presentation will review the policy framework of the SEI, discuss key planning activities, review the strategy underlying NASA's SEI efforts, and outline future challenges.