

A Perspective on Space Exploration: Looking Back and Forward

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I began my career working in the space industry largely influenced by the events of my childhood. Shortly after my birth in 1957, the Soviet Union launched the first satellite, Sputnik I, into orbit. Within a few months, the United States placed its own satellite, Explorer I, into space. The space race was under way and the next year, the US created the National Aeronautics and Space Administration (NASA).

Those were certainly exciting times for the world, the nation, and for a young boy. It became part of our world and part of our imagination as we began to explore space. The launching of rockets, orbiting the earth, and finally stepping on the moon captured our attention and offered us such excitement. It inspired us and shaped our future and gave direction to the pursuits of our careers. Putting a satellite into orbit was the realization of Arthur C. Clarke's vision, whose passing this month we mourn. He also predicted that man would land on the moon by 1970 which came true. We will all miss this visionary in our industry.

Critics often question the motive, even the existence of space exploration. However, many people are unaware or take for granted many products and services that have come from space exploration. Certainly in the field of communication and computer technology, NASA provided the spark for what has become a much developed technology sector. Cell phones, television from around the globe, and faster and smaller computers are products that resulted from space exploration. These are items that we and the public are all familiar with. Other products in the areas of health, medicine, public safety, transportation,

manufacturing, food, sports, and housing have benefited from space exploration and research.

Instead of nations racing against each other, we now have an established spirit of cooperation in space exploration. The US has been conducting exploration with many other countries and began its cooperation with Japan in 1969 for space development. The partnership between NASA and the Japan Aerospace Exploration Agency (JAXA) has included research on the International Space Station, Japanese astronauts serving as mission specialists on Space Shuttle missions, earth observations, and scientific satellite missions. As I write this article, Japanese astronaut Takao Doi is returning to earth from space aboard the Space Shuttle Endeavour. The mission completed assembly of the Japanese Experiment Module "Kibo" as a permanent module to the International Space Station

I vividly remember, as if it happened today, watching on a black and white TV as Neil Armstrong first stepped on the moon. Today NASA is heading back to the moon and to Mars and beyond. The excitement is enormous at NASA as this generation of workers recognize this once in a lifetime mission. Only a few employees remain from the Apollo days, so most are embracing the challenge as we once again go to the moon. Those first timers were pioneers, blazing a trail through technology and through space. This time there will be no race, but building on the foundation that those early pioneers laid. Much of what will be done will be based on the designs of those early days. Improvements will be made in those systems where technology has advanced, particularly in the areas of avionics, computing, and communications.

The design approach for the return to the moon calls for two separate vehicles, the Ares I and the Ares V. The Ares I will launch the crew exploration vehicle into space with up to six astronauts. The Ares I will be outfitted with technology from the Shuttle and Saturn programs. Its first stage will use a solid rocket booster and the upper stage will be based on the Saturn J-2X engine. This engine will also be used on the Ares V vehicle which serves as the heavy lift component to launch the lunar module into orbit. The two will then mate and head to the surface of the moon. In addition to improvements in the designs of these rockets and the upgrade of technology, it is the goal of NASA to improve the operations of the system to reduce cost.

I have been fortunate to meet several of the space pioneers of the 1960s. They share the excitement of returning to the moon and to Mars and are thrilled that the work they pioneered is continuing. Another generation of explorers will land on the moon and bring the exhilaration of accomplishment back and improve our life and experiences here on earth.