NASA, BUILDING TOMORROW'S FUTURE

Edward J. Mango
National Aeronautics and Space Administration, Mail Code: FA, Kennedy Space Center, FL 32899, USA,
Email: Edward.j.mango@nasa.gov

We, as NASA, continue to Dare Mighty Things. Here we are in October. In my country, the United States of America, we celebrate the anniversary of Christopher Columbus's arrival in the Americas, which occurred on October 12, 1492. His story, although happening over 500 years ago, is still very valid today. It is a part of the American spirit; part of the international human spirit. Columbus is famous for discovering the new world we now call America, but he probably never envisioned what great discoveries would be revealed many generations later. But in order for Columbus to begin his great adventure, he needed a business plan. How would he go about obtaining the funds and support necessary to build, supply, and man the ships required for his travels? He had a lot of obstacles and distractions.

He needed a strong, internal drive to achieve his plans and recruit a willing crew of explorers also ready to risk their all for the unknown journey ahead. As Columbus set sail, he said "By prevailing over all obstacles and distractions, one may unfailingly arrive at his chosen goal or destination." Columbus may not have known he was on a journey for all human exploration. Recently, Charlie Bolden, the NASA Administrator, said, "Human exploration is and has always been about making life better for humans on Earth."

Today, NASA and the U.S. human spaceflight program hold many of the same attributes as did Columbus and his contemporaries – a willing, can-do spirit. We are on the threshold of exciting new times in space exploration. Like Columbus, we need a business plan to take us into the future. We need to design the best ships and utilize the best designers, with their past knowledge and experience, to build those ships. We need funding and support from governments to achieve these goals of space exploration into the unknown.

NASA does have that business plan, and it is an ambitious plan for human spaceflight and exploration. Today, we have a magnificent spaceflight laboratory, built over many years by the United States and other nations. Last month, the last man to step off the moon, Gene Cernan, told the U.S. Congress, "Today the International Space Station, the assembly of which may well go down in history as man's greatest engineering accomplishment of all time, circles the globe sixteen times every day - all in keeping with JFK's challenge to do the other things."

The International Space Station (ISS) is a ship which provides an outstanding platform for performing spaceborne scientific, engineering, and Earth studies. Numerous nations utilize this unique cooperative partnership by sending scientists, engineers, astronauts, and cosmonauts to the ISS to spend time aboard the station in order to further scientific research, truly an asset for the entire planet.

The United States is embarking on a new ship building activity for low Earth orbit access to the ISS via a new plan, the Commercial Crew Program. The Commercial Crew Program is all about a partnership with the best aerospace ship builders in the U.S., with assistance from other nations, to design and construct space vehicles to transport people into orbit and around our planet. This partnership is focused on safe flight access in sending astronauts into space, but also for other types of space adventures. The goal of the Commercial Crew Program is to ensure a more efficient way to open markets and explore new areas of business. NASA is providing the majority of the funding and design assistance, having over 50 years of knowledge and experience in human spaceflight and flight safety. The companies involved in the Commercial Crew venture will retain ownership of the designs and vehicles. NASA and our international partners will use these new ships to travel to the ISS and other low Earth orbit destinations. In my mind, just like Columbus, in order to explore, you have to leave where you are and go someplace else. The Commercial Crew Program affords the opportunity to leave the planet with the ISS the destination to explore. Charlie Bolden said back in July, "We will use the space station as a test bed and stepping stone for the challenging journey ahead. We are changing the way we do business, fostering a commercial industry that will safely service low Earth orbit so we can focus our energy and resources on sending astronauts to an asteroid and eventually to Mars."

Another great explorer from history is Ferdinand Magellan. He, like Columbus, wanted to go on a great adventure, this time trying to reach the Spice Islands by sailing west through the New World. His expedition took him farther than Columbus and he is credited with sailing from the Atlantic Ocean into the Pacific Ocean, and the first to cross the Pacific. To do this, his ships had to have more capability than those of Columbus. Neil Armstrong once said before taking on his great adventure, "I think

we're going to the moon because it's in the nature of the human being to face challenges. It's by the nature of his deep inner soul... we're required to do these things just as salmon swim upstream."

And like Magellan, NASA and the United States are today taking on the challenge to build new ships capable of exploring new places in space that we once only dreamed of. Several weeks ago, NASA laid out a new strategy for space exploration, the Multi-Purpose Crew Vehicle (MPCV) and the Space Launch System. The systems now have the support of the U.S. Congress, and the funding details are being worked out. These new vehicles will take us far beyond low Earth orbit, far beyond our home planet. This is huge for NASA, but as Neil Armstrong said after his mission, it is small for humankind. He said while on his great adventure to the moon, "It suddenly struck me that that tiny pea, pretty and blue, was the Earth. I put up my thumb and shut one eye, and my thumb blotted out the planet Earth. I didn't feel like a giant. I felt very, very small."

NASA's MPCV efforts will transport explorers just like Neil and Gene from the U.S., as well as many of our world partners. Currently MPCV is going through a design and build process, and like Magellan's ships, the MPCV has to be durably constructed to support life functions for its explorer's journey. The first flight test of the MPCV is scheduled to take place around the middle of the decade, with manned flights a few years later. NASA is on the forefront of future space exploration in designing and building this space ship.

As with Columbus and Magellan, their ships needed strong hulls and a set of sails to harness the full energy of the wind for top performance on the seas. For NASA and exploration beyond low Earth orbit, our ship's sails are called the Space Launch System (SLS). The hardest part of any journey off our planet is getting off the surface, through the atmosphere, and away from the pull of mother Earth. SLS is being designed to accomplish just that. At first, the system will be able to carry up to 70 metric tons, but the design will mature and grow, eventually having the capacity to carry up to 130 metric tons. 130 metric tons will make this the largest ship to ever leave the planet, and the largest vehicle to allow mankind to explore space. Technology and systems from the last 30 years of space shuttle program offer us a base from which to start and grow, a core stage that uses LH2/LO2 and engines derived from the shuttles. Also employed will be an upper stage using technology from the Apollo program, which has been improved upon over the last seven years. Lastly, we will use solid rocket propulsion, with the boosters eventually being completed in order to use the best, most efficient capabilities that rocket propulsion offers today.

This combination of the MPCV and the SLS will enable NASA to lead the way for space exploration beyond our surroundings. We will be enabled to explore asteroids, take longer trips to the moon, and trips to Mars. The possibilities are endless.

JFK inspired a can-do spirit when he said, "We choose ... to do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills..."

Just like the two explorers Columbus and Magellan who undertook the hard job of paving the way for exploration into the unknown, today NASA is building the great ships for our future, because we also choose to undertake just such a challenge; we too today have that can-do spirit!