

The Future of Human Spaceflight by Ian Benecken

Watching Apollo 13 as a young boy interested in Astronauts changed my life: I was amazed by the teamwork in mission control to keep these three men alive and bring them back to Earth. That people actually built such gigantic rockets and rode them into space to explore new worlds blew my mind.

Later I was really disappointed to find out that people stopped flying to the Moon and that they were “just” orbit around the Earth. My motivation for human spaceflight remained however and after different shuttle and space station projects I understood several things: The International Space Station was built by many nations together with the goal to create a proving ground for technology to fly back to the Moon and one day to Mars. With the technology of the 60s they were not able to do long term spaceflights. The ISS is there to prove: a regenerative life support system, knowledge about human physiology to live for an extended period in microgravity, repairing spacecraft in-flight, building large and complex structures in space and maybe the most important thing: to learn how to work together with different nations and cultures. I also found out that such an adventure to explore our solar system, the Moon and Mars with humans can only be done when different nations collaborate.

ISS nations are already working together that normally are not best friends like the USA and Russia and you know what? Despite all the cultural differences Astronauts and Cosmonauts as well as the engineers and flight controllers on the ground are working great. There are many cases where strong friendships evolved out of this.

When I interned at European Astronaut Centre I experienced this myself: ESA, also a partner of the ISS program, is in itself already an international agency with people from many different cultures, all united by space. I therefore strongly believe that whatever we do after the ISS program ends to explore the solar system together should also be international, because redundancy of technology benefits from the different ideas of our diverse nations.

What should be the next step for us? As an Aerospace student with a strong background in operations I strongly believe that we should go back to the Moon first. Many people think that we should go to Mars right away, but I firmly believe that we are not ready for this step, yet. We may have technology to build a big enough rocket and spacecraft that could take humans there and back, however there are so many things we do not know yet: how to operate a fully autonomous spacecraft? Since the beginning of human spaceflight all have been controlled from the ground. “Mission Control” is quite literal. Apart from some dynamic events in launch, landings and rendezvous Astronauts are just passengers in their vehicles. On a trip to Mars, with up to a 30min delay in radio communication, such procedures do not work anymore!

Furthermore, we still have little knowledge about deep space radiation effects on the human body. During the Apollo program Astronauts left Earth’s magnetic field for a limited period and *never during high solar activities*. Therefore we must build protection for Astronauts for those periods and have yet to prove this technology.

All human spaceflight missions heavily depend on a constant resupply chain from Earth. Although we already achieved long term space missions up to a year: these missions and the vehicle depended completely on resupply from the Earth. Nowadays when something breaks onboard the ISS we can send up spare parts within 3 months and the loss of redundancy of such a broken system only has to bridge that short period. Flying to Mars the spacecraft and their crew member would have to survive for up to 2 years without any resupply.

I have different ideas about how to solve this problem: growing food in space, using 3D printing to print spare parts and just bring raw material with you, but again all these technologies are not proven yet. That’s why I strongly believe that that we should go back to the Moon first, build a Moon base on the poles and a small space station in the Moon’s vicinity. So we can proof all these technologies in addition to a reusable lunar lander and a spacesuit that can be operated for an extended period of time with all the lunar or Martian dust.

Why the Moon? The Moon is “just” four days away from us in terms of travel time and just 2 seconds away with radio communication.

To master a permanently crewed lunar base is already a huge task. I strongly believe that as soon as we have mastered that we are ready to go to Mars with an international crew for all humankind!

... oh and I hope to become a tiny part of that adventure! ;)