Dr. Reinhold Ewald

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Dr. Ewald, what are your thoughts on the end of the 30-year-era of the U.S. Space Shuttle program?

The U.S. Space Transportation System is looking back on great achievements and certainly has given human spaceflight the very dynamic development opportunities we have seen in near-Earth orbit until today. Contrary to the Apollo program, it has left a legacy enabling a sustained and useable presence of humans in space, namely the ISS. This is definitely not the end of human spaceflight for the U.S. We Europeans join the US in sending our astronauts to live and work in space in a truly international partnership, where tasks are distributed among the partners. For a certain amount of time the task of transporting humans to ISS will be left to our Russian partners.
The one thing we have learned is that spaceflight unfortunately remains a risk even with a versatile and powerful vehicle like a Space Shuttle. The Augustine Report from the Review of U.S. Human Space Flight Plans Committee clearly states the financial difficulties into which the Shuttle Program had come and its intrinsic risks. From there on it was logical to define an endpoint that followed full ISS assembly. Though I have never had the opportunity to fly on a space shuttle, hearing my colleagues' reports and seeing the marvelous documentaries can give the impression that a Golden Era has passed.

How can the results of research in space help improve daily life on earth? Could you provide us with an example?

First of all, thank you for not putting research during human spaceflights under a lens requiring utilitarian justification. I am still very personally involved in one of the life science experiments from my mission back in 1997, where I underwent a strict metabolic control, from which we could derive a yet undiscovered effect: how the body under certain conditions stores sodium, a very important component to regulate body fluid volume and blood pressure. When working in the ESA Columbus Control Center based near Munich, Germany, I can still follow how my fellow astronauts do controlled research on that effect. This gain of knowledge is of immediate use to the treatment of individuals with high blood pressure, one of the most widespread dangerous health conditions these days.
Another example is combustion: the process that keeps industry going and our western society moving. Even a little improvement here by observing in space the effects that are masked by gravity means immense savings, when multiplied by the number of daily combustion processes on Earth.
And I didn't even mention the chance to grow tissue samples for pharmaceutical tests, or the sheer joy of experimenting with exotic physical states of matter, plasma, and fluids. All this may start as an experiment done out of curiosity, but may well end as a readily applied technology.

What technological innovations exist for today's astronauts that you wished existed when you were up in space in 1997?

Communication is definitely the major difference between MIR and the ISS followed by the scientific and research potential that we now have on ISS. We Europeans used MIR, the negative experiences as well as the positive ones, as a precursor to improve our preparation for ISS. The use of satellite links with the US Tracking and Data Relay Satellites (TDRS) system makes this difference. The experiment facilities could even be devised with the system's potential in mind.
Robotics to support extravehicular activities has also advanced excellently. There is plenty of electrical power available nowadays. Computers do fail from time to time, but here, as well as in other subsystems of ISS, international cooperation makes up for it by providing back-up solutions from the other partners. Last but not least, the transport fleet available with Progress, European ATV, Japanese HTV, and US-launched commercial vehicles are coming soon.
A significant concern we had during the MIR times as well as today after the Space Shuttle retirement, is the problem of bringing things down to Earth. For crew transport, this is done by the Soyuz in its role as crew exchange vehicle, but the Space Transportation System's (STS) capacity to return objects to Earth is lacking. Experiments will have to rely on data transfer and on-board analyses of the results rather than expecting the specimen to be brought back to Earth.

On June 28th, 2011, the ISS was almost evacuated because of a piece of space debris. How much waste is in space and what dangers and risks does it pose for astronauts?

Though respective treaties have been in force since the sixties, there are still instances where human-made debris is injected into frequently used orbits. The debris shields of ISS have a good chance of absorbing colliding objects of up to 10 cm in size. Above that, metallic debris is tracked, and depending on its size, the orbit of ISS is changed in advance. About once every two months there are instances when it is too late for that and the crew must seek shelter in its return spacecraft. It is a nuisance rather than a daily threat, but it is something that we have to watch and contain. When it comes to extravehicular activity, when the astronauts are most vulnerable, the time window is chosen such that we avoid known meteoroid debris showers, radiation exposure in troughs of the Earth's magnetic umbrella, and threats by known orbital debris.

What is your opinion on space tourism?

People tend to ask me about my sensory experiences (physical sensations) in space, not about the experiments that I did. So it would be unfair to keep people away from space just because they are going for their own pleasure and not with some government or agency objectives to explore, or perform technological research, or science.
Sub-orbital flights are an ideal solution to me. Once they have the same safety, standard it seems that the expenses in terms of fuel, launch, and flight operations are not grossly exaggerated in comparison to a first class transatlantic flight. When it comes to orbital flight and the velocity involved (7.5 km/sec in near-Earth orbit, some 17,500 miles/hour), the balance topples over. There is no personal justification in terms of ecology and social balance for spending the amount of chemical fuel needed today to put things into orbit just for the fun of the wealthy. In addition, current human launch systems and the orbital infrastructure have all been funded by societies as a whole. How do you calculate a payment that is truly offsetting these investments in cases where they are used for purely personal purposes?