The Human Perspective

Barbara Imhof

Last year in 2009, we celebrated the 40th anniversary of Apollo 11 when the first humans landed on the Moon. Next year in 2011, we will celebrate the 50th anniversary of the first human, Yuri Gagarin, to successfully orbit the Earth. When Yuri Gagarin entered his spacecraft, it was the seventh attempt to launch a human in the Vostok capsule. The head of the Russian space program, Sergej Korolyov, set April 12, 1961, to be the date for another 50% chance of a successful launch. Six rocket test-launches had been made previously, during which three of the rockets had blown up. Three official statements had been prepared for the event on April 12: one in case of success; one in case of rocket failure; and one in case the cosmonaut died somewhere between launch and landing. It had also been suggested that Gherman Titov, Gagarin’s back-up, should be first choice as he had no children, unlike Gagarin who had two daughters. Yuri Gagarin had a ten-day ration of food in stock just in case he could not return after the first orbit. He was connected by a radio transmitter to Mission Control throughout his 108 minutes of flight, and also to a monitor to record his psychological stress levels since the risk of a psychological breakdown was high. A photograph taken in the bus on his way to the launch pad shows a pensive man who is trying to grasp the magnitude of the meaning and significance of things to come, and the chance that he is either on his way to his own death or to become a hero.

Detailed reports of most early human spaceflights read like thrillers. Although spaceflight today seems like a daily business, with people being launched into orbit on a regular basis, the risk of failure and human death remains very high. When we set foot on the Moon again sometime beyond 2030, our resources will be limited. For this endeavor, we will have to develop closed-loop regenerative life-support systems to recycle air, water and waste, which will sustain us throughout a long duration stay on the Moon. In addition, we will need to look at the resources of the lunar environment in order to start living off the land. Caring about our resources and developing technologies for new ways of sustainable living beyond Earth will also lead us to a life that is capable of expanding into the future.

Although the Moon seems further away than ever due to current governmental space policies, it remains our closest celestial body, an object of fascination for every generation. The Moon also serves as an optimal test bed for missions to Mars, and it is an ideal location for a far-side telescope to look even deeper into the universe. There are plenty of new tasks waiting for us. In one of the modules – we saw that in the early assembly of the space station – the Node module, light shone from different sides and I found that working in a specific area, they turned several times and then when they needed to go somewhere (because space up there is close to being symmetrical) they spent a few seconds to try to orientate themselves to be sure that they were going in the right direction. So I think a good design will help you to save this moment of disorientation. (Krikalyov)

There are significant amounts of data on zero-gravity. Particularly, we can utilize information accumulated through the ISS for missions to the Moon and beyond. The answers of Sergej Krikalyov (male, Russian, engineer), Jean-François Clervoy (male, European of French origin, pilot), Chiaki Mukai (female, Japanese, medical doctor) and Claudie Haigneré (female, European of French origin, medical doctor) demonstrate the differences in professional background and culture – important aspects of international crews in all missions to come. Their perspectives constitute a multi-layered input for space designs.

What is some feed-back an astronaut can give on design issues, and what is the relationship of a good design with crew performance?

‘There is a connection. On the Russian side, we used to have light on one side, basically light on the ceiling and paint of different colours on the floor except in one of the modules – we saw that in the early assembly of the space station – the Node module, lights shone from different sides and I found that difficult, especially for people who had less experience in space and in weightlessness. After they had worked in a specific area, they turned several times and then when they needed to go somewhere (because space up there is close to being symmetrical) they spent a few seconds to try to orientate themselves to be sure that they were going in the right direction. So I think a good design will help you to save this moment of disorientation.’ (Krikalyov)
"Yes, I think, we can improve the mental comfort by putting more energy, more effort into the design aspect, the cosmetic aspect of the vehicle. The Russians have already thought a bit about this by having different colours for different surfaces. So you always know the floor is one colour, the ceiling another, and the walls another. On short missions it’s not important, but for a trip to Mars, I think it would help to have a nice layout with some ‘paintings’, or a nice window design, so that you don’t have the feeling of being constantly in a technical environment, otherwise you would feel like you were sleeping, eating, or having a wash at your work place. It is not nice to feel that you live all your life at the office. It is nicer when you think that you have your office to do your work and sometimes you can go into a different kind of place to do something else. So I think, organizing the layout, the colour, the shape, with more design innovation would probably help." (Clervoy)

The above statements sound supportive to the work of the designer. To tie good design to good performance, sometimes you can go into a different kind of place to do something else. So I think, organizing the layout, the colour, the shape, with more design innovation would probably help. (Clervoy)

The imagination of being in such an environment, and sharing the experience that only astronauts have had before, leads to the second field of a designer can contribute to space architecture operation: space tourism. The ‘fun sector’ of space tourism could become the driving force for the next step in human spaceflight. Very likely this will propel the space industry and accelerate the advancement of safe technologies for human spaceflight. A hotel on the Moon built and financed by a hotel tycoon might become a substantial contribution to any further human exploration with new materials, new construction methods and new paradigms for life and leisure. Apart from space tourism’s economic benefit, it will have a social and cultural value where each of us could eventually become a space traveller. Human spaceflight, regardless of governmental or commercial activities, will continue to generate technologies and knowledge for Earth. In the area of advanced life support systems, spin-offs such as water purification systems and waste management from space are already on their way to be implemented in buildings on our planet. In this way, it is a logic step that architects and designers get involved in the design of habitats in space, on Moon, Mars and beyond.

1 Barbara Imhof, ‘Long duration stays on space stations’ interview with the Russian cosmonaut Sergj Krikalyov, Radio Orange, August 19, 2008. He is record holder with six spaceflights and a total stay in space for 803 days. He has flown with Sojuz on MIR and on the ISS and he has also flown with the space shuttle. He has excellent knowledge of the Russian and the American technical human space systems.

2 Barbara Imhof, Interview with astronaut Jean-François Clervoy, Radio Orange, October 12, 2008.


4 Barbara Imhof [note 1].