

The Part-Time-Scientists (PST) on the Go!

A PST View on Space Commercialization



The [Google Lunar X PRIZE](#) is a \$30 million international competition to safely land a robot on the surface of the Moon, travel 500 meters over the lunar surface, and send images and data back to the Earth. Teams must be at least 90% privately funded and must be registered to compete as of December 31, 2010.

The first team to land on the Moon and complete the mission objectives will be awarded \$20 million if it is done before a government funded mission explores the Moon (currently planned for 2013). If that event occurs before the privately funded mission could be launched, the prize will drop to \$15 million. The second team to do so will be awarded \$5 million. Another \$5 million will be awarded in bonus prizes for special achievements. The final deadline for winning the prize is December 31, 2015.

As reported in a previous article the "[Part-Time-Scientists](#)" (PST) team is the only Germany-based team to join the Google Lunar X PRIZE. Headquartered in Berlin, Germany, they are a non-profit organization financed by donations, their own capital and sponsors including leading companies like Texas Instruments (electronics and semiconductors) and O'Reilly Media (computer book publisher) and also the German Aerospace Center (DLR).

Comprised of seven members, the team is one of the youngest in the competition, averaging a 20-something age mark.

During the recent internet conference re:publica at Berlin (May, 6-8, 2013) PTS presented the current status of their moon-rover developments and offered their visionary points of view for commercial space activities.

SpaceOps News (SoN) had the opportunity to discuss a couple of follow-on questions with the PTS managers Robert Boehme and Karsten Becker.

SoN: Could you bring us up to date with your rover development since our last article in December 2010?

Back in 2010 our focus was on developing the what we call it "R2 series" of our lunar rover prototype. The technical development goal behind the R2 was to build a prototype that allows us to test drive the 4 wheel configuration based on brushless drives and FPGA based electronics. In addition we tried to incorporate as many aspects of the final units as possible, things like working stereoscopic cameras, an active solar panel or various RF communication

systems. We are successful in reaching our core goals but had to learn that our R2 design was way too small to ever satisfy it's own energy demands. Thus we decided to do a rescaling of the system and changed many aspects with regards due to thermal management. As of today we are operating with the "R3 series" of "Asimov" lunar rover prototypes that by now satisfy almost all requirements. A major change in our design was to incorporate the RoboDrive brushless drive technology developed by the DLR into the system. In addition we managed to integrate our self-developed cameras as well made several advancements on their overall electronics and mechanics. First radiation and several off-site testings like at the Erzberg or the Dachstein Ice caves in Austria where successful and brought us closer towards the final "R4 series" of the rover. This last series will have to be able to withstand the harsh environments of both launch and landing.

SoN: With respect to commercial spaceflight a lot has happened in the USA since 2010: Selection of commercial suppliers for NASA under the [Commercial Crew Program](#), other commercial enterprises like Virgin Galactic, Bigelow for suborbital flights and space tourism, and just recently the founding of commercial "space mining" companies like Deep Space Industries, Planetary Resources and Golden Spike, not to forget MoonExpress Inc. (MoonEx), a company which acquired one of the Google Lunar X-Prize teams, "Rocket City Space Pioneers" from Dynetics in December 2012.

Could this be a model for you and how do you assess the probability something like that could happen in Europe too?

As part of the Google Lunar XPRIZE we are following these developments quite closely and welcome this new entrepreneurial spirit of space exploration that even got NASA to rethink their existing programs. We believe that private space exploration will play a big role in the future of space exploration and is the right way to go. Especially with such strong influence from the US it is important to establish a healthy foundation rooted in ITAR free technologies over in Europe as well. We are working with several companies and entities to promote private space exploration here in Europe. It is important that Europe is not getting left behind and that limitations like ITAR can be resolved in the future.

I think it would be far wiser to seek the technological leadership in a new advanced areas rather than trying to follow others.

Robert Boehme PTS

SoN: The interest of leading European space companies to take financial risks in commercial space developments is very low, what could be done to create more enthusiasm and confidence in commercial spaceflight.

In less than three years we partnered with over 50 industrial companies to take on the challenge of a private mission to the moon. Several of these companies are from Germany and Europe. This shows that the interest is there it just needs the right opportunity. I don't believe that the right incentive in this regard should or could come from the Government or European Space Agency but rather a number of successful small companies that simply proof a point, show that

it is both possible as well as valid foundation for a business to operate.

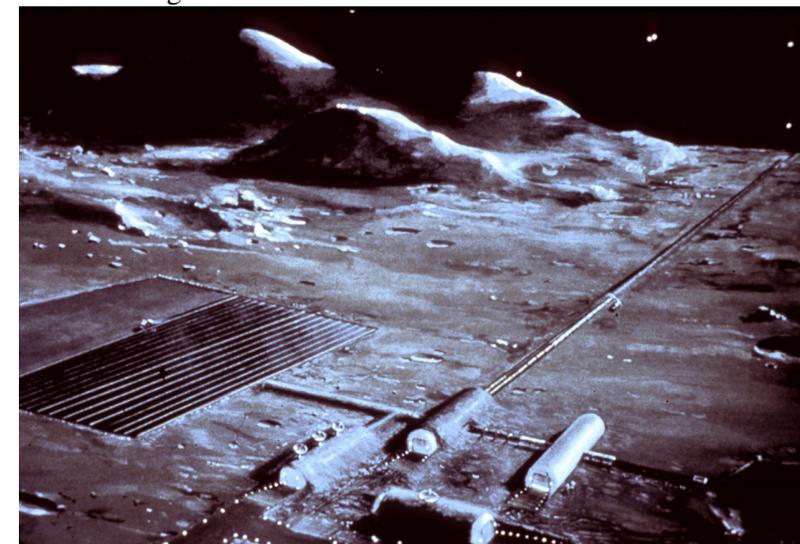
SoN: In our previous interview you said **“We are going to continue our developments that were born out of the X PRIZE. Even in a case where the first, second and third prize were already taken. We have numerous side projects which are totally independent of the competition. That can develop into valuable additions of the private space industry.”** Is this still your long-term goal or would you rather join the “institutionalized” space developments?

We believe it is important to establish a foundation of technology that enables a future of private exploration. In the end, business cases and investors alone don’t get you into space, rockets do.

SoN: How is your assessment of future space spaceflight developments and scenarios (human, robotic, Moon, Mars), let’s say for the next 20...30 years?

A personal feeling of what might be realistic is to use the moon as our Launchpad into space. Several upcoming robotic and manned exploration mission can enable the moon to become a base of operations for future mission that are either living of the land (on the moon) or are taking off to more faraway places like Mars. I believe that we are past the times where we need to send man to Mars just to proof a point, it’s about time for a space stragy that enables to get our foot into space in the long run.

Moon mining SSI



Lunar Mining: Mass Drivers Deliver – Electromagnetic mass drivers using solar power provide low cost transportation of materials to space construction sites.
(courtesy of the [Space Studies Institute](#))

SoN: Since 2006 EADS is developing a suborbital [spaceplane](#) concept which according to EADS is “ready to go”, however a (non-) European sponsor would be needed to enter the market.

EADS recently announced a new initiative to interest sponsors from United Arab Emirates. What do you think of that?

Personally, I see no future in suborbital flights as they are for entertainment only. The flights are going to offer an adventure to affluent individuals. The scientific value of such fights usually is very low and most of the relevant research activities were performed during the former shuttle program and parabolic flights or are ongoing on the ISS.

Although looking for investors from the United Arab Emirates seems to be logical, however it is just a duplication of the more advanced Virgin Galactic approach . There are already other successful followers of this philosophy such as KLM. I think it would be far wiser to seek the technological leadership in a new advanced areas rather than trying to follow others.

Thank you very much for your opinionated answers – the European space community will be very

proud to see you among the finalists of the very competitive line-up of currently 25 teams from 16 different countries. Good luck!

July 2013: Joachim J. Kehr, Editor SpaceOps News