Postfach 76, A-1071 Wien ‖ Technikerstr. 25/8, A-6020 Innsbruck
www.oewf.org , info@oewf.org

Press Kit Dachstein Mars Simulation 2012

Contents

1. General Information

Between 27.April - 01.May 2012, a five day Mars analogue field test will be conducted by the Austrian Space Forum and international research partners at the Mammoth cave and the Giant Ice caves at the Dachstein region in Austria. During this test, the most advanced version of the Aouda.X spacesuit simulator and selected geophysical and life-science related experiments will be conducted. 12 experiments involving scientists from 10 different countries and 3 continents will be conducted (A, D, I, F, USA, P, NL, H, Nz, Pt).

The media day also hosted a Mars-Tweetup with 20 participants. Space enthusiasts then had the opportunity to report live about the field tests taking place. Selected telemetry-data and videos will be available via live-streams on the internet.

1.1. The Dachstein Caves as Mars-Testing-Ground

Since more than a decade there are indications of cave systems on Mars - ranging from large "frozen" lava tubes to smaller high altitude caves on Mars. These systems are highly interesting from the astrobiology perspective - they provide an excellent shielding from the cosmic radiation, allow for a higher atmospheric water content and have a fairly stable temperature regime. So IF life ever arose on Mars, these would be a natural retreat for microbes.

The Dachstein caves are a model system for caves on Mars, providing similar challenges to operations, sterile sampling and engineering points of view. This will probably be the first time, such an integrated field simulation will take place in a simulated Mars spaceflight environment, including remote science activities. (E.g. we will have colleagues in Wellington/New Zealand, at the Mars Desert Research Station in Utah and the NASA Jet Propulsion Laboratory participate virtually and direct the subsurface activities from three continents - emulating a "two-landing-parties-on-Mars"-scenario).

We are very much excited about this mission, involving nearly a dozen international research partners such as the NASA Jet Propulsion Laboratory and French LATMOS, who are responsible for the development of a georadar for the ESA space probe EXOMARS.

1.2. Objectives of the Fieldtests

- a full systems check-out for the spacesuit simulator Aouda.X in its most recent configuration, including telemetry and teleoperations aspects with robotic assets.
- an opportunity for research teams to study equipment behaviour involving the simultaneous usage of different instruments with the option of a human-in-the-loop with a focus on remote-science
- a platform for performing ground validations and terrain tests for experiments, including rovers and study concepts of enhancing the situational awareness of remote support teams
- a test of managing two simultaneous landing teams on Mars, by switching Mission Control for a short duration between the Dachstein operations station and the Mars Desert Research Station/Utah and their MCC in Wellington/New Zealand for remote science experiments

2. LIST OF CONDUCTED EXPERIMENTS

Experiment	Organisation	Beschreibung
Aouda.X Spacesuit Simulator	Austrian Space Forum	Suit-subsystems check-out, field test of telemetry receiving station – subsystem commissioning & voice recognition
A.X MAT/EP	Medical Univ. of Innsbruck	Medical monitoring tool – continuation of the Rio Tinto 2011 medical survey protocol
PRoVisG Cave 3D Rekonstruction	Joanneum Research, Austria	3d TOF-camera for surveying parts of the cave with a high-resolution SLR camera
EXOMARS/WISDOM	LATMOS/IPSL, France	Ground validation for the ESA EXOMARS georadar under varying terrains
Asset planning	Univ. of Innsbruck, Austria	Field testing of a planning algorithm for traverse, consumables and hardware planning
CRV / Cliffbot	Association Planète Mars, France	Concept rover for studying steep terrain and cliffs
Terbium luminescence assay (µEVA)	NASA/Jet Propulsion Lab	Studying contamination vectors and germination rates of water/soil samples within the cave
Asimov Jr. R3	Part Time Scientists (Google Lunar X-Prize)	Chassis and drive-train tests for the GLXP lunar rover prototype
MAGMA 2	Polish Mars Society	Operational tests and demonstration of the winning rover of the University Rover Challenge
Life in Surface Ice (LISI) - Leben im Oberflächeneis	Vrije Universiteit Amsterdam, Netherlands	sterile collection of samples for PCR and phylogenetic analysis
Antipodes	Kiwispace, New Zealand	Simulation of a two-landing teams on Mars scenario – command handover for a remote science experiment
ERAS C3 Simulator	Mars Society Italy	A Mars-analog Command, Control and Communication (C3) infrastructure providing processing and communications capabilities

3. PRESS RELEASES

1.3. Austrian Space Forum

Network of experts

The Austrian Space Forum is embedded in a global network of people from the aerospace sector, including space policy, space industry and space research: ranging from globally operating institutions in the framework of the United Nations, national agencies, the International Space University to regional associations. It is under understanding to act as a turntable between this pool and space enthusiasts

Communication platform

The Austrian Space Forum serves as a communication platform between space enthusiasts, experts and the next generation of space advocates. We facilitate the formation of opinions based upon facts and figures in space matters. A special focus is on conveying the fascination of space and the co-operation with other space institutions.

Dissemination of know-how

By means of lecture series, workshops and seminars we connect the interested public with high-level experts. These activities bring international representatives from agencies, research institutions and governments to Austria. Also, the dissemination of space know-how for terrestrial applications plays a key role.

Conveying information

For the Austrian media, it is relatively difficult and time consuming to approach space experts and their knowledge and opinions. The Austrian Space Forum offers a direct link to the respective specialists: we act as a highly effective turntable between the journalists and the main space players.

1.4. OÖ Seilbahnholding GmbH

Refulgent summits, caliginous caves

Dachstein Salzkammergut promises pure

natural delights!

OÖ SEILBAHNHOLDING
SONNE, LUFT UND BERGE

OÖ Seilbahnholding GmbH
4810 Gmunden | Toscanapark 6 | Austria
Telefon +43 (0)7612 66014-0
Fax +43 (0)7612 66843
office@seilbahnholding.at
www.seilbahnholding.at

Firmenbuchnummer FN 267675 s
Landesgericht Wels
UID-Nr. ATU 64315903

Embedded in a superb landscape, Dachstein in Salzkammergut awaits with some special scenic treats. Cave labyrinths made from rock and ice, family-friendly hiking trails and three spectacular viewing platforms make it one of the most popular destinations in the region.

The highlight of any stay in Dachstein is certainly a trip to the various caves. The ice caves lead the way with their inspiring ice sculptures which have interesting names such as 'Gralsburg' or 'Eiskapelle', and provide amazement thanks to their natural beauty and also their sparing artistic effects. In the nearby Mammut Cave a superlative cave labyrinth awaits guests. Some 70 kilometres of cave passages, giant cave domes and prehistoric riverbeds provide guests with the impression of the multitude of forms of karst caves. The interplay of light and shade, along with a laser installation also provide a special effect here. In the valley the Koppenbrüller Cave provides a superb insight into the genesis of the Dachstein Caves. Expert nature and landscape guides outline the special features of the karst caves to visitors, and of course there is no shortage of myths and legends entwined around the caves.

As well as these 'standard' guided tours, Dachstein also provides special offers for children and those with a thirst for adventure. During the 'Korah and the cave bear' guided tour for children, the youngest children are accompanied through the ice cave by a child from Stone Age times; those who are especially audacious get to discover the caves as part of trekking tours off the tourist paths.

Upon reaching daylight again, a wonderful hiking area awaits guests on the Dachstein Plateau, which has three exceptional viewing platforms. The legendary 5fingers, which juts out 400 metres above a precipice providing views to Hallstatt and the surrounding mountainscape, is certainly the most spectacular. The WeltNATURerbeblick viewing platform provides a splendid view to Dachstein and the Welterbespirale viewing platform on the summit of the Krippenstein invites you to relax on cosy recliners at 2100 metres altitude. Relaxed and refreshed you can then hike on the adventure hiking trails to Heilbronner Kreuz and on the 'Nature Trail'. Here, even just in passing, you learn all sorts of interesting facts about the region and its natural treasures thanks to the numerous informative notice boards.

More detailed information is available here:

www.dachstein-salzkammergut.com

1.5. Aouda.X Spacesuit Simulator

Contact:

Project Leader: Dr. Gernot Groemer,

OEWF Innsbruck

Technikerst. 25/8, 6020 Innsbruck, Austria

Phone: +43 676 6168336

gernot.groemer@oewf.org

Aouda.X is a spacesuit simulator for planetary surface exploration which the Austrian Space Forum has developed within the Mars analog research program „PolAres“. Aouda.X is able to mimic border conditions which a real Mars spacesuit would provide. The purpose of this is to study contamination vectors in planetary exploration analog environments and create limitations depending on the pressure regime chosen for simulation.

The outer hull consists of a Panox/Kevlar tissue with aluminum coating and the suit can perform within a tested temperature range of -100°C and +35°C.

An advanced human-machine interface, a set of sensors and a purpose designed software act as a local virtual assistant to the crewman. Aouda.X is designed to interact with other field components like the rover and various instruments.

1.6. A.X MAT/EP

Medical Preperation and Monitoring guaranteeing a successful Mars Simulation

von O. Simonsen und Thomas J. Luger

Contact:

Project Leader: Dr. Gernot Groemer,

OEWF Innsbruck, Med-Uni Innsbruck

Technikerst. 25/8, 6020 Innsbruck, Austria

Phone: +43 676 6168336
gernot.groemer@oewf.org

Several weeks before the Mars simulation starts, each OEWF-suittester has to undergo a strict sportsmedical qualifying examination, because as a tester for the spacesuit simulator safety has the first priority and is a requirement to keep risks as low as possible.

Our suit testers are exposed to different burdens. Beside physiological parameters, which can be measured objectively by technical devices, i.e. oxygen saturation, CO_2-expiration, heart rate, heart rhythm, temperature, further physiological and psychological strains appear, which are difficult to be measured. For example hunger, thirst and fatigue can decrease the efficiency near to an abort of the simulation.

Additionally certain parameters will be categorized, which have to be answered by the astronaut at certain times: for instance audiovisual abilities, fatigue, discomfort, adynamia, pain. These are measured with the „Classification of Astronaut's present physical and psychological status". All these scores will be recorded daily, cross checked with the data and compared. On the basis of eventually appearing correlations between hard objective data and subjective sensations, an overall picture of the astronaut's status can be determined.

The obtained data, after satellite transmission and analysis, makes it possible, to gain a better and rather individual emergency medical monitoring during EVAs (Extra Vehicular Activities) as well as a better future preparation for all of our four suit testers Daniel Föger, Gernot Grömer, Ulrich Luger and Daniel Schildhammer.

At the Dachstein simulation the technical feasibility of a satellite transmission (online transfers) of standardized biomedical (Standard-ECG, „black box", Reanimation doll, no participation of the suit testers) and environment relevant data from the spacesuit simulator (O_2, CO_2, humidity and temperature) will be compared to the cable transmission.

(Luger TJ, Winter G., Hauth S., Simonsen O, Luger U, Luger MF, Götz N, Grömer G. Telemedical Transmission of Medical Data from a Reanimation Doll and Environment relevant Data of an Analog-Mars-Space Suit during Field Simulation - a Technical Feasibility Study.)

1.7. PRoVisG Cave 3D Reconstruction

3D Reconstruction& External WISDOM Tracking – embedded in FP7-SPACE Project PRoVisG

Contact:
Kathrin Sander
Close-Range Digital Photogrammetry
DIGITAL – Institute for Information and Communication Technologies
JOANNEUM RESEARCH
Forschungsgesellschaft mbH
Steyrergasse 17, 8010 Graz,
Österreich
Phone. +43 316 876-5008
Fax: +43 316 876 95008
Web: http://www.joanneum.at/digital
e-mail: kathrin.sander@joanneum.at

Image: Exomars Rover, Credits VRVis

The EC FP7-SPACE Project PRoVisG (2008-2012) brings together major EU and US research institutions and stakeholders involved in space robotic vision and navigation to develop a unified approach to robotic vision ground processing. State-of-art computer vision technology are collected inside and outside Europe to better exploit the image data gathered during future robotic space missions to the Moon and the Planets leading to a significant enhancement of the scientific, technologic and educational outcome of such missions.

The JOANNEUM RESEARCH participation in the Dachstein experiment in the frame of PRoVisGallows is to verify the implemented 3D Vision processing mechanisms and to collect various sets of reference data in representative environment.

In the context of the Dachstein experiment three main objectives are pursued:

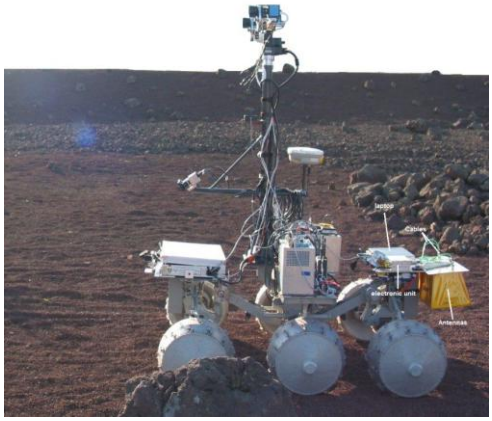
- the 3D reconstruction of a cave segment,
- the external tracking of the WISDOM ground penetrating radar unit in the same cave segment, in preparation to the ExoMars 2018 Rover mission
- the fusion of all gathered data.

Finally a texturized Digital Elevation Model (DEM) of a cave segment including the WISDOM radar path will be provided. By means of timestamps, the captured WISDOM radar data can be assigned to exact cave positions allowing for the localization of the soundings.

The equipment selection and the experiment realization aim at the conservation of the impressive natural heritage.

1.8. EXOMARS/WISDOM

WISDOM Ground Penetrating Radar – Part of the payload for ESA's 2018 ExoMars Rover



Principal Investigator:
Valérie Ciarletti, LATMOS, France,
valerie.ciarletti@latmos.ipsl.fr

WISDOM-Dachstein Media Contact:
Stephen Clifford,
WISDOM Deputy Science Team Leader
clifford@lpi.usra.edu, Phone. +1 713 859 5760

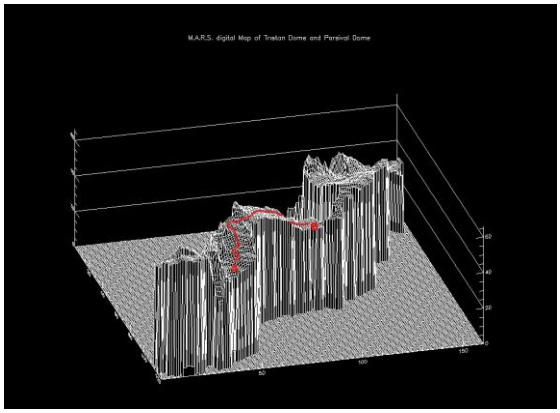
Photo caption: The WISDOM GPR, mounted at the rear of the CNES IARES Rover during a field test at the CNES Mars Yard in Toulouse, France.

The payload of the 2018 ExoMars rover includes WISDOM (Water Ice Subsurface Deposit Observation on Mars), a ground-penetrating radar that will provide a detailed view of the top few meters of the Martian subsurface. Unlike traditional imaging systems or spectrometers, which are limited to studying the visible surface, this radar operates at wavelengths that allow it to see what's underground. This gives WISDOM the ability to investigate the three-dimensional geological context of the terrain covered by the Rover. This additional perspective is vital for a better understanding of the planet's evolution, the local distribution of subsurface ice and water, and its past and present habitability.

WISDOM will study the nature of the subsurface remotely, using radar pulses in the frequency range of 500 MHz to 3 GHz, to map the occurrence of subterranean layers, fractures, embedded rocks and water ice – doing so to a depth of ~3 meters or greater, with a vertical resolution of a few centimetres -- complementing the 2-meter sampling depth of the Rover's drill. WISDOM transmits and receives signals using two small box-shaped antennas mounted on the back of the Rover. The WISDOM measurements will be used to identify optimal drilling sites by determining the nature, location and size of potential targets, as well as potential hazards to the drill.

A WISDOM prototype, representative of the flight model that will be carried aboard the ExoMars rover, is participating in the Dachstein field test.

1.9. Mission Assets and Resource Simulator (M.A.R.S.)



Contact:

Project Leader: Dr. Gernot Groemer,
OEWF Innsbruck

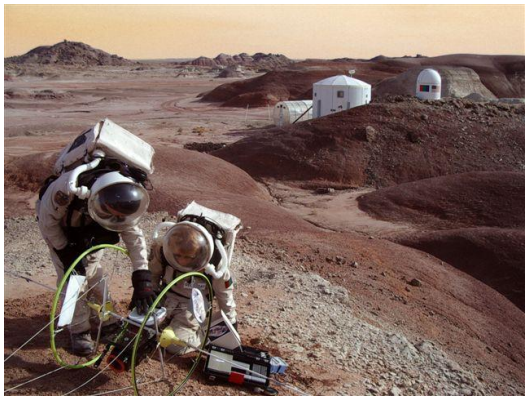
Technikerst. 25/8, 6020 Innsbruck, Austria

Phone: +43 676 6168336
gernot.groemer@oewf.org

You are ready to go to Mars. You have a detailed procedures list of things you need to do and long list of things you would like to do. In most cases a mission is planned from start to finish with a concrete configuration of elements, called a flight plan. But what happens if during an extra vehicular activity (EVA) you make a superb discovery. Can you change the Mission's flight plan? More often than not this requires time and resources that need to be accounted, and in most cases as a scientist you are left with questions. Questions like: Would one more sample have made the difference? Would a little more time have allowed the experiment to give a positive detection? Would it be possible to come back? Etc.

The Mission Assets and Resource Simulator (M.A.R.S.) aims to provide flight planners with a tool to reduce the number of questions left in scientist minds. M.A.R.S is an agile flight planning tool that incorporates the human decision process, while maximizing the scientific output of missions' EVAs. In order to do this, M.A.R.S. calculates the most desired path between the suit tester's current location and experiment locations, determining the necessary resources such as time, water, oxygen, fuel, etc needed to reach the final location. It compares the necessary resources with the resources available and gives flight planners a “Go” configuration of experiments, that maximizes the defined scientific goals and adjust the flight plan to the current flight situation.

1.10. CRV / Cliffbot



doc. APM/A. Souchier

Contact:

Alain Souchier
Association Planète Mars president
alain.souchier@gmail.com
Phone: +33 607289630

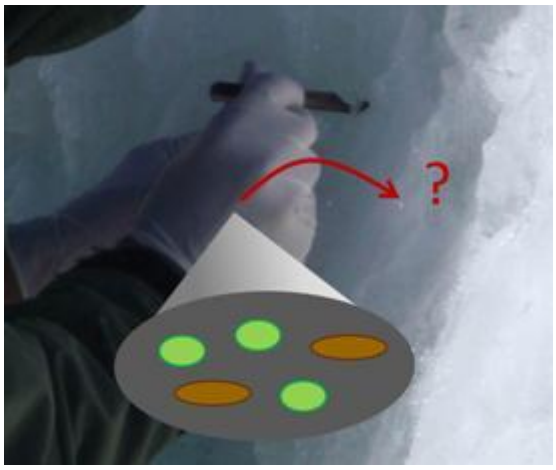
Cliffs and steep slopes provide access to layers telling the story of millions years of geological, meteorological and biological (eventually) activity. A rover using wheels for propulsion cannot travel on steep slopes. One solution is to use a cable suspended rover. Some Mars exploration artist views show astronauts in space suits suspended to ropes along a vertical cliff. Such a difficult operation would only be attempted if a suspended rover would have shown worthwhile features before! Planète Mars Association has decided in 2001 to explore the difficulties of mobility along a slope for a cable suspended rover. The association Cliff Reconnaissance Vehicle (CRV) is not a “lightweight space qualified” vehicle but only a

demonstrator to test the best configurations for mobility. The CRV has no autonomous mobility and is operated manually. An operational vehicle would surely be operated with an electric windlass. The CRV main payload is a camera but other payloads may be carried.

Three CRV configurations have been tested in France and in Utah in the US Mars Society simulation habitat (MDRS). Eight CRVs test campaigns were conducted at MDRS since 2002.

Caves will be interesting to explore on Mars: they may have supported life protected from the harsh outside conditions providing also water or humidity. A CRV type vehicle will be useful to explore these dangerous areas. The Dachstein caves operations will be the first occasion in which the vehicle will be used underground.

1.11. Terbium luminescence assay (µEVA)



Contact:

Veronica McGregor,
Manager, Media Relations

Jet Propulsion Laboratory
Email: Veronica.C.Mcgregor@jpl.nasa.gov

When looking for life elsewhere in our solar system during either manned or robotic missions, we will be looking for potential signs of native microbial life. Therefore, it is critical to prevent the contamination of samples taken on other planets by microbial life that has come from earth. This is challenging because a variety of microbes are tenacious and difficult to sterilize, one common and notable type are endospore (spore) forming bacteria. The spore is a dormant state where the bacterium is protected by a very resilient spore coat that allows them to survive in extreme conditions including space travel. Because eliminating spores and other hardy microbes from equipment sent to space can be so difficult, it is important to investigate to what degree they are transferred from Astronauts or robots to the samples they collect in simulation studies.

The microbead and endospore viability Assay (µEVA) experiment will assess the potential for transferring biological contamination between an Astronaut suit tester and the ice cave using luminescent microbeads as an indicator of contamination. The assay will also study how visitors affect the microbial life in the cave by comparing the number of bacterial spores detected in ice samples taken near access paths in the cave to the number found at more pristine areas away from common use.

1.12. Asimov Jr. R3

Contact:

Sven Wehlan,
Press Contact

Part-Time-Scientists GmbH
Kaulsdorfer Str 13A
12621 Berlin

Phone: +49 30 64 836739
Fax: +49 30 56 66508
email: info@part-time-scientists.com

The „Part-Time Scientists"-team was founded in late 2008 by team leader Robert Böhme. Official registration as a Google Lunar X PRIZE (GLXP) team followed in June 2009. The winner of this competition created by the X PRIZE Foundation is the team that can first land a rover on the moon, have the rover travel 500 meters on the lunar surface, and transmit HD resolution images and video back to Earth.

This challenge is in part technical and financial. The GLXP rules state that the mission must be 90 percent privately financed. The Part-Time Scientists, however, succeeded in attracting a number of companies and research institutes to their extraordinary project. These support the currently about 100 team members with technology and know-how. The mission plan is to design and build a lander and rover internally, while a carrier rocket will be leased from a third party.

The design and manufacture are largely carried out over the Internet; the team members are in Germany, Austria and spread out over the rest of the world. Short development cycles have lead already to the third generation rover prototype. The successor will be almost ready to go to the moon.

1.13. MAGMA 2

Contact:

Mateusz Józefowicz, CEO

ABM Space Education

Phone: +48 887 404 050
mateusz.jozefowicz@abmspace.com

ABM Space Education is a Polish startup, formally incorporated in July 2011. The initial investment came from the AIP Seed Fund. We are the first Polish for-profit private enterprise working in space exploration and space-related research and education areas.

ABM SE's staff, collaborators and consultants are recruited among the best and the brightest members of the Mars Society Polska, from Polish universities (students and the faculty members), and among the members of the Polish diaspora who have decades of working experience in relevant areas from companies, research institutions and governments in the EU, Asia and North America, including USA.

At Dachstain ABM SE will operate Magma White analog Mars rover. Magma White is a developed prototype of Magma2 URC rover, designed by Wojtek Głażewski and equipped with ABM SE's brand-new electronics and control systems, designed for the M4K commercial rovers. Magma White will be specially adapted to work with Wisdom georadar for the EXOMARS mission.

1.14. Life in Surface Ice (LISI)

Contacts:

Luísa Rodrigues
LISI PI, VU Amsterdam/Aveiro University,
rodrigues.luisas@gmail.com
Phone: +31 205987414

Prof. Bernard H. Foing
VU Amsterdam, PhD Supervisor, b.h.foing@vu.nl
Phone: +31 653945301 (office)

Bernd Andeweg
VU Amsterdam media contact b.andeweg@vu.nl

The recent evidence of subsurface ice deposits on Mars makes permafrost and ground ice primary targets for future astrobiology exploration missions on Mars. Direct evidence of caves existing on Mars has been already published. On Earth, glacial ice and permafrost can preserve microorganisms on the long-term. However, due to the low quantities of nucleic acids and viable cells expected to be present, the exact sampling procedure is a critical step.

Culture-independent methods will be used to investigate the microbial diversity from ice, drip water, permafrost samples from Dachstein cave. The number of airborne microorganisms will be evaluated using a culture settling plate technique, and several other quality controls will be undertaken during field sampling procedure steps, in order to minimize forward contamination with non-indigenous microorganisms.

The experiment that will be conducted is part of a joint PhD research undertaken by PI Luísa Rodrigues at Aveiro University (Portugal) and Vrije Universiteit, Amsterdam (The Netherlands): “Microbial communities in extreme Earth-Moon-Mars environments: effects of minerals, organics and physical-chemical conditions”.

1.15. Antipodes

Contact:

Project Leader: Dr. Gernot Grömer,
OEWF Innsbruck

Technikerst. 25/8, 6020 Innsbruck, Austria

Phone: +43 676 6168336
gernot.groemer@oewf.org

Antipodes is an operations experiment, where a loss of communication to the Mission Support Center on “Earth” is assumed and additionally a parallel landing party on the other side of Mars will take over the coordination of an ongoing Extra-Vehicular Activity via their habitat, relayed via a satellite in Martian orbit.

For this experiment the KiwiMars mission at the Mars Desert Research Station (MDRS) in Utah will take over the role of the other landing party on the other side of Mars, whereas the KiwiMars Mission Control Center (MCC) located in Wellington, New Zealand, acts as orbital Mars station.

The main goal is to assess the possibility of taking over the control and responsibility in case of signal loss. Therefore after losing the communication to “Earth” a request will be sent to the MDRS/ MCC Wellington to take over operations for the ongoing experiment and also the telemetry data will be relayed through MDRS / MCC Wellington. There will be several separate experiment instances to test the variety of permutations where the different stations change their roles every time. Such a scenario was never tested before.

1.16. ERAS C3 Simulator

Contact:

Franco Carbognani,

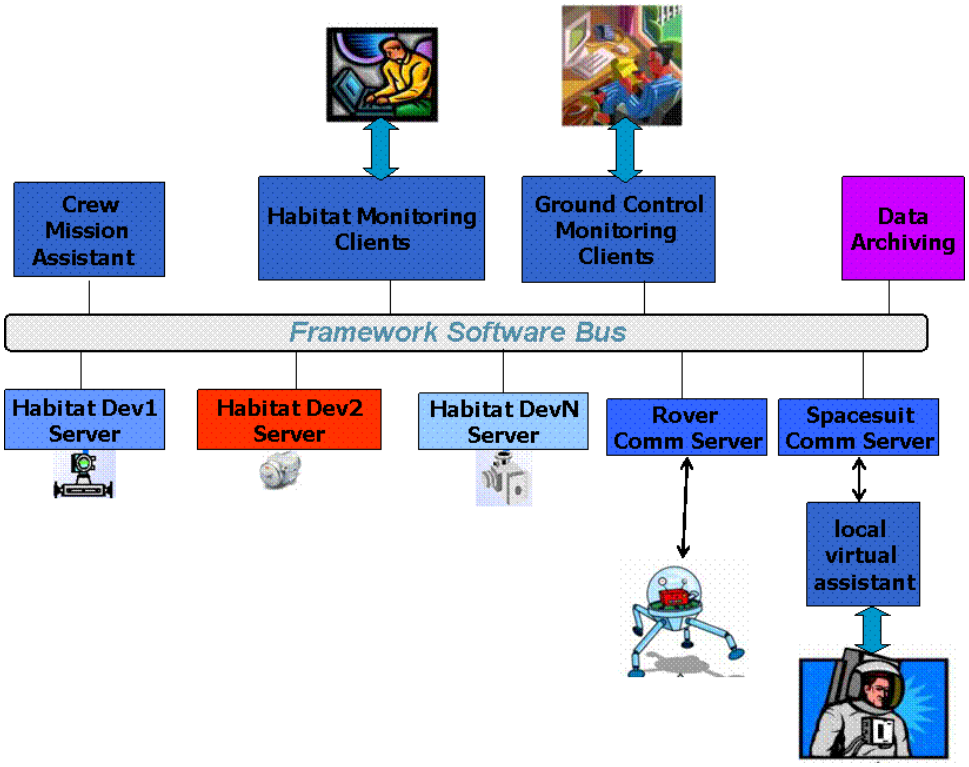
Italian Mars Society
franco.carbognani@marssociety.it

Crewed planetary exploration missions will be complex and high demanding, both for activities in laboratories and Extravehicular Activities (EVA). The human crew will have to interact with a diverse team of mobile robots operating in a variety of control modes.

To deal with this complexity there is a clear need for a concise and coherent design approach. Inadequate usage of technology will result in decreased task performance and may even increase the risks for astronauts' health. In addition to the requirement of excellent usability, the technology should provide excellent cognitive support to perform the nominal and off-nominal actions. The overall system must be able to integrate many modules, including sensors, graphical interfaces and navigation software. We will refer to such system as the Command, Control and Communication (C3) system. In supporting planetary crewed exploration missions, C3 will be facing all the issues associated with monitoring, assessing, and controlling heterogeneous multi-component and multi-degree-of-freedom systems.

Within the C3 system the crew mission assistant will constitute the "facility" side of the ubiquitous computing environment that will supports the crew at any time and place during their planetary exploration missions. The crew mission assistant will cooperate with the astronauts to accomplish safe, effective and efficient operations and will substantially enhance the human-machine's team resilience.

We intend to build a complete simulation of a C3 system as part of the European MaRs Analog Station for Advanced Technologies Integration (ERAS) program spearheaded by the Italian Mars Society. ERAS main goal is to provide an effective test bed for field operation studies in preparation for manned missions to Mars.



1.17. Catalysts

Upper-Austrian Software for Astronautics

Contact:

Bernadette Emsenhuber,
Catalysts

Phone: +43 676 3788244

bernadette.emsenhuber@catalysts.cc

According to the European Space Agency, in 2035 the first manned mission to Mars will take place. For this, the Austrian Space Forum is developing a space suit which has to guarantee the astronauts' survival. The suit has various built-in life-sustaining systems, like heaters, a ventilation system, sensors and a computer, which produce a lot of noise. Particularly the noise is problematic when the astronaut tries to control the various systems by voice.

The Upper Austrian software company Catalysts has found a solution to this problem. Together with students of the Institute for Computational Perception (Johannes Kepler University), Catalysts is working on a speech recognition system. Since the astronaut is exposed to a high level of physical stress and is restricted in his movements, voice control helps him execute the various settings for his space suit. The speech recognition system is trained on various languages and was already tested during the field simulation in Rio Tinto (Spain) in April 2011. From April 27th on, it will be put through its paces once more by the Austrian Space Forum during their field simulation on the Dachstein mountain.

"Pulse 180, Danger and the Computer

I'm moving on stony, frozen ground in the vicinity of a crater rim on Mars. My space suit protects me from the dangers of outer space and Mars, like radiation, cold, heat, vacuum and of course, bacteria. My spacesuit is a technical masterpiece. Life-sustaining systems, fans, heaters, sensors and computers are installed in my space suit and produce one thing − noise. Inside a space suit, it is loud - very loud. As an astronaut, I do not really care. I wear headphones. But the suit is also damn uncomfortable. It prevents me from moving. Every step is difficult. Each time I bend down, every time I change direction is a force effort. Pulse 130 is normal. The terrain goes uphill and downhill. My pulse is at 160 and I'm already 3 hours on the road. I exhale vigorously. My visor fogs up. I need a clear view again. Unimaginable what will happen if I fall. "Fan top - level 4," I wheeze when breathing out as loudly and clearly as possible with a pulse rate of 160. Nothing happens! Actually, the fan should run at full speed for conjuring up a clear view within seconds. The situation is uncomfortable. A bit of fear continues to accelerate my pulse. I really need a clear view as fast as possible. "Fan top - level 4" I repeat. "Please respond, you… computer", I curse."

This situation should never occur. The voice recognition in the space suit must work 100% - always!

- With noise levels of 100 decibels.

- When the astronaut has a pulse of 180.

- If the astronaut is in panic.

- If the astronaut has caught a cold or sore throat.

The Upper Austrian company Catalysts researches in this worst-case scenario of speech recognition for the Austrian Space Forum OEWF. The OEWF builds the best current spacesuit-prototype in Mars science.

4. Contact Austrian Space Forum

Projekt Leader: Dr. Gernot Grmer

OEWF Innsbruck

Technikerst. 25/8, 6020 Innsbruck, Austria

Phone: +43 676 6168336
gernot.groemer@oewf.org

Media Contact: Mag. Monika Fischer

OEWF Vienna

Phone: +43 699 1213 4610
monika.fischer@oewf.org

Partner: