

EUROSPACEHUB ACADEMY: TRAINING THE SPACE ENTREPRENEURS AND ASTRONAUTS OF TOMORROW. S. Crotti^{1,2}, J. Pascual^{1,3}, V. Purienė^{1,4}, B. Foing^{1,2,5}, and EuroSpaceHub Team,

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About EuroSpaceHub: a European-led initiative to foster Space-Tech entrepreneurship. EuroSpaceHub is funded by the EIT HEI initiative, led by EIT Manufacturing and Raw Materials, as part of the Strategic Innovation Agenda (2021-2027) of the EIT. The project was founded by six partners, including four universities and two startups: Vilnius Gediminas Technical University, the International Space University, Universidad Complutense de Madrid, Igor Sikorsky Kyiv Polytechnic Institute, Collabwith and Lunex EuroMoonMars. With its international perspective, EuroSpaceHub aims to promote networking among different stakeholders in the Space-Tech (Universities, researchers, startups, companies and entrepreneurs) with a digital and innovative approach. This is made possible through the EuroSpaceHub digital platform, which connects realities that are working in silos, i.e. without sharing their knowledge [1]. The digital platform spreads awareness on Space-related events, seminars, workshops and trainings. EuroSpaceHub also runs podcast sessions, blogs and events, so as to contribute to public engagement in Space-related initiatives.

EuroSpaceHub Academy and analog missions: an educational programme to train students, Space entrepreneurs and astronauts. The Academy is a project established under the EuroSpaceHub umbrella with the goal of educating students to Space-Tech entrepreneurship. Students in STEM are generally lacking skills integrated with entrepreneurship, which is essential in the context of the New Space Economy. The Academy encourages a hands-on approach to learning. This is made possible through students' participation in on-field experiences: the analog missions. Thanks to the experience of one of the founding partners, Lunex EuroMoonMars, students have the opportunity to participate as analog astronauts in various terrestrial locations worldwide, which are selected for their similarities with the Moon and Mars.

EuroMoonMars has been involved in the organization of analog missions and field-campaigns since 2009. These include missions at the HISEAS base on the Mauna Loa Vulcano (Hawaii), at the MDRS Station (Utah Desert), and also in Iceland (CHILL-ICE), Etna/Vulcano Italy, Atacama Desert in Chile, at the AATC in Poland, ESTEC Netherlands, Eifel Germany and others [2-14]. The missions allow students to simulate the daily life of astronauts in realistic settings, which teaches them various skills.

By putting themselves in the astronauts' shoes, students gain scientific-technical knowledge, master the use of on-board instruments, as well as manage to structure their own experiments, collecting data and processing the results efficiently. In this sense, analog missions are a way for students to "digest" theoretical notions with an experimental and practical approach. PhD and Master's students participate in the missions with their experiments and can take advantage of unique facilities and instruments to conduct their investigations. These studies belong to different areas of Space research: biology, psychology, physiology and engineering, to name but a few.



Fig. 1 - EuroMoonMars field tests experimenting partnerships and problems solving between astronauts, lunar lander, rovers and sample analysis instruments @Lunex EMM



Fig. 2 - Emmopol crew at the AATC Lunar base simulator ©AATC, EMMPOL, Lunex EMM

In addition to these, analog missions enable students to acquire transversal knowledge of a different sort. During the mission, they find themselves living in confined and extreme environments with the rest of the crew. They must survive with limited resources and they need to learn to collaborate for the success of the mission and of their individual experiments. Hence, analog missions become ideal places to test one's in-

terpersonal skills within the group, as well as to enhance one's problem solving and stress management capabilities.

The EuroSpaceHub Consortium recognizes the value of these soft skills in becoming successful entrepreneurs and makes analog missions the flagship of its educational program within the ESH Academy. Also supporting the practical knowledge gained during the field campaigns and missions are dedicated lectures and workshops with experts of the Academy. These trainings focus on the topics of innovation, entrepreneurship, psychology and emotional intelligence as applied to aerospace and missions. The EuroSpaceHub project is co-funding and actively organizing several analog campaigns with the goals of: a) training a growing number of students as astronauts, b) enriching their scientific-technical skills and c) shaping an entrepreneurial mindset.

ExoSpaceHab Express: a strategic facility for education, analog missions and public outreach.

Following their experience with analog missions, EuroSpaceHub and Lunex are focusing their efforts on the development of an innovative facility: a transportable habitat for analog missions and outreach. ExoSpaceHab Express will be made available to several European research organizations and ESH collaborators. The cost-effective and easy transportation of the habitat, which is conceived on wheels, makes its use versatile. Thanks to ExoSpaceHab-X, an increasing number of students will be able to get in touch with the analog mission experience and will receive dedicated training. The project is conceived to train the next generation of Space entrepreneurs.

The facility will be composed of a core housing the main on-board systems and an inflatable. The design allows missions of scalable duration to be organized with crews of four. In addition to its use as a base during missions, ExoSpaceHab serves as a tool for outreach and public engagement. The facility will be used to host Space-related workshops, demos, instrument tests and public & cultural events, such as Space music performances with artists, Space immersive experiences with VR/AR, Training classes and also Space-themed Escape Room. In this sense, ExoSpaceHab is conceived as an itinerant museum that will inspire the public and which will be used as a stage to communicate the importance of aerospace research for humanity.

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Fig. 3 - Rendering of ExoSpaceHab interiors ©Lunex, S. Crotti, B. Foing



Fig. 4 - Rendering of ExoSpaceHab Space Lab ©Lunex, S. Crotti, B. Foing

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