

EUROMOONMARS OUTREACH ACTIVITIES. M.Grosjean^{1,2,3}, A.Sitnikova^{2,3}, B.Foing^{2,3}, J.Preusterink³, B.De Winter⁴, M.Heemskerk⁴, M.Daeter⁴, D.Beentjes⁴, M.Berg⁴, R.Bas Korthouwer⁴, G.Vaessen⁴, S.Van Bloois⁴, I.Brouwers⁴, A.Kruijver⁴, B.Albers⁴, M.C.Gellings⁵, A.Tomic³.

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Introduction: EuroMoonMars is an ILEWG programme since 2009 gathering projects for research and field campaigns with young professionals [1-3]. In 2018-2019, new projects were developed such as IGLUNA Ice Habitat, Moon Gallery and field companies. Such interesting program must be shown or explained to the public or to other professionals, therefore we are discussing the outreach activities in this abstract. More precisely, what are we doing to involve more and more people? Our strong connection with students from Vrije Universiteit (VU) and from Willem de Kooning (WdKA), and the director of Space Expo (space museum specially focused on the youth awareness) gives us opportunities to focus on science and art students, and to childrens. Furthermore, thanks to the wide network we have, it is even possible to target professionals.

Communication Goal: Bigger is the awareness, bigger is the chance for us to get involvement. Already, students from WdKA are interested in joining IGLUNA team due to one of our outreach activities. Jolanda (active at a Dutch observatory and work with children for space awareness) and we are focused on the youth awareness. We think that astronomy is barely taught during school and we mainly want to give a spark of interest to create a burning desire of learning. Children education is primordial because they represent the tomorrow's generation. Moreover, what is more mind blowing than talking about the infinite of space to a toddler that is dreaming of being an astronaut...

Moon Village Workshops: For the 3 last months, we organized few workshops with all kind of people: Students from art, science and philosophy schools but also teachers and artists. We went to Vrije Universiteit for a workshop specially focused on IGLUNA. We were working on the scientific, technological and business aspect for the student project. The goal was to ask them to brain storm for an hour and make a short 5 minutes talk to present their ideas. We did the same with students from Sweden Lulea University and German Aachen University. The biggest workshop we had was during the first Moon Gallery opening with philosophical and art students. Various opinions coming from other sector of studies are vital for our own perception. To communicate, we need first to understand how the others are thinking. The workshop format is efficient to

make interest because it is fast (1hour maximum for the preparation) and it gather groups of 6 to 8 peoples. Indeed, this situation is perfect to improve the team learning and it is a great source of motivation.

ExoHab facilities: Exohab is a famous EuroMoonMars attraction. This space shelter is a simulation of a lunar habitat. Inside it you can find lots of scientific equipment such as telescopes, microscopes, spectrometer, EVA suits, sample analysis...

EuroMoonMars Team often invites interested volunteers to do all kind of simulation such as the one of *Fig 1* right below. The most relevant example here was 2 days of rover simulation with a Slovak team named Androver.

The key here is to involve people and let them discover this atypical place. We often ask them to do astronauts simulation. Please find a diagram that explains how it works:

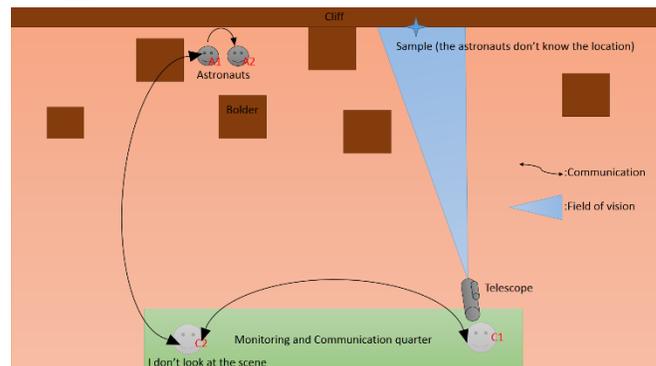


Fig 1: Astronauts simulation schema by M. Grosjean

This is a communication challenge that the team needs to achieve to find several samples into the field close to exohab. This funny activity is another way to create interest. For more immersion, a Martian landscape from DECOS is open for science experimentations. We organized a lot of 'star gazing' sessions opened to everyone. Aiming for the Moon, Mars or even Saturn and Jupiter are good exercise to know the sky better. Somehow, letting the people touch the instruments help them to vanish wrong ideas such as: "the difficulty of using a telescope".

The goal here is to show how it is easy to learn how "to be a scientist", it is either a good time to discuss about

science facts: the perfect time for networking, knowing each other and communicate.

Board game project:

1: Casual information of the player's astronauts
 2: Always good to stimulate drawing expression ! It's a good way to learn and to get fun out of it
 3: We still need to think about the consumption of oxygen etc... but this must be one of the most important section if the player paper
 4: This is the visual aspect of the paper. We can think of a pinning system to implement on the draw some item (paper made hammer, sample box etc...). That way, children will learn faster with visual content
 5: The last section is the Item list where children must right their own equipment by asking what a geologist should take etc... This enhance the curiosity of the players

Idea of mission:
 IGLUNA Mission (+ Easter egg for Moon Gallery):
 Start at a lunar base at the south pole mountain. The sun is shining there but the crew will need to deploy the Smart Ice Lab or collect ice sample at the craters (10 15km from the lunar base).
 The board will be made in consequence (lava tubes, craters, glacier and mountain). We can count as a crew : geologist, drone or/and rover driver, engineer, communication ect...

Fig 2: Player form for the Lunar Board Game by Marius Grosjean [5]

This is the main project developed by Marius Grosjean & Jolanda Preusterink. The challenge here is to create our new board game adapted for 12-16 years old children. Our inspiration is coming from several existing games such as Dungeon and Dragon for the player form and Warhammer for the board design and the movement mechanics.

It is a survival game with a quest system. It is called 'survival' due to the hostility of the environment: The Moon is both cold and hot, oxygen less, drowned into sun radiation and covered with a thin and sharp regolith powder. The team is composed of 4 to 6 players. They will learn how to work together for a same goal: achieve the scientific mission and survive on the Moon. Each player will have a 'player form' as you can see at the beginning of this section. They will all manage their oxygen, energy, temperature and radiation rates like true astronauts. We thought of a unique IGLUNA mission, it is a good way to communicate on this student project (please find a short draft for this mission at the bottom right of the player form). The board will be composed of mountains, craters, lava tubes, caves and glaciers. The 'master player' will explain to the children how to play and will reveal elements on the board depending to the crew's progress on the field. By playing, children will learn faster than to an original way of teaching. They will work together to achieve a common goal, this is perfect for an introduction for a 'professional social life' (and future working groups for high school and university).

To conclude this part, the board game will ideally be

introduced into Space Expo where the children are discovering the mysteries of space. We hope to release it at the end of the month of January 2019.

Public outreach: [4] Other projects and events

We will give an update on the events/workshops we organized or presented at:

- "Space Music & 100 hours of Astronomy" Space Expo Noordwijk Jan 2019
- "Moon Gallery Future Past" Space Expo exhibition Noordwijk 2018-2019
- "VU Space Day" Space Symposium Amsterdam Nov 2018
- "Moon Gallery exhibition" ESTEC Noordwijk Nov 2018
- "Dutch Weekend of Science event – Art in Space" Copernicus Observatory Overseen Oct 2018
- "Moon Gallery ArtMoonMars program for public engagement, outreach, international cooperation, space exploration through art" The Ninth Moscow Solar System Symposium Sep 2018
- Alumni Event at KABK Royal Academy of Art, Space exploration through Art lecture & workshop, The Hague Sep 2018
- "Moon simulations, Moon Gallery workshop & IGLUNA introduction" Iceland University of the Arts Sep 2018
- Smarthabitat at Spektrum Berlin, Sep 2018 –Origami, Igluna & Moon Gallery lecture

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References:

- [1] <http://adsabs.harvard.edu/abs/2017LPICo2041.5073F>
- [2] <http://adsabs.harvard.edu/abs/2017LPICo2041.5083N>
- [3] <http://adsabs.harvard.edu/abs/2017LPL...48.2997H>
- [4] Anna Sitnikova Abstract on Smart Ice Lab (2019)
- [5] Inspired from Dungeon and Dragon player form: <https://www.pinterest.com/pin/296182112967103331/>