



SPACE GENERATION
ADVISORY COUNCIL



SPACE GENERATION ADVISORY COUNCIL
presents the results of the

European Student Forum 2018

Budapest, Hungary
April 14th, 2018

Working Group 2

How can the aerospace sector guide university students?



Table of contents

Group Participants	2
1. ABSTRACT	3
2. INTRODUCTION	4
3. CURRENT SITUATION	5
4. THE SPACE EDUCATION ENVIRONMENT	6
5. GOALS OF THE NEW SPACE GENERATION	8
6. SUGGESTIONS AND IMPROVEMENTS FOR PRIVATE AND PUBLIC INSTITUTIONS	9
PRIVATE SECTOR	9
ACADEMIC ENVIRONMENT	10
GENERAL PUBLIC	10
7. REFERENCES	12

Group Participants

Role	Name	Nationality
Subject Matter Expert	Gábor Marosy	HUN
Authors	Ákos Gyenge Álvaro Romero Calvo András Illyés Áron Selmecsi Emanuel-Ioan Moraru George Vitanov Gianni Sin Yi Heung Luka Strizic Nikolaos Sarantinos Sophia Karolina Salas Cordero Yun-Hang Cho Nives Novkovic Zsófia Bodó	HUN ESP HUN HUN RO HUN UK CRO GR CR UK CRO HUN

1. ABSTRACT

Amidst the growing space industry and the renewal of the workforce of Space Engineers and Scientists, there is a need to train the latest generation of pioneers that will take mankind further than before. Students today face a variety of challenges from financing studies to gaining the right opportunities at the right time. The aim of this working group is to assess the problems faced by students across Europe and discuss the role of the aerospace sector in easing up the transition from the academic world to the space industry.

2. INTRODUCTION

When analyzing the transition to the space sector several questions appear, for instance: What skills are demanded? What are the most important attributes that a beginner should strive to obtain in this field? What makes a successful proactive candidate? What are the different career paths in the aerospace/space sector available? How can the sector facilitate students to successfully deal with the needs of an aerospace job?

In this document we aim to provide a general evaluation of the previous topics from the perspective of a young student. We will focus on what does the new space generation expect from the space sector, and how can private and academic institutions guide this passionate and extremely valuable workforce.

One of the main recommendations that we present is to provide a stronger support for long-term and short-term, public and private hands-on experiences and student competitions. We believe that this is not only convenient for students, but also for the companies that support the training process and require highly specialized and skilled students. The hiring process of companies should be partially based on the previous experiences as a way to perform a complete evaluation of potential candidates, hence ensuring an equal access to the space sector, both for traditional and emerging space countries.

3. CURRENT SITUATION

A common pattern in smaller, emerging countries (such as Croatia, Romania, Hungary to name a few regarding the EU, but knowing this situation is average for emerging countries worldwide) is the almost non-existence or lack of space industry in its totality, as well as a shortage of strong educational backbone in related disciplines. Therefore, to get education in related fields, students are forced to go abroad.

In countries with a long space tradition the situation is better. Companies have working outreach programs such as internships, traineeships, career fair attendance and others. However, there is still room for improvement. Some companies might not consider bachelor students for certain opportunities due to their lack of experience, but by giving the chance to getting involved they could have stronger trainings and guarantee themselves a motivated and young workforce.

Another important issue are the possibilities available for interested students and opportunities to meet. There are many highly motivated students in different levels of education. Also there are opportunities to gain hands on experiences with agencies and industry participants, Nevertheless, the supply and the demand might not always meet. This working group has decided that the communication between both sides is not always optimal and hence does not represent a promising avenue of work.

Application and selection processes in the space industry might also need a review. Nowadays it is common for industry participants to have a data driven selection process. This might be misleading and have a filtering based on geographical or financial background of applicants. In the era of interdisciplinarity and self-learning, the need to evaluate a candidate as a whole raises some doubts with this kind of processes.

4. THE SPACE EDUCATION ENVIRONMENT

Universities and higher education institutes have a leading role in drawing in perspective scientists and engineers. Companies and the space industry also need to be present in the academic life to give students perspective of their future.

Nowadays in the vast majority of universities [1], the bachelor curriculum is lecture-based and does not support students willing to get hands-on experience as much as it could. In several universities there is not enough freedom for the students to choose subjects which they may be interested in. Sometimes there are not any adequate, space industry related courses available, thus students don't have to opportunity to get involved in the work of this sector. The support of universities and skilled professors is mandatory in order to educate the future innovators. Professors have the responsibility to educate the new generation of innovators who think out of the box, thus ensuring an inspiring research environment. Senior year students could also hand over experience gained in former projects, however the real benefit is, that experts can share their knowledge with students not just about the given subjects, but about projects and real-life applications. These kind of heritage alumni/senior students returning to share experience could be utilized for sure. Unfortunately, it is not widely accepted that young graduates should take part in education in order to share their experience.

The involvement of private companies in education is limited in most cases. It is frequent that students do not get the ability to attend courses where they could learn about the practical use of their knowledge in space industry and specific applications. This results in the lack of preparation in both technical and soft skills, which limits the possibilities of a potential candidate. therefore companies should get involved in tertiary education and offer extra curricular courses for enquiring and enthusiastic students.

As a result of the previous, the main hardship for university students is finding straightforward ways to get involved in space-related activities. Opportunities like REXUS/BEXUS, Drop Your Thesis! or others are excellent initiatives, but without previous experience gathering a team and managing a 1 year project can become an unaffordable task for an inexperienced student - not to mention the costs. Most of the projects available for under- or postgraduate students require at least 2-3 years of continuous development which is almost as long time as a person attends a university. Shorter projects and courses, such as the famous ESA training programmes, represent the perfect complement to these activities.

Another easy, and cost-efficient way of reaching possible future workforce is to support student societies. These communities can advertise space activities and influence young professionals, so more skilled and adept students – who probably have not been interested in space activities before – will turn towards this field and generate a lucrative labor pool. However, the funding of these associations is quite limited nowadays, therefore only small amount of people are reached this way.

5. GOALS OF THE NEW SPACE GENERATION

The space sector could be appealing for the youth, because of the fast development of the industry and opportunities to take part in R&D projects which can encourage them the most. Students have the desire to be involved in cutting edge projects, and dedicate themselves to things that really matter to them. It is very important to envision a clear goal, which they could identify with, so their ambitions and dreams come to life.

The new space generation can't wait to start working on projects, the sooner, the better. Starting with CanSat competitions, or hands-on projects in high school, could be an especially useful catalyst, for later achievements during university.

It is desired by companies and universities that the students have deep theoretical knowledge as well as practical experiences (via small projects, for instance) after graduation. These small projects should be initialized by companies and universities, the university should organize the projects in the form of lectures, while the companies should be responsible for the themes of the projects and the provision of workplace. The aim is for graduated students to gain enough practical knowledge during their studies, to be productive as soon as they are employed, without the need of any further learning. This can also be realized by creating a dual education system.

6. SUGGESTIONS AND IMPROVEMENTS FOR PRIVATE AND PUBLIC INSTITUTIONS

Improving the engagement of young professionals during their first steps into the professional environment is crucial for their development into their future career. It falls within the realm of mutual benefit, for all - the public, private and academic institutes and the professionals themselves, to provide better trainingship and knowledge transfer, as it will hasten the integration of young employees into the work environment.

PRIVATE SECTOR

- The private sector and space companies should establish a framework for helping young engineers during the first few months at the company. Introducing how the company works, explaining the overall work logic, the role of each individual in the project should be part of the on-boarding process. Due to the complexity of space projects, early specialization of new employees is crucial and shall define a focus that could help new team members integrate and be more productive quickly. This shall also help align personal goals with the company's targets in advance, thus reducing the risk of conflict later on a project.
- Another proposed recommendation would be to establish a challenge in the form of a competition for university students, to tackle a novel concept or idea that an institute would like to research in a preliminary phase. This challenge could be similar to the X-prize contest [2], the European Rover Challenge [3] or the Student Aerospace Challenge [4] issued by the private sector, though on a much smaller scale and remaining limited within the preliminary design phase of a case study or scenario. This would increase the engagement of the students while providing them an opportunity to acquire significant experience that would help them continue their career as aerospace professionals. However, it should be kept into consideration that the challenge should fall well within the realm of feasibility for students to accomplish. Smaller projects and local competitions may help to solve this issue. That of course, without undermining the target of the challenge itself, which would be to engage the students into accomplishing a compelling task that would require them to research and broaden their knowledge on this specific topic.
- Companies should reach out to students to get them involved in their professional field and also offer more short-term challenges and competitions to give them opportunity to prove themselves as developers. Although companies can benefit from reaching masses

of students and inspiring them to continue their space-related studies – as more and more talented and well qualified graduates will apply for positions in the sector –, it is not widespread among companies to patron such projects or competitions. This would help companies not to just rank the job applicants by the universities where they come from, but on the basis of their practical project-based experience.

- Finally, the private space sector should keep in mind that space remains a technological and scientific frontier and should market it accordingly, with ultimate aim to inspire and push forward the goals and imagination of young professionals, students of all academic levels and the general public.

ACADEMIC ENVIRONMENT

- The process of having more well-prepared young professionals can be accelerated a lot with the help of private institutes in the academic environment. Taking the initiative, academia could invite companies to engage, by creating optional lectures for students, which are not included in the curriculum but are important in the job market. These lectures could be held by engineers, project managers, and other specialized professionals. In favour of creating an inspiring environment, guest lecturers and other view-widening opportunities would be necessary. Politicians should also be more engaged with space education in order to gather more - mostly financial - support from the governments.
- Job fairs could largely assist companies, academia and young professionals in networking, as they could be the cradle for promoting job positions, while at the same time advertising to the public the space industry's activities and the benefits that they provides to the citizens.
- Another well discussed idea would be the introduction of space hackathons - such as SpaceUP [5], and concurrent engineering projects, within the timeframe of several days. These projects could help young professionals acquire knowledge, soft skills and networking within a limited timeframe that would be impossible through other means, while also providing the institutes with fresh novel ideas that could be further developed.

GENERAL PUBLIC

- In order for the space sector to flourish, the general public should be aware of the activities, importance and services the space sector provides. Mostly, in the opinion of the general public, the space sector is only associated to rockets and astronauts. However, the space sector is so much more, as telecommunication, navigation services and earth

observation activities dominate today's industry providing widespread services that the general public uses on a daily basis. Thus, the public should be informed and it should understand the importance of space in their daily lives, as such a realisation shall increase the engagement of citizens, ultimately providing greater resources and enabling the space sector to grow increasing job positions for young professionals.

- The easiest and most engaging way nowadays to catch the public attention is not that much by “old” media but by internet and social-media, so there should be more space-related web pages, space journalism, documentaries and TV-shows for space activities, thus increasing the presence of space in the virtual and real-life environment. The recent SpaceX/Tesla campaign (“Starman”) is the clear example of how the new technologies can promote space.
- Young professionals and graduates should be reached through student societies and competitive programmes. With little investment, these associations can reach a vast amount of young people and make space, and space related activities more compelling to them.
- Another way of promoting space to the general public, would be by space-themed parks where people can see various aspects of space and even try some space simulators. The general public should also understand why space is so important, and this could be achieved with increased knowledge of the past of space exploration that could be provided by space-themed museums.

7. REFERENCES

- [1] Austrian journal of engineering education, (2018). *Engineering education – is problem-based or project-based learning the answer?* [online] Available at: https://www.researchgate.net/profile/Nathan_Scott2/publication/238670687_AUSTRALASIAN_JOURNAL_OF_ENGINEERING_EDUCATION_Co-Editors/links/0deec53a08c7553c37000000.pdf [Accessed 28 Apr. 2018].
- [2] Cprize.org, (2018). *XPRIIZE Official Website*. [online] Available at: <https://www.xprize.org/> [Accessed 14 Apr. 2018].
- [3] roverchallenge.eu, (2018). *European Rover Challenge Official Website*. [online] Available at: <http://roverchallenge.eu> [Accessed 14 Apr. 2018].
- [4] studentaerospacechallenge.eu, (2018). *The Student Aerospace Challenge Official Website*. [online] Available at: <http://www.studentaerospacechallenge.eu/index.php/en> [Accessed 14 Apr. 2018].
- [5] Spaceup.org, (2018). *SpaceUp Official Website*. [online] Available at: <https://spaceup.org> [Accessed 14 Apr. 2018].