**Lessons Learned: Managing Student Space Projects**

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1. **Introduction**

For almost 25 years members of Students’ Space Association at the Warsaw University of Technology have developed numerous space-oriented projects. Many of these projects have been pushing frontiers with record breaking rockets, innovative balloons, robots and satellites, unprecedented on a national scale. Rover Scarab, prepared for the University Rover Challenge 2009, began our society’s involvement in the analogue Mars missions. A decade later, the work on our 5th robot – Sirius is going strong. In recent years, Sirius has appeared in 3 international competitions, and overall reached a 4th place in Europe.

The Sirius project has been a challenge from the engineering point of view, but its management also proved to be quite a struggle. With a multidisciplinary team of about 30 members from different backgrounds, it was crucial to establish an efficient way of collaboration. The cooperation skills had to be gained quickly, in order to successfully lead the project ourselves amidst our regular student duties. We encountered many issues not typical for a professional environment, so all our solutions came as a result of trial and error, sometimes causing unnecessary frictions but ultimately leading to a success.

1. **Issues**

After time spent in development of Sirius, following issues were identified as crucial or unique for our situation.

1. **Prioritization** - As all participants study full time, projects rarely are the centre of attention. This makes them vulnerable for many outside factors and strictly ties them to the academic schedule, adding another level of complexity in the planning process.
2. **Personal relations** –As participation in the project is strictly voluntary, every responsibility is based on trust among members, making proper relations a top priority.
3. **Enforcement** – Measures for enforcing or awarding work results are limited.
4. **Changing generations** – Every year a large number of most experienced members leave the project after finishing their studies, a new generation has to be recruited and trained, all with minimal loss of knowledge and productivity.
5. **Remote work -** Recent events impacted every aspect of life, with student projects being no exception. In order to maintain productivity, the immediate plans and work process had to be altered after careful analysis.
6. **Additional duties –** Scope of the projects almost always requires seeking funds outside of the University and dealing with additional bureaucracy. As a result, most members have to take on responsibilities that are not related to technical development, namely such roles as accountants, PR specialists or educators. That requires not only flexibility, but also openness and creativity.

For the project to function properly every single one of mentioned points had to be analysed and addressed. The aim of this paper is to show mistakes, solutions and lessons learned in the process. As a result, we hope to aid fellow students with starting or developing their own projects, and to facilitate dialog between students and industry representatives, by showing our way of thinking and working, our expectations and limitations.

1. **References**

[1] Gajewski, M., Cieplicka, P., Kostrzewa, Ł., Hałoń, M., “Sirius – analog mars rover from SKA Robotics”, Mars Society Convention, 2019.

[2] J. Tymoszuk, F. Walesiak, J. Fabisiak, M. Szymański, A. Pieczul, T. A. Miś, „Lessons Learned - A students' approach to designing a rover for an analogue Mars mission”, 2020