

SPACE SYSTEMS SYMPOSIUM (D1)
Lessons Learned in Space Systems (5)

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LESSONS LEARNED AND FOLLOW-UPS TO EDUCATIONAL CUBESAT PROJECTS GAINED IN
THE PW-SAT PROJECT**Abstract**

The CubeSat standard is getting more popular in the world. In next years number of CubeSats launched will reach 100, and perhaps even more. Most of them were built and are being built for educational and scientific purposes, where thousands of students are involved in the development process. That makes a difficult situation to any project manager as well as team to avoid circumstances which could make difficulties to fulfill mission goals. Experiences and knowledge gained in the PW-Sat project, which was launched on 13th February 2012 on the Vega Maiden Flight as the very first Polish satellite, as well as other CubeSat projects launched on the same launcher too, let to conclude this overall process into the complete lesson learned summary. The example of the PW-Sat project gives a list of issues related with software, hardware as well management which provides complete guidelines for any developing project, especially new educational project's players whose goal is to develop first CubeSat within their institutions or countries. The topic of lessons learned can be split into sections which cover following parts: project management, system engineering, mission design, satellite developing process and post launch operations. The example of the PW-Sat gives a comprehensive analysis of issues met during all project phases, in example: lack of automatic modes which made a problem with meeting mission goals, too short test campaign which influenced on the power budget, and so on. In result the PW-Sat satellite, which was intended to test the new deorbitation system based on a drag augmentation device, could not reach all mission success levels. The analysis of the lessons learned performed by the PW-Sat team implicated a need to provide guidelines for the next satellite project – the PW-Sat 2, which is intended to be 2U CubeSat and equipped in more devices and payloads than the first one, for example the sail to deorbit the satellite, and the new type of the sun sensor which has been never tested in space. It also forces on requirements on any level of the project to avoid circumstances which could be predicted as well as to minimize a risk of failure during mission in space. These lessons, as a good practice, could be shared to those organizations and institutions which are going to develop their first CubeSats, and to help them to build better projects and reach assumed mission goals.