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BLUESat Roadmap – Launch and Beyond

The Future of the BLUESat project beyond the
successful completion of the first satellite

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Executive Summary

The first primary BLUEsat project is successfully wrapping up after 15 years. The project presented a working satellite at the conclusion of the Warrawal Space Education Project in July 2013, and Launch being negotiated for April 2014. BLUEsat will continue to exist in the form of an undergraduate space engineering group. Past project issues will be addressed by continued collaboration with the Australian Centre for Space Engineering Research (ACSER) and by focussing on projects with externally administered deadlines. Currently, the group is fielding teams for the Canadian Space Design Challenge and NASA Lunabotics Mining Competition, whilst also providing support for the QB-50 project.

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1 Background

From its conception in 1997, BLUEsat has had a long history of delayed deadlines and development velocity issues. The recent 2010 to 2013 period has seen the project revitalised with new leadership and direction. Increased collaboration with academic and professional sponsors has pushed the project to successful completion, with a full functional demonstration of the Satellite at the final Warrawal Conference in July 2013.

1.1 Warrawal Project

The Warrawal Project was a space educational project arising from a government grant as part of the Australian Space Research Program (ASRP). Aim of the project was to create space-engineering educational opportunities by creating a Master's program in Satellite Systems Engineering, providing two internships to Thales Alenia Space and driving the BLUEsat project to completion. The Consortium was composed of UNSW, Thales Alenia Space, l'Institute Supérieure de l'Aéronautique et de l'Espace (ISAE) and Optus Satellites.

As part of the project, the BLUEsat microsatellite was to have a completed fully functional model by mid-2013. This deadline was successfully met, with functional demonstration to the final Warrawal Consortium Conference in late July of 2013.

1.2 Expected Launch

Due to restricted available funds, the Satellite will launch on a Stratospheric Balloon for a near-space functional test, instead of launching into Low Earth Orbit on a rocket. The Balloon Launch is currently being organised in conjunction with Professor Ravi Sood of UNSW@ADFA. Launch equipment is in the process of being sourced and a flight model of the satellite is in the process of being built. The Project is well on track for launch during the launch window in April of 2014.

2 Roadmap and Future

BLUEsat will carry on the tradition of giving UNSW undergraduate students experience in professional space engineering and project management across all levels. To address issues which hampered the progression of the first satellite, the group will take on multiple, smaller projects under advisement of the ACSER. The scope and number of these projects undertaken will depend on the availability of student resources.

Past scoping and deadline issues will be addressed by focussing our efforts on externally administrated design competitions. BLUEsat is currently preparing to field teams in the Canadian Satellite Design Challenge (CSDC) and NASA Lunabotics competition. BLUEsat will also provide some design resources to the UNSW contribution to the QB-50 CubeSat project. These projects have been chosen after discussion with Professor Andrew Dempster and Doctors Elias Aboutanios and Barnaby Osborne.

2.1 Society Structure

With focus on one project, BLUEsat has previously functioned by having one executive structure, consisting of the President, Chief Technical Officer (CTO), Chief Operations Officer (COO).

The change of focus to multiple projects requires multiple structures of leadership. The project will be sub-divided into divisions, each with an executive support structure. This is illustrated in Figure 1.

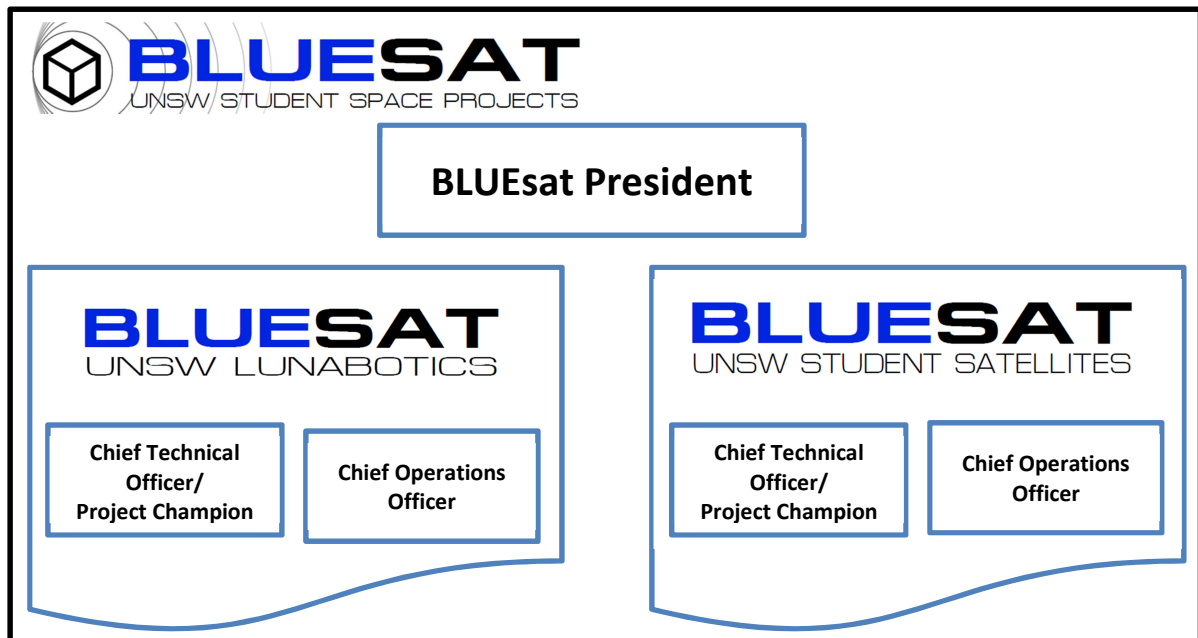


Figure 1 – BLUEsat Executive Structure

BLUEsat members will work on projects according to their division, administered and mentored by their division's executive. Although the structure seems quite tiered, the expectation is that the more senior and experienced members will mentor younger members, regardless of division or title. This mentoring process has yielded positive results over the last 5 year cycle. Younger members have matured through the project to perform to a higher standard within university and become competent engineers sought out by industry.

This structure will change as projects gather more momentum and the needs of the group are more concretely identified.

2.2 Canadian Satellite Design Challenge (CSDC)

The CSDC is a Canadian run CubeSat design competition. The competition calls for the design and delivery of 3U CubeSat, with 21 months between registration and satellite delivery. The CSDC also requires that entrants participate in high-school outreach and science educational programs in order to increase space-technology awareness in the public community. In the past, the CSDC has had some international involvement, with a partnership between the University of Bologna and École Polytechnique de Montréal

BLUEsat has contacted the CSDC administrators with support from ACSER. The CSDC has given a positive response, encouraging UNSW to partner with a Canadian University in order to field an entrant into the next cycle of satellites, expected to be delivered in mid-2015. Liaising with the CSDC to organise a partnership is ongoing.

The current satellite development team will migrate to working on BLUEsat's entrant to the CSDC.

2.3 NASA Lunabotics

The NASA Lunabotics Mining Competition requires university student groups to design and build an un-manned rover designed for operation on the moon. The challenge runs annually, with competitions held at the Kennedy Space Centre in Florida. International universities make up a significant number of entrants each year, with the University of Sydney fielding a team for the May 2013 competition. Like the CSDC, the Lunabotics competition also requires student groups to perform high school outreach.

A team of 1 PhD and 3 undergraduate Mechatronics engineers has joined the BLUEsat Group with the expressed purpose of fielding a Lunabotics team under the UNSW and BLUEsat banner. The BLUEsat Lunabotics team is currently working on an initial conceptual design, project plan and budget. The aim is to have a semi-functional model by end of Semester 1, 2014 and a rover ready for entrance to the May 2015 competition.

2.4 QB-50 Support Projects

BLUEsat has been and will continue to provide support to the development of UNSW ECO CubeSat intended for the QB50 Mission. This has taken the form of undergraduate theses undertaken by BLUEsat members, and side projects assigned to BLUEsat Satellite sub-teams.