

## TP Small Satellites

### Introduction

The project team is tasked with creating a comprehensive guidebook to build and maintain the capability to perform space technology development through application of nano- and small spacecraft technology.

The guidebook shall contain advice and best practices on technical issues, cost-benefit and programme and project management considerations, infrastructure requirements as well as on regulatory (frequency allocation, satellite registration practices, space debris mitigation) and policy (international cooperation, technology transfer) aspects.

### Background

Article 1 of the Outer Space Treaty states that "the exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind."

Establishing simple standards for nano- and small-satellite platforms, such as the CubeSat Standard, has enabled a growing number of organizations to develop, build and launch their own satellites. These organizations are increasingly also located in countries with limited means for expenditures for space activi-



ties and in countries that have previously only been passive users of space applications. The establishment of a basic capacity in space technology development, through measures such as the education and training of the necessary experts or the creation of the required testing and building infrastructure, is therefore becoming relevant to more and more countries. The United Nations, through its Programme on Space Applications, has recently embarked on the Basic Space Technology Initiative (BSTI), encompassing a set of activities aiming to assist these countries with their efforts.

As part of the BSTI, the United Nations intends to provide its Member States with a primer/best practices guidebook on establishing nano- and small satellite projects. Project team members should consider themselves as advisors to the BSTI in helping to prepare such a guidebook.

There is no universally agreed

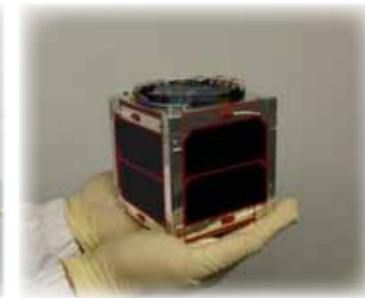
upon definition of the mass and size of nano- and small satellites, however, for the purpose of this project the project team shall focus on satellites with a mass of up to 50 kg. The guidebook may however include information on the options available and steps necessary to progress from the development of such smaller to larger-sized satellites.

### Objectives

Produce a high-quality guidebook with concise and comprehensive information, tools and techniques to enhance the use of nano- and small satellite projects for capacity building in space technology development, targeted to relevant decision makers in academia, industry and governmental organizations. Provide participants with the opportunity to contribute to the growth of space technology development throughout the globe and gain experience in interdisciplinary and international teamwork, while fostering skills in effective management of time and resources.

### Tasks

1. Identify a feasible scope for the project and devise a team organization, outline and work plan required to deliver a high-quality guidebook consistent with the time and resources available (Letter of Intent, beginning of Week 6).



2. Collect and compile relevant information, best practices, tools and techniques on:

- State-of-the-art applications and general (cost-) benefits of nano- and small satellite projects for capacity building in space technology development;
- Infrastructure requirements for nano- and small satellite development projects;
- Technical issues—design, development and operation of small spacecraft (platforms, payloads, ground stations, assemblies, components, equipment along with suppliers);
- Programmatic, management issues (project management models, concurrent engineering, cost, schedule and risk issues);
- Relevant regulatory issues (space law, satellite registration, frequency allocation, space debris mitigation guidelines, and others as required);
- Standardization issues (standards for platforms, ground-stations, project and programme management, communication protocols, and interfaces);
- Policy issues (nano- and small satellite development as part of an overall research and development strategy, modes of international cooperation and their benefits and drawbacks, technology transfer issues, industrialization, start-up opportunities, and related issues);
- Available (open source) software, hardware, people along with other relevant tools;
- Any other information considered relevant.

3. Present the above information in a comprehensive and

concise manner, suitable for a quality guidebook.

4. Use the standard ISU template on format and references.

### Additional Deliverables

(In addition to the project report and executive summary)

- Presentation for external review of the team project to the Third United Nations / Austria / European Space Agency Symposium on Small Satellite Programmes for Sustainable Development, to be held in Graz, Austria, from 13 to 16 September 2011.
- IAC Conference Paper for presentation at the 62nd International Astronautical Congress, to be held in Cape Town, South Africa, from 3 to 7 October 2011.
- Presentation of the team project to the 49th session of the Scientific and Technical Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space, to be held in Vienna, Austria, in February 2012.

### Suggested References

United Nations Basic Space Technology Initiative, <http://www.unoosa.org/oosa/en/SAP/bsti/index.html>.

Second United Nations/Austria/European Space Agency Symposium on Small Satellite Programmes for Sustainable Development: Payloads for Small Satellite Programmes, United Nations Document A/AC.105/983, December 2010, <http://www.unoosa.org/oosa/>

[en/SAP/act2010/graz/index.html](http://www.unoosa.org/oosa/en/SAP/act2010/graz/index.html).

CubeSat Website, <http://www.cubesat.org/>.

HUMSAT Website, <http://www.humsat.org>.

Space Mission Analysis and Design, Third Edition, Wertz and Larson, Microcosm Press.

Reducing Space Mission Cost, Larson and Wertz, Microcosm Press.

The Logic of Microspace - Technology and Management of Minimum-Cost Space Missions, Rick Fleeter, Microcosm Press.

UN Document Style Guide and the ISU Project Report Template.

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