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Basic Space Technology Initiative (BSTI)

Activities in 2014-2015 and plans for 2016 and beyond

I. Introduction

1. The United Nations Programme on Space Applications was established as a result of discussions at the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE), held in Vienna in 1968.¹ The Programme is implemented by the United Nations Office for Outer Space Affairs (OOSA) and provides support to capacity-building in space technology and its applications to Member States of the United Nations.²

2. Advances in technology, as well as the adoption of philosophies of technology development that accept a higher, but still reasonable, level of mission risk, have resulted in increasingly capable small-satellite missions that can be developed with an infrastructure and at a cost that make them feasible and affordable for organizations such as academic institutions and research centres that have a limited budget for space activities. The many benefits that can be derived from such activities have led to an increased interest in establishing basic capacities in space technology development, including in developing countries and in countries that had previously only been users of space applications.

¹ United Nations, General Assembly, Official Records Twenty-Third Session, Agenda item 24, Report of the Committee on the Peaceful Uses of Outer Space, Annex II "Documentation on the United Nations Conference on the Exploration and Peaceful Uses of Outer Space", New York 1968.

² United Nations Office for Outer Space Affairs, "United Nations Programme on Space Applications", United Nations, ST/SPACE/52/Rev 1, September 2012.



3. In response to that interest, the Basic Space Technology Initiative (BSTI) was established as a new cornerstone to the Programme on Space Applications in 2009.^{3,4}

4. The Initiative focuses on the development of affordable, small-satellite platforms with a mass below 150 kg and on the associated technical, managerial, regulatory and legal issues. It supports capacity-building in basic space technology and its applications for the peaceful uses of outer space in support of sustainable development and, in particular, their contribution to achieving internationally agreed development goals, including those set forth in the United Nations Millennium Declaration (General Assembly resolution 55/2), as well as those set out in the Plan of Implementation of the World Summit on Sustainable Development,⁵ the Johannesburg Declaration on Sustainable Development⁶ and the outcome document of the United Nations Conference on Sustainable Development, entitled “The future we want”.⁷

5. This document reports on the BSTI activities conducted in 2014-2015 and on planned activities for 2016 and beyond. It should be read in connection with documents A/AC.105/2011/CRP.14, A/AC.105/2012/CRP.16, A/AC.105/2013/CRP.14 and A/AC.105/2014/CRP.6 which describe the mission and the underlying objectives of BSTI and report on the activities in 2009-2011, 2011-2012, 2012-2013 and 2013-2014, respectively.

II. BSTI Workplan

6. BSTI activities are conducted in accordance with a multi-annual workplan developed in consultation with representatives from Member States and space technology development experts from all around the world. The work programme, as described in more detail in document A/AC.105/2011/CRP.14, is structured around five activity categories: I. Basic activities, II. International symposiums on capacity building in basic space technology development, III. Space technology education curriculum, IV. Establishment of long-term fellowship programmes, and V. Basic Space Technology Initiative projects.

7. The workplan is reviewed annually and updated to take into account the changing needs in Member States and to reflect new trends in the field of space technology development. The latest version of the workplan is available from the BSTI website at www.unoosa.org/oosa/en/ourwork/psa/bsti/index.html.

³ Balogh, W., Haubold, H., “Proposal for a United Nations Basic Space Technology Initiative”, *Advances in Space Research* 43, Elsevier, 15 June 2009, pp. 1847-1853.

⁴ Balogh, W., “Capacity Building in Space Technology Development: A New Initiative within the United Nations Programme on Space Applications”, *Space Policy* 27, Elsevier, August 2011, pp. 180-183.

⁵ *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August-4 September 2002* (United Nations publication, Sales No. E.03.II.A.1 and corrigendum), chap. I, resolution 2, annex.

⁶ *Ibid.*, chap. I, resolution 1, annex.

⁷ General Assembly resolution 66/288, annex.

III. BSTI Funding

8. BSTI activities are implemented by the Space Applications Section of the Office for Outer Space Affairs. In terms of staffing the Initiative uses 30 per cent of the time of one P-staff and 20-25 per cent of the time of one G-staff. Ms. Chisato Kobayashi joined the Office in the temporary position of a Programme Officer from October 2013 to June 2014 and spent 50 per cent of her time working on BSTI-related activities. Mr. Daniel Garcia Yarnoz joined the Office in the temporary position of Associate Programme Officer from May 2015 to support the work under the BSTI.

9. Basic funding for BSTI is provided through the regular budget of the Office. In 2014, a total of US\$ 41210 were used to defray the costs of air travel for participants in BSTI-related activities. These funds were complemented by in-cash and in-kind contributions from various co-sponsors of the United Nations/Mexico Symposium on Basic Space Technology, including the Ministry of Transport and Communications of Mexico, the State of Baja California, the Universidad Autónoma de Baja California, Axon' Cable, Honeywell, and UK Trade and Investment, a department of the Government of the United Kingdom. Other co-sponsors of BSTI activities in 2014 included the Kyushu Institute of Technology, the University of Tokyo and the University Space Engineering Consortium (UNISEC).

10. Member States interested in receiving technical assistance on matters related to capacity-building in regional/national space technology development or in hosting or co-organizing BSTI events are invited to contact the Office for Outer Space Affairs. For further information on partnership opportunities please also consult www.unoosa.org/oosa/en/aboutus/partnerships.html.

11. The Office for Outer Space Affairs is also looking for a donor country interested in providing the services of an Associate Expert to the Basic Space Technology Initiative. The job description (INT-190-11-P090-01-V) is available from the Associate Expert Website at <http://esa.un.org/techcoop/associateexperts/>. Interested donor countries are invited to contact the Office.

IV. Activities in 2014-2015 and plans for 2016 and beyond

12. The following paragraphs describe the activities conducted in 2014-2015 and plans for 2016 and beyond:

I. Basic activities

13. BSTI continued to cooperate with the International Telecommunications Union (ITU), to provide advisory services on legal and regulatory issues of small satellite activities. Information on registration procedures for space objects, liability issues and space debris mitigation measures, frequency coordination, launch opportunities, orbital data information and conjunction assessment services and relevant open standards and standardization efforts is provided at: www.unoosa.org/oosa/en/ourwork/psa/bsti/resources.html.

14. BSTI is also disseminating at its annual international conference a CD-ROM with information on "Frequency Registration for Small Satellite Programmes" provided by

ITU-R. The CD-ROM is updated annually and the latest version is available from www.unoosa.org/oosa/en/ourwork/psa/schedule/2014_symposium_mexico_basic_space_technology.html.

15. The following presentations were made in 2014-2015 to promote BSTI:

(a) Invited Presentation, “United Nations Basic Space Technology Initiative”, 21st Asia-Pacific Regional Space Agency Regional Forum (APRSAF), Space Technology Working Group, Tokyo, Japan, 2 December 2014;

(b) Invited Presentation, “UN Treaties on Outer Space, Launch Register and Other Civil Responsibilities”, International Satellite Symposium 2014, International Telecommunication Union (ITU), Bangkok, Thailand, 18-19 September 2014;

(c) Lecture, “Outer Space Activities, Space Law and the United Nations”, National Seminar on Space Laws and Satellite Communication Regulation Bangkok, Thailand, Office of National Broadcasting and Telecommunication Commission (NBTC) and International Telecommunication Union (ITU), Bangkok, Thailand, 17 September 2014.

16. The following papers were published in 2014-2015 to promote BSTI:

(a) J. Polansky, M. Cho, W. Balogh, “Nano-Satellite Project-Based Learning for Capacity Building in Basic Space Technology Development”, 65th International Astronautical Congress 2014, Paper IAC-14-E1.4.7, Toronto, Canada, September 2014;

(b) W. Balogh, “Aims and Achievements of United Nations Initiatives Supporting Small Satellite Projects”, in “Small Satellites: Chances and Challenges”, I. Marboe (ed.), “Studies on Space Law”, Brill Academic Publishers, 2015 (in publication).

17. In 2014-2015 BSTI contributed to the following activities:

(a) International Workshop on Small-Scale Satellite Standardization, Kitakyushu, Japan, 17-18 November 2014;

(b) Second UNISEC-Global Meeting, Kitakyushu, Japan, 18-20 November 2014;

(c) Scientific Programme Committee, 10th IAA Symposium on Small Satellites for Earth Observation, Berlin, Germany, 20-24 April 2015;

(d) International Scientific Committee, 7th European Cubesat Symposium, Liège, Belgium, 9-11 September 2015.

18. BSTI also contributed to the work of the United Nations Office for Outer Space Affairs and the International Telecommunications Union (ITU) to prepare a document providing “Guidance on Space Object Registration and Frequency Management for Small and Very Small Satellites” to assist small satellite developers and operators with space object registration and frequency management. The document also covers information on authorization and licensing of satellite missions and space debris mitigation measures. It is available for download from www.unoosa.org/oosa/spaceobjectregister/resources/index.html.

19. A request has been received to organize a side-event on capacity building in space technology development at the forthcoming Sixth African Leadership

Conference on Space Science and Technology for Sustainable Development to be held in Cairo, Egypt, in December 2015.

II. International conferences on capacity building in basic space technology development

20. Following the conclusion of the series of three United Nations/Austria/European Space Agency symposiums on small-satellite programmes for sustainable development held from 2009 to 2011, starting from 2012 BSTI is organizing international space technology symposiums on basic space technology development in each of the regions that correspond to the United Nations Economic Commissions for Africa, Asia and the Pacific, Latin America and the Caribbean, and Western Asia.

21. The third Symposium in this series was held for the Latin America and the Caribbean region as the United Nations/Mexico Symposium on Basic Space Technology on the theme “Making Space Technology Accessible and Affordable” in Ensenada, Baja California, Mexico from 20-23 October 2014. More than 150 small satellite experts from 30 countries participated in the meeting.

22. The Symposium programme was structured around eight sessions on the following topics: (a) space technology development activities in Latin America and the Caribbean; (b) capacity-building in basic space technology development; (c) small satellites for Earth observation and disaster management; (d) small-satellite projects for engineering education; (e) education curriculum on space engineering; (f) regulatory and legal issues; (g) use of space technologies for early warning systems; and (h) international experiences.

23. The Symposium report, including the observations and recommendation of the participants, has been issued under the document number A/AC.105/1086 and all presentations made at the Symposium are available from the Symposium website at www.unoosa.org/oosa/en/ourwork/psa/schedule/2014_symposium_mexico_basic_space_technology.html.

24. In 2015, the international space technology conference will focus on the African region and will be organized in cooperation with the Department of Science and Technology and the University of Cape Town on behalf of the government of South Africa, at Cape Town, South Africa, from 1-4 September. The technical sessions to be included in the Symposium are as follows:

(a) Space Technology Development and Capacity Building in Basic Space Technology Development with a Focus on Africa;

(b) Small Satellite Missions in Support of Key Scientific Projects and Questions;

(c) Applications of Small Satellite Missions;

(d) Small Satellite Missions Ground Segment;

(e) Small Satellite Projects for Engineering Education;

(f) Legal and Regulatory Issues;

(g) Long-term Sustainability of Outer Space Activities.

25. Registration and applications for funding support to attend the Symposium can be made through the BSTI website at www.unoosa.org/oosa/en/ourwork/psa/schedule/2015_symposium_south_africa_bst.html. Within the limits of the funds made available by the co-sponsors, the United Nations, under the BSTI, will provide support for qualified space technology experts to attend the Symposium. The deadline for applications is 21 June 2015.

26. In 2016 the international space technology conference will focus on the region of Western Asia and an offer to host the Symposium has been received from Turkey. For the 2017 Symposium an expression of interest to host the meeting has been received from Brazil.

III. Space technology education curriculum

27. In connection with the establishment of the Regional Centres for Space Science and Technology Education (affiliated to the United Nations), the Programme on Space Applications has prepared a series of education curricula to ensure an acceptable minimum common standard of teaching. The curricula, in line with the courses offered at the Regional Centres, initially focused on space applications. An education curriculum on Global Navigation Satellite Systems (GNSS) was issued in 2013 (ST/SPACE/59) and a curriculum on space law was published in 2014 (ST/SPACE/64). The BSTI workplan calls for the preparation of an education curriculum on space engineering, which should include topics such as space engineering, mission design and project management.

28. Work on the education curriculum on space technology began at the 2012 United Nations/Japan Nano-Satellite Symposium with the organization of a special session. A draft of the curriculum was presented and discussed at the United Nations/Mexico Symposium on Basic Space Technology held in October in 2014. Due to staff changes in the Programme on Space Applications affecting the BSTI work plan, the curriculum is now planned to be finalized in 2016 for presentation to the Scientific and Technical Subcommittee at its session in 2017. Further information on the curriculum development plan is available from www.unoosa.org/oosa/en/ourwork/psa/bsti/ecse.html.

IV. United Nations/Japan Long-term Fellowship Programme — Post-graduate study on Nano-Satellite Technologies (PNST)

29. In 2011 the Office for Outer Space Affairs and the Government of Japan in cooperation with the Kyushu Institute of Technology (KIT), established the United Nations/Japan Long-Term Fellowship Programme — Post-graduate study on Nano-Satellite Technologies (PNST) for nationals of developing countries and non-space-faring nations.

30. Since 2013 the Fellowship Programme accepts up to four three-year doctoral and up to two two-year master degree students per year with full support through a scholarship provided by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan. Presently eleven doctorate degree students from Algeria, Egypt, Mongolia, Nigeria, the Philippines, Romania, Thailand and the Ukraine and four master degree students from Colombia, Indonesia, Singapore and Sudan are studying at KIT under this fellowship scheme.

31. More than 155 potential applicants registered through the PNST webpage for the 2015 round of applications. By the deadline of 25 February 2015, 45 valid applications had been received. The four doctorate degree scholarship were awarded to applicants from Egypt, Mexico, Mongolia and Turkey. The two master degree scholarships were awarded to applicants from Bangladesh and Costa Rica. They will begin their studies at KIT in October 2015.

32. The sixth selection round will open for applications in the second half of 2015. Application information will be made available from the Fellowship webpage at www.unoosa.org/oosa/en/ourwork/psa/bsti/fellowships.html.

33. The Office for Outer Space Affairs is continuing discussions with educational institutions, including the Regional Centres for Space Science and Technology Education, affiliated to the United Nations, to identify education opportunities for future space technology experts.

V. Conclusions

34. BSTI is continuing to assist Member States interested in the establishment of basic capacities for space technology development. The first phase of the workplan has been completed in 2011 with the conclusion of the three-year series of Symposiums on Small Satellite Programmes for Sustainable Development held in Graz, Austria. Since 2012 the focus is on the international space technology symposiums and on the preparation of the space technology education curriculum.

35. Member States are invited to make full use of the activities offered under the BSTI. The Office for Outer Space Affairs welcomes comments on the Initiative as well as expressions of interest for cooperation on activities related to capacity-building in space technology development.