United Nations A/AC.105/983

General Assembly

Distr.: General
29 November 2010

Original: English

Committee on the Peaceful Uses of Outer Space

Report on the second United Nations/Austria/European Space Agency Symposium on Small Satellite Programmes for Sustainable Development: Payloads for Small Satellite Programmes

(Graz, Austria, 21-24 September 2010)

I. Introduction

1. The second in a series of three United Nations/Austria/European Space Agency symposiums on small satellite programmes for sustainable development was held in Graz, Austria, from 21 to 24 September 2010, focusing on the theme "Payloads for small satellite programmes". The series of symposiums is part of the Basic Space Technology Initiative, a new initiative carried out in the framework of the United Nations Programme on Space Applications that is aimed at supporting capacity-building in basic space technology and promoting the use of space technology and its applications for the peaceful uses of outer space and in support of sustainable development (see www.unoosa.org/oosa/en/SAP/bsti/index.html).

2. The Office for Outer Space Affairs of the Secretariat, the Government of Austria and the European Space Agency (ESA) have jointly organized symposiums on space science and technology and their applications in Graz, Austria, since 1994. The symposiums have addressed a broad range of themes, including the economic and social benefits of space activities for developing countries, the cooperation of space industry with developing countries, enhancing the participation of youth in space activities and space applications for sustainable development. Information on all the symposiums is available on the website of the Office for Outer Space Affairs (www.unoosa.org/oosa/SAP/graz/index.html).

3. The present symposium was the seventeenth held since 1994. It was hosted by the Government of Austria and co-sponsored by the Federal Ministry for European and International Affairs of Austria, the State of Styria, the City of Graz and ESA. The International Academy of Astronautics (IAA) and the Austrian Academy of Sciences supported the Symposium.

4. The present report describes the background, objectives and programme of the Symposium, provides a summary of the thematic sessions and contains the recommendations and observations made by the participants. The report is prepared pursuant to General Assembly resolution 64/86. It should be read in connection with the report on the first symposium in the series, held in September 2009 (A/AC.105/966).

A. Background and objectives

5. Since the Third United Nations Conference on the Peaceful Uses of Outer Space (UNISPACE III), held in Vienna from 19 to 30 July 1999,[1] considerable progress has been made in the operational use of space technology and its applications. Advances made in several technological fields in the past decade have led to the increased affordability and accessibility of space applications, thus enabling more and more users in a growing number of countries to benefit from space activities. Space-based assets such as telecommunications, Earth observation and navigation satellites support a broad range of applications and are increasingly integrated into public infrastructure, contributing to policy- and decision-making in support of sustainable development to improve people's lives.

6. Increasingly capable nano- and small satellites can now be developed with an infrastructure and at a cost that make them feasible and affordable for organizations such as academic institutions and research centres, which 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 countries that had previously been only users of space applications.

7. Small satellites, their development and their applications have been considered by the Committee on the Peaceful Uses of Outer Space in the framework of the United Nations Programme on Space Applications since the mid-1990s (see A/AC.105/611, A/AC.105/638 and A/AC.105/645). As part of the Technical Forum of UNISPACE III,[2] the United Nations, in cooperation with IAA, held a workshop on small satellites at the service of developing countries. In follow-up to that workshop, since 2000, the Office for Outer Space Affairs and IAA have organized half-day workshop sessions on the theme of small satellites at the service of developing countries as part of the annual International Astronautical Congress.

8. The accelerating pace of technological advances, in particular those related to the development of satellites in the 1-30 kg class and the sharply rising number of players active in the field led to the establishment in 2009 of the Basic Space Technology Initiative, a new area of activity of the United Nations Programme on Space Applications, pursuant to its mandate to stimulate the growth of indigenous nuclei and an autonomous technological base, to the extent possible, in space technology in developing countries, with the cooperation of other United Nations agencies and/or Member States or members of the specialized agencies, as set out in

---

[1] *Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, 19-30 July 1999* (United Nations publication, Sales No. E.00.I.3), chap. I, resolution 1.

[2] Ibid., annex III.

General Assembly resolution 37/90. The Basic Space Technology Initiative will support capacity-building in basic space technology, with an initial focus on the development of nano- and small satellites and their applications for the peaceful uses of outer space in support of sustainable development and, in particular, consider their contribution to achieving the internationally agreed development goals, including those contained in the United Nations Millennium Declaration (Assembly resolution 55/2), as well as the goals set out in the Plan of Implementation of the World Summit on Sustainable Development[3] and the Johannesburg Declaration on Sustainable Development.[4]

9. The 2010 Symposium focused on the theme "Payloads for small satellite programmes" and had the following objectives:

(a) To review the status of small satellite activities worldwide, with a particular focus on regional cooperation;

(b) To examine the potential of using small satellites for education, research and operational applications;

(c) To discuss the technical and programmatic issues of developing payloads for small satellites;

(d) To consider the relevant regulatory issues specific to small satellite programmes (such as frequency allocation, space debris mitigation and registration).

B. Attendance

10. Participants in the Symposium were selected on the basis of their academic qualifications and on the basis of their professional working experience in space technology development or their involvement in the planning and implementation of small satellite programmes of relevant governmental organizations, international or national agencies, non-governmental organizations, research or academic institutions or private sector companies.

11. The Symposium was attended by 117 space professionals involved in nano- and small satellite missions from governmental institutions, universities and other academic entities and the private sector from the following countries: Algeria, Austria, Belgium, Brazil, Canada, China, Colombia, Egypt, Germany, India, Indonesia, Iran (Islamic Republic of), Iraq, Italy, Japan, Kenya, Lithuania, Malaysia, Mexico, Nigeria, Poland, Republic of Korea, Republic of Moldova, Russian Federation, South Africa, Spain, Switzerland, Thailand, Netherlands, Tunisia, Ukraine, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United States of America, Venezuela (Bolivarian Republic of) and Viet Nam.

12. Representatives of the Office for Outer Space Affairs, International Telecommunication Union (ITU), ESA and IAA were among those participating in the Symposium.

---

[3] *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.

[4] Ibid., chap. I, resolution 1, annex.

13. Funds allocated by the United Nations and the co-sponsors were used to defray the cost of the air travel, daily subsistence allowance and accommodation of 16 participants. The co-sponsors also provided funds for local organization, facilities and the transportation of participants.

C. Programme

14. The programme of the Symposium was developed by the Office for Outer Space Affairs in cooperation with the programme committee of the Symposium. The programme committee included representatives of national space agencies, international organizations and academic institutions. An honorary committee and a local organizing committee also contributed to the successful organization of the Symposium.

15. The programme consisted of a series of keynote speeches, technical presentations and workshop-style sessions, with time set aside for discussions and short presentations by participants on their relevant activities. Chairs and rapporteurs were assigned to each session and provided their comments and notes as an input for preparation of the present report. The detailed programme, the list of participants and full documentation of the presentations made at the Symposium have been made available on the website of the Office for Outer Space Affairs (www.unoosa.org/oosa/en/SAP/act2010/graz/index.html).

16. Following welcoming remarks by representatives of the co-sponsoring organizations, two keynote addresses, entitled "Microsatellites: moving from research to real operational missions" and "Experiences with capacity-building in small satellites", were delivered by representatives of pioneering and successful small satellite companies from Asia and Europe. A representative of the Office for Outer Space Affairs made a presentation introducing the Basic Space Technology Initiative and reviewed the highlights, objectives and expected outcome and follow-up activities of the Symposium. A press conference held on the first day promoted the work of the United Nations Programme on Space Applications among representatives of Austrian media.

17. The Symposium consisted of sessions on the following themes: small satellite programmes; state of the art, design and integration of payloads for small satellites; examples of payloads for small satellites; regulatory issues and launch opportunities; and workshop-style working group activities and discussion of recommendations and observations. At the closing session, statements were made by representatives of the co-sponsoring organizations.

II. Summary of thematic sessions

A. Small satellite programmes

18. The purpose of the first thematic session was to provide an overview and an update on ongoing small satellite activities worldwide. It was noted that the definition of the mass range of what constitutes a small satellite varies from source to source. For example, some considered that all satellites with masses below 1,000 kg fell within the category of small satellites, while others gave a lower mass

limit. For that reason, there was no strict definition or delimitation of what was considered to be a small satellite within the framework of the Basic Science Technology Initiative. Presently, there was a strong interest in the development of nanosatellite platforms, such as those based on the CubeSat standard, with satellite masses in the approximately 1-30 kg mass range. However, some of the presentations at the Symposium also encompassed satellites with greater masses. Many of the subsystem and payload designs, as well as the design and engineering methods and project management approaches used in the development of nanosatellites, are scalable and applicable to larger satellite platforms, and vice versa. While small satellites had some inherent physical constraints compared with larger-sized satellites, for example, limitations of the aperture size of optical payloads or the size of antenna structures, studies had indicated that between 50 and 60 per cent of the demand of satellite missions could be met with satellite platforms in the 1-150 kg range.

19. The CubeSat nanosatellite standard had been developed by California Polytechnic State University and Stanford University in 1999. It was based on a 10 cm^3 cube with a mass of approximately 1 kg. Double- and triple-sized CubeSat configurations had also been built and launched. Institutions in more than 50 countries were developing satellites based on the CubeSat standard. Some considered CubeSats to be cost-effective science and technology platforms, in particular for emerging and developing countries and countries with limited budgets for space activities. CubeSat projects had been used to educate and train engineers and project managers, but they were increasingly being used for operational applications, space science and even exploration missions. The majority of CubeSat projects involved cooperation among partners in different institutions and countries. Several countries provided funding support through national programmes and welcomed the participation of international partners under arrangements not requiring the exchange of funds. Japan was organizing a contest inviting proposals for a nanosatellite constellation mission, which was open to international participation. Efforts were also being made to increase the benefits of educational space missions by forming a worldwide network of ground stations. One such effort was the Global Educational Network for Satellite Operations of ESA, which promoted a common hardware and software standard enabling ground stations and spacecraft from different builders to interact.

20. The flexibility of small satellite missions in serving the needs of countries and regions with highly diverse needs was demonstrated by presentations on ongoing cooperation efforts in Africa for the development and operation of the African Resource Management satellite constellation and by presentations on small satellite activities in Canada, the United Arab Emirates and the United States. To enhance cooperation in exploration and science missions, the Committee on Space Research (COSPAR) Panel on Exploration promoted its International CubeSat Programme.

B. State of the art, design and integration of payloads for small satellites

21. In the second session, on the state of the art, design and integration of payloads for small satellites, it was noted that builders of small satellites were, in general, willing to accept higher levels of risk by using or adapting off-the-shelf

components. Such components had proved to be surprisingly reliable in the space environment. Accordingly, one of the several advantages of small satellites and their payloads was their greatly accelerated technological innovation cycle as compared with the more conservative approach taken with more expensive, larger and heavier satellites. Consequently, it was deemed necessary to dedicate a specific session to the discussion of recent ideas and innovations with respect to the design of small satellite payloads.

22. Of particular interest to the small satellite community was the networking of satellites using distributed satellite systems, such as constellations, formations, swarms and clusters. Such satellite configurations had certain advantages, such as higher temporal resolutions, higher levels of availability, higher fault tolerance and greater system robustness through graceful degradation capabilities in case of failures. Small satellite platforms made networks of satellites affordable. For certain applications, the shift from the use of single, large spacecraft to decentralized and distributed small satellite systems thus offered many interesting opportunities for new or improved applications.

23. It was reported that efforts to establish an integrated local collaborative space technology development programme in Malaysia were centred on the CubeSat platform-based Innovative Satellite (InnoSAT) project, aimed at building Malaysian space technology development skills by enhancing infrastructure and developing the necessary human resources through inter-organizational partnerships. The project involved capacity-building efforts in local universities and the initiation of partnerships to transfer local space technology to other industry sectors. The project was open to international partners. The launch of InnoSAT was planned for 2011.

24. The Educational Satellite (SATEDU) kit, a system for training human resources in the small satellite field developed by the National Autonomous University of Mexico (UNAM) was an example of how the CubeSat platform could be used to educate engineers. SATEDU was a didactic tool created to be used in universities and research institutions. It contained and reproduced the behaviour of the following subsystems: structure, power, wireless communications, flight computer, inertial navigation sensors (gyros, accelerometers and digital compass) and a stabilization card that employed a reaction wheel. SATEDU was an open system allowing the user to develop and test new experiments or payloads.

25. Slightly larger satellite buses were the focus of the presentations on innovative system architectures for the development of small satellite systems in Japan and on the Proba spacecraft family developed in Belgium, which was providing small mission solutions for Earth observation and science applications.

26. Systems engineering tools and the methods for the concurrent design of small satellites employed by the ESA Education Office and the Massachusetts Institute of Technology were discussed and identified as topics that should be considered in more detail as part of future activities of the Basic Science Technology Initiative. The Massachusetts Institute of Technology made some of those tools and related documents available through its MIT “OpenCourseWare” website.

C. Examples of payloads for small satellites

27. One of the original proponents of the CubeSat standard described the unexpected and tremendous developments that had taken place since the original standard was issued in 1999. By the time of the holding of the Symposium, launch attempts carrying more than 50 CubeSat had been made on six different launch vehicles. Thirty-four CubeSats had been successfully placed into orbit. Four additional launch vehicles had been scheduled to carry future CubeSat missions. Currently, thousands of people were working on CubeSat-based satellites, establishing a lively developer community and a growing marketplace for CubeSat components and technologies. The presentation provided practical advice, based on lessons learned, for the development of CubeSat satellites.

28. The Humanitary Satellite Network (HUMSAT) project (www.humsat.org), in support of humanitarian missions, was conceived at the United Nations/Austria/ESA Symposium on Small Satellite Programmes for Sustainable Development, held in 2009 (A/AC.105/966, paras. 54-60). It was aimed at deploying a constellation of nanosatellites for worldwide communications, including for geographical areas lacking suitable communication infrastructures. The project, led by the University of Vigo of Spain, had made considerable progress since 2009. Institutions of several countries had pledged to contribute a satellite to the constellation. The African Regional Centre for Space Science and Technology Education — in English Language and the Regional Centre for Space Science and Technology Education for Latin America and the Caribbean, affiliated to the United Nations, were considering contributing to the HUMSAT project.

29. Presentations were made on other projects involving constellations of small satellites that were open to international cooperation: the QB50 mission, an international network of 50 double CubeSats for multi-point, in situ, long-duration measurements in the lower thermosphere and for re-entry research; the CANEUS shared small satellites for collective safety, security and prosperity, and an effort to create a low-cost, internationally shared space-based data collection and distribution backbone with exceptionally low barriers to entry for participating nations; and the six-satellite Bright-star Target Explorer (BRITE) constellation (with two satellites each to be provided by Austria, Canada and Poland), which would conduct high-precision photometry of bright stars.

30. Specific payload-related issues were discussed in presentations addressing the advantages of utilizing nano- and small satellite formations for technology, science and education; the adaptation and miniaturization of existing payloads so that they could be carried on increasingly smaller satellite platforms; the fruitful links that could be established between academia and industry for the development of small satellite technologies; and current possibilities for ordering off-the-shelf parts for CubeSat platforms via the Internet.

D. Working group session

31. The first part of the working group session was dedicated to a workshop on CubeSat design challenges, on the basis of the experiences of the Malaysian InnoSAT platform. The challenge given to the working groups was to come up with

the conceptual design of an InnoSAT mission that met the requirements of developing countries or countries that did not yet have a space programme. An added constraint was that the mission should be based on a self-contained payload system ready to be integrated into a single InnoSAT bus. Working group participants were provided with four scenarios: (a) introducing space technology; (b) initiating high-technology development; (c) introducing space engineering; (d) introducing space science. Each of those scenarios assumed different levels of unit mission cost, research and development infrastructure and industrial capacities, and human resources skills.

32. The unique holistic workshop approach was highly appreciated by the participants and helped place the technical capabilities of nano- and small satellites into the wider context of seeking to provide concrete mission applications or achieve certain space technology development capacity-building aims, while taking into account the limited financial resources available to the mission.

33. The second part of the working group session was dedicated to discussions on requirements and development solutions for the HUMSAT constellation project. The discussion was facilitated by the fact that several of the participants were already familiar with the HUMSAT project because their institutions were planning to contribute to the project.

34. At the conclusion of the working group session, participants identified a list of possible applications (including the sensors required by those applications) that could benefit from the communications services offered by the HUMSAT constellation. Participants also identified other missions that would be compatible with the HUMSAT system and that could potentially be carried as primary or secondary payloads.

E. Regulatory issues and launch opportunities

35. The final thematic session was devoted to regulatory issues relevant to small satellite activities, specifically, the procedures for frequency and satellite registration and considerations related to space debris mitigation. The identification of suitable launch opportunities was linked to the issue of debris mitigation, as the destination orbit was an important factor in preventing the long-term accumulation of mission debris.

36. The Radiocommunication Sector of the International Telecommunication Union (ITU) organized a workshop on frequency registration for small satellite programmes.[5]

37. A representative of the Office for Outer Space Affairs made a presentation on the registration obligations of Member States with respect to satellites. The Office maintained the public registers containing information provided by Member States on the launchings of space objects, in accordance with General Assembly resolution 1721 B (XVI) and the Convention on Registration of Objects Launched

---

[5] Documentation of the workshop by the ITU Radiocommunication Sector has been made available on the website of the Basic Space Technology Initiative of the Office for Outer Space Affairs (www.unoosa.org/oosa/en/SAP/bsti/index.html).

into Outer Space. Participants were also informed about the recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects, contained in General Assembly resolution 62/101.

38. A representative of the Office for Outer Space Affairs presented the Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space.[6] The Guidelines were based on the guidelines for debris reduction developed by the Inter-Agency Space Debris Coordination Committee. There were several potential technical solutions for the control of the in-orbit lifetime of nanosatellites in order to minimize the creation of new space debris. One concept involved the deployment of a large-area solar sail to reduce the orbital speed of the satellite, causing it to eventually re-enter and burn up in the atmosphere. PW-Sat, the first Polish satellite based on the CubeSat platform, was being designed as an in-orbit proof of concept. Regulatory and standardization issues would be an area of focus at the following United Nations/Austria/ESA Symposium, to be held in Graz, Austria, in 2011.

39. While over recent decades the cost of small satellite development had decreased considerably, for reasons such as the standardization of satellite platforms, the cost of launching satellites into outer space has remained fairly static. In some cases, the cost of launching a small satellite, based on commercial launch service rates, could be orders of magnitude higher than the actual cost of developing that satellite. Thus small satellites were frequently launched as secondary or tertiary payloads that were "piggy-backed" to a primary and usually larger payload. Consequently, as non-primary payloads, small satellites were limited in the choices available with respect to the final delivery orbit. In some instances, that might hinder space debris mitigation efforts.

40. The status of present and anticipated future launch opportunities for small satellites was reviewed in another presentation. The Nanosatellite Launch Service of the Space Flight Laboratory of the University of Toronto Institute for Aerospace Studies was negotiating shared launches with launch providers willing to accept secondary payloads. The Service been used by many builders of small satellites to procure launch opportunities.

41. A representative of the NanoLauncher consortium introduced the concept of an air-launched transportation service for nanosatellites. The NanoLauncher business model was based on studies indicating a growth in the number of small satellites to be launched in the near future. It was planned that the service would become available in the period 2014-2015.

F. Presentations by participants

42. In addition to the presentations described above, participants were given the opportunity to make five-minute presentations on their small-satellite activities. Those presentations were an integral component of the Symposium and provided a

[6] *Official Records of the General Assembly, Sixty-second Session, Supplement No. 20* (A/62/20), annex.

wealth of information on ongoing small satellite programmes and projects worldwide.[7]

III. Observations and recommendations

43. The last day of the Symposium was dedicated to finalizing the observations and recommendations of the Symposium participants. The discussions focused on the range of benefits that could be derived from building capacities in space technology development by implementing programmes to develop nano- or small satellites; the opportunities to contribute to the HUMSAT satellite constellation project; the range of activities to be conducted in the framework of the Basic Space Technology Initiative and their approval by the participants; and the planned upcoming activities of the Initiative, including the topics to be discussed at the United Nations/Austria/ESA Symposium to be held in 2011.

A. Benefits of small satellite programmes

44. Participants noted a wide range of benefits of implementing programmes dedicated to the development of nano- and small satellites, which went far beyond the benefits that could be derived from the actual applications enabled by those satellites. In particular, participants concluded that nano- and small satellite programmes made the following possible:

(a) The conceptual design, detailed development, manufacturing, launching and operation of a satellite could be conducted within a time frame shorter than that of projects employing larger-sized satellite platforms. Nanosatellites had gone from conceptual design to launch in a time-period as short as six months. Such projects were therefore extremely flexible and allowed graduate students to follow a satellite project from its conceptualization through to its operational phase;

(b) Such programmes opened a door for developing countries and countries with limited resources to participate in space activities, enabling them to establish basic capacities for the development of space technology, tailored to their needs. That was due to the comparatively modest infrastructure and funding requirements for nano- and small satellite programmes;

(c) System engineers, mission designers, industrial engineers and programme and project management specialists could be trained and educated in methods of space mission design. The skills of those experts were easily transferable to professionals in other sectors of industry, thus benefiting industrial sectors other than the aerospace sector;

(d) Technical capabilities could be acquired in the areas of miniaturization, microelectronics and micro-manufacturing, with potential spin-offs for other industrial sectors such as the medical, consumer electronics, robotics and entertainment sectors;

[7] Documentation of those presentations has been made available on the website of the Office for Outer Space Affairs.

(e) The services and technologies developed for such programmes created opportunities for the establishment of commercial businesses, to act as players in the burgeoning global marketplace for nano- and small satellite technologies, as had been demonstrated by several companies, including in developing countries, or as suppliers to other industrial sectors. It was noted that small satellites were becoming tools for commerce, as their capabilities had increased and their cost had been reduced, yielding a return on investment. That was significant in so far as it permitted countries to subsidize the development of space technology and encourage the establishment of companies that could help to support a local high-technology industry;

(f) Such programmes created new opportunities for international space cooperation. For cooperation to be equal and fully beneficial to each side, each partner had to offer capabilities and knowledge of interest to the others. Owing to the comparatively quick technology innovation cycles of nano- and small satellite programmes, such satellite programmes offered a relatively level playing field for both new entrants and established players. While it might take years or even decades to establish the capabilities required to develop larger satellites, new players could catch up relatively quickly with the developments in the field of nano- and small satellites. The experiences gained and lessons learned in the development of small satellites were often directly applicable in the development of larger satellites. That was also the case with infrastructures required for the development of small satellites, which in many cases could also be used or upgraded for the purpose of developing larger satellites;

(g) Such programmes generated short-, mid- and long-term plans and perspectives for space technology development and served as a stepping stone in enhancing a country's space capacity. Nano- and small satellite programmes were also ideally suited to be a starting point for bringing together a country's academic, administrative and industrial sectors and for making use of their synergies in defining and implementing the initial phases of a space programme and a national space policy;

(h) Such programmes demonstrated the benefits of space technology and its applications, focused the attention of government and industry and served to rally and encourage the people uniting behind a programme and project;

(i) Benefits could be derived from the actual operational use of nano- and small satellites, in a wide range of applications fields, as well as in space science and research and technology development.

45. Participants noted that active government support was important to sustain capacity-building efforts for space technology development. Such support could include the provision of funds through appropriate national programmes as well as the establishment — in compliance with international law and internationally agreed upon standards of operation — of an appropriate legal and regulatory framework, including the opportunities to create start-up companies and facilitate technology transfers.

46. The above list of benefits provides arguments that should encourage policy- and decision makers to support nano- and small satellite activities. This list may be far from complete, and it may be the case that additional benefits may be derived from a programme or project, depending on its specific characteristics.

B. Humanitary Satellite Network project

47. Participants agreed that the HUMSAT project was an important initiative for promoting space activities and international space cooperation between developed and developing countries and for supporting education, research and humanitarian applications, including in the field of monitoring climate change.

48. Participants agreed that participation in the HUMSAT project and support for the project through scholarships and the donation of hardware and software should be encouraged.

49. Participants agreed that, whenever possible and reasonable, open standards and open-source and non-proprietary methods and tools should be used in the development of the HUMSAT project.

50. Participants also agreed to that the HUMSAT project should be followed in the framework of the Basic Space Technology Initiative.

C. Approval of the workplan of the Basic Space Technology Initiative

51. Participants in the Symposium discussed and approved the following work programme of the Basic Space Technology Initiative. The work programme is structured in five areas of activity:

I. Foundations

(a) To organize a series of United Nations workshops and symposiums on basic space technology, including the series of three United Nations/Austria/ESA symposiums on small satellite programmes for sustainable development. These initial workshops and symposiums will also have the purpose of defining the activities to be conducted in the framework of the Basic Space Technology Initiative in greater detail;

(b) To set up and maintain on the website of the Office for Outer Space Affairs web pages dedicated to the Basic Space Technology Initiative and a mailing list to disseminate relevant information on topics related to space technology development. This may also include the creation of an online forum and the hosting of databases containing information such as opportunities available for the sharing of manufacturing and testing infrastructures and equipment for the development of nano- and small satellites;

(c) To provide nano- and small satellite developers with assistance with respect to relevant regulatory aspects, such as the registration of satellites with the United Nations and the voluntary space debris mitigation guidelines of the Committee on the Peaceful Uses of Outer Space and, in cooperation with ITU, assistance to ensure compliance with the established procedures required for the notification of the allocation and use of frequencies;

(d) To promote the use of open standards as well as open-source and non-proprietary development methods and software tools for design, development, manufacturing and simulations.

II. Regional space technology conferences

To conduct between 2012 and 2015 regional space technology conferences in the regions that correspond to the United Nations economic commissions for Africa, Asia and the Pacific, Latin America and the Caribbean and Western Asia.

III. Space technology education curriculum

(a) To conduct a comprehensive survey of worldwide academic programmes in aerospace engineering and small satellite development offering scholarship opportunities. The results of the survey have been published in the document entitled "Educational Opportunities in Aerospace Engineering and Small Satellite Development" (ST/SPACE/53). It is planned that this document will be updated as may be needed;

(b) To develop an educational curriculum for aerospace engineering, following the model of earlier education curricula developed by the United Nations for use at the regional centres for space science and technology education, affiliated to the United Nations, as well as at other interested academic institutions.

IV. Establishment of long-term fellowship programmes

To establish, in cooperation with interested academic institutions worldwide, long-term fellowship programmes in aerospace engineering and small satellite development at the graduate and postgraduate levels.

V. Basic Space Technology Initiative projects

To use the Basic Space Technology Initiative as a framework to implement regional and international projects related to capacity-building in space technology development. Presently, two projects are being implemented:

(a) Support for the HUMSAT project, an effort led by the University of Vigo, Spain, with the participation of institutions in many other countries;

(b) Development of a best practice handbook for small satellite programmes, an effort to be conducted in cooperation with the International Space University (ISU), as the output of one the team projects planned for the ISU Space Studies Programme to be held in Graz, Austria, in 2011.

52. Other activities under consideration, but which are not yet part of the formally approved Basic Space Technology Initiative workplan, are the development of a nanosatellite code of conduct, as a self-policing initiative of the nanosatellite community and as a possible contribution to the discussions under the agenda item on the long-term sustainability of outer space activities in the Committee on the Peaceful Uses of Outer Space, and the initiation of discussions with launch providers to consider making available free or low-cost launch opportunities for international nano- and small satellite projects. It is anticipated that those activities would be conducted in cooperation with the International Astronautical Federation.

IV. Conclusions

53. The present series of three United Nations/Austria/ESA symposiums conclude in 2011 with a final symposium focusing on programmatic, regulatory and legal aspects of nano- and small satellite activities, including space debris mitigation measures, procedures for frequency allocation and use and registration of satellites with the United Nations. The symposium to be held in 2011 will serve as a point of departure for a future series of United Nations regional space technology conferences to be organized as part of the Basic Space Technology Initiative to be held from 2012 onwards.

54. Representatives of institutions of the following countries participating in the present symposium expressed an interest in hosting a future regional workshop on basic space technology development in the period 2012-2015: Canada, India, Japan, Mexico, South Africa, Thailand, Tunisia, United Arab Emirates and Venezuela (Bolivarian Republic of).