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United Nations/Economic and Social Commission for Asia and the Pacific/China Workshop on Tele-Health Development in Asia and the Pacific

(Guangzhou, China, 5-9 December 2005)

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I. Introduction

A. Background and objectives

1. In its resolution entitled "The Space Millennium: Vienna Declaration on Space and Human Development",[1] the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) recommended that activities of the United Nations Programme on Space Applications should promote collaborative participation among Member States at both the regional and the international level by emphasizing the development of knowledge and skills in developing countries and countries with economies in transition.

2. At its forty-seventh session, in 2004, the Committee on the Peaceful Uses of Outer Space endorsed the programme of workshops, training courses, symposiums and conferences planned for 2005.[2] Subsequently, in its resolution 59/116 of 10 December 2004, the General Assembly endorsed the United Nations Programme on Space Applications for 2005.

3. Pursuant to General Assembly resolution 59/116 and in accordance with the recommendation of UNISPACE III, the United Nations/Economic and Social Commission for Asia and the Pacific/China Workshop on Tele-Health Development in Asia and the Pacific was held in Guangzhou, China, from 5 to 9 December 2005. Organized by the Office for Outer Space Affairs of the Secretariat in cooperation with the Economic and Social Commission for Asia and the Pacific, the five-day workshop was hosted and co-sponsored by the China National Space Administration, the Asia-Pacific Multilateral Cooperation in Space Technology and Applications (AP-MCSTA) and the Ministry of Health of China.

4. The primary objectives of the workshop were to exchange information on the current state of tele-health practices in the Asia and Pacific region and to discuss issues, concerns and approaches in developing tele-health for the region, with a view to establishing a network and stimulating the development of a plan of implementation. A technical visit to a hospital in Guangzhou was organized for a real-time telemedicine demonstration.

5. The present report was prepared for submission to the Committee on the Peaceful Uses of Outer Space at its forty-ninth session, in 2006. It complements a similar report on the United Nations/European Space Agency/Argentina Workshop on the Use of Space Technology for Human Health for the benefit of the countries in Latin America, which was organized in cooperation with and hosted by the National Commission on Space Activities of Argentina and was held in Córdoba, Argentina from 19 to 23 September 2005 (A/AC.105/860).

B. Programme

6. Keynote presentations were made by representatives of the China National Space Administration, AP-MCSTA and the Office for Outer Space Affairs. A total of 33 presentations on tele-health and telemedicine, landscape epidemiology, distance education, HIV/AIDS and avian influenza were made during thematic sessions.

7. Discussion sessions allowed deliberations on structured topics, with the aim of defining follow-up activities for the region. All sponsored participants made presentations on the status of the use of tele-health and landscape epidemiology programmes for sustainable development in their respective countries.

C. Attendance

8. Approximately 60 participants from the following countries and international organizations attended the workshop: Afghanistan, Australia, Belgium, China, India, Iraq, Lao People's Democratic Republic, Mongolia, Nepal, Pakistan, South Africa, Sri Lanka, Thailand, United States of America, Uzbekistan, Viet Nam, United Nations Educational, Scientific and Cultural Organization (UNESCO), AP-MCSTA and Office for Outer Space Affairs.

9. Financial resources provided by the United Nations and the co-sponsors were used to defray the costs of logistics, air travel, accommodation and daily subsistence allowance of 16 participants from the region.

II. Summary of presentations

10. The participants were informed that the first Asia-Pacific Conference on Multilateral Cooperation in Space Technology and Applications had been held in Bangkok from 14 to 18 January 1994. In the light of the recommendations of that Conference, the Preparatory Committee for the Asia-Pacific Space Cooperation Mechanism (APSCOM) had been established, composed of high-level representatives from the Governments of Australia, Bangladesh, China, Indonesia, Mongolia, Pakistan, the Republic of Korea, the Russian Federation, Sri Lanka and Thailand.

11. The secretariat of the Preparatory Committee of APSCOM was based in Beijing. The mission of the Preparatory Committee was to make recommendations for the establishment of an Asia-Pacific space institution for technological cooperation in the peaceful use and exploration of space resources.

A. Tele-education

12. It was stated that one of the major problems that the scientific world had been experiencing in recent years was the chronic brain drain from the developing countries and countries with economies in transition towards the more industrialized countries. One of the principal reasons for that movement was the difficulty faced by researchers in continuing their research activities in their home country because of a lack of connections with their peers operating in the industrialized countries. New technologies today permitted a continuous exchange of information at a reasonable cost by using video communications among many research centres worldwide.

13. An initiative by the UNESCO Regional Bureau for Science and Culture in Europe was aimed at introducing advanced courses in renewable energy to the Eastern and South-Eastern European countries, the Arab States and China, through

the use of a wideband telecommunications infrastructure. UNESCO and other international organizations had used the networking model for developing cooperation in various areas of intellectual life for many years. Now, in the era of modern communication and information technologies, networking activities could be more efficient than they had been in the past.

14. A high-performance network within and among the countries of Eastern and South-Eastern Europe, the Arab States and China could prove to be a key tool for strengthening research and development. The major objectives of the network were to collect and disseminate information, arrange training activities, promote innovation processes and stimulate new methods and modes for using equipment, service facilities and databases, while encouraging researchers to stay in their home cities for most of the time.

15. It was reported that regional imbalances existed worldwide, especially in developing countries. Health and education were among the basic needs of human beings and were two of the most important aspects influencing the level of individual welfare; they were also preconditions for the overall process of economic development. Standard education techniques and routine medical procedures alone could not drastically improve medical care or reduce illiteracy in the population, in particular in remote and rural areas, on a large scale and within a short timespan. However, using distance learning and tele-health practices, it was possible to attain those goals. Experience gained in the framework of the Chinese Golden Health Network project, a modern tele-education project for middle and primary schools in rural areas, proved that statement.

16. It had also become obvious that satellite-based communications played an important role for both distance learning and tele-health applications. Communications were achieved through the establishment of the village information centre, while a satellite-based communications system, in turn, provided large area coverage, with the cost of communications unaffected by distance and geographical location. The ground-based user terminal was low-cost, fast to deploy, easy to install and flexible for resource-sharing. Such a satellite-based service could, therefore, play an important role in the socio-economic development of poor rural areas.

17. Moreover, many areas in the Asia and Pacific region were isolated from developed centres and had undeveloped infrastructure. Therefore, experience gained in distance learning and tele-health applications in China was of value to the other countries in Asia and the Pacific.

B. Tele-health and telemedicine

18. It was noted that the rapid developments in information and communication technologies, together with achievements in space research, were changing how people provided and received health care. All those who used information and communication technologies and space research for health-related purposes, including patients, health-care professionals and administrators, needed to join together to enhance the utilization of those achievements for meeting health-care needs.

19. A telemedicine system was user-friendly and was similar to any other computerized electronic system. Telemedicine ground systems mainly consisted of customized medical software, which was integrated with computer hardware along with medical diagnostic instruments, which were in turn connected through a satellite-based very small aperture terminal (VSAT) or terrestrial communication link. Normally, the medical records of patients could be sent to specialist doctors either in advance or on a real-time basis. Specialist doctors would, in turn, study the records, diagnose the illness and advise the course of treatment through videoconferencing with the patients and the local doctors. A short period of training was sufficient for both specialized hospital doctors and rural doctors to handle the system. Hospital technicians could take care of system operation and maintenance.

20. Wireless technology brought telemedicine more flexibility and portability. Telemedicine with embedded medical sensor networks could allow non-invasive and passive approaches for medical testing. Telemedicine had been widely developed and applied for real-time health monitoring, from patients to astronauts.

21. It was reported that the International Society for Telemedicine and eHealth (ISfTeH, www.isft.net) was a non-profit membership organization of national, regional and international associations, institutions, organizations, corporations, individuals and students, established under Swiss law. ISfTeH was the international representative body of national and international telemedicine and e-health organizations and was dedicated to promoting telemedicine, tele-care, tele-health and e-health broadly around the world. ISfTeH supported the start up of national associations or societies and facilitated their international contacts. Its aim was also to disseminate knowledge, information and experience and to facilitate the international dissemination of knowledge and experience in telemedicine and e-health and to provide access to recognized experts in the field worldwide. As part of its educational activity, ISfTeH offered an interdisciplinary intensive course on telemedicine/e-health in collaboration with the International Space University.

22. The workshop was informed that innovation in providing medical services over a distance had begun in Australia in 1928, with the formation of the Royal Flying Doctor Service of Australia. The Service currently provided 210,000 patient consultations per year, about 60,000 of which were provided through telemedicine. Most Australian state governments provided extensive tele-health services from major capital cities and regional centres to smaller communities. Australia had begun to provide some telemedicine services to nearby countries in the Asia and Pacific region; most of those services were delivered by satellite. Australia's Academic and Research Network provided a range of services to Australia's research communities and had been active in the Asia and Pacific region through initiatives such as the Asia-Pacific Advanced Network.

23. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) had been conducting trials of some innovative broadband telemedicine (for example, the demonstration of intercontinental surgical training). Those demonstrations and clinical trials of tele-health over advanced networks had indicated that higher bandwidths did not simply make traditional tele-health applications run faster, but enabled new applications facilitated by a higher degree of "tele-presence", not previously considered in the tele-health domain. Telemedicine in Australia had suffered from poor funding and lack of critical mass, which had meant that many programmes were not sustainable. The Australian

Government had recently set up the National E-Health Transition Authority and an outcome of that development was expected to be a more extensive and coordinated expansion of telemedicine in Australia.

24. Many of Australia's smaller, more isolated hospitals lacked specialized staff and patient load to maintain skills across a broad range of specialties and were increasingly looking to telemedicine to assist them in supplying such services. However, most current tele-health technologies could not support a broad range of medical services, especially complex, critical clinical settings such as emergency medicine. Emergency medicine was often considered as an emerging or future application domain, because the commonly used telemedicine infrastructure could not provide the sense of "tele-presence" to permit a team in an emergency case to collaborate seamlessly with a distant specialist.

25. CSIRO and the Sydney West Area Health Service had developed the Virtual Critical Care Unit. This was an advanced tele-health system using digital video and broadband Internet technologies for "tele-presence" support in the emergency, high-dependency and obstetric departments between two distant hospitals over a dedicated fibre-optic link. It was totally transparent and nurse-initiated and permitted true "tele-presence" in a complex, critical, clinical area, which to date had been unavailable to tele-health support. It had been in operational use in a clinical trial since December 2003 and had already demonstrated its effectiveness in many incidents of patient care, exceeding expectations in its user acceptance, the range of applications and the number of uses. The apparent success of this trial indicated that telemedicine could, with the appropriate technology, routinely deliver complex, critical care services previously considered not well suited to telemedicine.

26. Established in 1997, the Beijing Hospital Telemedicine Centre was mainly responsible for remote consultations, distance teaching and learning and telemedicine-related work. Using different communication means such as the common telephone line, satellites and the Internet among others, the Centre was equipped with hardware products from various companies. It had established telemedicine relations with the comprehensive hospitals and primary hospitals in the Hong Kong Special Administrative Region of China and in Guangdong, Sichuan, Shandong, Shanxi, Hebei, Zhejiang, Qinghai and Tibet provinces and had conducted more than 1,000 remote consultations and distance teaching and learning activities in recent years.

27. It was stated that the application of remote technology could popularize the diagnostic and treating technique of traditional Chinese medicine to benefit more people and greatly improve the prevention and treatment of heart disease. The diagnostic methods of traditional Chinese medicine, for example observation of the tongue, face and hands and pulse-taking, could be brought into telemedicine. Establishing a platform for the subject of "heart diseases in traditional Chinese medicine" and developing its advantage in telemedicine could save time and travel expenses for patients with tele-medical equipment at home. Images transmitted to the Telemedicine Centre were being monitored by medical staff and could be shared via the Internet to raise awareness and influence of the therapeutic effects of such medicine throughout the world.

28. The problems in providing telemedicine services were presented as: (a) the communication infrastructure available in the region; (b) the cost of establishing the

telemedicine system; (c) expert consultation fees; (d) communication charges; and (e) legal aspects of telemedicine services and participating staff. Development of telemedicine was essential for China because of the shortage of highly qualified medical experts in vast rural and remote areas.

29. The workshop was informed that in consonance with pursuing the objective of taking the benefit of space technology to populations in rural and remote areas, the Indian Space Research Organisation (ISRO) had taken the initiative to establish a space-based telemedicine network in 2001. The success achieved by India in telemedicine had drawn the attention of other countries and India's experience could be valuable for many developing countries that shared similar problems in providing the benefits of modern health care to remote and rural areas.

30. In pursuing its objectives of using space technology for societal benefits, ISRO had initiated space-based telemedicine connecting the Apollo Hospitals in Chennai to a rural hospital in Argonda, Andhra Pradesh, in November 2001. The ISRO telemedicine network had now been expanded to 150 hospitals in remote rural areas, including Jammu and Kashmir, the Andaman and Nicobar Islands, the Lakshadweep Islands, the north-eastern region and remote tribal areas in the central and southern Indian States, which were connected to 22 specialty hospitals in major cities. The experience so far was encouraging and there was demand for such facilities to be established on a larger scale.

31. In January 2003, the Amrita Telemedicine facility had been inaugurated in Kavaratti on the Lakshadweep Islands, located 220 nautical miles off the coast of the Indian State of Kerala. The Amrita Institute of Medical Sciences was the first institution in Kerala to begin using telemedicine to treat patients in remote places in India, such as the Lakshadweep Islands, Port Blair on the Andaman Islands and Leh in the Ladakh mountain range, thereby vastly improving the quality of health care for the local populations.

32. The goals of the Amrita telemedicine programme were to provide speciality tele-consultations to the remote corners of India, to educate the doctors in those remote primary centres with the latest advances in the field of medicine through such mediums as international seminars, workshops and teaching programmes, and to strengthen the skills and confidence of the doctors at the remote primary centres and help them to build better relationships with their patients.

33. The workshop was informed that there were many health-care units in Pakistan, ranging from established health-care institutes in big cities to small clinics with poor conditions in the rural areas, but the main problem was that health practitioners and experts were not properly distributed, because most of the doctors and practitioners preferred not to be posted in remote areas.

34. Considering the numerous advantages of telemedicine, the Government of Pakistan had decided to provide that service to all remote areas of the country. Future plans were to integrate the international telemedicine system for the enhancement of medical research activities and to have expert opinion in the currently deficient fields of medicine. A VSAT system was considered the most suitable, but because of its high cost and the lack of funding, it had proved difficult to provide the technology to all rural areas of Pakistan. Initially two VSAT terminals would be installed: one at a central (hospital) site and another at a remote (hospital) site in the Sindh province of Pakistan. The satellite bandwidth link would be from

512 kilobits per second to 1 megabit per second. C-band or extended C-band transponders would be utilized for the network.

35. The present situation of telemedicine in Afghanistan was reported as follows: (a) there were no telemedicine activities in the programmes of the Ministry of Public Health of Afghanistan; (b) mobile telephones and radio were being used in cases of emergency and for epidemic preparedness and response; (c) in 2004, the Office for Outer Space Affairs and the Governments of India and the United States had initiated a pilot project on telemedicine in Afghanistan; and (d) a delegation from the Ministry of Public Health had attended the International Telemedicine Conference, held in Bangalore, India, from 17 to 19 March 2005.

36. In August 2005, ISRO, with the support of the Office for Outer Space Affairs and the Government of the United States, had trained five Afghan medical specialists in India. The subsequent steps envisaged for implementation were: (a) establishment of the first telemedicine centre in Kabul (on the premises of the Indra Gandhi hospital) with the support of experts from ISRO; (b) selection of other hospitals for initiating telemedicine in the provinces; and (c) preparing a complete plan for telemedicine project development.

37. The workshop was informed that when the telemedicine project had begun in Thailand in 1995, the critical problems were not only related to a lack of expert physicians but also to the limited distribution of health personnel over the country. Accordingly, the Ministry of Public Health of Thailand had implemented the project using satellite as a network medium. The project was divided into three phases over a period of three years. At the beginning of the second phase, however, Thailand had suffered an economic crisis; the second and third phases were postponed as a result.

38. The applications available on the system were tele-consultation, teleconferencing, tele-radiology, tele-pathology, tele-psychiatry, tele-cardiology, tele-education, data transfer and voice communications. During the period of the economic crisis, an evaluation of the project was conducted. The results were interesting. Tele-consultation utilization was very low; only tele-education and managerial teleconferencing were used. The Internet was used the most, followed by telephony. The evaluation also revealed that it was not worth it to maintain and continue with the next phases, the project was therefore abandoned in 2003.

39. It was noted that when planning to link two hospitals, the most cost-effective link that could be relied upon to provide for video-on-demand conferences needed to be sought. Currently, a communication channel via Yagi antennae was being used. That technology had shown good results and low maintenance costs. The videoconferencing system via the Internet was estimated to break even just one year after commissioning.

40. The workshop was informed that there were several problems for health services in Nepal’s remote and rural areas. These included isolation, transport and communication problems, poor local infrastructure and few further education opportunities for doctors and health workers. For those problems, tele-health technologies could have a major potential for improving health care in remote and rural areas of Nepal. In primary health care, tele-health technologies could help with diagnosis and treatment in difficult cases, afford valuable feedback and learning opportunities for health workers, help in decision-making for evacuation and increase health worker retention by improving communications.

41. In secondary care, tele-health could help with diagnosis and treatment in difficult cases, provide better primary medical education opportunities for doctors, speed up the application of new clinical knowledge in isolated hospitals, provide opportunities for relevant research and increase the retention of doctors in remote hospitals by improving communication. However, there were also several problems specific to remote areas in Nepal that might affect the implementation of tele-health solutions: specifically, the low level of training of community health workers, language barriers, low levels of education and awareness and severe poverty in the local population.

42. It was stated that the Ministry of Science and Technology of Iraq had been charged with the task of creating an information society. There was a plan to establish a wireless network connecting 35 ministries. That Intranet-based network would be connected to the Internet gateway through the wireless Baghdad broadband network, which was a major project of the Ministry of Communications. At present, 13 ministries had already been connected and there were discussions on proposals for health applications (such as telemedicine consultation services) to be delivered through the network.

43. The objective of a major project planned by the Ministry of Health of Iraq was the implementation of a communication network for the applications of e-health throughout the country. Telemedicine services had already been implemented in one Baghdad hospital. The network connected different hospital departments (such as the radiology, therapy and intensive care units etc.) The following conclusions had been reached: (a) health services and medical care should be promoted; (b) hospitals with qualified experts were needed; (c) a study on conditions, capabilities and requirements in hospitals and health centres should be conducted; (d) collaboration with and financial support from outside Iraq in the health sector was of paramount importance to Iraq; and (e) coordination between the Ministry of Health of Iraq, the World Health Organization and other health-related entities was necessary.

44. Participants were informed that the Government of Mongolia recognized the importance of the development of e-technologies and, in particular, e-health services, because the country had large areas with a sparsely distributed population. In that regard, the Government was carrying out two national programmes and some projects. In 2002, the Government had approved a national programme on improving health technology. The following activities would be implemented within the framework of that programme: (a) establishment of an integrated database and network of health sector information; (b) introduction of distance diagnoses, counselling, training, an electronic library and trade; and (c) introduction of a hospital internal network and electronic records of diseases.

45. In 2005, the national programme "e-Mongolia" had been approved in order to develop socio-economic capabilities and enable sustainable development through the application of information and communications technologies in all sectors of society. Accordingly, the project "Information communication technology for improving rural health services" had been approved and had produced the following outputs: (a) data collection on reproductive and child health records; (b) interactive case management databases; and (c) conducting training activities for local health staff.

46. The project “Cardio-vascular diagnostic centre” aimed to make the best expertise in cardiology available to the provincial doctors through a telemedicine network and a specialized website in Mongolia. The project “Distance learning and medical doctor system” aimed to enable doctors across the country to collaborate online in the diagnosis of medical problems. Thus, a significant level had been achieved in the development of e-health in Mongolia; however, there was plenty of room for further improvement, including the following: (a) improving the legal environment for telemedicine and distance learning; (b) establishing a structure for an e-hospital and laboratory; (c) training medical professionals on telemedicine to improve their knowledge and skills; (d) integrating the financial services of the health facilities; and (e) allocating more funding to finance telemedicine services.

47. It was reported that, at present, the Lao People’s Democratic Republic did not yet have a telemedicine and tele-health programme. In the current practice, the Centre for Information and Education for Health provided health information aimed mostly at health promotion and disease prevention, but not aimed at curative treatment. Some health programmes or projects on issues such as HIV/AIDS, tobacco control and reproductive health used a telephone hotline for counselling. Some other health programmes and projects used telephony for daily reporting between districts and provinces. Fixed telephones and mobile telephones were frequently used by health staff in the hospitals to receive advice from respective experts on how to handle the difficulties encountered in the process of treating patients.

48. Workshop participants heard that telemedicine services in the central and eastern provinces of Sri Lanka had first been established in November 2003. With that limited experience, it was felt that the telemedicine services were very helpful, especially at times when there were no specialists available in the relevant fields of expertise. Furthermore, the service was very helpful for obtaining a second opinion from a distant specialist. This service therefore was thought to be very cost-effective; however, it was presently facing several problems.

49. The main problem had been the inadequate funding for paying leased communication lines and the maintenance of the corresponding equipment. The other problem pertained to the legal issues involved in patient care. The distant specialists, although willing to help by providing their expert comments, were reluctant to hold the legal responsibility. This had hindered the enthusiasm of many experts in being involved actively in telemedicine services. The issue was currently being discussed at the ministerial level in the country.

50. In addition to the telemedicine service described above, a telemedicine service had been established at the Faculty of Medicine, University of Kelaniya, Sri Lanka, in May 2005. During the inception of the telemedicine service, the following obstacles were encountered: (a) a lack of experience in the compilation of patient data; (b) a lack of time to spend on sending patient data across to the Centre for Online Health; and (c) a lack of equipment required for the telemedicine service.

51. To overcome the first two obstacles, assistance by selected students from overseas was provided. During the exercise, such problems as lack of proper equipment required for telemedicine services were encountered. Selected foreign students did not have to bear any of the costs. There had been an opinion that their

involvement as a link between the staff and the online service would not be cost-effective. It was suggested that local students should be trained for that purpose.

52. The objective of the telemedicine project in Kosovo was described as to become a catalyst of hope and technology. The goals of the project were as follows: (a) creation of infrastructure; (b) human capacity-building (currently 3,948 medical staff and 5,455 medical students had been trained); (c) introduction of clinical protocols; (d) establishment of information resources and an e-library (there were currently 2,100 scientific journals online); and (e) continuing medical education through regional and international collaboration. As at March 2005, 43 regional and international conferences had taken place at the Telemedicine Centre of Kosovo, including live broadcasts of complex surgical procedures.

53. The workshop was informed that in 2004, the Ministry of Health of Viet Nam had approved Medisoft 2003 as a standard programme for Viet Nam. Medisoft 2003 had the following characteristics: (a) it was a unique reporting system; (b) it provided access to data at the hospital level; (c) it was compatible with the Total Hospital Information System; and (d) it was ready for telemedicine/teleconferencing and for new technologies such as the Worldwide Interoperability for Microwave Access (WiMAX) technology.

54. It was stated that telemedicine and tele-health in Uzbekistan had been developed within the framework of international projects such as the Scientific and Educational Network of Uzbekistan. However, the American International Health Alliance had first introduced the elements of telemedicine through the Learning Resource Center project. Nowadays, using a web portal (www.rrcem.uzsci.net), it was possible to have tele-consultations with all affiliates of the Republican Research Centre of Emergency Medicine (RRCEM) of Uzbekistan.

55. A telephone line and/or e-mail communications were being used for detailed consultations on medical problems. There were around 620 calls annually from medical professionals of RRCEM to the regions of Uzbekistan and about 6,900 requests were received from clients in the provinces of the country. A tele-health team had been established at RRCEM that could control patient conditions via Internet videoconferencing. Simultaneously, a second team would move to a region to provide high-quality medical care. Unfortunately, the practice described above had only been used on a few occasions and was now under review. An analysis of the impact of tele-health on the outcome of patient conditions in the most complicated cases showed that the mortality rate in the regions had decreased.

56. The conclusions were as follows: (a) a web portal structure could be a prototype for the emergency medical system of Uzbekistan; (b) the country needed major assistance in the development of information technology and international organizations could assist the country in taking the first step; (c) necessary equipment and trained staff were needed for successful telemedicine implementation; and (d) telemedicine and tele-health could make a strong impact on the outcome of patient conditions, in particular in emergency cases.

C. Landscape epidemiology

57. It was stated that it was difficult for epidemiologists to link environmental factors to diseases in the macro view. Advanced techniques such as remote sensing and geographical information systems (GIS) could assist them in addressing that challenge.

58. The Beijing Institute of Microbiology and Epidemiology and the Chinese Centre for Disease Control and Prevention could provide technology support for tele-epidemiology programmes using remote sensing in pathogen character, epidemiology character and epidemic pathogenesis.

59. The China Centre for Resource Satellite Data and Applications (CRESDA) was also able to provide support for epidemic monitoring using remote sensing. CRESDA had archived 450,000 scenes of all kinds from the instruments on the China-Brazil Earth Resources Satellite-1 (CBERS-1) and nearly 10,000 scenes had been distributed to users. More than 300,000 scenes from the CBERS-2 satellite had also been archived and nearly 7,000 scenes had been distributed to users. Images from the Earth Observation Satellite (SPOT) and the Medium Resolution Imaging Spectrometer (MERIS) could also be used for those activities.

60. For example, the location of avian influenza outbreaks was likely to correlate with migration routes of songbirds and wading birds. The spread pattern of avian influenza was thus more likely to be from the wetlands and lakes on the paths of bird migration.

61. Haemorrhagic fever with renal syndrome (HFRS), characterized by fever, shock, haemorrhage and acute renal dysfunction in distinct clinical stages, was described as a rodent-borne disease. Approximately 150,000 to 200,000 patients with HFRS were hospitalized annually throughout the world. More than half were reported in China, with a mortality rate of 2 to 10 per cent. In recent years, although great efforts had been made to control the disease, the incidence of HFRS remained high in rural China and had tended to increase in certain regions.

III. Recommendations

62. Participants in the group discussion sessions recommended the projects below for implementation.

Project I. Development of methodology for early warning of avian influenza using geospatial data and space technologies

63. This project falls under the category of tele-epidemiology. It was suggested by participants because of the destructive impact of avian influenza, in particular for Asia. The objective is to develop a methodology for providing early warning of the growth and spread of avian influenza. The approach is to use geospatial data and space technologies to analyse the landscape characteristics and environmental and biological data that could have an impact on the growth and spread of avian influenza.

64. The participants will jointly conduct this project and determine together the project scope, schedule, end product and financial resources.

Project II. Tele-health training

65. This project is to provide training to the medical staff and tele-health operators in various subject areas. Five participants offered to share their training programmes and provide training to the parties that need to learn. The institutes that provide the training will determine training details and terms, such as subjects, length, location and cost arrangements. The training will be non-profit oriented.

66. The training providers will announce the opportunities through two means: (a) by e-mail to all the workshop participants, and (b) by posting an announcement on the website of the Office for Outer Space Affairs and on their own respective websites.

Project III. Assessment of specifications for communication system network configurations for different applications of tele-health

67. This project will assess the existing configurations of communication network systems and their detailed specifications.

68. The three major elements of setting up communication network systems for tele-health applications are: (a) knowledge; (b) end-users; and (c) hardware/software for communication network systems. Because different user communities have different needs, their requirements differ accordingly. There is a need to standardize hardware configurations in order to reduce cost and achieve interoperability.

69. The project will assess the communication network configuration of detailed specifications for the different applications of tele-health that are available. Hardware, software and their functionality will be assessed. When trying to integrate the efforts of all the potential participants in the Asia and Pacific region, a common specification for the entire system and not for the individual communication system alone is of utmost importance.

70. The aim of this project is to use the assessment results to build guidelines for the design, installation and service maintenance of a communication system for different levels of service.

71. The project participants will take the following steps in terms of approach: (a) an assessment of the common specifications for each level of tele-health applications; (b) utilization of the common specification that is provided by step 1 as a template to assess local needs in detail; (c) a budgetary planning exercise; and (d) establishment of guidelines for hardware/software configurations for different levels of service in the respective countries of the project participants.

Project IV. Comprehensive needs assessment to implement a national tele-health programme

72. The needs can be grouped into three categories: (a) tele-health policy and requirements; (b) requirements and preparation for information and satellite-based technologies; and (c) medical informatics.

73. The objective of the project is to assess the potential of telemedicine services for a country, taking advantage of the current developments in satellite communications in a wide range of health-care applications such as diagnostic, therapeutic, educational and administrative.

74. The approach of the project is to assess the geographical needs (where tele-health services should be provided); the types of diseases that a country considers as high priority; estimates of populations and their needs and cost implications; successes and failures in completed tele-health projects; attitudes within the community and cultural change; sources of funding; assessment of user requirements; necessary equipment and costs estimates, etc.

75. The following parties in a country will be invited to provide support to the study: (a) the space agency and/or space research centres; (b) health departments and agencies and medical service providers; (c) media entities; and (d) decision makers on policy setting and budget.

76. This assessment can be used as the initial step in understanding a country's needs in implementing a national tele-health programme. After understanding the needs, an implementation plan can be established.

77. All participants whose countries do not have an integrated implementation plan or policy are: (a) invited to carry out this assessment for their own countries; (b) encouraged to create their own teams within their respective countries and implement the study using their own national resources; and (c) encouraged to share information and exchange experience during the assessment phase.

78. Some reference issues to be addressed by the needs assessment study are described below.

Policy-related issues

79. The implementation of telemedicine requires multidisciplinary interaction, with the active participation of a satellite-based system operator and medical staff. Pilot project organizers, health professionals and technical experts will need a working description of how to interact with one another. The process should start with conducting an analysis of the requirements of local users in each country.

80. Some questions to be considered are as follows:

(a) What are the main issues in the respective country's health-care system?

(b) Which of these could be successfully addressed by telemedicine?

(c) What are the current or planned health-care programmes in the country that could benefit from the application of telemedicine?

(d) Have any policies for implementing telemedicine been developed in the country previously?

(e) Have there been any projects using telemedicine in the country previously? If so, what is the experience?

(f) What could be the capacity of coverage?

(g) How large is the area that one tele-facility will cover?

(h) What is the population in one coverage zone?

(i) How will the zones be divided (based on what criteria)?

Organizational and human capacity issues

81. There are several organizational and human capacity issues, which must be coordinated with national ministries of science and technology, health and medical education, the space agency, etc. Some have to do with commitment and ownership of the pilot project, others are related to the inevitable changes in work patterns. The issue of available key personnel should be discussed.

82. Some questions to be considered are as follows:

(a) Which local institutions and focal points would be involved in a telemedicine project?

(b) Why would these areas or institutions be recommended?

(c) What kind of human resources are available?

(d) How can the loss of skilled and trained personnel be prevented?

(e) What is the computer literacy level among key personnel?

(f) What kind of training programmes will be needed?

(g) Where does the issue of medical responsibility within the country's health-care system stand in relation to telemedicine?

(h) Is there any existing legislation on confidentiality, security and privacy that could be applied for telemedicine services?

(i) In case of provision of services between countries, is a special licence for health-care personnel required? If not, will this cause any problems for the introduction of telemedicine?

(j) Will emergency service be available for critical patients?

Financial issues

83. The costs of the project can be divided into investment and ongoing costs.

84. Some questions to be considered are as follows:

(a) How will the project be funded with regard to investment and running costs?

(b) How will the service be paid for?

(c) What is the level of communication costs in the country?

(d) Who will provide training and maintenance?

(e) What kind of activities, human resources, equipment and other factors can be provided by the local project participants or the Government?

(f) How is the financial and budgetary planning to be done for near-term and far-term support?

Technical issues

85. Technical issues include a variety of objectives and functions as well as the content of the future applications. The technology chosen should be consistent with the outcome of the users' requirements. The question of standardization should also be considered.

86. Some questions to be considered while conducting this assessment are the following:

(a) How is the telecommunication infrastructure in the respective country in terms of distribution and costs?

(b) Are there any Government plans for improving the current telecommunication infrastructure?

(c) Who are the main telecommunication providers in the country?

(d) Who are the Internet service providers in the country?

(e) Are there any key aspects that should be known, such as power supply stability or difficult topography?

(f) How will system maintenance be cared for?

(g) Will a back-up system be available to prevent interruption of service?

(h) Is computer and facility security planned to cope with intrusion of service?

Notes

[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] *Official Records of the General Assembly, Fifty-ninth session, Supplement No. 20* and corrigenda (A/59/20 and Corr.1 and 2), para. 71.