Space summit at Indian Science Congress

The highlight of the Space summit, held for the first time in the history of the Indian Science Congress was the speech by President A. P. J. Abdul Kalam at the Space summit special session and a live 'Space Bridge' demonstration via satellite link, to showcase some key benefits from use of space-technology tools such as in the areas of telemedicine, e-governance, education and biodiversity conservation. With a galaxy of key space-faring nations such as United States, France, Europe, China along with Thailand, Malaysia, representatives from the United Nations Space Programme, host India, and participation of leading private space industry, various aspects of space policy and agency programmes for space applications for development were discussed.

Messages from the United States were conveyed at the summit by Joe Seaman, US State Department, who called for broadening dialogue and increasing levels of cooperation on civilian space collaboration, thereby building on the underlying theme of the Congress, namely 'Frontier

Excerpts from press briefings at the Indian Science Congress related to space

K. Kasturirangan, Chairman Space Commission and Secretary, Department of Space while speaking to reporters highlighted the need for using space technology for applications of social relevance. One such is the 'Edusat', an educational satellite approved by the Government of India on 31 August 2002 and due for launch between 24 and 30 months time. ISRO has forayed in the use of satellites for other developmental projects such as the Jhabua development network and an APNet for the Government of Andhra Pradesh, etc. However, the Edusat, according to Kasturirangan, would be 'exclusively for education'. The satellite INSAT-3 on the third experimental mission of GSLV-3 is for Edusat. This would make possible, signals of education programmes receivable, using low-cost, small VSAT antennae, for raising literacy levels and for higher education. For use all over India, the satellite is expected to carry five extended C-band transponders. Setting up the ground infrastructure and software is currently under way for effective use of Edusat, when operational, providing the jump-start for reaching education to more people.

When asked to comment on the 'International Space Force' concept mooted by President A. P. J. Abdul Kalam, Kasturirangan said this was a 'visionary statement' and had to be seen 'block by block'. On being asked whether India proposes a manned mission, he replied that 'there is no manned mission planned in the foreseeable future', further adding that it required heavy resource, India has set priorities and this was not the time to do it. Planetary exploration required both resources and capability for making the quantum leap, he said. He stressed that the effectiveness of the science and technology system should expand in the country's context for national development, with this being 'virtually demonstrated through use of space technology that was guided by social objectives'. Adding that this would have a commercial spin off, bringing in more space activities in the industrial base of the country, he hastened to state that 'we should not be worried about privatization'. When asked about his view on the proposed Chinese manned mission, he replied that in a space classification system, 'level-3 would be a country's capability to both build and launch its satellites'. India belonged to this category and moving onto level-4, which would mean manned space capability was not on the cards as this would require a substantial allocation of resources, he felt. He also informed reporters that the second test flight of the Geo-synchronous Satellite Launch Vehicle (GSLV), initially planned for February 2003, would now take place during late March. This second flight would carry a capacity of 1800 kg, with the previous test flight having been 1540 kg, and would have improved thrust in all three stages. India has in its first test flight of GSLV shown its capability to place 2000 kg-class satellites into geo-synchronous transfer orbits or GTOs. The launch made India the sixth country in the world to achieve such a feat.

James Dodge, Director, Office of Space Sciences, US National Aeronautics and Space Administration, when asked for his comments on the 'International Space Force' idea said to reporters that 'there are a lot of satellites up there for the good of all'. He said 'there is no need for a police force or space force' as these satellites were for peaceful purposes and did not pose a threat. President Kalam had called for a force to prevent the spreading of geo-political conflict to outer space. He welcomed Kalam's concern and hoped that there would be general peace in the world. In the joint press briefing along with Kenneth Hodgkins, Office of Space and Advanced Technology, US Department of Space, Dodge appealed for cooperation in space with India. As a sequel to the agreed cooperation in the field of space, discussed during Prime Minister Atal Behari Vajpayee's meeting with President Bush in the United States, there had been more discussions in general terms regarding the cooperation, with the areas included being satellite navigation services, global positioning system and environmental monitoring. For promoting space cooperation between the two countries, an Indo-US conference on space technology is slated for later this year. Another promising area, not yet been discussed, was making use of human capital from India for analysing the large volumes of US satellite data that exist, as the US was short of scientists and engineers who could be used for such an objective, felt Dodge. Hodgkin replied, on being asked about the removal of the remaining sanctions against India, that 'I cannot predict what will happen with the remaining sanctions'.

science and cutting-edge technologies' for social relevance and the use of space technology tools for national development.

Eric Cerf-Mayer, Adviser to President, CNES while speaking on the topic 'Space at the planet's bedside – when space meets the demands for a sustainable development – the European and French answers', said that the international space community is committed to cooperation. The global space community, by data collection from earth observation programmes for monitoring sea, land masses, world environment and vegetation cover that provide statistics for food safety was an 'efficient way towards development'. He spoke of the strides made by the French Space programme in providing more than 200 French educational establishments with internet and high-speed services, virtual medical schools for integrating training services and a cyber university of science, forging space technology with essential services. The CNES think-tank has been deliberating and implementing programmes in telemedicine and tele-epidemiology by monitoring environmental changes such as the Rift valley epidemic, dengue haemorroghic fever in Niger and tracking avian fevers in other parts of the world. He described the strong cooperation with India in the field of space and said that space is 'an essential resource and an essential factor in geo-political power'. Remote diagnostic systems using space tools have been useful in Senegal, West Africa for helping in high-risk pregnancies, maternal and child welfare programmes in French Guinea where four remote sites were linked to hospitals, and a cervical cancer programme in Cambodia.

Suvit Vibulshresth, Geo Informatics Space Technology Agency (GISTDA), Thailand enumerated the programmes of GISTDA, established in 2000. Thailand has close links with the Indian Space Research Organization (ISRO) and uses several facilities from Indian satellites for its national development such as Cartosat, etc. Thailand is concentrating on using space tools for e-governance, digitizing Thailand with a map server and using Radarsat for flood-monitoring. Also there are programmes on forest type and tourism-island site monitoring and forest-fire detection.

M. G. Chandrasekhar, formerly of ISRO and now in Worldspace, gave working models of low-cost connectivity solutions using space technology. Worldspace, according to him, provides global constellation of digital satellite broadcasting of audio and multimedia content to about 5.2 billion people using Ameristar Afristar and Asiastar – a Worldspace solution to 21st century digital broadcasting. Using low-cost satellite receivers, data from clients are collected and uplinked through a server and then downloaded to consumers in Asia and Africa. Thus, as Chandrashekar put it, 'creating information affluence and bridging the digital divide in these two continents'. He outlined the uses of the Combined Live Audio and Slide Show programme for taking science to schools that had ready to use, scalable, easy to maintain and operate, encryptable and addressable, now numbering about 2.5 lakh, all-weather receivers. These had been used in Kenyan schools, AIDS awareness in Nepal, sending research articles from Princeton University to Africa, science education programme of Vigyan Prasar, etc. Chandrasekar had been guided by Kasturirangan's adage to 'have purpose, create values and be useful in a system' and Worldspace had maintained a strong link with ISRO.

Sergio Camacho, UN-OOSA, Vienna detailed 'Implementing the recommendations of UNISPACE III – Work and actions by the United Nations'. The third UN Conference on Exploration and Peaceful Uses of Outer Space had agreed upon 33 recommendations, and these were in the form of the Vienna Declaration endorsed by the UN General Assembly. There are 65 space-faring nations in this committee and he hoped for India's greater participation in the activities of UNISPACE III. Action teams have started work in 2001 in the following areas:

- Worldwide environmental monitoring strategy (led by Iran and Syria).
- Management of earth's natural resources (led by India).

China's future space plans

The Chinese National Space Agency official Xu Yansong spoke on the 'Perspectives of space – China's future plans'. China had successfully launched on 30 December 2002, Shenzhou-IV, a recoverable spacecraft orbiting the earth and welcomed the return of the unmanned space capsule on 5 January 2003. This mission was fourth in the series that began in the 1990s. China is now on the threshold of manned space missions. One module would remain in space for a week completing science experiments such as protein crystallization, advanced materials, etc., said Yansong.

A spotless Shenzhou-IV mission would enable a man mission to be considered at the end of 2003, with the decision likely in a few months, added the Chinese official. For a future manned mission, two 'taikonauts' or astronauts among the twelve being currently trained, are likely to be on the first manned mission. When asked what would be the kickbacks from such a mission, he replied, the mission would lead to technological innovation, new materials and above all, national prestige. National prestige would be the most important, once the mission is actually accomplished, he added. He said that the recent successful mission was completely Chinese and comprised a two-stage rocket with a capsule orbiter and a supporting segment. When asked about the budget, he declined to comment, except saying 'very expensive'. The Chinese are also planning a manned lunar exploration in about four years, with the project put up for approval to the Chinese State Council. The official hastened to add that all the requirements for launch of the manned lunar mission and infrastructure were 'already available'. When accomplished, this achievement would put China in third position after the US and Russia to be able to send its own astronauts to the moon.

In addition, China has the Long March I–IV vehicle series, with twelve kinds of launches. China has three launch sites and has also meteorological satellites and an 'oceanosat' launched in 2002 for ocean observations. The President of India, A. P. J. Abdul Kalam in his speech delivered at the space summit on 4 January 2003, had congratulated China for the successful launch of Shenzhou-IV.

- Enhancing weather and climate forecasting (led by Portugal).
- Public health services (led by Canada).
- Natural disaster management (led by China, Canada and France).
- Improving space navigation (led by United States and Italy).
- Promoting sustainable development (led by Nigeria).
- Observation of near-earth objects (led by France).

He also spoke of the establishment of regional centres for space science and technical education, affiliated to the UN for example, operational in India since 1996, that were concerned with remote sensing, satellite meteorology, satellite communication and would likely to encompass space law in the future.

Nik Nasruddin Mahmud, Director, MACRES, Malaysia spoke about 'Earth observation from space-development and prospect for cooperation among developing nations'. Jim Dodge, Programme Director, Earth Sciences, NASA stressed that analysis of some NASA satellite data would be outsourced to India as 'there was too much data' and NASA would focus between 2000 and 2025 on 'social needs'.

Antonio Rodata, European Space Agency, while speaking on Global Navigation Satellite Systems (GNSS) technology, put out a plea that Europe and the whole world should be independent of the United States Global Positioning System (GPS), as both economic and scientific independence was required for the future of space technology. He spoke of the European GNSS strategy and said that to build a common effort the network would be enlarged later to India. An official from the Chinese National Space Agency spoke on behalf of Guo Baozhu, who had language difficulties on 'Perspectives of space – China's future plans', and Greg Withee, CEOS Chair, NOAA outlined 'The future of space observation'.

K. Kasturirangan, Chairman Space Commission and Secretary, Department of Space gave a talk on 'Space for development – A vision for India' at the summit. He said that India's vision for development was a convergence of growth, rights and ethics in societal, technological, cultural and economic spheres. The challenges faced by India were adverse social indicators, poverty and inequity, and a depleting resource base. However, the enabling factors for higher economic performance were institutional mechanisms, core competence in science and technology, and democracy. He stressed the need for integration with the global economy, interventions to combat illiteracy and bridging the health divide between rural and urban people in India. He added that in a globalized economy, connectivity drives growth and mobility thereby reducing the digital divide. Kasturirangan spelt out 'India's space vision' – to enhance quality of human life and to kindle the spirit of exploration for expanding the horizons of knowledge and creating capabilities for multi-dimensional progress. ISRO's mission was to 'develop frontier space technologies towards carrying out innovative applications of societal relevance in consonance with national priorities'. Towards this goal, Space in India had touched all aspects of space science such as satellite communications, earth-observation systems through multipurpose missions, while enabling interventions in land and water management, infrastructure and disaster management. Indian space research, including space transportation had taken up several challenges. The institutionalization mechanism had been strengthened by ISRO's interface with industry, international missions, academic institutes and global business partners, so that India could play an even greater role in a globally competitive and vibrant space industry serving domestic and international markets, said Kasturirangan. He stressed that the 'vision to mission to national endeavour' would be through innovative missions, theme-oriented satellites, institutional frameworks, down-the-line impacts and global outreach, laying the foundations of a prosperous and equitable society.

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Indian success stories in use of Space tools for social development

The Space summit had a space bridge demo of telemedicine, APNet and the biodiversity information system for national development using space technological tools.

Telemedicine: Initiatives have been taken by the Indian Space Research Organization (ISRO) for introducing telemedicine via satellite for making speciality treatment accessible to people in remote areas of India. Places around Bangalore, Kolkata and Tripura are networked with a hub using VSAT terminals. Port Blair, Andaman and Nicobar islands, Leh, Jammu and Kashmir and Lakshadweep are also being connected for availing telemedicine facilities as are spacenet terminals for a private hospital in Chennai and a rural hospital in Argonda, Andhra Pradesh. ISRO's own hospital at Sriharikota would also be linked for telemedicine.

Devi Shetty, Narayana Hrudayalaya, Bangalore gave a live demonstration and showed how telemedicine could be used for accessing health care to people in remote areas of the country. This is a joint programme with ISRO. According to Shetty, India produces the largest number of children with heart disease in the world and 18% of Indians over the age of 30 are diabetics; India also produces the largest number of babies in the world. This makes it imperative to have a cardiologist, diabetologist and a neonatologist in every small town of India, said Shetty. Since more than 95% of illness does not require operations, superspecialist care could be provided through telemedicine as disease management is based on history, data of body fluids and images, all of which are transferable live through use of satellites. ISRO's telecardiology programme connects 19 remote locations in India with over 5000 heart patients being treated in the last 15 months. The treatment offered is completely free of