Records of Discussion of the meeting of Scientific Advisory Committee to the Cabinet (SAC-C) held on 25th August, 2006 at Committee Room 'A', Vigyan Bhawan Annexe, New Delhi.

The eleventh meeting of the Scientific Advisory Committee to the Cabinet (SAC-C) was held on 25th August, 2006 under the Chairmanship of Dr. R. Chidambaram, Principal Scientific Adviser to the GOI at Committee Room 'A', Vigyan Bhawan Annexe, New Delhi. The list of participants is annexed.

The Chairman welcomed all the members and mentioned that this meeting was primarily a brainstorming session on the S&T inputs that need to be provided for inclusion in the 11th plan. He informed the members that a Steering Committee on Science and Technology for the Formulation of Eleventh Five Year Plan (2007-2012) has been constituted by the Planning Commission under his chairmanship. He mentioned that a total of 17 working groups, 6 for the scientific departments, and 11 others have been formed to provide necessary inputs for finalization of the recommendations. He was also aware that many of the members of SAC-C are either chairmen or members of one or more working groups and would already be involved in the process. He quoted the Prime Minister, Dr. Manmohan Singh from his remarks at the launch of Knowledge Commission. The PM had said "At the bottom of the knowledge pyramid, the challenge is one of improving access to primary education. At the top of the pyramid, there is need to make our institutions of higher education and research world class".

Mentioning about a note that has been sent by Dr. CNR Rao, Chairman, SAC-PM to the Prime Minister, raising concern about the state of the science and scientific research in the country, he said that all would agree that more funds should be made available for scientific research. Countries like China have made substantial increases in their allocation of resources for higher education. China also spends much more than India on R&D and they have 6 times more numbers of working scientists. He also informed that the rate of publication of scientific papers of China is 2.8 times that of India. However, the productivity in terms of number of publications per scientist in the two countries, is more than double in favour of India. The most important issue that needs to be addressed, he felt, is the problem of Attracting Young People to and Retaining them in Careers in Science and Scientific Research.

He also elucidated the concept of "Directed Basic Research". In its execution, and in the requirement of no other deliverables than knowledge generation, it is no different from conventional basic

research. The selected areas are determined in a national perspective and may be in an area where the knowledge generation would benefit Indian Society in the long term or it may be in area where the results of the research would benefit Indian Industry in the long term. He cited the examples of initiatives of his office in "Basic Science in Ayurveda", "TB related Protein Crystallography", "Cyber Security" and "Automotive Electronics".

Chairman mentioned that the members are aware of the initiatives of the O/o PSA to GOI to initiate appropriate measures to attract young people to careers in science. He briefly mentioned about the 15 years Assured Career Support Programme being suggested as part of the report of the working group on 'Attracting Young People to and Retaining them in Careers in Science and Technology'. The scheme proposes attractive scholarships/ fellowships to bright students opting to remain in science right from 10+2 onwards and an assured job for 5 years after they complete their Ph.D. Lateral entry will also be permitted at graduate and post graduate levels. The aim is not to match the remuneration offered to IIM Graduates but some assured career options for a reasonable period of time that would ensure bright students like gold medallists in science Olympiads and top rankers in IIT JEE getting attracted to taking up careers in science. Some of the working groups are also examining various possibilities of rejuvenating State and Central Universities. Innovative integrated course like 5 years M.Sc.(Hons.) course in science is also being thought of. Undergraduate education in a Post graduate environment may lead to improvement in teaching quality. Proximate national laboratories can provide part of the faculty. In a recent initiative, Department of Atomic Energy is setting up a centre for Basic Science in collaboration with Bombay University. An arrangement is being worked out between IISc., Bangalore and Mysore University for providing faculty and access to the scientific infrastructure of IISc. to the latter.

A presentation was also made giving details of the working groups, their terms of reference and issues that were under consideration by these groups. Chairman asked the members to offer their comments and suggestions. Salient features of the suggestions made are as follows :-

a) 11^{th} Plan offers an opportunity of making a difference by mapping convergence of issues. The S&T plan must bring out the critical importance of the changes proposed and also indicate the adverse effects the country would face if such issues are neglected.

b) There is a requirement of massive revitalization of the University system and UGC must take on the responsibility for doing this at very large scale. The O/o PSA to GOI, Planning Commission and UGC should have a meeting to agree on a structured programme during the 11th Plan for rejuvenating State and Central Universities. Support also needs to be provided so that engineering and science can co-exist in good institutions. UGC and AICTE will have to work together to bring in these changes. B.Tech students should be encouraged to go for research and obtain Ph.D in science.

c) Practical problems of students pursuing various courses in Science and particularly those doing Ph.D in science need to be addressed immediately. After 4 to 5 years for Ph.D and 2 years of post doctoral research, the scholars usually do not find good openings in the job market.

d) Appropriate and suitable changes in the management structure of research institutions and reducing bureaucratic interference are also extremely important and necessary.

e) Resources being limited, spreading them thin may be a equitable but may not promote excellence. There has to be an effort to create a few "Centres of Excellence" which could make a difference. This select group of institutions like the "Navratnas" of PSUs can include autonomous institutions as well as universities. One can follow the example of USA and see what they have done in developing their educational institutions and learn from the experience of these institutions and appropriately follow the same methods. The selection of such "Centres of Excellence" could even be done region-wise but only the best have to be selected with no other consideration.

f) Something needs to be done urgently to improve quality of teaching of science in schools and engineering in colleges. At present, practicals and experiments are of poor quality and require upgradation. During the plan period at least 1000 good schools and colleges may be selected for special support.

g) The issue of adequate compensation for outstanding scientists needs to be looked at closely and innovative methods of providing incentives could be suggested. One such method has already been successfully implemented in UDCT, Bombay University in which public private partnership has created a novel system of providing higher compensation to outstanding faculty members. Similar method is also

being attempted at Pune Engineering College.

h) The status of MBBS graduates also needs be addressed. Many doctors do not find jobs and all of them are not selected for MD. Something on the lines of the assured career scheme could be thought of for these graduates.

i) To improve the system of funding and monitoring of research projects, a new mechanism, 'National Science Foundation' is being proposed. It is expected that this foundation would have more flexibility in operations and not get tied up with day to day problems of govt. ministries while releasing funds for implementation of projects.

j) A major concern relates to difficulty in creation of posts/ positions for deploying quality manpower for implementation of large budgeted projects. As a matter of policy, the manpower proposed for implementation of any project should be considered as necessary and approved at the time of the sanction of the project itself. No separate clearance from any other agency should be necessary.

k) Identifying centres of excellence and providing them with financial support has already commenced. IISc., Bangalore and some other universities have already been given block grants during the last two financial years. However, the university and the autonomous institution need to be given adequate flexibility to use these funds for the purpose they feel as most appropriate and important.

l) The mission mode agencies need to identify proximate colleges which are rated as high-average institutions and provide incremental support in terms of faculty and laboratory facilities. This is being done by IGCAR for some colleges in Chennai.

m) Engineering and medical streams are considered to be professional courses and have not been included in the 15 years assured career support programme. However, if some of the bright students opt for research in basic sciences after graduation, they can be provided lateral entry at appropriate levels.

n) Presently, the process of funding of multi-ministry/department programmes is complicated with requirement of separate clearance/ approvals at various levels. For such projects, an apex committee should be empowered to recommend approval and thereafter no other committee of individual departments need to examine these projects any further. The Steering Committee would make an appropriate recommendation to this effect.

o) Members were also informed by PSA that a report "Higher Education in Science and Research & Development: The Challenges and the Road Ahead" prepared by Indian National Science Academy, New Delhi & Indian Academy of Sciences, Bangalore has recently been submitted to the Planning Commission. This report has made many recommendations e.g. :-

i) Upgradation of Universities, Colleges – This is to include special assistance to ten selected Universities, undergraduate science education in leading post-graduate Universities and IITs, additional assistance to 200 undergraduate colleges to develop into colleges of excellence, establishing 20 engineering schools for a two-year B.Tech degree, etc.

ii) Human Resource Development including national merit scholarships for B.Sc. and M.Sc. students, increase in fellowship, stipends to school students, recognition of meritorious scientists, involving more women in science and technology, etc.

p) Regarding working groups, the members were informed that :-

i) Working Groups on Attracting Young People to and Retaining them in Careers in Science and Technology and "Science & Technology for SMEs" have submitted their reports.

ii) In the Working Group on "S&T in Socio-Economic Ministries/ Departments and State S&T Councils", the support and co-operation of the ministries concerned have been rather disappointing.

iii) In the Working Group on "Mega Science Projects" large budgeted developmental projects as well as projects with international collaborations have been considered. The present collaborative programmes such as in CERN has been extremely good for Indian S&T scene. Such mega projects would provide hands on experience in laboratories/industries, learning opportunity to scientists, provide access to frontline science & technology, attract large number of students to a particular domain of science and are also consistent with national needs. The overall cost benefit analysis of such large projects has always shown that the money has been well spent. Many new proposals are under consideration of the Working Group for implementation during the 11^{th} Plan.

The Chairman thanked all the members for their inputs and mentioned that these will help the Working Groups enormously to formulate their recommendations for inclusion in the report of the Steering Committee.

The meeting ended with a vote of thanks to the chair.

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Annexure

1. Dr. R. Chidambaram, Principal Scientific Adviser to the Government of India, Office of the Principal Scientific Adviser to the Government of India, Vigyan Bhavan Annexe, Maulana Azad Road, New Delhi – 110 011.

2. Dr. Padmanabhan Balaram, Director, Indian Institute of Science, Bangalore – 560 012

3. Dr. Prem Shanker Goel, Secretary, Department of Ocean Development, Block No.12, CGO Complex, Lodhi Road, New Delhi – 110 003

4. Dr. Jamshed J. Irani, Director, Tata Sons Limited, Bombay House, 24 Homi Modi Street, Fort, Mumbai-400001.

5. Prof. S.K. Joshi, Vikram Sarabhai Professor & Honorary Emeritus Scientist, # 252, National Physical Laboratory, Dr. K.S. Krishnan Marg, New Delhi – 110 012.

6. Dr. J.M. Khanna, Executive Director & President, Life Sciences Jubilant Organosis Ltd., A-1, Sector 16-A Institutional Area, Noida- 201301

7. Dr. S.P.S. Khanuja, Director, Central Institute of Medicinal and Aromatic Plants (CIMAP), (Council of Scientific & Industrial Research), PO-CIMAP,Near Kukrail Picnic Spot, Lucknow – 226015.

8. Dr. R.K. Pachauri, Director General, The Energy & Resources Institute (TERI), Darbari Seth Block, Habitat Place, Lodhi Road, New Delhi 110 003.

9. Dr. Placid Rodriguez, Flat 2B Adithya Apartments, 38 Balakrishna Road Valmiki Nagar, Chennai 600041.

10. Dr. Bikash Chandra Sinha, Director, Saha Institute of Nuclear Physics, Sector I, Block AF, Bidhan Nagar, Kolkata.

11. Prof. Veena Tandon, Parasitology Laboratory, Department of Zoology, School of Life Sciences, North-Eastern Hill University, Shillong – 793 022.

12. Prof. A.L. Verma, Former Director, North Eastern Hill University Campus, Shillong, D-3, Ram Vihar, Sector 30, Noida 201301.

13. Dr. Anil Kakodkar, Secretary, Department of Atomic Energy, Anushakti Bhavan, C.S.M. Marg, Mumbai – 400 039.

14. Dr. Mangala Rai, Secretary, Department of Agricultural Research & Education, Room No.105, 1st Floor, Krishi Bhawan, New Delhi – 110 001.

15. Dr. M. Natarajan, Secretary, Defence Research & Development Organisation, Room No.138, South Block, New Delhi – 110 011.

16. Dr. Prem Shanker Goel, Secretary, Department of Ocean Development, Block No.12, CGO Complex, Lodhi Road, New Delhi – 110 003.

17. Dr. T. Ramasami, Secretary, Department of Science & Technology, Technology Bhawan, New Mehrauli Road, New Delhi – 110 016.

18. Dr. R.A. Mashelkar, Secretary, DSIR & DG, CSIR, Anusandhan Bhawan, Rafi Marg, New Delhi – 110 001.

19. Dr. R.A. Mashelkar, President, Indian National Science Academy, 2, Bahadur Shah Zafar Marg, New Delhi –110 002

20. Dr. V.P. Kamboj, President, National Academy of Sciences (Allahabad), National Academy of Sciences, 5, Lajpatrai Road, New Katra, Allahabad - 211 002.

21. Shri V. Rao Aiyagari, Adviser and Head (SERC), Department of Science & Technology, New Mehrauli Road, New Delhi – 110 016.

22. Dr. S.K. Sikka, Scientific Secretary, Office of the Principal Scientific Adviser to the Government of India, Vigyan Bhavan Annexe, Maulana Azad Road, New Delhi – 110011.

23. Shri S. Chatterjee, Adviser, Office of the Principal Scientific Adviser to the Government of India, Vigyan Bhavan

Annexe, Maulana Azad Road, New Delhi – 110011

24. Dr. R.P. Gupta, Scientist 'E', Office of the Principal Scientific Adviser to the Government of India, Vigyan Bhavan Annexe, Maulana Azad Road, New Delhi – 110011

25. Shri Neeraj Sinha, Scientist 'E', Office of the Principal Scientific Adviser to the Government of India, Vigyan Bhavan Annexe, Maulana Azad Road, New Delhi – 110011