A report on the Brainstorming Session on Science, Technology and Innovation (STI) Policy – Implementation aspects

under the joint auspices of

The National Academy of Sciences, India, Allahabad

and

Department of Science & Technology, Govt. of India, New Delhi
The National Academy of Sciences, India
5, Lajpatrai Road, Allahabad - 211 002

A report on the Brainstorming session on Science, Technology and Innovation (STI) Policy - Implementation aspects

Saturday, March 2, 2013 10:00 AM-5:30 PM
National Institute of Plant Genome Research, Aruna Asaf Ali Marg, New Delhi.

Prelude:

India has declared 2010-20 as the “Decade of Innovation”. The government has established a National Innovation Council. The STI Policy 2013 was unveiled by the Hon’ble Dr Manmohan Singh, Prime Minister of India, during the inaugural session of the Centenary Celebrations of Indian Science Congress-2013, in Kolkata. It is aimed towards bringing fresh perspective to bear on innovation in the modern context of India’s growth and development. The policy has the potential and components to drive investments in science, science-led technologies and innovations in selected areas of socio-economic importance.

In this context, on the initiative of the Department of Science & Technology, it was decided by the Council of the Academy (NASI) to discuss the implementation part/strategy of STI Policy, so that recommendations could be framed for implementation towards achieving the objectives of STI Policy 2013. (List of participants and Programme at Annexure-I & II)
Inauguration:

The Brainstorming Session was inaugurated by Prof M.G.K. Menon, FRS, past President NASI. Prof. Menon in his inaugural address, talked about the Scientific Policy Resolution (1958) and the Technology Policy Statement of 1983, TPIC which created the TIFAC and later Technology Development Fund. He said that one is preaching the converts, i.e. only scientists. There are others involved in the innovation chain as Blackett had said in his Nehru Memorial Lecture- 90% down the line of lawyers, bankers, venture capitalists, lobbyists, and others that is why we talk of ecosystem in innovation to flourish.

Prof Akhilesh Tyagi, Director of NIPGR, New Delhi, formally welcomed the distinguished participants; followed by a brief introduction of the present session and the earlier policies by Dr (Mrs.) Manju Sharma.
Special remarks were made on the present policy and its motto by Prof. S.K. Brahmachari. He said, to target 2% GDP, industry is growing at 30 to 40%. How to tap the resources and have innovations which are more cost effective. Academies have a major role to generate high quality human resource.

Brief remarks were made by Dr. Sneh Bhargava and Dr. Neeraj Sharma. Prof. Krishna Misra, proposed a vote-of-thanks.

Session 1- Aspirations of the Policy:

The Session was chaired by Prof. Manju Sharma and Dr. M.K. Bhan. The aspiration part of the STI Policy emphasizing that with our large natural resources, diversity and demography, we need to play a definite role in achieving the goal of positioning India among the top five global scientific powers by 2020 through practically implementing the STI Policy 2013 in all effective sense was brought out by Dr. Sharma. Further Dr Bhan, emphasized
the need of systematically planned strategy for achieving this target, specifically mentioning the role of different factors, such as effort-reward rationale, overcoming conservative approach by its replacement with broad based approach, talent pool and think tank reservoir creation etc. in implementing STI Policy.

The following scientists gave a brief 10 minutes presentation each; Prof. Asis Datta, Prof. Kishan Lal, Dr. Akhilesh K. Tyagi, Dr. Dinkar M. Salunke, Dr. Rajesh Gokhale, Dr. Kanury Venkata Subba Rao, Dr. A.K. Ghatak, Dr. Subrata Sinha, Dr. Jitendra N. Verma, Prof. Paramjit Khurana and Dr. R.P. Sharma. They dealt on the various issues related to the earlier shortcomings and corrective measures as well as effectively designing the road map for implementation, as exploring talent through the science education programmes of different institutions of excellence; role of three national Science Academies in motivation and dissemination of knowledge; developing world class institutions of research and innovation; making consortium for collaborative research; preparing strategy implementation documents with indicators; analyzing the intellectual components of the plan; removal strategy for the blocks and breakers of implementation; independence and accountability for research programmes; area specific and people specific strategies; social security for the entrepreneurs; regulatory steps and commercialization of innovative products/ideas; modeling and extrapolating the cause-effect of any plan/policy before implementation; funding of the programmes/projects etc.
Session 2 - Innovations, Capacity Building and Training:

The session was chaired by Prof. S K Brahmachari, and Prof. S.K. Sopory.

Prof. Brahmachari citing an example of creation of National Innovation Fund of Rs 500 crores as an effective step for supporting and nurturing innovators, stressed on identifying the young innovators/talented researchers for realizing the dream of Innovative India. Prof Sopory highlighted the importance of strengthening the education system to generate intelligent human resources.

Presentations were made by; Prof. H.Y. Mohan Ram, Prof.V.P. Sharma, Dr. Ashok Misra, Dr. Balram Bhargava, Dr. Nikhil Tandon, Dr. Sneh Bhargava, Dr. Subeer Majumdar and Dr. Anupam Verma. They suggested several important measures to ensure effective implementation of STI Policy by adapting ways to- develop research and training to prepare bachelors of elementary education; make science communication compulsory in the
school/college curricula; ensure control on population and poverty; introduce radical change in education system; coordinate and collaborate with other ministries/programmes for inventions/innovations as per their need; provide opportunities to the talented; improve health care strategies; bridge the gap between availability and affordability; open the boundaries between the subjects/disciplines and fix-up the role of the different Institutions/Academies/Sectors, etc.

**Session 3 - Open Session for Recommendations:**

Prof. P.N. Tandon, Past President, NASI, chaired this session with Prof. Manju Sharma and Dr. Jitendra P. Khurana as the two Co-chairs. Prof Tandon quoting the famous epithets- “What is honoured is developed-Aristotle” & “We have no money, so let’s think-Rutherford”, initiated the discussion.

Lead discussants were Dr. Amit P. Sharma, Dr. Anil Tyagi, Dr. Renu Swarup, Dr. Pratibha Jolly, Dr. Deepak Bhojwani, Dr. Shubhra Chakrabarti, Dr. Vani Brahmachari and Prof. Satya Deo. There was two hours of long and interactive discussion. The recommendations have been made synthesizing the crux of ideas/views generated during the brainstorming session. These recommendations have been grouped under different areas to facilitate their implementations.

**Recommendations**

1. **Policy issues and conducive changes for S and T progress in the exiting procedures**
   
   (a) The STI Policy document may be widely circulated in other Ministries such as Human Resource Development, Health & Family
Welfare, Culture, Information & Broadcasting, Environment, Planning Commission & State Departments of Planning, University Grants Commission and other relevant governmental and non-governmental bodies, for their perusal, record and coordinated discussion on the common points of action for implementation. After the circulation and discussion/integration phase, a **Common Action Plan** (CAP) be developed with proper allocation of their roles and resources for adopting the step-wise implementation strategies. As Hon’ble Prime Minister of India has already declared the year 2012-13 as the “Year of Science”, therefore the PMO may consider an integrative/suggestive role for ensuring the development of CAP.

(b) Efforts should be to complete the implementation of our earlier policy document’s plan; and their each point to be taken as a mission.

(c) There ought to be a governance structure in place to handle issues related to decision making, execution and monitoring to ensure multiple levels of managerial modernization/obsolescence; similarly in terms of scientific organization and infrastructure.

(d) To analyze the intellectual components of the plan, modeling and extrapolating the cause-effect relation of any plan/policy is required before implementation.

(e) To remove the blocks and breakers of implementation, the need of the region, people specific strategies be adopted with proper involvement of Public-Private Partnership.

(f) To ensure sustainability of the programmes/projects, regular income is required; and this could be ensured by enhancing the
product value by adopting periodic assessment and quality improvement.

(g) Develop appropriate policies for sharing germplasm within public sector and with industries.

2. Infrastructure development including establishment of new institutions and centers of excellence

(a) To involve the innovators/entrepreneurs together with academicians/scientists (as Mentors) for developing ‘area/need’ specific ‘research/technology’ based institutions/projects (as health care has different need in comparison to agriculture and information technology has different tools and techniques than biotechnology). Not only this, the people of one region have specific choice or demand, as per their demography, which is also to be taken care of.

(b) To ensure independence and accountability of these research institutions/projects, as well as social respect of the innovators/researchers, appropriate institutional measures are called for.

(c) To make a consortium for collaborative research by opening the boundaries between the subjects/disciplines and fixing-up the role of the different Institutions/Academies/Sectors, etc.

(d) To evolve global pattern of patenting.

(e) To ensure cooperation of Private Sector for commercialization of the concept/products developed by the innovators/entrepreneurs.

(f) Special efforts would also be required for establishing institutions/centres for-
i. Conservation of fresh water resources and utilisation of marine resources.

ii. Encouragement for more research and use of biomass and marine farming.

iii. Diploma courses for the technology development and application

iv. Parasitology, as it is an important area for health care; also the reorientation of the medical curriculum is the need of hour and more science has to be brought in.

(g) To establish a Centre for Innovation Analysis.

(h) To set up hubs of “omics” platforms with breeders as driving force

(i) Establishment of phenomics facilities and field stations.

(j) Research projects to be supported covering improved photosynthetic, nitrogen fixation and nutrient utilization potential, improved reproductive efficiency with high yield convertibility, protection of yield loss due to stress/climate change and mitigation of post harvest losses.

(k) To create facilities for collection, characterization and cataloguing of germplasm and create a knowledge database.

(l) India has the potential to be an excellent hub for Intellectual Property (IP) creation provided institutional mechanisms are created to overcome:

- Lack of education and awareness about IP, its ownership and its value.
- Access to capital to invest in IP creation
- Lack of comprehensive IP commercialization frameworks
- Inadequate enforcement of IPRs and legal/policy frameworks
• Lack of IP infrastructure in the form of IP agents, law schools and special IP courts.

(m) To deliver health care to the underprivileged, it is necessary to build infrastructure to reach rural pockets, create innovative financing and incentives for local companies, roping in global players and putting in place public private partnerships.

(n) India needs 74150 community health centre per million population but has less than half that number.

(o) Setting up more advance care tertiary centres in all states.

3. Science education; Popularization of science, awareness building and creation of scientific temper and training

(a) The present system of education, scientific research and technology development will need to be harmonized in achieving ambitious goals. Particularly, more emphasis is to be put on experimental work in all spheres.

(b) The science academies are striving to promote science by recognizing excellence at young age as well as among established scientists and technologists. The academies can help in implementing the new policies by taking into account outstanding contributions in innovations while evaluating scientists.

(c) There is a necessity to make science communication compulsory in the school/college curricula. For example NASI may take-up the task of framing the curricula, as it has a wide experience of last about 25 years in science communication in the schools; NCSTC and Vigyan Prasar are other important bodies engaged in similar tasks; their scope can be further expanded.
(d) Organizing science communication/education activities throughout the length and breadth of the country to cultivate scientific temper among the students and general mass to create an atmosphere for exploring and nurturing talent. DST INSPIRE Programme, Science Education Panel Programme of all three National Science Academies and Vigyan Chaupals being organized by the NASI, are worth mentioning as these have created good impact in several areas, but the need is to strengthen these programmes with proper networking among the institutions/areas and the DST/Academies.

(e) Develop better curriculum at bachelor’s level. Suggest a four years B.Sc./B.S. with engineering subject added

(f) Project work to be introduced at the bachelors level

(g) B.Sc./B.S. should be looked as an alternative to B.Tech./B.E. and not a default option

(h) Introduce innovation at all levels in science and engineering education

(i) Alongside introduce appreciation of Intellectual Property related issues

(j) Develop systems to translate the ideas into products, process and services. Concept of Innovation labs to be created.

(k) For integrating research and education, strengthening of the universities especially in the states is important. To identify key department and individuals and work around them to raise the efficiency of average institutions.

(l) There is need to recognize and respect shared ownership and credit. Collaborative work should be rewarded before individual
work. There is also need to look at the impact of social value in scientific contributions.

4. **Training for teachers at various levels and for other professionals**
   (a) There is a nation-wide concern in ensuring universal literacy and quality education at all levels. The lack of well trained teachers is a major stumbling block. However, there is a lack of reliable data on the number of vacant positions at different levels starting with primary schools to university level. This must be analyzed.
   (b) The three science Academies are jointly working on improving levels of scientific research in education sector. Training of teachers and mentoring of researchers is a key component of this effort and its demand is increasing at an exponential rate. A special scheme is needed to take up this activity to new higher levels.
   (c) To organize training programmes for the teachers to develop a support system for nurturing such talent. NCERT, UGC and Teacher’s Training Institutes have their specific role, but there is also a need of coordination among these for guided results.
   (d) Train extension personnel, farmers with demonstration at the fields.

5. **Supporting and nurturing excellence; younger generation; reward system and Innovations**
   (a) A large number of students should be sent regularly on a planned basis to different laboratories in India for exposure (Bharat darshan).
(b) We must protect wherever there is excellence and create an environment for those who want to work.

(c) The recruitment system in the Universities/IITs/ICAR/ICMR etc to be amended to give space to innovators.

(d) Project/Programme evaluation/assessment processes to be independent and cross checked by other agencies; Proper legislation is required to protect the interests of the innovators/entrepreneurs.

(e) Technical Support System (TSS) should be introduced to support the researchers/scientists to save their productive time and energy; as well as Changes in the GFR to make it more conducive for the scientific and technological activities are required.

(f) Plan long term projects instead of short term with necessary assessment measures for introspection and improvement; long term funding should be provided for research to individuals who have established themselves.

(g) A two-fold strategy, namely big time innovations for larger ecosystem are needed in medical research, agriculture etc. Secondly, the need is to ensure that the efforts are rewarded.

(h) Bridging the gap between availability and affordability Entrepreneurship Development & Sustainability Board (EDSB), be created involving Ministry of Human Resource Development, Environment, Culture and Science & Technology for assessing the need, providing the opportunity and maintaining the growth rate of entrepreneurs/innovators.

(i) Management of technology and completion of innovation chain down the line, appropriate mechanism in place.
(j) Devising regulatory steps and commercialization of innovative products/ideas through public-private partnership (PPP); for commercialisation, ecosystem for investment must be nurtured.

(k) Entrepreneurs’ insurance policy should be introduced.

(l) Schemes needed to support young entrepreneurs on 100% basis by the Government; Protection to young entrepreneurs be provided from the big fishes.

(m) Steps to be taken to avoid regulatory delays.

(n) To develop leaders in biomedical technology innovations and to indentify unmet health care need.

(o) To develop low cost, high quality devices for the common man.

(p) To help ignite the Indian Med Tech industry. The basic philosophy should be to educate, collaborate and innovate.

(q) To create a group to prioritize targets for biotechnological interventions.

(r) To initiate intensive mission mode research to understand molecular basis of target traits.

(s) Use diversity of traits for knowledge-based genetic enhancement.

6. **Gender issues, parity and inclusiveness.**

(a) Empower women in every sector for providing support in search of talent as well as to nurture the young talent. Academies have already initiated such programmes.

(b) Women entrepreneurs/researchers be provided safety financial/working atmosphere/insurance and opportunities at all levels.

(c) The women living in difficult terrains be given relaxation in working age and completion of their tasks.
(d) Provide health care to all; microcosmic approach of NASI in organising Jal & Swasthya Chaupals, may serve as the basic model for qualitative/quantitative improvement in the human resource and consequently success of the programmes; regular events of this type to be organized.

7. Measures for speedy development of entrepreneurship

(a) Grant of funds and space to Innovators and Innovation Led Enterprises (ILEs) should be made only if the Innovators and/or Technologists with expertise in the domain are majority shareholders. Enterprises that have availed government funding and benefitted by other resource allocation from the Government shall be investigated to streamline shareholding patterns to ensure that equity is in proportion to investments and contributions taking into account Rs value of Intellectual and Expertise Inputs.

(b) Innovator companies be certified by the relevant ministries and departments as “Innovator Company” / “Innovated Product” after due diligence. ILEs with such certificates shall be provided immunity from elimination from procurement programs and guarantee of business share. IP shall be respected and shall not be left to the interpretation of unqualified persons. Such misinterpretation shall be made punishable offence.

(c) Innovators with IP shall be provided space for R&D and Manufacturing at highly subsidized costs with provision for recovery by the supporting agency from royalties levied as pre-
condition. The space so provided shall be non-transferable except to the decedents of those who have been granted such space.

(d) World class training facilities should be created for the innovators/researchers; orientation programmes/refresher courses are also required for their qualitative improvement.

8. **Identification and implementation of some Missions of relevance to the nation**

(a) Create specialised National Facilities of sophisticated instruments distributed regionally.

(b) Major focus should be on Fresh Water resources, its management and distribution, including ground water resources (implications for agriculture).

(c) Under-utilisation of our marine coast line and resources be spotted for eco-friendly and sustainable growth; this should get more attention.

(d) Indian agriculture is basically a subsistence agriculture, evolved primarily to meet the basic needs of farmers for their sustenance. In order to convert it into commercial venture, the following impediments need to be addressed.

- Small land holdings by the farmers, making agriculture largely a labour intensive and time consuming activities rather than an efficient mechanized operation.
- Shrinking land and natural resources; farmland being diverted to other competitive developmental needs and depleting natural energy and water resources.
- Century old routine, many a times non-profitable cropping systems.
• Increasing input cost, particularly chemical fertilizers and labour.
• Inadequate storage facilities and marketing problems.
• Lack of post-harvest processing facilities.
• Non-availability of timely and cheaper loans.
• Almost zero tolerance among farmers against natural disasters such as drought, flooding, hailstorms etc.
• Over and above these impediments, in many regions of the country including “Bread Basket states”, there seems to be a technological “fatigue” where the productivity of the conventional crops has been stagnating for quite some time without any immediate hope of achieving substantial gains in productivity. It is recommended that in these areas attempts should be made to consolidate the past gains by (i) adopting crop diversification and advocating the most profitable cropping system and (ii) promoting contract farming.
• East and Northeast regions in the country, in spite of good fertile land, remained more or less untouched from the gains of the “Green Revolution”. It is now generally believed that the existing technologies, at least for the immediate future, are adequate and must be introduced and popularized in these areas for increasing the crop productivity and for improving cropping intensity.
• India is rich in biodiversity including agro-biodiversity. In the past major efforts have been made in the collection of these bio-resources. It is now time that the available germplasm is extensively characterized for each of the crop of agriculture importance and crop-wise “Biodiversity Register” is prepared.
This is a major but essential activity for future plant breeding needs and deserves to be undertaken as a national activity. NASI has already taken steps; and biodiversity registers of some zones have been prepared.

(e) There should be clearly demarcated funding policy with committed funds for focused attempts to develop new vaccines, drugs, diagnostics or any other medical devices and diagnostic tools depending upon the area of concern and their evaluation.

(f) Translational research often does not lead to the highest impact journals. To encourage translational research, it should be given due value based on the merit and the impact factor of the journals should not be the only criteria for highest academic awards. NASI and other academies have started recognizing such talents.

(g) Taking note of examples of national programs like TB, Malaria etc. integrating basic science and its translational applications is important to launch many more national missions. Linking innovations, products and the delivery systems will be profitable to have larger social impact. Involvement of industries is critical in these efforts.

9. **Instituting some structures for implementation of the S T I policy (2013) and for monitoring various programs**

   (a) The Academies can play a crucial role in promoting Science, Technology and Innovation. Their actions should be harmonized with the national effort.

   (b) Academies have a major role in implementing the science popularization, awareness, creation of scientific temper,
preparing specific recommendations, organizing workshops and involving the young scientists and students to impress upon them the importance of science, technology and innovations. Academies are already involved in similar activities. They should be given some specific missions and tasks with clear targets and financial support.

(c) To ensure wide coverage and publicity of any programme/project, role of media is also relevant; a full time science channel may be introduced on TV with the support from both public and private sector. High quality professionals to be hired to run this. This will speed up the science awareness and public understanding of science. NCSTC of DST may consider this proposal.

(d) Science branding is essential. Large international programmes are needed also to increase the publications for a long term national benefit.

(e) S&T in the socio economic sector needs to be very significantly strengthened. The science departments can act as advisors and provide inputs for the progress of these sectors on a formal basis. Such as Research Advisor Committees.

(f) Every effort has to be made to reduce the regional imbalances especially in the infrastructure and research efforts.

(g) Financial security and support must be there to cover the risk.

(h) Government funding should not only look at the direct benefits but should focus more on implicational benefits.

(i) To excite and inspire the young investigators we can launch at least two large programs with international consortium having major funding.
(j) STI Policy Implementation Committee (STIPIC) should be established for proper and effective implementation of the policy by DST. It should be an inter-ministerial committee with some experts, somewhat similar to TPIC. It can follow a decentralized approach; using the existing structures and expertise STIPIC can also set up monitoring mechanisms for all small and large projects, missions policy frame works etc.
Annexure - I

List of Participants

1. Hon’ble Prof M G K Menon, FRS,
2. Prof. (Mrs.) Manju Sharma, Formerly Secretary to the Govt. of India,
3. Prof. S.K. Brahmachari, DG (CSIR) and Secretary to the Govt. of India, DSIR, New Delhi,
4. Prof. P.N. Tandon, Past President, NASI & President NBRC, Manesar,
5. Dr. M.K. Bhan, Formerly Secretary to the Govt. of India, DBT, New Delhi,
6. Prof. V.P. Sharma, NASI-ICMR Chair Professor at CRDT, IIT Delhi, New Delhi,
7. Prof. Asis Datta, NASI-Platinum Jubilee Chair Professor, New Delhi,
8. Dr. Ashok Misra, formerly Director, IITB, Mumbai,
9. Prof. Kishan Lal, President, INSA, New Delhi,
10. Dr. Sneh Bhargava, Formerly Director, AIIMS, New Delhi,
11. Dr. Neeraj Sharma, Scientist ‘G’, D.S.T., New Delhi (representative of Dr. T. Ramasami, Secretary to the Govt. of India, DST, New Delhi),
12. Prof. S.K. Sopory, Vice-Chancellor, J.N.U., New Delhi,
13. Prof. H.Y. Mohan Ram, Honorary Scientist, INSA, New Delhi,
14. Dr. Balram Bhargava, AIIMS, New Delhi,
15. Dr. Nikhil Tandon, AIIMS, New Delhi,
16. Dr. Anupam Verma, formerly Professor, Advanced Centre for Plant Virology, IARI, New Delhi,
17. Dr. Akhilesh K. Tyagi, Director, N.I.P.G.R., New Delhi,
18. Prof. Krishna Misra, General Secretary (HQ), NASI, Allahabad,
19. Prof. Jitendra P. Khurana, University of Delhi South Campus, New Delhi,
20. Prof. Satya Deo, Formerly Vice-Chancellor, APS University, Rewa & Treasurer, NASI, Allahabad,
21. Dr. Renu Swarup. Advisor, DBT, Govt. of India, New Delhi,
22. Dr. Vani Brahmacari, Professor, Delhi University, Delhi,
23. Dr. Dinkar M. Salunke, Executive Director, Regional Centre for Biotechnology, Gurgaon,
24. Dr. Rajesh Gokhale, Director, CSIR-Institute of Genomics & Integrative Biology, Delhi,
25. Dr. Kanury Venkata Subba Rao, Head, Immunology Group, ICGEB, New Delhi,
26. Dr. A.K. Ghatak, Formerly Emeritus Professor, IIT Delhi, New Delhi,
27. Dr. Subrata Sinha, Director, NBRC, Manesar,
28. Dr. Jitendra N. Verma, Managing Director, Lifecare Innovations Pvt. Ltd. U.P. ,
29. Prof. Paramjit Khurana, University of Delhi South Campus, New Delhi,
30. Dr. R.P. Sharma, Director, NRCPB, New Delhi,
31. Dr. Subeer Majumdar, NII, New Delhi,
32. Dr. Amit P. Sharma, Group Leader, ICGEB, New Delhi,
33. Dr. Anil Tyagi, Professor, J.N.U., New Delhi,
34. Dr. Pratibha Jolly, Principal, Miranda House, Univ. of Delhi,
35. Dr. Deepak Bhojwani, Scientist ‘G’, D.S.T., New Delhi,
36. Dr. Shubhra Chakrabarti, Staff Scientist VI, NIPGR, New Delhi,
37. Mr. Ashutosh Agarwal (Industry), Jubilant Life Sciences Ltd., U.P.,
38. Dr. S.P. Malhotra, Indian Institute of Technology Kanpur,
39. Dr. Niraj Kumar, Executive Secretary, NASI, Allahabad.
The National Academy of Sciences, India  
5, Lajpatrai Road, Allahabad - 211 002

Programme

Science, Technology and Innovation (STI) Policy - a Brainstorming conference on implementation aspects

Date : 2nd March, 2013  
Time : 10.00 a.m. to 6.00 p.m.  
Venue: National Institute of Plant Genome Research, New Delhi

10.00 - 11.00 a.m.

Welcome : Dr. Akhilesh Tyagi
About the Conference : Dr. Manju Sharma
Special Remarks : Dr. S.K. Brahmachari  
Dr. Sneh Bhargava  
Dr. Neeraj Sharma
Inaugural Address : Prof. M.G.K. Menon
Vote of Thanks : Dr. Krishna Misra

Tea Break: - 11.00 - 11.30 a.m.

Session 1- Aspirations of the Policy 11.30 a.m. to 2.00 p.m.

Chairpersons : Dr. Manju Sharma  
                 Dr. M.K. Bhan

Speakers : Dr. Asis Datta  
           Dr. Kisan Lal  
           Dr. Akhilesh Tyagi  
           Dr. Dinkar M. Salunke  
           Dr. Rajesh Gokhale  
           Dr. Kanury Rao  
           Dr. A.K. Ghatack  
           Dr. Subrata Sinha  
           Dr. Jitendra Verma  
           Dr. Paramjit Khurana  
           Dr. R.P. Sharma

Lunch Break-2.00 - 2.45 pm
2.45 - 4.45 p.m.
Session 2 Innovations, Capacity Building and Training

Chairpersons : Dr. S.K. Brahmachari
                Dr. S.K. Sopory

Speakers : Dr. H.Y. Mohan Ram
           Dr. V.P. Sharma
           Dr. Ashok Misra
           Dr. Balram Bhargava
           Dr. Nikhil Tandon
           Dr. Sneh Bhargava
           Dr. Subeer Majumdar
           Dr. Anupam Verma

Tea Break 4.45 - 5.00 p.m.

5.00 - 6.00 p.m.

Session 3 Open Session & Recommendations
(Remarks/Suggestions from the discussants)

Chairpersons : Dr. P.N. Tandon
                Dr. Manju Sharma
                Dr. Jitendra P. Khurana

Lead Discussants

   Dr. S.P. Malhotra
   Dr. Amit Sharma
   Dr. Anil Tyagi
   Dr. Renu Swarup
   Dr. Pratibha Jolly
   Dr. Deepak Bhojwani
   Dr. Shubhra Chakrabarti
   Dr. Vani Brahmachari
   Dr. Satya Deo
   Mr. Ashutosh Agarwal (Industry)

Vote of Thanks : Dr. Niraj Kumar