National Knowledge Commission
Report to the Nation 2006

सत्यमेव जयते

Government of India

Where the mind is without fear
and the head is held high;

Where knowledge is free;

Where the world has not been
broken up into fragments by narrow
domestic walls;

Where words come out from
the depth of truth;

Where tireless striving stretches its
arms towards perfection;

Where the clear stream of reason
has not lost its way into the dreary
desert sand of dead habit;

Where the mind is led forward by
thee into ever-widening thought and
action…

Into that heaven of freedom, my
Father, let my country awake.

Rabindranath Tagore

Foreword

As the National Knowledge Commission (NKC) presents its first annual report to the nation, we feel a sense of excitement at the potential that India has to emerge as one of the leading knowledge societies in the world. The Commission was set up by Prime Minister Manmohan Singh to prepare a blueprint to tap into the enormous reservoir of our knowledge base so that our people can confidently face challenges of the 21st century. We are conscious that this is a daunting task, which requires not only resources and time but also a vision and a long term view. At the same time, we are happy that we have taken this first important step.

At the heart of the NKC's mandate are five key areas related to Access, Concepts, Creation, Application and Services. We have addressed the question of how to build a knowledge society from these perspectives with a particular focus on access to knowledge. Of the nine sets of recommendations made by the NKC in 2006, six deal directly with access. We have done so consciously in conformity with the UPA government's philosophy of building an inclusive society. The emerging knowledge society and associated opportunities present a set of new imperatives and new challenges for our economy, polity and society. Our future prosperity depends upon the policies, programmes and people that can foster continuous generation and application of knowledge in the pursuit of learning.

We have addressed a wide range of subjects including a comprehensive reform of higher education, overhaul of public libraries, creation of a Knowledge Network, setting up of national portals, transformation of vocational education, re-engineering of government processes and making E-governance citizen-friendly. The impact of what we have proposed would be felt over the next decade and beyond. We have taken particular care to keep the entire process democratic, transparent and participative. In doing so, we have consulted a wide range of stakeholders in government, parliament, politics, academia, industry, civil society and the media. Our recommendations reflect and incorporate the concerns and aspirations of experts and persons from the concerned spheres.

The Commission members have worked painstakingly on every aspect of our recommendations. I want to thank all members for the exceptional dedication they have brought to their mandate even though they all know that the impact of their work will be felt only in the long-term. We have had our agreements and disagreements on many issues on the table but their expression has always been in the highest traditions of democracy. I would also like to thank the members of various working groups and the secretariat for their contribution and support. I would like to particularly acknowledge the support and guidance of the Prime Minister's Office and the Planning Commission.

We hope that the work we have done during our first year will be of value to the government and will find the enthusiasm and support of the administration in its implementation. We also hope that our recommendations will receive the attention they deserve and create necessary public discussion, debate and dialogue to shape and mobilize public opinion. We say this with a focus on the 550 million people below the age of 25 who will benefit the most from the new knowledge initiatives. The destiny of India is in their hands. While making the recommendations we have been guided by how knowledge will impact the lives of people, ordinary people, of India. We are conscious that knowledge is about farmers having access to accurate information about water resources, land quality and fertilizers, students having access to schools and colleges of high quality relevant education and good jobs, scientists having access to well equipped modern libraries and laboratories, industry having access to a skilled workforce and people feeling empowered with good governance in a vibrant democracy.

The recommendations of the National Knowledge Commission are really a call to action. It is time to act here and now.

Sam Pitroda
Chairman, National Knowledge Commission

National Knowledge Commission

Terms of Reference

- Build excellence in the educational system to meet the knowledge challenges of the 21st century and increase India's competitive advantage in fields of knowledge.
- Promote creation of knowledge in Science & Technology laboratories.
- Improve the management of institutions engaged in Intellectual Property Rights.
- Promote knowledge applications in Agriculture and Industry.
- Promote the use of knowledge capabilities in making government an effective, transparent and accountable service provider to the citizen and promote widespread sharing of knowledge to maximize public benefit.

The National Knowledge Commission has a designated time-frame of three years: from 2nd October 2005 to 2nd October 2008

This Report highlights the major initiatives taken by the National Knowledge Commission and the recommendations submitted to the Prime Minister in the first year of its inception, and gives a brief introduction to the Commission.

Contents

National Knowledge Commission

The ability of a nation to use and create knowledge capital determines its capacity to empower and enable its citizens by increasing human capabilities. India today stands poised to reap the benefits of a rapidly growing economy and a major demographic advantage that will see the country having the largest pool of young people in the world in the next few decades. In the words of Dr. Manmohan Singh, Prime Minister of India, *"The time has come to create a second wave of institution building, and of excellence in the fields of education, research and capability building so that we are better prepared for the 21st century."*

To make the best of these opportunities and respond to global challenges more strongly than ever before, India today needs a knowledge-oriented paradigm of development to give the country a competitive advantage in all fields of knowledge. The potential is tremendous, but the task of realizing it is daunting too. It is with this broad task in mind that the National Knowledge Commission (NKC) was constituted on 13th June 2005 as a high-level advisory body to the Prime Minister of India, with a mandate to guide policy and direct reforms.

NKC's overarching aim is to transform India into a vibrant knowledge-based society. This entails a radical improvement in existing systems of knowledge as well as the creation of avenues for generating new forms of knowledge. Increased participation and a more equitable access to knowledge across all sections of society are also of vital importance in achieving these goals.

In view of this, NKC seeks to develop appropriate institutional frameworks to strengthen the education system, promote domestic research and innovation and facilitate knowledge application in sectors like health, agriculture, and industry. It also aims to leverage information and communication technologies to enhance governance and connectivity.

Its prime focus is on the on five key areas of the knowledge paradigm — access to knowledge, knowledge-concepts, knowledge-creation, knowledge-application and development of better knowledge services.

Organization

NKC consists of six members, including the Chairman. All members perform their duties on a part-time basis and do not claim any remuneration.

The Members are assisted in their duties by a small Technical Support Staff headed by an Executive Director seconded to the NKC by the government. The Commission is also free to co-opt experts to assist in the management of its tasks.

The Planning Commission is the nodal agency for the NKC for planning and budgeting purposes as well as for handling Parliament submissions or responses.

The National Steering Group for NKC is headed by the Prime Minister and includes the Ministers of Agriculture, Human Resources Development, Science & Technology, Commerce and Information Technology.
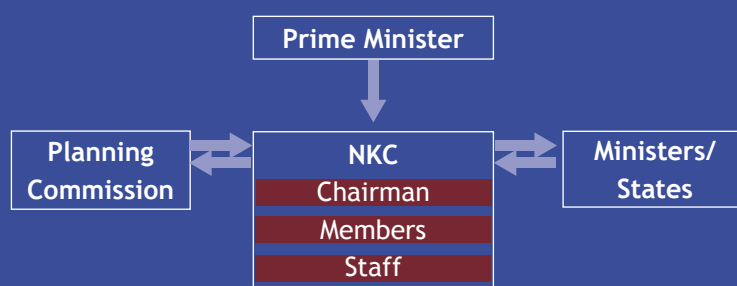
Members

Mr. Sam Pitroda: Mr. Pitroda has spent four decades in the world of telecommunications, having pioneered its use as a means to expedite the process of development and nation building, and bridge the global communications divide. His professional career has been divided between the three continents of North America, Asia and Europe, and he has received international acclaim for using telecommunications as a tool for national development.

As Adviser to Prime Minister Rajiv Gandhi, Mr. Pitroda helped to build India's telecommunications and information technology infrastructure. He was the founding Chairman of the Telecom Commission in India and headed the National Technology Missions on Drinking Water, Literacy, Immunization, Oilseeds and Dairy. In these roles, he made a notable contribution to India's developmental planning and policy approaches.

Mr. Pitroda has owned and run several companies in the United States and Europe; as an inventor he owns more than 75 patents worldwide.

Dr. P.M. Bhargava: Widely regarded as the architect of modern biology and biotechnology in India, Dr. Bhargava is Chairman of The Medically Aware and Responsible Citizens of Hyderabad, the Sambhavna Trust, Bhopal, and the Basic Research, Education and Development Society (BREAD), New Delhi.

He was the Founder-Director of the Centre for Cellular and Molecular Biology (CCMB), Hyderabad, President of the Society of Biological Chemists of India, President of the Indian Academy of Social Sciences, President of the Society for Scientific Values, and President of the Association for Promotion of DNA Fingerprinting and Other DNA Technologies.

The author of over 125 major scientific publications and over 400 articles, Dr. Bhargava has headed or served on over 125 major national and international standing committees and has been connected with numerous scientific, social and cultural organizations.

He has received over 100 national and international honours and awards, including the Padma Bhushan, the *Legion d'Honneur* and the National Citizens Award (India). Dr. Bhargava has delivered over 250 invited lectures in over 60 countries and more than 1600 invited lectures in India.

Dr. Ashok Ganguly: Dr. Ganguly is the Chairman of ICICI OneSource Limited and ABP Pvt. Ltd., and a Director on the Central Board of the Reserve Bank of India, since November 2000. He heads his own consulting company, Technology Network India Pvt. Ltd.

He is a member of the Prime Minister's Council on Trade and Industry as well as the Investment Commission. Dr. Ganguly's principle professional career spanned 35 years with Unilever Plc/N.V. He was the Chairman of Hindustan Lever Ltd from 1980 to 1990 and a member of the Unilever Board from 1990 to 1997, with responsibility for world-wide research and technology.

A recipient of the Padma Bhushan and an Honorary Professor of the Chinese Academy of Science, Dr. Ganguly has authored three books – *Industry and Liberalization*, *Strategic Manufacturing for Competitive Advantage* and *Business Driven R&D - Managing Knowledge to Create Wealth*.

Dr. Jayati Ghosh: Dr. Ghosh is a Professor of Economics and Chairperson of the Centre for Economic Studies and Planning, School of Social Sciences, Jawaharlal Nehru University, and is an alumna of Delhi University, Jawaharlal Nehru University and the University of Cambridge. Her research interests include globalization, international trade and finance, employment patterns in developing countries, macroeconomic policy, and issues related to gender and development.

Her published works include *Crisis as a Conquest: Learning from East Asia, The Market that Failed: A Decade of Neoliberal Economic Reforms in India* and *Work and Well-being in the Age of Finance.* She was the principle author of the West Bengal Human Development Report 2004 which received the UNDP Award for excellence in analysis, and numerous academic papers. She is a regular columnist for leading journals and periodicals.

Dr. Ghosh is involved in managing several public information websites, a founder of the Economic Research Foundation, and is the Executive Secretary of International Development Economics Associates (IDEAS), an international network of heterodox development economists. She chaired the Andhra Pradesh Commission on Farmers' Welfare in 2004, and continues to be closely involved in working with progressive organizations and social movements.

Dr. Deepak Nayyar: Dr. Nayyar is a Professor of Economics at Jawaharlal Nehru University, and has taught at the universities of Oxford and Sussex, and the Indian Institute of Management, Calcutta. He was Vice Chancellor of the University of Delhi from 2000 to 2005. He served as Economic Adviser in the Ministry of Commerce, Chief Economic Adviser to the Government of India and Secretary in the Ministry of Finance.

A graduate of St. Stephen's College, University of Delhi, he became a Rhodes Scholar and obtained a D.Phil in Economics from Balliol College,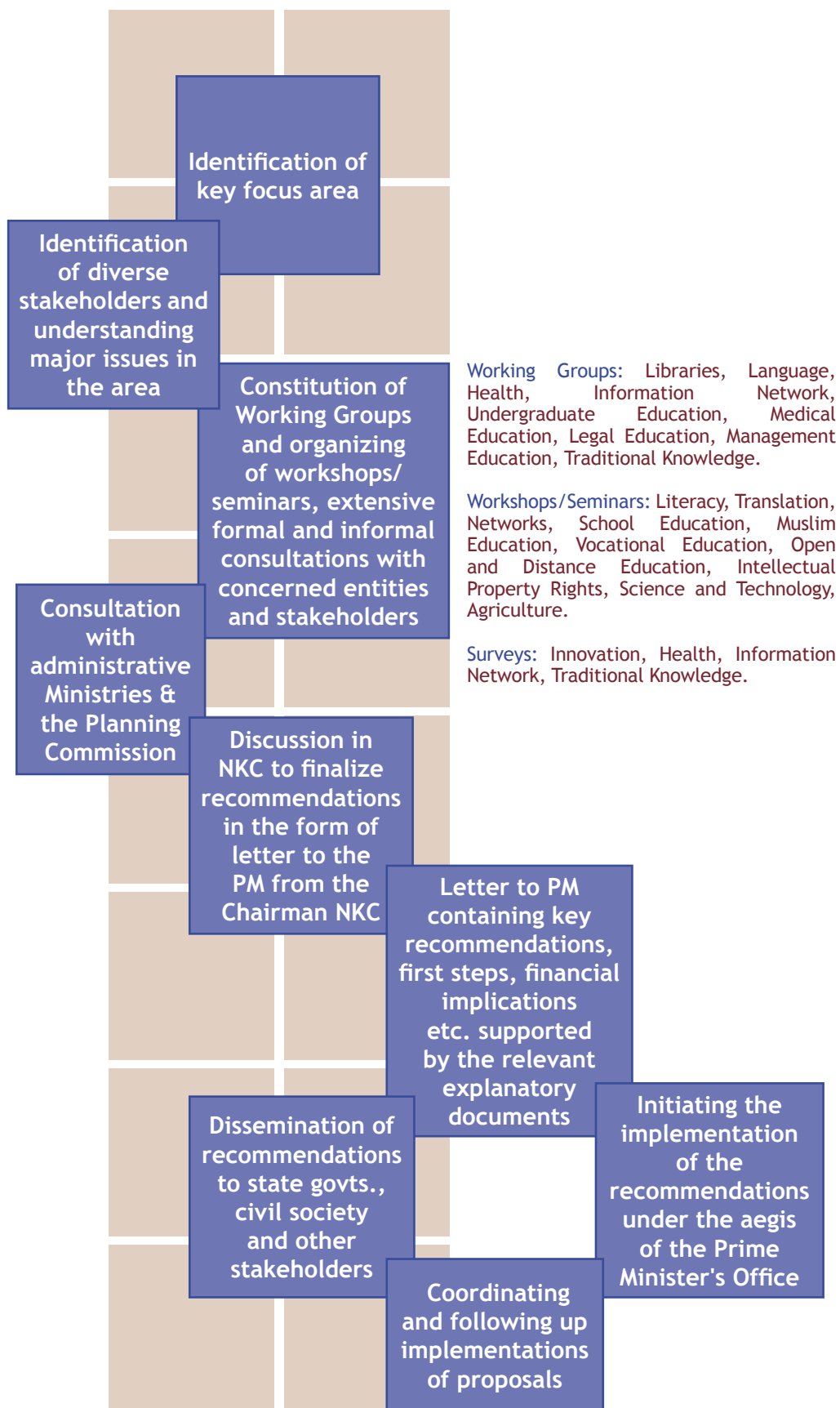 Oxford. He has received the VKRV Rao Award for his contribution to research in Economics. His books include *India's Exports and Export Policies, The Intelligent Person's Guide to Liberalization, Governing Globalization: Issues and Institutions* and *Migration, Remittances and Capital Flows: The Indian Experience.*

Dr. Nayyar is an Honorary Fellow of Balliol College and Chairman of the Advisory Council for the Department of International Development, Queen Elizabeth House, University of Oxford. He is the Vice President of the International Association of Universities, Paris and Chairman of the Board of Governors of the World Institute for Development Economics Research, Helsinki. He served as a Member of the World Commission on the Social Dimension of Globalization.

Mr. Nandan Nilekani: One of the founders of Infosys Technologies Ltd., Mr. Nilekani is its Chief Executive Officer, and was formerly its Managing Director and President.

Mr. Nilekani co-founded India's National Association of Software and Service Companies (NASSCOM). He is Vice-Chairman of The Conference Board, Inc. – an international research and business membership organization and Member of the London Business School's Asia-Pacific Regional Advisory Board. He has served as Chairman of the Government of India's IT Task Force for the power sector. He was a member of the insider trading subcommittee of the Securities and Exchange Board of India (SEBI), and of the Reserve Bank of India's Advisory Group on corporate governance.

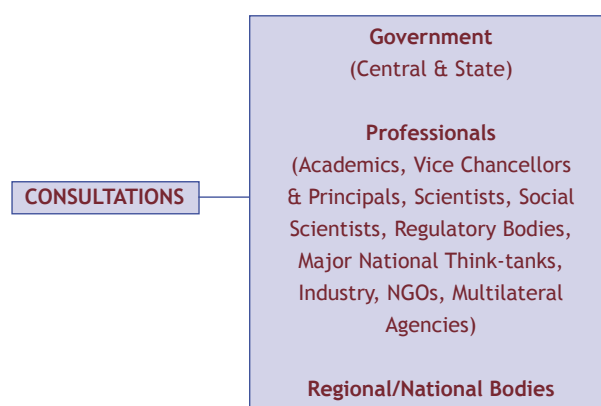His many honours include Fortune magazine's 'Asia's Businessmen of the Year 2003' award (along with Infosys Chairman Mr. N. R. Narayana Murthy), the Corporate Citizen of the Year Award at the Asia Business Leader Awards (2004) and Padma Bhushan (2006). In 2002 and 2003, he was named among the 'World's Most Respected Business Leaders', according to a global survey by Financial Times and PricewaterhouseCoopers.

Identification of key focus area

Identification of diverse stakeholders and understanding major issues in the area

Constitution of Working Groups and organizing of workshops/ seminars, extensive formal and informal consultations with concerned entities and stakeholders

Consultation with administrative Ministries & the Planning Commission

Discussion in NKC to finalize recommendations in the form of letter to the PM from the Chairman NKC

Letter to PM containing key recommendations, first steps, financial implications etc. supported by the relevant explanatory documents

Dissemination of recommendations to state govts., civil society and other stakeholders

Initiating the implementation of the recommendations under the aegis of the Prime Minister's Office

Coordinating and following up implementations of proposals

Working Groups: Libraries, Language, Health, Information Network, Undergraduate Education, Medical Education, Legal Education, Management Education, Traditional Knowledge.

Workshops/Seminars: Literacy, Translation, Networks, School Education, Muslim Education, Vocational Education, Open and Distance Education, Intellectual Property Rights, Science and Technology, Agriculture.

Surveys: Innovation, Health, Information Network, Traditional Knowledge.

An Interactive, Consultation-based Work Methodology

The methodology followed by the National Knowledge Commission involves identification of focus areas in the first instance. This selection arises from wide consultation, within and outside the government. Thereafter, diverse stakeholders in these focus areas are identified and the major issues highlighted. Given the fact that the Government is already undertaking initiatives in some of NKC's focus areas, selection of areas also takes into account an analysis of unique value addition by the NKC. This could be either through proposing innovative solutions for conventional problems or bringing together disparate groups working on an area.

After the identification of focus areas, Working Groups of specialists and practitioners are constituted. Working Groups typically consist of between five to ten experts, and meet periodically over a period of three to four months in order to prepare a report. Working Group reports are one of the inputs used by the NKC during deliberations to frame its recommendations. In addition, workshops and seminars are held periodically along with informal consultations with concerned entities and stakeholders to get as broad-based a point of view as possible. Through this process, the NKC serves as a forum to bring together diverse opinions, in order to understand the issues in depth. For issues requiring an understanding of a very broad spectrum of experiences, a survey is undertaken. NKC has adopted different approaches for different focus areas, with the aim of setting in place a process

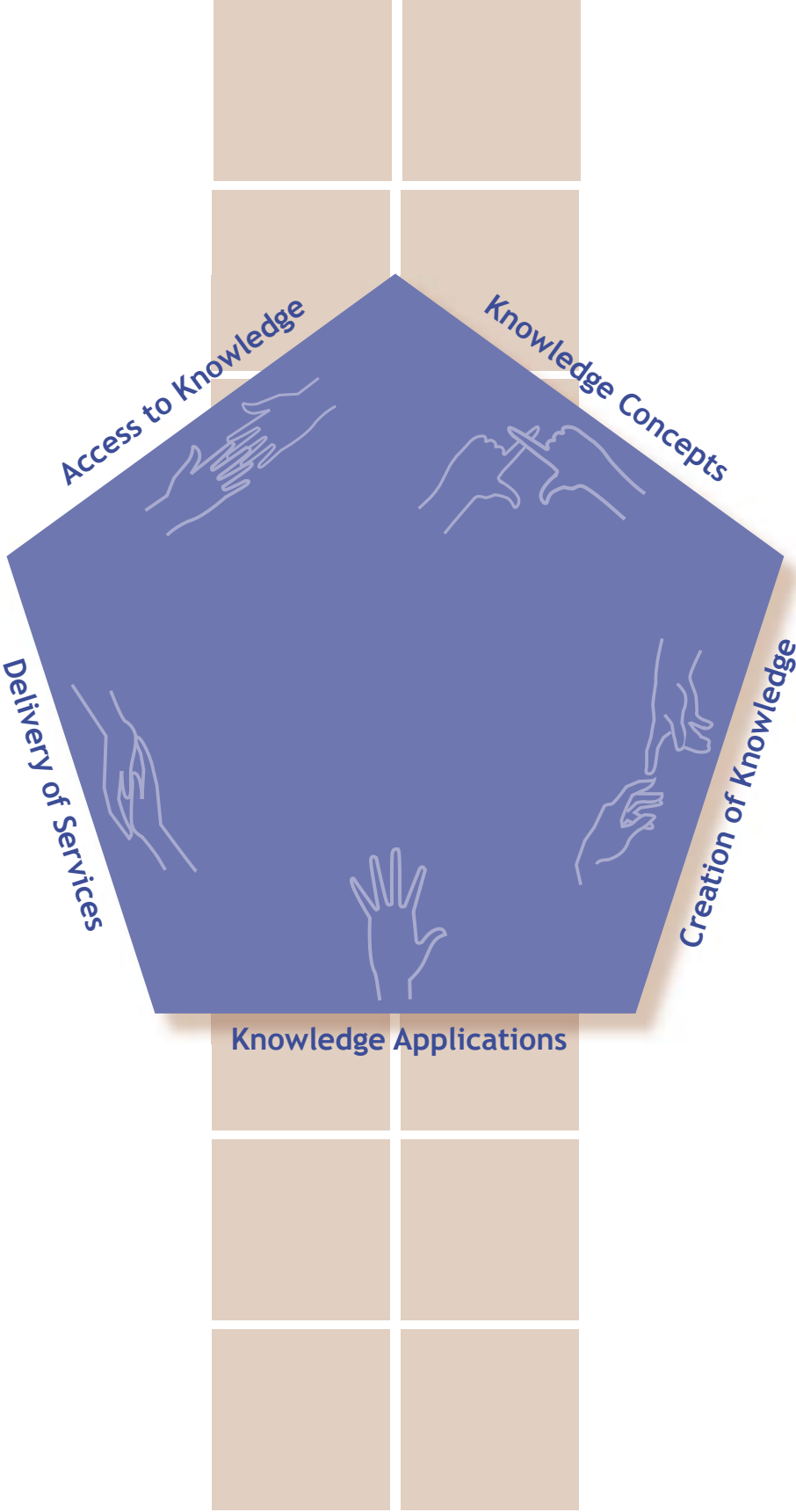| CONSULTATIONS	Government (Central & State)
	Professionals (Academics, Vice Chancellors & Principals, Scientists, Social Scientists, Regulatory Bodies, Major National Think-tanks, Industry, NGOs, Multilateral Agencies)
	Regional/National Bodies

that is as inclusive and participatory as possible. At this stage of discussions, representatives from the relevant ministries are actively involved.

NKC Members discuss the issues raised during Consultations and in the Working Group Reports to finalize recommendations. After several rounds of deliberations, a letter is sent to the Prime Minister containing key recommendations, first steps, financial implications etc., supported by relevant explanatory documents.

Widespread dissemination of NKC recommendations to state governments, civil society and other stakeholders takes place after the recommendations have been received by the Prime Minister and the relevant ministries. The implementation of the recommendations under the aegis of the Prime Minister's Office is then initiated, along with coordination and follow up with various implementing agencies.

Five aspects of the knowledge paradigm

Access to Knowledge

Knowledge Concepts

Delivery of Services

Creation of Knowledge

Knowledge Applications

ACCESS
to Knowledge

Access to Knowledge

Providing access to knowledge is the most fundamental way of increasing the opportunities and reach of individuals and groups. Therefore, means must exist for individuals who have the ability to receive and comprehend knowledge to readily obtain it. This also includes making accurate knowledge of the state and its activities available to the general public. Certain issues that are being examined in this context by the National Knowledge Commission are literacy, knowledge portals, networks and translation.

Literacy

The National Literacy Mission (NLM) was initiated in 1988 with the objective of achieving a sustainable threshold level of 75 per cent functional literacy for non-literates in the 15-35 age group by 2007. It relied on mass mobilization through locally organized cultural and social events, and integrating literacy into a wider programme of mass social education and awareness. The 2001 Census indicates that the literacy level in the country has gone up to 65.38%, from 52.21 per cent in 1991. For the first time, the total number of non-literates has decreased in absolute terms from 329 million to 304 million during this decade. However, the national average masks enormous disparities, pockets of residual illiteracy and differentials based on factors such as region, caste, gender. These continue to be problematic and the total number of non-literates continues to be enormous. No country on its path to becoming a knowledge society can allow a sizeable proportion of its population to remain illiterate.

Literacy initiatives have to be re-invigorated to ensure that these problems can be tackled. In this context, NKC organized a brainstorming workshop on 'Literacy: Emerging Issues and Next Steps' in July 2006. Some of the issues discussed were:

- The framework of the National Literacy Mission
- Use of Information Communication Technology (ICT) based approaches in Literacy initiatives
- Development of relevant material and quality training of resource persons
- The role of Panchayat Institutions
- Convergence with the state developmental programmes and the setting up of community universities to codify people's knowledge systems.

Concurrent to this process, NKC initiated an independent evaluation of the Computer-Based Functional Literacy Programme developed by Tata Consultancy Services (TCS). The evaluation was undertaken during July 2006 by a team headed by Kerala Sastra Sahitya Parishad (KSSP), Kerala. The findings of the evaluation were considered at the workshop.

Libraries

The role of libraries in providing widespread and inclusive access to knowledge is widely acknowledged. In today's context, a library has to play two distinct roles — to serve as a local centre of information and knowledge, and to be a local gateway to national and global knowledge. To achieve this goal, existing libraries must modernize their collections, services and facilities, become more pro-active, and collaborate with other institutions, agencies and non-governmental organizations (NGOs) in order to develop a community-based information system.

Recognizing that the Library and Information Services (LIS) sector needs immediate and sustained attention in order to fulfill its potential, NKC constituted a Working Group on Libraries, composed of experts in the area. The Working Group formulated its recommendations after holding extensive discussions with a wide range of professionals. NKC's recommendations on LIS were submitted to the Prime Minister in December 2006. The need to use modern information and communication technology to meet the changing needs of the LIS sector has been widely recognized. Some of the issues considered by NKC include institutional framework of libraries; networking;

LIS education, training and research; modernization and computerization of libraries; maintenance of private and personal collections, and staff requirements to meet changing needs.

Translation

High quality translation is vital for increasing access to knowledge in many critical areas, and strengthening people's participation in education and the creation and dissemination of knowledge. However, the current facilities for translation are inadequate. There is both latent unrecognized demand and uneven availability of complete information. Therefore some amount of public intervention is crucial to encourage the translation industry in scope, scale and quality.

NKC submitted its recommendations to the Prime Minister on translation and the nature of public intervention needed in September 2006. There is a need to provide an impetus for developing translation, to establish a storehouse of information, to create and maintain various tools for translation and to provide for training and capacity building to develop a competent pool of translation experts. Towards these objectives, NKC has recommended the establishment of a National Translation Mission which will supervize and coordinate the initial public intervention in the area.

Language

An inclusive society is the foundation for a knowledge society. Language is significant, not only as a medium of instruction or a means of communication but also as a determinant of access. In the current scenario, an understanding and command of the English language, is a most important determinant of access to higher education, employment possibilities and social opportunities. School-leavers who are not adequately trained in English as a language are always at a disadvantage in the world of higher education. There is an irony in this situation. English has been part of our education system for more than a century. Yet, English is beyond the reach of most of our young people. This makes for highly unequal access.

In this context, NKC engaged in informal consultations on this subject with a wide range of people in government, academia, media and industry including some chief ministers in the states, Members of Parliament, people in professions such as medicine and law, as well as civil society organizations. There was unanimity that the time has come for us to teach our people - ordinary people - English as a language in schools. In order to work out first steps, a Working Group was constituted. The report submitted by this group was used as an input in NKC deliberations. Based on these inputs, NKC submitted its recommendations to the Prime Minister in October 2006. The recommendations broadly deal with the modalities of introducing English in schools from Class I, teacher training, language pedagogy and resource support for language teaching and learning.

Networks

1. Knowledge Network

Extensive educational infrastructure and resources are required to meet the challenge of producing quality trained personnel in sufficient numbers in the country. While the requirement of having enough quality educational institutions with adequate research facilities cannot be compromised, one way of meeting this challenge is to share the existing educational material, equipment and facilities available in the limited number of centres of excellence with a large number of universities and technical, agricultural and medical institutions throughout the country. In addition, research and development activity in various fields the world over is increasingly being carried out through inter-institutional and even trans-national collaborative approaches. This has become necessary owing to the increased activity and data-intensive research problems requiring intensive computation. Key elements in this approach are consultations, data sharing, and resource sharing. Thus it is necessary to create facilities to enable Indian researchers to undertake such collaborative efforts at reasonable cost. Sharing of Research & Development infrastructure and data, which has been an approach favoured in Europe from the 1980s and since then adopted by other countries around the world, could provide a viable solution for India as well.

An NKC project explored the possibility of establishing an efficient and cost-effective network design to interconnect all universities, research and development institutions, science and technology institutions; health service facilities, agricultural research and extension services and libraries in the country with high-speed access. A white paper outlining the concept and the approach has been prepared for NKC by Dr. D.P.S. Seth, an external expert. This report was extensively circulated amongst relevant stakeholders, and feedback and suggestions were incorporated to finalize NKC recommendations on this subject which have been submitted to the Prime Minister (December 2006).

2. Health Information Network

A reliable, swift, real-time health data collection system is essential to enhance the quality of health care delivery in India. Moreover, independent growth of health care delivery institutions could create multiple dissimilar standards of data collection and dissemination which would increase the cost of health care enormously. A Health Network is thus urgently needed to pre-empt these and other problems confronting mature health care systems of the world today.

Recognizing this, NKC has constituted a Working Group on the Health Information Network, composed of experts in the area. The group is in the process of holding extensive discussions and will address issues such as the required IT and clinical standards, and the regulatory framework that needs to be put in place to facilitate a national level, web-based, secure electronic health information system. The Working Group has held two meetings to discuss these issues.

Portals

Web portals have risen in popularity as a way of aggregating, organizing and presenting content of a uniformly high standard in a customized and personalized way. A web portal is essentially a web site or service that offers a single point of access to information on a given subject and allows users to share and create a broad array of resources and services, such as case studies, e-

mail groups, forums and search engines within that sector. NKC recognizes that as the drive towards decentralization, right-to-information, people's participation and transparency sweeps the country, tools like public portals can play an important role in ensuring that more people exercise their rights.

In this context NKC has adopted the following procedure for setting up public portals on certain key sectors-
- Identification of champion or lead organization(s).
- Submission of proposal on architecture of the portal by the champion organization(s) for consideration by the Commission.
- Identification of stakeholders and partners and setting up of framework for portal management.
- Development of content.
- Launch of Portal

India Water Portal is being developed by Arghyam Trust, a public charitable trust. Initiated in January 2006, it was launched in January 2007.

The portal seeks to create an open platform for sharing information and knowledge about the water sector. The primary objectives of the portal are:
1. Increase awareness and demystify various aspects of water management for a general audience.
2. Share successful techniques and experience amongst serious practitioners
3. Provide a platform for information flows between multiple stakeholders.

India Energy Portal is being developed along similar lines, with Tata Energy Research Institute (TERI) as the lead organization. The portal was launched in January 2007. The broad functions of the energy portal would include the following.
1. Identification of sources and providing essential knowledge on basic aspects of energy
2. Providing data and information in a comprehensive manner.
3. Enabling efficient and effective retrieval of information.
4. Maintaining and updating the knowledge repository.

5. Providing a platform for interaction and exchange of ideas.

A proposal for developing an **India Environment Portal** has been received from the Centre for Science and Environment (CSE) and is under consideration by NKC.

Possible future portals could be on **Citizen's Rights, Health, Employment etc.**

Knowledge
CONCEPTS

Knowledge Concepts

Knowledge concepts are organized, distributed and transmitted through the education system. It is through education that an individual can make better informed decisions, keep abreast of important issues and trends around him or her and most importantly, question the socio-economic arrangements in a manner that can lead to change and development. NKC's concern with many aspects of the Indian education system covers school education, higher education, professional education, and vocational education.

School Education

It is essential to address the issues related to school education in order to build the foundation for a knowledge society. Children must be from all backgrounds in order to prepare India for the 21st century and to ensure that all sections of society can meaningfully participate in the development process.

NKC organized a national workshop with a wide range of stakeholders in order to identify appropriate intervention areas. A model Right to Education Bill was circulated to all state governments. NKC submitted its recommendations to the Prime Minister in October 2006. Further consultations will be held with experts in order to frame policy recommendations on different aspects of school education, including the quality of education imparted, management of schools, developing the human resource capacity for teachers, and ensuring quality education for children from different backgrounds.

Vocational Education

An important dimension of India's rapidly growing economy is the development of a skilled and educated workforce, and a demographic advantage over aging Western societies. Technicians and other skilled workers and craftspersons form the backbone of manufacturing and infrastructure development. There is a growing demand for skilled workers but data suggests that this demand is not met by the existing system, since the skills imparted do not match employer needs. For the system to become more relevant in the changing context and to leverage this demographic advantage in the future, there is a need to create a model of imparting vocational education that is flexible, sustainable, inclusive and creative.

NKC has submitted its recommendations to the Prime Minister on vocational education, taking into consideration consultations with a wide range of stakeholders. In addition to strengthening the current institutional structure, NKC has proposed alternative delivery structures to expand capacity, meet the increasing demand for skilled workers and provide training to workers in the informal and unorganized sectors. These include public-private partnerships, computer-based training, distance learning and a decentralized model that takes local needs and aptitudes into account. In order to achieve this, a robust regulatory and accreditation framework needs to be set in place. A national 'rebranding' exercise should be undertaken to address the negative association of vocational education with manual labour. In addition, there is a need for a detailed manpower analysis before formulating policy.

Higher Education

Higher education in India means to education beyond secondary school. The medium-term macro-objective for higher education would be to increase the gross enrolment ratio to 20%. This would imply more than doubling the scale of higher education in the next few years. The system needs to be expanded without diluting quality and by raising the standard of education imparted and making higher education more relevant to the needs and opportunities of a knowledge society. There is also a widespread recognition of the need to make higher education more accessible to all sections of society.

NKC submitted its recommendations to the Prime Minister on higher education in November 2006. The current regulatory structure needs

to be examined to make it more robust, flexible, transparent and dynamic. The standard of colleges across the country urgently needs to be improved; this could be done by imparting greater autonomy to the colleges. The recommendations have a focus on quality enhancement in educational institutions. The recommendations have been drafted taking into consideration consultations with a wide range of stakeholders (including a working group on undergraduate education) and previous reports on higher education submitted to various ministries.

Open and Distance Education

Almost half the students enrolled in higher education are receiving education through the distance mode, through open universities or through correspondence courses of traditional universities. But issues of acceptability of students for higher degrees and suitable employment persist. There is also an unprecedented opportunity with regard to open courseware (open education course content and material available on the web). There have already been great developments in broadband and internet infrastructure needed to facilitate the spread of open courseware, and this needs to be further developed in the country. A repository of such material could be developed by national experts for use across institutions.

A working group on open and distance education has met twice to discuss the infrastructure – technical and organizational – needed to implement these reforms. A two-day symposium was also held, with participation from a wide range of stakeholders including international experts, academics, local institutions involved in the development of open courseware, government representatives and industry.

Professional Education

1. Medical Education

India has wide disparities in the distribution of health professionals and health services, not only between rural and urban areas but also between various states. All the teaching hospitals and medical colleges are located in urban areas where only 30-35 per cent of the population lives. During the last 60 years, the present medical education programmes have failed to address these twin situations as health outcomes show. It is obvious that our health system needs revamping to make the changes needed to upgrade the existing medical colleges to be in tune with the astounding progress of science and technology in the field of medical science. At the same time, rural medical education needs to be addressed by developing innovative tracks in existing colleges for establishing rural medical education programmes specific to our needs and training rural physicians within the existing medical colleges in the country.

NKC has set up a working group of practicing doctors and educationists to address the state of medical education as it stands today. Steps need to be taken to improve the standards in education and recommendations need to be worked out to implement the changes required.

2. Legal Education

Legal Education as an aspect of professional education has assumed considerable significance, not only in terms of the historical utility of law in society but also in the current context of globalization. Legal education is a vital link in the creation of knowledge concepts as well as in the application of such concepts in society. The need for trained law personnel in academia, litigation, corporate practice, government and civil society has increased significantly in recent years and it is estimated that the demands for such trained personnel will rise far more exponentially in the years to come. There is therefore need to articulate a clear long-term vision on legal education in India, guided by a continuing commitment to excellence.

NKC is engaged in consultations with some of the country's foremost practitioners and academics in legal education. Some of the key areas under consideration are:
- Access to quality legal education;
- Methods of attracting and retaining a talented faculty;
- Identifying avenues for continuous curriculum development;
- Finding innovative solutions for infrastructure and administrative questions;

- Regulatory issues;
- Developing a serious research tradition that is globally competitive;
- Formulating a culture of sustained law training that meets the needs of the different sectors of the society and economy.

3. Management Education

In the field of management education, India has more than 1,200 institutions providing undergraduate and post-graduate level courses. Since the management graduates and post-graduates produced by these institutions are primarily absorbed by industry, there is a growing need to match the curriculum and structure of management education to fit the needs of India better and sensitize it to the changes in the industrial and services sectors within the country. There is a need to measure the quality of the education provided by these mostly private organizations. This will also benefit selection and recruitment by potential employers.

Some of the issues under consideration of NKC are:
- Constraints, problems and challenges relating to curriculum, teaching, infrastructure, administration and access;
- Methods of strengthening teaching and research in the management of public systems (including state governments and local governments), regulatory structures and public policy;
- Methods of attracting and retaining talented faculty members;
- Measures to promote and sustain research in management education;
- Issues of autonomy and accountability of institutions;

- Innovative means of raising standards and promoting excellence in management education situated in the wider context of society.

4. Engineering Education

India produced a total of 415,000 engineers in 2005. Though impressive, this is nowhere near to the number required. Over the next decade, India will have two significant opportunities in the form of manufacturing and). For India to make the most of these opportunities, the number of engineers has to be increased and their quality enhanced.

Except in a few elite institutes, engineering education in India is often outdated and irrelevant. Most graduates do not possess the skills needed to compete in the economy, and industries have been facing a consistent skills deficit. Also, most institutes, including premier institutes, fail to attract and retain quality faculty. These deficiencies in technical and engineering education mean that India runs the risk of missing out on significant opportunities. NKC is examining the following issues:
- Constraints, problems and challenges relating to curriculum, teaching, infrastructure, administration and access;
- Methods of attracting and retaining talented faculty members;
- Measures to promote and sustain research in collaboration with Industry;
- Issues of autonomy and accountability of institutions;
- Innovative means of raising standards and promoting excellence in technical education situated in the wider context of society.

CREATION
of Knowledge

Creation of Knowledge

A nation can develop in two ways – either it learns to use existing resources better, or it discovers new resources. Both activities involve creation of knowledge. This makes it important to consider all activities that lead to the creation of knowledge directly or help in protecting the knowledge that is created. India must therefore examine issues such as innovation systems in the country, science and technology activities and the regime of intellectual property rights.

Intellectual Property Rights

Intellectual Property Right (IPR) has emerged as an indispensable strategic tool in today's knowledge economies and societies, particularly in the context of economic globalization. The ability to compete in the global market depends to a large extent on the capacity to generate new ideas through innovation in science and technology, where such ideas are transformed into wealth-generating products. IPR, by conferring exclusive monopoly rights to its owner for a limited duration, has emerged as a significant factor in creating incentives for innovation and generation of economic value. An effective IPR system is also a constituent of a reliable legal environment, which in turn becomes an important factor for decisions on foreign investment and technology transfer.

Key systemic issues in this regard are:
- Clearly defined contractual rights and obligations enshrined in the law; respect for law; development of effective legal systems for enforcement; availability of accurate and detailed ready-to-use IPR information;
- Opportunity for continual training of IPR professionals across sectors; creation and development of modern infrastructure, including human resources in the various IPR establishments;
- Harmonization and streamlining of administrative procedures of the different IPR offices and perhaps most significantly, the development of a vibrant IPR culture in the processes of knowledge creation, application

and dissemination, all of which are connected with market demand and rewards.

In a developing country like India, there are various sectors in the economy where India has the potential of achieving competitive advantage, in which substantive policy-legal issues connected with IPR, along with its manifold dimensions, assume significance.

NKC organized a nationwide symposium of top IPR experts in the country, drawn from academia, industry, law, government and civil society, to brainstorm on the topic 'IPR Protection and Management in India'. The symposium was chaired by Dr. R. Mashelkar, the Director-General of Council of Scientific and Industrial Research (CSIR). To facilitate discussion on some of the most pertinent issues in IPR that the country faces today, NKC believes that IPR is a factor of enormous strategic significance in the context of knowledge creation, application and dissemination in the 21st century.

Innovation

Given that the Indian economy is growing at 6-8 per cent per year, while exports are growing at 30 per cent compound annual growth rate (CAGR), and many Indian firms are successfully competing against international firms and brands, it can be concluded that this has been made possible by a combination of enabling environment, rising capital and labour productivity, and improved quality of goods and services at lower cost. In the growth of quality and quantity of Indian economy, innovation is a key driver, although this may not be readily visible.

NKC seeks to explore and discover how innovations are taking place, driving growth and improving competitiveness in various sectors of the Indian economy, with a view to replicating and enhancing innovation. NKC envisages a national innovation system, where entrepreneurship at the local and national levels is encouraged, and inter-

disciplinary studies in science and technology are undertaken in order to encourage new approaches and methodologies. In order to explore this sector, NKC is undertaking a survey to seek answers from key players from each of these sectors. It will also hold a series of workshops with key players in each sector.

Science and Technology

Development of Science and Technology is essential to ensure the economic and social advancement of a people. Leadership in science and technology is an indispensable facet of knowledge creation and application. Progress in science and technology can significantly open new avenues for industry and be an engine for providing crucial knowledge services in a developing country like India.

In order to be a leader in the global arena, it is imperative that India emerges as a leader in the spheres of science and technology. There is need to give further impetus to the scale and scope of research activities being carried out within the country. There is need to improve the research landscape of the country through various measures directed at ensuring better Research and Development (R&D).

Some of the issues under consideration of NKC are:

- Identifying and removing hurdles in obtaining funding for research
- Identifying some major unsolved problems in science and technology, where India can play a significant leadership role in research and development
- Identifying futuristic interdisciplinary areas in science and technology and setting up studies
- Envisaging the use of science and technology as a crucial tool for development and facilitating their use for solving problems of the poor and the underprivileged.

NKC has submitted a recommendation to the Prime Minister proposing the establishment of a National Science and Social Science Foundation.

Knowledge
APPLICATIONS

Knowledge can be productively applied to promote technological change and facilitate reliable and regular flow of information. This requires significant investment in goal-oriented research and development along with access models that can simplify market transactions and other processes within an industry. Initiatives in the areas of agriculture, small and medium enterprises (SMEs) and traditional knowledge can demonstrate that knowledge can be very effectively applied for the betterment of the rural poor.

Agriculture

Agriculture provides the principal means of livelihood for over 60 per cent of India's population. Despite a steady decline in its share of the Gross Domestic Product (GDP), it remains the largest economic sector in the country. Low and volatile growth rates and the recent escalation of an agrarian crisis in several parts of the Indian countryside are a threat not only to national food security, but also to the economic well-being of the nation as a whole.

NKC has identified several specific areas of intervention within agriculture. In order to promote the application of knowledge in agriculture and enhance farm incomes and productivity on a sustainable basis, NKC engaged with diverse stakeholders and experts in a series of meetings in conjunction with the Indian Council for Agricultural Research (ICAR). The focus was on four areas, namely post-harvest infrastructure, organic farming, integrated pest management programs and energy management

in agriculture. A series of recommendations based on the deliberations has emerged. In addition, the NKC has begun work on agricultural research and extension systems to enhance and expand mechanisms for the creation and dissemination of relevant social and scientific knowledge.

Traditional Knowledge

Traditional knowledge can be defined as knowledge which has a traditional link with a certain social group. Moreover, in a diverse range of areas, this knowledge is also crucial to the identity of communities in which it operates and is preserved. The appropriate application of this knowledge can enrich people's lives and livelihoods, provide alternative means of sustenance and generate substantial employment.

NKC is examining the following aspects of traditional knowledge:

- The principles that should govern the documentation and use of traditional knowledge;
- Plant based drug formulations;
- Traditional agricultural practices;
- Culinary traditions;
- Culture-specific tourism;
- Traditional water-harvesting techniques;
- Traditional products, services and art forms not included above.

A working group has been constituted on globalizing traditional health sciences and the group has submitted its recommendations to the Commission.

Delivery of
SERVICES

Knowledge services have the potential to simplify many different points at which citizens interact with the State. Traditionally, these points of interaction have been vulnerable to unscrupulous activities and rent-seeking. Technology provides us with an opportunity to ensure accountability, transparency and efficiency in government services. E-governance is one of the ways in which citizens can be empowered to increase transparency of government functioning, leading to greater efficiency and productivity.

E-governance

E-governance has the potential to ensure speedy delivery, productivity and efficiency of services, making them citizen-centric and ensuring that the right people are served.

The benefits of E-governance include:

- Reducing the cost and improving the reach and quality of public services;
- Reducing transaction costs and transaction time;
- Empowering citizens and increasing transparency of government functioning;
- Re-engineering of processes for greater efficiency and productivity.

After a series of discussions and reviews of various E-governance efforts at the Centre and State levels, NKC formed a special group to study E-governance. The report of this group was discussed at the Planning Commission and presented to the Minister for Communications and Information Technology. Thereafter, several discussions were held with other stakeholders including the Administrative Reforms Commission. Based on these discussions, the Commission submitted its recommendations on E-governance to the Prime Minister in January 2006 and made them public in May 2006.

The Commission's report reiterates that E-governance is more about an opportunity for administrative reforms than merely about electronics and information technology and infrastructure. The recommendations on E-governance broadly relate to processes and standards, infrastructure and organization. They highlight the need to:

- Re-engineer government processes first, to change our basic governance pattern for simplicity, transparency, productivity and efficiency.
- Select 10 to 20 important services that make a critical difference, simplify them and offer them as web-based services.
- Develop common standards and deploy a common platform or infrastructure for E-governance.
- Begin all new national programmes (like Bharat Nirman, Rural Employment Guarantee Scheme, etc.) with well-engineered E-governance implementation and web interface.

For national E-governance to succeed, it is critical to create an appropriate central organization with structures that can operate in mission mode, with full autonomy and accountability. Organizational issues related to re-engineering government processes, autonomy, flexibility, clarity of purpose, predefined deliverables, measurable milestones and periodic monitoring need to be addressed, in order to implement the national E-governance programme within three to five years.

NKC Snapshot 2006

Recommendations Submitted

- Libraries
- Translation
- Language
- Knowledge Network
- Right to Education
- Vocational Education
- Higher Education
- National Science and Social Science Foundation
- E-governance

Works In Process

- Literacy
- Health Information Network
- Portals (Environment, Health, etc)
- Open and Distance Education
- School Education
- Legal Education
- Medical Education
- Management Education
- Technical Education
- Innovation and Entrepreneurship
- Intellectual Property Rights
- Science and Technology
- Agriculture
- Traditional Knowledge

Potential Future Areas (Under Discussion)

- Strategies for new technologies (such as nanotechnology, biotechnology, security applications, cryptology)
- Environment
- Public Health
- Gender (including education-specific constraints to education of girls)
- Legal Access issues, including availability of laws and judgements in the public domain
- Basic access to clean water, food, etc
- Teacher Training
- Learning methods
- Government process re-engineering
- Grassroots/rural/social innovation and grassroots business

Recommendations

Public libraries play a pivotal role in dissemination of knowledge and are an extremely important element of the foundation of a knowledge economy. There is widespread agreement that there is an urgent need for reform in the Libraries and Information Services (LIS) sector. Several initiatives in this regard have already been taken by the Government. NKC has consulted extensively with diverse stakeholders, including a Working Group of experts and professionals. NKC's recommendations for formulating strategies in the LIS sector are as follows:

1. **Set up a National Commission on Libraries:** A permanent, independent and financially autonomous National Commission on Libraries should be set up by the Central Government as a statutory body to address the information and learning needs of the citizens of India. To launch the process in a mission mode, a National Mission on Libraries should be set up immediately, for a period of three years.

2. **Prepare a national census of all libraries:** A national census of all libraries should be prepared by undertaking a nation-wide survey. Collection of census data on libraries would provide baseline data for planning. The Task Force that has been set up by the Department of Culture for this purpose should be given financial and administrative support to implement this activity and complete the survey on a priority basis (within one year). User needs and reading habits should be periodically surveyed at the national level as part of the National Sample Survey.

3. **Revamp LIS education, training and research facilities:** The proposed Mission/Commission on Libraries must assess as soon as possible the manpower requirements of the country in the area of LIS management, and take necessary steps to meet the country's requirement through LIS education and training. To keep the LIS sector abreast of latest developments, necessary encouragement should be given to research after evaluating the research status in this field. Establishing a well-equipped institute for advanced training and research in library and information science and services would provide the necessary impetus to this task.

4. **Re-assess staffing of libraries:** In the changed context, it is necessary to assess the manpower requirements for different types of libraries and departments of library and information science, keeping in mind job descriptions, qualifications, designations, pay scale, career advancement and service conditions.

5. **Set up a Central Library Fund:** A specified percentage of the Central and State education budgets must be ear-marked for libraries. In addition, a Central Library Fund should be instituted for upgrading existing libraries over a period of 3-5 years. The initial funding from the Government may be Rs 1,000 crores, which may be matched by the private sector through corporate philanthropy. This fund should be administered by the National Mission/ Commission on Libraries.

6. **Modernize library management:** Libraries should be so organized and the staff so trained that they become relevant to user communities (including special groups) in every respect. Also, to optimize resources, efforts should be made to synergize the strengths of different types of libraries through innovative collaboration. NKC proposes the creation of a model Library Charter, a list of services to be performed by libraries, a Library Network and a National Repository for Bibliographic Records.

7. **Encourage greater community participation in library management:** It is necessary to involve different stakeholders and user groups in the managerial decision-making process

for libraries. Public libraries must be run by local self-government through committees representing users of the library. These committees should ensure local community involvement and should be autonomous enough to take independent decisions to conduct cultural and educational community-based programmes. Libraries should integrate with all other knowledge-based activities in the local area to develop a community-based information system. In the rural sector, the responsibility for village libraries or Community Knowledge Centres must lie with the Panchayats. These should be set up in close proximity or on the premises of schools.

8. **Promote Information Communication Technology (ICT) applications in all libraries:** The catalogues of all libraries should be put on local, state and national websites with necessary linkages. This will enable networking of different types of libraries and setting up of a National Repository of Bibliographic Records and a centralized collaborative virtual enquiry-handling system using the latest ICT. To enable equitable and universal access to knowledge resources, libraries should be encouraged to create more digital resources by digitizing relevant reading material in different languages, which can be shared at all levels. Peer-reviewed research papers resulting from publicly funded research should also be made available through open access channels, subject to copyright regulations. It is recommended that open standards and free and open source software may be used for the above.

9. **Facilitate donation and maintenance of private collections:** There are numerous rich private and personal collections in India which need to be identified, documented and preserved for posterity. While there is a need to create a decentralized model for identification of personal collections, it is also necessary to sensitize organizations to receive and preserve donations of personal collections through a simplified process. The National Mission/Commission may set up a committee on private and personal collections under the chairpersonship of an eminent scholar. Since special facilities for maintaining private or personal collections are not easily available, it is suggested that 10 regional centres with specific mandates be set up in different parts of the country for this purpose.

10. **Encourage Public-Private Partnerships in LIS development:** Philanthropic organizations, industrial houses and other private agencies should be encouraged through fiscal incentives to support existing libraries or set up new libraries. The ingenuity of civil society may also be utilized to prepare necessary infrastructure to meet the special ICT needs of the LIS sector.

In order to facilitate the coordinated development of libraries across different sectors and to provide the legislative framework, required legal support and financial backing to the library sector, the Government could, in course of time, consider including libraries in the Concurrent List of the Constitution of India. This should be done without in any way abrogating the existing responsibilities of the States towards libraries.

There is an urgent need to expand the quantity and improve the quality of translation of different types (human, machine-aided, or instant) and in different domains (literary, scientific, technical, business) that would provide greater access to knowledge across the country. The current facilities available are inadequate and less than what is socially required. There is latent unrecognized demand which is not being met because of incomplete and asymmetric information. Inadequacy of information, compounded by the lack of coordination between potential users, also leads to market failures. There is inadequate dissemination of good quality translations which would provide a benchmark and create incentives for more private activity in this area. This therefore requires some amount of public intervention, not as a permanent feature, but as a set of measures to kick-start a process of encouraging private initiative so that the large commercially viable provision of high quality translation in different areas becomes feasible. The direct and indirect employment generation potential of translation activities is very high, and could absorb a substantial part of educated unemployed youth.

Based on these insights, NKC formed a Working Group led by Dr. Jayati Ghosh to bring together people and agencies involved in translation, publishing and dissemination activities. They included representatives of some of the relevant government bodies, academics, language experts, publishers, teachers and others associated with translation activities in India. They met several times for workshops and consultations.

As a result of their work and discussions NKC recommends the following:

1. **Provide impetus for developing translation as an industry** in the country. Going by the experiences of other countries, in a country like India with its many languages, as well as the huge potential for foreign language translation, the entire translation industry has the potential eventually to employ between 200,000 and half a million people.

2. **Establish a store-house of information** on all aspects of translation involving Indian languages, and make this available by creating, maintaining and constantly updating information on translations published, training programmes, translation tools/instruments and new initiatives, and facilities such as a 'National Register for Translators'.

3. **Promote printed as well as virtual publication** of works on translation studies; provide a clearing house for all translation activities, both in theoretical and applied subjects, in as many Indian languages as possible.

4. **Create and maintain various tools for translation,** including digital tools like Thesauri, Bilingual Dictionaries and software for translation. In addition, promote machine translation, leveraging emerging technologies to provide a rapid and large volume of translation at a relatively low cost.

5. **Provide quality training** and education for translators. This could be done through short term training programmes, course packages for translators that could be incorporated in language teaching programmes, and fellowship programmes and research projects to encourage quality. There is also need for guidance in the methodology of translation and for action to enrich teaching and training activities in translation studies.

6. **Translate pedagogic materials** at all levels (including primary onwards to tertiary education) specifically in natural and social sciences.

7. **Project Indian languages and literatures within South Asia and outside** through high-quality translation.

8. **Set up a national web portal** on translation as a one-stop shop for all information on translation and to provide a forum for dialogue by creating a bulletin board for people to post questions and answers.

9. **Organize annual national conferences** on translation to take stock of activities and initiatives in the field, for experts, industry and practitioners in the field to confer.

10. **Promote book launches, festivals, fellowships and prizes** and encourage collaborative translation work, as well as long-term multi-translator projects, and organize workshops for translators to interact and exchange views and experiences.

NKC feels that in order to achieve these goals as rapidly and efficiently as possible, the Government of India may establish a National Translation Mission (NTM), which would take up these tasks in a systematic way. The NTM would be a relatively small body in terms of its own infrastructure and be flexible in organization, but would have a budget sufficient to enable it to carry out targeted funding in identified areas. It would not function in a centralized way but will require involvement of state and local levels, and co-ordination with many different agencies. Since immediate requirements may be different from future needs not only in terms of translation activities but also the nature of interventions required, the NTM should be flexible and responsive to current and future social realities and market conditions.

It is envisaged that a National Translation Mission performing these activities could be set up during the 11th Plan, with a proposed budget of Rs 250 crore for the entire Plan period (around Rs 80 crore for organizational costs, manpower and scholarships, and around Rs 170 crore for all other activities, which would involve funding other collaborating institutions or parties). Depending upon the experience during the 11th Plan period, the extent of this support could be enhanced subsequently. In addition, the NTM would require some one-time support for creating and developing the necessary infrastructure.

A proposal on these lines was sent to the Planning Commission which made some further suggestions on the organization and structure of the National Translation Mission.

Translation activities should be seen in tandem with the plan to increase access to English language training across the population, and the promotion of English in school education at the primary level. Both are aspects of the goal of increasing access to knowledge.

The National Knowledge Commission has emphasized the importance of an inclusive society as the foundation for a knowledge society. NKC has also recognized the significance of language, not only as a medium of instruction or a means of communication but also as a determinant of access. An understanding and command of over the English language is a most important determinant of access to higher education, employment possibilities and social opportunities. School-leavers who are not adequately trained in English as a language are always at a handicap in the world of higher education. More often than not, teaching is in English. Even if it is not, in most subjects, books and journals are available only in English. And those who do not know English well enough find it exceedingly difficult to compete for a place in our premier educational institutions. This disadvantage is accentuated further in the world of work, not only in professional occupations but also in white-collar occupations overall.

This reality is not lost on our people, who recognize that the English language is a critical determinant of access to, and opportunities for a better life. Available information suggests that middle-income or lower-income households spend a large proportion of their modest income on sending their children to relatively expensive English medium schools. Such educational opportunities for children are a priority that is almost at par with health care for the family. But there are a very large number of people who simply do not have the resources for such investment. The outcome is exclusion. We believe that inclusion is possible through public provision.

There is an irony in the situation. English has been part of our education system for more than a century. Yet English is beyond the reach of most of our young people, which makes for highly unequal access. Indeed, even now, no more than one per cent of our people use it as a second language, let alone a first language.

These realities cannot be changed overnight. But NKC believes that the time has come for us to teach our people, ordinary people, English as a language in schools. Early action in this sphere, would help us build an inclusive society and transform India into a knowledge society. In just 12 years, it would provide the country's school-leavers with far more equal access to higher education and, three to five years thereafter, much more equal access to employment opportunities.

The Commission engaged in informal consultations on this subject with a wide range of people in government, academia, media and industry. It consulted some Chief Ministers in the states. It consulted Members of Parliament. It consulted people in professions such as medicine and law as well as civil society organizations. There was unanimity that this can and should be done. A Working Group was constituted to work out the modalities in terms of first steps. The report submitted by this group was used as an input in NKC's deliberations.

NKC recommends that the teaching of English as a language should be introduced, along with the first language (either the mother-tongue or the regional language) of the child, starting from Class I in school. This phase of language learning should focus on using both languages to create meaningful learning experiences for the child without disproportionate emphasis on grammar and rules.

NKC recognizes that nine States (of which six are in the north-east) and three Union Territories have already introduced English as a compulsory subject from Class I onwards. In addition, as many as 12 States and three Union Territories have made English a compulsory subject, at different stages in

primary school, by Class V at the latest. However, the implementation is slow and the quality of English language teaching is simply not good enough. The support systems, such as the number of teachers or materials for teaching, are neither adequate nor appropriate. NKC is recommending a fundamental change that seeks to introduce, nationwide, the teaching of English as a language from Class I onwards. This is not meant to be a stand-alone, add-on subject, but is meant to be integrated into the school curriculum.

Language learning cannot be separated from, and must be integrated with, content learning. Therefore, English should also be used to teach some non-language, content subjects, starting from Class III in school. The choice of subjects for this purpose can be left to schools depending on the proficiency of teachers and availability of materials. This would, in effect, create multi-medium schools. It would also help reduce the divide between English medium schools and regional language-medium schools.

The pedagogy of language learning as well as teaching should be suitably contextualized, to lend meaning to real situations and daily lives. Moreover, assessment should be based on proficiency rather than specifying achievement targets that reward mastery of single texts acquired through rote learning. To this end, a National Testing Service (NTS) for certification of language competence as well as recruitment of language teachers should be set up.

In order to meet the requirement for a large pool of English language teachers, graduates with high proficiency in English and good communication skills should be inducted without formal teacher-training qualifications. They could be selected through an appropriate procedure developed by the National Testing Service and then given a short–term orientation. The nearly four million school teachers all over the country, regardless of their subject expertise, especially teachers at the primary level, should be trained to improve their proficiency in English through vacation training programmes or other short-term courses. Most teacher training programmes are not based on a real assessment of needs of teachers. Thus, the entire teacher training system catering to pre-service and in-service training that exists today, including training for language teaching, needs to be thoroughly reviewed, recognizing the centrality of language in the curriculum.

A multiplicity of English textbooks should be made available to address the diversity of English language environments in the country. However, to ensure that certain standards are maintained, benchmarks may be laid down for the content of textbooks at each stage. For this purpose, an expert group should be set up to develop pedagogically sound English textbooks for every level, from Class I to XII. These should be used as models by states and made freely available on the web to allow easy access. While the State Council for Educational Research and Training (SCERT) may continue to be a nodal agency for textbook development for state board schools, the writing of textbooks needs to be further decentralized. To make the exercise more collaborative, civil society organizations with expertise in the domain should be involved in developing textbooks.

Since language learning takes place not only through direct instruction but also through assimilation from the environment, the classroom needs to be equipped with appropriate supplementary audio-visual and print material. Resource libraries could be set up in every classroom, comprising of a collection of books, magazines, newspapers, audio-visual material and posters, appropriate to the age of the students, on a variety of subjects. Language learning opportunities should also be created outside the classroom through specific bi-lingual radio and TV channels, which could be introduced for formal and informal teaching and learning of English. Knowledge clubs could be formed to discuss and disseminate knowledge as well as extend the use of English outside the classroom. Given that language learning requires extensive resources, a centrally sponsored scheme of financial assistance for developing English language resources (teachers and materials) should be instituted to address this requirement.

State governments would need to be equal partners in the implementation of this idea. NKC therefore proposes that the Prime Minister discuss this matter with all Chief Ministers at the National Development Council, to formulate a National Plan for the teaching of English as a language, in addition to the regional language, starting in Class I. This would also ensure that at the end of twelve years of schooling, every student is proficient in at least two languages.

NKC strongly feels that to optimally utilize the potential of institutions engaged in generation and dissemination of knowledge in various areas, such as research laboratories, universities and other institutions of higher learning, including professional institutions, it is important to connect them through a high-speed broadband network. In order to explore the feasibility of establishing broadband connectivity among such institutions, NKC spent six months studying various issues and alternatives. Extensive consultations with experts, potential users, telecom service providers, government officials and various educational and research institutions provided insights on the requirements, implementation issues and benefits of creating an integrated national knowledge network.

The purpose of such a knowledge network goes to the very heart of the country's quest to build quality institutions with requisite research facilities and to create a pool of highly trained persons. Considering the magnitude of the challenge, NKC believes an immediate objective of the network will be to share the existing content, coursework, expertise, ideas, innovations, equipment and facilities available in the limited number of centres of excellence, with a wider group of institutions, educators and students.

Globally, research and development activities and innovations are increasingly multi-disciplinary, and collaborative, and require substantial computational power. The key to successful research today is live consultations, data sharing and resource sharing. Therefore it is essential to provide broadband connectivity to our knowledge institutions to improve access, quality and quantity of R&D activities.

The primary objective is to interconnect all our knowledge institutions in various fields, and at various locations throughout the country, through an electronic digital broadband network with adequate capabilities and access speed to encourage sharing of resources and collaborative research.

NKC commissioned an expert to examine what it would take to create a national knowledge network. NKC also held detailed discussions with the office of the Principal Scientific Adviser (PSA) to the Government of India. The discussions yielded a consensus on the optimal approach to be adopted for setting up such a network, whether it is for a broad range of institutions as envisaged by NKC or a specific community of Science and Technology (S&T) research institutions. Based on the various discussions NKC recommends the following:

1. **National Knowledge Network:** Build a national knowledge network with gigabit capabilities to connect all universities, libraries, laboratories, hospitals and agricultural institutions to share data and resources across the country. This will ultimately require provision of connectivity to around 5,000 nodes covering all major institutions. The actual implementation could be in phases targeting 500 to 1,000 nodes in the first phase. However, the design of the network will have to be based on the final network. The prioritization of the nodes for implementation purposes should be on the basis of the institutions which are most likely to use the network from Day one and which would be able to demonstrate the benefits. Based on a detailed analysis of the country's existing optic fibre infrastructure and technologies available, it is estimated that a 500 to 1000-node network can be commissioned within three to six months.

2. **Options:** Wide consultations with experts and technology providers suggest that there are four possible networking options:
   - The first one involves hiring dark fibres that have been extensively laid out by various telecom service providers and lighting them.

- The second involves lit fibres and differs from the first in not requiring transmission equipment procurement and its maintenance.
- The third involves using existing commercial networks, making capital investment in equipment unnecessary. It requires minimum maintenance and operations organization.
- The fourth is a hybrid approach where the Core consists of two layers in which the inner higher-speed layer is wholly owned by the stakeholders while the lower layer is provided by commercial service providers.

From the viewpoint of cost, the third approach based on the utilization of the available commercial networks appears to be most attractive to start with. This is because the capital expenditure is negligible if the operator chosen has a well established network which is being used by a large number of existing customers. However, lack of experience of architectural flexibility and security aspects of virtual private networks (VPN) set up on a commercial basis, do not allow prospective users to be entirely comfortable with this approach. Therefore, NKC recommends that existing commercial networks be utilized. Subsequently, feedback from this exercise could enable a shift to a hybrid network with a central Core, preferably of a relatively few nodes, and an outer network constituted by practically each one of the other operators' networks.

3. **Architecture:** The network should consist of a Core using Internet Protocol (IP) and Multi-Packet Labeled Services (MPLS) technology, an Aggregation or Distribution network, and an Access or Edge network linking the institution's local area network (LAN) to the Core. The Core network could be a single hierarchy or a two-stage network with a higher speed network at the top to accommodate architecture flexibility and security concerns in a VPN-based commercial Internet Protocol-Multi Protocol Label Switching (IP-MPLS) network. The detailed specification of the network will have to be drawn up with a view

to inviting bids for speedy implementation. The network should be implemented in phases. The first phase should cover about 1000 institutions and should be commissioned in three to six months.

4. **Congruence with E-governance:** The question of whether the network for E-governance and the Knowledge Network should be one single network assumes importance and relevance depending upon the approach adopted for the realization of the network. In the recommended approach in the first phase, namely VPNs on commercial MPLS networks on Dense Wavelength Division Multiplexing (DWDM), this question becomes irrelevant because several VPNs can be created on a commercial network and they could be entirely un-correlated, as may be the case with these two networks. This question would assume importance only if the country were to implement a purely owned network on lighted fibres. On the other hand, even in the hybrid approach, the E-governance network with an entirely different geographical spread and much lower bandwidth requirements, can be realized as VPNs and the security and flexibility could be addressed by the inner core. The issue of congruence of the two networks therefore no longer remains important and the two aspects can be totally de-linked.

5. **Security and Privacy:** Methods will have to be evolved both at the time of commissioning of the network as well as during operations, to ensure security of data along with privacy and confidentiality. Access to data from the Data Centre of a given institution should be under the control of the institution being addressed. An arrangement for authentication and authorization, with the participation of the connected institutions is essential to launch the network.

6. **One-time Support for LANs:** The proposed broadband network envisages higher access bandwidth and therefore almost all user institutions will have to upgrade their networks to be able to cater to these speeds. While several

institutions may have the resources for doing this, a large number will need one-time capital support to set up Fast Ethernet LAN (FELAN) which includes expenditure on routers, switches and optic fibre cable on the campus.

7. **Costs:** The Knowledge Network initially proposed to be launched on existing commercial networks will therefore involve a recurring cost of Rs 20-40 lakhs per institution connected, amounting to Rs 200-400 crores annually for 1000 institutions in the first phase. In addition, there will be a one-time capital investment in upgrading the LANs of these institutions to a 100 Mbps capability Fast Ethernet LAN. Thereafter, based on feedback, the installation of the inner core network of 10 Gbps or higher capability will be taken up. This will involve a capital investment of around Rs 1,000 crores on a 7 or 8-node Inner Core network, its Gigabit connectivity to the commercial IP-MPLS networks, as also direct connectivity to a few users who are particularly concerned about the security and internetworking experiments. This expenditure will be incurred over a period of time. There will be an additional recurring expenditure for this Inner Core on hiring large bandwidths from bandwidth service providers. This amount will depend on the number of nodes and the negotiated or bid-based price.

8. **Organization:** To ensure day to day coordination, operation and efficient utilization NKC recommends establishing a Special Purpose Vehicle (SPV) consisting of major stakeholders. Such an SPV should have professional experts pooled from various stakeholder institutions for coordinating and guiding various private vendors for speedy implementation.

The policy, security and overall management should be the responsibility of the SPV and the operational support requirements should be met by the industry. One of the compelling reasons for such a mechanism is to provide assurance that the use of cyber space will in no way compromise the security concerns of the country.

9. **Ownership:** The Knowledge Network should be owned by the SPV consisting of major stakeholders. Government ownership is not desirable, despite the fact that substantial funding will be from the Government, because:
   - It is the Government's policy to withdraw from direct operations and maintenance activities in the ICT sector.
   - The type of trained manpower needed, though not large, is in great demand in the market, and therefore will require special remuneration and incentives.

10. **Special Group:** NKC recommends the setting up of a special Working Group of experts to finalize specifications, implementation plans, cost estimates, and network plans, as well as to carry out the actual task of procurement and commissioning of the network. This group will also establish the SPV needed for running the network on a day to day basis.

NKC believes that a National Knowledge Network interconnecting our knowledge institutions and infrastructure with access speeds of 100 mbps and more will give a major push to collaborations and sharing needed to enhance the quality of our education, research and applications and at the same time will empower our people to be competitive in the global economy.

Right to Education Bill

NKC believes that providing universal access to quality school education is a cornerstone of development and a minimum necessary condition for any progress towards making India a knowledge society. NKC is in the process of extensive consultations and will make detailed recommendations on various issues relating to school education at a later date.

However, at this point NKC would like to respond specifically to the recent initiative of the central government of sending a model Right to Education Bill to the Secretaries of State Education Departments, with incentives for the state governments to enact this bill. NKC has perused the bill and consulted with a wide range of experts and educationists. It feels that the model bill is flawed for a number of reasons, and most importantly that such legislation must be enforced by the central government following upon the commitment made in the Constitutional Amendment Article 21A.

NKC recognizes that there may be concerns about federalism, since school education is dominantly the responsibility of the state governments at present. However, it feels that this matter can be resolved through an appropriate central legislation which takes into account the following proposals:

1. **Central legislation:** Legislation at the national level is required to affirm the Right to Education, which is a fundamental right mandated by Article 21A. Since it cannot be dependent upon which state a citizen lives in, a model bill sent to be enacted individually by State Governments is not adequate to meet the constitutional responsibilities of the Government of India. Therefore, a central legislation should be enacted along the lines of the Panchayati Raj (Amendment) Act, requiring the states to enact Right to Education Bills within a specified time period, and with the primary financial responsibility for this resting with the central government.

2. **Financial commitment:** The Central Government must provide the bulk of the additional funds required to ensure the Right to Education. Therefore there must be financial provision in the central legislation, requiring the central government to share the revenues of the Prarambhik Shiksha Kosh with state governments and to provide additional resources as required to meet the requirement of ensuring the right to all children. Estimates for the additional resources required to achieve the goal of universal elementary education currently range from 0.8 per cent to 2.5 per cent of GDP, depending on the criteria used. However, the required financial resources are likely to be at the lower end of these estimates, since there is already close to universal provision in several states and there has been recent progress in providing more access through the Sarva Shiksha Abhiyan in other states.

3. **Time frame:** The state-level legislation should specify the period within which universal education of reasonable quality is sought to be achieved, preferably within three years. The model bill does not provide any time frame for adoption and implementation of the provisions.

4. **Schedule of norms and standards:** To ensure a minimum quality of education, it is important to have a schedule of norms for all schools to follow. The model bill does not have such a schedule of norms, and there is no specification of the minimum quality of education that schools should provide. There is only a reference to 'equitable quality' without defining the parameters of quality. While ensuring quality is a complex matter, certain norms regarding infrastructure, number of teachers per school and per student, teaching methods and other facilities, must be adhered to as necessary conditions.

5. **Specification for teachers:** Since teachers are critical to ensuring the quality of education, it is particularly important to lay down well-defined but flexible norms for the minimum qualifications of teachers. The model bill has no specification of a teacher, or the qualifications and in-service training needed for the position. A teacher is only defined as a person who teaches in the classroom. It is necessary to specify norms for teacher qualification and training.

6. **Justiciability:** Any right, including the Right to Education, is only meaningful if it is justiciable. However, in the model bill sent to state governments, the onus is placed on parents or guardians of the child. The responsibility of the Government, at different levels, must be recognized and made justiciable. The example of the National Rural Employment Guarantee Act (NREGA) could be used in this context.

7. **Redressal mechanism:** To ensure justiciability, a redressal mechanism should be outlined and an appropriate procedure must be set in place for students or parents in case the right is not upheld.

8. **Universal schooling:** School education must be provided to all. This necessarily also requires that children of the disadvantaged, landless and minority communities must also be integrated, along with children with disabilities or special needs. There should be no distinction made in terms of the type of schooling provided within the government system for children from different social, economic and cultural backgrounds. The model bill has the potential of creating a parallel and discriminatory system of schooling which can result in stratification of the education system for children from disadvantaged communities and backgrounds, because it requires only provision of non-formal education in such cases, rather than mandating the provision of regular schooling.

Obviously, in all cases, the school system should be flexible enough to cater to particular needs of students.

NKC can offer detailed explanations on these points. Continuing to consult with stakeholders and examine other issues in relation to school education, it is focussing in particular on the questions of how to ensure better quality across the board; the institutional structures and forms of control by local communities that could contribute to improved quality of schooling; issues related to common schooling and neighbourhood schools; ensuring adequate quantity and quality of school teachers, especially in specified areas.

NKC will make a broader set of recommendations on school education in the near future.

NKC considers Vocational Education and Training (VET) to be an important element of the nation's education initiative. In order for VET to play its part effectively in the changing national context and for India to enjoy the fruits of the demographic dividend, there is an urgent need to redefine the critical elements of imparting vocational education to make them flexible, contemporary, relevant, inclusive and creative. The Government is well aware of the important role of VET and has already taken a number of important initiatives. Through consultations with industry groups, academics, civil society and practitioners, NKC has deliberated on ways and means to strengthen these initiatives and recommends the following long and short-term strategies.

1. **Place Vocational Education entirely under the Ministry of Human Resource Development (MHRD):** In view of the role of VET in human resource development and importance of its linkages with other streams of education, the Government may consider placing all aspects of VET under MHRD. Currently, VET falls under the purview of MHRD as well as the Ministry of Labour, which leads to fragmented management of the VET framework. MHRD may consider setting up a National Institute of Vocational Education Planning and Development to formulate strategy, advise the Government, and undertake research and development in areas pertaining to technology and workforce development.

2. **Increase the flexibility of VET within the mainstream education system through the following steps:**
   i. Aspects of general education (such as numeracy skills) should be retained in VET as far as possible, to enable students to return to mainstream education at a later stage.
   ii. Courses in training institutes and polytechnics should have distinct tracks for students of different educational attainments.
   iii. Entry requirements for certain trades should reflect the requirement of the trade (as appropriate, for instance the entry requirement of Class X could be relaxed to Class VIII in some cases). Students should be permitted multiple entry and exit options in the vocational education stream.
   iv. Links should be established between the vocational education stream and school education as well as higher education.
   v. Courses devoted to certain skills training at the primary and secondary level should be introduced in all schools.
   vi. Vocational training should be made available in various literacy and adult education schemes.
   vii. Schemes for lifelong skill up-gradation, through short training programmes, should be introduced.
   viii. There should be a provision for generating a cadre of multi-skilled persons.

3. **Quantify and monitor the impact of vocational education:** Data should be collected periodically and analyzed in order to assess the impact of training on employability. Empirical evidence on wage premium or other advantages enjoyed by VET graduates, seat utilization in training institutes, nature of employment post-training, and the efficacy of various schemes is essential for continuous improvement. A detailed exercise of manpower analysis is a necessary step to understanding the nature and quantum of demand for VET and the mismatch between the skills of VET certificate holders and the requirements of the labour market. This exercise may be undertaken by the proposed National Institute of Vocational Education Planning.

4. **Increase resource allocation to vocational education:** In per capita terms, vocational

education costs more than general education, however public expenditure on vocational education has been extremely low, as compared to general secondary education. Given the demand for skilled manpower in manufacturing and services, the Government should aim to spend at least 10-15 per cent of its total public expenditure on education, on vocational education. Some options that may be considered for raising additional funds to finance a modernized VET scheme are:

i. Enhancing fees, coupled with student loan schemes. This would also make VET institutions more responsive to market needs.

ii. Raising funds through a cess on employers (for instance two per cent of salaries of all employees, as in Singapore).

iii. Making it obligatory for companies to finance public vocational education and training programmes (as in Korea).

5. **Expand capacity through innovative delivery models:** In order to meet the burgeoning requirements of skilled and unskilled labour, a massive increase in quantity of training is needed. The Government could explore new delivery models to increase capacity such as public private partnerships, decentralized delivery, distance learning and computerized vocational training. At the same time, the Government must introduce certain minimum standards as a measure of quality, and ensure that all public and private VET institutions adhere to these.

6. **Enhance the training options available for the unorganized and informal sector:** The greatest challenge lies in providing training for potential entrants in the unorganized/informal sector, which accounts for the largest proportion of employment. Systematic efforts need to be made to impart the skills required by the unorganized sector. These should be formally introduced in the curricula and practical training courses. In order to achieve this, the Government should act as a facilitator and provide financial support. This aspect of VET is critical for the success of the system as a whole.

7. **Strengthen the current institutional structure:** The existing Industrial Training Institutes (ITIs) and Industrial Training Centres (ITCs) are widely recognized to face problems such as poor quality trainers, lack of flexibility, and outdated infrastructure. Measures to improve the existing institutions are as follows:

i. Extent of functional autonomy must be increased, ITIs should be given more power to strengthen and adapt their training programmes to better meet local market needs.

ii. Indicators of internal and external efficiency should be developed (by the proposed National Institute) to incentivize good performance.

iii. Modules on literacy, numeracy, communication skills, entrepreneurship and other general skills relevant to workplace requirements must be introduced in all courses.

iv. Different tracks within courses for different levels of specialization should be introduced.

v. Students should be offered incentives such as tools, membership of trade associations, etc., as part of their degree or diploma.

vi. Industry and trade involvement should be enhanced not only at the internship stage, but also at the time of examinations and placements.

vii. Curricula should be constantly monitored and updated.

viii. The skills and courses offered should be reviewed periodically. The number of skills currently offered needs to be increased.

ix. Teaching should be conducted in English as well as local languages.

x. Infrastructure should be regularly upgraded.

xi. Quality of teaching should be drastically improved.

8. **Ensure a robust regulatory and accreditation framework:** In order to achieve the desired modernization and expansion, a critical aspect will be to regulate entry of new institutions

and accreditation of all institutions. NKC therefore recommends that an independent regulatory agency for VET be established. This body would license accreditation agencies and prescribe standards for certification. The procedures and methodologies adopted by the body would need to be simple and transparent to ensure unhindered growth in the sector.

9. **Ensure proper certification:** At present, the process of certification is handled by the National Council for Vocational Training (NCVT), in association with State Councils for Vocational Training (SCVTs). Clear demarcation between the roles of the NCVT, the SCVTs and the Directorate General of Employment and Training is essential for the proper functioning of the certification process. In order to ensure recognition of certification by employers, both in India and abroad, an electronic database of certified training providers as well as electronic identification for certified workers should be introduced. Electronic identification should contain information regarding skills and qualifications (and eventually other relevant information as well) about certified individuals and can be used to facilitate mobility of workers, encourage bank linkages and entrepreneurial initiatives.

10. **Undertake a re-branding exercise:** It is widely recognized that a crucial problem with vocational training in India is a negative association with manual labour. In order to match the modern requirement of the skills and competitiveness of the workforce, a massive re-branding exercise is of the highest priority. This could be the prime task of the recently announced National Skills Mission. Initiatives such as replacing the use of terms like 'vocational education' by 'skill development' are a step in the right direction. Training institutes should try to chart out a career path for their students and introduce entrepreneurship training modules.

It is crucial to significantly increase public and private investment in VET. However, a detailed analysis of manpower requirements in terms of numbers, skills and competitiveness is essential before formulating a master plan and deciding the quantum of expenditure in the 11th Plan. A robust framework put in place as a visible and dedicated resource in the MHRD is a pre-requisite to ensuring quality and facilitating significant private investment and participation. Most importantly, the quality as well as the image of VET needs to be actively promoted in order for it to be viewed as comparable to general secondary education, and as relevant.

Higher education has made a significant contribution to economic development, social progress and political democracy in independent India. But there is serious cause for concern at this juncture. The proportion of our population, in the relevant age group, that enters the world of higher education is about 7 per cent. The opportunities for higher education in terms of the number of places in universities are simply not adequate in relation to our needs. Large segments of our population just do not have access to higher education. What is more, the quality of higher education in most of our universities leaves much to be desired.

Foundations are critical. NKC believes that an emphasis on expansion and reform of our school system is necessary to ensure that every child has an equal opportunity to enter the world of higher education. It is engaged in consultations on school education and will submit recommendations in this crucial area in due course. In this recommendation, it focuses on higher education.

NKC has engaged in formal and informal consultations on the issue with a wide range of people in the world of higher education. In addition, it consulted concerned people in parliament, government, civil society and industry. Concerns about the higher education system are widely shared. There is a clear, almost unanimous, view that higher education needs a systematic overhaul, so that India can educate much larger numbers without diluting academic standards. Indeed, this is essential because the transformation of economy and society in the 21st century would depend, in significant part, on the spread and the quality of education among our people, particularly in the sphere of higher education. It is only an inclusive society that can provide the foundations for a knowledge society.

The objectives of reform and change in our higher education system must be expansion, excellence and inclusion. NKC recognizes that meaningful reform of the system, with a long-term perspective, is both complex and difficult. Yet, it is imperative.

I. Expansion

1. **Create many more universities**. The higher education system needs a massive expansion of opportunities, to around 1500 universities nationwide, that would enable India to attain a gross enrolment ratio of at least 15 per cent by 2015. The focus would have to be on new universities, but some clusters of affiliated colleges could also become universities. Such expansion would require major changes in the structure of regulation.

2. **Change the system of regulation for higher education.** The present regulatory system in higher education is flawed in some important respects. The barriers to entry are too high. The system of authorizing entry is cumbersome. There is a multiplicity of regulatory agencies where mandates are both confusing and overlapping. The system, as a whole, is over-regulated but under-governed. NKC perceives a clear need to establish an Independent Regulatory Authority for Higher Education (IRAHE). The IRAHE must be at an arm's length from the Government and independent of all stakeholders including the concerned Ministries of the Government.

   - The IRAHE would have to be established by an Act of Parliament, and would be responsible for setting the criteria and deciding on entry.
   - It would be the only agency that would be authorized to accord degree-granting power to higher education institutions.
   - It would be responsible for monitoring standards and settling disputes.
   - It would apply exactly the same norms to public and private institutions, just as it would apply the same norms to domestic and international institutions.

- It would be the authority for licensing accreditation agencies.
- The role of the University Grants Commission (UGC) would be re-defined to focus on the disbursement of grants to, and maintenance of, public institutions in higher education. The entry regulatory functions of the All India Council for Technical Education (AICTE), the Medical Council of India (MCI) and the BCI would be performed by the IRAHE, so that their role would be limited to that of professional associations.

3. **Increase public spending and diversify sources of financing.** The expansion of our system of higher education is not possible without enhanced levels of financing. This must necessarily come from both public and private sources.
    - Since government financing will remain the cornerstone, government support for higher education should increase to at least 1.5 per cent of GDP, out of a total of at least 6 per cent of GDP for education overall.
    - Even this would not suffice for the massive expansion in higher education that is an imperative. It is essential to explore other possibilities that can complement the increase in public expenditure.
    - Most public universities are sitting on a large reservoir of untapped resources in the form of land. It should be possible to draw up norms and parameters for universities to use their available land as a source of finance.
    - It is for universities to decide the level of fees but, as a norm, fees should meet at least 20 per cent of the total expenditure in universities. This should be subject to two conditions: first, needy students should be provided with a fee waiver plus scholarships to meet their costs; second, universities should not be penalized by the UGC for the resources raised from higher fees through matching deductions from their grants-in-aid.
    - India should nurture the tradition of philanthropic contributions through changes in incentives for universities and for donors. At present, there is an implicit disincentive in both tax laws and trust laws. These laws should be changed so that universities can invest in financial instruments of their choice and use the income from their endowments to build up a corpus.
    - Universities should also seek to tap other sources such as alumni contributions and licensing fees. There is need to create supportive institutional mechanisms that allow universities to engage professional firms for this purpose.
    - It is essential to stimulate private investment in education as a means of extending educational opportunities. It may be possible to leverage public resources, especially in the form of land grants, to attract more (not-for-profit) private investment.

4. **Establish 50 National Universities.** NKC recommends the creation of 50 National Universities that can provide education of the highest standard. As exemplars for the rest of the nation, these universities would train students in a variety of disciplines, including humanities, social sciences, basic sciences, commerce and professional subjects, at both the undergraduate and post-graduate levels. The number 50 is a long-term objective. In the short run, it is important to begin with at least 10 such universities in the next three years. National Universities can be established in two ways, by the Government, or by a private sponsoring body that sets up a society, charitable trust or Section 25 company.

Since public finance is an integral constituent of universities worldwide, most of the new universities shall need significant initial financial support from the Government. Each university may be endowed with a substantial *allocation of public land*, in excess of its spatial requirements. The excess land can be a subsequent source of income generation. Exceptions need to be made in existing income tax laws to encourage large endowments. There should be no restriction on

the utilization of income in any given period or in the use of appropriate financial instruments. These universities should have the autonomy to set student fee levels and tap other sources for generating funds.

The National Universities, NKC proposes, will admit students on an all-India basis. They will adopt the principle of *needs-blind admissions*. This will require an extensive system of scholarships for needy students. Undergraduate degrees in the National Universities, in a three-year programme, should be granted on the basis of completing a requisite number of credits, obtained from different courses. The academic year will therefore be semester-based and students will be internally evaluated at the end of each course. Transfer of credits from one National University to another would also be possible. An appropriate system of appointments and incentives is required to maximize the productivity of faculty in these National Universities. Strong linkages would be forged between teaching and research, universities and industry, and universities and research laboratories. The National Universities shall be department-based and shall not have any affiliated colleges.

II. Excellence

5. **Reform existing universities.** The endeavour to transform higher education must reform existing institutions. Some essential steps are:
   - Universities should be required to revise or restructure curricula at least once in three years.
   - Annual examinations, which test memory rather than understanding, should be supplemented with continuous internal assessment which could begin with a weight of 25 per cent in the total to be raised to 50 per cent over a stipulated period.
   - NKC proposes a transition to a course credit system where degrees are granted on the basis of completing a requisite number of credits from different courses, which provides students with choices.

- Universities must become the hub of research once again to capture synergies between teaching and research that enrich each other. This requires not only policy measures but also changes in resource allocation, reward systems and mindsets.
- There must be a conscious effort to attract and retain talented faculty members through better working conditions combined with incentives for performance.
- The criteria for resource allocation to universities should seek to strike a much better balance between providing for salaries or pensions and providing for maintenance, development or investment. It should also recognize the importance of a critical minimum to ensure standards and strategic preferences to promote excellence.
- The elements of infrastructure that support the teaching-learning process, such as libraries, laboratories and connectivity, need to be monitored and upgraded on a regular basis.
- There is an acute need for reform in the structures of governance of universities that do not preserve autonomy and do not promote accountability. Much needs to be done, but two important points deserve mention. The appointments of Vice-Chancellors must be freed from direct or indirect interventions on the part of governments, for these should be based on search processes and peer judgment alone. The size and composition of University Courts, Academic Councils and Executive Councils, which slow down decision-making processes and sometimes constitute an impediment to change, need to be reconsidered on a priority basis.
- The need is for smaller universities which are resposive to change and easier to manage, and these should be created.

6. **Restructure undergraduate colleges.** The system of affiliated colleges for undergraduate education, which may have been appropriate 50 years ago, is no longer adequate or appropriate and needs to be reformed.

There is an urgent need to restructure the system of undergraduate colleges affiliated to universities.

- The most obvious solution is to provide autonomy to colleges either as individual colleges or as clusters of colleges, on the basis of criteria that have been stipulated. However, this would provide a solution for a limited proportion, or number, of undergraduate colleges.
- Some of these affiliated colleges could be remodelled as community colleges, which could provide both vocational education and formal education.
- A Central Board of Undergraduate Education should be established, along with State Boards of Undergraduate Education, which would set curricula and conduct examinations for undergraduate colleges that choose to be affiliated with them. These Boards would separate the academic functions from the administrative functions and, at the same time, provide quality benchmarks.
- New undergraduate colleges could be established as community colleges and be affiliated with the Central Board of Undergraduate Education or State Boards of Undergraduate Education, or with some of the new universities that are established.

7. **Promote enhanced quality.** The higher education system must provide for accountability to society and create accountability within. An expansion of higher education which provides students with choices and creates competition between institutions is going to be vital in enhancing accountability.

- There should be stringent information disclosure norms for all educational institutions such as their financial situation, physical assets, admissions criteria, faculty positions, academic curricula, as also their source and level of accreditation.
- Evaluation of courses and teachers by students as well as peer evaluation of teachers by teachers should be encouraged.

- There must be a focus on upgrading infrastructure, improving the training of teachers and continuous assessment of syllabi and examination systems.
- It is particularly important to enhance the ICT infrastructure. Websites and web-based services would improve transparency and accountability. A portal on higher education and research would increase interaction and accessibility. A knowledge network would connect all universities and colleges for online open resources.
- It may be necessary to rethink the issue of salary differentials within and between universities along with other means of attracting and retaining talented faculty members. Such salary differentials between and within universities could be effective without being large.
- It is necessary to formulate appropriate policies for the entry of foreign institutions into India and the promotion of Indian institutions abroad, while ensuring a level playing field for foreign and domestic institutions within the country.
- The system of higher education must recognize that there is bound to be diversity and pluralism in any system of higher education, and avoid a uniform 'one-size fits-all' approach. This sense of pluralism must recognize, rather than ignore or shy away from, such diversity and differentiation.

III. Inclusion

8. **Ensure access for all deserving students.** Education is the fundamental mechanism for social inclusion through the creation of more opportunities. It is therefore essential to ensure that no student is denied the opportunity to participate in higher education due to financial constraints. NKC proposes the following measures.

- Institutions of higher education should be encouraged to adopt a *needs-blind admissions* policy. This would make it unlawful for educational institutions to take into account any financial factor while deciding whether or not to admit a student.

- There must be a well-funded and extensive National Scholarship Scheme targeting economically underprivileged students and students from groups that are historically, socially disadvantaged.

9. **Affirmative action.** A major aim of the higher education system must be to ensure that access to education for economically and historically socially underprivileged students is enhanced in a substantially more effective manner.

    - Reservations are essential, but they are only a part, and one form, of affirmative action.
    - Disparities in educational attainments are related to caste and social groups, but are also strongly related to other indicators such as income, gender, region and place of residence. There is need to develop a meaningful and comprehensive framework that would address the multi-dimensionality of differences that still persist. For example, a deprivation index could be used to provide weighted scores to students and the cumulative score could be used to supplement a student's school examination score.

NKC's recommendations require action at three different levels: reforms within existing systems, changes in policies, and amendments in, or the introduction of, new statutes or legislation. The suggested changes would also be implemented at three different levels: universities, state governments and the Central Government.

It is important to recognize that there is a quiet crisis in higher education in India which runs deep. The time has come to address this crisis in a systematic and forthright manner. NKC's recommendations constitute an important beginning; the changes suggested would make a real difference. Of course, the process of reform and change is continuous. There is more to be done, and NKC will continue to think about next steps, but it emphasizes the urgency of the situation, because India's future depends on it. It is important to act here and now.

Note on Higher Education

Introduction

The spread of education in society is at the foundation of success in countries that are latecomers to development. In the quest for development, primary education is absolutely essential because it creates the base. But higher education is just as important, for it provides the cutting edge. And universities are the life-blood of higher education. Islands of excellence in professional education, such as Indian Institutes of Technology (IITs) and Indian Institutes of Management (IIMs), are valuable complements but cannot be substitutes for universities which provide educational opportunities for people at large.

There can be no doubt that higher education has made a significant contribution to economic development, social progress and political democracy in independent India. It is a source of dynamism for the economy. It has created social opportunities for people. It has fostered the vibrant democracy in our polity. It has provided a beginning for the creation of a knowledge society. But it would be a mistake to focus on its strengths alone. It has weaknesses that are a cause for serious concern.

There is, in fact, a quiet crisis in higher education in India that runs deep. It is not yet discernible simply because there are pockets of excellence, an enormous reservoir of talented young people and an intense competition in the admissions process. And, in some important spheres, we continue to reap the benefits of what was sown in higher education 50 years ago by the founding fathers of the Republic. The reality is that we have miles to go. The proportion of our population, in the age group 18-24, that enters the world of higher education is around 7 per cent, which is only one-half the average for Asia. The opportunities for higher education, in terms of the number of places in universities, are simply not enough in relation to our needs. What is more, the quality of higher education in most of our universities requires substantial improvement.

It is clear that the system of higher education in India faces serious challenges. It needs a systematic overhaul, so that we can educate much larger numbers without diluting academic standards. This is imperative because the transformation of economy and society in the 21st century would depend, in significant part, on the spread and the quality of education among our people, particularly in the sphere of higher education. It is only an inclusive society that can provide the foundations for a knowledge society.

The challenges that confront higher education in India are clear. It needs a massive expansion of opportunities for higher education, to 1500 universities nationwide, that would enable India to attain a gross enrolment ratio of at least 15 per cent by 2015. It is just as important to raise the average quality of higher education in every sphere. At the same time, it is essential to create institutions that are exemplars of excellence at par with the best in the world. In the pursuit of these objectives, providing people with access to higher education in a socially inclusive manner is imperative. The realization of these objectives, combined with access, would not only develop the skills and capabilities we need for the economy but would also help transform India into a knowledge economy and society.

We recognize that a meaningful reform of the higher education system, with a long-term perspective is both complex and difficult. Yet, it is imperative. And we would suggest the following building blocks in this endeavour. First, it is essential to reform existing public universities and undergraduate colleges. Second, it is necessary to overhaul the entire regulatory structure governing higher education. Third, every possible source of financing investment in higher education needs to be explored. Fourth, it is important to think about pro-active strategies for enhancement of quality in higher education. Fifth, the time has come to create new institutions in the form of National Universities that would become

role models as centres of academic excellence. Sixth, the higher education system must be so designed that it provides access to marginalized and excluded groups.

I. Universities

Universities perform a critical role in an economy and society. They create knowledge. They impart knowledge. And they disseminate knowledge. Universities must be flexible, innovative and creative. They must be able to attract the best talent whether teachers or students. They must have the ability to compete and the motivation to excel. We cannot even contemplate a transformation of our higher education system without reform in our existing universities.

There is, however, a serious cause for concern about universities in India. The number of places for students at universities is simply inadequate. The quality of education at most universities leaves much to be desired. The gap between our universities and those in the outside world has widened. And none of our universities rank among the best, say the top fifty, in the world. The symptoms are clearly visible, even if we do not wish to diagnose what ails our universities. Of course, every problem does not exist everywhere. And there are exceptions. But the following problems are common enough to be a cause for concern. First, curricula, which have remained almost unchanged for decades, have not kept pace with the times, let alone with the extending frontiers of knowledge. Second, learning and creativity are at a discount in a system of assessment that places a premium on memory rather than understanding. Third, the milieu is not conducive to anything beyond the class room, for it is caught in a 9.30 to 1.30 syndrome. Fourth, the academic calendar is no longer sacrosanct for classes or for examinations, as there are slippages in schedules so much so that, at several places, classes in the timetable are not held and results are often declared with a time-lag of 6 to 12 months. Fifth, the infrastructure is not only inadequate but also on the verge of collapse. Sixth, the boundaries between disciplines have become dividing walls that constitute barriers to entry for new disciplines or new courses, while knowledge is developing most rapidly at the intersection of disciplines. Seventh, the importance attached to research has eroded steadily over time. Eighth, the volume of research in terms of frequency of publication and the quality of research reflected in the frequency of citation or the place of publication, on balance, is simply not what it used to be. Ninth, as in most public institutions, there is little accountability, because there are no rewards for performance and no penalties for non-performance. Tenth, structures of governance put in place fifty years ago are not responsive to changing times and circumstances but the system is readily subverted by vested interests.

It is difficult enough to provide a complete diagnosis of what ails our universities. It is even more difficult, if not impossible, to outline a set of prescriptions for our universities. Nevertheless, it is clear that a reform of existing institutions must be an integral part of our endeavour to transform higher education. We recognize that this is easier said than done. Even so, we believe that reforms in the following spheres, along the lines suggested by us, are not only possible but would also make a difference.

Number and Size: India has about 350 universities. This number is simply not enough with reference to our needs in higher education, or in comparison with China which has authorized the creation of 1250 new universities in the last three years. Yet, some of our universities are much too large, for ensuring academic standards and providing good governance. We need to create more appropriately scaled and more nimble universities. The moral of the story is not only that we need a much larger number of universities, say 1500 nationwide by 2015, but also that we need smaller universities which are responsive to change and easier to manage.

Curriculum: The syllabi of courses in universities, which remain unchanged for decades, need to be upgraded constantly and revised frequently. The laws of inertia reinforced by resistance to change must be overcome. Universities should be required to revise or restructure curricula at least once in three years. These revisions must be subjected to outside peer review before implementation. The process for such revisions should be streamlined

and decentralized, with more autonomy for teachers, through a change in statutes wherever necessary. For existing systems often act as major impediments to a timely or speedy revision of curricula. There should be some mode of censure for departments or universities that do not upgrade their courses regularly. It needs to be recognized that it is very difficult to introduce new courses or innovative courses in universities because of departmental divides. Appropriate institutional mechanisms should be put in place to resolve this problem.

Assessment: The nature of annual examinations at universities in India often stifles the teaching-learning process because they reward selective and uncritical learning. There is an acute need to reform this examination system so that it tests understanding rather than memory. Analytical abilities and creative thinking should be at a premium. Learning by rote should be at a discount. Such reform would become more feasible with decentralized examination and smaller universities. But assessment cannot and should not be based on examinations alone. There is a clear need for continuous internal assessment which empowers teachers and students alike, just as it breathes life back into the teaching-learning process. Such internal assessment would also foster the analytical and creative abilities of students which are often a casualty in university-administered annual examinations. To begin with, internal assessment could have a weight of 25 per cent in the total but this should be raised to 50 per cent over time.

Course Credits: The present system is characterized by too many rigidities and too few choices for students. Universities that are smaller, or run semester-based systems, are obviously more flexible. Even in large universities, however, it is necessary to introduce greater diversity and more flexibility in course structures. This would be the beginning of a transition to a course credit system, where degrees are granted on the basis of completing a requisite number of credits from different courses. Every student should be required to earn a minimum number of credits in his/her chosen discipline but should have the freedom to earn the rest from courses in other disciplines. It is essential to provide

students with choices instead of keeping them captive.

Research: We attempted to create stand-alone research institutions, pampered with resources, in the belief that research should be moved out of universities. In the process, we forgot an essential principle. There are synergies between teaching and research that enrich each other. And it is universities which are the natural home for research. What is more, for universities, research is essential in the pursuit of academic excellence. It is time to reverse what happened in the past and make universities the hub of research once again. This would need changes in resource-allocation, reward-systems and mindsets. Substantial grants should be allocated for research. The provisions of these grants should be competitive and the criteria for these grants should be different from the usual criteria for non-plan and plan grants.

Faculty: There must be a conscious effort to attract and retain talented faculty members. This is necessary because talented students who are potential faculty members have choices that are far more attractive in other professions in India or in the academic profession outside India. It is necessary to provide working conditions in the form of office space and research support combined with housing. But it may not be sufficient. This must be combined with some incentives and rewards for performance. There is, however, another dimension to the problem. Universities do not always choose the best in part because of native-son/daughter policies which leave them to select their own former students. This tends to lower quality and foster parochialization in universities. Therefore, cross-pollination between universities should be encouraged. It may be worth introducing a ceiling, say one-half or even one-third, on the proportion of faculty members than can be hired from within the university. This would almost certainly engender greater competition and more transparency in faculty appointments.

Finances: There is a serious resource crunch in universities which leaves them with little financial flexibility. In general, about 75 per cent of maintenance expenditure is on salaries and pensions. Of the remaining 25 per cent, at least

15 per cent is absorbed by pre-emptive claims such as rents, electricity, telephones and examinations. The balance, less than 10 per cent, is not even enough for maintenance let alone development. Laboratories and libraries languish while buildings crumble. But that is not all. In most universities, plan (investment) expenditure is less than 5 per cent of non-plan (maintenance) expenditure. Such a small proportion of investment in total expenditure can only mortgage the future. It is doing so. The time has come for some strategic thinking on the re-allocation of budgets for universities with some allocation for development grants and on needs other than salaries. The criteria for resource allocation should seek to strike a much better balance between providing for salaries/pensions and providing for maintenance/development/investment. These criteria should recognize the importance of a critical minimum to ensure standards and strategic preferences to promote excellence.

Infrastructure: The elements of infrastructure that support the teaching-learning process, most directly, need to be monitored and upgraded on a regular basis. This means attention particular attention to libraries and laboratories, in addition to class rooms, sports facilities and auditoriums. It is imperative that universities provide broadband and connectivity to all students and teachers in campuses. In parallel, information technology systems should be used for admissions, administration and examinations along with other relevant web services for campus communities. And, as soon as possible, a digital infrastructure for networking universities should be put in place.

Governance: There is an acute need for reform in the structures of governance of universities. The present system is flawed. On the one hand, it does not preserve autonomy. On the other, it does not promote accountability. The autonomy of universities is eroded by interventions from governments and intrusions from political processes. This must be stopped. At the same time, there is not enough transparency and accountability in universities. This must be fostered. It is exceedingly difficult to provide generalized prescriptions. Some steps, which would constitute an important beginning, are clear. First, the appointments

of Vice-Chancellors should be based on search processes and peer judgment alone. These must be freed from direct or indirect intervention on the part of governments. Once appointed, Vice Chancellors should have a tenure of six years, because the existing tenure of three years in most universities and five years in central universities is not long enough. Second, the size and composition of University Courts, Academic Councils, and Executive Councils slows down decision-making processes and sometimes constitutes an impediment to change. University Courts, with a size of 500 plus, which are more a ritual than substance, could be dispensed with. Large Academic Councils do not meet often. Even when they meet, decisions are slow to come. Thus, Standing Committees of Academic Councils, which are representative, should be created for frequent meetings and expeditious decisions. The Vice-Chancellor should, then, function as a Chief Executive Officer who has the authority and the flexibility to govern with the advice and consent of the Executive Council which would provide checks and balances to create accountability. Third, experience suggests that implicit politicization has made governance of universities exceedingly difficult and much more susceptible to entirely non-academic interventions from outside. This problem needs to be recognized and addressed in a systematic manner not only within universities but also outside, particularly in governments, legislatures and political parties.

II. Undergraduate Colleges

Undergraduate education, which accounts for about 85 per cent of the enrolled students, is the largest component of our higher education system. It is imparted through colleges where students enrol for first degrees in Arts, Science or Commerce. There are a total of about 17,700 undergraduate colleges. Of these, a mere 200 colleges are autonomous. The rest, as many as 17,500 colleges, are affiliated to, or constituent in, 131 universities. On average, each university has more than 100 affiliated colleges, but there are some universities each of which has more than 400 affiliated colleges.

This system of affiliated colleges for undergraduate education, which may have been appropriate fifty years ago, is neither adequate nor appropriate

at this juncture, let alone for the future. It is cumbersome to manage. And it is difficult to ensure minimal academic standards across the board. The problem has at least three dimensions. First, it imposes an onerous burden on universities which have to regulate admissions, set curricula and conduct examinations for such a large number of undergraduate colleges. The problem is compounded by uneven standards and geographical dispersion. Second, the undergraduate colleges are constrained by their affiliated status, in terms of autonomy and space, which makes it difficult for them to adapt, to innovate and to evolve. The problem is particularly acute for undergraduate colleges that are good, for both teachers and students are subjected to the 'convoy problem' insofar as they are forced to move at the speed of the slowest. There is also a problem for undergraduate colleges that are not so good, or are poor, because universities cannot address their special needs or unique problems. Third, it is difficult to set curricula and assess performance for such a large number of students where there is such a large dispersion in performance at school before entering college. This reality tends to make courses less demanding and examinations less stringent across the board. In fact the design of courses and examinations needs to be flexible rather than exactly the same for large student communities.

There is an urgent need to restructure the system of undergraduate colleges affiliated to universities. In doing so, it is important to make a distinction between undergraduate colleges that already exist and undergraduate colleges that will be established in the future. It is also important to remember that undergraduate colleges are afflicted by problems which are very similar to those that afflict universities.

The most obvious solution is to provide autonomy to colleges, either as individual colleges or as clusters of colleges.

Individual colleges: Colleges with a proven record of academic excellence and efficient administrative functioning can be granted autonomy in terms of academic self-governance. Existing affiliated or constituent colleges should be granted autonomy in phases after due assessment by professional accreditation bodies. A review of performance of these colleges should be institutionalized and they may be granted university status on the fulfilment of stated criteria of academic and administrative performance. The college authorities should be given financial autonomy with regard to internal allocation of resources. However existing methods of financing should be retained. In operational terms, then, the autonomy would be accorded in setting of curriculum and evaluation of students.

College Clusters: Autonomy can be provided to clusters of colleges, selected on the basis of criteria such as similar standards or geographical proximity. These colleges could then form a group, complementing each other, offering different courses between them. In time, these clusters could be upgraded to universities. The course-credit system can be implemented in these autonomous clusters, whereby different colleges offer semester-based courses on a credit system and credits can be transferred across colleges. A mechanism for the administration of courses across colleges and for the resolution of problems should be institutionalized with provision for representation in committees.

Such autonomous colleges, or clusters of colleges, would constitute a part of the 1500 universities we propose nationwide by 2015. It must be recognized, however, that this is, at best, a limited solution. There are two discernible problems.

The first problem with the model of autonomous colleges is the principal-agent problem of providing autonomy as an option. It becomes necessary to distinguish between the motivations and the capabilities of colleges. We need to make a distinction between colleges that wish to become autonomous but do not deserve to, and colleges that have the capabilities to be autonomous but do not wish to opt for autonomy. For colleges that wish to become autonomous but may not be suitable, clear cut criteria should be put in place as a filtering mechanism for colleges wishing to attain autonomous status: critical number of faculty and disciplines, governance, track record in terms of students, faculty and research, administrative competence measured by utilization of grants, regularity of audits, office resources and account

maintenance, contribution to university processes, infrastructural facilities and ratings, if available, by accreditation agencies. For colleges that can be autonomous but do not wish to be, appropriate incentives have to be designed, especially for the teaching staff to encourage a move towards autonomy. Institutional incentives relating to funding and resource generation and professional incentives for staff including positions of professors, research grants and greater mobility should be provided.

The second problem with the model of autonomous colleges is that it would be able to provide a solution for a limited proportion, or number, of undergraduate colleges. There would be a significant number of undergraduate colleges that would remain because they may not have the capabilities to become autonomous or join an autonomous cluster. The obvious solution would be for this latter group to continue as affiliated colleges with their present universities. In that event, problems will persist not only for these undergraduate colleges but also for their affiliating universities. Nevertheless, a proportion of these undergraduate colleges will continue to be affiliated to their present universities on the basis of stipulated criteria. There are two other possibilities that could be explored.

The first possibility is that some of these affiliated colleges could be remodelled as community colleges. These colleges could provide both vocational education through two-year courses and formal education through three-year courses. This would serve the needs of a particular segment of the student population better. They could focus on promoting job-oriented, work-related, skill-based and life-coping education. These community colleges could provide a unique opportunity to provide holistic education and eligibility for employment to the disadvantaged.

The second possibility is that we establish a Central Board of Undergraduate Education along with State Boards of Undergraduate Education which would set curricula and conduct examinations for undergraduate colleges that choose to be affiliated with them. These Boards would separate the academic functions from the administrative

functions and at the same time provide quality benchmarks. Governance would become much simpler. It is possible that some of the existing undergraduate colleges, particularly those that are at some geographical distance from their parent university, may wish to affiliate themselves to these Boards.

New undergraduate colleges are bound to be an integral part of the expansion of opportunities in higher education. Where would these be located? It would be difficult for them to become autonomous colleges without a track record. It may be possible for some to join a cluster of autonomous colleges but this would be more the exception than the rule. It would not be possible for them to affiliate with existing universities which are already overloaded. Hence, there are three possible options for new undergraduate colleges to come. First, they could be established as community colleges. Second, they could be affiliated with the Central Board of Undergraduate Education or State Boards of Undergraduate Education. Third, they could be affiliated with new universities that are established.

There are, of course, issues related to governance, curricula, examinations, course credits and access which arise in the context of undergraduate colleges. These have been discussed in the context of universities in the preceding section of this note.

III. Regulation
There is a clear need to establish an Independent Regulatory Authority for Higher Education (IRAHE). Such a regulatory authority is both necessary and desirable.

It is necessary for two important reasons. First, in India, it requires an Act of Legislature of Parliament to set up a University. The deemed university route is much too difficult for new institutions. Entry through legislation alone, as at present, is a formidable barrier. The consequence is a steady increase in the average size of existing universities with a steady deterioration in their quality. The absence of competition only compounds problems. Second, as we seek to expand the higher education

system, entry norms will be needed for private institutions and public-private partnerships. The institutional framework for this purpose must be put in place here and now.

It is desirable for four important reasons. First, it would minimize conflicts of interest as it would create an arm's-length distance from stakeholders. Second, it would replace the present system which is over-regulated but under-governed, through more appropriate forms of intervention. Third, it would rationalize the existing system where mandates are both confusing and overlapping. Fourth, it would dispense with the multiplicity of regulatory agencies to provide a single-window clearance.

The present regulatory system in higher education is flawed in many respects. The barriers to entry are too high. The system of authorizing entry is cumbersome. And there are extensive rules after entry, as the UGC seeks to regulate almost every aspect of an institution from fees to curriculum. The system is also based on patently irrational principles. The UGC Act section 3.1.2(a) suggests that permission for receiving grants will be accorded only if the Commission is satisfied that the existing institutions in the state are not adequate to serve the needs of the state. The other regulators, say in the sphere of professional education, are often inconsistent in their adherence to principles. There are several instances where an engineering college or a business school is approved, promptly, in a small house of a metropolitan suburb without the requisite teachers, infrastructure or facilities, but established universities experience difficulties in obtaining similar approvals. Such examples can be multiplied. These would only confirm that the complexity, the multiplicity and the rigidity of the existing regulatory structure is not conducive to the expansion of higher education opportunities in India.

In sum, the existing regulatory framework constrains the supply of good institutions, excessively regulates existing institutions in the wrong places, and is not conducive to innovation or creativity in higher education. The challenge is therefore to design a regulatory system that increases the supply of good institutions and fosters accountability in those

institutions. An independent regulator has to be the cornerstone of such a system.

The proposed IRAHE will rationalize the principles on which entry is regulated. There are two aspects to this rationalization: what is to be regulated and what are the principles used for regulation.

In higher education, regulators perform five functions: (1) Entry: licence to grant degrees. (2) Accreditation: quality benchmarking. (3) Disbursement of public funds. (4) Access: fees or affirmative action. (5) Licence: to practice profession.

India is perhaps the only country in the world where regulation in 4 of the 5 functions is carried out by one entity, that is, the UGC. The purpose of creating an IRAHE is to separate these functions. The proposed IRAHE shall be responsible for setting the criteria and deciding on entry. It would, in addition, license agencies to take care of accreditation. The role of the UGC will be limited to disbursing public funds. Issues of access will be governed by state legislation on reservations and other forms of affirmative action. And, professional associations may, in some institutions, set requirements to determine eligibility for conducting a profession. All other regulatory agencies such as the AICTE will need to be abolished while the MCI and the BCI will be limited to their role as professional associations. These professional associations could conduct nationwide examinations to provide licences for those wishing to enter the profession.

The second aspect of regulation is the principle used to regulate. The IRAHE will determine eligibility for setting up a new institution based on transparent criteria rather than discretionary controls. Its main role would be to exercise due diligence at the point it approves a licence to grant degrees. In doing so, it would assess the academic credibility and the financial viability of the proposed institution on the basis of information submitted in accordance with the stipulated criteria. It will apply exactly the same norms to public and private institutions, just as it will apply the same norms to domestic and international institutions.

The IRAHE would be constituted as follows. It would have a Chairperson and six Members. The tenure of the Chairperson would be six years. The tenure of the Members would also be six years. One-third of the Members of the Authority will retire every two years. The Chairperson would be a distinguished academic from any discipline with experience of governance in higher education. The Members would be distinguished academics drawn from the following sets of disciplines: physical sciences, life sciences, social sciences, humanities and professional subjects such as engineering, medicine, law or management. The IRAHE could have some part-time members or standing committees drawn from academia to advise the Authority in each of the aforesaid sets of disciplines. The Chairperson and the Members of the IRAHE would be appointed by the Prime Minister based on the recommendations of a Search Committee.

The IRAHE would have to be established by an Act of Parliament. It would be the only agency that would be authorized to accord degree granting power to higher education institutions. It would also be responsible for monitoring standards and settling disputes. It should also be thought of as the authority for licensing accreditation agencies. The IRAHE must be at an arm's-length from the government and independent of all stakeholders including the concerned Ministries of the Government. The Acts of the UGC, AICTE, MCI and BCI would have to be amended. The role of the UGC would be re-defined to focus on the disbursement of grants to, and maintenance of, public institutions in higher education. The entry regulatory functions of the AICTE, the MCI and the BCI would be performed by the IRAHE, so that their role would be limited to that of professional associations. These professional associations could conduct nationwide examinations to provide licenses for those wishing to enter the profession.

IV. Financing

The expansion of our system of higher education, which is both necessary and desirable, is not possible without financing. For an increase in supply of quality education depends upon an increase in investment which, in turn, requires financial resources. There are several sources of such financing.

Government Support: There is no system of higher education in the world that is not based upon significant public outlays. And government financing will remain the cornerstone of any strategy to improve our system of higher education. The present support for higher education, at 0.7 per cent of GDP, is simply not adequate. In fact, over the past decade, in real terms, there has been a significant decline in the resources allocated for higher education, in the aggregate as also per student. In an ideal world, government support for higher education should be at least 1.5 per cent, if not 2 per cent of GDP, from a total of 6 per cent of GDP for education. This is easier said than done. But the government should endeavour to reach these levels by 2012. Even this magnitude of state financing, however, would not suffice for the massive expansion in higher education that is an imperative. Therefore, it is essential to explore a wide range of possibilities which can be complements to the increase in public expenditure.

Better Asset Management: Most public universities are sitting on a large reservoir of untapped resources in the form of land. In effect, with some imagination, many of our universities can be converted into institutions that are similar to land grant universities. Each university should thus have an innovative asset management plan. Such plans should be in consonance with objectives of universities. At the moment, however, universities have no strategy in this sphere. And there is considerable room to think in strategic terms about the use of physical assets in the possession of universities. It should be possible to draw up norms and parameters for universities to use their land as a source of finance.

Rationalization of Fees: On an average, fees constitute less than 10 per cent of total expenditure in our universities. And, in most universities, fees have remained unchanged for decades. In theory, universities have the freedom to decide on fees. In practice, however, universities have not exercised this freedom in part because of some genuine concerns about access but in larger part because of the rhetoric and populism in the political process.

The problem has been compounded by the UGC method of providing grants-in-aid to bridge the difference between income and expenditure. Consequently, there is no incentive for universities or colleges to raise income through higher fees as that sum would be deducted from their UGC (or State government) grants. The low fees in public universities, without any means test, have meant unquantifiable benefits for unintended beneficiaries. But private players and foreign institutions have not been restrained in charging fees that the market can bear. The time has come to rethink, as we have no choice but to rationalize fees. It is for universities to decide the level of fees but, as a norm, fees should meet at least 20 per cent of the total expenditure in universities. In addition, fees need to be adjusted every two years through price indexation. Such small, continuous, adjustments would be absorbed and accepted far more easily than large, discrete changes after a period of time. This rationalization of fees should be subject to two conditions: first, needy students should be provided with a fee waiver plus scholarships to meet their costs; second, universities should not be penalized by the UGC for the resources raised from higher fees through matching deductions from their grants-in-aid.

Philanthropic Contributions: It is clear that we have not exploited this potential. In fact, the proportion of such contributions in total expenditure on higher education has declined from more than 12 per cent in the 1950s to less than three per cent in the 1990s. It should be possible to nurture this tradition of philanthropy through changes in incentives for universities and for donors. In the present system, there is an explicit disincentive. If universities mobilize resources from elsewhere, they are in effect penalized through a matching deduction in their grant-in-aid. What we need to do is exactly the opposite. Universities which mobilize resources through contributions should be rewarded with matching grants-in-aid. At present, there is also an implicit disincentive in both lax laws and trust laws. Endowments of universities can only be placed in specified securities where rates of return are low and barely keep up with rates of inflation. What is more, trusts must spend 85 per cent of the income stream from the endowment in the same year, so that only

15 per cent of the income stream can be used to build up the corpus in the endowment. These laws should be changed so that universities can invest in financial instruments of their choice and use the income from their endowments to build up a corpus.

Other Sources: Obviously, universities must not be driven by commercial considerations. But it would be both prudent and wise to tap other sources such as alumni contributions, licensing fees, or user charges (for facilities in universities used by people from outside). We need to create supportive institutional mechanisms that allow universities to engage professional firms for this purpose. Mobilizing resources, even from former students, is a task that cannot be performed by academics because it needs specialized talents and experience. Current UGC practice also penalizes universities for any resources mobilized with a matching deduction from the grants-in-aid provided to the institution. Rather than penalizing universities for raising resources, the UGC should incentivize them. In addition, universities must have the autonomy and flexibility to mobilize resources from elsewhere by creating or using appropriate institutional mechanisms.

Private Investment: In three professions – engineering, medicine and management- there has been a *de facto* privatization of education so that two-thirds to three-fourths of the seats are in private institutions. But private investment in university education, where more than 70 per cent of our students study, is almost negligible. It is essential to stimulate private investment in higher education as a means of extending educational opportunities. We must recognize that, even with the best will in the world, government financing cannot be enough to support the massive expansion in opportunities for higher education on a scale that is now essential.

Public-Private Partnerships: It might be possible to leverage public funding, especially in the form of land grants, to attract more (not-for-profit) private investment. The present system of allotment of land, where political patronage is implicit, discourages genuine educational entrepreneurs and encourages real estate developers in disguise. In principle, it should be possible to set up new institutions in

higher education, not just more IITs and IIMs but also more universities, as public-private partnerships where the government provides the land and the private sector provides the finances. Such public-private partnerships which promote university-industry interface would also strengthen teaching and research.

International Students: India is not an attractive destination for international students, not even as much as it used to be 30 years ago. It is time for us to make a conscious attempt to attract foreign students to India for higher education. This would enrich our academic milieu. This would enhance quality. This would be a significant source of finance. Even 50,000 foreign students charged fees at an average rate of US$ 10,000 per annum would yield US$ 0.5 billion: the equivalent of Rs 2,300 crores per annum in current prices at current exchange rates. The other side of the coin is perhaps even more important. Estimates suggest that there are about 160,000 students from India studying abroad. If their average expenditure on fees and maintenance is US$ 25,000 per student per year, Indian students overseas are spending US$ 4 billion: the equivalent of Rs 18,400 crores per annum in current prices at current exchange rates. This has an enormous potential as a source of finance for higher education in India, if only we could crate more opportunities for students with increased places and enhanced quality in our system.

V. Quality

The introduction of an independent regulator in higher education, the reform of existing public universities and the creation of national universities, taken together, would contribute to enhancement of quality in higher education. But this needs to be supported with some pro-active steps that would foster quality in higher education.

Accountability: The quality of higher education depends on a wide range of factors. But accountability, at every level, is a critical determinant. The higher education system must, therefore, provide for accountability *vis-à-vis* the outside world and create accountability within the system. Accountability of universities must not be confused

with control of the state. Institutional mechanisms, based on checks and balances, constitute the most effective system for this purpose. The essential objective of accountability to society must be to empower students to take decisions rather than simply increase the power of the state. Stipulated performance criteria or inspections are forms of control. We need to create systems that enable students, or their parents, to choose between and assess universities.

Competition: The supply constraint on higher education is an impediment to accountability. When students have relatively few choices, institutions have greater power over them. An expansion of higher education which provides students with choices and creates competition between institutions is going to be vital in enhancing accountability. Such competition between institutions within India is, of course, essential. But the significance of competition from outside India, more qualitative than quantitative, must not be underestimated. For this purpose, we must formulate appropriate policies for the entry of foreign institutions into India and the promotion of Indian institutions abroad. Such policies must ensure that there is an incentive for good institutions and a disincentive for sub-standard institutions to come to India. The present regime does the opposite: sub-standard players rush in while premier universities stay away as they care more about their autonomy and wish to set benchmarks for themselves. However, a level playing field should be ensured and all rules that apply to domestic institutions should also be applicable to foreign institutions. At the same time, policies must encourage rather than discourage Indian institutions to create campuses abroad not as business opportunities but as competition opportunities in their quest for academic excellence. Of course, expansion abroad should not be at the cost of domestic provision, either at present or in the future.

Accreditation: So far, we have sought to create accountability by increasing the powers of government regulators. Yet, it has done little to improve the quality of higher education. Consider, for example, the National Accreditation and Assessment Council (NAAC). This system has

three characteristics which significantly erode its credibility. First, it grants one institution, the NAAC, monopoly power over accreditation. Second, NAAC itself does not have the capacity to rate all the institutions. It has rated just about 10 per cent of the total number so far. Third, the methodology of NAAC is much too discretionary. Instead of vesting one institution created by the state with monopoly power, the IRAHE may be empowered to license a number of accreditation agencies, public and private, to do the ratings. In doing so, the regulator would set standards for them. This will need to be accompanied by stringent information disclosure norms for all educational institutions, including the source and level of their accreditation. The rapid growth in higher education, particularly in the private sector, has created a strong need for empowering students and parents with reliable information from a credible accreditation process. This system can be supplemented with the creation of self-regulatory bodies in the higher education system and the freedom to seek recognition from global accreditation systems.

Internal Systems: In most universities, the main stakeholders, students, are minimally part of any mechanism for accountability. Obviously, student evaluations need to be used with care. Even so, they can be part of a baseline set of accountability measures which could at least establish whether classes scheduled in the timetable are held. But that is not all. Evaluation of courses and teachers by students is also needed, just as much as we need peer evaluation of teachers by teachers. Such internal systems of evaluation would strengthen accountability in the teaching-learning process. These must be combined with institutional mechanisms for accountability in other dimensions of university systems.

Information: Almost everywhere, information in the public domain is an important source of accountability. Higher education should be no exception. There should be disclosure norms for universities and institutions imparting higher education. They should be required to place basic information relating to their financial situation, physical assets, accreditation ratings, admissions criteria, faculty positions, academic curricula,

and so on, in the public domain. This would empower students and parents and enable them to make informed choices. Information, along with competition, fostered by increased supply, will close the accountability loop.

Incentives: Even if we cannot introduce penalties for non-performance, it is necessary to introduce rewards for performance. We must, of course, recognize that universities are different from the hierarchical worlds in governments and corporate structures. The web of incentives is far more subtle. Even so, the time has come to think of salary differentials within and between Universities as a means of attracting and retaining talented faculty members. The salary differentiation among teachers within the same university needs to reflect the opportunity costs for teachers in some departments. This will help retain talent in some disciplines where remuneration in the market is much higher than in other subjects. Salary differentiation may enable some universities to develop centres of excellence in some disciplines. At the same time, it is important to ensure that disciplines which are essential for a good liberal education such as social sciences and humanities, as well as basic sciences which are not necessarily rewarded by the market, are given appropriate incentives to attract both teachers and students. Such salary differentials between and within universities could be effective without being large. Indeed, there is a good reason to stipulate a maximum ratio for differences in salaries between faculty members so as not to threaten the identity of the professoriate. Obviously, universities cannot compete with salaries elsewhere, but they should endeavour to provide a comfortable minimum for all, with some premium for those who perform. It is also important to think of other incentives, such as housing, good facilities for teaching and research and some flexibility for non-teaching professional activities so long as these do not impinge on the primary responsibilities to the institution.

Differentiation: We have to recognize that there is bound to be diversity and pluralism in any system of higher education. Therefore, in a country as large as India, we cannot afford to adopt the principle that one-size-fits-all. We must allow diversity to blossom. This could have many dimensions: curriculum,

specialization, institutional architecture, students' composition, and so on. Similarly, differentiation is inevitable if not natural. Even if we do not wish to recognize it, such differentiation is a reality. Students and parents have clear preferences, possibly implicit rankings, based on their perceptions derived from available information. Our sense of pluralism must recognize, rather than ignore or shy away from, such diversity and differentiation. It is characteristic of every higher education system in the world. For higher education is about a quest for excellence. It is, at least in part, about distinction and not always about levelling. The institutions which excel are the important peaks that raise the average. They are also role models others seek to emulate. And institutions that become such role models could mentor and guide other selected institutions.

VI. National Universities

We need to create substantial additional capacity in higher education for achieving a quantum jump in the gross enrolment ratio for a rapidly expanding population of young people. It would be expeditious to do so by simply expanding on our existing educational infrastructure. A fundamental paradigm shift in our understanding of quality and standards in higher education, however, requires creating completely new institutions that operate unconstrained by the current institutional and regulatory framework. We recommend the creation of up to 50 National Universities that can provide education of the highest standard. As exemplars for the rest of the nation, these universities shall train students in a variety of disciplines, including humanities, social sciences, basic sciences, commerce and professional subjects, at both the undergraduate and post-graduate levels. The number 50 is a long term objective. In the short run, it is important to begin with at least 10 such universities in the next 3 years. It is worth noting that the National Universities need not all be new universities. Some of the existing universities could also be converted into National Universities, on the basis of rigorous selection criteria, to act as exemplars. We recognize that there could be a human resource constraint if faculty members are not available in adequate numbers to establish these universities. But, for such centres of academic excellence, it should be possible to attract talent from among those who choose other professions in India or the academic profession outside India.

National Universities can be established in two ways, by the government, or by a private sponsoring body that sets up a Society, Charitable Trust or Section 25 Company. Since public finance is an integral constituent of universities worldwide, most of the new universities shall need significant initial financial support from the government. This could be in several forms. Each university may be endowed with a substantial *allocation of public land*, in excess of its spatial requirements. The excess land can be a subsequent source of income generation, its value rising over time due to the growing stature of the university. In the case of privately executed Charitable Trusts, exceptions need to be made in existing Income Tax laws to encourage large *endowments*. In particular, there should be no restriction on the utilization of income in any given time period, the Trusts should be allowed to invest their funds in financial instruments of their choice, and all proceeds from the sale of capital assets should be exempt from capital gains tax. These universities shall have the autonomy to invest in financial instruments of their choice, by employing private fund managers if required. Appropriate mechanisms also need to be put in place for the optimal *management of physical assets*, like laboratories, libraries, classrooms and other facilities. Finally, these universities shall have the autonomy to set *student fee levels* and tap other sources for generating funds such as industry collaborations, overseas operations, as also commercial use of university facilities and alumni networks.

The National Universities we propose shall admit students on an all-India basis. They shall adopt the principle of *needs-blind admissions*, thereby ensuring that an applicant's ability or inability to pay shall not influence the admission decision made by a university. Further, once admitted, the university should ensure that no student has to forego his/her place due to financial constraints. This will require a host of scholarships, freeships, bursaries and awards for economically disadvantaged students. At the undergraduate level, a nationwide test that objectively measures the verbal, quantitative and

analytical abilities of applicants shall be administered by an independent testing body. Admissions shall be based on a combination of Class XII results, scores from the nationwide test, application materials including written work and personal statements, as also interviews. At the postgraduate level, admissions shall be based on a combination of the applicant's academic record, application materials, interviews and academic or professional references that indicate his/her aptitude for further studies in the relevant discipline.

Undergraduate degrees in the National Universities shall have a duration of three years so that these are in conformity with the duration of undergraduate courses elsewhere in India. In the first year, students shall have the opportunity to study foundation, analytical and tools courses before choosing a specific discipline in the second year. They shall also have the option, at the end of the second year, of completing an integrated five-year master's degree. Degrees should be granted on the basis of completing a requisite number of credits, obtained from different courses. Each student shall be required to earn a minimum number of credits in his/her chosen discipline, and shall have the freedom to earn the rest from courses in other disciplines. The academic year shall therefore be semester-based and students shall be internally evaluated at the end of each course. Transfer of credits from one National University to another shall also be possible. A wide variety of courses shall be offered, in traditional academic disciplines, employment-oriented specific areas and cross-cutting competencies. Syllabi shall be revised every year to keep up with changes and current developments in various disciplines. Departments that do not update their syllabus for two consecutive years shall be asked to provide justification. Students shall have the option of taking up internships in private companies or research institutions in lieu of a certain number of credits.

An appropriate system of appointments and incentives is required to maximize the productivity of faculty in the National Universities. There shall be scope for salary differentials between National Universities and also between disciplines. Faculty training will be contingent on periodical reviews of research output and student evaluation. The most accomplished faculty members shall be encouraged to teach undergraduate courses. There shall be no career advancement schemes and appointments at every level shall be through open competition. The total number of faculty positions may be specified, but there should be complete flexibility in choosing the level at which faculty appointments are made, so that, for talented faculty members, career paths are not constrained by the number of vacancies. In order to maintain the quality of the National Universities, mechanisms should be in place to monitor and evaluate the performance and progress of teachers including peer reviews. The procedures and results of these evaluations will be open and transparent.

The research outputs of these universities shall be vital contributors to India's socio-economic development and progress in science and technology. Strong linkages shall be forged between teaching and research, universities and industry, and universities and research laboratories.

The National Universities shall be department-based and shall not have any affiliated colleges. Each department will administer undergraduate and post-graduate courses. Non-teaching functions should be outsourced wherever possible, and a maximum ratio of 2:1 should be maintained between non-teaching and teaching staff. Each university should appoint an internal ombudsman for the redressal of faculty, staff, student and public grievances. Administrative processes, wherever possible, should be streamlined and made transparent and accountable by the use of information and communications technology.

VII. Access

Education is an essential mechanism for inclusion through the creation of social opportunities. It is, therefore, essential that in addition to ensuring that no student is denied the opportunity to participate in higher education due to financial constraints, access to education for economically and historically socially underprivileged students is enhanced in a substantially more effective manner.

Economic barriers to higher education can be addressed by ensuring financial viability for all

students wanting to enter the world of higher education. This can be done through two strategies. One is to adopt a *needs blind admissions* policy. This would make it unlawful for educational institutions to take into account any financial factor while deciding whether or not to admit a student. Every institution will be free to use a variety of instruments to achieve this aim: scholarships or cross-subsidies. In addition, academic institutions would be able to set a fee of their own choice subject to the provision that there are at least two banks that are willing to finance the entire cost of education at that institution, without any collateral other than the fact of admission. The cost of education includes not just fees but also reasonable living expenses including costs such as hostel and mess fees and any other expenses associated with the course of study. Since commercial banks may be wary of funding economically deprived students, especially in non-professional courses, we need a well-funded and extensive National Scholarship Scheme targeting economically underprivileged students and students from historically socially disadvantaged groups, particularly students from rural and backward areas. The success of this proposal depends on generous government support. For instance, the government should endeavour to make available about 100,000 scholarships for such students. These scholarships should be set at a level where students are empowered to go to any institution of their choice.

We also need to undertake more proactive forms of affirmative action to ensure inclusion of marginal and excluded groups. Reservations are essential but they are a part, and one form of, affirmative action. Disparities in educational attainments are related to caste and social groups, but are also strongly related to other indicators such as income, gender, region

and place of residence. Access to quality higher education is further limited for students from certain types of schools. Therefore deprivation of educational opportunities is a multi-dimensional problem and attention needs to be paid to different salient levels of deprivation faced by students. A meaningful and comprehensive framework would account for the multidimensionality of differences that still persist. Such a deprivation index could provide weighted scores to students and the cumulative score could be used to supplement a student's school examination score. After adding the score from the deprivation index, all students could compete for admissions.

The indicators need to be easily identifiable and verifiable for the system to work effectively. They should cover the different types of disadvantages that a student could face at the school level, and while applying for admissions to higher education. This system serves the dual purpose of considering various disadvantages and ensuring that a reserved category student who has otherwise enjoyed other benefits does not get great preference at the time of admissions.

Illustrative indicators of backwardness that need to be measured by such an index could include *social background* covering caste (keeping in view regional variations), religion and gender, *family education history*; *family income, type of school* distinguishing between government and private schools and between schools from different locations, the medium of instruction, *place of residence* distinguishing between urban and rural areas and accounting for regional deprivation by sorting districts along an index of infrastructure or access to social benefits and *physical disability*.

National Science and Social Science Foundation

Indian scientists made significant contributions to the advancement of science and technology in the 1950s and 60s. This was possible because of the support successive governments extended to science education and research. Numerous research and development institutions were established across the country. However, over the years, in spite of continuing government support, both the quality and quantity of the research output from India has been on the decline. It is necessary to examine the reasons for this decline and implement remedial measures.

One widening realization of the last few decades has been that knowledge is a continuum and the boundaries between disciplines are increasingly becoming blurred, tenuous and indefinable.

The following major causes for the current crisis in Indian research deserve attention:

- **Lack of interaction:** There is very rigid compartmentalization of natural and social sciences; as a result, there is little or no interaction between researchers in natural sciences and social sciences.
- **Lack of long-term vision:** Research topics of long term relevance and importance are not taken up as support tends to be for the duration of three to five years because of our planning process.
- **Lack of differential remuneration:** The principle of differential remuneration based on performance and output is not followed to reward those who perform well and chastise those who do not.
- **Lack of scientific methods:** Current teaching methodologies at school, college and university levels do not inculcate a scientific temper in the students.

NKC is aware that the Science Advisory Council has recently suggested the establishment of a National Science Foundation to address some of these and other issues confronting research. It supports this suggestion, with some modifications that will make the solution more comprehensive and practicable.

NKC feels that in view of the disappearing boundaries between various disciplines of knowledge and knowledge emerging as a continuum, India should set up a National Science and Social Science Foundation (NSSSF) which will look at all knowledge as one seamless entity. We will be the first country to set up such an avant garde organization – and rightfully so, given our 5,000-year-old tradition of broad-based knowledge.

The objectives of the proposed NSSSF will be to:
a) Suggest policy initiatives to make India a leader in the creation and use of new knowledge in all areas of natural, physical, agricultural, health, and social sciences, with emphasis on those areas which cut across traditional disciplines;
b) Ensure that science and technology are maximally used for betterment of the lives of our people;
c) Develop a scientific temper

The Governing Board of the Foundation should have a Chairman, a Vice-Chairman and 8-10 members. The Chairmanship and Vice-Chairmanship of the NSSSF should rotate between the sciences and the social sciences, ensuring that if the Chairperson is a scientist, the Vice-Chairperson should be a social scientist, and vice-versa.

The Chairman, Vice-Chairman and members of the Governing Board should be appointed by the Prime Minister and should satisfy the following criteria:
- High level of professional competence.
- High national and international reputation.

- Professional and personal integrity and honesty that are beyond reproach.
- Evidence of absence of any bias or prejudice.
- A strong social commitment, loyalty to the country, and concern for others.
- Commitment to social, professional and financial accountability.
- Someone who combines erudition with articulation.
- Courage of convictions.
- Ability to listen to other people's views and modify one's own if reason demands that

The budget of the NSSSF should be Rs 1,250 crores a year; which will allow it to fund between 200 and 400 outstanding, long-term (5-10 years), extremely carefully selected projects that have the potential of making India a leader. We should expect at least a 20 per cent success rate. The NSSSF should work towards having at least three to four Indian scientists and/or social scientists produce work in six years which should be worthy of a Nobel Prize. The NSSSF will set up a world-wide review system involving some of the best-known scholars around the world for approval of the projects that it supports. The project-funding activity will, however, be only one (though a major one) of the activities of the NSSSF

Some of the major activities and responsibilities of the NSSSF will be to:
- Identify major unsolved problems in various areas of science and social sciences and individuals, groups and/or institutions who can work on them to provide India leadership.
- Identify and set up studies on (a) relationships of science with other areas of human concern such as economics, sociology, politics, art and literature, and vice versa, and (b) social, economic, political, legal, moral and ethical implications of advances in science and technology.
- Identify and set up studies on futuristic interdisciplinary areas in real time.
- Recommend steps that would help inculcate a scientific temper amongst the people of the country as envisioned in the constitution.
- Help the Government to set up systems that would remove bureaucratic hurdles,

increase professional, social and financial accountability; and recognize that creativity in science and social sciences like in all creative endeavors is non-hierarchical.
- Identify and set up studies to find solutions to the problems of the poor and the underprivileged by translating the advances in science and technology.
- Recommend strategies (scientific, technological and social) that would provide additional employment in the rural sector and help set up mechanisms for their implementation with the cooperation of Government, industry and NGOs.
- Recommend steps for optimizing the use of our natural resources (including marine resources).
- Help set up systems for documentation, standardization where necessary, validation and use of our traditional knowledge. Ensure that the custodians and providers of such knowledge and wisdom are identified, are involved in the process, and share benefits accruing from the use of such knowledge.
- Set up policies for international cooperation in science and social sciences.
- Serve as a platform for the coming together of various departments, organizations and agencies of the Government that are concerned with scientific and social science research and related developmental work, to optimally utilize their collective knowledge and capabilities.
- Set up a mechanism for close interaction between state-funded scientific and social science organizations, private sector and responsible and effective NGOs.
- Set up a system that would ensure that appropriate credit comes to India, the Indian institutions and the Indian scientists and social scientists for their work, and that their work is duly publicized in and outside India (e.g. through our embassies and missions).
- Formulate ethical guidelines for administration of science, doing science, communicating science, and using science; and a system of punishment when those guidelines are compromised. Set up similar guidelines for social sciences.

- Recommend setting up of new organizations or institutions that would help advance these objectives and close down existing institutions which have outlived their utility or are not functioning satisfactorily.

- Prepare and present to the Government of India, periodic reports on the state of science and social sciences in India in the global context, and suggest steps that may be taken to improve it.

After a series of discussions and reviews of various E-governance efforts at the Centre and State levels, NKC formed a special group, under the chairmanship of Nandan Nilekani, to study E-governance. The report of this group was discussed at the Planning Commission and presented to the Minister for Communications and Information Technology. Thereafter, several discussions were held with other stakeholders including the Administrative Reforms Commission. Based on these discussions, NKC is convinced that E-governance is more about an opportunity for administrative reforms than merely about electronics and information technology and infrastructure. NKC's recommendations on E-governance which broadly relate to Processes & Standards, Infrastructure and Organization are as follows:

1. **Government process re-engineering before any computerization —** At present the E-governance efforts are primarily based on computerizing age-old processes left behind by British Raj and compounded by a plethora of new layers and silos by Indian bureaucracy, each working within departmental boundaries and pet-priorities. As a result we are computerizing cumbersome processes and hence not commensurately benefiting from it. Simply digitizing the existing government processes merely adds an additional layer of expense, complexity, delay and confusion. NKC feels that there is now a unique opportunity in the history of India to leave behind the British Raj and re-engineer and modernize government processes to build a new India of the 21st century. Hence it is essential zto first redesign the government processes keeping the citizen at the centre, providing for the enablement of citizens, businesses, producers and consumers, replacing the old mistrust and control regime of the colonial past. This redesigning of government processes will drastically reduce the numbers and duration of successive steps required to obtain services. It will also provide traceable records; enable

enforcement of individual performance, accountability, efficiency and productivity, as well as transparency of policies and processes.

2. **Ten to 20 important processes and services —** To make an immediate impact on citizens it is critical to identify and simplify important processes and services, say 10 to 20 to begin with, which are currently cumbersome, bureaucratic and prone to unnecessary delays and even corruption. These processes can be simplified and made available as web-based services. Initially, these services could include birth certificate, death certificate, proof of residence, and ration/ID cards. Other processes can be added over a period of time. This approach will require each state to implement these processes in concert and learn from each other.

3. **Common standards —** At present, various state governments are choosing their own ways of selectively computerizing their processes and provide E-governance. Many of these programmes are vendor-driven and not scalable. It is critical to develop and enforce citizen/business entitlement standards uniformly over all states and central ministries and functions, spanning from voting, taxes, certificates, financial products, law-enforcement and welfare for individuals, properties of land, institutions, businesses etc. These standards should not be hardware-centric and vendor dependent but should enable easy participation by any State, Panchayat Institution, business, NGO or citizen, whenever they decide. These standards, templates and data formats must be designed carefully by teams of experts drawn from government, IT companies, academia, R&D institutions and users or stakeholders who understand latest trends, technology, software, user interfaces and interoperability requirements. NKC recommends that all state governments follow these standards. At the same time, it is also conscious of the need to

incorporate some of the standards followed by state governments.

4. **Best practices and lessons from the past** — A great deal of work has already been done in various central ministries and in state governments. The key is to learn from these and design best practices that are affordable and applicable nationwide to ensure ease of use and interoperability. NKC notes that the Government's own offices, laboratories, and directorates have an immense amount of useful and relevant data (e.g. the seven centres of the National Bureau of Soil Science and Land Use Planning - NBSSLUP), which needs to be digitized and made publicly accessible for use and analysis. Data collected by one agency should be made available across all agencies as well as to the public, subject to national security considerations.

5. **National infrastructure** — It is important to provide secure broadband infrastructure and associated hardware, software and hosting facilities nationwide with easy access at all levels. This infrastructure should be based on a 'user pays' principle and public-private partnership in investments and mutual accountability and efficiency. This infrastructure creation should be led by the Central Government to enforce a high level of security, uniformity and standards at every interface, regardless of state language, culture, legacy and financial health.

6. **Web-based services** — To enforce standards and to keep the governance uniformly responsive and transparent, it is recommended that state governments use templates created by the Central Government to offer localized data and services in Indian languages. In this model, the private sector can invest in creation of access-infrastructure and building relevant business models for user-fee collection and its sharing across all stakeholders, to ensure sustainability and adaptation for future needs. This also implies that all public institutions will make sure that all public data is available on the web.

7. **Open source software** — Because of the enormous size and scope of the E-governance effort in India and because of the availability of globally recognized software talent of Indians, we must actively encourage open source software implementations and open standards wherever possible. This will allow us to have cost-effective solutions and help develop open software products and standards. It will also help improve scaling up and minimize delays caused by repeat tendering.

8. **Specialist CITO (Chief Information Technology Officer)** — Each state and major central government departments must create an empowered chief information technology officer, with relevant expertise and skills in the domain subject and IT usage. These posts must be filled on open recruitment and draw the best and the brightest from India's technologically qualified talent. These officers should be paid market salaries and have a three-year contract with the Government, which can be renewed depending on performance.

9. **New national programmes** — As government plans to spend hundreds of thousands of crores on Bharat Nirman, Rural Employment Guarantee Scheme, and urban development initiatives, it is recommended that we mandate that each of these programmes begin with well engineered E-governance implementation and web-interface that ensures speedy delivery, productivity and efficiency. It is recommended to invest one to two per cent of the national programme budget in establishing new processes and associated E-governance infrastructure to improve delivery and reduce leakages.

10. **Focused organization** — For national E-governance to succeed, it is critical to create an appropriate central organization with structures that can operate in a mission mode, with full autonomy and accountability. NKC recommends creation of an organization with a Chief Executive Officer (CEO), with board members drawn from the IT industry and government to redesign processes and procedures, to represent

a multiplicity of stakeholders and diversity in domain expertise, and to drive the national E-governance plan with facilitation from the CIT Ministry.

The task of this organization shall include but not be limited to:

a) administrative reforms related to process re-engineering

b) providing and maintaining common national ICT infrastructure for E-governance

c) providing leadership and framework for implementation, with immediate focus on selected mission mode projects ; and

d) providing a neutral consulting framework and standards for E-governance with the help of CITOs

There is a need to re-engineer our processes first to change our basic governance pattern for simplicity, transparency, productivity and efficiency, to select 10 to 20 important services that make a critical difference, to offer web-based services, develop common standards and deploy a common platform or infrastructure for E-governance to make it citizen-centric.

As a next step, NKC recommends focusing on the organizational issues related to re-engineering government processes with strong committed leadership, autonomy, flexibility, clarity of purpose, predefined deliverables, measurable milestones and periodic monitoring in order to implement the national E-governance programme within three to five years.

Consultations

Consultations

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Abbreviations

ADRI	Asian Development Research Institute		FELAN	Fast Ethernet LAN
AICTE	All India Council for Technical Education		FICCI	Federation of Indian Chambers of Commerce and Industry
AIIMS	All India Institute of Medical Sciences		FRLHT	Foundation for Revitalization of Local Health Traditions
BARC	Bhabha Atomic Research Centre		GAIL	Gas Authority of India Limited
BCI	Bar Council of India		GDP	Gross Domestic Product
BREAD	Basic Research, Education and Development Society		ICAR	Indian Council for Agricultural Research
BSNL	Bharat Sanchar Nigam Limited		ICMR	Indian Council of Medical Research
CAGR	Compound Annual Growth Rate		ICT	Information Communication Technology
CDAC	Centre for Development of Advanced Computing		IEG	Institute of Economic Growth
CCMB	Cellular and Molecular Biology		IGNOU	Indira Gandhi National Open University
CEO	Chief Executive Officer		IIM	Indian Institute of Management
CIEFL	Central Institute of English and Foreign Languages		IIT	Indian Institute of Technology
CII	Confederation of Indian Industry		INFLIBNET	Information and Library Network
CIT	Centre for Innovative Technology		IP	Internet Protocol
CITO	Chief Information Technology Officer		IP-MPLS	Internet Protocol-Multi Protocol Label Switching
CMC	Christian Medical College		IPR	Intellectual Property Rights
CORE	Centres of Relevance and Excellence		IRAHE	Independent Regulatory Authority for Higher Education
CPR	Centre for Policy Research		ISRO	Indian Space Research Organization
CSE	Centre for Science and Environment		ITCs	Industrial Training Centres
CSIR	Council of Scientific and Industrial Research		ITIs	Industrial Training Institutes
DIT	Department of Information Technology		IUCAA	Inter-University Centre for Astronomy and Astrophysics
DRDO	Defence Research & Development Organization		JNU	Jawaharlal Nehru University
			KSSP	Kerala Sastra Sahitya Parishad
DWDM	Dense Wavelength Division Multiplexing		LAN	Local Area Network
			LIS	Library and Information Services
ERNET	Education and Research Network		MCI	Medical Council of India

MHRD	Ministry of Human Resource Development		PGIMER	Post Graduate Institute of Medical Education and Research
MPLS	Multi-Packet Labeled Services		PSA	Principal Scientific Adviser
NAAC	National Accreditation and Assessment Council.		R&D	Research and Development
NBSSLUP	National Bureau of Soil Science and Land Use Planning		RIS	Research and Information Systems
NCVT	National Council for Vocational Training		SARAI	South-Asia Resource Access on the Internet
NGO	Non-Governmental Organization		SCVTs	State Councils for Vocational Training
NASSCOM	National Association of Software and Service Companies		SCERT	State Council for Educational Research and Training
NCAER	National Council of Applied Economic Research		SEBI	Securities and Exchange Board of India
NIC	National Informatics Centre		SERC	Science and Engineering Research Council
NIEPA	National Institute of Education Planning and Administration		SMEs	Small and Medium Enterprises
NISCAIR	National Institute of Science Communication and Information Resources		SNDT	Shrimati Nathibai Damodar Thackersey
NISTADS	National Institute of Science Technology and Development Studies		SPV	Special Purpose Vehicle
			S&T	Science and Technology
NKC	National Knowledge Commission		TCS	Tata Consultancy Services
NLM	National Literacy Mission		TERI	Tata Energy Research Institute
NPTEL	National Programme on Technology Enhanced Learning		TIFAC	Technology Information Forecasting and Assessment Council
NREGA	National Rural Employment Guarantee Act		TIFR	Tata Institute of Fundamental Research
NSSSF	National Science and Social Science Foundation		UGC	University Grants Commission
			VET	Vocational Education and Training
NTM	National Translation Mission		VPN	Virtual Private Networks
NTS	National Testing Service		VSNL	Videsh Sanchar Nigam Limited
			YCMOU	Yashwantrao Chavan Maharashtra Open University

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