INFORMATION TECHNOLOGY

7.4.1 Over the last decade, India has developed into a major and credible information technology (IT) outsourcing centre. The IT sector is one of the fastest growing segments of Indian industry, growing from Rs. 13,200 crore in 1992-93 to Rs. 80,884 crore in 2001-02. Sixty per cent (Rs. 48,134 crore in 2001-02) is accounted for by software and the remaining 40 per cent (Rs. 32,750 crore) by hardware. The sector has performed exceedingly well on the export front. Exports grew from Rs. 1,454 crore in 1991-92 to Rs. 42,371 crore in 2001-02. Again software comprises the bulk of the exports. Software exports of Rs. 36,500 crore accounts for 86 per cent of total IT exports. Hardware exports of Rs. 5,871 crore account for only 14 per cent. The major achievements of the sector include the development and tremendous success of the software industry, large-scale computerisation and Internet usage, IT-based automation in various industries, development of supercomputer technology etc.

7.4.2 The growth of the sector has led to tremendous pay-offs in terms of wealth creation and generation of high quality employment. IT is an area where the country has a competitive edge and can establish global dominance. Advancements in IT have a profound impact on the economy and the quality of human life. The increasing convergence of technologies and content has created tremendous opportunities as well as challenges for both developed and developing countries.

7.4.3 The Government, while recognising IT as a thrust area for growth, has taken a number of initiatives to promote it (Box 7.4.1). A major effort to promote the sector is proposed in the Tenth Plan. The main objectives are: ensuring the sustained growth of software and IT-enabled services and increase India's share in the global IT market as well as expanding the domestic market; putting in place a policy framework to make India a major force in the hardware manufacturing sector; greater use of IT in governance; bridging the digital divide; promoting the development of software in Indian languages; and improving the quality of manpower, skills and research and development in the sector.

REVIEW OF THE NINTH PLAN

7.4.4 During the Ninth Plan, The IT industry achieved a compound annual growth rate (CAGR)

Table 7.4.1
Production of the IT industry in the Ninth Plan

(Rs. crore)

Item	1997-98	1998-99	1999-2000	2000-01	2001-02
IT Hardware	22,100	25,250	28,100	30,700	32,750
Software Exports	6,500	10,940	17,150	28,350	36,500
Domestic Software	3,470	4,950	7,200	9,400	11,634
Total	32,070	41,140	52,450	68,450	80,884

Box 7.4.1

Major Government Initiatives in the IT Sector

- Setting up of a new Ministry of Information Technology in October 1999, which was re-christened as Ministry of Communication and Information Technology in September 2001 given the increasing convergence between communication and IT.

- Setting up of National Task Force on Human Resources Development in IT in July 2000. The report of the Task Force is before the Government.

- Creation of an IT Venture Capital Fund of Rs. 100 crore in 1999.

- Upgradation of the Education and Research Network (ERNET) connecting various universities and regional engineering colleges (RECs) through a high speed network.

- Upgrading all RECs to the level of National Institutes of Technology.

- Enactment of a comprehensive law called the Information Technology (IT) Act, 2000, which provides legal recognition for transactions through electronic data interchange.

- Lowering custom duties on IT products, allowing 100 per cent foreign direct investment (FDI) in the sector, raising the limit on the issue of American Depository Receipts/Global Depository Receipts (ADR/GDR) by stock swap from $50 million to $100 million or up to ten times the company's export earnings in the previous year.

- Computerisation of government departments by spending up to 3 per cent of the budget on IT. Many e-governance applications were initiated. A number of government portals were hosted. Technology development and content creation in Indian languages were promoted.

- The Government initiated moves to set up 487 Community Information Centres at the block headquarters in the northeastern states and Sikkim for bridging the digital divide.

- The Media Lab Asia project was initiated in 2001 for taking IT to masses.

- Human resource development (HRD) for the IT sector was promoted through a multi-pronged approach to IT education revolving around increasing the availability and improving the quality of education. Many states set up Indian Institutes of Information Technology (IIITs) as centres of excellence.

- Research and development (R&D) in the emerging areas of technology and supercomputing are being pursued.

of 25 per cent in production and 46.5 per cent in exports. While software sector registered an impressive CAGR of 50 per cent, the growth in the hardware sector lagged at 10 per cent. The performance of the industry during Ninth Plan period is given in Table 7.4.1.

STRATEGY FOR THE TENTH PLAN

Hardware Development

7.4.5   The major reasons for the stagnant growth in IT hardware production are distorted tariff structure, poor infrastructure, high cost of finance and stiff competition from multinational corporations (MNCs). This sector is likely to face even harder competition after 2005 when the zero duty regime comes into place in line with the Information Technology Agreement of the World Trade Organisation (ITA-WTO). Although under this regime, import duty on finished products would come down to zero, it is unlikely that duties on various inputs such as chemicals and metals used in hardware production would also be brought down to zero. In such a scenario, the viability of domestic manufacturing will be adversely affected. A comprehensive package

of measures, both short term as well as long term, needs to be put in place to ensure accelerated development of the sector. The most important long-term measure is to evolve a well thought-out hardware policy suited to our requirements. The highlights of any strategy to promote the hardware sector should be:

- Formulate a national hardware development policy by December 2002 in line with the relevant recommendations of the second and third reports of the National Task Force On IT and Software Development.

- Undertake a comprehensive rationalization of the tariff structure, especially for raw materials, to cope with the zero duty regime from 2005.

- Identify global hardware majors through trade delegations and encourage them to set up manufacturing units in India.

- Work out a specific action plan to ensure the development of world class products at competitive prices. This should include promoting international specific alliances, dedicated R&D, targeting new overseas markets, continuous product improvement etc. Existing Indian companies have to play a major role in this regard.

- Strengthen quality certification programmes and encourage the establishment of test laboratories for international certification in order to generate greater confidence in suppliers from India.

- Promote HRD and skills development in key technologies like embedded systems, VLSI (Very Large-Scale Integrated Circuit) design, blue tooth technologies etc. The industry needs to set up contract design centres and spend 5 per cent of revenues on R&D.

Software Development and Marketing

7.4.6   The total global software and IT services market is estimated to be about $ 1.2 trillion of which India's share is 2 per cent. The Indian software industry is under threat from emerging competitors like China, the Philippines, countries of the Commonwealth of Independent States (CIS), South Korea etc. Strategies would, therefore, have to be re-oriented for sustained growth. The domestic market also needs to be developed. The experience of countries like China which have a very strong and vibrant domestic market, needs to be studied when developing our long term strategy. Major initiatives that require immediate action in the software sector are:

- The software industry needs to move up the value chain by developing high value products through R&D. Software firms need to tie up with the extensive R&D network that exist in the country.

- To ensure long-term sustained domestic growth and exports, the software industry needs to move from being software solutions providers to manufacturers of packaged products.

- Continuous improvement in productivity will hold the key to maintaining our competitive edge in the global market. Three vital inputs are need for this: sustained improvement in the quality of products and services, availability of high quality manpower and strong R&D support.

- For building brand equity and positioning the India brand abroad, large investments in marketing and brand building would be required. The United States would continue to receive priority attention for software exports. Other elements of the marketing strategy should be strengthening marketing channels globally, expanding the focus to emerging markets in Europe, the United Kingdom, Asia-Pacific, Japan etc., and entering into agreements with end-user countries for executing large projects.

- Industry associations like the National Association of Software and Service Companies (NASSCOM), Manufacturers Association of Information Technology

(MAIT), Electronics and Computer Software Exports Promotion Council (ESC) etc., need to assist the small and medium enterprises (SMEs) in their export efforts through effective networking and one-on-one meetings with potential customers in developed countries.

- Priority attention needs to be given to the development and promotion of software in Indian languages and meeting local requirements in order to expand the domestic market.

Human Resources Development

7.4.7   In order to achieve sustained growth in the IT sector and maintain India's competitive edge in the field, high quality professionals in adequate numbers are required. According to a McKinsey-NASSCOM study, India would require 2.2 million IT professionals by 2008 – 1.1 million in the hardcore IT sector and an equal number for IT-enabled services. The country needs to ensure the right mix of technical, business and functional skills in the workforce to meet the needs of individual business segments and customer markets. Educational and training institutions need to match the demands of the industry. The major initiatives required in this regard are:

- Continuous upgradation of standards at the school level with emphasis on physics, mathematics and English.

- Make microelectronics and biology the new focus areas in tertiary education.

- Updating the syllabus of computer engineering, electronics and IT in various technical institutions in line with the demands of the industry. The curriculum in other branches of engineering should also be reoriented and broad based to include IT subjects.

- Postgraduate engineering education and innovative research in IT are imperative in order to maintain quality and facing new challenges in this dynamic sector.

- Ensuring a continuous upgrading of teaching faculties and introduction of teaching aids like computers, access to Internet, videos etc.

- Augmenting and upgrading facilities in existing RECs and engineering colleges under deemed universities to Indian Institute of Technology (IIT) level so that the country has at least 100 such institutions by the end of the Tenth Plan to meet the requirements of quality manpower.

- Recognizing, without further delay, the 'C'-level course of the Department of Electronics Accredited Computer Courses (DOEACC) as equivalent to M.Tech in computer engineering for all purposes.

Legal and Regulatory Issues

7.4.8   The Information Technology (IT) Act, 2000 provides the basic regulatory framework for the domestic IT industry. The Communication Convergence Bill (CCB), 2000, which has been introduced in Parliament, needs to be enacted and operationalised at the earliest to provide the required institutional framework for ensuring convergence of services i.e. telecom, IT and media. However, several related issues need to be sorted out effectively to ensure optimum growth of the IT sector. Some of these are:

- The issue of software piracy needs to be tackled through suitable legal and other provisions of the IT Act.

- Growth of e-commerce would also depend to a great extent on effective IT security systems for which necessary technological and legal provisions need to be put in place and strengthened constantly.

- The IT Act does not clarify all the issues regarding taxation of electronic transactions, especially indirect taxation for goods/services delivered electronically.

- The Act is silent on the issue of protection of intellectual property rights (IPR).

- The issue of controlling cyber crime has not been comprehensively addressed by the IT Act since the offences defined in the Act are not exhaustive.

- Law enforcing agencies are not fully equipped and trained to deal with cyber crime.

- Safeguards to protect the privacy of personal and business data collected over the Internet need to be put in place.

Financial Issues

7.4.9   The domestic hardware industry in general, and electronic components manufacturing units in particular, are charged high interest rates when borrowing money. Fast obsolescence, weak R&D base, poor infrastructure etc., have resulted in a situation where there have been no new investments in the hardware sector during the Ninth Plan. It has, on the other hand, resulted in the closure of some existing units. The Tenth Plan Working Group on IT has recommended the creation of an Electronic Component Development Fund with a corpus of about Rs. 100 crore. An appropriate quantum of capital, depending on the criticality of the components, could be made available out of this Fund at a subsidised rate of interest to credible entrepreneurs.

7.4.10   Advanced IT skills in the Indian software industry is limited to a few leading companies which contribute about 65 per cent to the total software exports. The SMEs, which are larger in number, contribute about 35 per cent to software exports. Unless the SMEs are promoted through suitable policies, including fiscal incentives, it may be difficult to achieve the Tenth Plan target of $ 50 billion software exports. Some measures that need to be taken to address financial needs of the IT industry are:

- Developing confidence among financial institutions about the potential for the growth of the IT sector.

- Evolving special norms to finance operations to augment bandwidth by

considering it a tangible asset for collateral purposes.

- Evolve norms to finance the working capital needs of the IT software sector by considering the intellectual brain-ware also a tangible asset for collateral purposes.

Convergence

7.4.11   The unprecedented growth of innovative services and technologies are challenging the demarcation of various services, service providers, users and government regulations in the communication and information technology industry. The success of the convergence regime would lie in ensuring a seamless transition to the new services and information delivery systems. The single biggest area of convergence could be the integra-tion of the Internet with the broadcast sector. The Communication Convergence Bill, envisages a unified regulatory regime to address the convergence of telecommunications, data communications, Internet, satellite and terrestrial broadcasting, cable television, audio broadcasting, software and content creation.

E-governance

7.4.12   The delivery of government services has become very inefficient because of too much discretion at every level, lack of transparency and cumbersome record management. E-governance denotes the application of IT to government processes in order to bring about Simple, Moral, Accountable, Responsive and Transparent (SMART) governance.

7.4.13   Though the central and several state governments have taken some initiatives in e-governance during the Ninth Plan, these efforts have yet to take the shape of a systematic national programme. Actions and programmes have been driven primarily by individual initiatives rather than institutional thrusts. Different levels of development, computerisation and political will necessitate the adoption of some standardised, uniform pattern in order to avoid the emergence of a digital divide.

7.4.14   So far, the programme of e-governance has largely been restricted to the efforts of the National Informatics Centre (NIC) and a few individual organisations. The emphasis has been on providing connectivity, networking, technology upgradation, selective delivery systems for informa- tion and services and a package of software solutions. It is now necessary to look seriously at the re-engineering of procedures and rules which form the core of any effective programme of e- governance. This, perhaps, is the most difficult part of the entire exercise and requires priority attention at all levels. Keeping all this in view, the master plan of e-governance in the Tenth Plan has to be guided by the following principles:

- A clearly focused vision of the objective of introducing e-governance.

- The range and standards of delivery of information and services to the people must be defined, with time frames within which they are to be attained.

- Any plan or scheme for e-governance should be sustainable and should not be a passing fad.

- Standardisation of technologies without any delay. Otherwise, the ensuing con- fusion will negate the advantages of use of IT.

- Areas of public and private funding should be clearly spelt out.

- State-specific plans and schemes must be drawn up, keeping in mind the situation in different states.

- All schemes must be interactive, otherwise they will only be labour-saving devices for government functionaries.

- Government to government (G2G), govern- ment to citizen (G2C) and government to business (G2B) modalities have to be developed. E-governance also covers local government as well as private corporate bodies, For e-governance to be effective, it is necessary to draw up the architecture of the whole system.

Box 7.4.2
Successful E-governance Initiatives in States

Several state governments have taken steps to promote e-governance. Andhra Pradesh, Madhya Pradesh and Rajasthan have launched the Chief Minister's Information System to monitor a range of activities from developmental progra- mmes to redressal of public grievances. The Andhra Pradesh Development Monitoring System has a database (with spatial as well as non-spatial parameters) of the entire 75 million population. APSWAN (Andhra Pradesh State Wide Area Network), a state-wide network for voice, data and video communication, is the basic information highway for improving government-citizen and government-industry interface.   The state's Secretariat Knowledge Information Management System (SKIMS) efficiently manages information in the Secretariat. Rajasthan's *Vikas Darpan* envisages a geographical information system (GIS)-based planning and decision support system. The Disaster Management System in Gujarat maintains communication during natural disasters. The state's VIDYUTNET, India's first VSAT-based communication network, supports real-time data applications for power generation and distribution. In Karnataka, computerisation of treasuries has helped capture every transaction at all district and taluka (sub-district) treasuries. Kerala has introduced the Rural Development Net (RD Net) project to connect the state's 152 block offices with a view to transforming local bodies into genuine institutions of self-governance.   Besides, the Office of Controller of Entrance Examinations has been automated to bring about transparency in the allocation of colleges to successful students.

Andhra Pradesh, Kerala, Maharashtra, Rajas- than and Tamil Nadu provide online registration of property transactions. Other areas where IT has been used to improve services to the public are: registration of vehicles and issue of driving licenses in Andhra Pradesh, Delhi, Gujarat and Tamil Nadu; land records in Andhra Pradesh and Tamil Nadu; and single-window/one-stop delivery

of public services in Andhra Pradesh, Kerala, Madhya Pradesh, Maharashtra and Tamil Nadu.

The use of IT in the delivery of public services has several success stories. Andhra Pradesh's TWINS project enables the citizens of the twin cities of Hyderabad and Secunderabad to access 18 services of six departments through a single window. Under the *Warana* project of the NIC in Maharashtra, facilitation booths in the rural areas provide information about employment and agricultural schemes and government procedures, automated assistance in completing applications for government certificates, crop information, information on bus and railway services, medical facilities, water supply etc. Similarly, the *Gyandoot* project of Madhya Pradesh, which won the Stockholm Challenge IT Award 2000, provides information regarding market rates of grains and vegetables; dispenses land records; and issues income, domicile and caste certificates. The smart card-based driving licence project of Gujarat has equipped all the Regional Transport Offices with state-of-the-art enrolment and issuance centres. The Bhubaneshwar Development Authority in Orissa has set up kiosks that map the city using GIS. Citizens can now check on the status of existing schemes for housing, commercial and industrial projects without depending on middlemen. Tamil Nadu's tele-medicine project allows doctors in remote areas to consult experts on special cases or for referral purposes through a direct ISDN link. The West Bengal Electronics Industry Development Corporation has implemented a map-based GIS project for one-stop access to all information pertaining to a municipal area. The state government has also designed a web and kiosk-based education information system to help students with career counseling and selection of educational institutes. Given the country's linguistic diversity, special mention needs to be made of the Tamil Internet Research Centre, which has been set up for funding projects promoting the use of Tamil on the Internet in order to maximize access for citizens.

Computer Penetration, Affordability and Digital Divide

7.4.15   The reach of the basic IT infrastructure is still limited and not affordable for the common man. The high cost of personal computers (PC) is one of the major factors for low PC penetration in the country. Development and production of mass-friendly and affordable devices would, therefore, need to be given high priority in the Tenth Plan. Development of low-cost PCs to suit domestic needs is central to any strategy in this regard. Development of inter-lingua software with visual feature applications will have to be the other important element of the strategy to increase PC penetration.

7.4.16   Innovative and cost-effective solutions have to be found to make the required bandwidth available in remote and rural areas. Innovations like small electronic devices fitted in a PC having the capacity to disseminate a bandwidth of about 11 mbps (megabits per second) around a four to ten km radius would need to be encouraged to make broad-band connectivity available all around in the country. This innovative technology has tremendous significance in the case of the postal sector. The existing 1.55 lakh post offices can become radial points for dissemination of bandwidth. Since Internet telephony has now been allowed, the existing STD/PCOs need to be upgraded with Internet facilities to expand Internet connectivity throughout the country. Rural post offices should also be modernised this way.

7.4.17   The digital divide is one of the major issues facing the IT sector. The disparities between different sections of the society and different regions must also to be bridged. Special programmes may have to be designed for IT-enabled services in rural areas. Panchayati raj institutions (PRIs) and non-government organisations (NGOs) have to be effectively involved in this programme.

Successful Indian IT Companies

7.4.18   The Indian IT industry has already created a brand image in the global market. A large number

of Indian software and IT services companies have acquired international quality certification. Out of top 400 companies, more than 250 have acquired ISO 9000 certification.

(i) Infosys Technologies Limited : Infosys is an end-to-end IT consulting and services provider helping global corporations to successfully transform their businesses. The company has been awarded SEI CMM Level 5 quality certification. It earned a revenue of Rs. 1900.60 crore in 2000-01 and is listed on major stock exchanges like the National Stock Exchange (NSE), Bombay Stock Exchange (BSE) and NASDAQ. The Infosys portfolio of services includes e-strategy consulting and solutions, large application development and enterprise integration services. It also has product co-development initiatives with numerous communication and Internet infrastructure companies that are creating the building blocks for the digital economy. The company has marketing channels in the United States, United Kingdom, Australia, Belgium, Canada, France, Germany, Singapore, Japan etc.

(ii) Wipro Technologies : Wipro Technologies, the first CMM Level 5 and SEI CMM level certified IT services company globally, provides comprehensive IT solutions and services to companies globally and within India. This includes systems integration, information systems outsourcing, package implementation, software application development and maintenance and R&D services. The company earned revenue of Rs.2642.92 crore in 2000-01.

(iii) Tata Consultancy Services (TCS) : TCS offers end-to-end strategy consulting and system integration services to help organisations build their business in the global economy. TCS employs more than 16,000 consultants across 50 countries and its solutions are backed by 60,000 person-years of experience, cutting-edge R&D, world-class training and software development facilities. Thirteen of its centres function at SEI CMM Level 5, and four of its centres have People-CMM Level 4 assessments, the highest quality assessment levels in the world. Seven out of the US Fortune Top 10 companies are TCS clients. TCS earned a revenue of Rs. 3,142 crore in 2000-01.

(iv) Satyam Computer Services Limited: Satyam Computer Services Limited, is a multi-faceted end-to-end IT solutions provider. It offers a range of expertise that includes software development services, embedded systems, systems integration, ERP solutions, enterprise application integration, customer relationship management, supply chain management, product development, e-commerce, consulting etc. Satyam, an SEI CMM Level 5 company, operates in 35 countries and has over 300 global clients, including 40 Fortune 500 corporations. Over 10,600 highly skilled IT professionals at Satyam and its associated companies provide customised IT solutions from development centres in India, United States, United Kingdom, West Asia, Japan and Singapore. The company earned a revenue of Rs. 1,220 crore in 2000-01.

(v) HCL Technologies Limited : HCL Technologies provides a broad range of services to clients worldwide, including technology development, software product engineering, networking and application services. The company focuses on technology as well as R&D outsourcing and delivers these services through an extensive offshore software development infrastructure in India and a vast global marketing and project network. Its offshore model involves delivery of outsourcing services to clients abroad by technical professionals located in India and may also include onsite work on a short-term project-by-project basis. Two of the company's centres have been awarded SEI CMM Level 5 international quality certification. The company, which is doing business in the United States, United Kingdom, Japan, Germany, Sweden, France, Netherlands, Italy, Australia, Hong Kong etc., has five major international collaborations, and earned a revenue of Rs. 1,405.10 crore in 2000-01.

(vi) I-flex Solutions Limited : i-flex solutions, a SEI CMM Level 5 company, is a leading provider of software solutions and services to the banking and financial services sector. Its flagship product 'FLEXCUBE', a universal banking solution, is among the top two companies selling solutions worldwide for two consecutive years — 1999 and 2001. Apart from India, I-flex has representative offices in the United States, Argentina, the United Kingdom, the Netherlands, Kenya, Nigeria, Singapore and earned Rs.308.58 crore revenue in 2000-01.

(vii) Mahindra – British Telecom Limited (MBT): MBT is focused on the growing global telecom industry. It offers software solutions and systems integration services to telecom operators, mobile operators, telecom equipment manufacturers and technology suppliers. MBT has 21 marketing offices and development centres worldwide and earned revenue of Rs.387.39 crore in 2000-01.

(viii) NIIT Limited : NIIT, a global IT solutions and training company, operates in 38 countries with regional headquarters in the United States, Japan and several other countries in Europe and Southeast Asia. NIIT's strength lies in the unique synergy of its businesses — IT software and IT training. This enables NIIT to provide a steady stream of software professionals for offering solutions in state-of-the-art techno logies with high levels of scalability across domains. NIIT's software business has been assessed at SEI-CMM Level-5 and also has an ISO 9001 certification. It has earned revenue of Rs. 682.80 crore in 2000-01.

(ix) Patni Computer Systems Limited (PCS): PCS is a leading global services organisation focussing on providing integrated software and project solutions to clients in a wide range of technology environments. The breadth and scope of its technology skills, applications expertise and experience allows it offer full service support and single window software outsourcing opportunities to its customers. The company earned revenue of Rs. 518 crore in 2000-01.

(x) Pentamedia Graphics Limited: Pentamedia Graphics is one of the world's biggest entertainment graphics player, focussing on animation and special effects for big, small and personal screens. The company extends its expertise into core areas of films/broadcasting, video, compact disks/digital versatile disks (CD/DVD) and entertainment, including studio entertainment, media entertainment, web entertainment, and sports entertainment. The company has markets in the United States, United Kingdom, Singapore, Japan, Malaysia, Australia, West Asia etc., and has alliances with IBM, Silicon Graphics, Softimage and Eastman Kodak. It earned revenue of Rs. 552.38 crore in 2000-01.

(xi) Silverline Technologies Limited : Silverline Technologies is an international software solutions provider with over 2,300 software professionals globally. With SEI CMM Level 4 certification, Silverline has a track record of delivery on time and within budget of state-of-the-art IT solutions, besides a comprehensive set of e-business consulting and IT services. The company earned a revenue of Rs. 707 crore in the year 2000-01.

APPROACH IN THE TENTH PLAN

7.4.19 The Government's hitherto hands-off policy with regard to the IT sector would continue in the Tenth Plan. It will confine itself to being a facilitator and a catalyst for accelerated growth of the sector. It plans to take major initiatives in the area of e-governance with a view to ensuring balanced and orderly growth. The major objectives envisaged for the IT sector in the Tenth Plan are:

- To ensure the sustained growth of software and IT-enabled services and increase India's share in the global market.

- To put in place the basic policy framework for making India a major force in the hardware-manufacturing sector.

- To devise appropriate policy interventions for the greater use of IT for promoting more efficient, transparent and responsive governance.

- To promote the development and use of software in Indian languages to meet local requirements and expand the domestic market.

- To take necessary steps for taking IT to the masses by making it affordable, easy to use and useful in day-to-day life.

- To put in place the required policy framework to improve the quality of manpower, skills and R&D in IT.

Targets For the Tenth Plan

7.4.20 Based on the recommendations of the Tenth Plan Working Group on IT and information available from other sources, the following projections have been made:

i) The IT industry is envisaged to achieve a production target of Rs. 2,82,000 crore by the terminal year of Tenth Plan (2006-07), with the software sector accounting for Rs. 2,13,000 crore and hardware production Rs. 69,000 crore.

ii) Against the current level of $ 8 billion, software and IT services exports are expected to grow to $ 87 billion by 2008. While the software export target is set at $ 50 billion, the target for export of hardware has been kept at $ 10 billion by 2008.

iii) Keeping the above growth potential in mind, IT exports are likely to constitute 35 per cent of India's total exports in 2008 against the present level of 14 per cent. The software and IT services industry is likely to contribute 7.7 per cent of gross domestic product (GDP) in 2008 against the present level of 1.7 per cent.

iv) India's share in the overall global software market is expected to increase from the present 2 per cent to 6 per cent by the terminal year of the Tenth Plan. The United States and Europe are expected to continue to be the major

markets for software in the future. In the Asian region, China, the Philippines, the CIS countries and South Korea are emerging as new centres of software excellence. Japan has also shown keen interest in outsourcing software requirements to India.

v) Domestic IT spending in the US and western Europe is expected to touch $ 634 billion and $ 424 billion respectively by 2004. IT spending in the Asian region is expected to go up to $ 200 billion in 2002 from $ 152 billion in 1999. The Asia-Pacific region is likely to account for IT spending worth $ 240 billion by 2004.

vi) India's IT spending is about 0.7 per cent of GDP, as compared to 1.3 per cent in Malaysia and 2.5 per cent in Singapore. India is almost five years behind China in terms of the number of PCs, Internet users, cable TV subscribers, fixed telephones etc.

vii) The Internet subscribers base is expected to cross 35 million by 2007 from the present level of four million.

viii) The IT industry is projected to generate seven million jobs by 2008. The hardware sector is expected to provide employment to 4.8 million persons while the software sector and IT-enabled services would account for the remaining 2.2 million jobs.

ix) PC penetration is expected to become 20 per thousand by 2008 against 5.8 at present.

Thrust Areas in Tenth Plan

7.4.21 The Department of Information Technology (DIT) is meant to act as a nodal institution for the promotion of the sector, facilitating and coordinating the various initiatives of the central and state governments and the private sector. A list of Plan schemes of the DIT indicating Tenth Plan outlays is given in the Appendix. Keeping in view the basic approach, objectives and targets envisaged for the sector in the Tenth Plan, the major thrust areas are:

- Software development and exports and IT-enabled services. New markets for software exports would be developed.

- Priority will be given to e-governance, development of software in Indian languages, IT for masses, distance education, e-commerce, cyber security and HRD.

- Postgraduate education and research in IT would be pursued as will R&D in the emerging areas of bluetooth technology, e-commerce, nano-technology and bio-informatics solutions.

- Foreign investment in the sector will be encouraged by further simplifying policies and strengthening and upgrading tele-communication and IT infrastructure.

Major Initiatives/Projects in the Tenth Plan

7.4.22   The major projects proposed to be pursued in the Tenth Plan period are:

Software Technology Parks

7.4.23   As the existing 35 government software technology parks (STPs) and 25 private STPs have made significant contributions to national software exports, the Government would encourage the setting up of new STPs in private sector.

Community Information Centres

7.4.24   The Government has taken up an ambitious project for setting up Community Information Centres (CICs) in 487 blocks in the northeast and Sikkim at an estimated cost of Rs. 242 crore to provide connectivity at the block level. The project is aimed at development of IT infrastructure in the region and to promote applications of IT in health-care, distance education, HRD, e-governance, data transmission, documentation, connectivity for management of national calamities, disaster management, etc.

Indian Languages Interfaces to Computers and IT for Masses

7.4.25   While the English-speaking population has easy and adequate access to IT services, the real challenge lies in the creation of software for establishing an interface of computers with diverse Indian languages. The endeavor will be to develop suitable software and technologies to enable the people to use computers in local languages. Attempts to take IT to the masses will be accelerated by promoting Internet accessibility, content creation in local languages, IT applications for various disabilities, empowerment of the masses with special thrust on women and children, rural health-care systems, digital library in order to preserve the country's cultural heritage and social identity.

E-commerce

7.4.26   E-commerce has proven its efficiency in supply chain management in the business to business (B2B) segment and enhanced customer relationship management (CRM) in business to consumer (B2C) transactions, apart from benefits like just-in-time (JIT) management. Various technology development and regulatory initiatives taken in the Ninth Plan for the promotion of e-commerce would be pursued in the Tenth Plan. These include: strengthening the information and communication infrastructure, establishment of a legal and regulatory framework, technology development and implementation of IT security. Apart from technological and other constraints, e-commerce could not grow as expected in India due to insecurity and non-transparency in financial dealings. The DIT has worked out a scheme on E-commerce and Information Security in the Tenth Plan to address issues relating to this.

E-governance

7.4.27   E-governance would be encouraged in a major way by the central and state governments and public utility service organisations for improving efficiency and transparency. The major thrust of initiatives in this field would be to put in place the required institutional framework and create the necessary infrastructure. The major schemes envisaged include Support for Multi-functional Application Community Centres, a National Institute of SMART Governance, Creating Citizen Databases through ID/SMART Cards and Development of Local Language Tools and Content.

Media Lab Asia

7.4.28   The Media Lab Asia project has been taken up by DIT in collaboration with the Massachusetts Institute of Technology. The objective of the project is to bridge the digital divide through development of state-of-the-art Information and communication technologies and deploying these technologies for the benefit of the citizens, especially those in the rural areas, and empowering them by creating business opportunities. The thrust areas to be taken up in the project are health, education/learning, employment and micro-entrepreneurship.

IT Security

7.4.29   As the country moves towards becoming a vibrant information society, it is necessary to protect important resources from any kind of threat. Indian companies, government agencies etc., will have to be trained in IT security and specialised institutions need to be developed to address this issue. Also, research will have to be undertaken in the area of cryptography.

Human Resource Development

7.4.30   The availability of qualified human resources in adequate numbers at various levels is vital to meet the Tenth Plan targets. With the mushrooming of engineering colleges in the private sector, quality concerns in technical education have taken a back seat. Steps would be taken to address the issue of lack of qualified faculty and poor infrastructure in these institutions. Promotion of distance education, emphasis on postgraduate and continuing education and research would also receive adequate attention.

Vidya Vahini and Gyan Vahini Programmes

7.4.31   These two programmes would be initiated on a pilot basis for providing connectivity to Government Senior Secondary Schools (Vidya Vahini) and upgradation of IT infrastructure in the higher learning institutions (Gyan Vahini) during the Tenth Plan.

Strategy For Critical Electronic Materials

7.4.32   The advances in electronic materials have opened up new frontiers in the area of IT and communication, nuclear, space and other technologies. New advanced materials also play an important role in the miniaturisation of electronic components and devices. There is a major gap in the indigenous availability of professional grade components for use in high quality manufacturing of electronic equipment. This can, to some extent, be attributed to the non-availability of a wide variety of electronic materials meeting the required specifications at competitive rates. The competitiveness and growth of the component technology sector is dictated by the capability of the domestic manufacturers of electronics materials. Some critical electronic materials like pure gallium, tellurium, cadmium, tantalum powder, tantalum pentoxide, thick film pastes, alumina substrate, ceramic composites etc., have been identified for production in the Tenth Plan. The Centre for Electronic Materials for Electronics Technology (C-MET), Pune, under the DIT has done excellent work in the development of electronic materials, successfully transferring technologies to industry for commercial production. It is expected that critical materials would be produced through this alliance during the Tenth Plan as well.

INFORMATION TECHNOLOGY-ENABLED SERVICES

7.4.33   The Internet and other advances in IT have ushered India into an era where various services can now be delivered remotely. Time and distance barriers have been dismantled as software companies provide customer interaction services, help desks, medical transcription, translation, localisation services, data digitisation, legal databases, data processing, back office operations, digital content development, remote network management and specialised knowledge services to both domestic and foreign customers.

7.4.34   IT-enabled services or remote processing services are today being considered a major growth

market for the Indian software and services industry and are expected to generate significant employment opportunities in the future. According to an estimate, by 2008, IT-enabled services activities globally will be to the tune of $ 50 billion. The two most promising segments in IT-enabled services are customer interaction services, including call centres and content development and animation.

7.4.35   India is a preferred outsourcing destination and enjoys the confidence of global corporations because it offers innovations as well as competitiveness in terms of cost and quality. This has been made possible due to some favourable factors:

- The availability of abundant talent.

- Software exports to over 165 countries.

- The presence of a mature IT industry with world-class systems.

- India accounts for 69 of the 122 IT companies in the world having the prestigious CMM 4 and 5 level quality certification. India will soon have the highest number of ISO certified companies in the world.

- IT-enabled services hubs such as Ireland and Singapore are increasingly back-ending their operations in India, since skilled professionals are becoming a scarce resource in these countries.

- The telecom infrastructure is becoming competitive in India. With the active support of the Government, India is emerging as a preferred global hub.

- India offers favourable time zone differences and is able to provide round-the-clock services.

- India has state-of-the-art technologies for providing total solutions to outsource turnkey projects.

7.4.36   The Tenth Plan Working Group on IT has projected that IT-enabled services would generate revenues of Rs. 81,000 crore and provide employment for 11,00,000 people in India in the next eight

years. The current status and growth potential for remote processing services are:

- The revenues of IT-enabled services jumped from Rs. 2,400 crore in 1999-2000 to Rs. 4,100 crore in 2000-01.

- This segment employed 70,000 people and accounted for 10.6 per cent of the total IT software revenues in 2000-01.

- In 2001-02, the sector is expected to show a high growth of 54 per cent, well above the industry average. Revenues during the year for IT-enabled services are expected to touch Rs. 6,300 crore.

- A large number of players are already operating in this market and this includes key multinational corporations that have set up their call centres to cater to the requirements of both the overseas and domestic markets.

- Other IT-enabled services activities that have witnessed a rise over the last two years include medical transcription, and back-end processing operations.

- The offshore economics of IT-enabled services is as good as those of IT services. The revenue per employee for many areas of IT-enabled services are comparable to those of other IT services.

Opportunities in major segments of IT-enabled services

7.4.37   The spectrum of IT-enabled services is wide. Some of the popular services with substantial wealth and employment generating potential are:

Call Centres/Customer Interaction Services

7.4.38   These services rely heavily on state-of-the-art communications and information technologies. The centre is used for a number of functions like marketing, selling, information dispensing, advice, technical support and e-commerce. There are more than 100,000 call centres worldwide and this number is expected to

grow to 300,000 by the end of 2002, resulting in employment for approximately 18 million people. By 2003, around $ 60 billion is expected to be spent on call centre services.

Business Process Outsourcing (BPO)/Back Office Operations

7.4.39   The potential for business process outsourcing (BPO) in India is projected to grow from the present level of $1.49 billion in 2001-02 to $ 21 billion by 2008. India can tap this potential through aggressive marketing, strengthening IT infrastructure and by creating specialised training facilities. Banks and airlines require large-scale data processing for their management and decision-making. Such organisations, with extensive data turnover and customer interface, send raw data over high speed communication links to remote locations for data entry, processing and necessary reconciliation etc., enabling them to save costs and resources. Such centres are basically the offshore extensions of existing information and back-office operations. There has been a growing trend to outsource these services to major IT-enabled service providers. India stands to gain from such a trend, as the Indian IT industry has been able to make a mark in this field. It also has access to a huge pool of skilled as well as semi-skilled professionals and offers relative cost advantage.

Insurance Claims Processing

7.4.40   Large insurance companies can get the claims of their clients processed anywhere, as long as a large number of graduates proficient in English, a few doctors and a few accountants are available. Apart from processing, a large amount of logistic support is also required. The guidelines to the process are well established and hence can be easily performed at remote locations. To save costs, large insurance companies in the United States are now outsourcing a lot of such work, which can prove to be another good opportunity for India to tap.

Medical Transcription

7.4.41   Medical transcription is a time and cost saving process for transcribing medical records

dictated by doctors and other healthcare professionals. In countries like the United States, doctors' time is at a premium and they simply record their findings on a Dictaphone. The recordings are then sent through datacom lines to overseas companies, which transcribe these recordings into reports and send them back electronically. Turnaround time is often as low as two hours and, therefore, this process is often better than what the hospital may have achieved if it had done all of it in-house.

Legal Databases

7.4.42   Many legal firms in the United States and other developed countries have started to outsource their database work to organisations having a large, cost-competitive, English-speaking workforce of trained lawyers. The job involves creating a database of the firm's existing records, indexing on the basis of various useful and commonly understood criterion, keeping track of new documents being created and incorporating them into database as per well established parameters. Lawyers can then simply use their computers to draw up a history of similar cases and draw a clear plan of action.

Digital Content Development

7.4.43   Digital content development is emerging as one of the fastest growing service segments in the global IT-enabled services industry. It caters to the needs of website management, production of content for new media such as CD/DVD and products of convergent technologies such as Internet-enabled television. It offers a large emerging potential as more and more students, professionals, individuals and offices realise the need to have easy access to information that can also be suitably fused with other media.

Online Education

7.4.44   The online education market is booming the world over. The global online education and e-learning market is projected at $ 11.4 billion in 2003. More than 1,600 companies, including nearly half the *Fortune 500* firms, have built corporate universities. Nearly all of them offer some classes online

primarily through the Web, via video-conferencing, CD-ROMs and other technologies. The online education market in India is showing significant growth potential and the sector is expected to be a significant revenue earner for the industry.

Data Digitisation/GIS

7.4.45 Digitisation is a labour-intensive process by which physical or manual records such as text, images, video and audio are converted into digital forms. Data digitisation services offer a very good opportunity for India, due to the relatively lower costs and the technical skills available. GIS is a collection of tools and methods that are used in a digital environment for the study of spatial information. IT-enabled services in GIS offer business opportunities from Europe and the United States. Many multinational companies have set up centres providing GIS services in India.

Payroll / HR Services

7.4.46 HR services is another area that has immense potential in the field of IT-enabled services. HR service components include recruitment screening, administration and relocation services, payroll processing, compensation administration, benefit planning, and administration.

Web Services

7.4.47 Internet and the wide use of the Web has accelerated the growth of remote services and created opportunities of its own. Some of the Web services include e-mail management, Internet security, web page designing and updating, managing of Internet commerce, exchange of data, payment and clearance, electronic data interchange, supply chain management and Internet data centres etc.

Action Plan for the promotion of IT-enabled services

7.4.48 Since the Indian IT industry has matured enough, the IT-enabled services are expected to grow through private initiatives in the Tenth Plan.

The Government has already provided income tax exemption to most of the IT-enabled services. Further initiatives that need to be taken for making India a sustainable hub for these services include:

➢ Support from local authorities and state governments for IT-enabled services units in order to ensure ease of operations and start-up assistance.

➢ Setting up of training infrastructure for IT-enabled services and the involvement of Industrial Training Institutes (ITIs) and Polytechnics for call centre management and degree-level courses for the industry.

➢ Flexibility to call centres to merge domestic and international business in the same facility.

➢ Creation of an 'India Brand' marketing fund for promoting India as a preferred destination for the IT-enabled services sector.

➢ Special incentives to promote entrepreneurship and tele-working for women in the IT-enabled service sector.

THE PATH AHEAD

➢ Encourage global hardware majors to set up their manufacturing units in India.

➢ A comprehensive rationalisation of tariff structure to cope with the zero duty regime on finished products that will come into place after 2005.

➢ Formulate a national hardware development policy by December 2002 by including relevant recommendations of the second and third reports of the National Task Force on IT and Software Development.

➢ Encourage the setting up STPs by the private sector.

➢ The software industry needs to move up in the value chain by developing high value products through regular R&D.

- The focus of Indian industry needs to shift from providing software solutions to becoming manufacturers of packaged products.

- Make large investments in building brand equity and positioning the India brand abroad.

- Industry associations like NASSCOM, MAIT, ESC etc. must help SMEs in their export efforts through effective networking and meetings with potential customers.

- Promotion of software in Indian languages to increase IT penetration in the domestic market.

- Updating the syllabus of computer engineering, electronics and IT in various technical institutions in keeping with the industry's requirements. The curriculum in other branches of engineering should also be expanded to include IT subjects. Emphasis must be laid on postgraduate engineering education.

- Facilities in existing RECs and engineering colleges under deemed universities must be upgraded to IIT level so that there are at least 100 such institutions by the end of the Tenth Plan.

- 'C'-level course of DOEACC must be recognised as equivalent to M.Tech in computer engineering for all purposes.

- IT-enabled services must be encouraged in order to create employment opportunities.

- E-governance has to be a priority area in the Tenth Plan and a clear roadmap to make it a national programme must be formulated without any delay.

- An action plan needs to be formulated to take up R&D in the emerging areas like bio-informatics and nano-technologies.

- The Communication Convergence Bill must be enacted soon and digital signatures must be allowed at the earliest as per the IT Act, 2000.

- Enforcement of the IT Act to deal with cyber crimes and training law-enforcing agencies to handle such crimes.