3. Aspects of India's Engineered Traverse to an Information Society

C.P. Chandrasekhar

This paper is concerned with the transformation of India into an information society driven by the diffusion in use of information technology. In particular it examines the impact of policies aimed at using the technology as an interface between the government and citizens, between businesses, and between businesses and their customers, with attendant gains in terms of reduced transaction costs, higher productivity, and improvements in the quality of life. It suggests that that the evolving National e-Governance Programme has features that make it substantially a top-down initiative and notes that implementing the programme in haste may result in an excessive focus on hardware roll-out and outcomes that central coordination of a project implemented in decentralised fashion is specifically meant to avoid.

Ambiguity surrounds the notion of an information society. At its most abstract it would refer to a post-industrial phase of development in which the structure of an economy, measured by sectoral gross domestic product (GDP) or employment shares, has shifted in favour of the knowledge and information[1] sectors such as education, research and development, mass media, information technologies, and information services. This is not the situation in the Indian economy, even though services account for more than 50 percent of the country's GDP. Since India is the focus of this paper, the term information society would be used in its more rudimentary form, referring to a type of society in which information and information access play a central role, economically, socially, and individually, and the growth of communication networks facilitate the rapid exchange of information.

The use of the latter definition of the information society, however, does bias the discussion towards one kind of diffusion of information technology: the *diffusion in use* as opposed to the *diffusion of supply*. Developing countries the world over have made the widespread use of Information and Communication Technologies (ICTs) a central feature of their development agenda. To that end, they have devised policies aimed at promoting the use of information technology for development; radically altered their communications policies;

[1] For the purposes of this discussion I go along with Castells in accepting Porat's definition of Information as being "data that have been organized and communicated", and Bells definition of Knowledge as "a set of organized statements of facts or ideas, presenting a reasoned judgment or an experimental result, which is transmitted to others through some communication medium in some systematic form" (Castells 1996, 17).

massively invested in strengthening and extending their ICT infrastructure; and launched numerous e-governance initiatives. Conviction that ICT use can accelerate the pace and improve the quality of development is strong.

As is well known, among developing countries India is a case where the diffusion of supply of not merely of information technology hardware but also of software and information services has also been rapid. Policies in the form of creating and facilitating the private provision of information technology infrastructure, of improving access to cheaper imported equipment and software tools, and of supporting profitability through tax breaks and benefits have played a crucial role in such diffusion of supply, even though there is a misconception that the growth of the information technology (IT) industry has been completely independent of the government. However, those policies are not the concern of this paper. Rather it is concerned with policies aimed at diffusing the use of ICTs, so as ensure easier and more rapid access to information.

This would allow for the use of the technology as an interface between the government and citizens, between businesses, and between businesses and their customers, with attendant gains in terms of reduced transaction costs, higher productivity, better information access, and improved quality of life indicators. The realisation of these potential gains from ICT requires of course, the rather widespread diffusion of the technology through a vertical, multi-level process that delivers access to the technology to all sectors, communities, and individuals.

As has been repeatedly stressed, there are many routes through which the diffusion in use of information technology can impact human development once access to the technology is provided to people, independent of their social and economic standing, and to decision-makers concerned with furthering human development goals. It may be useful to refer to a few.[2]

To start with, the technology and product offshoots of the phenomenon can directly contribute to the creation of new productive employment. Many new products generated by the technology, such as cellular telephones, personal digital assistants (PDAs), and forms of digital infotainment do not displace existing products and jobs but create new ones, releasing new demands because of the felt needs they cater to. The production and distribution of such products obviously create new employment opportunities, and thereby improve economic well-being.

The second way in which ICT use can improve the quality of life is through its productivity enhancing and cost reducing effects that increase the returns accruing to small and medium producers from productive activity. The use of ICT devices in the management of operations of commercial and non-commercial projects also helps ensure transparency, efficiency, and fairness that can have significant implications for the underprivileged.

---

[2] For a more detailed discussion on this refer Chandrasekhar & Kumar (2004).

The third way in which ICTs can contribute to improved welfare is to provide access to information as well as help impart skills and develop capabilities. There is no overstating of the value of information that has a significant economic content, e.g. real-time information on prices, weather, and pests; advice on agricultural technology, water use, soil management, livestock management, and livestock diseases (agricultural extension); and availability and conditions of bank credit, micro-credit, and governmental grants and subsidies. In the social domain, health-related information is particularly valuable.

Fourth, ICTs can be used for skill and capability development, with significant effect, through measures like distance education that use innovative ways of conveying ideas in a multimedia format.

Fifth, ICTs can be used for better and more widespread provision of social services such as education and health. Tele-health programmes have many components, such as tele-consultation, mass customised/personalised health information provision, and education and continuing medical education.

Finally, ICTs allow the Government and civil society organisations (CSOs) to obtain, collate, store, and analyse information in ways that improve decision making and facilitate implementation of policies that improve the quality of life of the people at large and the disadvantaged in particular.

Recognising these benefits, the government, business, and various civil society organisations have made progress towards an information society as an immediate goal to be pursued, even though many development goals such as complete literacy, universal schooling, and access to basic health and sanitation facilities have yet to be realised in India. In fact, in the perception of many of these actors, realisation of these development goals would be facilitated and accelerated by the traverse to an information society.

There are many components of the strategy being elaborated to ensure the diffusion in the use of information technology to realise the final goal of a networked society. These include: (i) making available information technology hardware at dispersed locations; (ii) ensuring the availability of hardware in government departments responsible for collating and providing information and delivering services; (iii) building networks of such computers; (iv) ensuring connectivity that links these networks to each other and the Internet; (v) digitising information needed for use of the technology; (vi) devising systems that harness the benefits of the technology for service delivery; (vii) creating new user-friendly and useful content; and (viii) increasing computer literacy.

The government has, as it must for success, clearly taken the lead in this mammoth task. In recent years, a range of policies for accelerated diffusion of IT in use have been formulated by the government. A National Task Force on IT and software development was set up in the Prime Minister's office in May 1998.[3] The Task Force made significant recommendations

[3] Reports prepared by the Task Force are available at http://it-taskforce.nic.in/.

in three information society-related areas, among others. These were: IT in government; IT spread and IT awareness; and Citizen-IT interface. With regard to IT in government, the Task Force recommended complete computerisation (up to viable limits) of government in five years. The objective of such computerisation was to reach service delivery as close to the citizen as possible, with minimal intermediation and at affordable cost. The argument was that unless computerisation progressed significantly in government, it could not spread adequately outside. To that end, it recommended that 2 percent of the budget in every government department should be earmarked for the introduction and use of information technology, including training.

In the area of IT spread and awareness, the Task Force, besides recommending reaching computers and the Internet to every school and college within five years, called upon the government to launch a range of value-added network services. The committee argued:

> While providing delivery of services, use of a variety of technologies and solutions could be explored. These could include home-based computers, ATMs, electronic kiosks, telephones, smart cards, etc. Such networks could substantially promote government's efforts to provide a 'one-stop non-stop' interface with the public. (Government of India, National Task Force on Information Technology and Software Development 1998).

The Task Force also felt that for at least about two decades it would not be possible to provide either telephones or Internet or other information services universally, i.e. to more than 90 percent of households, since many would not be able to afford private subscriptions. It, therefore, recommended that these should be made available on a public access basis, just as long distance services were then available through STD/ISD booths. Since there were more than 600,000 of these booths, with half of them located in villages, it suggested that as many of these as possible should be converted into Public Tele-info Centres.

Finally, the committee called for use of the Freedom of Information Act to make available all official databases online to intensify democracy and increase transparency.

Subsequently, as a follow-up to the work of the Committee, the government set up a Working Group on Information Technology for Masses, on 10 May 2000 (Government of India, Ministry of Information Technology n.d.), The Working Group was mandated to: (i) review various schemes and major initiatives taken by various government agencies for taking IT to the masses; (ii) identify potential areas and applications for deployment of IT for the masses; (iii) recommend development schemes/programmes for citizen participation for taking IT to the masses; and (iv) prepare a comprehensive plan for taking IT to the masses.

The Working Group examined four areas: Infrastructure and Services, Electronic Governance, Education, and Mass Campaign for IT Awareness and came up with a range of detailed recommendations in keeping with the thinking outlined earlier. Thus, it is clear that at least at the level of policy formulation and statement, the traverse to an information society had begun to be incorporated into the policy framework of the government almost a decade back. Further, there was a substantial degree of recognition of the constraints to ensuring

the reach of ICT to the extent needed for it to be a major instrument of development, so that policy did take account of the need for reducing costs and mobilising resources. However, a decisive thrust towards implementing the transition is indeed quite recent.

The National E-Governance Plan (NeGP)

Even if not always stated explicitly, the presumption underlying government policy seems to be that diffusion in use would be driven by a State-led e-governance plan. The idea seems to be that once a host of information and services falling in the government-to-citizen domain is provided through digital communication, the demand for e-literacy and the offtake of e-services are bound to rise. This then would provide the vehicle for the delivery of other services by the private sector and civil society organisations, which may launch experiments of their own, but would not be able substitute the government in driving the diffusion of IT use. However, as has been emphasised elsewhere, e-governance does not merely consist of the online provision of government services (IT for Change, 2008).

In its entirety, the National e-Governance Plan (NeGP) is a mammoth project involving multiple governments, multiple departments, multiple agencies, and multiple stakeholders and players. Announced on 15 August 2002, and having received initial cabinet approval around a year later, the plan gathered momentum when the government approved the NeGP, comprising of 27 Mission Mode Projects (MMPs) and 10 components, on 18 May 2006. The officially stated vision emphasises delivery of services to realise provision of basic needs. It defines the objective of the Plan as being to "Make all government services accessible to the common man in his locality, through common service delivery outlets and ensure efficiency, transparency & reliability of such services at affordable costs to realise the basic needs of the common man". To this end completed or ongoing initiatives at the central (railways, Directorate General of Foreign Trade, customs, passports and tax) and state (land records, registration, transport, treasury, police, municipalities, etc.) levels are to be integrated into the national plan. But as an official presentation on the issue recognises, while in the developed world the challenge for e-government is building the middleware that gives citizens direct access to a full-fledged network and connecting legacy systems of providers to that network, the problem in India is of building a system from bottom up with work to be done on ensuring access, creating the appropriate middleware, and building the required back ends. While legacy problems would be far less in the Indian case, the task here involves not only a huge coordinated effort but massive investment. While some of this investment (as in the case of the railways, for example) may yield pecuniary returns, it would not in many cases.

Overall, the NeGP envisions a three pillar model for delivery of 'web-enabled Anytime, Anywhere access' to information and services in rural India. These are:

a) Connectivity in the form of National and State Wide Area Networks (SWANs)/ NICNET;

b) Back-ends in the form of a National Data Bank and State Data Centres (SDCs); and

c) Front ends in the form of dispersed Common Services Centres (CSCs).

The other core infrastructure requirements identified by the plan includes:

a) A security Infrastructure and Resource Centre for E-Governance;

b) A national Spatial Data Infrastructure; and

c) A Language Resource Centre.

To this must, of course, be added policies with regard to devolution, standards, systems design, content generation, funding, staffing pattern, and the creation of a management ethos that permits interactivity of a kind that does not reduce the system to a mere passive provider of pre-existing information.

What needs to be noted is that initiatives at the central level have been accompanied by policy initiatives at the level of individual states, financed either out of central, state, or joint funding. At the state level, however, the goal for harnessing IT for development has been combined with (and in some cases overwhelmed by) an emphasis on ensuring diffusion in supply rather than diffusion in use. Initially the concern was with setting up a hardware production infrastructure in the state, resulting in a proliferation of public sector electronics units at the state level. More recently, a growing number of states are attempting to replicate the successes of the states of Karnataka, Tamil Nadu, Andhra Pradesh, Maharashtra, and New Delhi, among others, in attracting investments in the software services and IT-enabled services areas, to accelerate GDP growth and increase employment opportunities for the educated unemployed. Through provision of land, infrastructure, and tax concessions, states have been vying with each other to garner a share of the IT pie. However, there has also been concern with increasing IT in use, which is often seen as a trigger for diffusion of IT supply. But many of these have been spurred by programmes launched by and supported from the centre. In the decentralisation and devolution inevitable in a quasi-federal structure, the roll-out of the national e-governance platform has been characterised by elements of duplication and inadequate integration of initiatives across states and between the states and the centre.

It must be recognised that creating an e-governance system of this kind cannot be a short-term venture but must involve a prolonged roll-out. There are many reasons that this must be the case. To start with, since there are conflicting financing priorities before the government, at no single point in time can the draft on resources for e-governance be such that it becomes subject to the criticism that it is being implemented at the expense of developmentally more significant programmes. Second, very often the basic information that is sought to be collected, collated, and digitised needs to be cleaned and verified. Digitising customs records or passport offices may be easy. But, in a situation where the perception is that land records in many states are in disarray, it is indeed surprising that the

digitisation of land records is proceeding apace. Third, as has been repeatedly stressed, there are many prerequisites, other than mere access to technology, needed for citizen access. While IT may be put to use to increase literacy and improve school education, its role as an enabling device to deliver a host of other outcomes may be predicated on increased literacy and universal schooling. The success of a technology depends not just on its potential but on how circumstances and the environment facilitate its adoption and use. It may therefore be necessary to first ensure that circumstances and the environment are appropriate to substantially exploit the potential of a technology. Staggering the introduction or diffusion of the technology may ensure that the utilisation of the technology may be much better and more effective. Finally, developing integrated cost reducing standards and relying on open source software may require research and development, training, and time. Rushing to implement a mammoth project of this kind can result in it being vendor-driven.

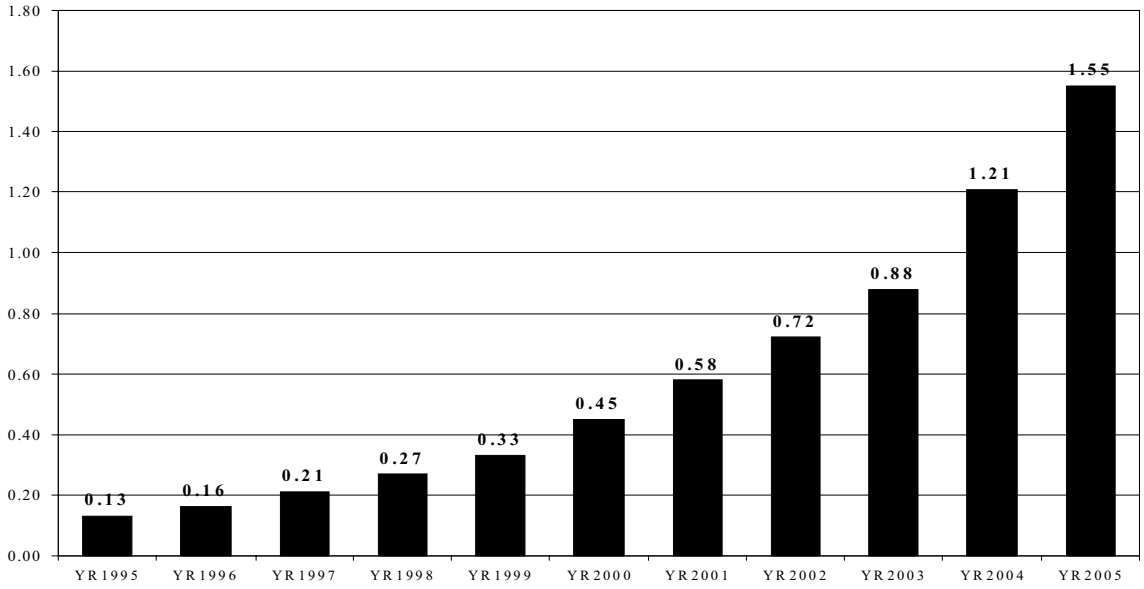
All of these and many other similar difficulties are not without their solutions. But even when such solutions have been experimented with in pilot form, scaling them could take time. This calls for some caution in the pace of roll-out. And when the roll-out has to be paced, appropriate sequencing and inter-temporal integration add to problems of spatial integration. This requires a clear roll-out plan. Unfortunately the official slogan 'Think big, start small, and scale fast' does not make clear the inter-temporal roll-out trajectory being chosen by the government.

What is also crucial to recognise is that the inadequacy of hardware presence required to support the move to the information society does imply that there is a component of the total plan, demanding a large share of resources, which can easily be pursued. Vendors exist who can supply the equipment and offer systems design support. But this can lead to multiple standards and systems, especially if individual state governments exercise choices of their own.

Ensuring Dispersed Availability of Hardware

Viewed in terms of the mere spread of computer access, the spread of information technology across the country has, it appears, been limited. Starting from a low base of around 1computer per 800 persons in the population in 1995, the figure had indeed climbed to exceed 1 computer for every 100 persons in the population by 2004 and stood at 1.6 computers per 100 people in 2006. However, since this average figure is bound to conceal a substantial degree of urban, corporate, and income-wise concentration, the spread of computer access is likely to be substantially limited.

Chart 1: Personal Computers (per 100 people)



Source: International Telecommunications Union, *World Telecommunications/ICT Indicators*, Digital Database.

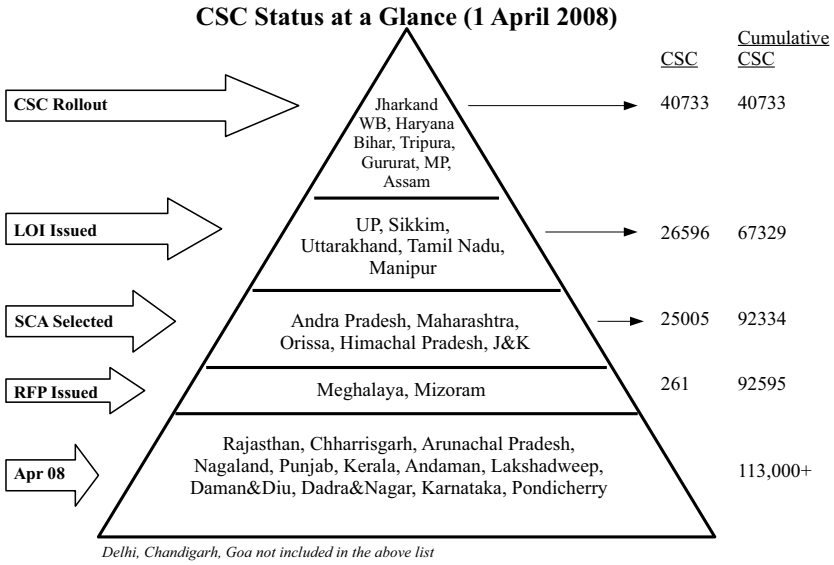
To bridge this digital divide, the government has been focusing on increasing physical access to computers connected to the Internet. This thrust received a fillip through the 2005 policy initiative to establish a hundred thousand rural CSCs – broadband-enabled computer kiosks that will offer a range of government-to-citizen and business-to-customer services, besides providing sheer access to the Internet.

The initiative is based on an entrepreneurship model involving private-public partnerships aimed at generating self-sustaining units, operated by Village Level Entrepreneurs (VLEs), each catering to five to six villages. The emphasis on entrepreneurship notwithstanding, the roll-out of the CSCs would be supported with government grants. Further, since a VLE on his own is unlikely to have either the managerial or technical skills to sustain a CSC and to continuously identify and support various services needed by the local community, an entity at a tier above the village entrepreneur – the Service Centre Agency (SCA) – is envisaged that would provide business and technical support to this activity. This entity is expected to typically support 200 to 500 CSCs in a district or section of a state. In addition there is a state designated agency (SDA) to oversee the implementation of the programme across the whole state.

The CSCs, which are expected to begin servicing all of India's 600,000 villages in the not-too-distant future, was originally estimated to cost Rs. 5742 crore, of which the Central and State governments were to outlay Rs. 856 crore and Rs. 793 crore, respectively, with the remaining Rs. 4093 crore expected to come from the private sector. With the economic

viability of these service centres uncertain, the offtake of the scheme has been uneven, with the performance being bad especially in the poorest regions. As a result, despite efforts to accelerate implementation, this programme has missed its original deadline of March 2008 and will remain incomplete for many years to come. But to the extent it is successful (Chart 2), it does amount to a major step forward from the supply side, to help rural India exploit whatever potential the Internet holds in the Indian context.

Chart 2: CSC Status at a Glance



Source: Government of India, Ministry of Information Technology, http://www.mit.gov.in/download/cscpyramid010408.pdf.

It hardly bears stating that this is primarily a front-end hardware plan. But its success (including commercial viability) would depend on the degree to which supportive hardware and software infrastructure is put in place along with the roll-out of the CSCs. The government has been attempting to ensure a degree of integration in tandem with the roll-out of the CSCs. To exploit any economies of scale in the identification, customisation, and implementation of the physical and digital infrastructure required for the project, and to aggregate at the national level many of the requirements (content provision, for example) of potential citizen-centric services, the Department of Information Technology has decided to create a National Level Service Agency. Between the Service Centre Agency and the National Service Agency is an appropriate state-level institution.

The Connectivity Push

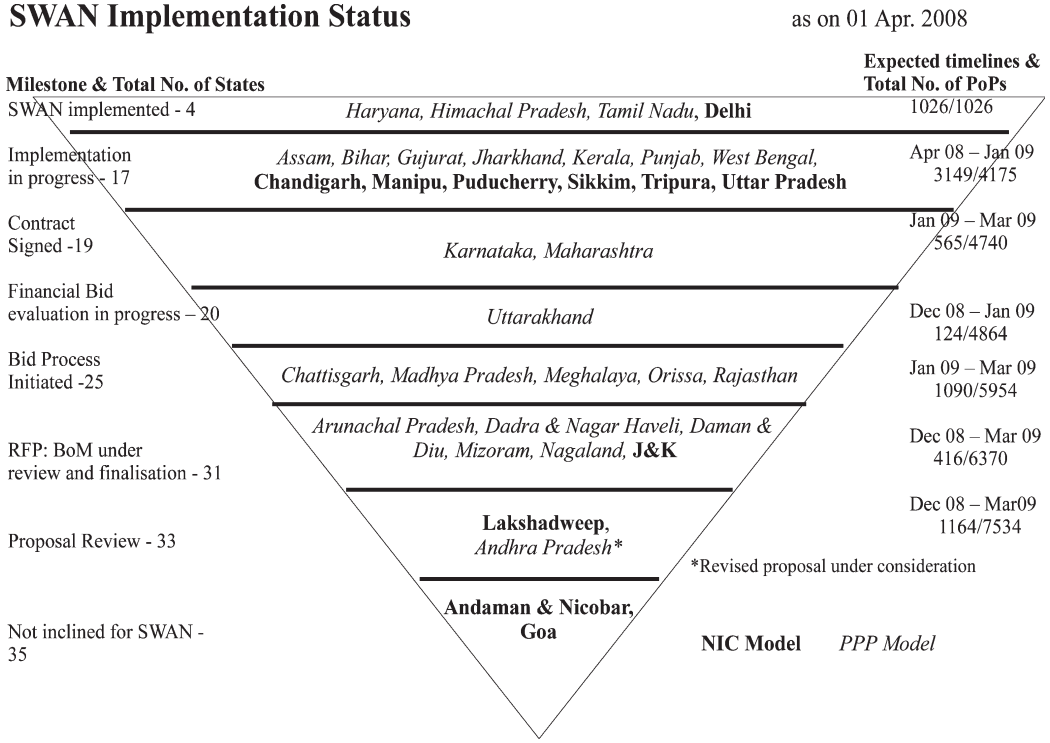
The issue of course is that a substantial part of the supportive infrastructure is also hardware-based. One factor driving the push for diffusion in use of information technology is the increase in the availability and fall in the costs of connectivity. India's communications infrastructure is still limited in size and spread, and though it is witnessing rapid growth in recent times, that growth is much less than in a country like China, which has the wherewithal to undertake huge public investments. But it appears that there is enough to go around and at relatively low cost. The view seems to be that if the government can exploit the opportunity, diffusion in use can expand substantially.

This perception has substantially accelerated the roll-out of national and state-wide networks. States are now required to and are being supported to establish a state-wide area network (SWAN) down to the block level with a minimum of 2 Mbps connectivity. The Department of Information Technology is providing funds on a 100 percent grant basis to cover the establishment, operation and maintenance of SWAN for a period of 5 years. Implementation is to occur through a state chosen public-private partnership model or through the choice of NIC as the principal implementation agency.

With funds available on a grant basis the roll-out has begun and progressed in most states. As shown in the Chart 3, monitoring of progress is close and available in the public domain. Thus this is an area where supportive infrastructure is being created to support the CSCs. The Department of IT has issued directives to the state governments to meet the connectivity requirements of the CSCs, through the SWAN from the nearest block headquarters level Point-of-Presence (PoP) through appropriate wireless/terrestrial connectivity. Usage of SWAN by the CSCs would be free-of-cost for the first five years, though the cost of any terminal equipment and Internet Service Protocol (ISP) charges would be borne by the SCA/VLE.

Connectivity is of course a requirement. But there is a catch. Even if physical access to working computers and connectivity in the form of communications links are established, there is no guarantee this will actually connect India's villagers to the information-rich, interactive world offered by the network. The principal bottlenecks to effective use may lie elsewhere: illiteracy, e-illiteracy, efficacy, and, since the private sector is to be involved, costs. Unfortunately evidence to assess this is not available. But information from the parallel world of the Internet is illustrative.

Chart 3: SWAN Implementation Status



Source: Government of India, Ministry of Information Technology, http://www.mit.gov.in/download/SStatus010408_v2.pdf.

How Much of India is Online

When compared even with the current spread of computing and the Internet, usage in the country appears still limited, despite huge variations in available estimates of the number of Internet users. According to Computer Industry Almanac Inc. (CIAI), an Internet consultancy, India ranked fourth in 2006 (after USA, China, and Japan) in terms of the absolute number of Internet users. CIAI places the number of Internet users in these four countries at 206 million, 123 million, 86 million, and 51 million, respectively. In most cases CIAI's figures are drawn from the International Telecommunications Union (ITU), which collates official data drawn largely from national governments. Thus, going by this respectable source, India is indeed significantly online when compared with the rest of the world. In fact, *Internet World Stats: Usage and Population Statistics*,[4] a data warehouse on the Internet, places the number of Internet users in India in June 2007 at 42 million (compared with 211 million for the US, 162 million for China, and 86 million for Japan).

[4] http://www.internetworldstats.com/top20.htm

The problem, of course, is the limited penetration these high figures imply in relation to India's population. Even if we go by *Internet World Stats*, Internet penetration of the population in India amounts to 3.7 percent, as compared with 69.7 percent in the US, 67.1 percent in Japan, and 12.3 percent in China. This would still give cause for comfort, but for the fact that numbers yielded by independent surveys being conducted in India point to widely varying figures.

For example, two divergent figures have emerged from two such independent surveys. One titled *Internet in India*, (Internet and Mobile Association of India (IAMAI) and Indian Market Research Bureau (IMRB) 2007) conducted jointly by the Internet and Mobile Association of India and IMRB International, has reported that the number of Internet users in *urban* India[5] in September 2007 stood at 46 million, up from less than 5 million in 2000, 16.4 million in 2004 and 32 million in 2006. The 2006 urban users figure of 32 million compares with the 60 million national figure quoted by the ITU for the end of 2005. But if that were the explanation for the difference between the two figures, then India's rural-urban digital divide seems minor – a conjecture that flies in the face of a host of other evidence on the matter.

Another agency that has been tracking Internet use for a number of years now, based on a much larger sample, is the National Readerships Studies Council (NRSC). An autonomous division of the Audit Bureau of Circulation, NRSC (2006) conducts the National Readership Study (NRS), which also tracks media habits of different kinds including Internet usage.

The figures on Internet usage yielded by different rounds of the NRS point to a much lower level of usage and a more modest rate of growth. Its 2006 survey estimates that the number of individuals who accessed the Internet in the three months preceding the date of the survey stood at 13 million, having increased marginally from 10.8 million in 2005. What is noteworthy is that of these 13 million users, only 1.8 million lived in rural areas. Not only are the estimated number of users about a fifth of that cited by the ITU and the estimated rates of growth in usage much lower, but the rural-urban digital divide appears to be extremely sharp, especially when compared to the relative populations of the two sectors. Further, while the growth in the number of Internet users in urban India was 35 percent over the previous year, the number of users in rural India seems to have stagnated.

It is by no means clear what accounts for these sharp differences in the estimates. One reason is of course the reference period used. While the ITU defines an Internet user as a person with access to the worldwide network, without specifying when and for how long she needs to have used it, the NRS specifically identifies those who have accessed the Internet at some point during the previous three months. In fact, the NRS also provides estimates of those who accessed the net in the previous week, which stood at 9.5 million as opposed to the 13 million who accessed the net at some point in the previous three months. As is to be expected, the shorter the reference period, the smaller the number of users.

---

[5] The IAMAI-IMRB survey covers 65,000 individuals across 30 cities.

However, the IMRB survey makes a distinction between 'active users', who used the Internet at least once in the 30 days preceding the date of survey, and 'ever users'. According to its estimates, the number of active users in urban India stood at 25 million in September, up from 21.1 million in March. These figures too are way above those yielded by the NRS.[6]

In sum, we have no clear idea about the number of Internet users in the country and their extent of use of the medium. But domestic sources seem to suggest extremely limited usage despite the communications transformation the country is seeing. Part of the reason must be that prerequisites other than hardware for the use of the information-rich Internet are lacking.

Moreover, users are geographically extremely concentrated. NRS (NRSC 2006) figures indicate that besides the urban concentration noted earlier, there is a high degree of geographical concentration even among urban Internet users. A little more than 40 percent of all users were located in the top 8 metros, while another 18 percent were located in other metros/ state capitals, with smaller towns accounting for the remaining. Reaching e-governance to those who need it most may be more difficult to achieve than envisaged. Interestingly, however, while towns with a population of 5-10 lakh and 2-5 lakh accounted for 7.1 percent and 5.4 percent of Internet users, respectively, those with populations 2 lakh and less were home to 12.2 percent. That is, these are signs of some diffusion of Internet use among smaller Indian towns, providing a glimmer of hope to those who see in an opportunity in the new technology.

Such signs of diffusion at the 'lower-end' of the user spectrum are visible elsewhere as well, as in the figures on the place of access. While 30 percent of users accessed the Internet from their homes, 19 percent had access from their place of work, and another 16 percent from their place of study. What is noteworthy was that 32 percent accessed the net through cybercafés. This lends credence to the view that the creation of common service centres and conversion of public call offices and STD/ISD booths, that are indeed ubiquitous across India now, into Internet kiosks could help expand Internet use over time.

This picture of a combination of extreme concentration at the top accompanied by a more diffused access to the technology among users at the 'lower-end' is supported by figures on the distribution of users in terms of hours of usage. Those who had used the Internet for 5

---

[6] The problem in India relates not just to the Internet but to the IT sector as a whole, information on which comes largely from interested sources supported by the private sector. This is a major lacuna. China, a country of similar proportion, has for many years now been conducting regular six monthly surveys of Internet usage. The surveys are conducted by the China Internet Network Information Centre (CNNIC at http://www.cnnic.net.cn), which is a not-for-profit organisation under the Ministry of Information Industry administered by the Chinese Academy of Social Sciences. Independence from the industry and a degree of autonomy make this a credible source of information. Definitions are clear and much more stringent: CNNIC defines an Internet user as one who uses the Internet at least one hour per week. It runs a professional survey that is transparent. Even though some may argue that the Chinese government's interest in the Internet is political, this is definitely a model for statistical purposes. India, too, needs to create a state-sponsored autonomous body to track both Internet usage and the information technology industry.

hours or more in a week accounted for 32.2 percent of the total of Internet users, whereas those who used it for one hour or less accounted for as much as 42 percent. That is, there were a large number of users who were using the net to a limited extent, principally for email and restricted surfing. It is likely that this large chunk of low-frequency users belonging to the 'lower-end' of the user spectrum restricted the use of the technology to what were seen as absolutely necessary operations. That is, the Internet is not just concentrated among those who surf the net for entertainment, besides information and communication. It shows signs of diffusion among those whose usage pattern suggests that their use is much more purposeful, even if limited in terms of time.

These features of access are captured in aggregate indices such as network- or e-readiness. The network readiness index computed by the World Economic Forum (2008) is defined as "the potential and degree of preparation of a community to participate in the networked world, participate in and benefit from the ICT development". In its 2007-08 rankings India was placed at 50 among 127 countries (down from 44 among 122), being ranked below a number of developing countries like Singapore, Korea, Taiwan, Malaysia, and Thailand.

Other Experiences with Connectivity

There are many who argued that the entry of private operators made possible by the implementation of the National Telecom Policy statements of 1994 and 1999 promises acceleration in telecommunications infrastructure growth based on private initiative. This view was influenced by the experience with television penetration, driven in significant measure by private investment. Until 1991, the spread of even television in India was limited, with broadcasting reach ensured by the much lower cost radio. Television programming, delivered through terrestrial channels, was dominated by the state-owned Doordarshan. A combination of factors such as the Government's decision to relax availability of television sets in time for the Asian Games in the early 1980s, the availability of a number of free-to-air private channels in English and the Indian languages beamed out of foreign locations such as Hong Kong and Singapore, and the rapid and unregulated growth of local cable operators, helped increase the demand for and reach of television. Yet the progress achieved must not be overstated. In 2002, 32 percent of homes in the country had television receivers. In 2001, only 31.5 percent of rural Indians and 74.1 percent of urban Indians had access through home-based or community TV sets to Doordarshan's network. Figures on cable television access in 1999 indicated that less than 10 percent of rural India's television viewers had access to cable television and the percentage of rural homes with cable television was less than 1 percent. In urban areas figures for cable television access varied from 10 to 50 percent depending on location (Franda 2002, 107). More recent data from the NRS 2006 indicates that 51 percent of households in the country owned a television set and 28 percent had access to cable/DTH television.

In the case of ICT, since connectivity is a core element of the new technology, a simple measure used to assess the degree of such diffusion is tele-density, or the number of telephones per hundred inhabitants in the country. Going by that measure, there is evidence that suggests

that India may be on track to realise the required degree of diffusion even if at a slow (but accelerating) pace. As the increasingly ubiquitous cellphone suggests, over the last few years many, though not most, Indians have indeed been connected in ways they had not imagined before.

Telephone density had touched 18.72 per 100 inhabitants as on 30 April 2007, compared with only 1.39 at the end of March 1994, when the shift to a new, more liberal telecom policy began. Mobile phones that hardly existed a decade back account for more than 80 percent of that capacity. The pace of change suggests that the process is only gaining in dynamism. Tele-density increased from 2.86 lines per 100 people on 31 March 2000, to 5 per 100 as on 31 March 2003, 12.76 as on 31 March 2006, and 18.72 at the end of April 2007.

This growth in connectivity is expected to substantially increase interactive communication between distant centres, permit improved governance through the more efficient delivery of information and a range of social services in rural areas, as well as expand access to the Internet and the benefits it can provide. Assuming that the government is able to put in place the IT infrastructure needed to exploit the benefits of such connectivity, it is argued, the country seems to be well on its way to realising its goal of delivering IT to the masses, to supplement the benefits from the autonomous growth of IT use in the urban areas epitomised by the burgeoning revenues from the 'production' and export of IT-enabled and software services.

The difficulty is that a closer examination of the data suggests that aggregate tele-density may not be a good measure of the extent of diffusion. To start with, the aggregate figure conceals the low penetration of telecommunications capacity and a high degree of urban and regional concentration. Tele-density in rural India stood at 1.5 at the end of March 2003, when urban tele-density was placed at 14.3. By the end of December 2005, urban tele-density had risen to 34.8, whereas rural tele-density had gone up to just 1.8. Further, inter-regional variations were also substantial. As on 31 December 2004 while total tele-density in the state of Delhi was 50.2, that in Bihar was as low as 2.0. Overall, the picture is indeed one of a digital divide driven by asset and income inequalities, such that there are a few at the top who are connected while the majority, preponderantly in rural areas, are marginalised from the communications network.

Further, India does not measure up well in terms of other measures of connectivity. To start with, as of now data connectivity through mobile phones is limited. On the other hand, India still lags far being many other developing countries in terms of the bandwidth (or the pipe) necessary for people to simultaneously access information flow through the Internet. The ITU (2008) estimates bandwidth availability per inhabitant in India in 2006 at 24 bits per second, as compared with 1037 in South Korea, 12,946 in Hong Kong, 194 in China, and 3,294,000 in France. The total number of fixed line Internet subscribers per 100 inhabitants stood at 1.13 in India, as compared with 52.78 in Singapore, 29.27 in South Korea, 38.54 in Hong Kong, 5.84 in China, 25.12 in France, and 27.7 in the UK. Of these broadband

subscribers per 100 inhabitants stood at 0.21, 18.19, 29.27, 25.24, 3.85, and 21.71, respectively. India does not feature even in the top 20 countries in terms of number of broadband subscribers.

However, this point should not be belaboured because there exists the possibility that large scale investment in infrastructure such as bandwidth can result in mere unutilised capacity. In fact the experience in many other parts of the world, including in the developed industrial countries, has been that the expected demand for bandwidth has not materialised. While in India this has not yet resulted in bankruptcies among private operators, it has indeed meant that "thousands of kilometres of buried optical fibre cables remain unlit, and a few are used as one would use copper wires for mere telephony" (Arunachalam et al. 2004, n.p).

The Evidence on Diffusion in Use

In sum, the use of information technology is indeed still extremely limited in India, and diffusion of the benefits of IT that can make a difference to the quality of life must wait, but there are signs of change. Besides being concentrated among a set of top-end users, the technology does seem to be in the process of diffusion among a set of lower-end, low-frequency users.

As of now, the nature of diffusion of Internet technology suggests that there are two routes through which the technology can impact on the quality of life. Elite users, who use the technology to share information and analysis in crucial areas such as the environment, health, corporate practices, and labour conditions, can debate, develop, and contribute to creating international best practice standards in the relevant area. These can provide the basis for national policy and for mobilisation of public opinion, nationally and internationally, to change policy regimes. This would be the top-down, trickle-down means for the technology to influence human development. The other route would be for the technology to be diffused, leading to use by and participation of the relatively disadvantaged in the formulation and implementation of policies, as well to the direct provision of improved services that affect the quality of their lives. This is the more democratic face of the technology and the best manner in which it can be used to advance human development goals. Unfortunately, the current extent and pattern of diffusion of the technology in the country is such that it is the first of these that overwhelmingly predominates and is likely to continue to do so in the foreseeable future.

The government's e-governance programme with the CSCs as its vehicle seems to suggest that it wants to promote the second route. But to do so successfully, it must know where the technology stands, what its rate of diffusion is, and what determines the pace of diffusion. The minimum requirement for that is credible information. When armed with that, it may find that the solution to the digital divide lies not principally in increasing hardware access but in some other area, such as education. That could change priorities, save money, and deliver better results.

Explaining Poor Offtake

It has been argued that slow offtake partly points to the needs to recast information solutions, so as to ensure diffusion and access. Examples of such efforts are those directed at developing software in national and local languages so as to overcome the barrier that language creates, develop content which appropriately exploits the interactive, textual and visual information transmission capabilities, or harness the technology for ensuring effective and cost efficient service delivery. There are many experiments in these and similar areas. Some of them are reportedly quite successful as, for example, the eKrishi programme in Kerala, the Dristi programme in Bengal and the one coordinated by Abhiyan in Gujarat.[7] But many others are in the nature of pilot projects undertaken by a variety of institutions ranging from government bodies to NGOs and private sector firms. Quite a few are of recent origin and there is not much information on their financial profile, their sustainability, or their actual impact. Unless the success and sustainability of these experiments are assessed and the lessons assimilated into efforts to scale up the use of IT, the information society thrust of the government may deliver more unutilised capacity than improved and fair development.

The Case for Caution

This strengthens the case for caution in the pace of roll-out. An interesting development in this connection is the view expressed by the National Knowledge Commission (NKC) that there is much else that is of significance in the e-governance realm than the technology itself. In its view, "e-governance is more about an opportunity for administrative reforms than merely about electronics and information technology and infrastructure". Based on its consultations the Commission seems to have concluded that the government's current e-governance thrust is primarily based on computerising age-old processes left behind by colonialism and subsequently compounded by new layers added on by a post-Independence Indian bureaucracy working within departmental boundaries. This, in its view, amounts to computerising cumbersome processes with limited benefit, since it merely adds an additional layer of expense, complexity, delay, and confusion.

It therefore calls for a an initial step of redesigning of government processes to drastically reduce the number and duration of successive steps required to obtain services, as well as efforts to provide traceable records, improve delivery, and ensure transparency of policies and processes. A concomitant of this view is the perception that it is necessary to unfold e-governance in stages. The exercise should begin by identifying and simplifying a small set (10 to 20) of processes and services, such as the provision of birth certificates, death certificates, proofs of residence, and ration/ID cards. These are services that are currently cumbersome to access and prone to unnecessary delays and even corruption. These in the NKC's view should be processes that are simplified and made available as web-based services and other services added on the basis of that experience.

---

[7] See in this connection ICTD (2006) regarding Abhiyan in Gujarat and ICTD (2007) regarding Dristi in West Bengal and eKrishi in Kerala.

This staggered roll-out can help integration across states, since they would be required to implement the same processes in concert and learn from each other. The problem when states implement their e-governance according to their own chosen patterns and processes is that programmes are prone to being vendor-driven and non-scalable. There is no effort to develop common standards, templates, and data formats using the best talent available, at a cost that would be much lower when not duplicated. This is not to say that there is not much of worth that has been done so far. It is to emphasise the fact that the whole process can be made more cost effective and quality intensive by choosing the best of what is available and pushing developments that fill gaps in integrated fashion. This is particularly necessary to ensure cost effective open source software and standards. In the drive by some states successful on the software supply front to collaborate with global software leaders, there is a danger that inadequate attention would be devoted to open source software development using the talent that is obviously available in the country.

Integration and planned development will also ensure that e-governance developments take place in areas that are in keeping with other parallel development efforts and where their externalities are bound to be substantial. Here again the suggestion of the NKC is well taken that development programmes such as the National Rural Employment Guarantee Scheme, Bharat Nirman, Jawaharlal Nehru National Urban Renewal Mission (JNNURM) etc., on which the government plans to outlay thousands of crores of rupees should begin with well-engineered e-governance initiatives that can ensure speedy and effective delivery and better monitoring . Finally, e-governance initiatives should be engineered from the beginning to make the Right to Information Act meaningful in a 'prior' sense and not merely a system that allows provision of information when demanded.

Concluding Remarks

Signs of the necessary devolution and decentralisation of implementation in a quasi-federal structure notwithstanding, it is worth noting that the evolving NeGP programme has features that make it substantially a top-down initiative. This is inevitable when trying to build a common, standardised, inter-operable framework for the transition to an information society in a large, diverse, and quasi-federal country. But political structures being what they are, the ability to implement such a programme stems from the willingness of the centre to provide up front much of the money for the initiative. What needs to be noted is that implementing the programme in haste and one go may result in an excessive focus on hardware roll-out which has as its concomitant the emergence of platform features that central coordination of a project implemented in decentralised fashion is specifically meant to avoid.

References

Arunachalam, V.S., Raj Reddy, and Rahul Tongia. 2004. Where is the broadband. *The Hindu*, January 26.

Castells, Manuel. 1996. *The rise of the network society, 2nd ed. (The information age: Economy, society and culture, vol I)*. Malden, MA: Blackwell Publishing.

Chandrasekhar, C.P., and Simran Kumar. 2004. *Promoting ICT for human development in Asia 2004: Realising the human development goals, India.* New Delhi: NASSCOM and UNDP.

Franda, Marcus. 2002. *China and India online: Information, technology, politics and diplomacy in the world's two largest nations.* Oxford: Rowman & Littlefield Publishers.

Government of India, Ministry of Information Technology. n.d. Working Group on information technology for the masses, National Informatics Centre. http://itformasses.nic.in/.

Government of India, National Task Force on Information Technology and Software Development. 2008. Basic Background Report I. http://it-taskforce.nic.in/bgr12.htm.

International Telecommunications Union (ITU). 2008. *World telecommunication/ICT indicators 2007.* Geneva: ITU.

IT for Change. 2008. *Recommendations for meaningful and successful e-governance in India.* Bangalore: IT for Change.

ICTD. 2006. Taking ICT to marginalised communities. www.i4donline.net/nov06/886.pdf.

ICTD. 2007. ICTD project newsletter. www.i4donline.net/articles/current-article.asp?articleid=1223&typ=Features.

Internet and Mobile Association of India and Indian Market Research Bureau (IAMAI-IMRB). 2007. I Cube 2007: Internet in India. http://www.iamai.in/Upload/Research/I-Cube-2007-Summary-Report-final.pdf.

National Readership Studies Council (NRSC). 2006. *National readership survey*. Mumbai: NRSC.

World Economic Forum (WEF). 2008. The global information technology report 2007-2008. http://www.weforum.org/en/initiatives/gcpGlobal%20Information% 20Technology%20Report/index.htm.