Computing for the Masses: an enabler for enduring development

Priyadarsan Patra

India is the second fastest growing major economy in the world, with a GDP growth rate of 8.1% at the end of the first quarter of 2005–2006. The primary contributor of the growth has been the rapidly growing software sector: revenues from the information technology industry reached a turnover of $16.2 billion in 2004-05. India's IT (Software) exports experienced a record 36% yearly growth to $22.5 billion in 2005-06. Many Indian IT companies find their homes in cities such as Bangalore – India's 'Silicon Valley' – and Hyderabad often touted as 'Cyberabad', and Pune. Even my state Orissa has its Software Technology Park of India (STPI) and Software City in Bhubaneswar.

The STPI registered units from the state of Karnataka pulled off an IT export at Rs 370 billion, followed by Maharashtra at Rs 155 billion, and Tamil Nadu at Rs 139.60 billion. And, Andhra Pradesh posted her software exports at Rs 1250 billion. What can Orissa learn from this? More importantly, what does all this mean to an average Indian and, particularly, to the Orissa's desperately poor? Why has the apparent prosperity not 'trickled' down to the masses? I think it is due to a lack of "foundational capacity". In this article, I discuss the ecosystem and the needs, then an experiment being undertaken, followed by exposition of the benefits and potentials, and finally the pitfalls.

India in general and Orissa in particular face a great challenge in bringing IT and its economic benefits to the common people. Simply put, the challenge is to turn the *Digital Divide* into a *Digital Provide*. The changes brought about by Information and Communication Technologies (ICT) are rapid and potentially ubiquitous. The uneven diffusion of this fast-changing technology has caused the digital divide within (and between) the countries. States or countries which do not adopt in and adapt to these changes will be marginalized, widening the digital divide. A careful planning by poorer states would decide if ICT would bring economic growth for them or push them deeper into technological isolation. In fact the booming software industry of India is concentrated in few cities such as Bangalore, Delhi, Mumbai, Pune, Chennai, Hyderabad and Calcutta -- a clear reflection of the initiative taken in respective states to promote IT sectors and the application of computers.

Speaking at the National e-Governance Conference, 2005 in Orissa, the Union Minister Dayanidhi Maran said, "Our government has a dream to empower people to better their lives and have access from their village to economic opportunities within the country and globally…Do we have all the skills and capabilities needed to realize these goals?… We must recognize that PC penetration in the country is low, telecommunication connectivity, though rapidly rising, is still low in per capita terms (around 8%) and IT literacy is even lower..." This clearly points to a lack of and a strong need for "capacity building".

The Ecosystem:

A primary mover behind the IT-powered knowledge economy, and perhaps even social change in modern societies, is Personal Computing (PC). PC penetration is estimated to be 9 per 1,000 persons in India. The highest potential in PC penetration is demonstrated by regions of Delhi and Chandigarh followed by Goa. Delhi and Chandigarh have all the favorable parameters (income, urbanization and services). However, the penetration in the highly populated states such as Bihar, Orissa and Uttar Pradesh is very poor as these states suffer from lack of the driving parameters of PC penetration such as income level, IT education, and awareness. In this article, we look at several of the reasons why grassroots penetration of computing and communication technologies is so important for *bootstrapping* and *leapfrogging* of development.

Teledensity is an attribute combining telephones, internet users, and cell subscribers per every 100 people. The following table lists the attribute for many states versus the national average.

State-wise Teledensity			
	Teledensity		
	URBAN	**RURAL**	**TOTAL**
Delhi	30.2	0	26.9
Punjab	25.7	4.6	11.6
Kerala	23.7	7.9	11.1
Andaman & Nicobar	15	7.7	9.6
Maharashtra	19.3	2.2	9
Himachal Pradesh	39.6	5.4	8.4
Tamil Nadu	15.2	2.1	7.8
Gujarat	17.8	2.5	7.4
Karnataka	15.8	2.4	6.5
Haryana	16.5	2.3	6.1
Andhra Pradesh	16.5	2	5.6
Uttaranchal	12.6	1.3	4
West Bengal	11.5	0.9	3.7
Rajasthan	11.3	1.3	3.4
Madhya Pradesh	10.2	0.6	2.9
Jammu & Kashmir	8.3	0.5	2.5
Orissa	11.3	0.9	2.2
India Average	**15.2**	**1.5**	**5**
***As of 31 March 2003 **Source:** Ministry of Communications and Information Technology			

The implications for Orissa in this context are tremendous. In fact, a much localized successful attempt at introduction of ICT for the people is the case of the Bhubaneshwar Development Authority in Orissa setting 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.

There are several union government initiatives poised to take off, with the infused cash from a toll levied on software exports. The high-tech industry is a willing partner in this because of their fear of shortage of qualified manpower. The civil society and volunteering citizenry must take advantage of this opportune confluence.

An Experiment:

Rural Orissa is a perfect test bed for propagation of education through “computing for masses” or CFM, for short. Access to internet and productivity software can easily be provided by a single server with several cheap terminals. There are dramatic advantages to this idea of computing: lower system maintenance and administration costs, reduced hardware costs by using old, donated PCs as thin clients, open-source software availability, and quite importantly, a mechanism to create linkage between technical colleges and counter-part schools for common socially-conscious projects. Sustainable Economic and Educational Development Society

(SEEDS) has transferred the idea and provided financial support to JITM (Jagannath Institute of Technology and Management) in Paralakhemundi to explore this vision of appropriate technology and knowledge-economy preparedness for the digital have-nots. As further detailed at the website www.seedsnet.org, we are exploring Paralakhemundi, Nabarangpur area of KBK region and the Bajirout Chattrabas of Dhenkanal as the initial experimental sites. We hope that once we show some benefits and open some possibilities in a few less-privileged schools, the community and other development entities will take it further and spread. The website above includes a recipe for a prototype that may be emulated.

We are promoting *self-help groups* of beneficiaries consisting of the parents, students, and teachers. These self-help groups are supported by the technical knowledge and enthusiasm of students and staff of a nearby engineering college or school. We provide a model, a system and some financial support to guide the development of the "computing for masses" network. We try to imbibe a genuine interest and elicit commitment from the self-help group before deployment of our system at the target school, possibly culminating from a competition between multiple qualified groups/schools. We hope this increases the chances of long-term success -- through a shared stake-holding. In the following, we discuss the many implications and potential benefits of this technology-enabled socioeconomic and educational development.

The Benefits

Micro enterprise is all about how to take the things we have--labor, raw materials, and skills--and make the things we want and sell for a profit. How do lakhs of independent, dispersed consumers tell thousands of independent, dispersed producers exactly what they want, so collectively they don't make too many nuts and too few bolts? Information, especially involving prices, makes this amazing coordination possible. Information and Communication Technology (ICT) is what can grease the wheels of this market economy. More sophisticated technologies such as networked computers could automate the search for prices, labor or employment opportunities, while assuring better matching and reducing search time and costs Thus ICT (communication and computation is so closely intertwined that we would use ICT and IT synonymously) can help generate income and a capacity to buy from the basic food to healthcare to quality education.

According to a recent report, it costs a bank Rs 1.2 million and a huge running cost to set up a one-man branch in rural India. Believe it or not, farmers of a remote village in Honavar, 600 km away from Bangalore, are using ATM machines, linked wirelessly to servers at participating banks. A mobile ATM is hauled on a van meandering though a cluster of villages offering thousands of farmers a first-time experience of many basic modern banking facilities. The cost of a mobile ATM is estimated at Rs 1.2 million but its infrastructure is usable for many villages, across taluks and many banks, making it cost-effective.

The very premise of Right To Information (RTI) Act of India (operational since October 2005) is the power of IT. RTI promises to reduce corruption, develop governmental transparency, and empower the common citizens through their ability to inspect and take notes or certified copies of government works, and official documents, records, etc., cost-effectively. But much of this information is stored, processed and delivered through electronic techniques, the stuff of IT.

ICT has a tremendous potential in education as well. If properly harnessed, it can provide a content-rich, educational environment for young and adults alike. This also opens up the opportunity of open-access distance learning for working adults and the associated man-power development. An experiment called "Hole in the Wall," put an Internet kiosk in a poor Indian neighborhood with surprising results; children who could not read or write immediately took to the computer, figuring out how to use it with no instruction at all. Orissa could benefit from its children skilled in modern technology and ready for the competitive higher educational institutions, guaranteeing skilled workforce to the technology firms being roped in. This can make possible

school- or college-level distance lectures from experts around the world in real-time or through stored information servers.

There are several more direct economic advantages of Computing for Masses networks as well. Students of a school can take up the editing, formatting and print-setting for newspaper or magazines in English or other native languages. Village entrepreneurs may get essential knowledge or partly employ the network facilities to setup a kiosk-like business, and pay for the improvement and maintenance of the facilities in turn. Such a part-time kiosk could be staffed with students, the business proposition being a paid service for farmers to access a whole range of online services, including submitting of applications, lodging of complaints, obtaining of birth/death/marriage records, and paying of electricity and water bills.

There are other interesting ideas for “micro entrepreneurship” enabled by the CFMs such as printing of marriage invitation cards, local programming, and school handbooks, etc. One could even advertise healthful food or consumable items for generating revenue, sell various transcription services, and offer *Kumon*-like tutoring classes. CFMs could also serve as PCOs, combining and integrating many disparate functions of fax, telephone, printer, video, and data processing tasks.

Now, think of the empowering of the people, irrespective of gender and age, these possibilities can bring about. Information availability, and enhanced economic and training opportunities will help level the “playing field” for a large number of average Indians and Orissans wishing for a faster and better socio-economic change. For instance, with broadband ushering in near-free telephone calls, and CFM centers providing connectivity at rural libraries or schools, a wage earner going away to far-flung places like Surat will not remain incommunicado indefinitely from the loved ones left behind. Nor would he be easily duped by the brokers who manipulate the final wages due to his lack of information and ability to negotiate directly with the employers.

Some anecdotal successes: Hyderabad has initiated an "e-governance" system that puts computer kiosks in government buildings to limit the bureaucracy and provide easier access to information. In Mumbai, there is an ongoing experiment with video e-mail. It allows taxi drivers to speak to their wives -- who live in villages some 900 miles away -- via the Internet. The wives can then record their responses on video and send them back to Mumbai as e-mail documents.

We must unleash the creativity of the people by providing a catalytic infrastructure and training which will in turn make them the driving force behind progress.

The Pitfalls:

There are several challenges to be solved. First, just as anti-virus software is no substitute for vaccines, ICT should not be mistaken a panacea for development.

Second, to scale up the network viably and to cover more villages/towns need lots of resources, and we must leverage the union govt.’s ambitious *e-governance* project. We must also leverage the scattered private efforts such as multinational company Intel’s *Jagruti* and Microsoft’s *Saksham* projects. These companies are funding NGOs as well as local companies with an undisclosed budget and technical support, and we should leverage these and turn them into an advantage for Orissa. The Indian ministry of Information Technology has an ambitious target to set up 100,000 "common services centres" across villages where e-governance services will be available by August 2007. Local Indian companies and NGOs are getting involved. Take for example, Jai Kisan - an NGO set up to introduce rural IT technology in Uttaranchal - is hoping to put up over 3000 Kisan Soochna Kendras across that state.

Third, one must keep the students and their parents excited and committed to learning, leveraging, and maintenance of the “computing for masses” network. It must be made self-sustaining, without excessive or perpetual dependence on subsidies. The challenges to successful CFM functioning is at least as much sociological as technological.

Fourth, rural internet connectivity poses a problem of cost and availability. However, some solutions are in sight: Intel’s WiMax, n-Lounge’s corDECT (wireless and local loop) technology, and the costlier VSAT connectivity. Good business models are necessary to make these projects viable and self-sufficient.

Finally, the beneficiaries must use the computing network as a work-horse, not as a show-piece to be locked away in a headmaster’s office and to be only admired at a distance. A motivated self-help group is hard to build, but totally worthwhile in order to make technology a vehicle of positive socio-economic change for the masses.

Priyadarsan lives in Portland with his wife Anu, and kids Ashish and Adarsh.