

Connect and Catalyze:
Can India Leverage ICT
for
Inclusive and Sustained Growth?

A report of the Aspen Institute
Joint Roundtable on Communications Policy

David Bollier
Rapporteur



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249F, Sector 18	P.O. Box 222
Phase 4, Udyog Vihar	109 Houghton Lab Lane
Gurgaon, Haryana 122015	Queenstown, Maryland 21658
India	United States
Phone: +91-124-4014060 ext. 352	Phone: +1-(410) 820-5326
Fax: +91-124-4014080	Fax: +1-(410) 827-9174
E-mail:	E-mail:
aspenindiaict@ciionline.org	publications@aspeninstitute.org

For all other inquiries, please contact:

	
THE ASPEN INSTITUTE INDIA	THE ASPEN INSTITUTE
The Aspen Institute India	The Aspen Institute
c/o Vikram Tiwathia	Communications and Society Program
249F, Sector 18	One Dupont Circle, NW
Phase 4, Udyog Vihar	Suite 700
Gurgaon, Haryana 122015	Washington, DC 20036
India	United States
Phone: +91-124-4014078	Phone: +1-(202) 736-5818
Fax: +91-124-4014080	Fax: +1-(202) 467-0790

Lt. Gen (Ret.) Shamsheer S. Mehta	Charles M. Firestone
PVSM, AVSM and Bar, VSM	<i>Executive Director</i>
<i>Director General</i>	Communications and
Confederation of Indian	Society Program
Industry	The Aspen Institute (U.S.)
and <i>Trustee</i>	
Aspen Institute India	

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Foreword

India is called the “world’s fastest growing free market democracy” and is likely to become the third largest economy by 2040. This trend is enhanced by India’s democratic government, highly educated workforce, entrepreneurial citizens, and several forward thinking leaders. At the same time, for India to continue to shine and accomplish its twin objectives of becoming a Developed Economy by 2020 and a Knowledge Superpower, development needs to be technology-driven, sustained, participatory and inclusive.

Finding and describing the levers of these changes is a large part of the work of the Aspen Institute Joint Roundtable on Communications Policy, an annual gathering of over two dozen leaders from business, academia, government and the non-profit sector from India and the United States. In the inaugural Roundtable, which took place in Goa and New Delhi, India February 19-23, 2006, these leaders addressed issues of innovative policies for leveraging ICT (Information and Communication Technology) for inclusive and sustained economic growth. Topics ranged from Foreign Direct Investment, telecommunications regulatory reform, and spectrum reform to policies for widespread diffusion of ICT innovation and information literacy in India.

In the following report of this inaugural roundtable, conference rapporteur David Bollier aptly describes the current Indian economic environment, including the challenges the country faces, and lays out the group’s suggested solutions for ICT as a means to India’s sustained economic development.

The roundtable participants agreed that ICT was indeed a major driver of the economy, and its development would in turn stimulate economic growth across all sectors of the economy. Since 72 percent of Indians live in rural villages it is necessary for the ICT development to spread from urban to rural areas. The group also discussed the use of ICT for health, improving literacy, establishing business models for rural micro-telcos and promoting e-governance. Some of the major areas that the group decided needed change were the Government pol-

icy towards Foreign Direct Investment, Spectrum Management, and increasing the use of ICT to improve education. These are all detailed in the following report.

After the two day roundtable in Goa, the group met with three Indian ministers and the deputy chairman of the Planning Commission of India in New Delhi. In their report to the ministers, the group observed that the world looks to India to set a leadership standard for ICT particularly regarding rural telecommunications issues. Accordingly, India would do well to now move beyond software and focus on hardware and information management. India would do well to develop a long-term strategy to promote ICT development in rural areas and to demonstrate leadership in using ICT through electronic governance, health, education and rural development among other means.

In the following report, which spells out the specific issues and the recommendations of the group, David Bollier describes the roundtable dialogue over a two day period in Goa and the meetings with the ministers and government officials in Delhi. Bollier also incorporates outside material into the report where appropriate to provide context to the reader.

From this report, it is our aim that governments and the ICT industries can work together to leverage the power of both hardware and software to improve conditions for all Indians, and other people who have been largely left out of the communications revolution to date.

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Lt. Gen (Ret.) Shamsher S. Mehta
PVSM, AVSM and Bar, VSM
Director General
Confederation of Indian Industry (CII)
and
Trustee
The Aspen Institute India

Charles M. Firestone

Executive Director
Communications and
Society Program
The Aspen Institute (U.S.)

CONNECT AND CATALYZE:
CAN INDIA LEVERAGE ICT FOR
INCLUSIVE AND SUSTAINED
ECONOMIC GROWTH?

David Bollier

Connect and Catalyze: Can India Leverage ICT for Inclusive and Sustained Economic Growth?

It is hard to imagine a more promising moment for India. The country's economy is rapidly expanding, fueled by strong foreign investment, innovation, and outsourcing deals. New digital technologies are supplanting old, inefficient ways of doing business, boosting productivity. Cities such as Mumbai, Bangalore, and Hyderabad are booming, as are Pune, Jaipur, and Chandigarh, and the resulting prosperity is sweeping across many segments of Indian society. A new, more-educated generation is seizing the opportunities presented by this growth and developing a more cosmopolitan outlook. A sense of optimism is palpable.

Yet even as India basks in its robust economic growth and new global prominence, the nation faces a series of daunting challenges. Can India harness its enviable growth to benefit the bulk of the population, not just selected pockets of fortunate ones? Is the current prosperity, in fact, a classic case of an overheated developing economy that eventually will implode? Can India develop a strategic plan that will *connect* its society's many institutions and *catalyze* economic growth? Can its growth be made inclusive and sustainable over the long term?

To address these questions, the newly formed Aspen Institute India and its U.S. counterpart, the Aspen Institute, hosted a conference in Goa and New Delhi, February 19-23, 2006. The gathering convened 29 business leaders, investors, scientists, information technology (IT) experts, development specialists, service officers, and policy analysts to explore how India might leverage its current opportunities to achieve durable growth and inclusive social gains. The conference was the first major deliberative event convened by the Aspen Institute India, a nonpartisan policy forum recently launched under the auspices of the Confederation of Indian Industry (CII).

Lieutenant General (Retired) Shamsher S. Mehta, Principal Adviser to the CII (now the Director General), organized the event in collaboration with Charles M. Firestone, Executive Director of the Aspen Institute

(U.S.) Communications and Society Program, based in Washington, D.C. The conference discussion was co-moderated by General Mehta and Robert Pepper, the former Chief of Policy Development at the U.S. Federal Communications Commission (FCC) and now Senior Managing Director for Global Advanced Technology Policy for Cisco Systems and Communications Fellow at the Aspen Institute.

This report, which was written by rapporteur David Bollier, an independent American journalist and consultant, is an interpretive synthesis of the wide-ranging conversations from the conference. The report also draws on various articles and books that served as readings for the conference.

Exciting Opportunities, Profound Challenges

For the past four years, India's economy has enjoyed an annual growth rate of 8 percent and a boom of foreign investment. Much of this dynamic energy has been propelled by information and communications technologies (ICT). In 2006 more than half of all Fortune 500 firms were outsourcing some sort of ICT work to India. More than 125 of those firms have research and development operations in India.

Now that India is a leading target for foreign ICT investment, export revenues are soaring. India now exports software and services to more than 100 countries, and the nation's ICT export revenues grew from \$164 million in 1991 to about \$10 billion in 2002—a 45 percent compounded annual growth rate. The National Association of Software and Service Companies (NASSCOM) estimates that by 2008, overall ICT revenues in India will reach \$77 billion.¹

The ICT boom in India has been a driving force in the country's rising economic fortunes. It is helping to expand the middle class of 300 million people, open fresh opportunities for a new generation of business entrepreneurs, and bolster consumer demand. "There is an air of euphoric expectation that at last India is reclaiming its rightful place both in the world economy and in the global balance of power," notes *The Economist* magazine (February 25, 2006).

Yet India's remarkable economic vitality stands in stark contrast to some of the profound problems it faces. About 300 million Indians live on less than \$1 a day. An estimated 45 percent of children under the age

of five are malnourished. India is home to the world's second-largest population of people with HIV, and the gulf of inequality between rural and urban India, as well as between urban slums and the urban elite, is large and persistent. It has been said that India has about one-third of the world's software engineers and one-quarter of the world's undernourished people.²

The disparities can be striking. Although many segments of India's educational system are excellent, nine out of ten children never finish high school. Although parts of the nation's health care system are world-class, basic health care is not available to many millions of people. Basic infrastructure such as roads, telephones and Internet access are deficient in many areas, especially rural India.

A central premise of this Aspen Institute conference was that ICT could play a significant strategic role in addressing many of India's structural problems.

"The fact is that ICT is not a sector-specific technology," said General Mehta. "It affects every sector of the economy in which it is used. It is a strategic force that affects everything. ICT is like fresh air; everybody is required to breathe it."

Economic statistics suggest that this assessment is indeed the case. A recent NASSCOM study, for example, found that every increase of 10 percent in ICT investment correlates with a 3.6 percent increase in gross domestic product (GDP).³ Mobile phone use seems to have the same effects. The International Telecommunications Union (ITU) has estimated that for every 1 percent increase in mobile telephone penetration, the per capita share of GDP increases \$240,⁴ and for each 1 percent increase in Internet penetration the per capita share of GDP increases by \$593.⁵

"There are strong implications that if we want sustainable economic development, one of the drivers is technology," said Ravi Venkatesan, Chairman and Vice President of Microsoft Corporation India. Venkatesan urged Indian business and government to explore more

"The fact is that ICT is not a sector-specific technology. It is a strategic force that affects everything. ICT is like fresh air; everybody is required to breathe it."

Lt. Gen. (Ret.) Mehta

thoroughly how ICT can stimulate growth and what specific interventions can help fuel it. Attention must be paid to both the demand and the supply side of ICT, he said, as well as to the basic infrastructures that are important to all economic activity.

The power of ICT to stimulate economic growth is likely to increase as the role of ICT in the economy becomes more significant. From 1997 to 2003 the share of IT markets in the Indian economy grew from 1.22 percent to 3.15 percent, said Venkatesan. Revenues from IT markets during that same period increased from \$5 billion to \$16.4 billion.

Because India's entire IT and office service sector employs only about 1 million people—or about one-quarter of 1 percent of the Indian labor force—it is tempting to dismiss ICT as a parochial factor in long-term growth. This attitude, however, ignores the significant role ICT can play in improving efficiency and productivity in all sectors of the economy.

A great deal of India's ICT boom has been fueled by foreign direct investment (FDI)—\$4 billion in 2005 alone. According to the *Wall Street Journal*, India accounts for 65 percent of the global offshore IT industry.⁶ Although such growth obviously is welcome, India's disproportionate dependence on foreign investors naturally leads observers to wonder whether such growth can be sustained. Will foreign investors at some point decide that they have better opportunities elsewhere?

For this reason, there was a strong consensus among conference participants that India must diversify its ICT sector and focus more on developing a larger domestic market. This conclusion is echoed in the 2005 book, *India Rising: Emergence of a New World Power*, in which author Tarun Das and his colleagues write:

The Indian ICT sector can see the writing on the wall. If the status quo is maintained, India will be overtaken by China in less than a decade. The realization emerges that margins will continue to decrease in BPO [business process outsourcing] and rapid growth in that sector alone cannot save the day. Top management becomes aware that the Indian ICT sector's best hope for the future lies in developing and exploiting unique technological competence that cannot be matched easily.⁷

Developing a stronger *domestic* ICT industry, therefore, becomes the path toward developing a more sustainable and diversified competition in *international* markets as well. Participants widely agreed that India must aggressively develop its own capacities to compete with the ICT sectors of other nations, especially China. China's economy, for example, is about 2.5 times larger than India's. Its FDI is about 10 times larger, and its rate of growth and integration with the world economy is more extensive. For the moment, India may enjoy a robust offshoring business, but that advantage could dissipate in the future.

This analysis suggests that if India is to sustain its ICT growth over the long term, it must begin to branch out into higher value-added work and higher-margin projects. It also must begin to develop greater domestic demand, which is a more stable source of sustainable growth than foreign outsourcing alone. The authors of *India Rising* believe that "Indian firms [can] move up the value chain successfully by collaborating closely with lead customers and international governing bodies; by building competence in specific verticals; and by leveraging the large talent pool of Indian university graduates."⁸

A more difficult barrier to developing a more robust domestic ICT market may be cultural. "In our attitude toward innovation," said Vinay Deshpande, Chairman and Chief Executive Officer (CEO) of Encore Software Limited of Bangalore, "a lot of us, for whatever reason, seem happier to serve our masters than to do things on our own. We have to change that attitude. Among younger entrepreneurs, I'm happy to see that changing."

Developing a Domestic ICT Market

Most of this report explores how India might begin to fortify, diversify, and expand its domestic ICT market while it addresses urgent social needs. Before examining this challenge in greater depth, a general overview of the key challenges India faces in developing its ICT industries and spreading the benefits in inclusive ways will be useful. In general, conference participants believed that India must:

- Stimulate greater demand for ICT
- Enhance ICT supply capacities

- Improve basic infrastructure
- Foster new ICT business models and socially oriented hybrids
- Encourage government leadership and policy reforms.

India's engagement with these issues will have wide international significance. Among developing countries, India is regarded as a bellwether and leader. India has 17 percent of the world's population, much of it very poor, so the country's attempts to exploit ICT to develop itself economically and allocate its benefits inclusively will be closely watched. Will India's behavior serve as an inspiration or a cautionary tale? Will it invent new models of equitable, sustainable development for rural populations, or will economic growth aggravate inequalities among classes and regions?

Much will depend on the choices made by the Indian government, businesses, civic institutions, and social groups over the next few years. Fortunately, as this Aspen Institute conference revealed, India has several promising government projects, policy strategies, business models, and social initiatives it can draw on. Much of the discussion at the conference, therefore, focused on how these vehicles for progress can be understood, supported, and implemented.

Bringing ICT to Rural India

To speak about inclusive development means to address the enormous challenges of bringing ICT to rural India. According to the 2001 census, 72 percent of the nation's 1.1 billion citizens—nearly 800 million people—are scattered among 600,000 villages. Most of these villages are very small; half of all rural Indians live in settlements of fewer than 2,000 inhabitants. About 82 percent live in towns with fewer than 5,000 people. Most households have incomes of less than \$60 per month.

Rural villages obviously are not as attractive as India's cities for ICT markets. The villages are geographically dispersed, and individual increments of consumer buying power are quite small. In the aggregate, however, India's rural villages represent a considerable market demand. C. K. Prahalad and Allen Hammond, in an article in the *Harvard Business Review*, point out that

...60% of India's GDP is generated in rural areas. The critical barrier to doing business in rural regions is distribution access, not a lack of buying power. But new information technology and communications infrastructures—especially wireless—promise to become an inexpensive way to establish marketing and distribution channels in these communities.⁹

Prahalad and Hammond believe that “there’s a real opportunity for companies, particularly big corporations with economies of scale and efficient supply chains, to capture market share [in rural India] by offering higher quality goods at lower prices while maintaining attractive margins.”

Although bringing modern markets to rural villages will require many things, extension of the Internet and other ICT systems can begin to address key structural reasons for underdevelopment: poor marketing and distribution channels, as well as disaggregated demand. Along with better roads and other infrastructure, ICT can help India's isolated villages begin to develop economically and socially. The Indian government, in partnership with state governments and Panchayati Raj institutions, has launched “Bharat Nirman,” a time-bound plan for rural infrastructure development.

To be sure, ICT will not be a magic bullet. Its deployment in rural areas will require new business models, innovative technology design, and changes in social practices. Nevertheless, successful instances of ICT-based rural development are well-worth studying and emulating.

Rural India's “Graveyard of Successful Pilots”

To date there have been a variety of very successful projects serving different rural areas of India. In Andhra Pradesh, for example, the government has pioneered a highly effective e-government service called eSeva.¹⁰ This online service integrates more than 66 government-to-citizen and business-to-citizen services into a “one stop shop” electronic interface. Citizens and businesses can readily obtain information, file forms, and make tax payments through 46 eSeva centers and 400 service counters.

Another successful rural ICT project is e-Choupal, which serves more than 3.5 million farmers in 31,000 villages in six states (Madhya Pradesh, Karnataka, Andhra Pradesh, Uttar Pradesh, Maharashtra, and Rajasthan).¹¹ Through village Internet kiosks known as sanchalaks, farmers can access information in their local language about weather conditions, market prices, scientific farm practices, and other information that can affect their productivity. The project was developed by

ITC's International Business Division, one of India's largest exporters of agricultural commodities. e-Choupal helps rural farmers break a vicious cycle of low risk-taking, low investment, and poor market performance by reaping the advantages of vertically integrated value chains that are common in more mature economies.

“... India is becoming famous for being a graveyard of successful pilots. The issue is scalability. We are doing great work, but somehow these have not managed to scale.”

Anjan Ghosh

The Akshaya Project is a successful e-literacy effort that has used ICT to reach more than 600,000 households, or more than 3.6 million people, in the rural Malappuram district of Kerala.¹² This project uses more than 600 village tele-centers that incorporate wireless networks. In its first phase, this state-private partnership invited one member of every household to visit the local tele-center to

learn the basics of computing. In succeeding stages, tele-centers are free to operate as cybercafes, training centers, online payment agents, and providers of e-government services.

For reasons that are not immediately clear, many of these pilot ICT projects in rural India have never been replicated or developed on a larger scale. They remain isolated pinpoints of success: effective within their regions, inspirational perhaps, but not influential or transformative on a wider scale.

Many conference participants agreed with the assessment made by Anjan Ghosh, Regional Director, Public Affairs, Intel Technology India: “If you look at an eSeva, an Akshaya, or an ITC e-Choupal, these are great examples of what is possible. But India is becoming famous for

being a graveyard of successful pilots. The issue is scalability. We are doing great work, but somehow these have not managed to scale.”

Many reasons have been cited for the failure of pilot projects to be replicated elsewhere. “Just because you have worked with one state government [on an ICT pilot] does not mean that you can convince another state government,” said N. Balakrishnan, Chairman of the Division of Information Sciences at the Indian Institute of Science in Bangalore. “You have to start all over again, and if the person in charge changes, the system loses its memory.”

“We in India have become a great burial ground of pilot projects because of our ‘last mile’ problem,” said Roy Gilbert, Director of Google India. “Unless we make them independent of the personalities involved and implementable without any indirect costs being added into them, we will not be able to call them success stories. Why do we have isolated success stories in every state instead of having governments across India implementing them all? The greatest advantage of software is its replicability. Unless we network these applications, rather than just networking computers, we will continue to talk in isolation.”

“The greatest advantage of software is its replicability. Unless we network these applications, rather than just networking computers, we will continue to talk in isolation.”

Roy Gilbert

Arun Singh, former Minister of State for Defense, believes that greater effort must be made to share and evaluate successful projects. Although there are mechanisms by which state governments can share the details of effective pilots, this task could be pursued more aggressively, he said, adding that leadership by the national government would be particularly helpful. S. Mahalingam, Chief Financial Officer of Tata Consultancy Services, believes that “the critical piece that is missing is implementation assistance.” State and local authorities could do a better job of replicating pilots if they had more outside advice and expertise.

Observers commonly believe that ICT services and products are not replicated because the prices to consumers are too high. Poor vil-

lagers simply can't afford to buy computers, software, Internet service or other information systems. Yet participants said that although cost is obviously an important factor, the real missing ingredient is the *value proposition*.

"Cost can be easily overcome if there is perceived value," said Stacy Standley, an American telecommunications investor, advisor to the Aspen Institute (U.S.), and New Delhi resident. "If farmers are able to

improve their well-being because of the technology—by learning market prices, for example, or better farming practices via the Internet—they're going to do it."

"The critical piece that is missing is implementation assistance."

S. Mahalingam

N. Balakrishnan agreed: "Many people have been able to buy a television set for Rs. 8,000. This is because the TV has utility for the user, with 150 channels, 24 hours a day, at Rs. 200 per month. Cell phone use has exceeded expectations.

But for the average Indian, there is no perceived utility for PCs, even at \$100. They need an application that is either entertainment or applications that can be used without the PC and Internet connectivity."

The lesson: Consumer adoption of personal computers and broadband Internet access has lagged not necessarily because of price but because the value proposition has not been sufficiently demonstrated.

Ravi Venkatesan of Microsoft India pointed out, "When there is a perceived value, people—even at the bottom of the economy pyramid—are willing to come up with the means to access it. The affordability issue in ICT is being addressed by Moore's law [which holds that computing power will double at the same price every 18 months] and competition."

If this analysis is true, it suggests that once a certain price threshold is met, the real challenge is finding compelling software applications that meet people's urgent local needs. "Connectivity for the sake of connectivity accomplishes very little," writes Allen Hammond, Director of the Digital Dividend project, in one of the conference readings. "Connectivity that links marginalized citizens with needed services, however, can play a major role in economic development."¹³

An example is the use of ICT to help villagers access land records. Amir Alexander Hasson, President of United Villages, a U.S.-based company that operates wireless networks in Asia, Latin America, and Africa, pointed to the success of the Bhoomi program in Karnataka. The state government spent six years digitizing 20 million rural land records and putting them online; they are no longer available in paper form—a shift that in itself has spurred greater familiarity with and trust in ICT systems. The region’s 6.7 million farmers can obtain authoritative deeds, printed on official paper and acceptable in market transactions, from 177 government-owned kiosks.¹⁴

“The Bhoomi project was a more affordable and convenient way for villagers to get their land records than to pay for bus tickets and waste a day dealing with a bureaucrat, and going back several times to deal with problems,” said Hasson. “Application-specific ICT services are credible. They can save people time and money.”

Good ICT projects, however, can do more than that, said Hasson. They represent new revenue opportunities that serve real community needs. He cited the interest of banks in using Internet kiosks as platforms for lending. “ICICI Bank makes loans to village kiosk entrepreneurs and gets paid back on the loans from service revenues that the kiosk owners generate,” said Hasson. “It is still a nascent process, but it is breaking down barriers to ICT adoption by creating microenterprise opportunities for rural entrepreneurs.”

Making the value proposition of ICT vivid to the average villager remains something of a subtle art, however. An illiterate farmer is not likely to know in advance how a personal computer or Internet connection might help him.

One strategy for making the value proposition evident, said Davinder Kumar, Lieutenant General and Signal Officer-in-Chief of the Indian Army, is to develop a “total solution” package—that is,

“When there is a perceived value, people—even at the bottom of the economy pyramid—are willing to come up with the means to access it.”

Ravi Venkatesan

emulate the cell phone industry and its bundling of the mobile phone and subscription contract into a compelling, user-friendly sales proposition. “Today’s computers are not something that the current generation of SMEs [small and medium-sized business enterprises] are capable of using themselves,” said Kumar. “They normally need to

“One strategy for making the value-proposition evident is to emulate the cell phone industry ... a software package that is easy to use, and at the right price point.”

Davinder Kumar

hire a person, but there are no such people to hire. They need a total solution—a software package that is easy to use and at the right price point.”

Sheeja Dony, Director of Technologies for India, Hong Kong, the Philippines and China for American Express, agreed: “We need to do something like NTT [the telecommunications firm] did in Japan, which created a packaged solution for people so that consumers do not have to buy computers, software and internet connections separately, and integrate them on their own. We are poised for that in India, but we need to give it the right push.”

“The industry is partly to blame,” said Ravi Venkatesan of Microsoft India, “because we are not focused on the customer. Instead, we focus on new products and features and on driving innovation and lowering the cost trajectory. Unless we start delivering solutions and make those solutions available essentially as a utility, on an easy monthly installment or pay-as-you-go plan, the inflection point [for rapid technology adoption] will not really happen.” Venkatesan urges the ICT industry to learn from the cell phone business in terms of driving down costs—showing the desirability of the product, providing easy consumer finance, assembling a mix of players who can work together, and delivering total solutions.

Conference participants believed that the Indian government should set up interstate coordination groups composed of government agencies, industry, and nongovernmental organizations (NGOs) to share information on successful ICT-driven models for development.

The Power of User-Driven Innovation

Although a “total package solution” provided by ICT vendors is one possible strategy, several participants drew attention to the power of user-driven innovation at the local level. Individuals often find uses for ICT that technology designers and manufacturers never had in mind. In a presentation to the group, François Bar, Director of the Annenberg Research Network on International Communication at the University of Southern California, told many stories about individuals who adapt off-the-shelf technologies in unexpected, highly creative ways to serve their local needs.¹⁵

For example, while Bar was on a trip to East Africa to study how ICT could be used to alleviate poverty, a Ugandan colleague asked to borrow Bar’s cell phone. “He removed the battery, removed the SIM [subscriber identification module] card, and put his own SIM card in,” said Bar. (A SIM card is the “smart card” chip that contains all of a subscriber’s personal information, phone settings, and billing information.) “The man rapidly made some calls, and then hung up each time.” Bar was perplexed by what he had just witnessed. It turned out that the Ugandan man was in the habit of using his SIM card as a virtual cell phone; by borrowing someone else’s cell phone and putting his own SIM card into it, he could signal friends that he had a workable receiver and could accept calls.

As Bar explained, “This was not what Nokia had in mind when they designed its cell phones. Otherwise, it would have put the SIM card in a more accessible place. But to the extent that the phone device has enough openness that the battery, SIM card, and cell phone can be unbundled, users can find ways to recombine them in ways that make a lot of sense for them.”

“We need to do something like NTT did in Japan, ... so that consumers do not have to buy computers, software and internet connections separately, and integrate them on their own.”

Sheeja Dony

In parts of Africa, Latin America, and India, Bar continued, “cell phones are very often used not as personal phones but as community devices. As a result, people need to negotiate how to pay for using someone else’s cell phone. In Kenya, a company called Safari.com has developed a billing system that allows people to keep track of how much of their phone time friends have used. That allows people to set up businesses reselling minutes on their cell phones.”

The lesson: “Innovation is not just a matter of how a device or service is designed by companies,” said Bar. “It also comes from users who come up with new ideas.” From this perspective, the focus of innovation is not just in the product itself but in the entire environment—social, technological, organizational—in which a user lives.

In fact, that kind of innovation is one reason some development specialists favor open-source software as a platform for innovation and economic growth: It can enable individuals to come up with customized solutions to local problems.¹⁶ It also can enable them to develop an expertise of their own and not simply be passive consumers who are dependent on what is offered to them.

The peer-to-peer, bottom-up approach to innovation can even apply to infrastructure deployment, said Bar. In some countries, communities have built water distribution systems by laying pipes on people’s land and then extending the pipes to a neighbor and then the neighbor’s neighbor. Eventually, everybody is able to tap into the water. This model of neighborly cooperation is sometimes combining with low-cost ICTs, propelling remarkably fast and efficient build-outs of telecommunications infrastructure.

Micro-Telcos and Other Novel Business Models

Some of the most potent forms of innovation occur when local users become entrepreneurs. The power of this kind of innovation comes from a customized local solution that is integrated into a sustainable business model and market. The grassroots deployment of wireless fidelity (WiFi) is an instructive example.

“What has happened ‘under the radar’ in many Latin American countries,” said Bar, “is what we call micro-telcos. These are very small

telecom providers who have between 50 and several hundred customers. Micro-telcos service high-cost, low-income areas as a business proposition. They often do not rely on state subsidies or universal service monies, yet they can nonetheless generate significant amounts of business and ICT usage.”

In Columbia, micro-telcos expanded wireless service from 7 percent of the population in 1994 to 12 percent in 2002, said Bar. In Argentina, micro-telcos provide 8 percent of the landlines. In some provinces, they actually provide as much as 53 percent of the landlines. Amir Hasson of United Villages reported that “12 to 13 percent of India has cable television access simply because it was built on a microenterprise level. Small-town entrepreneurs would get out a wirebox and splice out cable TV signals to households and distribute cable TV. The *lack of government intervention* was important in spreading cable TV. It was an entrepreneur-driven model. It spread because there was a fairly simple way for entrepreneurs to set up a micro-cable operator without a lot of capital.”

By relying on a mix of local entrepreneurship and creative uses of local resources, micro-telcos often can achieve things that a top-down approach to innovation cannot. In one area of Ghana, for example, a person with a high wooden tower was able to sell access to it as a transmission node for wireless service. “If there is a policy recommendation that comes from this,” said Bar, “it is that we should try to every extent possible to make the system as open as possible. We should try to create interfaces that are accessible and that can be reprogrammable by any of the users.”

Despite the technical complexities of many ICT systems, motivated users often can play a significant role in adapting them to local circumstances. Robert Pepper of Cisco Systems told a story about 18 Native American tribes living in a mountainous region north of San Diego, California. The tribes—7,600 people scattered across hundreds of square miles—suffer from 50 percent unemployment. They decided

“We should try to make the system as open as possible. We should try to create interfaces that are accessible, and that can be reprogrammable by any of the users.”

François Bar

that they wanted to use ICT to obtain distance learning from the nearby University of California, San Diego. Pepper explained how they organized themselves as the Tribal Digital Village and used low-cost ICT to build their own world-class network:

They used off-the-shelf WiFi 802.11(b) with directional and nondirectional antennas to create a backbone of unlicensed microwave in the mountains and connected each of their communities. At each of the nodes, they created additional extensions, or “clouds,” so that broadband service could reach 900 locations. With VoIP [Voice over Internet Protocol] on top of this WiFi network, there were some locations that had telephone service for the first time ever, but it was all based upon the data platform. They totally leapfrogged the infrastructure. Some people say it is “only WiFi,” and it won’t work reliably. But it is, in fact, a very robust system.

Pepper noted one other interesting benefit from the project: “Young people on the reservations who otherwise would have left because of the lack of jobs have stayed because they were trained to build and maintain the network. The technology has actually provided tribe members with a new skill set that has given them a new infrastructure and new job opportunities.”

Professor Ashok Jhunjhunwala, head of the Department of Electrical Engineering at the Indian Institute of Technology, Madras, told the story of a local entrepreneur who has adapted automated teller machine (ATM) technology to work in rural settings. One major impediment to deploying ATMs in rural areas is their high cost; a typical ATM costs about \$20,000. Another problem is environmental (i.e., dirt and weather). There also is the question of how to provide secure, authenticated transactions.

An entrepreneur in Chennai figured out a way to produce an ATM for \$1,200 that uses biometric authentication, said Jhunjhunwala. “It even uses soiled currency notes because people in rural areas do not trust new notes,” he said. “A lot of work needs to be done, but the basic technology for this sort of thing is emerging. This is the beginning of providing credit and credit ratings for rural people.”

Once an Internet connection is established in villages, it can serve as a multipurpose platform for imaginative entrepreneurs. Jhunjhunwala has seen models in which the Internet is used as a vehicle for local weather forecasting, thanks to a \$200 weather monitoring kit being promoted by the Department of Science and Technology [part of Ministry of Science and Technology, Government of India].

Internet connections in rural areas also are being used for education, such as coaching students to help them pass their school exams, and outsourcing businesses that serve urban clients. For example, Jhunjhunwala said, “an educational company contracted with four villages to do different elements of the same project. One village did all the language translation work; another did animation work; a third did voice recordings; and a fourth village integrated the whole project and delivered it to the company.”

Besides serving as a platform for localized business opportunities, Internet connections can create new jobs directly. Jhunjhunwala reports that companies such as e-Choupal, Drishti, and n-Logue have been setting up Internet kiosks that come with computers, web cameras, printers, video conferencing, and training—all for about \$1,200. Kiosk operators can make about \$80 per month.

Ravi Venkatesan of Microsoft India recommended a basic strategy for tackling the problems of ICT in rural India: Go study it at the village level. “In Japanese manufacturing,” he said, “they have a phrase, *gemba kaizen*—which means, in essence, that the only way you are going to solve a problem is by going to the scene of the problem. Speculating about it from a remote location does not really help. My submission is that innovation at the village level needs to be studied at the village level.”

Venkatesan recommended that someone “do a superb postmortem of the successful ICT pilots that never scaled and see what can be

“One of the biggest problems in rural areas in relation to the management of common assets is who owns it and who will look after it.”

Arun Singh

learned from them. Otherwise, we are just going to keep on creating more and more successful, non-scalable pilots.” To be scalable, projects must be able to adapt to local circumstances, which naturally will vary immensely even if the physical problem being addressed in each location is similar. Technology will work only if it is regarded as an enabler, not as an end in itself.

Perhaps the issue is not really scalability *per se*, said Stacy Standley, a telecom investor and advisor to the Aspen Institute. The issue may be how to integrate different local modules into an ICT platform. “Don’t look for either economies of scale or the absolute size of a project,” he warned, “but rather look at the appropriateness of the project to a specific application in a village. Whether it is telemedicine, WiFi or farmers’ use of the Internet, the issue is how to propagate these modules into the appropriate context, not how to get them scaled up.”

Thus, rather than focusing on ICT alone, we must regard the technology as an enabler, not an end in itself. Local communities and entrepreneurs will play a critical role in making ICT work. They must engage with, expand, and adapt the technology to serve their own local needs.

Aggregating Rural Demand Through Shared Assets

To this point this report has identified three strategic approaches for demonstrating the value proposition of ICT:

- Packaged “total solutions” provided by ICT vendors
- Entrepreneurial micro-telcos and other innovative local models
- Open, modular technologies that enable individuals to adapt the technology to serve their local needs.

There is another option, however, that has a venerable history and proven effectiveness in Indian history: *the shared asset*. Notwithstanding the success of the cell phone, said Arun Singh, the former Minister of State for Defense, “the ICT revolution in India, at least so far as the consumer is concerned, commenced with the creation of the STD [subscriber trunk dialing or domestic long distance] booth.... That was the original driver.”

Sam Pitroda is widely credited with developing the concept and technology behind India's network of 600,000 STD/public call operator (PCO) phone booths—an innovation that brought telephone access to most villagers in the country, even in the most remote regions. In the mid-1980s Pitroda made the case for indigenously designed and manufactured telephone exchanges that could be deployed in difficult rural environments (dust, dirt, high temperatures, high humidity) where servicing capabilities would be limited.

The telephone booths and kiosks Pitroda developed were a brilliant innovation for many reasons. They proved the economic appeal of shared assets that were nonetheless convenient for individuals to use. As shared assets, the phone booths eliminated the need for the state to build large cable networks and for individuals to pay for expensive devices. Yet the phone booths were cleverly designed for individual use by ensuring, for example, that the cost of each call is displayed and that a bill is instantly printed out at the user's end (not at the central office). Finally, besides bringing basic phone service to hundreds of millions of Indian villagers, the booths have provided employment for about 1 million people.¹⁷

In this second telecommunications revolution brought about by computers, cell phones, and the Internet, Singh argued that shared ICT assets may be an effective way to overcome a variety of problems. "It may well be that SMEs or farmers or the rural poor might not be able to afford the capital to buy ICT as personal assets, which in any case have problems such as the need for power, backup systems, and so on. But it is more than theoretically possible that ICT could be adopted at locations shared by many."

Lt. Gen. Davinder Kumar of the Indian Army agreed on the practicality of using shared assets. "TV penetration took place in India when there was one TV in the village, and the entire village used to watch the same television program. The shared assets approach does work." Telephone usage spread in much the same way, he pointed out. "The statistics on telephone penetration do not mention that one telephone may be used by 10 people. The utilization and familiarity with the telephone is there, but perhaps the person does not own the telephone." Lt. Gen. Kumar also cited a recent experiment in Rajasthan, where Internet kiosks connected to fiber wires have been providing all sorts of new applications to rural areas.

One advantage of a shared assets approach is that it can leverage many existing capital assets owned by the government, such as post offices. Arun Singh said that post offices, schools, and other government facilities could be used as shared assets to promote ICT usage. “The buildings exist and are already owned by the government,” he pointed out. “No investments would be required in buildings or land.”

In a poor country with a large, dispersed rural population, the appeal of a shared-assets solution is fairly obvious, Singh said. Other countries have pioneered such approaches as well. Russia has used post offices as community centers, and Mexico has been a leader in the communal uses of technology, said David Gross, United States Coordinator for International Communication and Information Policy at the U.S. Department of State.

The Indian government is already piggybacking on the nationwide network of 22,500 PCO stations so they can serve as “multifunctional service delivery points” (SDPs). The idea is to use PCOs with personal smart cards as an electronic payment system. In effect, each PCO booth will be able to act as a franchise outlet for banks. Even the poorest of the poor will be able to access basic banking services such as loans and interact on a more flexible basis than normal bank customers.

In their 2002 *Harvard Business Review* article, C. K. Prahalad and Allen Hammond explain the economic benefits of shared assets: “The shared access model, which disaggregates access from ownership, not only widens [a company’s] customer base but increases asset productivity as well.... Typically, the providers of such services [Internet connections, cell phones, refrigerators, even cars, on a pay-per-use basis] get considerably more revenue per dollar of investment in the underlying assets.”

A shared asset has another virtue: It is a vehicle for aggregating consumer demand that otherwise would remain diffused and unexpressed. It makes the community, not the individual, the “customer” of ICT and, in so doing, makes the ICT asset more affordable, manageable, and sustainable.

A startup company, Gyandoot, demonstrated the benefits of the shared asset model when it created an ICT network in the Dhar district of central India, where 60 percent of the population falls below the poverty level. As Prahalad and Hammond relate, Gyandoot created a

network of 39 kiosks that provide local entrepreneurs with Internet and telecommunications access, as well as with governmental, educational, and other services. Each kiosk serves 25 to 30 surrounding villages; the entire network reaches more than 600 villages and more than half a million people.

For all of the economic advantages of shared assets, management and social control of shared assets can be contentious. “One of the biggest problems in rural areas in relation to the management of common assets is who owns it and who will look after it,” said Arun Singh. He pointed out that, unlike the Native American tribes near San Diego who created a joint governance structure, “there are often fights over the management of common assets in village India.” Any economic advantages of sharing ICT, therefore, must take into account the community models and business management approaches that make them work properly.

This area may need further exploration, said Professor Ashok Jhunjhunwala of the Indian Institute of Technology, Madras. “Do we need to set up companies to manage things, or do you do it as part of a state-supported exercise? What about community-oriented services? What is the business model for providing them?”

New ICT-Based Models for Health Care

Imaginative deployment of ICT could have especially dramatic effects on rural health care, most conference participants agreed. The new technologies are pioneering cost-effective new ways of bringing quality health care to rural villages. An equally important innovation, however, is the rise of new organizational models that combine non-profit goals with financial sophistication and accountability.

William A. Haseltine, Chairman of Haseltine Global Health, LLC, and President of the William A. Haseltine Foundation for Medical Sciences and the Arts, argued that some sort of innovation in business and organizational models will be imperative in the health care sector. At present, he said, existing models are simply economically unsustainable.

“The current model for treating disease is basically based on foreign countries sending large sums of money to developing countries,” said Haseltine. “At best, 20 percent of the money reaches the people who

actually need it. If there is one thing we have proved over the last 50 years, it is that direct foreign aid through NGOs to treat health problems is relatively ineffective.”

Fortunately, India’s social sector has been pioneering some highly attractive innovations that other nations would do well to emulate, said Haseltine. If some of these innovations can be more widely adopted, he said, “the nongovernmental sector may hold the solution to many of the world’s health care problems, both in the developed and the developing world.”

“The non-governmental sector may hold the solution to many of the world’s health care problems, both in the developed and the developing world.”

William Haseltine

What is really needed, said Haseltine, is a more serious look “at health care structures that can be self-sufficient in the economic context of a given country.” This concept was a key focus of a November 2005 conference that the Haseltine Foundation for Medical Sciences and the Arts and the Lind Family Foundation hosted in New Delhi. The conference focused on “best practices in social entrepreneurial medicine,” said Haseltine. “We do not really have a good word for the topic, and we still don’t, but the idea is providing affordable access to high-quality medical treatment in a system that is self-supporting.”

The model Haseltine is trying to develop is an amalgam of many different practices that are being pursued by a variety of independent players—NGOs, foundations, public-spirited physicians, and others. All are attempting to develop new ways of providing quality health care to underserved populations.

“The fundamental goal of these health care services is to provide care to whoever needs it at a cost that that person or group can afford, and to subsidize their treatment by charging more for services to the middle class,” said Haseltine. “The model depends on efficiency, on volume, and to a large extent on the good use of information and communications technology.”

An exemplar of this new approach to health care delivery is the Arvind Eye Hospital in Madurai. Started 25 years ago by a single doctor and run by his family ever since, the enterprise now consists of five hospitals in cities throughout Tamil Nadu. In its effort to treat and eliminate needless blindness, the hospital sees 1.6 million Indians every year and performs 250,000 cataract operations and 50,000 other eye surgeries. Sixty percent of the treatment is provided free of charge, subsidized by people who can pay.

“How do they do it?” Haseltine asked rhetorically. “One way is to reduce costs very dramatically. They have broken apart every aspect of the operation and use high school graduates for certain tasks while reserving their doctors and nurses for the tasks for which they are really needed. A second way is, of course, volume and efficiency. They use very high-end equipment but keep the marginal cost low by having high-volume usage.”

Haseltine pointed out that ICT enables the Arvind Eye Hospital to reap many efficiencies while extending its catchment area. For example, through telemedicine technologies, patients can have medical images of their eyes scanned at local kiosks and transmitted to central hospitals for examination. The hospital also reduces costs by doing its own manufacturing of lenses. Instead of paying commercial vendors \$200 for lenses, the hospital makes its own lenses for \$12.50. Instead of buying suture packs for \$80, it buys the components from California and assembles the sutures itself for \$10. The hospital even manufactures its own ophthalmic solution and exports it for profit.

“At this point, the hospital is making a lot of money even though they give 60 percent of their care for free,” said Haseltine. “They are using that money to reinvest in themselves—to improve their technology and manufacturing capabilities and to extend their reach. Their goal is to cover more areas of India, such as Hyderabad, Bangalore, and Chennai.”

The hospital is now working to create new technology specifically designed for high-volume, low-cost medicine that can be distributed rurally. For example, the hospital is working with a European manufacturer to develop a machine that could be strapped on by a high school-trained technician that would determine the refractive index of

a patient's eyes, automatically send the data to a machine that would grind the patient's lenses, and record the images needed to do surgery on cataracts, corneas, and retinas. A workable prototype is months away. Because the hospital serves 1.6 million patients, it has attracted the interest of large pharmaceutical companies seeking to do scientific research within a controllable system. Arvind therefore is investing some of its profit to create a new research center.

Haseltine also told participants about a hospital run by Devi Shetty in Bangalore that uses high-resolution broadband technology to do doctor-to-patient conferencing. "They are able to transmit medical data directly from rural areas, and to prescribe appropriate medication through local doctors," he said.

"ICT has been shown to help empower women, the poor and the uneducated by providing them with new sources of education, income, autonomy and social opportunity."

S. Gangopadhyay

What is noteworthy about these sorts of health care projects is that they are not traditional philanthropies, nonprofits, or businesses. They are dynamic hybrids that represent a new economic model entirely. Can they be sufficiently understood and replicated elsewhere in India? What initiatives and processes are needed to "grow" these novel types of health care services—or, for that matter, to grow other ICT and pilot projects?

If the goal is to boost efficiency and cut costs while serving large numbers of people, ICT is likely to be an important infrastructure for such experiments. As with the grassroots-driven innovations discussed above, however, many on-the-ground social and economic factors will be as influential as the technology itself.

Although this situation makes for a more complex challenge in deploying ICT to improve rural health care—"solutions" cannot just be "parachuted in"—it does mean that any successes are likely to have enormous spillover benefits. As Shubhashis Gangopadhyay, Director of

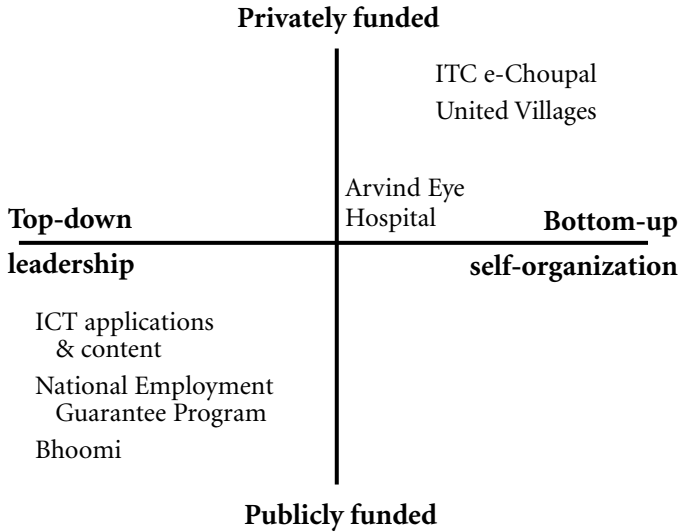
the India Development Foundation, put it, using ICT as a core infrastructure in rural health care “creates a backbone which allows other commercially viable services to be distributed through the network.” ICT as a core infrastructure will not only help India serve rural health needs, it will spur new business development—and help address education, training, and unemployment.

Introducing ICT to rural areas also is likely to help address gender and caste problems, Gangopadhyay added. “There is a positive correlation between ICT penetration and a reduction in the gender gap,” he said. Although he acknowledged that caste and gender issues have deep and complicated origins, he said that ICT nonetheless has been shown to help empower women, poor people, and uneducated people by providing them with new sources of education, income, autonomy, and social opportunity.

With the proper design and implementation, ICT can address a variety of health care delivery and social issues in a single stroke. Gangopadhyay cited the promise of smart cards in treating people with HIV/AIDS. By requiring patients and doctors to authenticate the information stored on biometric health cards, the Indian government could more easily track the incidence of HIV/AIDS in a mobile population; ensure that health care subsidies are going only to people who need them; and provide treatment in a discreet, confidential way that does not risk publicly revealing patients’ identities.

A Rural ICT Roadmap

As the preceding sections indicate, India already has developed an impressive array of successful ICT projects. An important practical question, however, is what lessons to draw from such an eclectic set of examples. What criteria make sense in trying to understand their similarities and differences? Amir Hasson of United Villages, working with a subgroup of conference participants, presented the following graph as a way to help conceptualize the many examples. The participants decided that the x axis of the graph should represent a continuum of top-down leadership to bottom-up self-organization, and the y axis should represent a continuum of privately funded to publicly funded projects.



In trying to move more ICT projects forward, Hasson urged the government, ICT companies, and others to populate this chart with successful examples to see how existing initiatives can be harmonized and scaled up; disseminate the results of successful projects to relevant people within government, business, and NGOs—perhaps a website of the projects and implementation strategies could be made, he said—and mobilize funding with the explicit purpose of rolling out successful initiatives on a statewide basis.

The point is to get beyond the disaggregated, pilot-based mentality of ICT projects and begin to use ICT more strategically, boldly, and on a broader scale. “Once you take a leap of faith in computers and the Internet,” said Davinder Kumar of the Indian Army, “people will demand them. As that demand increases, the government and NGOs will have to come in as facilitators, providing the wherewithal to bring about a change in culture that India needs, especially with the younger generation.”

This sentiment was widely shared by the conference participants. Although every sector of Indian society has some role to play in fulfilling this vision, everyone agreed that government leadership will be critical. What specific steps should government take to catalyze sustainable and inclusive development using ICT? Conference participants offered a variety of recommendations.

Opportunities for Government Leadership

There was a strong consensus that government must play a larger role in using ICT as a strategic tool, but as Peter A. Reiling, Executive Vice President for Leadership and Policy Programs of the Aspen Institute (U.S.) noted, “there is no consensus on what that role should be.” Much discussion therefore focused on precisely how government could play a more constructive role.

Historically, many ICT businesses have welcomed a hands-off role by government, said B. K. Zutshi, former Indian Ambassador and Permanent Representative to the General Agreement on Tariffs and Trade (GATT) and Vice Chairperson of the Telecom Regulatory Authority of India (TRAI). “The benign neglect was good for the sector,” he said. “But now we have to do more to promote inclusive, sustainable growth, for which there is enormous potential. There is a need for partnerships with government, and the right kind of government intervention. India’s success is being studied all over the world, and that’s very good. But there is enormous potential for doing more, which cannot be done by industry alone. Some amount of intervention is now required.”

The proliferation of new ICT models being driven by business and NGOs certainly is promising, said Shubhashis Gangopadhyay of the India Development Foundation, but these models are not likely to solve the problems. Therefore, he said, government leadership is imperative: “We cannot depend on innovative people to solve the basic problems. Government cannot hang around and wait for these initiatives to mature when we are talking about very basic issues of education and health. We need to be more proactive.”

Leadership is urgently needed not only because there are so many serious and acute problems but also because India’s youthful demo-

“India’s success is being studied all over the world, and that’s very good. But there is enormous potential for doing more, which cannot be done by industry alone. Some amount of (government) intervention is now required.”

B.K. Zutshi

graphics and competitive advantages may be a passing phenomenon. “There is a window of opportunity here that will not be open forever,” noted Ravi Venkatesan of Microsoft India. “In fact, Dr. Vijay Kelkar published a paper recently where he said that India’s demographic advantage will come to an end by 2025. Unless we seize the moment of the next three to four years, our opportunity to become a developed nation in our lifetimes will slip away. We do not have a lifetime to get our act together.”

In that paper, “India’s Economic Future: Moving Beyond State Capitalism,” Dr. Kelkar argues, “This is our last chance. If we miss this opportunity, then we’ll be in the dire straits of being a poor, aging country.”¹⁸ He continues, “In the new India, poverty must become history, by promoting inclusive growth and improved governance. Towards this end, incentive-compatible policies and improved institutional architecture will play a key role. We now have a new tool, in the form of information technology, which can help deliver more rapid progress in improving governance in general, and removing poverty in particular.”¹⁹

Conference participants made the following general recommendations for government action.

Stimulate ICT Demand

If the tonic economic effects of ICT are to be felt more widely in Indian society, both the central and state governments must do more to help stimulate ICT demand. This assertion was a recurrent theme of discussion.

To be sure, government has already taken many important steps. Government has set ambitious targets for expanding tele-density and broadband penetration in India. India currently has a mobile telephone subscriber base of more than 90 million lines and is adding more than 5 million lines per month. The current tele-density level of 12.73 percent might increase considerably over the next two years, according to Das, Mathur, and Richter in *India Rising*.

The Department of Telecommunications (DoT) has set a target of 20 million broadband subscribers and 40 million Internet users by the year 2010.²⁰ India also is in the enviable position of having fiber optic wires

available in every county headquarters. As a result, virtually everyone in the country is within a 15 kilometers of a fiber wire connection. (The problem, as discussed below, is that actual connections to the fiber backbone are sparse.) At the same time, new wireless technologies—worldwide interoperability for microwave access (WiMAX), Flash dynamic memory allocation (DMA), high-speed downlink packet access (HSDPA), evolution data optimized (EVDO), iBurst, and 3G (third-generation technology) technologies—are extending Internet and wireless applications to more and more people.

Access to the Internet and other ICT services also is being facilitated by new High Speed Public Telecom and Info Centres (HPTIC), which plans to enable 100,000 ICT common service centers (CSC) across rural India. The government is committed to providing such centers in all villages with 2,000 people or more.

Yet for all these encouraging signs, India has the potential of increasing investment in ICT infrastructure considerably. A 2005 study by NASSCOM found that “among 30 economies worldwide, the IT capital share that separates invested from underinvested economies is 10 percent. The IT capital share in India’s economy—only 3.5 percent of total capital—is lowest among all economies considered.”²¹

The NASSCOM study also found that the dispersion of existing information technologies “is narrower than in any of the 30 economies examined.” India had only 7 personal computers per 1,000 people in 2002, compared to 419 PCs in economies regarded as “invested in IT capital” and 59 personal computers for economies that are “underinvested in IT capital.” Thus, India’s PC penetration rate is less than 12 percent of the average rate for other economies that are underinvested in IT capital, whereas Internet access penetration rates in India are less than 16 percent of the average rate for those economies.

Given this scarcity of ICT infrastructure, it is not surprising that there has not been a convergence of computers, communications, and content in India or the productivity gains associated with such convergence. Moreover, the infrastructure that does exist is inefficient and costly to use.

N. Balakrishnan of the Indian Institute of Science explained, “We have a fabulous infrastructure [in fiber wire], but it is still ‘lit’ at 622 megabits per second (mbps) or at best at 1 gigabits per second (gbps),

whereas the same fiber elsewhere in the world is lit with a multitude of 10 gigabyte channels, or lambdas.” Balakrishnan said that a U.S. household may spend \$200 per year for Internet connectivity of 2 megabyte (MB) connectivity, with no limits on downloads, whereas the Indian Institute of Science pays \$8,000 annually for the same level of broadband connectivity—40 times more. “We are being very inefficient in using our infrastructure,” said Balakrishnan. “We are using third-generation technology to light up first-generation fiber and trying to make it run. It’s like trying to run a Rolls-Royce with a bullock cart wheel.”

The deficiencies of ICT infrastructure may have their greatest impact on rural India, which accounts for 60 percent of the nation’s GDP. Although there are an estimated 1.8 million SMEs in India, only 10,000 have Internet connections. This gap prevents SMEs from becoming part of a larger supply-chain management system and reaping its greater efficiencies.

Indian Prime Minister Manmohan Singh has declared that improving India’s infrastructure is his “top priority.”²² Bharat Nirman and Jawarharlal Nehru National Urban Renewal Mission are meant to address this aspect. However, because the country’s fiscal deficit is about 8 percent of GDP, if state and central governments are counted, it is difficult for the government to make large infrastructure investments. Hence the appeal of public-private partnerships to build or improve India’s roads, airports, broadband, and other infrastructure.

Expand e-Government and ICT Procurement

One of the most effective ways for government to stimulate ICT demand is through its own example. By integrating ICT into its everyday work, particularly in government-to-business (G2B) and government-to-citizen (G2C) activities, government can set a powerful example to citizens and induce more of them to use ICT. “If government applies ICT to its own functions,” said B. K. Zutshi of TRAI, “then obviously there is going to be an explosion.”

Some state government initiatives mentioned above, such as the e-Choupal, eSeva, and the Bhoomi projects, are powerful tools for improving the quality and efficiency of government services while indirectly encouraging people to learn how to use ICT. This strategy in

itself is an important aspect of government leadership because it helps cultivate greater familiarity and trust in ICT-mediated transactions.

Telecom investor and Aspen Institute advisor Stacy Standley said that people often do not trust electronic technology. Many travelers actually send office assistants to retrieve hard copies of airline and railway tickets that they have booked online. A grocer may tabulate a customer's purchases with a calculator, he said, but then insist on doing a paper-and-pen addition as well. Standley said he has even seen commercial bankers, in the course of checking a client's inventory as the basis for a loan, ignore the results of computerized inventories based on the scanning of bar codes and insist on doing a hand tabulation.

The more government can validate ICT systems as trustworthy for everyday transactions, the faster ICT will be adopted. "If all income tax returns had to be filed electronically, then that triggers many other things," said S. Mahalingam of Tata Consultancy Services. There probably would be corresponding increases in government efficiency, ICT sales, entrepreneurial innovation, and cultural acceptance of technology.

Properly used, government procurement could be another powerful tool for stimulating the economy (especially indigenous ICT manufacturing) and promoting broader public acceptance and use of ICT systems. A recent report by CII makes several recommendations for changing government procurement practices.²³ Among the suggestions: align procurement policies with the government's larger policy objectives of building the ICT sector; consider legal changes regarding supplier liability; allow suppliers to obtain intellectual property rights on government-developed technologies; and streamline the procurement process to reduce bidding costs and increase competition.

The 2005 NASSCOM study offered its own ideas for improving government procurement.²⁴ There is a widespread belief that "government procurement of IT assets is neither competitive nor transparent," according to the report. NASSCOM therefore recommends that the government make procurement of software and IT a political priority, much as the government has already made IT exports a priority. NASSCOM also recommends that government procurement be technology-neutral and transparent and that it promote competition and be based on economic considerations.

To be sure, government is aware of the catalytic influence of ICT procurement. A 2000 law requires every government department to spend 3 percent of its budget on ICT. Will such expenditures actually be made, however? Many conference participants were skeptical because there are no serious enforcement mechanisms or sanctions for failing to spend the money.

“The large-scale adoption of e-government is not going to happen unless there is a well-defined metric for doing it,” said Parag Kar, Director of Government Affairs for Qualcomm India. “A general recommendation to spend 3 percent of your budget is not enough.” Others agreed that the government has a “pathology of nonenforcement” that must be addressed. Indeed, as noted below, one potent incentive for governments to use more ICT in their work is the potential to increase accountability and reduce corruption.

Also worth noting is that although government leadership in stimulating demand is important, an even more powerful stimulant will be *people-driven* demand. If people realize that technology can save them time and money in their daily lives—if they can easily acquire digitized land records or file government forms without losing a day’s work—that recognition will validate the value of ICT. A “citizen pull” on the technology ultimately will be more powerful than a “government push.”

In addition, any government ICT plans must have sufficient openness to accommodate local needs, user-driven creativity, and private-sector innovation. If the government stipulates too strictly how technology should be designed, it could unwittingly thwart these important sources of innovation and limit public acceptance of the technology.

Bring Clarity, Coordination, and Transparency to Policymaking

A frequent complaint among many conference participants was the lack of clarity, coordination, and transparency in government policymaking. Ravi Venkatesan of Microsoft India put it succinctly:

There are inconsistent government policies, unclear decision rights, and occasional encroachments on the independence of regulators. These create a difficult set of circumstances that have incredibly important prac-

tical consequences—in how tariffs are set, what technology choices are made, how spectrum is allotted, and so forth. In addition, there is the issue of how to maintain policy consistency even as governments change. How do you keep the goal posts from moving?

S. Mahalingam of Tata Consultancy Services echoed this sentiment: “Policy has to have clarity, coherence, and stability. There has to be a mechanism for horizontally and vertically integrating government goals, policies, and statements.”

Conference participants told several stories about government policies working at cross-purposes to each other. One participant described how the government’s finance minister rejected the use of smart cards because they represent an unauthorized form of money—even as other government agencies were seeking to promote e-commerce in villages. Another pointed out that the authority of the DoT and TRAI sometimes overlap in confusing ways. There also is a lack of coordination between the central government and Indian states, as well as irregularities and inconsistencies in compliance with government regulations and the granting of government licenses. These cases seem to be mostly matters of technical and bureaucratic coordination.

Sometimes, however, basic government policies seem to be pitted against each other. Several participants noted the perverse incentives of the import duty structure. Because the government taxes hardware, software, and other ICT products differently, it has caused all sorts of market distortions and business subterfuges to reduce the tax paid. The result often favors foreign suppliers over domestic ones and discourages FDI. Participants agreed that a uniform tax for all telecom products would be far more sensible.

The lack of coordination in government policymaking—whether intentional or not—impedes ICT usage and innovation and, along with it, the many follow-on efficiency and productivity gains that ICT can bring.

Perhaps the deeper problem, several participants pointed out, is the lack of structural independence by regulatory agencies. “The genesis of independent regulation in the western liberal democracies has been the need to insulate decision making in some sensitive areas, especially with public policy and economy-wide implications, from partisan electoral

politics as elected representatives cannot always be trusted to rise above party politics,” said B. K. Zutshi of TRAI. “Basically, although we have adopted this institutional form of governance, the underlying political philosophy has not been internalized by our political system.”

This factor is one reason (among others) that regulatory policies are not coordinated. It also is why regulators sometimes favor public telecom companies such as Bharat Sanchar Nigam Limited (BSNL) in their policymaking, as well as why the whiff of political influence or outright corruption can be detected in some supposedly neutral policy decisions. These problems are serious because they prevent government from acting as a more effective catalyst and leader for ICT and economic development.

Support Local Innovation and the ICT Ecosystem

Many participants argued that one of the most useful things the Indian government could do in trying to reform the policymaking process would be to develop a broader conception of the environment it seeks to influence.

Instead of conceiving of the government’s role as a strictly directive and controlling influence in a static environment, a more useful approach may be to regard government as a powerful catalyst in a constantly shifting environment of players, each of which has its own distinct capacities. The point of such a shift in vision is for government to acknowledge that individual users, local communities, and the ecosystem itself have co-evolutionary powers of their own. Government should try to leverage those powers more effectively, not necessarily command behaviors in rigid ways.

Participants cited several reasons why government ought to wield its powers with this larger vision in mind. First, as noted above, individuals and local communities are resourceful innovators in their own right. If an ICT system is overspecified and overly prescriptive, it forecloses the kinds of bottom-up innovation that are more sustainable and locally adapted.

Robert Pepper of Cisco Systems pointed out that the United States and other countries—and now India—are moving toward a more flex-

ible regulatory system that eschews command-and-control directives and instead talks about “coverage areas.” “Companies are granted greater flexibility in terms of the technologies and service rules,” Pepper said. “They also have flexibility in the transfer of licenses, so that the market can correct for wrong administrative decisions.”

The virtue of this sort of regulatory flexibility is its ability to empower local solutions, market efficiencies, and entrepreneurial initiative. If rules are too rigid and prescriptive, companies and NGOs alike will have less incentive to innovate and become more efficient and greater incentives to “game the rules” in ways that undercut larger policy goals. A flexible regulatory policy would be more likely to encourage the most efficient, cutting-edge technologies, as well as the kinds of organizational hybrids exemplified by the Arvind Eye Hospital.

A regime of regulatory flexibility also helps the government keep its eye on the overall ICT ecosystem, not just on one narrow element of it. A differential tax structure for software, hardware, and other ICT products, for example, may achieve its immediate goals, but only by sabotaging the larger ICT ecology (by prodding companies to adopt inefficient subterfuges).

Another example, said TRAI’s B. K. Zutshi, is when government charges large users of public utilities higher rates, on the assumption that they are richer and therefore can afford the rates. Regulators do not acknowledge that such “fairness” can simply depress demand, inhibit market growth, and thereby delay cheaper rates for everyone. “It’s very important to create a set of policy measures that foster an enabling environment for innovation,” said S. Mahalingam of Tata Consultancy Services.

The United States and now India are moving towards a more flexible regulatory system that eschews command-and-control directives and instead talks about “coverage areas.”

Robert Pepper

Solicit More Foreign Direct Investment

FDI is potentially very important to building a more sustainable, inclusive Indian economy, and conditions for FDI currently are very favorable. The National Venture Capital Association has targeted India as its “number one growth opportunity overseas,” said Amir Hasson of United Villages.

Despite India’s growing appeal to foreign investors, many significant barriers remain; in fact, some observers believe that India is not really enthusiastic about wanting more FDI. The country’s FDI rose from \$1.6 billion in 1995 to \$3.2 billion in 2000 and to \$3.8 billion in 2005.

A “fast-track enforcement process” might be one way to show foreign investors that India is committed to intellectual property rights.

John-Michael Lind

To put these sums in perspective, the United States invested 15 times more than that sum in China in 2005—and that amount is invested in the United States every six hours.

In a presentation to the conference, John-Michael Lind, CEO of a Mumbai-based investment group, Strategic Partners (India) Pvt. Ltd., said, “We have done a tremendous job here in the last three to four years to create investment momentum into this country. But the government has been very suspicious of foreign direct investment for the past 10 to 12 years. Every discussion of FDI takes place in an environment in which the government asks how do you attract foreign investment yet limits its participation and influence. There is a government psyche that is very protectionist and suspicious of foreign, free-market capital.”

Lind asserted that foreign institutional investors are excluded from FDI in India, adding, “That includes everything from venture capital to most forms of private equity as well as corporate investment and to some extent non-capital market privatization.” Lind said that foreign investors often are deterred by taxes, regulations, bureaucratic delays, and pervasive corruption.

Ravi Venkatesan of Microsoft India agreed: “India is naturally attractive as a place for foreign companies to invest. The real question is, How do we stop turning it away? If we are going to compete with our neighbor China for FDI, then we have to realize that it’s not just our infrastructure. There are other factors as well.”

Lt. Gen. Davinder Kumar of the Indian Army said that there are issues of sovereignty to be considered in making the policy on FDI, as is true for all nations. For any nation, keeping the national interest paramount while deciding the FDI policy is a pragmatic necessity.

One factor that several participants mentioned is India’s commitment to intellectual property rights. About 70 percent of software in India is pirated, according to *India Rising*—a level that significantly exceeds the global average of 40 percent. This piracy accounted for an estimated \$340 million in losses in 2002 alone.

Venkatesan said that India must pay greater attention to “the enforcement of copyrights, the lack of judicial capacity to deal with that huge issue, and the country’s extreme ambivalence about patenting, whether it is in pharmaceuticals or software.” John-Michael Lind suggested that a “fast-track enforcement process” might be one way to show foreign investors that India is committed to intellectual property rights.

Several participants wondered whether FDI truly enhances India’s domestic industries over the long term, or whether it is mostly a form of outsourcing that has little durable impact. “Half of the FDI companies in India are relocations of in-house R&D [research and development] from the home country,” said General Shamsheer Mehta of CII. “Partnerships with local companies are good at first, but they don’t last forever. And 56 percent of FDI companies prefer to work alone in India—100 percent foreign equity with no local equity.” Vinay Deshpande of Encore Software warned, “FDI in R&D should be welcomed with caution. It should not be done in a way to provide yet

“The real issue about FDI is ideological. It is not clear that India has decided that it is a free market economy. Until such a decision is made, the problems... will continue to appear.”

Arun Singh

another service. If it is done that way, India will not get what is required in order to get sufficient return on its human capital.”

Former Minister of State for Defense Arun Singh believes there is a deeper, unresolved philosophical issue at stake: “The real issue about FDI is ideological. It is not clear that India has decided that it is a free market economy. Until such a decision is made, the problems that John-Michael [Lind] identified will continue to appear.”

In response, Lind, an American investor, said, “For me, it is still difficult to understand why any country in the world would discourage FDI. It is philosophically beyond me. To me, it’s fundamentally about whether India wants to improve its standing in the world community as an investment target.... I, as a foreigner at the table and investor in India, want to invest more, but I am not sure whether the country wants that.”

Use ICT to Fight the Culture of Corruption

Lind said that a serious deterrent to FDI, above and beyond the philosophical issues, is the prevalence of corruption in India. High corruption levels and low FDI, he said, “are directly connected.” Many foreign investors are uncomfortable making illicit payoffs as the price of doing business, he said, and are understandably skittish about the financial integrity of Indian businesses in a climate in which corruption is common.

Some people minimize the seriousness of Indian corruption by pointing to corrupt practices in other countries and by blaming those who pay bribes. Lind rejects such arguments out of hand: “Who cares what others do in other countries? That’s no reason for India to do less. It should do more! It should try to be the number one destination for foreign investors.” One of the most significant things India could do to woo FDI, he argued, would be to develop a bold plan to fight corruption.

Happily, ICT can be a powerful tool for reducing corruption by improving transparency and accountability in transactions. “The sophisticated provisioning of ICT in a variety of fields would completely minimize corruption in a vast number of areas,” said Arun Singh. Introducing ICT into the regulatory process and other government ser-

vices could not only help streamline those functions, it could help reduce the “leakage” of money and physical goods distributed by government programs.

For a program such as the Rural Employment Guarantee Program, said Shubhashis Gangopadhyay of the Indian Development Foundation, “you are talking about a 60 to 70 percent leakage that could be brought down to 0 percent.” With the proper design, an expenditure of 5 to 10 percent of a program’s cost on ICT could show enormous savings by eliminating leakage, he said. Ambassador David Gross of the U.S. Department of State noted that Romania has cut its corruption levels by conducting its government procurement through the Internet.

Gangopadhyay pointed out how ICT was used in Haryana to reduce corruption in tax collection. “This was a big problem for small businesses because the sales tax inspector would come and harass small businesses. Now the government takes these taxes online. You can do a self-assessment, and there is no visit by the inspector. This cuts down corruption a lot. It has also encouraged small businesses to buy computers and hook up to the Internet. In Gurgaon now, even the smallest of small businesses are using computers to pay taxes.” Observers hope that the drive by all states to implement the State Wide Area Network (SWAN) will carry the advantages of various e-governance initiatives to a larger segment of the society, as well as enhance transparency.

Reform Government Spectrum Policy

One of the most important policy challenges the Indian government faces, participants agreed, is reforming existing regulatory policies for spectrum. “It is clear that spectrum is going to be the largest renewable revenue source for any nation,” said N. Balakrishnan of the Indian Institute of Science. Government can exploit its value without building a costly infrastructure, and the resource is not depletable. Yet the economic development potential of spectrum often is squandered, or at least underleveraged, because government policies do not encourage more efficient or broader uses of it.

Much discussion therefore focused on existing impediments to smarter uses of spectrum. There appear to be two distinct types of impediments: misguided policies and practical challenges.

The practical challenges are fairly basic. In many instances, there are no high peaks of land available for transmission towers. Sometimes finding appropriate locations for towers is hampered by the lack of good topographical maps. There also are security problems in protecting

wireless equipment in remote locations from theft and vandalism. Reliable power sources also can be a problem in rural areas.

The big march of technology is not, in fact, from spectrum-inefficient technologies to spectrum-efficient technologies, but rather towards the use of unlicensed bands that give space for everyone to co-exist.

Asim Ghosh

ment to develop software-defined radio applications that could use these spectrum bands. Balakrishnan noted that “while spectrum utilization efficiency has gone up because of technology over the last 20 years, government does not seem to have the incentive to come up with protocols to encourage people to use the spectrum more efficiently.”

Kanawalinder Singh, President of Qualcomm India and the South Asian Association for Regional Cooperation (SAARC), identified two major problems in current spectrum management policies. The first, he said, is “inordinate delay” in issuing new policies. “This has prevented the deployment of nonvoice services, even in the 3G context. I am talking about GSM [global system for mobile communications], CDMA [code division multiple access], and other services. That delay needs to end, and the government needs to publish its spectrum policy now.”

The more serious and vexing challenges, however, are policy-related. Many participants complained that government spectrum policies contain perverse incentives or rigid bureaucratic rules that prevent a more cost-efficient use of spectrum. Others complained that spectrum policymaking is fraught with delay and uncertainty and favors urban regions over rural villages.

For example, Balakrishnan noted that large portions of the VHF [very high frequency] and UHF [ultra high frequency] spectrum are lying idle with the information and broadcasting ministry, which had been allotted control of that chunk of spectrum. Fortunately, he said, Intel and other companies are working with the govern-

“The second issue,” K.Singh continued, “is that the existing spectrum allocation policy penalizes technologies that are more efficient. This is an absolutely inverted technique. It says that if you are more efficient, you get less spectrum. This not only penalizes efficient technologies, it stunts the migration to more efficient spectrum utilization on both sides. This disparity should be corrected.”

The quest for efficient use of spectrum, of course, is of great importance to urban markets, said Asim Ghosh, Managing Director of Hutchison Essar Limited, but it is not as relevant to rural regions. Rural areas have plenty of spectrum—“enough to support both voice and data in the context of any foreseeable demand for the next five years.” Yet the current subscriber-based criteria allocate spectrum for the entire band on a per-circle basis, not by geographic regions, he said, which makes it more difficult for rural regions to develop wireless applications. “That is a key issue,” he said.

Ghosh also pointed out that “the big march of technology is not, in fact, from spectrum-inefficient technologies to spectrum-efficient technologies but rather toward the use of unlicensed bands that give space for everyone to co-exist.” If one goal is to improve rural penetration of wireless telecommunications, he said, then attention must be paid to this reality.

Kanawalinder Singh agreed that the fact that spectrum in rural areas cannot be disaggregated from spectrum in cities is a problem. He pointed out, however, that urban areas have more users, and “newer technologies need economies of scale before they can become affordable.” Notwithstanding the rural/urban differences, he said, “Spectrum policies should be agnostic to technologies and services and encourage efficiencies and competition in various settings, whether they be rural or urban. And they should do so in a way that there is not a time or money delay which causes uncertainty and fails to benefit consumers.” He also mentioned that the subscriber-based allocation model encourages service providers to offer voice-based services with restricted capacity for enhanced services—namely, broadband data and differentiated services. Adequate bandwidth is essential to provide broadband data to extend e-governance applications into remote areas to enable transparency, reduce corruption, and lead to inclusiveness in these societies.

Several participants emphasized that government policymaking also must take account of evolving telecommunications standards in international forums. India's policies must recognize the latest technologies and standards recognized by the ITU, for example, so that Indian companies can innovate and exploit the latest,

Adequate bandwidth is essential to extend e-governance applications into remote areas enabling transparency, reducing corruption and leading to inclusiveness in these societies.

Kanwalinder Singh

not in school of any kind, and 180 million will drop out before they finish high school. "Basically, 9 out of 10 kids will not finish a high school education," said Sheila Gulati, Director, Developer and Platform Evangelism of Microsoft Corporation India.

A subgroup of the conference proposed several general strategies for using ICT to reach more children in cost-effective ways. Developing a "virtual teaching community," for example—which uses distance-learning techniques and social networking software—is one way that more rural children might be able to learn. Such programs might be integrated with ICT-driven rural health care projects to provide both health education and conventional academic instruction. Another strategy suggested by the subgroup was the concept of bringing India's young talent to bear on India's challenges—to think about and develop innovative solutions through competitions, technology

companies can innovate and exploit the latest, most efficient, and most affordable technologies. "If India is only going toward one path, i.e., the service-specific path, even though the world has recognized newer standards, the consumer is going to get hit," said Asim Ghosh. "It will also prevent market innovation."

Use ICT to Improve Education

There was broad consensus among the conference participants that government could and should promote the use of ICT to improve educational opportunities. This effort is an enormous challenge, of course. Currently there are 320 million Indian children between the ages of 6 and 16. Of these 320 million, 100 million are

and science fairs, or school projects. Microsoft, for example, has a Code for India program that does this.

Another strategy is to use ICT to improve the curriculum and recruit more teachers into the profession. One attractive strategy would be to tailor more curricula to “gray collar talent”—the high school dropout population that is somewhere between the blue collar and white collar workers. “How do you bring more of the industrialized skill sets into the curriculum for this gray collar sector?” asked Gulati. It is useful to think about online content curriculum to serve these people.

At the more specialized and professional levels, improving education will be critical. The authors of *India Rising* note that an estimated 1.1 million Indians will be needed as workers in the IT sector by the year 2008, but “the current supply of professionals, based on current trends, will fall short by over 200,000.” They continue: “Our higher education institutions are unable to attract and retain high-quality faculty and research students. There is a lack of research focus. If the level of education in Indian colleges is to be improved, an impetus must be given to improving the level of R&D.”

Although India has many excellent schools of higher education and produces an impressive number of graduates—350,000 engineers, versus only 70,000 in the United States, for example—Indian engineers often have trouble applying those skills in real-world contexts. The *Wall Street Journal* explains: “Trained by rote learning in an often inflexible higher education system, they [India’s technical graduates] are a far cry from the confident self-starters that many multinationals require—who can be entrusted with making decisions without requiring constant supervision.”²⁵ A study by Duke University distinguished between “transactional” engineers who are grounded in fundamental skills and “dynamic” engineers, who can apply their skills creatively in varied circumstances and work in teams to solve novel problems. Much of Indian education needs to focus on developing more dynamic engineers.

**“How do you
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sector?”**

Sheila Gulati

The Aspen Conference Meets With Government Ministers

After two days of discussion in Goa, some of the participants of the Joint Roundtable on Communications Policy traveled to New Delhi to present recommendations to several government ministers. In a series of meetings, the Aspen participants sought to apprise the government agencies of the conference's conclusions, as well as to open lines of communication for future consultation and collaboration. General Shamsher Mehta of CII served as spokesman for the group, although the informal discussions included the entire delegation of participants.

Some of the greatest promise for ICT is in citizen-to-government, C2G, transactions. For example, its use in customs and tax collection could reduce delays and improve the transparency and accountability of the process.

Dr. Montek Singh Ahluwalia

The Aspen participants presented the following key recommendations to the ministers:

1. It is universally established that there is a direct linkage between ICT use and GDP growth through enhanced productivity and efficiency.
2. The world looks to India to provide leadership in the application of ICT for inclusive and sustainable growth, especially regarding rural telecommunications issues.
3. Although segments of the Indian ICT industry are globally successful, its long-term competitiveness requires a strategy for inclusive and sustainable economic growth in rural India. Success in meeting that challenge will not only enhance India's national interest, it will pioneer a model of development for dozens of other nations.
4. For progress to occur in India's industry, it must work with government to move beyond software (which is 10 percent of the sector's overall value-creation) and begin to focus on hardware (20 percent) and information management (70 percent). Government also must help to develop a diverse ecosystem of

resources that will support ongoing R&D and innovation, so that new generations of India-created ICT may emerge.

5. Government itself must show leadership in using ICT to enhance transparent governance, electronic government, health and education, cost-effective procurement, and rural development.

Dr. Montek Singh Ahluwalia, Deputy Chairman of the Planning Commission of India, agreed with the conference participants that ICT should be used as a strategic tool within government and in promoting economic development. He said that some of the greatest promise for ICT is in citizen-to-government (C2G) transactions. For example, ICT use in customs and tax collection could reduce delays and improve the transparency and accountability of the process.

Dr. Ahluwalia also mentioned how ICT is revolutionizing some farmers' markets by allowing greater transparency in price discovery, segmentation of markets based on the quality of produce, and remote participation in markets. Collectives of fishermen can use ICT to track the weather and share equipment. ICT such as satellite maps can help villages identify the most promising locations to drill for water. He mentioned that a huge amount of standardization is required for exploitation of ICT.

A first major, said Dr. Ahluwalia, is how to prioritize which ICT applications should be pursued; a second issue is how to implement ICT systems so that they work effectively and can scale. Too often, he warned, vested interests compromise the design and implementation of an ICT program. The result can be summarized by the formula $OO + NT = EOO$, which stands for "Old Organization" + "New Technology" = "Expensive Old Organization." Yet Dr. Ahluwalia shared the group's vision of using ICT and government leadership to develop a more sustainable and inclusive economy in India.

Shri Kamal Nath, Minister of Commerce and Industry, cited studies

India's terms for FDI are "among the most liberal in the world."

Minister Kamal Nath

by the World Bank and CII showing that ICT can raise productivity levels in developing economies. “The compounding effect of ICT is phenomenal,” Minister Nath said. Like Dr. Ahluwalia, however, he pointed to the need for government to set priorities if India is going to become a model for the world.

General Mehta asked how India might begin to persuade its citizens to use ICT in their businesses and daily lives. Minister Nath believes that e-learning holds great promise for exposing people to ICT and what it could do for them. Telecom investor and advisor to the Aspen

Attention must be paid to bringing ICT to rural India and integrating it into government and business transactions.

Minister Kapil Sibal

Institute (U.S.) Stacy Standley raised a question about the Indian government’s actual commitment to foreign direct investment: “Does India really want FDI, or only FDI on its own terms?” Minister Nath replied that India’s terms for FDI are “among the most liberal in the world,” but he conceded that “we do have an inverted duty structure sometimes,” which is something the government should address.

Shri Kapil Sibal, Minister of Science and Technology and Ocean Development, agreed with the general recommendations by the Joint Aspen Institute Roundtable that ICT is a broad strategic force for economic development, not simply one industrial sector among many. He also agreed that attention must be paid to bringing ICT to rural India and integrating it into government and business transactions. The current challenge in getting ICT adopted, he noted, is really a “chicken-and-egg problem.”

Finally, Shri Dayanidhi Maran, Minister of Communications and Information Technology, expressed support for developing India’s domestic ICT capacities. Citing his own work in developing new e-government programs such as SWAN, Minister Maran said that government has to set an example in the effective use of ICT. He agreed that there is great potential in exploiting existing resources, such as the extensive fiber optic networks throughout the nation and new wireless technologies. Agreeing with former Minister of State for Defense Arun Singh’s suggestion that the government must provide the catalyst to ini-

tiate the ICT revolution to bring inclusiveness, Minister Maran appreciated this effort of the industry to explore the nascent Indian market. He agreed that India is very diverse and that localization of content over broadband with a local flavor is a must. He emphasized that although the government and NGOs can initiate pilots and early-stage use of ICT, industry must take the initiative to follow up and stimulate demand.

Conclusion

A happy convergence of digital technologies, global trade, government leadership, and private initiatives is creating a bright future for India. Columnist Thomas Friedman captures the feel of this change when he writes, “There is a huge famine breaking out all over India today, an incredible hunger. But it is not for food. It is a hunger for opportunity that has been pent up like a volcanic lava under four decades of socialism, and it’s now just bursting out with India’s young generation.”²⁶

In both a literal and figurative way, ICT is at the heart of the transformation underway. The new technologies are enabling entirely new types of businesses, social-service models, and entrepreneurial activity. Long-isolated villages can more readily join the rest of their country in trade, politics, and culture. Organizations of all types can use ICT to reap new efficiencies and work more effectively. Individuals have new opportunities to improve their lot. The raw tools for economic and social development have never been more available.

Yet enormous challenges must be met if India is to make the most of this moment in history. It must find the means not only to stimulate greater demand for ICT but to enhance supply capacities. Government must find ways to invest in the infrastructure that is so critical to economic development; foreign investment; and advances in health, education, and social well-being.

While the government and NGOs can initiate pilots and early-stage use of ICT, industry must take the initiative to follow up and stimulate demand.

Minister Dayanidhi Maran

The most significant hurdles, in truth, may have less to do with economics than with politics, culture, technical design, and bureaucracy. There was broad consensus, for example, that government must find better ways to coordinate policymaking and make it clear and stable. It must declare its independence from special-interest influence and corruption, so that policy can be driven by long-term merits, openly debated. It must find the courage to champion bold initiatives that could deliver tremendous benefits.

Regulation itself may have to be reconceptualized. For example, creative ways must be found to use public policy to leverage local innovation and individual initiative, and not stifle them. Regulators must learn to focus on the entire ICT ecosystem, not just on narrow, bureaucracy-driven objectives. Social-sector innovations that blend nonprofit goals with financial self-sustainability must be recognized and supported. Policies must honor the capacities for creativity and self-determination that all communities and individuals cherish.

None of these goals will be met easily or quickly; indeed, all will surely require significant debate and improvement. For now, what may be more important is to have a clear vision of the possibilities, a commitment to address problems with candor and good faith, and an ability to engage in far-ranging, intelligent discussion in open forums. The Aspen Institute India hopes that its first major policy conference has contributed to this immediate need.

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APPENDIX

Aspen Institute India
in partnership with the
Aspen Institute Communications and Society Program

Joint Roundtable on Communications Policy
Leveraging ICT for
Inclusive and Sustained Economic Growth in India

Goa & New Delhi, India
February 19-23, 2006

Conference Participants

N. Balakrishnan

Associate Director
Indian Institute of Science
INDIA

François Bar

Associate Professor
and
Director, Annenberg Research
Network on
International Communication
Annenberg School for
Communication
University of Southern California
UNITED STATES

David Bollier

Independent Journalist and
Consultant
UNITED STATES

Vinay Deshpande

Chairman and Chief Executive
Officer
Encore Software Limited
INDIA

Sheeja Dony

Director of Technologies
India, Hong Kong, Philippines,
and China
American Express
INDIA

Shubhashis Gangopadhyay

Director
India Development Foundation
INDIA

Protip Ghose

Head, Office of Marketing &
Technology,
Networks Business
Motorola India Pvt. Ltd.
Motorola Excellence Centre
INDIA

Anjan Ghosh

Regional Director, Public Affairs
Asia Pacific Region, Intel
Malaysia
Intel Technology India Pvt. Ltd.
INDIA

Note: Titles and affiliations are as of the date of the conference.

Asim Ghosh

Managing Director
Hutchison Essar Limited
INDIA

Roy Gilbert

Online Sales & Operations Director
Google, India
INDIA

David Gross

United States Coordinator for
International
Communication and
Information Policy
United States Department of State
UNITED STATES

Sheila Gulati

Director
Developer and Product Evangelism
Microsoft Corporation (India)
Pvt. Ltd.
INDIA

William Haseltine

Chairman, Haseltine Global
Health, LLC
and
President
William A. Haseltine Foundation
for Medical Sciences and the Arts
UNITED STATES

Amir Alexander Hasson

President
United Villages, Inc.
UNITED STATES

Ashok Jhunjhunwala

Professor
Department of Electrical
Engineering
Indian Institute of Technology-
Madras
INDIA

Parag Kar

Director, Government Affairs
Qualcomm (India & SAARC)
INDIA

Davinder Kumar

Lieutenant General
and
Signal Officer-in-Chief
Senior Colonel Commandant
INDIA

John-Michael Lind

President
Haseltine Global Health, LLC
and
Chief Executive Officer and
Founder
Strategic Partners (I) Pvt. Ltd.
INDIA

S. Mahalingam

Chief Financial Officer
Tata Consultancy Services
INDIA

S. S. Mehta

Lieutenant General (Retired)
and
Principal Adviser
Confederation of Indian Industry
INDIA

Robert Pepper

Senior Managing Director
Global Advanced Technology Policy
Cisco Systems
and
Communications Fellow
The Aspen Institute
UNITED STATES

Peter A. Reiling

Executive Vice President for
Leadership and Policy Programs
The Aspen Institute
UNITED STATES

J. V. V. Satyanarayana

President / Chief Executive Officer
SVL Infotech (P) Ltd.
INDIA

Arun Singh

Former Minister of State for
Defense
Government of India
INDIA

Kanwalinder Singh

President
Qualcomm India and SAARC
INDIA

Stacy Standley

Advisor to the Aspen Institute
UNITED STATES

Ravi Venkatesan

Chairman and Vice President
Microsoft Corporation (India)
Pvt. Ltd.
INDIA

Robert Watts

Director for South and
Central Asia
International Communications &
Information Policy
United States Department of State
UNITED STATES

B.K. Zutshi

IAS (Retired)
Former Indian Ambassador and
Principal Representative to GATT
and Vice Chairperson, TRAI
INDIA

*Observer:***Vijay Kapur**

Major (Retired)
and
National Technology Officer
Microsoft Corporation (India)
Pvt. Ltd
INDIA

Note: Titles and affiliations are as of the date of the conference.

*Staff:***Vikram Tiwathia**

Colonel (Retired)

and

Consultant

Confederation of Indian Industry

INDIA

Subho Ray

Director

Information Technology &

Telecom

Confederation of Indian Industry

INDIA

Mridulika Menon

Project Manager

Communications and Society

Program

The Aspen Institute

About the Author

David Bollier is an author, civic strategist, and consultant with a varied public-interest portfolio. Much of his work deals with progressive public policy, digital media, and the commons.

In recent years Bollier has concentrated on developing a new analysis and language for reclaiming the commons—a project begun with his book *Silent Theft: The Private Plunder of Our Common Wealth* (Routledge, 2002). He continues that effort through a series of essays and reports about the commons (archived at www.bollier.org) and through a new Web portal, www.OntheCommons.org, hosted by the Tomales Bay Institute, a think tank devoted to the commons.

Bollier also writes and speaks frequently about the public's stake in copyright, digital technology, and Internet issues. To help advance this agenda, in 2001 Bollier co-founded Public Knowledge, a policy advocacy organization. He also is the author of the forthcoming book *Brand-Name Bullies: The Quest to Own and Control Culture* (John Wiley & Sons)—a collection of stories about extensions of intellectual property law that hinder creativity, free expression, and innovation.

Bollier is a Senior Fellow at the Norman Lear Center at the University of Southern California's Annenberg Center for Communication, where he heads the Creativity, Commerce & Culture project. Since 1984 Bollier also has been a public affairs and political advisor to television writer/producer Norman Lear. The author of seven books and a graduate of Amherst College and Yale Law School, Bollier lives in Amherst, Massachusetts, with his wife and two sons.

About the Aspen Institute India

www.aspenindia.org

In collaboration with the Confederation of Indian Industry (CII), the Aspen Institute launched its newest international partner with the opening of Aspen Institute India in New Delhi on February 3, 2004. The Aspen Institute India is a non-profit organisation dedicated to in-depth discussion of global issues, development of values-based leadership, and a high-level exchange of opinions, information and values.

The Institute focuses on the most important problems and challenges facing Indian society, the business community, and the individual, inviting top industrial, economic, financial, political, social and cultural leaders to discuss these issues in settings that encourage frank and open debate.

The Aspen Institute India pursues its objective by organizing value-based leadership seminars, policy programmes, and public activities.

About the Communications and Society Program

www.aspeninstitute.org/c&s

The Communications and Society Program is a global forum for leveraging the power of leaders and experts from business, government, and the nonprofit sector in the communications and information fields for the benefit of society.

Its roundtable forums and other projects aim to improve democratic societies and diverse organizations through innovative, multidisciplinary, values-based policymaking. They promote constructive inquiry and dialogue and the development and dissemination of new models and options for informed and wise policy decisions.

In particular, the Program provides an active venue for global leaders and experts from a variety of disciplines and backgrounds to exchange and gain new knowledge and insights on the societal impact of advances in digital technology and network communications. The Program also creates a multidisciplinary space in the communications policymaking world where veteran and emerging decision makers can explore new concepts, find personal growth and insight, and develop new networks for the betterment of the policymaking process and society.

The Program's projects fall into one or more of three categories: communications and media policy, communications technology and the democratic process, and information technology and social change. Ongoing activities of the Communications and Society Program include annual roundtables on journalism and society, telecommunications policy, Internet policy, information technology, and diversity and the media. The Program also convenes the Aspen Institute Forum on Communications and Society, in which chief executive-level leaders of business, government, and the nonprofit sector examine issues relating to the changing media and technology environment.

Conference reports and other materials are distributed to key policymakers and opinion leaders within the United States and around the world. They also are available to the public at large through the World Wide Web.

