

# Science & Technology

## From Bangalore to Bulawayo:

*Connecting the Less-Developed World*

Jeffrey Sachs

The idea of information technology playing a role in development is something like a fish in water; it is a pretty fundamental linkage. I believe information and communications technologies are absolutely vital instruments for development. But information technology, and the benefits it brings to development, will not find its way to the poorest regions of the world without help from outside nations.

Thinking about what development is and what its real challenges are, two core elements come to mind: knowledge and connectivity. These are central to any society's aspirations to achieve economic growth on a sustained basis. Information and communications (IC) technologies, as their name implies, are critical in two dimensions. First, they bring information to bear on local conditions and allow isolated regions of the world, which are often the poorest of the poor, to provide information to the rest of the world. Second, IC tech-

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nologies enable communities to connect to the rest of the world in virtually every sphere of social activity. This includes commerce, of course, but also education, health, culture, and many other dimensions of social life.

I think we have in our hands the opportunity to take a big step forward in development—one that has not been available before. At this juncture, however, I am not sure the digital divide is getting any narrower. I am not sure that we are really making the bridges over this vast gulf that we need to make.

Some of this divide will take care of itself. We have to understand that commercial activity is going to be successful in and of itself in making information flow and connecting parts of the world that otherwise would be unconnected. An example of this is in southern India, where a revolution is at hand. There, the three headline capitals of southern India—Hyderabad, Bangalore, and Chennai—are each competing for the title of “Silicon Valley” of the region. But, I can also tell you from several weeks of driving through the smallest villages in southern India that information technology by itself is already reaching into the most remote hamlets. In virtually every village there is a banner over the road for lessons in Java or in some other programming language that I am too out-of-date to even know about.

So what is making India go forward? It is an important question. Clearly, India is primed in a few important ways. First, a very wise investment was made forty years ago—a kind that we have stopped making in many regions, unfortunately. That investment entailed helping India build very sophisticated leadership in technology with the creation of the Indian Institutes of Technology, the IITs, which are

now the champions of the information technology (IT) revolution in India. These are actually the champions of the American IT revolution as well, because so many Indian entrepreneurs are leaders of the IT industry in the United States.

Those IITs were built before it became conventional wisdom that developing countries should only have primary education but not necessarily tertiary education. Countries cannot get by focusing just on basic literacy. Building great centers of learning has huge long-term social returns. In India, this was accomplished by inviting foreign institutions and investors to team up with several centers of excellence throughout the country. Those centers of excellence have now produced leading faculty and experts in IT software and hardware, and these people are now spearheading a brilliant spread of IC technologies. That's one good piece of news.

Second, another of India's advantages from the point of view of IT is that it is a very crowded place. Why is this advantageous? Because having about 800 people per square kilometer means that it's efficient for the private sector to lay down fiber-optic cables all over the country, even in very remote areas. When firms get to those remote areas, they are then able to use locally-designed technologies that take that connectivity to the last mile—through a local wireless loop, for example, that is well-designed for Indian ecological conditions such as hot temperatures. Due to these locally designed technologies, high connectivity is spreading throughout India.

A third factor, related to the second, is that India is becoming increasingly connected to the world. Innovations such as a submarine cable running from Singapore to Chennai, which is opening up

tremendous amounts of bandwidth for southern India, are making it possible to dramatically expand the coverage of information technology at very low cost.

India is a place where the IC industry is going to take-off with a little bit of nudging and one major piece of public policy: getting out of the way. In 1998, India finally broke the state telecom monopoly that was holding up the rapid spread of technology by keeping connectivity in the hands of a single inefficient state enterprise. By increasingly getting out of the way—and in this year's budget by providing some very positive investment incentives—India is spurring tremendous private-sector development.

The problem with the digital divide, however, is that India's special circumstances are not replicated throughout the world. Actually, the fourth condition that is very helpful for India is that Indians happen to speak some of the most beautiful English in the world. This language capacity has been phenomenally helpful in enabling India to take the lead in software development and in the kind of long-distance data services for which India has become famous. Data transcription, data processing services, long-distance consultancies, and so forth dot the horizon of the major IT centers of Hyderabad, Chennai, and Bangalore.

If the whole world's situation were like that of India, we would stand here marveling at the rate at which the digital divide would take care of itself. But first, recognize that this miracle isn't even extending to the north of India. Nor is it yet extending to much of the world that urgently needs this technology and what it can bring. There are many parts of the world, I believe, where these technologies will prove to be commercially viable in a

relatively short period of time. This will not happen, however, without a period of pump-priming to prove economic viability, create platforms, and establish the modalities and the uses of these technologies that will enable them to become commercially viable in the longer term.

Let me turn to the case of sub-Saharan Africa. At the risk of making profound and unfair generalizations about a continent that has forty-nine countries south of the Sahara and 20 percent of the world's landmass, I will refer to it as a homogenous entity, which it hardly is. What one can say about sub-Saharan Africa is that there the divide is not being conquered in the same way that it's being conquered in India. In general, sub-Saharan Africa does not have local centers of excellence that allow for the kind of local adaptation of technology that has proven to be so important in the Indian context. Sub-Saharan Africa does not have the population density in urban or rural areas that makes it feasible right now for private sector firms to lay fiber-optic cables.

Until now, though I hope it is imminently changing and that my remarks may even be a little out of date, Africa connects to the world only through satellite, in effect because the submarine cables that will be vital for high-bandwidth, low-cost data exchange have not yet been laid. The Africa One project, a privately-financed project whose goal is to lay a fiber-optic loop around the African continent, can make a profound difference in the future. My understanding is that the Africa One project is still slated for completion at the end of 2001. Until that happens, however, Africa is connected to the world primarily through costly satellite transmission, and that means very low bandwidth, high subscription rates, and the like.

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In addition, African governments have yet to do uniformly what the Indian government has finally done—gotten out of the way of the private sector. There is still far too much state monopolization of telecommunications companies, too much corruption, and too much use of the telecoms as state cash cows that finance local political parties or other even less savory propositions. This has proved to be yet another obstacle.

Yet if one thinks about a part of the world that needs to bridge this divide urgently, it is certainly the African continent, particularly the sub-Saharan African region. How can this be done? I have a few thoughts that I hope will prompt deliberation.

For a dramatic and sustainable expansion of IC technology to occur, there is really no substitute for long-term commercial viability. This is a technology that will work if it can pay for itself. I believe this is extremely likely to happen, even in the poorer settings of the world, if we look at a five- to ten-year horizon. Why is that? I think we are going to find that there is such a multiplicity of uses for these technologies that viability will be achieved because they will serve purposes in education, health, commerce, agriculture, data transcription, and job creation, to name a few areas.

The problem is that in order to achieve viability a stable infrastructure and multifunctionality need to be in place. In investment terms, this is the

typical chicken-and-egg problem. Multifunctionality cannot be developed until the infrastructure is there, but the private sector is very unlikely to finance the infrastructure itself just because an optimistic guy from some university in New England says so. So, we are a little stuck. The logic of the situation says that we ought to be promoting very rapid development of the bandwidth and connectivity because of all of the purposes that this technology can support. Yet we are finding that it is not being rolled out in most of Africa and in many other remote and very poor parts of the world. Hence the divide continues to widen.

In the numerous digital divide conferences that I have attended there has been a lot of discussion of the potential sources of this divide, but remarkably few specific projects to overcome it have actually been designed and carried out. Practical steps should now be undertaken to close the divide, because the general scale, scope, and nature of this problem are well understood. I propose a combination of high-level decision-making along with some pilot projects supported largely by U.S. industry to prove the worth and viability of IC technology in a number of settings. High-level decisions are required to ensure adequate high-bandwidth connectivity in all parts of the world. Africa One is vital for Africa's future economic development. It is a matter of high public policy concern to ensure that projects like it go forward. We

should understand that until that project is completed, our hopes for high-bandwidth, multifunctional applications are going to be ideas but not realities.

A second crucially needed action is the creation, through deregulation, of a business environment that will allow the private sector to invest large amounts of capital in these countries. This mainly means telecommunications deregulation. I have yet to see a case for doing that slowly. I am a very impatient person to begin with, so I generally think all reform should be done this morning. But on telecoms, I really would commend the Singapore approach. Normally a very cautious country, Singapore did its big bang and just said, "Okay, this sector is open for business," and then gave fifty-seven licenses in the first day of mass deregulation. It did not say, "We'll do one company here," and, "we'll license two there," and so forth. In my opinion, gradualism in a sector like telecom is a reflection of payoffs, corruption, or rent-seeking rather than real economic logic.

Thus, high-level decisions are needed to guarantee the bandwidth in international connectivity and access for investment through deregulation. Within that context, what is needed on the ground are real projects in difficult areas in developing countries. The urban coastal sites around the world will take care of themselves. Dar-es-Salaam, Abidjan, Accra, and Dakar will all have Internet connectivity almost no matter what we do and probably on a pretty good basis within the next few years. What worries me are the more remote, impoverished regions where so many of the poor people of the world live.

I believe we need to think through some very practical projects. Yes, projects can make a difference because we can offer

ideas about how to get schools online, how to construct better education platforms, and so forth. I would look for applications that have high social returns, that are urgently needed, and that are technologically feasible. My favorite of favorites right now is to get the public health systems of Africa online and connected with the proper information technology platform as an instrument for a massive attack against the critical diseases that are ravaging the continent. From a technical point of view, this is a proposition that needs public and private support from the U.S. government and U.S. industry. I know that it is an extremely high and rising priority among the African leadership.

By establishing programs like this, in which technologies are introduced for some very specific but extremely important purposes, we will also find, as one does in poor villages that get connected to the world, that at the end of the day, the terminal at the primary health center is going to turn into the local kiosk for e-commerce. It is going to be the place where farmers get the weather report and local businesses get the timing of ships, and will soon enough become something that local schools use as a platform for education.

There is little doubt that information and communications technologies can have a profoundly positive impact on the lives of the world's poorest people. But technology will not necessarily take care of itself in those regions. Developed countries, through well-designed and highly targeted projects, can ensure that investment finds its way to the regions of the world that need it most. With such investments, the digital divide will become an outdated label.