Connecting India

Great inventions will not be born in the absence of the will and intent to embrace change and solve wide-ranging societal problems.

By Sam Pitroda

Asia is now at the forefront of innovation. But if we are to continue the lead, we must take another look at the use of technology for the greater good, and its role as a means to bridge the social inequities that are visible in so many developing countries around the world. And while innovation has long been on the agenda of public and private policymakers, especially when combined with technology, its use as a tool for profound social change is often not given its full due. There is an urgent need for innovation to enable positive social and economic change.

Today, we are witnessing sharp discrepancies, even crises, in resources–be they food, water, oil or human capital–that, in turn, have led to an alienation of vast groups of people as well as squabbles over the limited resources available. In such troubled times, information, communications and telecommunications (ICT) can be a means of providing a better life for humanity through social and economic empowerment.

I view information as the fourth pillar of democracy, along with the legislature, executive and judiciary. Meanwhile it is Information *Technology* –and innovations stemming from it–that has played an indispensable role in promoting openness, accessibility, accountability, connectivity, democracy and decentralisation–all the 'soft' qualities so essential to effective social, economic and political development.

In the case of my country, India, the process of connecting the nation with telephones, knowledge and IT has been going on for more than 30 years. We started with nothing, and now in 2016, Indian software services bring in about US$150 billion or more every year. Without innovation, India would have simply been left behind.

We might now find ourselves at a crossroads, having reached the tipping point for expansion, excellence and equity. But to maintain the Indian growth story we will still need to continue building an innovative nation. For these reasons, the Indian government has declared 2010-20 as the 'Decade of Innovation'.

The connectivity revolution

For me, connecting India was a big dream. I strongly believed that a diverse and complex nation like ours could expedite the process of modernisation by linking people and places using telecommunications technology, which is the most basic form of modern connectivity. Until comparatively recently, telephones in India were only for the elite. I was 21 the first time I used one.

Back in the 1980s, the developed world had 800 million people and 400 million telephones, one for every two people. India had almost 800 million people and 2.5 million telephones, one for every 280 people, most of which did not work. Our system operated on a patchwork of outmoded exchanges provided by different companies originating from different foreign countries. Our technical resources to maintain this crazy quilt of a system were vastly inadequate. We had virtually no ability to expand service in a way that would meet the continually growing demand.

Meanwhile villagers, who formed the vast majority of the population, were isolated in stagnant social and economic enclaves. Introducing workable telecommunication technologies would help rural communities connect with their customers and suppliers elsewhere, so that they could expand and build their businesses–none of which were

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possible with that generation of scarce and unworkable phones. I intended to break them free from their barriers and connect them with one another and the rest of the world.

TELEPHONE FUNERALS

When I returned to India from the U.S. in 1981, I was frustrated by not being able to call my family back in Chicago. It was then that I decided to help modernise India's telecommunications system. The next morning, I looked out of my window and saw a large funeral procession passing on the street below. But it looked a little odd—a funeral, but not an ordinary funeral. I went downstairs to see, and it turned out that this was a funeral for dead telephones. People were carrying a funeral litter, but instead of a body, the litter was piled with dead, old, non-functioning telephones. That was intriguing. A dead telephone demonstration. Telephones being paraded through the streets. When I asked the doorman what was going on, he said, "Oh, it's just the phone problem. It takes 10 years to get one, and then they never work. People get upset." The next day in the newspaper, I saw a long article on the dead phone demonstration.

ACCESS VERSUS DENSITY

All over the globe, higher growth had been correlated with increased telephone density, and the obvious approach to modernising India's systems was to import the western model, which focused on density. I questioned what this would do for India, where there were more than 600,000 villages, home to more than 70 percent of India's population, many of which had no phones at all. We needed to do it differently than in developed countries.

Our focus was to move towards providing *access* instead of *density*, starting with smaller rural exchanges that we designed ourselves, for our conditions, especially for a climate given to extremes. To transform the existing dilapidated system also meant we had to build it with the best modern digital technology.

Whenever I talked about public access, people immediately thought of the western-style coin-operated public phones. But coin-operated phones were expensive to make, install and maintain. What I wanted were public phones operated by a phone manager or phone entrepreneur, what came to be known as Subscriber Trunk Dialling/Public Call Offices.

AN INDIGENOUS DEVELOPMENT STRATEGY

My strategy for India's telecom development was based on indigenous development, accessibility, local production, ancillary industries, digitisation of networks, rural telecom and young local talent. Making things at home instead of importing them—that is the concept of 'swadeshi'—was the backbone of the Indian independence movement. It is a philosophy deeply ingrained in our history, and one I was determined to bring to telecommunications and technology.

For many reasons, existing telecommunications agencies could not be expected to accomplish this. Nor was it even desirable, as costs would be prohibitive if outsourced to foreign companies, and cash reserves would be spent on imports from multinationals. On the other hand, building indigenous equipment would see us establish local manufacturing, modernise our phone systems, provide access for the bulk of our population, and develop our own technology, entrepreneurs, human resources and industrial base.

Our engineers achieved a breakthrough. The resulting phone system assured access, met local Indian needs, was humidity-, dust- and monsoon-proof, and did not require air conditioning. This was a design breakthrough as (imported) switches built for high-temperature and high-humidity environments invariably needed air conditioning. Beyond that, the Indian electrical grid was notoriously undependable; we couldn't have the switches overheating every time the power failed.

At last we were on the way to connecting India from the bottom-up; and soon, everywhere you went in rural India, there was a yellow public phone. The telephone was no longer a luxury, but a necessity. Eventually the private entrepreneurs took over; large and small mobile operators entered all parts of the country, and by 2014 India had over a billion mobile phones in use.

The first phase of India's telecom revolution was a success. The foundation of that revolution was connecting rural India to the rest of the country and the world, and giving villages access to the grid of modernity. And once international standards had been promulgated, we opened India up to mobile telephony.

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The knowledge revolution

The ultimate goal, as I saw it, was to ensure that India would become a thriving democracy, and the key value at the core of that goal was inclusivity. A thriving democracy had to be an inclusive democracy. Growth had to benefit those at the bottom along with those flourishing at the top.

Around the world, poverty and lack of (social) progress is typically linked to a lack of knowledge. To me, that meant we needed two complementary efforts—one, to give people a way of accessing knowledge and, two, to make sure the knowledge they needed was useful, such as for personal, business, technical, academic, practical and social purposes.

Thus commenced the second phase of India's telecom revolution, which encompassed broadband, applications and locally relevant content. It required a blueprint for knowledge-related institutions and infrastructure. In order to accomplish these things on a *countrywide* scale, we needed to create a *countrywide* platform—and that platform was knowledge, something that had never been done before.

The next question was: What would a comprehensive knowledge platform look like? India's economic progress had been accelerating but we did not have enough educated, skilled people to maintain the growth we needed. We had shortages of expertise in every sector: teachers, doctors, scientists, engineers, nurses, plumbers and carpenters. Education and knowledge had to be the key for us, which meant that we had to develop what I began thinking of as a 'knowledge edge'.

But how did one take a country of 1.2 billion people and develop society-wide plans to bring education into the 21st century? I started thinking about university reforms. But universities were only one part of the picture. Vocational education was equally important. We didn't just need professionals; we needed skilled people occupying the trade and services sector. And we needed to excel too. Apart from the top five percent of the universities, the quality of Indian education was, to put it bluntly, just not good. Also, there was a need for equity. The poorest of the poor needed to have access to the best—or at least halfway decent—schools.

At the same time, the academic circles were challenged to continue to provide access to technology, a greater degree of connectivity among university teachings and industry desires, good innovation cultures that must be practised, as well as intellectual property protection. Today, we cannot afford to have our mindsets locked up in the past. We need to use technology and redesign everything around us.

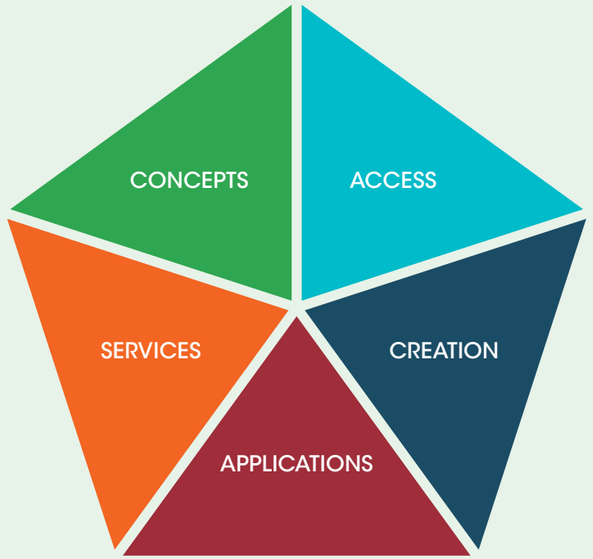
NATIONAL KNOWLEDGE COMMISSION

Education cannot be geared just for the industry but the industry needs educated people. So while we need better interface between industry and university, we also need better interface between university and research institutions. Knowledge is continuously changing and as a result, if we don't train or re-train people, they will not be productive in the dynamic society.

As a way to induce the second phase of India's technology revolution, a National Knowledge Commission (2005-2009) was tasked with providing a blueprint of reform for the knowledge-related institutions and infrastructure for the 21st century India. This would

enable the leapfrogging of social and economic development. The focus was on five essential areas: access to knowledge, knowledge concepts, knowledge creation, knowledge application, and knowledge services (refer to Figure 1).

THE KNOWLEDGE PENTAGON



Access	Making knowledge as widely available as possible.
Concepts	Where are knowledge concepts taught, and what do we need to do to upgrade our teaching institutions, to make more of them world-class?
Creation	To create jobs, modernise our industries and lift the masses out of poverty, we need to focus on science and technology.
Application	What are the most effective ways to make knowledge practical, useful and with the most impact? Education through the Internet and e-learning; agricultural improvement through new farming technologies and techniques.
Services	By this I primarily mean e-governance. India was a country where the citizens' interactions with the government were commonly a source of frustration, fear, and a door to corruption. The procedures for all kinds of interactions, ranging from driver's licences to birth certificates, business approvals, passports, pensions and other social payments, were antiquated, unnecessary and complex.

FIGURE 1

Today, the knowledge network is fully operational. It can instantly connect professors, students, researchers and others. But we cannot create a 'knowledge paradise' for tomorrow without looking at technology input related to open courseware, distance learning, and the rest. The entire model of education of how we learn, what we learn and why we learn is going to change. In the case of universities and colleges, I believe they should be centres of innovation.

Disparity, demography, development

Currently, there are three fundamental challenges that remain. Firstly, the disparity between the rich and poor, the urban and rural, and the educated and uneducated. This has to be reduced substantially by a commitment to inclusion and equity through democratisation and decentralisation. Young India must focus on an Indian model of development and solve the problems of the people at the bottom of the pyramid. Secondly, demography. There are 550 million people below the age of 25 who need to be skilled, educated and empowered for employment. This is the workforce for the world. And thirdly, development. Everything is happening in India, but perhaps not at the pace we want.

India is at a crossroads today due to fundamental challenges related to corruption, the black market, the status of women, security, employment, education, health, infrastructure, energy, and governance. The country needs major administrative, judicial and political reforms. It is believed, for example, that the modernisation of the railways would add up to two percent to the GDP, and that a revamping of the judiciary and the police would add the same amount as well. I believe it is technology-inspired innovation that can close the door on disparity and demographic issues. At the same time, it opens the door for development efforts.

TECHNOLOGY: THE GREAT ENABLER

Not too long ago, it used to take 10 years to get a telephone connection in India, five years to get a scooter and three years to get a car. Now, everything is available on demand, instantly, and also of international standards. India has also increased its export of products and services and built several Indian multinational companies with a presence in all the major global markets.

Technology clearly generates growth and is a pathway to alleviating poverty. I usually say that technology is the great social leveller, second only to death (I'm sure tax must figure in there somewhere as well). But technology needs the mechanisms and structures imposed by the government, academia, law and business life to allow it to flourish and unleash its power.

While technology, and access to it, are key enablers to social change, it is also important to question and focus on the applications and outcomes, rather than just investing in and conducting research. If innovation drives growth and the economy, as well as creates jobs, then it is important to develop not only an environment for innovation, but connectivity.

Nevertheless, it needs to be emphasised that development must be an Indian model of development, with traditional Indian values and incorporating wisdom for Indian solutions. Needless to say, this will require political will and national consensus.

We have, today, the ability to bring about generational change. The question is: Will we squander this crucial moment away? And what we do here is not simply an Indian affair. India's population is the youngest in the world, and it's getting younger, while the workforce of other nations is ageing. Our young people will comprise the world's talent and upcoming workforce.

India's needs are immense. But her talent pool is deep and bountiful. The world is looking to India to find affordable, scalable and sustainable solutions for basic needs: food, shelter, infrastructure, education and health.

India's place in the game is to make sure that its talent is used properly to solve the problems of the poor. This is the Indian model, essentially, because the country is a democracy. It is the laboratory for the democratic world, and also the democratic world's potential engine for growth. But for this to come about, India must change. And for that, she needs nowhere else to look but within.

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I remain very optimistic about India because of my faith in the strong Indian family system, the young talent pool, the heady successes of the recent past– and the potential of new technologies of the future.

Yes, there are other greater challenges ahead, but as I discovered in my 50-year journey from Orissa to Chicago to Delhi, innovations happen at the edge. We need to cross boundaries, and accept and respect those who are different.

Sam Pitroda
is a telecom inventor, entrepreneur, development thinker and policy maker. He is the author of 'Dreaming Big: My Journey to Connect India', Penguin (2015)