TECHNOLOGY AT THE MARGINS

HOW IT MEETS THE NEEDS OF EMERGING MARKETS

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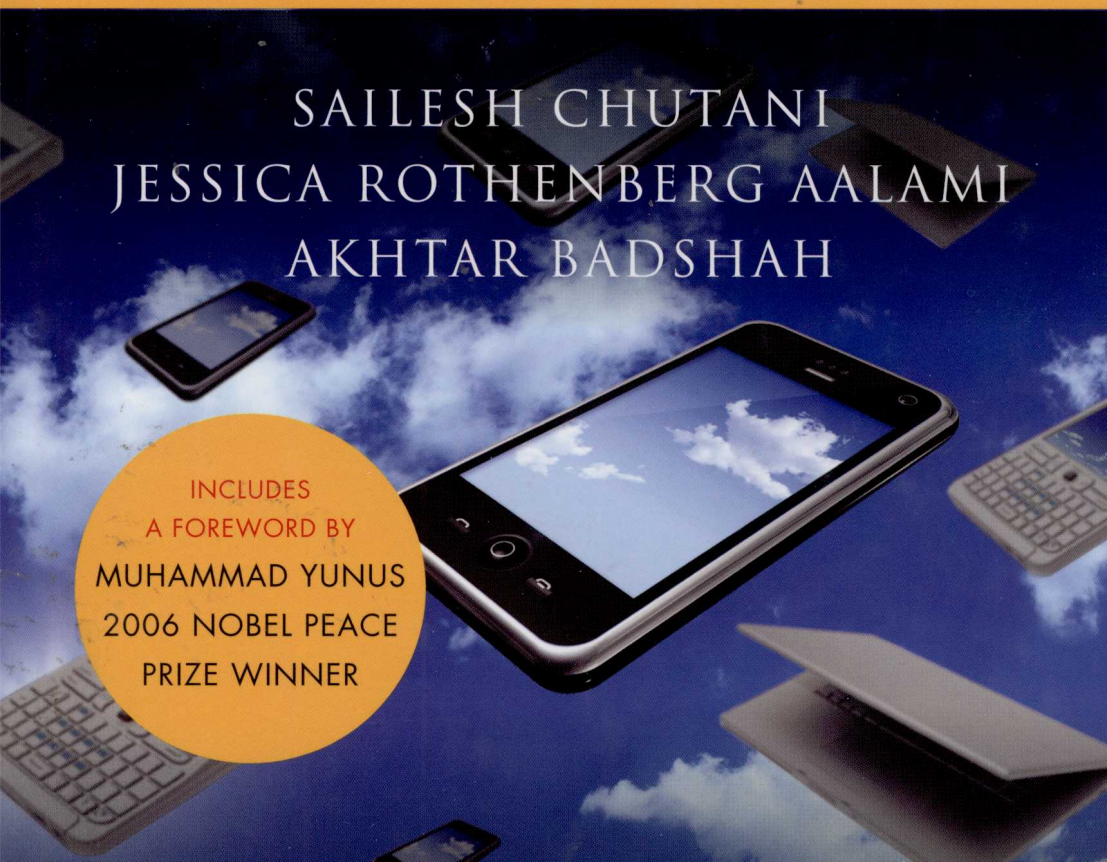

INCLUDES
A FOREWORD BY
MUHAMMAD YUNUS
2006 NOBEL PEACE
PRIZE WINNER

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FOREWORD

During the late 1990s, at the height of the digital divide debate, I saw the power of information technology (IT) and launched many IT companies, including Grameen Phone, in Bangladesh. I believed then, and continue to believe today, that information technology has a role to play in accelerating the pace of change and providing unique opportunities to people struggling to come out of poverty. I also believe that through the use of information technology we will be able to help the poor to come out of poverty with their own efforts. I have seen this firsthand through my work at Grameen; I have seen how cell phones have impacted the lives of the poor. IT has created new business opportunities for the poor, as well as connecting illiterate rural women with the world at large.

Over the last five years I have been focusing on the important role of business—particularly social business—in creating a world without poverty. I believe that the future of capitalism lies in harnessing the power of the free market to solve the problems of poverty, hunger, and inequality. For me, this book addresses the

heart of the problem we face in creating a world without poverty. It makes a convincing argument that if innovators, development experts, and business leaders reimagine their respective roles and forge new partnerships, they can have a broad impact on society by building businesses that are sustainable and that improve lives. Through such collaborations, businesses would be able to reach nontraditional markets while the innovators and NGOs would see their successful experiments touch millions.

Today, few doubt that IT can play a fundamental role in helping underserved communities not only gain access to much-needed information and knowledge, but also create new and viable businesses to reach customers all over the world. However, the specific role of technology is not always clear in people's minds. The decision makers need a framework to think about these issues, to distinguish problems that require research from those that require a business model or scaling up, and to base their decisions on what is known from empirical evidence. In *Technology at the Margins: How IT Meets the Needs of Emerging Markets,* the authors admirably meet that need. They provide a structured framework to evaluate the key problems in health care, education, microfinance, and the environment, and show which ones can be addressed through technical innovation, business model innovation, and creative partnerships between the public and private sectors. Through their examples they show that even the existing information technology can be used effectively to address the most pressing needs of humanity in education, health, finance, and the environment. They also argue that innovation targeted at meeting the needs of those at the bottom of the pyramid is difficult but can yield big dividends if successful.

I have known Dr. Badshah for over two decades, when he was at MIT, at Digital Partners, and now at Microsoft, and have been impressed by the depth of his knowledge and his dedication to development issues through technology. I first met Dr. Chutani in 2007 when he showed me research prototypes at Microsoft Research that demonstrated how phone-based technologies could improve access and affordability of health care—something that

is of deep interest to Bangladesh and to me. I am delighted to see that he has decided to apply these ideas to the real world situation. Together, these three authors have created a compelling book that is a must-read for those who are looking at creating a world without poverty through sustainable businesses.

Professor Muhammad Yunus
Nobel Peace Prize Winner,
2006, and Founder of the
Grameen Bank and other
Grameen companies

PREFACE

Although the three authors of this book each bring different yet complementary backgrounds and experiences, they share a great belief that information technology can make a difference in social and economic development. Sailesh is an engineer, scientist, and entrepreneur by training and profession; Akhtar is an architect, educator, and social entrepreneur; and Jessica is an economic geographer, development expert, and advisor. Each has arrived in this field through a unique set of experiences and looks at the world through a different set of lenses. This book is a reflection of our combined yet varied viewpoint, which we hope makes it exciting and interesting reading. Sailesh and Akhtar both grew up in India and studied and lived in Switzerland and the United States at different times: Akhtar was in Zurich in 1980 for a four-month stint while Sailesh lived a few years in Lausanne. Jessica, however, grew up and studied in California, undertaking travels in Europe, Asia, and elsewhere as part of her global research and practice.

In March 2004, Sailesh decided to uproot his family from the San Francisco Bay Area to move to Redmond, Washington, much

to the shock and surprise of his friends and colleagues, who viewed him as a diehard Californian. He was, of course, following the long line of people who had been seduced by the possibility of being at Microsoft and utilizing its great resources to try to change the world. He was also looking forward to working with Rick Rashid, Dan Ling, and Kevin Schofield, all very well known in computing research, who had recruited him into Microsoft Research, one of the foremost research labs in the world. Akhtar, however, moved from the field of architecture to development and started a non-profit in Seattle focusing on the role of information technology and development. He also joined Microsoft in March 2004 to run Microsoft's Community Affairs and philanthropy program.

After a decade of research and travel to better understand global production networks and sustainable development issues, Jessica started her research and consulting work with Microsoft in 2005 to help explore emerging market opportunities—from both business and community investment viewpoints. She and her teams have worked across the company, spanning research, product and business development, and community affairs, at U.S. headquarters and subsidiaries in East and Southeast Asia, the Middle East, and Africa, and in the field, where pilots and programs were running in over 30 countries.

Sailesh's role at Microsoft was to identify emerging technologies and trends before they became commonplace and to harness them to start new businesses and products for Microsoft. He decided to do so by collaborating with the top research scientists in the world who were working in universities and government research labs. Since these scientists are not constrained by meeting quarterly revenue numbers, they are more likely to ask fundamental questions and stay with them long enough to make interesting discoveries. And they also tend to be very cost effective by relying extensively on graduate students.

To discover what these scientists found interesting and what kind of collaboration they would look for with Microsoft, Sailesh went around the world and asked them. A pattern emerged very quickly. Yes, scientists were asking fundamental questions about computing

and its novel applications and they wanted collaboration, financial resources, and technologies from Microsoft to help them. But some of them, notably a small number of research labs at the University of California at Berkeley, Carnegie Mellon University, Stanford, and the University of Washington, among others, were also being driven to explore information and communication technology (ICT) to solve the problems of development and poverty, particularly in the case of the countries of Latin America and South East Asia, and especially India.

Akhtar's role, however, was to bring his expertise in the field to bear on development and to manage Microsoft's global philanthropic efforts focused on bringing the benefits of information technology to underserved communities all over the world. He, too, traveled the world to learn from the hundreds of projects Microsoft supported in small, large, rural, and urban communities so that youth, women, the elderly, and the disabled could learn basic information technology skills and achieve social and economic empowerment.

By the time of the publication of this book, Akhtar will have spent over a decade studying and investing in projects at the bottom of the economic pyramid, first with Digital Partners (the nonprofit that he established), and then with Microsoft. It was quite a shock at first to see that the world's poor (those living on less than $2 a day) could benefit from information technology, especially in the early part of this decade. At the end of this decade, as we reflect in this book, we are seeing not just an embrace of technology but innovation specifically targeted to benefit poor segments of society.

Jessica also spent the same part of the decade researching how information technology can bring about positive change in societies and how corporations and governments can play a role to foster that change. Going between these agents, she focused on the potential social and economic impact that relevant technologies may have on emerging economies via innovative entrepreneurs. Her workshops over the years in Asia (including the Middle East) and Africa on ICT for Education, Health, Microbusiness, and Development were aimed at empowering practitioners, managers, and partners

to take advantage of the often unexpected and exciting ways information technology has benefited individuals and societies. She shares many of those examples here.

Each of us became aware that the elite in the countries that we visited felt that the ICT revolution has largely bypassed those at the bottom of the pyramid. This was especially stark in countries, such as India, which had become global software powerhouses but built very few ICT products or services for their own populations. These academic and policy elite felt that if the technologies were constructed to meet the specific needs of those at the bottom of the pyramid, it could enrich and empower them in the same way as it had done for those living in the developed and the affluent world. Of course, first some serious research questions had to be answered to determine what kind of ICT would be affordable, accessible, and relevant for that constituency. There was just one problem: No money was available to fund that research.

The funding agencies and most of the scientists either were not aware of the problems or did not think that the problems were substantive or interesting and didn't consider the line of inquiry to be legitimate. And there were no conferences or journals to publish that research, either. To be fair, it was not clear what were the right questions to ask and whether these were in the realm of computer science, sociology, economics, anthropology, or a completely new field! This was one of the areas where academic researchers were looking for help from Microsoft. Microsoft could not only provide seed funding for the initial research, but it could also legitimize the area in the eyes of other scientists and hence attract more talent and resources to the problem.

In order for Microsoft to be involved in this space, there had to be a business rationale. As we started to think through the problem, a couple of fortunate developments took place. Sailesh and Akhtar were introduced and Akhtar in turn introduced Jessica, who also had looked at the problem of ICTs and development very deeply over the years.

Through our conversations over the next several years, we were also introduced to C. K. Prahalad and his work on the market

represented by those at the bottom of the pyramid. His recent passing is a remarkable loss, but his legacy remains, an indelible mark on the field. Our work, too, is inspired and influenced by our interactions with other colleagues in the field. Sailesh was also becoming convinced that the next generation of disruptive innovation could come out of emerging markets, as local entrepreneurs tried to meet the needs of those at the bottom of the economic pyramid. This is something that Prahalad had not postulated, but was hard to miss in one industry after another—be it solar, wind, or telecommunications, and now computing. In our minds, all the pieces were in place.

Being at Microsoft has its advantages as there are a number of people with similar interests and we could bounce ideas off these folks. Another advantage is the opportunity to collaborate among different groups and try out something new and innovative. Microsoft had a perfect tool for that, called the "Thinkweek." Twice a year, anyone in Microsoft could submit ideas to Bill Gates, who is referred to in Microsoft by his email alias, BillG. BillG would take off for a week and read all those ideas and provide extensive and pointed feedback on some of them. An endorsement or support from him could be an important boost to build support in the company.

Sailesh did just that. He submitted a paper whose main premise was that Microsoft's business could be disrupted by innovations coming out of the emerging markets, especially those innovations that tried to make computing more affordable and accessible at very low price points. Sailesh further argued that our best bet against being surprised by those innovations was to set up groups in those markets to pursue these innovations ourselves. BillG was intrigued and gave extensive comments but asked whether we had ideas on the form that such affordable computing could take. We didn't, but decided to find out.

We had come to know of Uday Desai's work on cell phones. He is a professor at Indian Institute of Technology (IIT) Bombay who pioneered cell phone–based services for the poorer segments of India. We ran a small program to find out if there were others

in India working on similar problems of making ICT more useful for those at the bottom of the pyramid. There were. Many labs were exploring ways to reduce the cost of bringing the Internet to villages by using mesh networking. Others were using a phone-based system to issue flood warnings; yet others were going after the illiteracy problem by using PC-based kiosks. It was possible that India was representative of a worldwide phenomenon. We decided to run a worldwide request for proposals (RFP) to invite ideas on how to make ICT more affordable, accessible, and relevant to those at the bottom of the pyramid.

The RFP promised small grants of up to $100,000 as seed funds for a total of just over $1 million and access to Microsoft technologies and resources. Sailesh and Akhtar collaborated on this RFP and proposed adding the criterion that each researcher have a nongovernmental organization (NGO) partner in the field, so that their research would be informed by cultural as well as pragmatic context. In hindsight, that proved to be a great approach. We were, of course, concerned whether anyone would submit proposals and whether the proposals were going to be along the lines we envisioned. Our concerns proved to be completely misplaced. The RFP was oversubscribed by ten times. We received more than 160 high-quality proposals from around the world. John Sangiovanni and Tom Healy, the two program managers who managed the program, got swamped. They had to engage additional help from the research and product groups to review the proposals. We selected 16 proposals to fund.

Suddenly, we had a community of researchers and a glimpse into what the answers could look like. Akhtar and Sailesh also decided to fund the online version of a journal, *ITID* (*Information Technology and International Development*), and the ICTD conference in collaboration with University of California, Berkeley, and Microsoft Research (MSR) India, in order to have a venue where the results from that RFP could be published. All that was needed now was patience and care and management of the collaborations with the RFP winners. Today, both the journal and the conference are major venues where researchers are able to publish and share their work.

Around the same time, Kentaro Toyama, a researcher in MSR, moved to India to help his manager and a fellow researcher, P. Anandan, set up the India lab. He decided to create a multidisciplinary group to explore how ICT could be used to help with the problem of development. This group was based in India and had a very important focus on fieldwork. Now we had an internal group of experts to work with as well! In parallel, a grassroots effort emerged to convince Microsoft to make products specifically targeted for the emerging markets and for those at the bottom of the pyramid. BillG sanctioned the creation of such a group, which was aptly named the "Unlimited Potential Group." This meant that we had business customers for the results coming out of our program as well as those from Kentaro's group.

Over the following year, we learned a tremendous amount about the problems as well as potential solutions while working with the RFP winners and others. It became clear that the cell phone was the affordable and accessible "computing" platform for the masses. These devices were becoming as powerful as the PCs of a few years ago. Most people, even those who were illiterate, could easily learn to use them. They could be recharged even in the absence of an electric grid. They didn't require expensive and complicated maintenance, and most importantly, they were becoming very cheap, extremely fast. This meant that even the poorest people could begin to afford them, especially with the advent of the prepaid plans and extremely low tariffs. It also became clear that the cell phones were not being used as computers and much work remained to be done.

We did discover, however, that what people were looking for from ICT once affordability and accessibility were addressed was help with improving their earning potential and access to credit, access to health care, and education for their children. They also saw the potential for making their voices heard in civic matters.

We decided to go deeper in the health-care space since ICT was already beginning to play a role in commercial microlending. We ran another RFP in 2007 that specifically targeted using the cell phone as a platform for health care, to make health care more affordable and accessible. Just like the first RFP, we were the first

to fund this kind of work and to take a risk on what seemed like science fiction to most people. Tom Healy and Kris Tolle managed that program. As before, the response was tremendous, but we were better prepared. We selected a dozen or so projects to fund out of nearly 100 submissions. Kris and Tom continue to cultivate those collaborations.

In addition, we used our collaboration with the FAPESP (Fundação de Amparo à Pesquisa do Estado de São Paulo) of Brazil to explore projects specific to Brazil, and our Latin America Virtual Research Institute to explore projects that were relevant to Latin America. These programs were managed by Jaime Puente and Juliana Salles, both of whom have roots in Latin America but have lived and worked in the United States as well.

Some of these projects are transitioning from research to products today, and some are attracting the attention of foundations and NGOs and winning global recognition. Today, the field of mobile technologies for health care (or mHealth) has become one of the hottest trends in health care globally, fueled by the desire to save costs in health-care systems around the world and to bring care to those who don't have it today. It is attracting venture capital as well as foundation money. The United Nations and Vodafone Foundations commissioned a special report on mHealth for Development, which included many of the projects funded by our two RFPs and others that we funded over the years. Well-established players are thinking through their own mHealth strategies or buying companies that have them. The National Institutes of Health hosted its first mHealth Summit as a prelude to more substantive funding in the area. The Gates Foundation has announced similar programs as well, including it in one of its grand challenge topics. Sailesh started an mHealth company, Mobisante, Inc., to pursue this field full time. If Mobisante is successful, it will make ultrasound imaging dramatically more affordable and accessible both in the United States as well as in the emerging markets.

Similar developments are taking place in finance and education. Furthermore, many of the pioneering companies are coming out of emerging economies, such as M-Pesa, SELCO, and KickStart, to

name a few. These trends have taken on lives of their own, beyond Microsoft, beyond one company, industry, or country, and have become truly global in their impact. And it is just the beginning, with some important lessons to share and learn along the way. As a research activity, it has gained respect within the computer science field as the mainstream publications start to feature research in this area. The last two Information and Communications Technology and Development (ICTD) conferences have attracted thousands of participants and very strong research results, and keynote speakers such as Bill Gates.

However, it is not yet clear whether these experiments will become sustainable businesses, whether multinational corporations (MNCs) or the local companies would dominate, and whether the real impact will have to await new inventions in the future or whether the current technology is good enough. As Akhtar and Sailesh talked with Jessica, it became obvious to us that there was a need out there to give the decision makers a framework to think about these issues, to distinguish problems that require research from those that require a business model or scaling up, and to base this framework on what had been tried, what works, and what doesn't. That is what we have set out to do in this book.

Numerous people have influenced our work, from our colleagues at Microsoft and in academia to business and nonbusiness circles that have graciously shared their ideas, helped us to consider other viewpoints, and provided honest and constructive feedback on our work. Special thanks are due to Karen Speerstra, Dr. Mahad Ibrahim, Dr. Jaspal Sandhu, Dr. Joyojeet Pal, and Jennifer Johnson for their support and input over the course of writing this book. Most importantly, this project would not have been possible had it not been for our time in the field where many of the projects we cite have been implemented. If it were not for the project partners, practitioners, and participants—from young people, women, and farmers to community leaders, all living in underserved communities around the world—we would not have had lessons to share. Finally, we want to thank our families for allowing us the time to write, travel, and reflect in order to tell this story—and ultimately write this book.