

Mastering Digital Transformation

Towards a Smarter Society, Economy,
City and Nation

Innovation, Technology, and Education for Growth

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Mastering Digital Transformation

Towards a Smarter Society, Economy, City and Nation

By

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India – Malaysia – China

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INVESTOR IN PEOPLE

Nagy Hanna's book captures a broad landscape of potential benefit from the introduction and application of Information and Communication Technologies in many settings. Achieving the positive benefits of these technologies is a challenge. Software may be the ultimate tool for adaptation but it also creates the potential for fragility. Avoiding these hazards while reaping the benefits Hanna so well describes will be our challenge in this 21st century.

– *Vint Cerf, VP and Chief Internet Evangelist,
Google; and member, Internet Hall of Fame*

We have come a long way toward a global network society over the last 30 years, but without commensurate progress in digital inclusion or achievement of social and economic goals. Our understanding of networked society has moved from an early emphasis on connectivity – often with the utopian view that in and of itself it could transform society – to ICT for Innovation as a central element in sustainable development. Dr. Hanna's book provides a comprehensive guide to ICT-enabled transformation – ICT for shared prosperity as well as innovation and growth. He stresses the essential role of policy makers worldwide in grasping, driving and regulating the new forces to ensure a positive and fairly distributed outcome. He provides them with a thorough guide to the elements of a digital transformation ecosystem. His work should be required reading for anyone interested in a new development paradigm with ICT as a vital element in a national strategy.

– *Dr. Nancy Hafkin, member, Internet Hall of Fame,
and former head of ICT initiatives,
UN Economic Commission for Africa*

This book is a hugely valuable resource. It gives the reader a sense of why it is so challenging to achieve inclusive information societies. The central message is that transformation to a smart economy, underpinned by a skilled workforce and open government is not simply a matter of investing in technology. It is about policy and regulatory institutions, it is about leadership and learning, and most of all, it is about tailoring change to the specific contexts where people live. This book brings together lessons learned over the past decade or more in a highly accessible way – it tells us which questions need to be asked. It gives us insight into why change is often resisted by powerful established institutions. More than this, it provides guidelines about what to do to ensure that the digital ecosystem

meets the needs of users and helps to get things done in a way that is consistent with their development agenda.

– *Dr. Robin Mansell, Professor,
London School of Economics and Political Science*

This book comprehensively spells out the many dimensions of the journey toward digital transformation of a country and its economy. Nagy Hanna brings our very clearly that there is no ideal or “copybook” path to such digital transformation. He has clearly and eloquently brought out the complexities of the challenges faced by policy makers and business strategists in defining ICT-enabled development policy and strategy. He lucidly and convincingly argues that the challenges as well as opportunities in developing economies are very different from those in developed economies. Most importantly, he offers some deep insights into how to go about these tasks in the face of such challenges. I particularly liked the manner in which all the stakeholders involved and the forces they generate, both positive and negative, have been identified and analyzed. Policy makers and business strategists will appreciate the finer points and the depth of analysis that the author provides. As a former policy maker and now heading NASSCOM, the IT industry body of India, I really enjoyed reading the book. A monumental and thoughtful work!

– *R. Chandrasekhar, President of India’s National
Association of Software and Service Companies
(NASSCOM), and former Secretary of Ministry of ICT*

That the DNA of Digital Transformation runs through Nagy Hanna’s veins, I have no doubt as I read this compelling and insightful book. It was in 2004 that World Bank President, Jim Wolfensohn, a demanding development practitioner and banker, while chairing a Board meeting and e-Lanka project architected by Hanna was presented, complimented Hanna stating “I have waited 10 long years to see such a path breaking project of digital transformation”; and added “I hope to see much more of such thought leadership.” He was surely prescient. The elements and nuances that are expounded in this fine book, stresses the need for a holistic and strategic approach that combines the soft infrastructure of policies and institutions with the harder aspects of connectivity, and where open and big data combine to inform how societies transform our planet.

Transformation comes, as Hanna says, with winners and losers. One thing is clear though, “Mastering Digital Transformation” is surely a winner. It is an invaluable road map for transformative

leaders and those of us who seek to gain deeper insights into the digital world that will surely define the 21st century.

– *Mohamed V. Muhsin, former VP & CIO, World Bank*

The communications and data revolutions present both opportunities and risks for all countries as they open up new development paradigms and destroy old hierarchies, business models, jobs, and skills. Dr. Hanna persuasively shows the urgency of mastering digital transformation to exploit the new opportunities and avoid the growing risks. He develops an integrated framework to establish the foundations for digital transformation throughout the economy and to deepen this transformation into various sectors in support of innovative, inclusive and sustainable development strategies. Dr. Hanna draws on the growing lessons of experience of countries at different levels of development to recommend the “how” for holistic, adaptive, learning strategies. A masterpiece!

– *Bitange Ndemo, Professor at University of Nairobi’s Business School and former Permanent Secretary, Ministry of ICT, Kenya*

This is a tour de force. *Mastering Digital Transformation* spans and combines many fields and disciplines: innovation, strategy, political economy, public sector reform, private sector development, human resources development, communication infrastructure, ICT services industry, institutional development, and more. It proposes an ecosystem framework to guide policy makers in formulating their digital transformation strategies and practicing smart development. It blends visions of the future of government, education, cities, information society, and knowledge economy, with the practical considerations of the policies, institutions, and learning capabilities necessary to implement adaptive, long-term transformation strategies. Hanna uses his deep insight and long experience in strategy and development assistance to provide an excellent and comprehensive guide for policy makers and development practitioners.

– *Klaus Tilmes, Senior Director, Trade and Competitiveness Global Practice, the World Bank Group*

Marrying a guide-book to a vision, Nagy Hanna offers a comprehensive view of the why, what, and how of transforming economies and societies with the power of ICT. Bringing to bear his vast experience, Hanna traverses the world to pick real-life examples of the potential and the challenges of ICT. Many countries have embarked on a journey to harness the ICT and data revolutions as means to accelerate economic growth and empower

people, and all have discovered that the path is strewn with obstacles. Here is a book that serves as a guide for the journey, warning us of pitfalls and suggesting ways that will make progress smoother and faster. A holistic view that looks at all aspects of the eco-system is a particular strength of this book. The stress on the importance of leadership, institutions and policy frameworks is clearly born out of real-life experience. So is the emphasis on learning and innovation.

Hanna has been a thought leader and pioneer in this area, having been associated with early efforts of India and Nasscom to build a powerful ICT services industry, and subsequently, to promote the effective use of ICT throughout the economy. His later work in Sri Lanka has won much praise and can serve as a model for many countries. He has since advocated and advised policy makers on the adoption of a holistic, sustainable, ecosystem approach to digital transformation to spread the gains of this technological revolution. As the global community works on finalizing a new set of sustainable development goals, to follow the MDGs, the new paradigm of “smart development” will play a key role. Here is a book that will greatly help in making this a reality. A must read.

*– Kiran Karnik, former member of
National Innovation Council and of
Science Advisory Council to Prime Minister*

This comprehensive and richly illustrated book details the core elements of the Digital Transformation ecosystem including its policies and institutions, the importance of human capital, the ICT services sector, essential infrastructure for information and communication and the investments necessary for ICT and complementary sector capacity. Its central contribution lies in integrating ICT into national development through all phases of transformation and across business and government. Bringing to bear his decades of experience, Hanna has produced an essential guide that is required reading for policymakers, development specialists and innovation leaders.

*– Jane E. Fountain, Distinguished Professor and
Director, National Center for Digital Government,
University of Massachusetts*

Nagy Hanna’s comprehensive guide is a welcome reminder not merely of the importance of our taking a comprehensive, multi-sectorial, approach to ICT transformation, but of its possibility. In chapter after chapter, decision-makers are presented with

context – context in technology but also in society, and examples from business and policy around the world. Dr. Hanna’s lifetime experience with the World Bank stands him in very good stead to be our guide in a high-level conversation that needs to draw in those in many nations who are charged with leadership as we transition to a digital-first experience in so many areas of our lives.

– *Dr. Nigel Cameron, President and CEO of the Center for Policy on Emerging Technologies*

This book conveys in a remarkably clear way the potential of ICT to enable far reaching socio-economic change across major sectors in developing countries. More than that, it points out the challenges involved in realizing the transformational potential of the technology and is packed with lessons drawn from Nagy Hanna’s long and diverse experience in ICT policy. The book should generate great interest among policy makers and practitioners.

– *Dr. Chrisanthi Avgerou, Professor of Information Systems, London School of Economics*

For over 30 years, Dr. Hanna has been the foremost chronicler of the rise and diffusion of IT as a driving force in national economic and social development. His work has been built not only through in depth research on technology dynamics but also as a leading practitioner in helping governments and private sectors worldwide mobilize comprehensive strategies and programmatic initiatives. His achievements have ranged from producing important multi-country policy reviews of IT-based transformation; to actually managing the prototyping and scaling of a national IT initiative in Sri Lanka.

For governments and companies worldwide seeking to adapt to the IT Revolution, Dr. Hanna’s work provides mileposts and best practices for this difficult yet indispensable journey. Dr. Hanna’s long experience as a World Bank pioneer and thought leader in IT has given him a unique perspective on what it takes to effectively move a nation from one level of technological sophistication to another, more mature level. His deep understanding of how institutions can unleash this growth process is without parallel.

– *Dr. Sandor Boyson, Research Professor, and Director of Supply Chain Management, Center, University of Maryland*

The digital transformation of nations and cities requires that stakeholders commit to a holistic, long-term strategy to reap the rewards

of a networked, smart economy. Dr. Nagy Hanna's book provides a much needed blueprint for policy makers and change leaders.

– *Dr. James Spohrer, Director, IBM University Programs and Cognitive Systems Institute, and Innovation Champion*

Nagy Hanna's *Mastering Digital Transformation* provides a first-rate analysis of the opportunities and challenges of leveraging Information and Communication Technologies (ICT) for economic development. It describes well how the digital transformation process occurs, while identifying the tensions generated by the adoption of these technologies from the perspective of institutions and actors devoted to "managing" disruption. By calling attention to the importance of integrating ICT into the broader development strategy of a country, the book provides many insights on the importance of leadership and stakeholder engagement in advancing this agenda. This is an important and innovative book.

– *Carlos Braga, Director and Professor, International Political Economy, IMD, Switzerland*

Nagy Hanna's latest book *Mastering Digital Transformation* is a robust work, covering both known (transforming government) and unknown (big data analytics) territory in the often troubled and incredibly risky digital landscape. Charting the terrain of digital transformation is not unlike trekking across the Alaskan wastelands – we think we know what we should do, but reality can trip up many a hardened policy-maker, regulator or innovator. The value of this book is that it does not shy away from navigating the many crevices and patches of shaky ground that abound in the digital world. The emphasis here is on the transformative agency of the human and the digital on economy and society, and on the depth of human-technology interaction emerging as we foster a 21st century reality, as we transform at least some of mankind's previously unsolvable problems into solvable ones.

– *Luci Abrahams, Director LINK Centre, University of the Witwatersrand, South Africa*

Nagy Hanna has been analyzing the potential of ICT to accelerate economic and social development for decades in the World Bank, academia, and as a consultant. In this book he synthesizes his extensive knowledge and hands-on experience in a cogent, up-to-date,

comprehensive, indeed encyclopedic work. It should be an essential source for policymakers, students, consultants, and practitioners of Digital Transformation.

– *Dr. Peter Knight, Board Member of Fernand Braudel Institute of World Economics.*

This is a must-read for policy makers and development practitioners who aim to build smart economies with the tools of the 21st century. Nagy Hanna, a World Bank pioneer in harnessing ICT for development, weaves digital technologies into development at the national, sectoral, city, and community levels. He appreciates the many challenges that face leaders as they design and implement policies and strategies to transform their economies and societies, and expand development possibilities, with the power of ICT. He shows that digital transformation is not a technical fix: it demands holistic and long-term visions, policies and institutions, innovation and experimentation, and leadership and learning capabilities. His balanced treatment of lessons learned is an excellent guide for aspiring nations.

– *Randeep Sudan, Global Practice Manager for ICT, World Bank*

Societal implications of technology often get lost in conversations about ICT and development. By focusing on policies and strategies for Digital Transformation, with ICT as enabler, Hanna has laid the groundwork for a meaningful discussion. Hanna proposes policy lessons from his vast international experience of ICT and development projects. Hopefully Hanna's book would provoke development thinkers to take a critical and symbiotic ecosystem view of technology in society.

– *Anil Srivastava, President, Open Health Systems Laboratory, USA; and founding president of NASSCOM, India*

Aim and Acknowledgments

This book is targeted at high-level decision makers in emerging markets and developing countries, to facilitate their pursuit of transforming their economies and societies toward smarter, networked, and information-rich ones, with the power of Information and Communications Technology (ICT). Many of the issues involved in digital transformation are also relevant to advanced economies, since all countries are still at early stages of such a profound transformation. The book also addresses the needs of aid agencies, financing institutions, and ICT multinationals that are increasingly engaged in assisting countries in their digital transformation journey with finance, partnership, and technical assistance. It offers researchers a broad agenda to validate and elaborate on the proposed holistic framework and lessons of experience to facilitate learning in this fast evolving field. It also offers a practical and comprehensive view of the field of ICT for development for the benefit of students in such studies as economic development, public policy, government and governance, e-business and e-commerce, telecommunications and information systems, ICT industry, human resources development, information society, innovation policy, and knowledge economy. For the most part, the book is written in non-technical language to be accessible to a broad readership ranging from policy makers to thought leaders involved in shaping the future of smart economy and networked society.

The ICT revolution continues to sweep the world economy. Many ICT advances and disruptions such as cloud computing, big data/analytics, and the Internet-of-Things have yet to begin their most dramatic impacts. In fact all economies and societies face expanding opportunities from ICT-driven innovation and transformation, and are under stress from the dramatic pace of change and threats of this technological revolution. But developing countries face the most challenges and stresses as they lack not only ICT investments, but also many of the complementary policies, institutions and capabilities to realize the potential transformational impacts of this ongoing technological revolution.

The book addresses diverse country audiences, reflecting the variety of country experiences at different levels of incomes and developmental learning. There is much to be shared between developed countries,

emerging markets, and even the least developed countries. Countries at all levels of development are learning to master ICT-enabled transformation. Lessons to be shared cover both the development fundamentals as well as new technologies where countries must be on a fast learning curve. Some developing countries are leapfrogging as in user-driven mobile innovation, mobile money, frugal innovation, and business-model innovation for the bottom-of-the-pyramid.

The book should help policy makers ask the right questions about the digitally-fueled future, as much as it should point to the right directions or sources for answers. Policy makers, advisors, development agencies, e-leaders, and other stakeholders should ask themselves and their followers the hard questions. Many of the issues and choices arising from the ICT revolution pose dilemmas and uncertainties, for which there are often no ready-made solutions or final answers. These dilemmas should be explored and managed over time. The specific answers for each country should come through invention, innovation, re-imagination, experimentation, evaluation, and systematic learning. They should also come from dialogue and sharing among local stakeholders, and from the mobilization and adaptation of global knowledge in this fast changing field.

A more ambitious aim of this book is to help change the way governments, development institutions, and financing agencies think about designing and investing in digital transformation so as to adopt a holistic, ecosystem view of the transformation process.

I wish to acknowledge the help of several individuals and organizations. Rene Summer, Director Government and Industry Relations, Ericsson, proposed the idea of a guide for policy makers for networked society, which provided the nucleolus for this book, and Ericsson's financial contribution. Rene also contributed the chapter on policies. I am also thankful for the senior managers of the World Bank Group for their strong endorsements and forewords: Sanjay Pradhan, Vice President, Leadership, Learning, and Innovation; Mahmoud Mohieldin, World Bank Group Corporate Secretary and President's Special Envoy; Klaus Tilmes, Senior Director, Trade and Competitiveness Global Practice; and Mohamed V. Muhsin, former VP & CIO, of the World Bank. Much appreciated are the helpful comments of ICT specialist colleagues at the World Bank: Randeep Sudan, Tim Kelly, and Samia Melhem.

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Bitange Ndemo, Professor at University of Nairobi's Business School and former Permanent Secretary, Ministry of ICT, Kenya; Kiran Karnik, former member of National Innovation Council and of Science Advisory Council to Prime Minister; Jane E. Fountain, Distinguished Professor and Director, University of Massachusetts Amherst; Dr. Nigel Cameron, President and CEO of the Center for Policy on Emerging Technologies; Lucienne Abrahams, Director LINK Centre, University of the Witwatersrand, South Africa; Dr. James Spohrer, Director, IBM University Programs and Cognitive Systems Institute; Carlos Braga, Director and Professor, International Political Economy, IMD, Switzerland. Dr. Peter Knight, Board Member of Fernand Braudel Institute of World Economics; Dr. Sandor Boyson, Research Professor and co-director, Supply Chain Management Center, University of Maryland; and Anil Srivastava, President, Open Health Systems Laboratory.

I also wish to thank professor Carayannis for considering to publish this book at the start of a new book series. Also thanks to Charlotte and her team for the editing and production process that turned my manuscript into an elegant book.

Foreword

The new information and communication technology presents a cross-cutting enabler and historic opportunity to address the daunting global challenges of poverty, growing inequality, youth unemployment, and environmental sustainability — and realize the ambitious Sustainable Development Goals (SDGs) being set by the global community for 2016–2030. In “The Road to Dignity by 2030,” the UN Secretary-General’s report outlines the call to action, puts ICT, and the data revolution that it has enabled, at the heart of its analysis. It expands development possibilities, allows us to see more clearly and communicate more widely than ever, and brings us closer to realizing an open, transformative, learning-oriented, knowledge-based, people-centered, planet-sensitive development paradigm.

In this book, Nagy Hanna argues persuasively that ICT should be also leveraged as a powerful tool for implementation of sustainable development strategies — measuring development and poverty in all their dimensions in timely and detailed ways, mobilizing and partnering among all stakeholders, adapting and learning throughout implementation, and monitoring and evaluating progress toward the local, national and global development goals. ICT tools and platforms, including mobile phones and the Internet, can create a rich information environment that can enhance participation and learning among stakeholders, eliminate information poverty, and democratize access to information for all. Thus, ICT holds the prospect of making development policies, strategies, and programs more transparent, dynamic, adaptive, inclusive, and evidence based. It can lighten the way for implementation for all stakeholders.

But for ICT to realize its potential, it is important to re-think development strategies, to fully take account of the power of this powerful general-purpose technology. He calls for integrating ICT more systematically, holistically, and dynamically into development strategies than has been tried so far, so as to tap the technological possibilities more fully and creatively. He offers frameworks and promising practices for doing so. The book guides us through transformative development possibilities: responsive public services, education and learning systems, health services, knowledge-based agricultural extension, mobile finance, smart and resilient cities,

smart and optimized infrastructures, business development services, open data and innovation, among others.

The book identifies the many challenges that must be addressed to realize digital transformation of economies and societies, to make them smarter and capable of realizing the nationally set SDGs. Much of the book is devoted to practical tools and advice to build the foundations for sustained, development-driven, ICT-enabled transformation. It covers issues such as setting compelling visions of open and responsive governments, developing digital leadership and institutions, developing citizen-centric service delivery, adopting a whole-of-government and ecosystem approaches to digital transformation, ensuring digital inclusion, building digital literacy, and informational capabilities among poor communities, building dynamic and affordable communications infrastructures, and developing appropriate human resources for mastering ICT and the corresponding policies and organizational changes, among others. Perhaps most important, he emphasizes that mastering digital transformation is much more than simple “technology transfer,” and thus the need to build capacity for local ICT know-how and content development, and for innovation, experimentation, scaling up, and continuous learning.

This is a timely, relevant, comprehensive, and path-breaking book. It anticipates and supports the implementation of the newly set SDGs, and the forthcoming 2016 World Development Report on “Internet and Development.” It deserves to be read and practiced by all policy makers and stakeholders interested in pursuing their country’s SDGs. I can see it as an invaluable resource for development practitioners and policy makers alike.

Mahmoud Mohieldin
*World Bank Group Corporate
Secretary and President’s Special Envoy*

Foreword

We live in technological, information and communication revolutions with huge implications for development and the future of economies, societies, cities, and nations. These revolutions are propelled by the dramatic and sustained changes in our information and communication technology (ICT) tools and infrastructures. These changes offer transformative opportunities to developing countries. Equally, they present new challenges and substantial risks to those countries that ignore these revolutions and their implications for their economic health, social security, shared prosperity, and environmental sustainability. Nagy Hanna very effectively demonstrates the possibilities and equally the challenges, and offers a practical guide to navigate them.

In essence, development is a social and economic transformation process. It involves knowledge, learning, innovation, and adaptation. This book demonstrates the potential contribution of ICT to this transformation process, for at all levels of development. It illustrates the many ways ICT can contribute to improved governance, transparent and accountable institutions, citizen voice, collective and coordinated action, reduced corruption, and participatory and inclusive decision making at all levels. It also illustrates the many ways the effective use of ICT can transform public service delivery, improve access to public information, and secure citizen-driven continuous improvement. The book also covers such transformation possibilities for some key sectors of the economy, such as education and health, and for communities, enterprises, and cities.

What distinguishes this book is that it candidly shows the demanding process of digital transformation and how it must be guided by vision, leadership, enabling policies, ecosystem view, participatory approaches, coordinating institutions, and effective governance. Nagy Hanna draws on his extensive experience in advising countries to provide the essential pillars and steps needed to translate the potential benefits of ICT into sustainable and transformative impact. His key point is the crucial task of developing the policies, institutions, competencies, and implementation mechanisms necessary to lead this transformation process. He suggests options and mechanisms for developing the human resources necessary for a

smart economy, driven by information, innovation, and learning. He also covers other key pillars: developing the ICT services industry capabilities and communications infrastructure. He concludes with key lessons learned so far to formulate, implement, lead, learn, and adapt digital transformation strategies.

The book will be very useful for: those in policy making position who wish to transform their economies and cities; those in the private sector wishing to transform their business with ICT or contribute to a dynamic ICT industry in support of inclusive and sustainable growth; development practitioners and economists who provide advice to policy makers; and educators and students who want to understand the big picture and contribute to this learning journey.

Sanjay Pradhan

*Vice President, Leadership, Learning, and
Innovation, The World Bank Group*