Paradigm Shift

The New Promise of Information Technology

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To our children, Kim and David Caston and Nicole and Alexander Tapscott. It is our hope and ambition that the smaller, more open world they inherit will be a better one.

Preface

A fundamental change is taking place in the nature and application of technology in business. This change has profound and far-reaching implications for your organization and for you.

To date, no one has fully articulated this change. As a result, developments in technology often appear as a barrage of random, unrelated events. Further, most enterprises are having severe difficulties embracing the change, remaining constrained by traditional approaches to exploiting technology and by legacy technology investments and cultures.

A multimillion dollar research program conducted by DMR at the turn of the decade and early 1990s was launched to understand this problem and find some answers. Several thousand organizations in North America, Europe, and the Far East were studied to investigate the nature and impacts of changes in technology, including emerging applications, organizational benefits, and management implications.

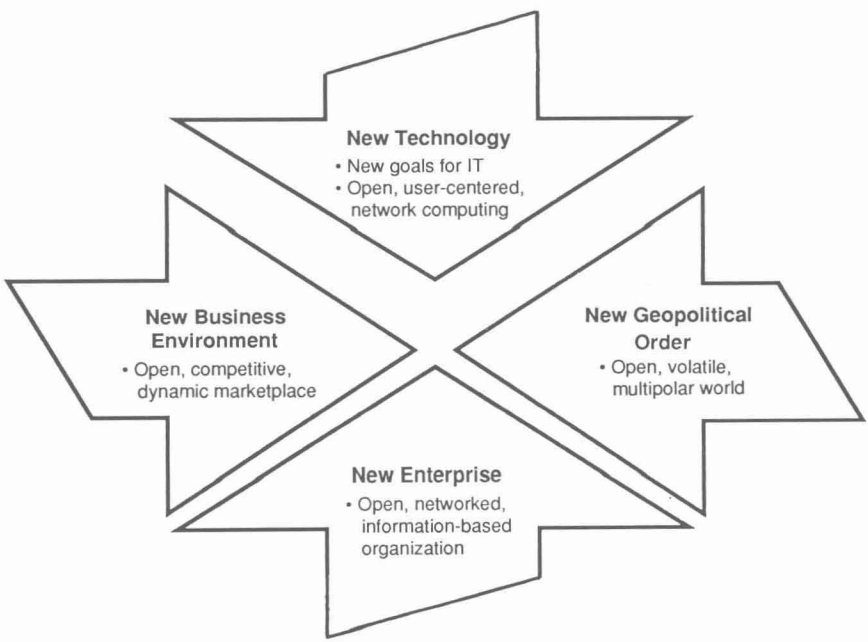
The research came to a number of striking conclusions, which all center on one theme: Information technology is going through its first *paradigm shift*—driven by the demands of the new, competitive business environment on the one hand and profound changes in the nature of computers on the other. *The information age is evolving into a second era.*

The paradigm shift encompasses fundamental change in just about everything regarding the technology itself and its application to business. The old paradigm began in the 1950s. The late 1980s and the 1990s are a transition period to the new paradigm. Organizations that do not make this transition will fail. They will become irrelevant or cease to exist.

A paradigm shift is a fundamentally new way of looking at something. It is often necessitated by new developments in science, technology, art, or other areas of endeavor. Such shifts are necessary because important changes in reality demand a shift in conceptualization. For example, in the early twentieth century the march of science began to raise issues that were not easily explained by Newtonian physics. A new paradigm, in this case Einstein's special theory of relativity, emerged as a new and more comprehensive theory and framework to explain the new realities.

The concept of a paradigm shift was first introduced by philosopher and science historian Thomas Kuhn in his 1962 book, *The Structure of Scientific Revolutions.*[1] The notion of a paradigm has grown beyond the dictionary definition. Today the term is widely used to define a broad model, a framework, a way of thinking, or a scheme for understanding reality. Psychologists discuss a reinforcement paradigm; politicians speak of political paradigms; doctors discuss a paradigm shift in medicine; and so on.[2] The idea that the information age is going through its first paradigm shift was first elaborated by DMR Group in 1987.[3,4]

Four paradigm shifts impact business today. These are illustrated in the figure below.



1. The change in the world economic and political order is quite apparent to anyone who reads newspapers. No one is really sure what that change is or where it is going, but the end of the post-World War II era has occurred. The world is opening and is volatile.
2. A related shift is occurring in the business environment and marketplace. The stable, postwar period of limited competition is over. Markets and national economics are being transformed. Old rules are disappearing, as are walls to competition.
3. A shift is occurring in the nature of organizations. The corporation of old simply does not work anymore. Business transformation enabled by information is required to succeed in the new environment. The new enterprise is dynamic and can respond quickly to changing market conditions. It has a different structure—flatter and team-oriented—eliminating bureaucratic hierarchy. It is based on commitment rather than control. Business processes are streamlined for productivity and quality. The new enterprise is open and networked.
4. The information age is entering a second era. The new technology paradigm parallels the other shifts. Like the new enterprise it is open and networked. It is modular and dynamic—based on interchangeable parts. It technologically empowers, distributing intelligence and decision making to users. Yet, through standards, it is integrated, moving enterprises beyond the system islands (and their organizational equivalents) of the first era. It works like people do, integrating data, text, voice, and image information in its various formats—and provides a backbone for team-oriented business structures. It blurs walls between enterprises, enabling the recasting of external relationships. Most important, it has matured to the point where it is achievable and affordable. In fact, the longer your organization waits to begin a transition, the more you have to spend, even in the short term.

This book is about the paradigm shift in information technology and how it relates to the other historic changes in our world. We believe this shift is the missing piece in the discussion of how to achieve the new enterprise. The computing platforms that exist in most organizations today are unable to deliver the goods for corporate rebirth. They are expensive, are limited in function, and seem to take forever to change. Worse, these old computing structures lock organizations into old corporate structures.

It is only through open network computing that the open networked enterprise can be achieved. Understanding the technology paradigm shift is therefore becoming a precondition for business success in the information age.

This book investigates the critical dimensions of the shift to help you uncover the new promise of IT in your organization, demystify the sometimes bewildering changes occurring in technology, and provide a framework for leading the transition to the new.

Don Tapscott
Art Caston

Acknowledgments

This book is a product of the collective work of a number of leading thinkers in DMR Group Inc. and other organizations.

A primary source is several large multiclient studies performed by DMR and others over the period of 1986 to 1992. These programs received more than $7 million in funding from more than 300 companies and government agencies in the United States, Canada, Australia, and several European countries, each of which contributed approximately $25,000. The programs were initiated by DMR to investigate critical issues of information technology direction and management. In total, more than 5000 organizations participated in these programs, providing information about their current technology, technology directions, key problems, successes, failures, attitudes, and perceptions on a wide range of issues. The people who contributed their time included *information systems* (IS) executives and professionals as well as a wide range of business people who have responsibilities for decision making regarding IS. As well, more than 100 DMR professionals were involved in the research and execution of these programs. We are deeply indebted to all. The main programs are:

- *The Integration of Data, Text, Voice, and Image.* This $2.5 million investigation examined the rise of integrated systems and their impact on both organizational effectiveness and the computer industry. The program was conducted by DMR and collected information from more than 1500 persons in 100 subscribers.
- *Unix in Canada.* This $500,000 effort was cosponsored by the

UniForum Canada association and involved research in more than 400 companies and government departments.

- *Strategies for Open Systems.* This multimillion dollar effort was launched by the UniForum association, X/Open consortium, and DMR and conducted by DMR. Funding came from more than 50 computer vendors and 90 government agencies and other companies. It was also sponsored by the U.S. government's National Institute of Standards and Technology, the Commission of European Communities, the Open Software Foundation, and the Unix International Consortium.
- *Aligning IS with the Business.* In partnership with Cognitech Services Corporation of Connecticut, this study investigated the issues of how to measure the contribution of IS to the business and how to better align IS with the business to maximize IS contribution.

A second key source of the conclusions reached in this book is the DMR consulting experience. We are deeply indebted to dozens of colleagues and clients who have worked with us around the world in various projects to help organizations compete more effectively through IT, reengineer their businesses, retool their technology architectures, and realign the IS functions to improve IS contribution.

Finally, we are indebted to a number of individuals who have made specific contributions to the manuscript. These include consultants Joe Arbuckle, who provided important insights on the challenges of reimaging and relearning for the new enterprise, and Alex Lowy, who provided essential information on the issues of building team-based work systems; Stephen Sieck of Link Resources, who provided valuable data on the new information markets; Lyle Anderson of Aetna for his insights on the issues of network computing, the transformation of IT architecture, and software development; consultant Michael Anderson for his thoughts on changing organizational structures and the role of the CIO, Stephen Caswell of Incomnet for his assistance on the issue of the extended enterprise; futurist Robin Macrae for his collaboration, years ago, in developing the concept of the IT paradigm shift; Tom Vassos for his review of the manuscript and for, along with Araldo Menegon and Ed Palmer, as executives of UniForum, being instrumental in launching the original syndicated research on open systems; Ben Porter of Anderson Consulting for his assistance on the issue of IS organizational structures; Tom Lodahl and Kay Redditt of Cognitech for their considerable insights on the issue of aligning IS with the business; Bob Tapscott, the visionary behind the initial Citibank workgroup implementation; Paul De Lottinville for his initial case study research for the

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From DMR, David Ticoll, who was instrumental in the launching of our open systems research, gave us invaluable suggestions and comments throughout the process of writing the book. We are also indebted to Stan Rolland, Paul Martino, Jean-Marc Proulx, and Joe Deragon for their thoughts on the issue of software development; André Dubuque, Burnes Hollyman, and John Thorp for their insights in the area of IT strategy and architecture; Del Henderson-Langdon for sharing her considerable expertise in work-systems redesign; Andrew Lamb for his assistance on the issue of the extended organization; David Forrest and George Lysenko for advice on geographic information systems; Mike Lovell for his work on continuous improvement; and Rob Howie, Randy Russell, Colleen Radigan, Nancy Miller, Andrew Toller, Tamerey Camp, and Kim Hatton of DMR's Emerging Technologies consulting practice; and DMR's Australian team headed by Kim Fitzpatrick for its critical contribution to the research effort. Additional thanks to Tamerey, Kim, Helen Mroczkowski, Halyna Fenkanyn, Tim Warner, Catherine Colburn, and Ruby Densmore for their help in the production of the manuscript.

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While we are grateful for the contributions of those mentioned above, final responsibility for the content and views expressed herein rests with ourselves.

Finally, we are most indebted to our partners and spouses Penny Caston and Ana P. Lopes, not just for their support in holding the fort while this book was in the making, but for invaluable collaboration throughout the project.

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Introduction

What on Earth Will Happen Next?

It happens to you at various points throughout the day—starting with reading the morning newspaper and ending with watching the late night news. The staggering changes taking place in the world and their implications for our professional and personal lives are relentless, changes unimagined just a few years, months, or weeks ago. There is a new openness and volatility that seem rich with opportunity and fraught with danger for humanity, your country, your organization, and you. As you read the headlines, you often find yourself shaking your head: What on earth will happen next!

When news of the collapse of the Berlin Wall reverberated around the globe at the end of the 1980s, even the most diehard cold warriors realized that the world was changing. The assumptions that had directed the economic and political events of the world since 1945 suddenly had to be questioned and reconsidered. The status quo of more than four decades was quickly disappearing. Authors of east-west espionage thrillers, such as John LeCarré, admitted that their work was quickly becoming dated.

The Berlin Wall, the physical and symbolic barrier that had separated two countries, two ideologies, and divided a continent, was dismantled and its pieces sold as souvenirs of another time. Its demise, to people all over the globe, was the beginning of a new decade and a new world. Its destruction symbolized the birth of an uncertain but exciting new era and a profound shift in the structure of world order.

The Berlin bulldozer engines were still warm when Saddam Hussein—freed of the constraints of a bygone, bipolar world—boldly set out to exploit the new world situation. He was followed, in turn, by

George Bush, who sought to define and establish a new world order. The United States and the Soviet Union stood side by side. Old rules and alliances were quickly swept away. New alliances and rules were forged. Six months and tens of thousands of deaths later the world had seen a first glimpse of the dark side of a new era.

Other dramatic changes continue as the twentieth century draws to a close. With the postwar era and its economic, political, and social barriers collapsing, changes in economic and political relations are affecting countries everywhere and challenging traditional ways of thinking. Whether they be concrete blocks in Berlin or tariff barriers in Europe and North America, physical, economic, cultural, and political barriers are tumbling. There is a growing awareness of the interdependency of nations, individual countries no longer operating as island states if they hope to survive, let alone prosper.

Countries, whether they be in southeast Asia, western Europe, North America, South America, Africa, or the Middle East, have become integral parts of a world trading market. Through economic necessity as well as political and social pressures, attitudes are rapidly changing. As the world prepares to enter the twenty-first century, there is a new openness among countries and cultures and a freer flow of information, goods, and ideas.

As more and more of the traditional postwar barriers fall, a new era bringing upheaval, unprecedented change, and major political and economic realignments continues to unfold. The stunning disintegration of Stalinism in eastern Europe and the breakup of the Soviet Union clearly constitute one of the most significant developments in the century (ranking with the "10 days that shook the world" in October 1917) and arguably in human history.

Information and information technology are at the center of this opening. Faxes provide students demonstrating in Tienanmen Square with information about what is happening in their own country and enable them to communicate their story with the world. People around the world view the Iraqi war from live television feeds in besieged Baghdad. Debates once restricted to the Soviet underground *samizdat* rage in the pages of Russian newspapers, presenting views that a few years ago would have qualified most authors for a one-way trip to a psychiatric hospital. Smart bombs enter 6 ft^2 windows, and thousands of networked personal computers become key battlefield weapons. Global telecommunications networks energize the metabolism of world commerce and move us inexorably toward Marshall McLuhan's global village.

There are new opportunities, but there are also potential perils for nations, cultures, economies, and people. The growth of political, eco-