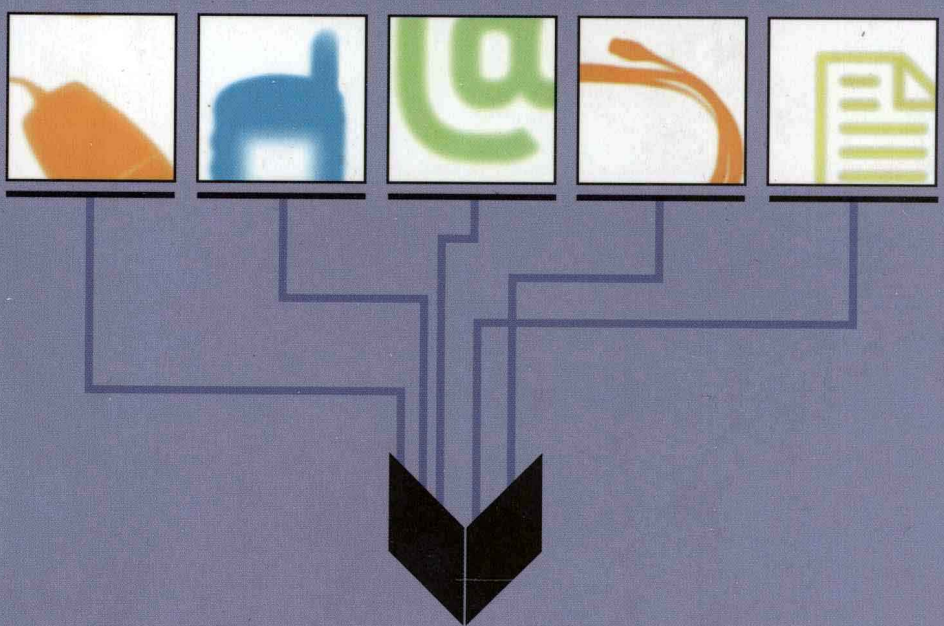
THE COMMUNICATIONS TOOLKIT

How to Build and Regulate Any Communications Business



P. H. LONGSTAFF

foreword by ANTHONY G. OETTINGER

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How to Build and Regulate Any Communications Business

P. H. Longstaff

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Foreword

Whoever you are, wherever you are on earth, if you must pick your direction in the buzzing, blooming confusion of the converging, diverging, emerging Information Age, the compass that P. H. Longstaff offers in *The Communications Toolkit* is the best one around to help you find your way.

The Communications Toolkit reflects Longstaff's unique capabilities. Longstaff is a world-class pioneer in developing and codifying a clear understanding of the fundamentals of the ongoing revolution in information and communications. This book sets a quality standard for interdisciplinary thinking that matches the standards of any classical discipline or profession that I know of. Best of all, Longstaff's work combines the originality and the depth of the best scholarship with professional directness and practicality.

Longstaff forged the tools presented in *The Communications Toolkit* during a decade of close collaboration with the Program on Information Resources Policy at Harvard University, so some background about the program and its practices is in order here.

In 1972, John C. B. LeGates and I founded the program to create knowledge useful for coping with changes in communications and information resources. Since then, we along with researchers and authors like Longstaff have worked with stakeholders around the world to clarify what is at stake and for whom, and how to deal with it. Certain assumptions underlie this work. We believe that decisions made with more information and better reasoning are, on balance, likely to be better decisions; and that the world of information and communications is changing fast, is permeated with confusing technology, laced with self-serving

information and disinformation, and highly politicized. It is hard to tell what is really going on, and the stakes, both for the players and for society, are high. To make a good decision, we believe, you need two kinds of information: what's going on out there and what's going on in here. The only people who know what's going on in their segment are those in it, but precisely because they are inside the stakeholder organization they can't see the whole picture. They can't understand even their piece of the information and communications world in the context of all the other pieces.

The goals of the program are twofold. *Substantively*, we watch how the major blocks in the information and communications world are evolving and affecting one another, and look at their effects on society as a whole: the Big Picture. At the level of strategy and policy, we focus on conflict, controversy, and change in work organized around issues, players, stakes, forces, trends, arenas of conflict, and the rules of those arenas and how these rules are changing. *Procedurally*, we aspire to create knowledge that is both impartial and competent, and to make that knowledge available to decision makers in whatever format and timing may be congenial to them. The program does not aim to provide the latest news flash but instead to illuminate the context into which that news flash fits.

The program's work is conducted principally with affiliating companies and organizations—the players that make things happen and that often conflict and compete. Affiliates provide the program with diversified financial support, but we are under no financial pressure to support any special interest. Being bought by everyone, we are bought by no one. The result: the program is in no one's pocket, and it has statistical stability. Affiliates also provide insights into what is happening in their realms; they review our working drafts and talk to us. Thus, we know what's going on. Finally, the affiliates incorporate the program into their thinking and planning, so that their decisions can be better informed. An important outcome is that all our research findings are public, with the result that everyone who cares to read them can be better informed.

The ores from which Longstaff ultimately forged the tools presented in this book were refined in the crucibles of the Program on Information

Resources Policy. For example, in keeping with program practice to assure competence and impartiality, drafts of this work benefited from critical comment by representatives of the relevant disciplines and professions, by interested parties, and by a potential lay audience. During a decade of collaborative endeavor, thirty-five formal reviewers looked over Longstaff's five program monographs that underlie *The Communications Toolkit*, among them nine executives from diverse sectors of the information industries around the world; nine professors from diverse disciplines, institutions, and nations; five think-tank people; a senior economist of the Commission of the European Communities; three senior officials of the U.S. Federal Communications Commission and another three from various branches of the U.S. government; and five partners in major law firms from Washington, D.C., to Tokyo. Longstaff further subjected these ideas to critical scrutiny in conferences and conversations in Asia, Europe, and North America.

Longstaff's search for fundamentals in various disciplines and professions is always guided by a quest for understanding and by common sense, never by trend surfing or riding on bandwagons. I found this out soon after we first met in 1992, when the seeds of *The Communications Toolkit* were first advanced as ideas about information theory, now refined in chapter 2 of this book. I thought so much of those ideas that I urged Longstaff to expound on them in what became the first of those five monographs published by the Program on Information Resources Policy. A lot of prejudice on my part had to be overcome for this to happen. As a student in 1949, I cut my intellectual teeth on Warren Weaver's work and on Shannon's *The Mathematical Theory of Information*. I was then well aware of the limitations of the "information theory" that others later pushed far beyond reasonable limits in legions of worthless papers entitled "Information Theory and . . . ," lampooned by Peter Elias in an IEEE article sarcastically titled "Information Theory and God." My initial response to Longstaff's idea had been to roll my eyes and groan! But Longstaff quickly persuaded me of the value of the approach that permeates this book.

Longstaff's approach is a remarkable combination of wide-ranging imagination, bedrock common sense, and bulldog tenacity. It was clear from the start that this author was on to something profound in its

simplicity: "Look at the world through the clear lens of stable function, not the clouded lens of shifting technologies," Longstaff said, in effect distilling the essential functions from Shannon's work. As the French say, "C'est simple, mais il fallait y penser" (It's simple, but you had to think of it). I've experienced the same "aha!" with all the other tools set forth in *The Communications Toolkit*. Longstaff offers not silver bullets for simpletons, but profoundly simple and simply profound approaches for thinking through the fundamental issues that anyone anywhere in the world who wishes to succeed in the world of digital communications and information must resolve.

I think you will be better informed after you have read this book. It is not an academic exercise but a real, working toolkit.

Anthony G. Oettinger, Chairman
Program on Information Resources Policy
Harvard University

Acknowledgments

Having decided to take a year off from the practice of law to attend the midcareer program at Harvard's Kennedy School of Government, I signed up for a class in the applied mathematics department called Information Age. Anthony Oettinger, one of the legendary pioneers of computing, taught the class. He surprised me when he assigned readings about things like the introduction of literacy to the masses and the histories of the postal system and the pencil. He was trying to show us (because many of us wouldn't have believed it if he'd told us) that the Internet and other recent innovations in communication aren't really different. They're just new. The parallels between the old and the new (and their implications for business and policy) were fascinating. I was hooked on the Big Picture and never went back to practicing law.

The paper I wrote for the Information Age class was later expanded to become the first of several monographs I have published at Harvard's Program on Information Resources Policy (PIRP), which is headed by Oettinger. This book is a synthesis of those papers and other thoughts I have formed over the last few years. It's time to put all this theory into action.

PIRP has been a wonderful intellectual home base because the people there have never discouraged my inclination to look in unusual places for ideas about communications policy problems. For example, as I thought about the tribulations of those trying to introduce competition into telephone systems, it occurred to me that I had read about competition and cooperation before—in a biology class. The more I looked, the more the two systems seemed to have in common. To help me track down this hunch, Oettinger introduced me to biologists E. O. Wilson and William Bossert, who helped deepen my understanding of

biological systems and refine my ideas about how knowledge of biological competition and cooperation could be useful for understanding how those forces work in the communications sector. H. T. Kung, of Harvard's computer science department, one of the world's experts on computer networks, helped me test my ideas about the similarities of all networks, as did many other friends of PIRP (from academia and industry) with regard to transportation, communication, and energy networks.

Oettinger and another mentor at Harvard, Lewis Branscomb of the Kennedy School, encouraged me to spend some time at the Santa Fe Institute (home of a lot of work on complex adaptive systems and chaos theory). There I tracked down another hunch. The communications sector was beginning to look more like a complex adaptive system, and this will change our ideas about appropriate strategies for nudging it in one direction or another.

I have had the opportunity to present some of the ideas in this book to various professional groups in the United States, telecommunication professionals in Australia, business leaders and policymakers in the European Union, policymakers in Korea, and communications professionals in Canada. Feedback from these people has been an important source of information, inspiration, and adaptation because any tools useful for twenty-first-century communications must work in many countries, with many cultural and technical resources, with different economic opportunities, and with changing political realities.

Special thanks for financial assistance go to PIRP, the Shorenstein Center at Harvard, the Santa Fe Institute, and especially to Syracuse University, which supported this work by granting me a special research leave and by providing research assistants Melani Kinne and Mike Ruby.

Of course, there are too many individuals who have been helpful in this process to name them all, but no book is good without good editors. My readers and I owe a debt to Ellin Sarot of PIRP, Katherine Innis and Deborah Cantor-Adams of MIT Press, and my toughest editor, Jim Longstaff.

I could not let this book see the light of day without acknowledging how important it has been to have people who believe in me, even when I go off (sometimes way off) the beaten path. For that I am deeply indebted to James and Roberta Hirl, Bob Shaw, Norton Armour, and Tony Oettinger.

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I

What Is a Strategic Toolkit, and Why Do We Need One?

It has never been easy to make predictions about the many industries that make up the communications sector. Sometimes new industries emerge and threaten old ones. Sometimes it looks like several industries will converge to create a new one. Sometimes the various parts of an existing industry find that their interests have diverged and they split into several new industries. In the early twenty-first century the communications sector seems to be emerging, converging, and diverging faster than ever before, leaving people all over the world (in business and government) wondering about the future.

This book introduces some perspectives and concepts that shed light on what's going on. I call them tools. These tools should help readers build better strategies because they will have a better understanding of how things work no matter what new technology emerges, how much industries converge, or how many companies and industries come apart.

One of the best bosses I ever had saw me struggling with an apparently incomprehensible problem and told me about some research involving two sets of frogs. One group was put in a pail of cold water and then the water was heated up. As the water got hotter, the frogs kept swimming faster and faster until they died. The other group of frogs was dropped into a pot of water that was already very hot. They just jumped out. The moral of the story is this: When you can't make things better by doing the same thing harder, it may be time to find a new strategy. Sometimes the answer is in a world bigger than the pot you're currently swimming in and you need a bigger or wider view of how things work.

I offer six tools here. They are essentially ways to think about how things work in the communications sector from a larger, more inclusive

perspective. Think of the difference between the view from the space station and the view from an airplane or from your car. As you gain altitude, you begin to see patterns that were not obvious from your old vantage point. These tools are like rockets that will take you up for a Big Picture view of the entire communications sector–from print to broadband, from local to global.

A fallacious idea of the so-called Information Revolution is that everything has changed and that the old rules no longer apply. This is not the first time a new technology has made a new means of communication possible and, at the same time, made it possible for existing communication systems to evolve and merge into one another. Those who thought everything was new had an underdeveloped knowledge of history. The fundamentals of communication, networks, and competition have not changed. It's just the technology (and to some extent its broader scope) that's different.

Unfortunately, our business and regulatory strategies are often tied to a specific technology. But separate strategies for each may soon be difficult to justify. Broadcasting, telephone, cable, and satellites are all heading in the same technological direction and competing for the same customers. The most useful strategic tools will work for many different industries and many different regulatory goals in many different countries. And since there is no guarantee that any technology around today will be around (and dominant) tomorrow, we need tools that work not only with our current engineering or business plans but also with the plans no one has thought of yet. These multipurpose tools can be built using the features common to all the problems and technologies that exist and that will exist. One looks for the basics.

We know the basic elements of communication systems, the basic structure and operation of networked industries, and the basic forces of competition/cooperation and convergence/divergence. And we know what happens when we introduce a new communication channel. But few of us have the whole picture because engineers never talk much to historians, who never talk much to biologists, who never talk much to business managers or lawyers. Until now they never had to. Now they will start talking to each other because they must. None of these disciplines can fix the problems they face by just swimming faster.

Sometimes one gets a look at a place bigger than the place one is swimming in when one least expects it. Such a weird, life-changing thing happened to me in 1992. I was killing some time at a used book sale when I stumbled onto a book on information theory. Browsing, I recognized ideas I had first heard in a communications class in college, when such theoretical stuff seemed a total waste of time because it didn't apply to anything real. But as I leafed through that battered book with the eyes of a communications lawyer, I stopped at a drawing of the communication process: senders, receivers, channels, encoding, and noise. *Click*! This described all the communications industries! It occurred to me that maybe we shouldn't continue to try to regulate broadcasters, cable systems, telephone networks, and satellites. Maybe we should regulate senders and channels. That would give communications regulation some consistency and predictability because it would make it possible to apply the same rules to everyone who was doing the same thing. The more I thought about it, the more sense it made. Looking to the fundamentals of a process or system in order to see the Big Picture became the foundation for all my work and allowed me to develop the tools in this book.

It is my hope that these perspectives will help readers solve real problems that exist today in the communications sector. The tools described here should become more useful and widely applicable as people gain experience with them. They are, of course, not the final take on how things work and will work in the communications sector. Like the Stone Age implements that became wrenches, hammers, power screwdrivers, and robotic manufacturing gear, these tools will evolve. But perhaps they will serve for the time being as a way to understand and deal with the issues of the communications sector of our time.

1

Why New Tools?

First things first. Any discussion of new tools has to be clear about what the tools are and how they can be used. Before readers take the trouble to learn how to use them, they will want to know why they should take the trouble to change their current tools. After all, change is disruptive, and one can't always tell if the new will be better than the old.

What Caused the Changes in the Communications Sector?

There have been many changes in the communications sector, but the most important can be characterized as "breaking down barriers." The widespread adoption of digital technology has eroded the barriers between industries, and faster, cheaper communication networks have eroded the barriers between countries. As these barriers fall, the technical and geographic territories established by each communications industry become contested ground. All the firms in this sector seem to be competing for the same time and money of communications consumers. As the technical, political, and regulatory walls that had protected each industry's (and each country's) unique culture and revenue stream are breached, their customers become fair game for anyone.

Why would governments and industries agree to break down the walls that protected their comfortable territories and usher in a period of unpredictable turbulence? They seem to have deliberately turned their world upside down. In the process, some of our assumptions about how things work don't seem to be true anymore. The game has gotten bigger for everyone because two things happened in the 1990s: digitization and