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New Ways to Think About the Visions Called "Convergence": A Guide for Business and Public Policy

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Executive Summary

Convergence: Everyone talks about it but no one is sure what it means. This report is intended for those who need to sort out the meanings of convergence in order to decide about investments, career changes, or public policy in the communications and computer industries.

There are many visions of what convergence will look like, some complementary, others contradictory. Will convergence mean the death of "old" communications media and the birth of new communications networks that will deliver all messages? Is convergence the migration of old media to new distribution platforms? Is it the addition of new platforms to old ones? Is it one box in every home, replacing telephones, computers, and television sets? Is it two or three multi-national companies that will rebundle communications services to sell them as a single package?

The best answer appears to be "maybe," because forces are also at work for *divergence*. This report examines both forces: those moving the communications and computer industries together and those moving them apart.

Three categories can be posited for the visions of convergence: the Big Pipe, the Big Box, and the Big Company. Although the categories are not rigorously bounded (some visions include elements of the others), classification helps to clarify the identity of stakeholders and forces working for (or against) a particular vision of convergence. It allows a better focus, which is necessary for deciding business strategy and public policy.

The report also identifies convergence *theologies* and their role in public debate (in government and in the stock market) on the future of the communications and computer industries. Believers, agnostics, and atheists all may see the same evidence but focus on different elements from which to predict the future.

Based on research in Europe and North America in 1999, this report builds on the author's prior publications to suggest the use of information theory to form analytical building blocks for the communications sector at a time when the old boundaries are changing.

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Chapter One

Introduction

One of the earliest recorded uses of the term "convergence" was by Johannes Kepler, a scientist in the early seventeenth century, as part of his work on optics, and by the eighteenth century the term had come into common English use.[1] *Convergence* denotes a process in which two forces or things "bend or come together at a point."[2] At the dawn of the third millennium, the world is said to be coming together in many ways: science and religion, human and machine, western and eastern cultures, local and global markets.[3] Convergence has become a "buzz word" in many disciplines, but nowhere has it evoked the almost religious fervor that it has in the communications and computer industries, where it often carries the mystical power of "The Force" revered by Jedi knights in the "Star Wars" movies.

The communications and computer industries are said to be going through a "revolution" that will result in their coming together into one sector, perhaps even one industry. The industrial revolution of the twentieth century will, some believe, pale in comparison with "converged" communications technologies (and their effects on the economies and cultures of the world). That the various communications industries will become indistinguishable has become an article of faith in world financial centers and an assumption that underlies the business plans of many companies, large and small.

It is no wonder, then, that governments are trying to determine what role they should play in this drama. Should they be helpful (even indulgent) parents, guiding the players toward the best future? Should they step back and let the forces of technology and competition take their natural course? Will the new world be good for everyone, or will some people inevitably be hurt? Will most consumers (and voters and investors) see the new monochromatic communications landscape as a good thing? Do they care? Will the new world arrive before or after the next election or the next annual report to shareholders? What exactly is "convergence," and why is it happening? And is it *really* happening?

The answer is: No one knows. There are as many opinions as there are pundits. But most of those expressing opinions (except, maybe, those who charge a lot of money for them) admit that the forces at work are so complex and change so rapid that even the most apparently sophisticated prognostication is little more than a guess. Many of the opinions expressed in the popular media

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[1]For a brief history of this term, see Geoffrey Nunberg, "kon-`ver-jen(t)s: A History," *Forbes ASAP* (Oct. 4, 1999), 201-202.

[2]Webster's New World Dictionary.

[3]For an overview of many of these ideas from the perspectives of a variety of disciplines, see "Big Issue IV: The Great Convergence," *Forbes ASAP* (Oct. 4, 1999) [special issue].

are based on unstated political or marketing agendas, which does not necessarily make them wrong, but this bias needs to be taken into account, especially if the opinions are used as the basis for business decisions or public policymaking.

The purpose of this report is to offer business executives and policymakers several new ways to structure the discussion of "convergence." Readers are shown a new way to look at the communications sector as a whole, a new way to evaluate visions of the future based on "convergence theology," and a new way to categorize these "visions." New tools for analysis may help to structure assumptions about the mountains of data on reorganization of the communications sector. In the absence of new ways to structure those assumptions, what may be perceived is only chaos, leaving the assumption that there are no directions, no rules; or, an attempt may be made to force the data into old assumptions about the nature and future of communications. Neither alternative seems appropriate to effective business planning or policymaking.

Changes are clearly taking place. Many of the attributes and assets of communications industries such as telephony, cable, and broadcasting are being reorganized, and reorganization is occurring as these industries *coadapt* to changes in their environments induced (or enabled) by technical forces such as digitization and economic forces such as globalization. The concept of business coadaptation is analogous to the concept in biology: it occurs when one organization responds to a change (such as the use of new technology by a competitor or the invasion of formerly secure territory) by changing its own strategy. This change causes the competitors to respond in turn. Each will continue to adapt to the other's moves until a new winner becomes apparent or each has developed a niche without life-threatening competitive pressures in which it can survive.

Convergence does not describe the process of coadaptation but, rather, is one of its *possible outcomes*. The forces at work are so complex that they are truly unpredictable. The ultimate shape of the communications sector (who and what will come together or come apart) is not knowable.

This report makes no grand predictions, but it does make one assumption. It assumes that in no system (political, economic, biological) do forces move inexorably in only one direction, and that in the communications sector in the years 2000 and 2100 forces will both pull the sector together (toward concentration) and pull it apart (toward diversity).

The various visions of the business world that come under the rubric of "convergence" assume that a new equilibrium will be reached in the near future and that the system will settle into a communications sector with new and larger structures in place of the old ones. These visions fall into three broad categories:

- The Big Pipe, where current methods of transporting messages are combined into one (or a few) large one(s);

- The Big Box, where one (or a few) consumer appliances will replace the variety of appliances currently used for computing, entertainment, and sending messages; and
- The Big Company, where one company (or a few) will control the resources in this sector, providing the Big Pipe and the Big Box to customers globally.

All three visions represent high levels of concentration, yet such high levels of concentration offer only *one* of many potential stopping places in the current turbulence. Indeed, the turbulence may not stop any time soon if the forces causing it (such as the development of technology) do not stop.

Even if these visions of the future are not infallible predictions, they still have purpose and power, because, if only apparently, they provide business leaders and policymakers with some direction for the future and a focus for tactics. They offer hope of new and bigger pastures to industries that have reached maximum growth in their old territories: new electronic equipment everyone will want to buy and new (global) markets for such products and services as telephony and television (TV).

To build new tools for analysis, this report reviews information from the traditional literature of communications policy and business, and it also examines the literature of several different disciplines not generally consulted when dealing with policy or business strategy. The discussion should not be interpreted as offering predictions but, rather, as a search for clues in a very complex situation. Some information is taken from interviews conducted during the fall of 1998 with leaders in communications in business, government, and academe in the European Union (EU) and the United States. Some of them asked to speak off the record or “not for attribution,” and in this case the speaker’s general credentials are noted to indicate the general background for the statement quoted, not to identify the individual.

The next three chapters set out three new tools for analysis of the communications sector. **Chapter Two** outlines elements of an information theory model (developed as part of the theoretical basis for computing) and proposes that it is appropriate as a new model for the entire communications sector, no matter how “converged” this sector may appear ten, twenty, or a hundred years from now. In **Chapter Three** the various visions covered by current use of the term *convergence* in business and policy circles are distilled into the Big Pipe, the Big Box, and the Big Company, and the implications of these three visions are explored.

Chapter Four suggests that business and policy planners often analyze the arguments made for each vision of the future on the basis of their own “convergence theology” and that their adherents also fall into three broad categories: believers, agnostics, and atheists. Each category, and the speakers representing it, reveals a system of beliefs about the dangers and opportunities in the current turbulence and these beliefs color the speakers’ acceptable vision of the future.

Chapter Five examines some of the forces that may contribute to concentration and diversity, including the usual suspects (technical forces of digitization, economic forces for globalization, organizational searches for synergy) as well as ideas from disciplines not often invoked in discussions of communications business and policy but which offer insights that are worth exploring, including systems analysis and biology.

One of the biggest forces in the communications sector has always been government regulation. Communications assets have always been regarded as a critical resource for the economic, cultural, and military success of any country. Government efforts at the beginning of the twenty-first century, like other forces discussed here, are moving the communications industries both together and apart. **Chapter Six** examines government policies that appear to pull the sector in two directions at once. **Chapter Seven** explores the Big Questions for any government response to these forces, the *why, what, how*, and *who* examined in the context established in Chapters Five and Six, using the tools developed in Chapters Two, Three, and Four. Chapter Seven ends by asking *when* (if ever) the communications sector may reach some new equilibrium (which may or may not be one of the three visions of convergence) and whether regulation might be appropriate before that happens.

Given the intention throughout to be helpful to policymakers and business leaders worldwide, the discussion deliberately attempts to avoid country-specific regulatory nomenclature.[4]

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[4]For an overview of regulation in all parts of the world, see Dianne Northfield, *The Information Policy Maze: Global Challenges—National Responses* (Melbourne: RMIT University Press, 1999); see URL: http://www.circit.rmit.edu.au/publics/index.html

Chapter Two

A New Model for the Whole Communications Sector: Using the Common Ground

Even if all the industries that comprise the communications sector do cohere into a single, giant, integrated industry, the reorganization begun in the 1980s cannot be denied. A new model of this sector no longer breaks it down neatly into discrete industries (telephony, broadcasting, cable) but, instead, will need to take into account the similarities and differences among the reorganized industries necessary for both those operating the businesses and those who would regulate them. To be useful for the long term, the model will need to be able to outlive assumptions about the technologies, economic imperatives, and political ideologies of the players (corporations and countries), and it will need to be able to explain structure and process without dictating them.

Fortunately, such a model already exists. Although largely unknown in business and policy circles, it has long been used for analysis in fields as diverse as physics, cybernetics, psychology, and art,[1] and for at least one science writer, it offers a possible foundation for a theory of "everything."[2] The model comes from the field of study known as Information Theory, itself one of the breakthroughs for conceptualizing communications that made possible the "communications revolution."[3] Because it breaks communications down to the basics—the functions of the process—the general model, shown in **Figure 2-1**, can be used to analyze any process of communication, from interstellar to intercellular. These basic functions may be said to form building blocks for the complex technologies already developed (or to be developed). In various industries these functions are known by various names—"content," "pipes," and "transport"—but in every industry the functions are the same.

The following basic functions of communication which are used in this report can be used to discuss any communications business or regulation:

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[1]See, e.g., John R. Pierce, *An Introduction to Communication Theory, Symbols, Signals, and Noise* (New York: Dover Publications, 1980).

[2]Timothy Ferris, "The Last Bit: Information Theory Is the Answer to Everything," *Forbes ASAP* (Oct. 4, 1999), 258-260.

[3]Information theory was developed during World War II to build radar systems. For the mathematical basis of the theory, see the original work: Claude E. Shannon, "A Mathematical Theory of Information," *Bell System Technical Journal* **27** (1948), 379-423, 623-656. See also Anthony Liversidge, "Interview with Claude Shannon," *Scientific American* (January 1990), 22-22B.

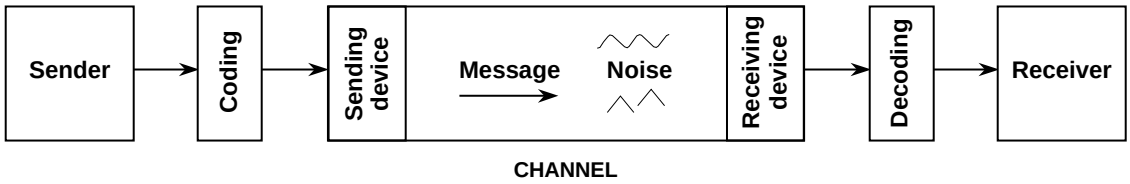


Figure 2-1

General Model of Communication

- **Sender:** The person (flesh and blood or corporate entity) attempting to send a message to another person or group of either known or unknown identity (e.g., a local broadcaster, the person posting messages on an electronic bulletin board).
- **Receiver:** The person who receivers the message, whether or not the intended receiver (e.g., the person who watches a TV program or reads a message on a bulletin board).
- **Encoder:** The person or device that changes the code of the message so it can be used in a particular channel (e.g., a person who translates a language, a device that changes music into analog waves, or a device that changes text into digital code).
- **Sending device:** A machine or system of machines that puts the coded message into the channel (e.g., a TV transmitter or a modem).
- **Receiving device:** A machine that takes a coded message out of the channel (e.g., a TV set or a modem).
- **Decoder:** A person or machine that changes the coded message into a version appropriate to the receiver (e.g., a TV set or computer).
- **Channel:** The medium or process through which the message travels (e.g., the air or telephone wires).
- **Message:** The changes or variations of the signal in the channel that convey information once they are decoded. Messages are not the same as *meaning*; a message may have many meanings, depending on who receives it (e.g., the change in the pattern of ones and zeros in digital code, the changes in the amplitude of a radio wave).
- **Noise:** Other messages or signals in the channel (e.g., electromagnetic static over the air or in a wire) that make it difficult for the receiver to sort out the message being received.

These basic building blocks are used in several types of human communications systems: *interpersonal* communication (between two people) and *mediated* communication (in which some social or technical construct allows messages to reach receivers far from the sender). Technical mediators are often categorized as point-to-point networks and point-to-multipoint networks.[4] The economics and regulatory history of these networks are significantly different. Policy and

[4]Multipoint-to-multipoint and multipoint-to-point networks are possible also because computers can carry several communications simultaneously.

business discussions of new communications networks tend to ignore both the differences and the similarities in networks, treating each as if it were unique. This is often an unnecessary reinvention of basic principles.[5] This paper will deal with point-to-multipoint (one-to-many) networks, commonly thought of as "mass media," and point-to-point (one-to-one) networks, such as the telephone network. Because they are not the same, their coming together into some "convergence" may be problematic at both the economic and the regulatory level. For example, is a fax broadcast to many people at once a type of "mass media"?

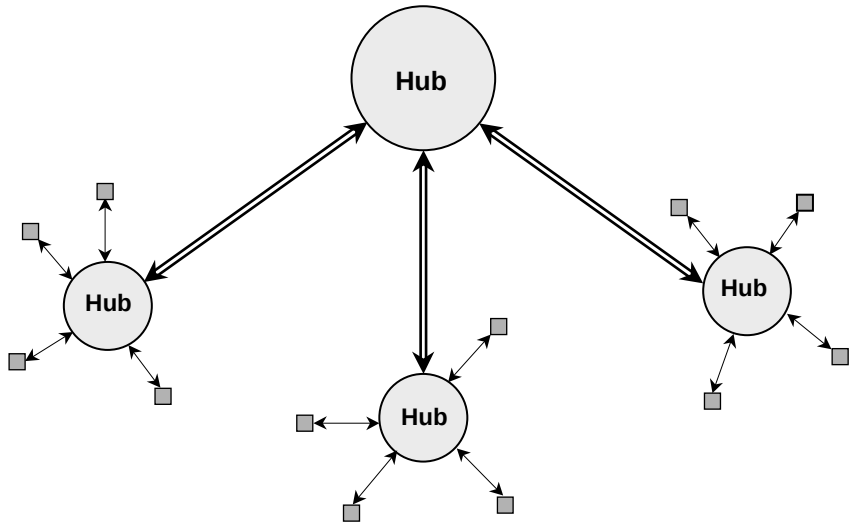


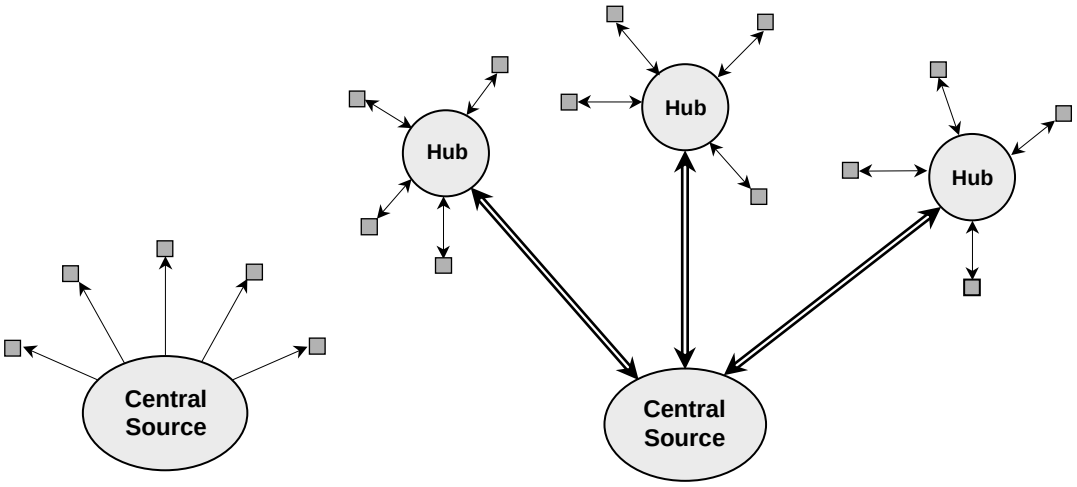
Figure 2-2

Point-to-Point Network

Communications networks have two important ancillary functions:

- **Storage:** Messages in the networks may be stored temporarily while the system waits for capacity to become available or to facilitate delivery at a time chosen by the sender or receiver (e.g., TV shows are sometimes stored on videotape until the receiver wants to see

[5]For a discussion of the history and structures of networked industries, see, P. H. Longstaff, *Networked Industries: Patterns in Development, Operation, and Regulation* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, P-00-2, March 2000), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html



Note: All connections are from a central source to terminals. Connections may be one- or two-way.

Figure 2-3

Point-to-Multipoint Network

them or until the broadcaster or cablecaster wants to run them. Data messages are sometimes stored temporarily in computers while the network determines the best way to use its capacity, or they may be stored in a central computer until the receiver wants to see them.

- **Directory:** Senders and receivers must know how to find the receivers and senders they are looking for. The directory organizes senders, receivers, or messages to make them accessible (e.g., the telephone system must know which numbers make a particular receiving device (your phone) ring, and TV viewers need to know where and when to see their favorite shows).

These functions must be present in any network, and their reconfiguration will require substantial cooperation in setting the standards for reorganized networks.

Understanding the basic functions, or building blocks, of communication and communications networks is important to creating robust business plans and public policy that can adapt to a variety of scenarios. Whatever type(s) of communications systems emerge from economic and technical turbulence, they will contain all the elements of the information theory model. Channels and access by senders and receivers will be present, but who they will be and how many will exist is not knowable. Although it is not clear whether seeing the communications world in terms of the historical technical and legal constructs now known as broadcasters and telephone companies will remain useful, it will always be useful to see that world in terms of senders and channels.

Long-term business strategies and short-term business tactics can be built using the information theory model, because the functions illustrated in it will not change with changes in

technology, the economic environment, or the political party in power in a particular country. Companies in the communications sector often are warned not to regard themselves as broadcasting or cable companies but as communications providers, and, although this caution opens new possibilities, it may not help executives to focus on how their services will fit into the broad picture or how they can use their strengths in one function to build for an unknowable future. A successful firm will not necessarily be a successful channel, and vice versa.

The information theory model can encompass any assumptions about the future of the industry and about managerial options based on those assumptions, which means it can be used in conjunction with any business strategy tool, as, for example, the underpinnings of such important business analysis tools as the Information Business Map (see **Figure 2-4**).[6]

For policymakers, a model based on information theory offers the possibility of treating all channels in the same way, regardless of the technology each uses.[7] The model can be used with any political assumptions about the role of the channels. It can be used to design regulatory schemes that promote competition or cooperation. By itself, it does not offer an advantage to any existing technology nor promote any potential technologies. It can accommodate a communications sector that sees convergence or divergence, or both, in the technologies and corporate strictures of the twenty-first century. **Table 2-1** presents a rough guide to how the building blocks of information theory can be used to broaden policy discussions.

The information theory model offers everyone (regardless of particular assumptions about the future, technology preferences, or politics) a common framework for discussion of the many important issues in the communications sector. In the next chapter it is used to help make sense of the many ideas called *convergence*.

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[6]See "The Fields We Till" in the Web site of the Program on Information Resources Policy, URL: http://www.pirp.harvard.edu/about.html See also John F. McLaughlin, with Anne Louise Antonoff, *Mapping the Information Business* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, P-86-9, September 1986), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html

[7]The author has previously suggested this model for use in communications regulation in the United States and the EU in "Convergence Regulation: Evolving to the Common Ground," a paper presented to the International Telecommunications Society, at the Regional Conference, Turin, Italy, Sept. 2, 1999 [unpublished]; and in "Regulating Communications in the 21st Century: New Common Ground," in *The Information Resources Policy Handbook: Research for the Digital Age*, edited by Benjamin M. Compaine and William H. Read (Cambridge, Mass., and London: Massachusetts Institute of Technology (MIT) Press, 1999), 453-489, an earlier version of which was published as *Information Theory As a Basis for Rationalizing Regulation of the Communications Industry* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, P-94-4, June 1994), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html

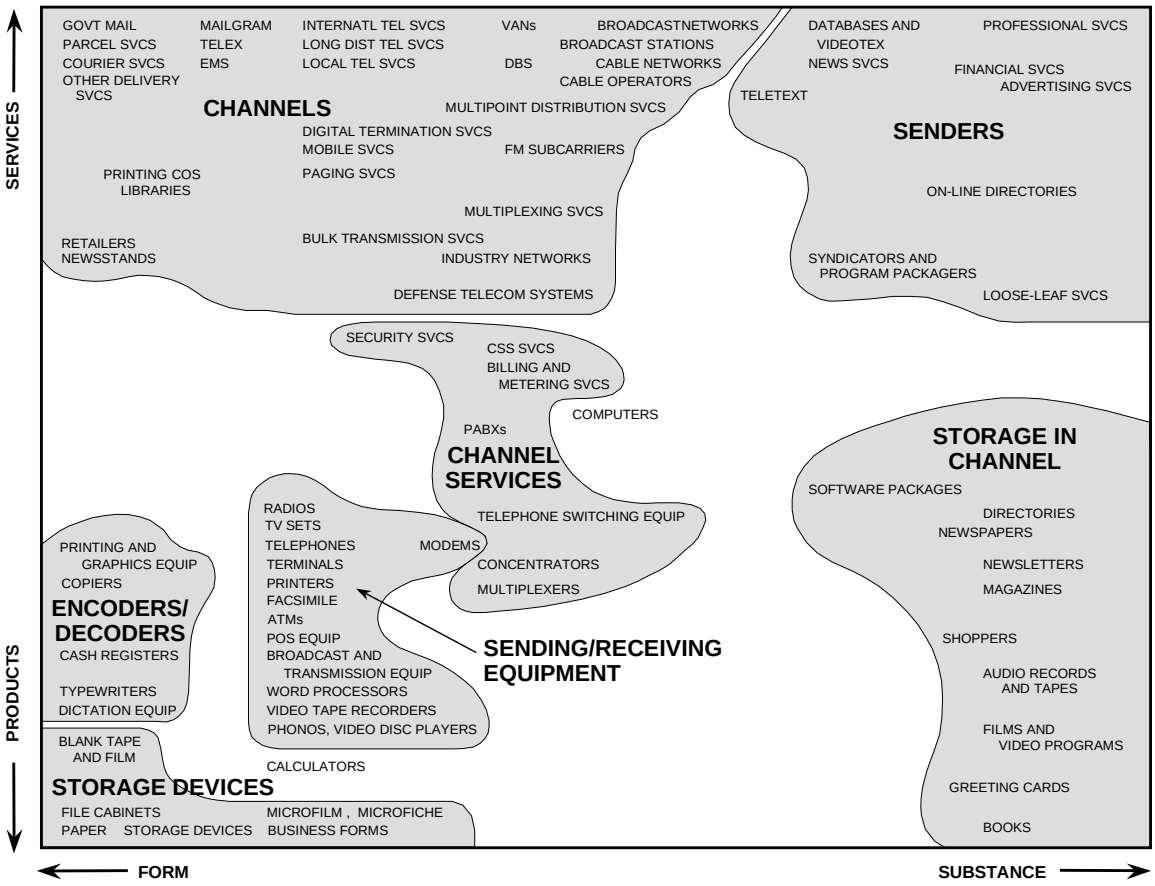

Figure 2-4

The Information Business Map: Reality Matches Theory

Table 2-1

Using Information Theory to Put Regulation into More Appropriate Boxes

Part of the Communication	Definition with Examples	Examples of Regulations
Sender	One (or more) sending a message to receiver(s) • TV station • Web page producer • Person making phone call	Regulation of content: Censorship • Illegal to put certain messages into a channel • Illegal to send (or use for sending) personal information
Receiver(s)	One (or more) perceiving a message, whether or not the intended recipient • TV viewer • Web page viewer • Phone call recipient	• Banning distribution of certain messages to certain receivers (e.g., minors)
Encoding/decoding	Process of coding or formatting a message so that it can be used in a particular channel or by particular person(s) • TV show coded for analog signal • Conversation coded as ones and zeros for digital phone system • Cryptography (secret codes)	• Restrictions on language • Government standards for computer coding
Sending device	Device that puts coded message out on the channel(s) • Radio transmitter • Telephone handset • Personal computer	• Banning radio transmitters • Standards for telephone handsets
Receiving device	Device that takes the coded message out of the channel(s) • Car radio • Telephone handset	• Banning ownership of satellite dishes • Standards for digital TVs
Channel	Medium through which a message travels from sender to receiver • Air waves in atmosphere • Telephone or cable line • Paper	• Mandated access for some senders but not others • Subsidized access for certain receivers or senders • Regulation of price for access to channel

Chapter Three

Three Visions of Communications "Convergence"

Although things are clearly "coming together" in communications and computing, at the turn of the century the ultimate direction(s), outcome(s), and timing(s) of change remain unclear because so many variables are at work. Most business planners and policymakers feel that they cannot wait until the turbulence subsides, because by then it may be too late to get a piece of the action. Planners and policymakers prefer to shape the future, to whatever extent they can. This leads them to seek out academics, consultants, and industry leaders who can offer a vision of the future. The buzzword emerging from much peering into the future is *convergence*, a term now used for so many ideas that it has come to lack predictable meaning. Its use varies depending on who is speaking and to whom. Speakers may assume, for example, that the various communications industries will become one large industry or that "convergence is more like crossing paths or marriage, which results in the transformation of each party, as well as the creation of new entities."[1]

In the computer and communications industries, the term convergence usually includes assumptions about how communications products and services are produced, distributed, and displayed in homes and businesses. Other assumptions may be about the nature of the business organizations that may best capitalize on the changes taking place. Often in marketing materials, stock prospectuses, lobbying lunches, and even academic journals, such assumptions may be unstated or unsupported. The absence of common definitions or assumptions means that sometimes an answer may assume a different definition from that in the question, and, as a result, explanations of the idea(s) of convergence to customers, investors, voters, and policymakers sometimes appear to be beyond the grasp of mere mortals.

In 1992, a report by the Organization for Economic Co-operation and Development (OECD), *Telecommunications and Broadcasting: Convergence or Collision?*, noted that the term convergence is "high on concept but low on content" and therefore adopted a definition denoting "the blurring of technical and regulatory boundaries between sectors of the economy."[2] The report concluded that technical and regulatory "convergence" was not inevitable and that companies in telephony and broadcasting may have little to gain by moving out of their comfortable coexistence. It also concluded that pressures for convergence were coming from companies that wanted to compete with established telephone companies and from the hardware manufacturers that would provide the new equipment, which were "pressuring governments of OECD members

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[1]Roger Fidler, *Mediamorphosis: Understanding New Media* (Thousand Oaks, Calif.: Pine Forge Press, 1997), 27.

[2]*Telecommunications and Broadcasting: Convergence or Collision?* (Paris: OECD, Information, Computer and Communications Policy [ICCP], No. 29, 1992), 13-14.

for relaxation of the regulations which define lines of business and which keep broadcasting and telecommunications structurally different."[3]

Following the publication of this report, the notion of the communications sector coming together grew, in both business planning and policymaking circles. In 1999, the OECD issued another report that pointed to a trend toward concentration on the technological and financial levels of the sector.

> Rapid convergence, in technologies, services and markets, linked with the development of digital technology, is allowing various content, e.g., voice, data, audio or video, to be provided through different networks regardless of their characteristics. Different network platforms are becoming increasingly substitutable from the technical perspective as they attain the ability to carry essentially the same services. Taking advantage of this technical progress, a number of market participants are strategically expanding service provision beyond their traditional services through cross-platform and cross-product development…. Furthermore, cross-ownership is also developing in the communications sector as enterprises enter traditionally separated markets seeking further business opportunities. The sectors impacted by convergence have shown a growing trend towards mergers and alliances.[4]

In the many pronouncements about "convergence," three major visions of the future were discernible: the Big Pipe, the Big Box, and the Big Company. The power of these visions cannot be underestimated. Were people to become convinced that one or more of the visions was the probable future (and that it was good), companies and governments might begin to act as if the vision were inevitable. And if enough people were to adopt that vision, they might well make it come true.

3.1 The Big Pipe

By the mid-1970s, when there was no longer any doubt that the underlying digital technologies of computers and telecommunications had begun to merge into each other to become "compunications,"[5] the first vision of convergence appeared: The Big Pipe. In this vision, all (or most) of the current channels of communication (print, broadcast, cable, telephone, among others) will converge into one giant channel that will carry all messages, whether audio, video, or

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[3]Ibid., 93-94.

[4]OECD Communications Outlook 1999 (Paris, 1999), 113.

[5]Anthony G. Oettinger, "The Abundant and Versatile Digital Way," in Mastering the Changing Information World, edited by Martin L. Ernst (Norwood, N. J.: Ablex Publishing Corp., 1993), 85-168, [On-line]. URL: http://www.pirp.harvard.edu/pubs.html

text.[6] As early as 1973, the Harvard University Program on Information Resources Policy was predicting that the walls between the communications and information industries were going to come down and public policy had to adjust:

> Today, major social, economic and technological factors are altering or eliminating the historic barriers between information industries and making new alternatives available to information users. Most notable are the vast increases since World War II both in transactions entailing information processing and in the capability and reliability of electronics, increases that go hand in hand with large decreases in the costs of electronic technologies. What therefore happens to one information industry strongly affects not only all the others, but also the public generally. These relationships have not been widely recognized and little is known about their effects on either the industries or the public.[7]

One of the earliest uses of the term convergence to denote this vision has been attributed to Nicholas Negroponte, director of the Media Lab at the Massachusetts Institute of Technology (MIT). As early as 1979, Negroponte was raising money to build the Media Lab, using a chart that predicted that the ability to digitize information and other developments in the computer industry could cause the communications industries to come together on at least some levels and that they should be studied and developed as a single craft[8] (see **Figure 3-1**).

Some interpreted Negroponte's view to mean that the printing, broadcasting, and film industries were as good as dead and that computers would take over the world. This mass extinction of established channels assumed that, because different kinds of information could be put into a single pipe (or channel) after being digitized, they would be. The assumption ignored the deep roots many stakeholders had (and continue to have) in established distribution channels. At this writing, all the distinct industries continue to flourish in a world in which digitization is taking over the production but not the distribution of newly digitized products—although the merger in 1999 of telephone powerhouse AT&T and several cable giants may revive that dream. In the academic world, the interdisciplinary approach to the study of the communications industries urged by Negroponte has not been widely adopted outside the Media Lab, and the

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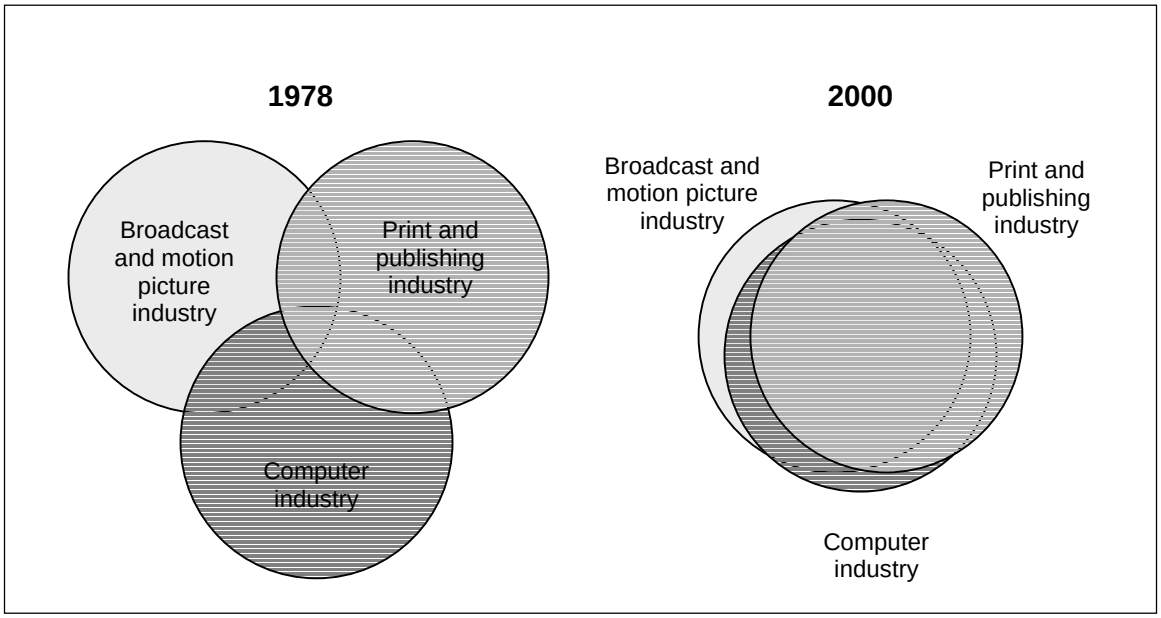
[6]One of the first to articulate this vision was J. C. R. Licklider, director of the Advanced Research Projects Agency (ARPA) in the 1960s; see, e.g., Licklider, "The Computer As a Communications Device," *Science and Technology* (April 1968).

[7]*A Perspective on Information Resources: The Scope of the Program 1973–74* (Cambridge, Mass.: Harvard University Program on Information Technologies and Public Policy, October 1974), 3. Later in 1974 the name of the Program was changed to the Program on Information Resources Policy, which is its present name.

[8]See Stewart Brand, *The Media Lab: Inventing the Future at M.I.T.* (New York: Penguin Books, 1987), 10-11.



Stewart Brand, *The Media Lab: Inventing the Future at M.I.T.* (New York: Viking Penguin, Inc., 1987), 10. Printed with permission.

Figure 3-1

With These Diagrams Negroponte Made the Case for the Creation of a Media Laboratory at MIT

various industries retain their very distinct cultures, with different customer expectations, business practices, and legal regimes.

In policy circles, the Big Pipe became known as the Information Superhighway, the National Information Infrastructure, the European Information Infrastructure, and the Global Information Infrastructure. It was envisioned as a new network with broadband capabilities that could send text, audio, and video from anywhere to anywhere. Government, it was believed, would have a large part in building the network as a "public good" that would be available to all citizens because it would be important for education, health care, participation in democratic government, and general edification. The network would compete with other channels of information and, over time, replace some of them.

The explosion of the World Wide Web (WWW) and the use of the Internet Protocol (IP) for a variety of communications (data, audio, and video) over existing infrastructures has made the future of a brand-new network seem remote. In 1999, a report by the Aspen Institute Roundtable on International Telecommunications noted the change in rhetoric about the Big Pipe:

> Broadly defined notions of information superhighways, information infrastructures, and societies, and media convergence have given way to a significant extent to more precise formulations and objectives. In the

> United States, at least, one rarely hears these terms used anymore—everyone is back to talking about telecommunications and the Internet. Indeed, to the extent that there is multimedia convergence in the offing, the Internet has emerged as its focal point and driving force. Internet telephony, Internet webcasting, Internet television, Internet appliances, Internet commerce, and so on are the order of the day, not "500 channels" of interactive television services and proprietary platforms provided by PTOs [public telecommunications operators], cable companies, and the like.[9]

It is possible that, in the short term, the revolution in the communications systems that deliver communications may not result in old products and services in a new pipe (planned from the top down) but in new businesses that may emerge as digitized products and services (some old, some new) using a variety of pipes: telephone, cable, broadcast, and satellite infrastructures. Bringing many pipes together into one big one by interconnection is in some doubt so long as the competitors see little payoff in allowing rivals access to customers and so long as governments struggle to find appropriate rules for pricing mandated access.

3.2 The Big Box

On the back cover of the U.S. edition of *Broadcasting and Cable* magazine for November 15, 1999, an ad for Canal Technologies™ portraying a TV set with a set top box declared:

> This is a phone, a supermarket, a computer, a movie theater, a bank, a game station, a radio, a video club, a mailbox and also a TV-set…. [A] middleware system complies with international standards such as DVB, DAVIC, OpenCable and ATSC and reads applications written in languages such as Java, HTML, and MPEG-5…. Being used around the world on numerous cable, satellite, and terrestrial platforms. Not bad for one box.

The ad illustrates another vision of the future: The Big Box. According to this vision, several (perhaps many) channels will continue into the future, but digitization will mean that the variety of receiving and decoding equipment now used by consumers (residential and business) will merge into one box (or several connected boxes). There are many variations on this vision, any one of which seems a credible scenario. A box could link a telephone with a computer and then plug into a telephone line (that is, a channel into and out of the home or office) to bring standard telephone services, video telephone services, video and audio entertainment, and access to the Internet.

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[9] *Toward Sustainable Competition in Global Telecommunications: From Principle to Practice*, A Report of the Third Annual Aspen Institute Roundtable on International Telecommunications, William J. Drake, Rapporteur (Washington, D.C.: The Aspen Institute, 1999), 102.

In another version of this vision, all the old boxes could be connected (by either wire or wireless systems) into a home or business network. In February of 1999, IBM and Bell Atlantic announced they will offer customers a service that will tie together home electronic devices—including computers, TVs, radios, VCRs, light fixtures, temperature controls, and coffee makers—into a single network. Installation prices were expected to range from $1,000 to $10,000. Sony and Apple have announced similar products (iLink™ and Fire Wire™, respectively).[10]

In yet another version, a different box might bring all the same services through a coaxial (or fiber) cable line (another type of channel) that was linked to a TV. Or a box could bring these all of these services from a satellite (which uses the airwaves as its channel) linked to a TV or a computer or both.

> Specialization, suggests Donald Norman, former vice president of research for Apple, can help provide a "better match between people's software and their jobs." He proposes abandoning giant, all-purpose application suites for simpler tools designed to do just one function well. Some, he suggests, should be separate "information appliances" outside the PC but linked to it by a network. The much heralded convergence of PCs, televisions and telephones "is totally wrong," concurs William Buxton, chief scientist for Silicon Graphics, "We need to diverge."[11]

If more than one box or appliance are to work together, technical standards will be needed. And cables or radio frequencies between appliances. And software. And consumer education. And a healthy economy, with consumers with lots of disposable income.

In another variant, the old boxes would be replaced by a new multipurpose appliance that would function as both an encoder/decoder and as a sending/receiving device, to bring messages from a variety of channels providing entertainment and information; run burglar alarms; and start the morning coffee. The box might use wired or wireless channels, or both.[12] Although such an appliance is technically possible, its development may depend on the willingness of consumers to throw out their old telephones, computers, TVs, radios, stereo systems, VCRs, cameras, burglar alarms, and coffeemakers.

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[10]See Richard Tedesco, "Giving New Meaning to Wired for Sound," *Broadcasting and Cable* (Feb. 8, 1999), 59; and Jim Davis, "Sony's Stringer Touts 'Invisible' Technology,'" Jan. 7, 1999, [On-line]. URL: http://www.news.cnet.com/category/0-1006-200-337071.html (Accessed Dec. 15, 1999.)

[11]W. Wayt Gibbs, "Taking Computers to Task," *Scientific American* (July 1997), 89.

[12]See Gautam Naik, "You Can Do What on a Cell Phone? Across Europe It Shops, Banks, and Talks Back," *The Wall Street Journal*, June 3, 1999, B-1.

A vision of the Big Box connected to a TV was articulated in 1998 by John Marselle, of Sun Microsystems, Inc., during a U.S. Senate Hearing:

> [L]et us take the prospect of a new digital set-top box where consumers can turn on a television and immediately have a myriad of choices—television shows, perhaps order a premium service or a first-run movie—and then click on the screen and go on line; place or receive a phone call; click again and order, through an on line catalog, order a pizza, order a new CD, or download a new magazine that you recently saw at the book stand; and, while waiting, go ahead and browse the TV Guide, watch a new show; and click again and unload the daily newspaper from your hometown. And by the way, that same box has the potential to allow us to pay for what we ordered using "smart card" technology; or transfer and receive funds using smart card technology. And of course, check your email or AOL chat or video-phone your friends.[13]

Many versions of the Big Box are planned for connection to an "Evernet" (you are always on line, through your phone, fax, pager, computer, or some other appliance). In 1998, IBM was said to be working on a product that will be voice-addressable and will combine most communications functions—and will be attached (by a magnet) to the kitchen refrigerator.[14]

All these visions of the Big Box are either smart or dumb. In the vision of the "smart box" (or boxes), the device (or devices) connecting with the network will have resident software that will accommodate the data the device sends and receives. The smart box will be much like a personal computer (PC), with software for wordprocessing, voice, and videoprocessing, storage, and so on. In the vision of the "dumb box" (or boxes), the device will look more like a terminal, wired or wireless, connected with a mainframe computer, and the network processing power will reside in giant central computers that will "rent" capabilities for dataprocessing and storage. The dumb box would never need to have its software upgraded and could be available to consumers at a much lower initial cost than a smart box. Some worry, however, that taking the brains of the system away from consumers might give too much power to those who control the Box or the Pipe, or both. According to Bill Joy, the cofounder of Sun Microsystems, in a network of dumb boxes, "Rather than having all the devices and the applications together in a single complex system (the PC), many parts of the system can be 'outsourced' to a set of simpler devices and services."[15]

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[13]Testimony of John Marselle, before the Subcommittee on Antitrust, Business Rights, and Competition of the Committee on the Judiciary, United States Senate, 105th Cong., Second Sess., July 7, 1998. S. Hrg. 105-906 (Washington, D.C.: U.S. Gov't Printing Office, 1999), 17.

[14]See Thomas L. Friedman, *The Lexus and the Olive Tree* (New York: Farrar, Straus, and Giroux, 1999), 179-180.

[15]Bill Joy, "Smart = Dumb: The Best Network Is Not So Bright," *Forbes ASAP* (Oct. 4, 1999), 39.

Both smart and the dumb boxes could be sold separately or in combination with network services. Consumers have become accustomed to the separation of the receiver/decoder (TV set) from the channel in broadcasting, but the concept is relatively new in telephony and cable, where the channel operator has traditionally supplied the customer premises equipment. If sold separately, the box would need to be very easy to install and use. The alternative would be for the service provider (channel) to install its boxes on a rental basis.

Whether consumers would purchase (as opposed to rent) a box that would operate with only the services of one provider (a Big Company's Big Box) is uncertain, because that would reduce the customers' options, locking consumers into one service by virtue of the investment in the box. Regulators worry that this would give a service provider with its own box too much power over access to homes and businesses. The Federal Communications Commission (FCC) has indicated that it will consider the policy implications of so-called set-top boxes (STBs), including whether STBs should use open standards for coding and system operating instructions and whether they should guarantee access to any service provider that wants to use them.[16] The hypothetical box would connect to many channels and understand many coding systems. It would accommodate competition for channels, senders, coders, and directories. But the scenario contains problems. If such a box could be manufactured by any company that met the standards, competition for sales would inevitably be based on the price of the box, driving prices down to near cost. While good news for consumers, a price war might prevent manufacturers from recovering development costs.

An all-purpose box that would separate the functions of encoding/decoding and sending/receiving from the channel and the directory functions, or both, might be possible with the development of "smart cards." The card would be issued to the individual (rather like a credit card), who would insert it into the box when ordering a service. The card would contain information about the individual placing the order (name, address, etc.) that the service provider would need for billing. Barry Diller, chief executive officer (CEO) of USA Networks™, sees convergence as a Big Box that would enable formerly distinct kinds of *content* services to come together.

> Everyone knows that television, the computer and the communications network are racing to become one seamless entity. What I think is less understood is that this union is in turn paving the way for a more meaningful evolution: the blurring of the lines between passive entertainment, interactive information and direct selling.[17]

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[16]*Order re Commercial Availability of Navigation Devices*, CS Docket No. 97-80, FCC, Washington, D.C., issued May 13, 1999.

[17]Barry Diller, "Local Eyes: The Changes Brought by Electronic Retailing Have Only Just Begun," *Forbes ASAP* (Oct. 4, 1999), 49.

Customers' acceptance of the all-purpose Big Box may prove a problem if they see it as invading their privacy. Because it is a two-way device, it can monitor how customers use the channel and the messages they receive or send. Many of the possible boxes allow customers to store messages until later, so the system might also record which messages the customer considers important enough to save, thereby providing information about those using the box and allowing anyone with access to that information to target messages (advertising, political messages, and so on) to the individual box.

Those who envisioned a Big Box in every home by the year 2000 have been disappointed. They did not anticipate the ferocity of the current industry stakeholders (particularly cable and computer interests) in the critical battles for standards that will determine the "winners." Many people believed that (as in the wars for supremacy in audio- and videotape players) only one technology would survive the competition. Governments often try to help by mandating standards, but they need to accommodate many interests at many levels. For example, the EU has passed directives that require STBs to be interoperable, but member states, under pressure from local interests, have not always vigorously enforced.[18]

Even as the FCC, the EU, and other regulators around the world tried to encourage development of the Big Box, they were also encouraging (indeed, demanding) competition between and within industries. In doing so they may, inadvertently, have made the cooperation necessary for the Big Box (and the Big Pipe) more difficult. For example, an attempt by EU telecommunications operators to reach agreement on standards for an interoperable, high-bandwidth, asynchronous transfer mode (ATM) network collapsed after the European Commission's Directorate-General IV (which oversees competition issues) intervened, citing possible anticartel actions.[19] In 1999, the FCC voted not to repeal rules that forbid marketing STBs that offer both security and channel-surfing functions, in order to ensure that the retail markets for each of the different services will continue to be competitive.[20]

3.3 The Big Company

If channels and equipment are going to converge, then perhaps the shrewd communications company would do well to gather expertise and resources in all the channel and sending/receiving technologies in order to place bets on all conceivable winners. No company wants to be the

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[18]Interview by the author with Richard A. Cawley, European Commission, Directorate-General XIII, Brussels, Sept. 16, 1998.

[19]David Moline, "Cartel Fears Block ATM Interconnect," *Communications Week International*, Oct. 19, 1998, 1.

[20]Order on Reconsideration, In The Matter of Implementation of Section 304 of the Telecommunications Act of 1996: Commercial Availability of Navigation Devices, CS Docket No. 97-80, Adopted May 13, 1999, affirming Order adopted March 26, 1996, 11 FCC CD 4121, 2 Comm. Reg. (P&F) 1179. See also Bill McConnell, "NCTA Balks at Box Ban," Broadcasting and Cable (May 17, 1999), 18.

communications industry equivalent of the buggy whip manufacturer after the automobile revolution. Successful adaptation means building large companies with investments in widely different parts of the communication process (e.g., as senders, coders, channel operators, and directory managers). At the turn to the twenty-first century, companies that formerly provided cable, satellite, broadcast, Internet access, software, TV, and film production or hardware began to reconfigure themselves into several new giant international organizations: by acquiring the giant MediaOne, Inc., AT&T became the largest provider of cable TV service in the United States; News Corporation bought broadcasting services in Germany (Telemunchen) and pay-per-view service in Italy; and United Pan-Europe Communications, which is controlled by the U.S.-based investor group Unitedglobal.com, bought a chain of broadcasting outlets in Central Europe as well as cable assets in Poland and France, to mention only a few.[21] The U.S. communications company NTL purchased the residential cable assets of Britain's Cable and Wireless (with a 25 percent investment by France Telecom), to become the largest cable operator in the United Kingdom (U.K.).[22]

The process of companies coming together was probably made inevitable as technical barriers between them were brought down by digitization and as national borders became less relevant with multinational agreements on free trade. Players grew in proportion to their new territory and from the fear that only size would let them survive in an environment filling with many competitors all after the same customers.

Big companies gambled on investment in a "converged" future, even while evidence mounted of technological problems in the integration of voice, data, and video and of the high cost of the amount of bandwidth necessary to accomplish convergence.[23] These gambles were thought necessary to establish a "full-service" communications company that would capture all its customers' communications business and keep those customers away from other integrated companies.[24] In Europe and Asia the so-called global economy has been said to be forcing a consolidation frenzy. Relatively small national players have joined forces to accumulate enough resources to cover the costs of switching to digital technology and of marketing new integrated "bundles" of TV, telephone, and Internet services—and to compete with the giant U.S. firms casting longing glances in their direction.[25] This *consolidation* is made more difficult (and sometimes impossible) by an evolving regulatory environment in which unique demands may still be made on companies that have historically been categorized as a single medium (as

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[21]See, e.g., John Tagliabue, "Big Changes for European TV," *The New York Times*, July 7, 1999, C-1.

[22]Peter Thal Larson, Cathy Newman, and Alan Cane, "NTL Set to Dominate U.K. Residential Cable Network," *Financial Times*, July 27, 1999, 1.

[23]John Geralds, "Vendors Bet Billions on Convergence," *Network News*, April 7, 1999, 9.

[24]Tagliabue.

[25]Ibid.

broadcasters or telephone). Different demands may also be made in the various countries where the Big Company seeks to do business.

The ultimate outcome may prove to be an oligopoly in each country, in which several large companies will control all aspects of the creative, production, and distribution functions (from sender to decoder). This outcome was predictable if one looked at the introduction of competition into other networked industries, such as the airlines, in which competitors formed nationwide networks to keep passengers away from competitors.[26] Interestingly, in the late 1990s some communications companies were preparing new full-service bundles just as others were unbundling them (such as local telephone service) in order to give consumers "more choice." In 1998, C. Michael Armstrong, chairman and CEO of AT&T, told a U.S. Senate Subcommittee that bundling was part of that company's strategic plan:

> And, yes, we will offer services a la carte as well as in packages. And no matter what you order, local or long distance, entertainment or Internet, or all the services…we will put it on one bill from one company to serve you.[27]

One U.S. pundit, Ben Bagdikian, saw these companies as "Lords of the Global Village," controlling businesses in publishing, film, computers, music, and so on, from which they launched multiproduct intellectual properties that become related movies, spin-off TV shows, music sales, books, computer games, lunch boxes, etc. [28] He feared that the enormous energy and resources behind these properties would drive out smaller, less integrated communications companies.[29]

Vertical integration is supposed to increase profits by creating a synergy among the many units of the company. Synergy was hoped for in connections between hardware and software, (music and music players), various types of hardware (the TV and the computer), and between hardware and distribution (computers and telephones). But vertical integration does not guarantee that a particular company will be a winner, both because it is difficult to manage and because the expected synergies have not always materialized.[30] Perhaps the most visible example of the

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[26]See P. H. Longstaff, *Networked Industries: Patterns in Development, Operation, and Regulation* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, P-00-2, March 2000), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html

[27]Testimony of C. Michael Armstrong, before the Subcommittee on Antitrust, Business Rights, and Competition of the Committee on the Judiciary, United States Senate, 105th Cong., Second Sess., July 7, 1998. S. Hrg. 105-906 (Washington, D.C.: U.S. Gov't Printing Office, 1999), 5.

[28]Ben Bagdikian, "The Lords of the Global Village," *The Nation* (June 12, 1989), 805-20.

[29]Ibid.

[30]See, e.g., Mark L. Sirower, *The Synergy Trap: How Companies Lose in the Acquisition Game* (New York: The Free Press, 1997).

difficulties in finding synergy occurred at the Sony Corporation in the early 1990s, when the parts of a large, vertically integrated communications company (with assets as senders as well as in decoding devices) did not add up to a whole.[31] By the end of the decade, synergy still was not easy to find. For example, the merger of the portal company[32] Excite™ with the cable Internet provider[33] @Home encountered difficulties soon after the companies came together, when the cable companies that controlled the new Excite@Home began to question a strategy of reliance on a single source for news and e-mail services.[34]

Some have decided that synergy may not be necessary or even good for consolidated companies. In the merger of Viacom (a U.S. company with diverse interests in many parts of the communications sector, including production and distribution) and the TV network CBS, according to Mel Karmazin, the president and chief operating officer of the new company, individual units of the new company will be free to deal externally with competitors of other units.

> We don't really view this as a situation where it's all about synergy…. But I can assure you that [Paramount Studio head] Jon Dolgen is going to make programming for whoever the highest bidder is, and Les Moonves [of CBS TV] is going to put programming on that's going to appeal to the largest audience.[35]

Strategy that is good for one company may be wrong for the Big Company. And alliances between communications companies that try to create a Virtual Big Company have not always been the best answer.

> Convergence thus inevitably involves alliance formation as well as market experimentation. But this combination of processes is a potentially volatile mix…. On the one hand, collaboration allows firms to be more flexible in responding to market feedback. But this may also mean that the composition of an alliance group is unstable—partners will be dropped and added in order to pursue new market experiments. Such instability is

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[31]For a discussion of the Sony strategy and its results, see Keith Negus, "The Production of Culture," in *Production of Culture and the Culture of Production* (Thousand Oaks, Calif., London, and New Delhi: Sage Publications, 1997), 87-101.

[32]A portal is an entry point to the Internet and serves a directory function.

[33]A cable Internet provider provides Internet access using coaxial cable and fiber-optic lines for faster speeds.

[34]Saul Hansell, "A Hitch to Marital Bliss: Excite@Home Is Often at Odds with Its Cable Parents," *The New York Times*, June 9, 1999, C-1. In 1999, AT&T owned 40 percent of Excite@Home.

[35]Harry A. Jessell and Steve McClellan, "Mel Karmazin: The Viacom Vision," *Broadcasting and Cable* (Nov. 15, 1999), 29-30.

> especially likely when a firm hedges its bets with multiple partners, a common pattern in uncertain markets.[36]

Creative and collaborative attempts to use existing infrastructure and service assets to get a piece of the Information Economy may not be limited to traditional communications and computer companies. As early as 1983, Ithiel de Sola Pool predicted that groups with their own communications networks (e.g., networks of large financial institutions) might someday use those networks to offer communications services to others and, by the same token, telephone companies that developed large, reliable billing systems might someday use the systems to offer financial services to others.[37] Technology thus presents the prospect of banks becoming telephone companies and telephone companies becoming banks as both seek more efficient uses of their assets.

Smaller companies in the same industry may be brought together to form Big Companies by joining to accumulate enough resources to play competitively in the new game. For example, in the 1990s, the U.S. radio industry became dominated by a few increasingly large companies that owned many stations. These companies seemed to be betting against the integrated service bundles envisioned by many cable and telephone interests and, instead, saw radio as a distinct business with important local aspects that could not be delivered by large, vertically integrated players.

On the other hand, small companies (especially new ones) may be better able to take advantage of new opportunities or fight new dangers than large, entrenched ones. They may be better able to find and exploit niches that large companies cannot or choose not to serve. These niches may be in areas where the large companies cannot use their advantages from economies of scope or scale. Both policymakers and investors hope that the evolution of the communications sector will present many opportunities for niche players.

All three visions of the future are found either alone or combined to form what might be called a *meta* convergence, in which the Big Company has an interest in one or more Big Pipes or Big Boxes, or in both. For example, in 1999 AT&T (clearly a Big Company) became the newest and largest cable operator, giving it a direct interest in both telephone and cable pipes and an indirect interest in the boxes that connect with them. Addressing the 1999 cable industry convention, AT&T chairman C. Michael Armstrong offered a vision of that company as “all-distance and broadform” (Big Pipe). He added that he also saw a new appliance in the home that was not a computer but more like a TV with an STB and which would deliver entertainment,

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[36]Ibid.

[37]Ithiel de Sola Pool, *Technologies of Freedom: On Free Speech in an Electronic Age* (Cambridge, Mass.: The Belknap Press of Harvard University Press, 1983), 243.

telephony, high-speed Internet services, and a host of other services, such as banking and shopping from home (the Big Box).[38]

In 1998, Time Warner president Richard D. Parsons articulated a variation of this vision for his company. He saw a Big Company capable of "taking on the competition in both the production of all media" (as sender) and of "deploying that media through all distribution options" (many pipes). But, like AT&T's Armstrong, he also saw his company as part of the "delivery of a single pipe into the home of voice, video and data" (the Big Pipe).[39]

Bill Gates of Microsoft sees all three visions of convergence in the communications industry in a new world of "universal connectivity," where all pipes and boxes become Big when connected to form a "virtual convergence." Gates sees the Big Company as part of this new (if uncertain) world:

> To make all this happen, we'll see more deals, alliances, and joint ventures involving computing, consumer electronics, telecommunications, Internet, and cable companies. And chances are that as everyone faces the challenge of developing a viable business model, some of those ventures will fail in the marketplace. But two things are certain: Ubiquitous wireless and high-bandwidth data networks are going to get built, and the various smart devices required to provide access to these networks will soon be on the market. Together, they will make the potential of virtual convergence a reality.[40]

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[38]Jon Van, "Pumping New Life into Cable," *Chicago Tribune*, June 15, 1999, 3-1.

[39]Testimony of Richard D. Parsons, before the Subcommittee on Antitrust, Business Rights, and Competition of the Committee on the Judiciary, United States Senate, 105th Cong., Second Sess., July 7, 1998. S. Hrg. 105-906. (Washington, D.C.: U.S. Gov't Printing Office, 1999), 13.

[40]Bill Gates, "Everyone, Anytime, Anywhere: The Next Step for Technology Is Universal Access," *Forbes ASAP* (Oct. 4, 1999), 45.

Chapter Four

Convergence Theology

When pondering predictions rooted in one of the three visions commonly called convergence, it is helpful to see whether the prognosticator's level of commitment to a particular vision may be described as religious—a commitment to what has been called "netaphysics."[1] Does the prognosticator accept a vision as a matter of faith and therefore discard contrary or inconsistent evidence as either irrelevant or merely the ravings of the uninitiated? Or is the prognosticator so confused by contradictory predictions that he or she is placing bets on many different visions of the future, without any strong preference for which will prevail? Or does the prognosticator think the Big Pipe and the Big Box are only marketing hype, and that the existing industries will survive this round of new technology, as they have survived others? Underlying beliefs matter when those espousing a vision have influence over the way resources of the sector can be moved or over the direction government policy may take. Determining their belief may be useful both for evaluating what they say and for putting their contributions to the debate into a perspective.

4.1 Believers

Believers are convinced that digital technology (by which they usually mean the World Wide Web) has fundamentally changed the nature of communications and that, because of the Web, a brighter future awaits the entire world. Perhaps the most poetic description of this future by a true believer came from George Gilder:

> Imagine gazing at the Web from far in space. To you, peering through your spectroscope, mapping the mazes of electromagnetism in its path, the Web appears as a global efflorescence, a resonant sphere of light. It is the physical phase space of the telecoms, the radiant chrysalis from which will spring the global economy.[2]

Believers assert that the history and economics of the "old" communications sector are now irrelevant. Anyone who questions this assertion (especially anyone from the "old" industries) may be dismissed as a Luddite or simply out of date. The "new" economics is said to require faith in both technology and the future profits technology will make possible. Such faith depends on new rules for Internet companies.

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[1]For a comprehensive analysis of communications technology and religious belief, see Erik Davis, *TechGnosis: Myth, Magic, and Mysticism in the Age of Information* (New York: Three Rivers Press, 1998), 332.

[2]George Gilder, "The Brightest Star: From Space the Web Appears as a Swirling Sphere of Light," *Forbes ASAP* (Oct. 4, 1999), 29-34; 29.

> Like other Internet companies [the company] said to the stock market: our future will look nothing like our present. You must close your eyes and imagine a new world. Look to the future! The future is bright! The belief was partly self-fulfilling: belief often is…. In this new world skepticism is not a sign of intelligence. It is a sin.[3]

For the faithful, their belief system "provides the literal and figurative missing links that bring genuine, sustainable democracy and community to a world in desperate need of both."[4] Their faith allows them to plan for the future when agnostics and atheists see only confusion. Similarly, believers in corporate management can provide direction and set the priorities that together allow a company to move forward.

Believers want government to get on board and help bring paradise to the masses, paradise being visions of the Big Pipe, the Big Box, and the Big Company. This brand of faith is based on what has been called the information "revolution" of the late twentieth century. According to a policy analyst at the European Commission (EC), belief in a "Digital Utopia" derives from "a general hope for a better society,"[5] which, he added, has become a "mantra" in policy debates, where no one seems to question it. Most staffers (and even many consultants) are afraid to challenge the political hierarchy leading the chant, he said, and, ultimately, when and if policymakers see "the ideology about to run the car off the road," they will need to start asking the hard questions.

Believers want government to act as a missionary for their cause and to convert heathens in other lands to their belief that technology will help overcome barriers of culture and xenophobia and lead to world peace. Believers therefore want technology available everywhere, in every country and village on the planet.[6] According to another EC staffer, calls for planetary debate on such policy issues as universal service, copyright protection, and privacy seem attempts to lead public opinion, not follow it.[7] He wondered whether this was just missionary work by U.S. believers. He sometimes found dealing with counterparts in the United States difficult, because U.S. policy people want to talk about the technical aspects of convergence while Europeans want to talk about possibilities for social betterment.

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[3]Michael Lewis, *The New New Thing: A Silicon Valley Story* (New York and London: W.W. Norton, 1999), 173.

[4]Vincent Mosco, "Myth-ing Links: Power and Community on the Information Highway," *The Information Society* **14** (1998), 57-62; 59.

[5]Interview by the author, Brussels, October 1998.

[6]See, e.g., Frances Cairncross, *The Death of Distance: How the Communication Revolution Will Change Our Lives* (Boston: Harvard Business School Press, 1997), 278.

[7]Interview by the author, Brussels, October 1998.

Some believers embrace the Big Pipe or the Big Box or both while characterizing the Big Company as the dark side of convergence. They foresee increased need for government intervention to implement their vision:

> We need to establish the parameters of a truly global media framework that supersedes increasingly phony "national" interests while protecting cultural diversity at its own level of expression—be it territorial, linguistic, ethnocultural, or gender based. This framework must empower an emerging global civil society that will otherwise remain disenfranchised at the hands of corporate interests.[8]

Others see the Big Company as the savior (one more powerful than those of the old order to be displaced) or as a necessary evil bringing all resources together (but one that must be carefully watched) to make the new utopia.

4.2 Agnostics

According to French philosopher and mathematician Blaise Pascal (1623–1662), agnostics assume that, if God exists, human beings are not capable of comprehending that existence and human reason cannot therefore settle the issue. He argued that a rational answer to the dilemma is to bet on God's existence, because either God exists and belief in God will bring infinite rewards or God does not exist and unfounded belief costs little except some time and effort.[9] Mirroring that view, convergence agnostics are not sure whether or when most information and entertainment will be delivered by the Big Pipe or the Big Box, but they do not want to be left out of the game, in case convergence happens. Generally, agnostics believe in placing as many bets as possible. Unlike believers in the Big Pipe or the Big Box, they tend to focus on what has made the communications industries unique and tend therefore not to trust in claims for a monotechnology.

Although agnostics do not deny that the information age may bring many good things to many people, they, more than believers, are liable to notice the potentially unpleasant aspects. They are also more liable to ask hard questions, for example, about the efficiency of information technology and about lessons learned from the "Y2K problem." As a computer scientist and economist noted:

> The millennium bug brought home the uncomfortable truth that the leaders of commerce and industry, so much in control of the other technology and

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[8]Marc Raboy, "Global Communication Policy and Human Rights," in *A Communications Cornucopia: Markle Foundation Essays on Information Policy*, edited by Monroe Edwin Price and Roger G. Noll (Washington, D.C.: The Brookings Institution Press, 1998), 218-242; 223.

[9]Blaise Pascal, *Pensées*, Translated and arranged by H. F. Stewart (London: Pantheon, 1950), No. 223.

> practices in their organizations, had not been in control of their information technology. Not only did they not know whether the computers were adding to profits, they did not really know what the computers did; they certainly didn't know what would happen if the computers stopped doing whatever it was they did.[10]

Perhaps understandably, because their death is being foretold by believers, broadcasters and publishers often are agnostics. They are more likely to focus on differences in the type of message (entertainment versus information), the type of audience participation (passive versus interactive), and the revenue potential (subscription versus advertising) when evaluating their next move in the digital world. But they do so with some hesitation. Dick Robertson, of Warner Brothers Domestic Television, put it this way in the autumn of 1999:

> I don't want to sound like an old fuddy-duddy, but I personally don't see the Internet becoming the medium for the primary exploitation of our copyrights…. They are really what drives the television business—the viewing, the advertising and the windows on those copyrights. Having said that, we're experimenting with lots of stuff on the Internet.[11]

Some broadcasters, such as Robert A. Iger, president of the ABC TV network, have even started to doubt that the Second Coming for broadcasting (i.e., the switch to digital) will arrive as soon as had been hoped. In 1998, Iger said:

> One reason the investment in digital television is risky is there is no real way of knowing how much people will spend on the home electronic products needed to consume new digital television, or how fast this will occur. It is a real digital "chicken and egg" situation, reminiscent of what happened when color television became available. Until programmers (mostly networks) spent huge sums of money to produce television in color, there was no perceived viewer interest. Even then, the pace of conversion was slow—it took well over 10 years to reach a 74 percent penetration level. The "if you build it they will come" scenario may unfold here, but the complexities of digital migration, and the unknowns of consumer behavior and the magnitude of the costs involved make this a far more risky proposition than color television.[12]

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[10]Charles Jonscher, The Evolution of the Wired Life: From the Alphabet to the Soul-Catcher Chip—How Information Technologies Changed Our World (New York: John Wiley, 1999), 259-260.

[11]Paige Albiniak, "Broadcasters: Internet-wary," *Broadcasting and Cable* (Oct. 4, 1999), 27-28; 27.

[12]Testimony of Robert A. Iger, before the Subcommittee on Antitrust, Business Rights, and Competition of the Committee on the Judiciary, United States Senate, 105th Cong., Second Sess., July 7, 1998. S. Hrg. 105-906 (Washington, D.C.: U.S. Gov't Printing Office, 1999), 10.

Agnostics believe in the Big Company, because only the huge have enough resources to bet on all the technologies in the race to become the Big Pipe(s) and the Big Box(es). Agnostics are less sure what they want government to do and generally profess a preference for "letting the market decide." This view usually changes once they have adopted one of the three visions and become believers. True agnostics seldom write books or give interviews about the future because they are not sure what it will be, but some have been brave enough to assert in print that the Internet has forces moving it toward success and toward failure, making its fate unknowable at the end of the twentieth century.[13] Some have said it could be a replay of an earlier communications "revolution," caused by the telegraph.[14]

Believers in the Big Pipe or the Big Box sometimes profess to be technology agnostics or platform agnostics—or both—which means they neither know nor care about the "how" of technical change, because they have no stake in any particular hardware or software (e.g., analog or digital, PC or Mac, or the integrated services digital network [ISDN] or ATM). Instead, they care about price, quality, and reach.

4.3 Atheists

Atheists are (almost) positive that none of the three visions of convergence will materialize any time soon and that the communications industries as now known will be around well into the future. Atheists do not deny that reorganization and change are taking place in the communications sector, but they think that neither Big Pipes nor Big Boxes can deliver all the things that consumers want. They are more skeptical than agnostics of claims for technical saviors and promises for the salvation of society in a world of Big Pipes, Big Boxes and Big Companies.[15] They sometimes attribute these promises to marketing hype or wishful thinking by the computer industry. One author has called this "silicon snake oil":

> They're well-meaning, of course. They truly believe in virtual communities and electronic classrooms. They'll tell you how the computer is a tool to be used, not abused. Because clearly, the computer is the key to the future.

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[13]John C. B. LeGates, *The Internet: Is It a Bird? Is It a Plane? Will It Fly?* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, I-95-5, December 1995), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html

[14]Tom Shandage, *The Victorian Internet: The Remarkable Story of the Telegraph and the Nineteenth Century's On-line Pioneers* (New York: Berkley Books, 1999).

[15]These people have also been called "Digital Skeptics and Pessimists." See Robert E. Litan and William A. Niskanen, *Going Digital: A Guide to Policy in the Digital Age* (Washington, D.C.: The Brookings Institution Press and The Cato Institute, 1998), 20-50.

> The key ingredient of their silicon snake oil is a technocratic belief that computers and networks will make a better society. Access to information, better communications, and electronic programs can cure social problems.
>
> I don't believe them. There are no simple technological solutions to social problems. There's plenty of distrust and animosity between people who communicate perfectly well.[16]

Economist Paul Krugman has said much the same thing:

> Now I am not saying that this is anyone's fault. If Bill Gates turns out to be no Henry Ford, that is no reflection on his abilities. Really productive ideas, like internal combustion and the assembly line, are hard to find. It is no tragedy if we have to make do with second-rate inventions like the personal computer until the next Model T comes along. But the techno-hype that surrounds us has some real costs. It causes businesses to waste money; it causes politicians to seek high-tech fixes (give every child a laptop!) when they should be getting back to the basics (teach every child to read). The slightly depressing truth is that technology has been letting us down lately. Let's face up to that truth, and get on with our lives.[17]

Atheists often want government to protect them from believers and from the believers' plans to promote the new at the expense of the old. Atheists who are part of an established communications industry definitely do not want missionaries from other countries (private or government missionaries) coming to change government policies (and protections) that they have worked hard to build. They often ask whether anyone *really* wants a global information society. They ask: Who will really be marginalized, the connected or the unconnected? Which group will find their culture remains intact? European and Asian convergence atheists may even see the U.S. believers and the Internet as an economic and political invasion:

> English is the dominant language of the Internet, found on most Web sites and used in most e-mail. Perhaps most important, the culture of the Net tends to be informal and individualistic, decentralized and hard to control. This makes it the preferred medium of dissident groups in countries around the world, and it also makes it feel just like home to American net surfers. "The Internet is profoundly disrespectful of tradition, very American," observed Fareed Zakaria, the managing editor of *Foreign Affairs*.

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[16]Clifford Stoll, Silicon Snake Oil: Second Thoughts on the Information Highway (New York: Anchor Press, 1995), 50. See also by the same author, High-Tech Heretic: Why Computers Don't Belong in the Classroom and Other Reflections by a Computer Contrarian (New York: Doubleday, 1999).

[17]Paul Krugman, The Accidental Theorist and Other Dispatches from the Dismal Science (New York: W.W. Norton, 1998), 104.

> Economically, the Internet is a transmitter of the kind of relentless, consumer by consumer competition that can be volatile and destabilizing. It has the astringent flavor of free-market economics embraced in America more than elsewhere.
>
> "If the United States government had tried to come up with a scheme to spread its brand of capitalism and its emphasis on political liberalism around the world, it couldn't have invented a better model," said Don Heath, president of the Internet Society, an international organization.[18]

Atheists are seldom quoted in news articles, because they sound "behind the times," thus irrelevant. Writer Tom Wolfe, an exception to the rule, calls the pronouncements of the believers "digibabble":

> I hate to be the one who brings this news to the tribe, to the magic Digikingdom, but the simple truth is that the Web, the Internet, does one thing: it speeds up the retrieval and dissemination of information, messages, and images, partially eliminating such chores as going outdoors to the mailbox or the adult bookstore, or having to pick up the phone to get ahold of your stockbroker or some buddies to shoot the breeze with. That one thing the Internet does, and only that. All the rest is digibabble.[19]

Many "public," that is, owned or subsidized by government, broadcasting organizations around the world would like to be atheists but fear the influence of believers (and a growing acceptance of their visions) on all parts of the communications sector and on policymakers. These organizations realize that the public funding that has sustained them will be put in jeopardy (or will spread to other channels) if "public interest" and cultural programming (i.e., programming for an audience too small to be commercially viable for broadcast channels) can move into either the Big Pipe or any of the pipes accommodated by the Big Box. Many European policymakers see the future of "public" communications as an important political hurdle for any new regulatory scheme.[20]

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[18]Steve Lohr, "Welcome to the Internet, the First Global Colony," *The New York Times Week in Review*, Sunday, Jan. 9, 2000, 4-1.

[19]Tom Wolfe, "Digibabble, Fairy Dust, and the Human Anthill," *Forbes ASAP* (Oct. 4, 1999), 213-227; 218.

[20]Interview by the author with Jean-Claude Burgelman, Institute for Prospective Technological Studies, Brussels, Sept. 15, 1998.

Chapter Five

Forces for Concentration and Diversity: Clues in Many Places

The communications and computing industries as systems are not alone in experiencing the tug of forces simultaneously pulling them together and pushing them apart. Unless these industries are regarded as unique, other systems are likely to offer clues about both their operation and the consequences of the forces leading toward concentration and diversity. In nature, any structure or system of structures is the result of a balance of opposing forces, and any attempt to predict change must take these forces into account. If the balance is disturbed, the system may experience a period of unpredictable turbulence; new, stable structures will begin to emerge only when the forces moving the system both toward concentration and toward diversity reach a new equilibrium.[1]

For clues to why and when concentration or diversity (or both) occurs, venturing beyond the usual policy literature is helpful. Typing such words as *convergence*, *divergence*, *concentration*, or *diversity* into the computer system of any good research library reveals that phenomena of two or more things coming together or moving apart have been studied in several disciplines, including biology, economics, and social science, although what these processes might have in common has received little attention.

If the goal is to find new ways to manage and regulate competition in communications and networks, then understanding the fundamental principles of how competition–cooperation and convergence–divergence work may provide a helpful basis for formulating a broadly applicable and robust strategy. These phenomena, ordinarily studied in the social sciences, are studied also in the biological disciplines and as part of general systems theory and the study of complex adaptive systems.

Drawing ideas from a discipline into use outside their ordinary arena can be hazardous if undertaken in pursuit of an agenda, for example, a political agenda, because the “lessons” of a discipline can be twisted to suit currently accepted answers to a particular problem. Modern history offers many examples of the perversion of ideas from the so-called “hard” sciences in the service of political doctrine, examples of industrial and national atrocities presented as the “survival of the fittest” that have included racial stereotypes, genocide, and environmental degradation, all justified as “how things work.” Care needs to be exercised in assessing any tool to use to build (or justify) a strategy that appears to have been dictated by some preconceived notion of where a system *should* go or how it *should* get there. Because “fitness” is a moving

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[1]For an accessible discussion of how equilibrium is reached in the natural world, see John D. Barrow, *The Artful Universe: The Cosmic Source of Human Creativity* (New York and London: Little, Brown, 1995), 48-53; hereafter cited as Barrow with a page reference.

target, preconceived or immutable definitions of it are liable to be ineffective as well as counterproductive.

Can anyone outside a particular scientific discipline really understand that discipline well enough to apply it to a problem? Can business people, elected officials, or judges really use ideas drawn from fields as far away as biology? Yes, they can. Dietrich Dörner, who won the Leibnitz Award, Germany's highest science prize, made precisely this point:

> The ideas nonexperts propose need not be strictly accurate to be valuable. The biocyberneticist Ludwig von Bertalanffy writes, "Oversimplifications, progressively corrected in subsequent development, are the most potent or indeed the only means toward conceptual mastery of nature." Experts see things in much more differentiated form—that's what makes them experts—and for that reason they may overlook other perspectives.[2]

Experts probably explore more thoroughly in the disciplines they know than when they jump out of those realms to search for answers where they have never gone before and where they may not be made welcome. Jumping out of familiar intellectual territory can be frightening and dangerous, but if the answers sought do not exist where answers can ordinarily be found, then there may be no other alternative. Tides and currents in the literatures of both the social and natural sciences have provoked enormous *angst* in academic circles, where a single accepted "truth" on any subject is difficult to find. The debate on "nature versus nurture," for example, as an explanation of human behavior has become protracted and personal.[3] One big advantage of looking to science rather than to the legal-political system of a particular nation is that science may offer tools to help build strategies that will be as neutral culturally and politically as human devising can make them.

This report presents not "truth" but ideas to ponder, and the ideas are offered without any illusion that they can, in themselves, enable policymakers or business executives to make accurate predictions about the future of the communications sector. The communications sector is too complex for simple solutions. But finding neutral and flexible tools of analysis is critical to a search for common ground that can accommodate many new technologies and, inevitably, many new players.

The communications sector is part of a dynamic system that includes the technical, economic, and political forces that are moving it at the same time toward increased concentration

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[2]Dietrich Dörner, *The Logic of Failure: Recognizing and Avoiding Error in Complex Situations*, trans. Rita Kimber and Robert Kimber (Reading, Mass.: Perseus Books, 1989), 168-69. Dörner received the Leibnitz Award in 1986. Ludwig von Bertalanffy (1901–72).

[3]See, e.g., Ullica Segerstrale, *Defenders of the Truth: The Battle for Science in the Sociobiology Debate and Beyond* (Oxford, Eng.: Oxford University Press, 2000).

and increased diversity. Learning why systems do not always converge at a point of concentration may help prevent premature judgement and avoid the irrational exuberance (in business and public policy initiatives) that appears to take concentration for granted. Understanding the reasons for the diversity of species may offer insights into the costs and benefits of competition in industry and suggest how to encourage competitive behavior.[4] It may be helpful to know, for example, that in an ecological system an increase in competition for scarce resources will cause each competing species to find "a niche that will *minimize* its need to compete with rivals."[5] Competition is expensive, so species and the organisms comprising them, like industries and firms, do not engage in it with relish. Concentration is one way to find differentiated niches in which companies and technologies may live without life-threatening competition.

The changes taking place in the communications sector at the end of the twentieth century and the turn to the twenty-first may more resemble the process called *coadaptation* or *coevolution* seen in biological systems. In this process, when species compete they adapt to the adaptations of competitors, in a spiral of change culminating in a new equilibrium, perhaps when one (or more) species loses the battle or when the competing species "have driven each other into ever-narrowing ruts of specialization."[6] Thus, in an analogy between this process and economics, the various communications industries and firms would not be heading toward a world of a single, converged sector, but (at least, in the short term) a world of constant change in the face of competitors' new strategies. The process could continue until a new equilibrium is achieved—that is, when stable redistribution of available resources is reached as competitors find new niches through increased specialization or some competitors go bankrupt or enter new lines of business.

The forces that set the opposing pulls of diversity and concentration in motion were known in communications research even before people began to dream of the information age. Some scholars believed that convergence was part of any communication process and that it often occurred along with its opposite, divergence:

> Communication is a convergence process, in which two or more participants share information to reach a better mutual understanding. Convergence is a tendency to move toward one point or toward one another, to come together and unite in a common interest or focus. Divergence is moving away or apart. Each term implies the other: As two

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[4]See P. H. Longstaff, *Competition and Cooperation: From Biology to Business Regulation* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, P-98-4, October 1998), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html See also Geoffrey Hodgson, Economics and Evolution: Bringing Life Back to Economics (Ann Arbor: University of Michigan Press, 1996).

[5]Barrow, 34.

[6]Michael Begon, John L. Harper, and Colin R. Townsend, *Ecology: Individuals, Populations and Communities*, 2nd ed. (Oxford, Eng., and Boston: Blackwell Scientific Publications, 1990), 45; hereafter cited as Begon, Harper, and Townsend with a page reference.

> or more persons or groups move closer to one another in terms of their interpretations and understandings, they may simultaneously move away from others.[7]

This chapter looks at some of the forces at work for both concentration and diversity, beginning with the usual suspects, digitization and globalization. These forces are critical to visions of the Big Pipe, the Big Box, and the Big Company. But digitization and globalization are forces for both concentration and diversity, so that they pull the communications sector in two directions at once. The chapter looks also at biological systems and other complex systems for concepts and insights that may help describe (if not make predictions about) phenomena observable in the communications sector that may help answer such important questions as the following:

- Is the communications sector really a single industrial species that has been artificially separated by technology and regulation?
- Would a reduction in the diversity of communications species be in the best interests of the whole economic-political-legal system?
- Do trends such as digitization and globalization have the same effect wherever they are encountered? Do local communications firms take advantage of local differences or are they limited by them?
- If the goal were a single species, would governments be forced to suppress local diversity?
- If the system were to remain in a turbulent state owing to changes in technology or unpredictable regulation, or both, could smaller players survive? Or might turbulence weed out all but the strongest?
- Were only the strongest (and largest) to survive, might they be so complex as to be unmanageable? ungovernable?

5.1 Digitization: The Power of a Common Language

The world's communications industries are preparing to convert virtually en masse to digital encoding in the hope that it will lower their costs, improve their product, or just to keep pace with a change many regard as inevitable.

As the print, broadcast, cable, satellite, film, and music industries begin to speak digitally, they break down the technological barriers that have separated them and invite into their businesses all those speaking the language of computers. The borders created by technology and geography will (in theory) disappear, and everyone will compete in the same worldwide and

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[7]George A. Barnett and D. Lawrence Kincaid, "Cultural Convergence: A Mathematical Theory," in *Intercultural Communication Theory: Current Perspectives*, edited by William B. Gudykunst (Beverly Hills, London, and New Delhi: Sage Publications, 1983), 171-194, 175.

cross-technology communications sector. All firms in this sector will compete for the same time and moneys spent by consumers of communications. Technical, political, and regulatory walls that once protected the unique culture and revenue stream of each industry will open to all those speaking in ones and zeros.

Why would industries agree to break down the walls that protected their comfortable territories and usher in unpredictable turbulence? Believers are sure that only the digerati will enter the heaven that the new (digital) technology will make possible. Even agnostics believe something wonderful awaits those still standing after the smoke clears from the battles (technical, economic, and political) of the information revolution.

A common language acts as a force for concentration and is critical to all three visions of convergence. If video, audio, and text are to fly through a Big Pipe into a Big Box, they must be converted into a common (or compatible) code. Digitization turns video, audio, and text into ones and zeros that would together travel through the Big Pipe and be decoded into their intended form by the big and small Boxes at the ends of the system. Messages can move easily between channels (messages designed for broadcast or for a music CD can also move on the Internet), which means a vertically integrated Big Company can use the same messages in all the channels it has access to.

Digitization is (at least, in the short term) also a force for diversity. The cost of producing a digital message (simple ones, like Web pages) is low and the cost of distribution on the Internet is very low, factors that may encourage an increasing diversity of both messages and senders. Evidence suggests, however, that in the long term the diversity of senders will fade and that only a few global winners will emerge.[8]

Digital coding makes it easier for communications networks to be global, because it allows large amounts of data to move through phone lines and by satellite without being stopped at national borders. More than ever before, messages easily go from anywhere to anywhere, but the notion that their global movement will change all receivers into an undifferentiated global audience assumes that technical improvements to the speed and reach of communications channels are all that is needed for intercultural communications of, for example, advertising and entertainment. Evidence to the contrary suggests the barriers are far more complex.[9]

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[8]See Lada A. Adamic and Bernardo A. Huberman, *The Nature of Markets in the World Wide Web* (Palo Alto: Internet Ecologies Group, Xerox Palo Alto Research Center. 1999), [On-line]. URL: http://www.parc.xerox.com/istl/groups/iea/webmarkets.html

[9]See, e.g., Fred E. Jandt, *Intercultural Communication: An Introduction*, 2nd ed. (Thousand Oaks, Calif.: Sage Publications, 1998).

5.2 Globalization

Globalization has been defined as "the assertion that a world-wide system of economic, cultural, and political interdependence has come into being or is in the process of formation."[10] The process is said to result in the end of national boundaries and, thus, the death of national cultures, national economies, and nation states in favor of a global culture, a global economy, and a world without sovereign states.[11] Those asserting this outcome see it as either a wonderful new world of peace and harmony[12] or a barren world where diversity has perished and the rules are made by international corporations, not by elected governments, which derive their power from the consent of the governed.[13] The international movement of information and entertainment are said to be crucial to either outcome, harmonious or barren.[14]

Large, interconnected communications and transportation networks made these images of globalization possible.[15] Without the networks, resources for information, capital, and (to some extent) labor could not move around the world at speeds that allow large, multinational structures to develop. Global communications networks enable a global economy by speeding up the flow of the information necessary for foreign investment and foreign operation of multinational companies. Global communications networks also allow entertainment and news messages to flow across borders, creating (some fear) a global culture.

Many scenarios for globalization assume, first, that the nation states will, in all important ways, remain powerless against the forces for a global concentration of power (in all industries), and, second, that giving up power is the price nations must pay for the growth made possible by international trade.[16] In the part of the communications sector concerned with the production of messages, this scenario may be affected by the efforts of many nations to encourage diversity by protecting or subsidizing (or both) local communications industries and cultural products in the face of invading competitors. Governments and local firms have an interest also in promoting

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[10]Albert Moran, Copycat Television: Globalization, Program Formats, and Cultural Identity (Luton, U.K.: University of Luton Press, 1998), 2.

[11]See, e.g., Don Tapscott, *The Digital Economy: Promise and Peril in the Age of Networked Intelligence* (New York: McGraw-Hill, 1996), 310-312; hereafter cited as Tapscott with a page reference.

[12]Marshall McLuhan, *The Global Village: Transformations in World Life and Media in the 21st Century* (Oxford, Eng., and New York: Oxford University Press, 1992).

[13]See, e.g., H. Schiller, "Striving for Communication Dominance: A Half-Century Review," in *Electronic Empires: Global Media and Local Resistance*, edited by Daya Kishan Thussu (London: Oxford University Press, 1998), 17-26.

[14]See, e.g., Robert McChesney, "Media Convergence and Globalization," in *Electronic Empires: Global Media and Local Resistance*, 27-46.

[15]See, e.g., Michael Porter, *On Competition* (Boston: Harvard Business School Publishing, 1998), 309.

[16]This development has been called the "Golden Straightjacket." See Thomas L. Friedman, *The Lexus and the Olive Tree* (New York: Farrar, Straus, and Giroux, 1999), 83-92.

local culture and languages, which could put a brake on a concentrated global culture they may not be able to influence.

Diversity in other aspects of each country's situation may slow development of a global communications sector. Scholars in many fields have examined the timing of concentration and diversity in human social systems. Such research asks when (or if) societies will share a common destiny. Evidence suggests that "History followed different courses for different peoples because of differences among peoples' environments, not because of biological differences among peoples themselves."[17] A large international study concluded that although many societies may be shaped by common trends strong enough to act as exogenous variables, the response of any particular society to such trends will be unique to that society.[18] For example, the study indicated a strong trend toward a decreasing birth rate in all countries studied, though the impact of the trend was different in each. In the United States and France, with Baby Boom population pyramids and moderate immigration, a low birth rate creates a stable ratio of working adults to dependents (the young and the old), whereas in Germany and Quebec, Canada, with less favorable age distributions, a falling birth rate is liable to mean a surplus of dependents for the working population. The same trend therefore has different economic and political implications for different countries.[19] On the assumption that no country has a homogeneous economic, social, and political environment, predictions of "what" and "when" for any of the three visions of convergence grow complicated.

Believers would assert that differences between countries and cultures will all be swept aside by a global communications network, which will create "communities of interest" that cross national boundaries and increase the likelihood of global cooperation (at least, in those communities). Believers appear to assume that increases in the volume and speed of messages in the channel are all that is necessary to develop cooperation between people. But this does not seem to be true. Economic "game theory" and evidence from biological systems suggest that cooperation can lead to the emergence of stable social structures when individual agents are in regular contact, but this contact must meet two conditions: (1) participants must be able to cooperate or defect (that is, to decide whether to cheat or not to cheat the other party); and (2) they must have a way to keep track of how others behave and so know whether to cooperate the next time.[20]

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[17]Jared Diamond, *Guns, Germs, and Steel: The Fates of Human Societies* (New York and London: W.W. Norton, 1999), 25.

[18]Simon Langlois, *Convergence or Divergence? Comparing Recent Social Trends in Industrial Societies* (Frankfurt am Main: Campus Verlag; Montreal and Kingston: McGill-Queen's University Press, 1994).

[19]Ibid.

[20]This theory is known as the Prisoner's Dilemma; for a discussion of how this theory works in other cooperative systems, see Robert Axelrod, *The Evolution of Cooperation* (New York: Basic Books, 1984). For a discussion of how

These two conditions are not always (or even usually) present in the many global communications networks envisioned. Simply sharing information about hobbies with others on the other side of the world does not offer an opportunity for the parties to make a choice between cooperation and defection that would build the trust necessary for cooperation in other areas. Global electronic commerce has the potential to offer many such opportunities to interact in a way that might build stable economic structures, but until some thorny problems, such as international protection of intellectual property and enforcement against fraud, are remedied, the potential may remain unrealized. Every transaction on the Internet gives both parties the chance to cooperate or defect (to cheat or not to cheat). The number of potential interactors is so huge that the cheater may never again encounter the cheated. Because there is no way to know who you're really dealing with (is it the one who cheated you last time?), keeping track of conduct toward you is simply not feasible. The payoff for cheaters is thus higher than for noncheaters, and establishing a cooperative system is difficult. Apparently, a world of peace and global commerce will need more than the opportunity to communicate with everyone. It will require a way to identify those with whom you interact and a way to keep track of the interactions in order to create a basis for enforceable, long-term cooperation.

The argument that more communication will achieve peace reveals profound ignorance of the use of communication as a tool in battles between nations and between commercial interests. This is not the first time that increased trade was supposed to decrease the probability of war. In the eighteenth century, the French philosopher Montesquieu believed that two nations that trade with each other become reciprocally dependent and thus less liable to fight each other.[21] Just prior to the First World War, trade and interdependence among nations reached an unprecedented level under the Gold Standard, and at least one contemporary writer, Norman Angell, argued that it meant that in an outbreak of hostilities the United States, Britain, Germany, and France could none of them (in economic terms) win.[22]

The advent of the telegraph was supposed to end the possibility of war because people everywhere would be able to communicate with one another. In 1868, Edward Thomlow, the British ambassador to the United States, echoing many of his contemporaries, remarked on the

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the it can be used in developing public policy see Longstaff, *Competition and Cooperation: From Biology to Business Regulation*.

[21]Charles de Secondat, Baron de Montesquieu, *The Spirit of the Laws*, Book XX, "Of Laws in Relation to Commerce, Considered in its Nature and Distinctions," translated by Thomas Nugent (1752) and revised by J. V. Prichard (London: G. Bell and Sons, Ltd., 1914). Available also at URL: http://www.constitution.org/cm/sol.htm

[22]Norman Angell, The Great Illusion: A Study of the Relation of Military Power of Nations to Their Economic and Social Advantage (London: Toronto, McClelland and Goodchild, 1909); see also Paul Hirst and Grahame Thompson, Globalization in Question (Malden, Mass.: Polity Press, and Oxford: Blackwell Press, 1996), 17-49; and Kevin H. O'Rourke and Jeffrey G. Williamson, Globalization and History: The Evolution of a Nineteenth-Century Atlantic Economy (Cambridge, Mass.: The MIT Press, 1999).

potential of global communications to promote peace: "What can be more likely to effect [peace] than a constant and complete intercourse between nations and individuals of the world."[23]

If truly cooperative global social systems do emerge, policymakers will become alarmed if these systems reduce people's local interactions. Such a reduction might disrupt local economies (people would not buy locally) and destabilize local social and political structures that depend on local interaction to build trust. Few political leaders would support policies that build trust in people and companies at remote places if, at the same time, those policies reduced trust in neighbors (and, course, in local politicians). The failure of local systems in the face of overwhelming global competitors might lead to a dismantling of the social construct of the nation state.[24]

A global communications system would not affect every country or every person in the same way. Studies of economic systems have been conducted to learn why poor regions grow faster in per capita income than rich ones.[25] One possibility is that the difference is due to changing rates of productivity—that undeveloped areas become productive more quickly than areas that have already reached relatively high levels of productivity. According to such theories, economic convergence is a dynamic process of adjustment to a new steady-state equilibrium. The force for adjustment is diminishing returns to capital in areas that are not becoming productive at the highest rate, and the diminishing returns cause a flight of capital to move to areas where it can achieve the highest return. If capital, labor, and natural resources were perfectly mobile, convergence ought to take place almost instantaneously, creating a world in which investment would move with the speed of the communications network. The modern ability to move capital quickly has created instability in such areas as Southeast Asia.

Evidence suggests that economic development will not spread evenly but will, instead, continue to concentrate where it is already under way: the "core" urban centers and industrialized areas of the developed countries. For communications businesses outside the core of production (the so-called underdeveloped and rural areas), concentration may mean that the information superhighway is not the good news they thought it was. The new communications and transportation infrastructures being built by government will allow factors of production to move more to the industrial core (the eastern and western corridors of North America and the Rhine valley in Western Europe). This movement may exacerbate the differences in efficiency between have and have-not nations and reduce even further their ability to compete with Big Companies. Paradoxically, rural areas and developing countries have been told by policy analysts that they

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[23]Tom Standage, The Victorian Internet: The Remarkable Story of the Telegraph and the Nineteenth Century's Online Pioneers (New York: Berkley Books, 1999), 90.

[24]See, e.g., Andrew Calabrese, "Communication and the End of Sovereignty?" *Info* **1**, 4 (August 1999), 313-326.

[25]For a review of this economics literature, see P. M. Romer, "The Origins of Endogenous Growth," *J. Economic Perspectives* **8** (Winter 1994), 3-22.

will become have-nots if they do *not* get connected to the new networks. Communications networks may, instead, be a force for geographic concentration, moving more people and resources to developed areas.[26]

The concentration of resources in core areas has led the EU to regional policies that emphasize both growth and fairness (by redistributing the gains of growth) in order to avoid a disruption to national and regional unity.[27] Whether, ultimately, policies that encourage communications networks will be viable is doubtful if they enable a massive redistribution of resources and result in a "race to the bottom" for labor (and other assets not easily portable) in currently developed areas.[28] Jobs in industrialized countries that may be lost include sales agents of all kinds, wholesalers, teachers, distributors (e.g., postal and retail), professionals, managers, laborers, farmers, and foresters.[29]

If forces for concentration operate at the level of the nation state, will they also operate at the level of the firm? Will the increased efficiency and speed of communications technology allow labor and investment to flow faster across various parts of the firm? Will this have consequences (e.g., instability) for the Big Company?

5.3 Concentration and Diversity in Biological Systems

In the study of biological systems, *convergence* denotes "the independent acquisition of the same feature by unrelated evolutionary lineages, such as the acquisition of wings by both birds and bats."[30] Convergence is distinguished from *parallelism* or the "independent realization of a characteristic in two related lineages owing to a genetic predisposition for this characteristic, even if not present in a common ancestor."[31] Examples of parallelism include the development of stalked eyes by certain related varieties of flies.

If there is a similarity between these biological processes and the economic process predicted for the communications sector, then perhaps the discussion in this report might better

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[26]For a review of the theories of economic convergence, see, e.g., Robert Leonardi, *Convergence, Cohesion, and Integration in the European Union* (London: Macmillan; New York: St Martin's Press, 1995), 35-40; hereafter cited as Leonardi with a page reference. For the role of communications infrastructure in the larger picture of competitiveness and economic development, see Michael Porter, *On Competition* (Boston: Harvard Business School Publishing, 1998), 197-271.

[27]Leonardi, 33-59.

[28]For a discussion of globalization from a labor perspective, see Jeremy Brecher and Tim Costello, *Global Village or Global Pillage***:** *Economic Restructuring from the Bottom Up*, 2nd ed. (Cambridge, Mass.: South End Press, 1998).

[29]Tapscott, 290, 292.

[30]Ernst Mayr, *This Is Biology: The Science of the Living World* (Cambridge, Mass.: The Belknap Press of Harvard University Press, 1997), 138; hereafter cited as Mayr with a page reference.

[31]Ibid.

have focussed on parallelism, not convergence. Communications industries are not unrelated lineages.[32] Indeed, new communications channels have always been built on the foundations of old ones. Print was built on speech. Speech became a foundation for radio, although it also built on the economics of print. TV was built on radio. E-mail was built on telephony and the postal system. The World Wide Web attempted to build on them all. Building new channels on the essential characteristics of old ones may be analogous to *propagation* in biological systems—the dominant traits of existing channels are passed on to emerging species or channels.[33]

The distinction between independent acquisition of the same characteristics and parallel development of a common predisposition may indicate that some assumptions underlying the current debate are wrong—at least, those focussed on differences among communications industries. All existing channels appear to share predispositions that have enabled them to exhibit similar characteristics even before technology and politics changed the economic ecosystems, perhaps because they share the basic structure of communications (see **Chapter Two**).[34]

If the various communications industries share a predisposition, does that mean they are all really one industrial species? Homogeneity in biological species results when "individuals are capable of breeding with each other, freely exchanging genetic material and producing fertile offspring."[35] During the time that government and technology erected barriers to separate them, communications industries had no opportunity to become one industrial species. Digitization and the new political faith in market forces have helped to establish a new environment in which these industries began to merge both capabilities and customers. Thus, the communications industries are starting to behave like one species. Whether *all* the resulting offspring will survive long enough to be "fertile" remains to be seen.

A reduction in the total number of species, however, may in the long term not be in the best interests of either biological or economic systems. In both systems, diversity has been critical to

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[32]The communications industries may be thought of as analogous in biological systems to related species. As a group, they may be analogous to biological "guilds," that is, groups of species that exploit the same class of resources in a similar way. See R. Root, "The Niche Exploitation Pattern of the Blue-Grey Gnatcatcher," *Ecological Monographs* **37** (1967), 317-350.

[33]Roger Fidler, *Mediamorphosis: Understanding the New Media* (Thousand Oaks, Calif.: Pine Forge Press, 1997), 29.

[34]See P. H. Longstaff, *Information Theory As a Basis for Rationalizing Regulation of the Communications Industry* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, P-94-4, June 1994), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html A revised version of this report appeared as "Regulating Communications in the 21st Century: New Common Ground," in The Information Resources Policy Handbook: Research for the Information Age, edited by Benjamin M. Compaine and William H. Read (Cambridge, Mass. and London, Eng.: The MIT Press, 1999), 453-489.

[35]Begon, Harper, and Townsend, 16.

the development of new answers to environmental challenges. A global sameness may hinder technological development because

> diversity is conducive to invention because adoption of useful techniques may be blocked by conservative attitudes and reactionary institutions and run into a dead end in one society, but get a fresh start when transplanted elsewhere.[36]

The evolution of the Big Company may have analogs also in the biological world. As animals grow bigger, they need more territory for forage. But the size of the territory is limited by an animal's ability to expend energy moving around in it to find prey or to patrol it to keep competitors out.[37] As companies grow bigger, they need a larger market in order to keep growing (as demanded by the stock market). They cannot go far unless networks are set up to allow them to move resources (capital, labor, and product) around in a larger space. Modern transportation networks and, more recently, communications networks enable companies to move resources, acquire production inputs, serve new territories, and patrol the larger territory in order to guard against competition. Faster, more reliable communications networks are necessary for the Big (global) Company, but the price may be the extinction of small competitors no longer able to compete on their traditional geographic or technical turf.

Biological systems offer other clues about the forces for difference. In nature as in human societies there are no homogeneous environments. Even organisms placed in a test tube have two potential environments: one on the wall of the tube, the other not on the wall. In such environments, organisms may divide into two groups, one that sticks to the wall, the other that floats freely. The apparent heterogeneity of the environment may depend on the scale of the organism sensing it. To a human being, a leaf may look like a single thing, but to a caterpillar it is a mosaic of things. From an airplane, a jungle looks homogeneous, but on the ground it is a riot of difference. Local differences are often caused by differences in resources, such as water and sunlight.[38]

Without a homogeneous place from which to start, there is little likelihood that all agents in an evolving system will end up at the same place. The evolution of technologies shows many of the forces for diversity apparent in other complex systems. These systems are said to be heavily dependent on initial conditions and even slight variations can result in radically different outcomes within the system. This diversity allows each area with different conditions to evolve a

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[36]Joel Mokyr, "Evolution and Technological Change: A New Metaphor for Economic History?" in *Technological Change*, edited by Robert Fox (Amsterdam: Harwood Academic Publishers, 1996), 63-83; 80; hereafter cited as Mokyr with a page reference.

[37]Begon, Harper, and Townsend, 230-234.

[38]See, e.g., ibid., 29-34.

local optimum whereby the system has an "adaptive landscape" with local peaks. Technological systems are said to be deterministic only in that various points in the system will reach a local optimum or "adaptive peak," but the forces that determine which optimum are heavily influenced by initial conditions and chance.[39]

Different biological species develop to take advantage of the diversity of local resources. A single converged species cannot use the resources efficiently, so eventually (over many generations) new species branch off and settle into the unused niches. Thus, the Big Pipe and the Big Box ultimately may not be attainable if the resources they will need—the time and money of communications consumers and advertisers in many countries—are not homogeneous. Those resources are not evenly distributed around the world (even within any country), and local preferences for communications products depend on language, culture, and income. Communications customers may look homogeneous because they are all human (or human businesses), but the Big Box and the Big Pipe (and the Big Company) will need to be extraordinarily flexible to make efficient use of the riot of differences. Should the Big Box and the Big Pipe (and the Big Company) leave any resources unused, new companies with new pipes and boxes will emerge. If a single pipe or box is the goal of public policy, government will need to step in at some point to wipe out divergence. Government actions to reduce diversity will be especially urgent if government has invested heavily in the pipe or the box. This might mean suppressing new technologies or products, which may then be developed in a friendlier environment (that is, in another country) which may thereby develop a competitive advantage.

The development of new biological species, a process known as *speciation*, may offer insights for those worried about innovation in the communications (or any other) sector. The development of a new species is much more likely to occur when a population becomes isolated from others of the same species, for example, on an island. Isolation, however, may also be an "essential step in splitting of one ancestral species of animal into two."[40] When members of a population are capable of breeding with many others of the same species, evolution will, over time, result in homogeneity. If a population becomes isolated (as on an island), a more "localized evolution of matches between organisms and their environments" will occur.[41] Similarly, if the communications sector begins to look like one species and becomes global in scope, there may be no place where new species can develop in isolation so the sameness of the sector will be reinforced. The absence of diversity in communications systems may not be in the best interest of other human systems, because it may mean that a threat to one of the systems could leave other systems that depend on that one without a convenient place to turn.

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[39]For a discussion of the application of complex adaptive systems analysis to diversity in technical change, see Mokyr, 81-83.

[40]Begon, Harper, and Townsend, 16.

[41]Ibid.

5.4 The Communications Sector as a Complex System

Both biological and business systems are studied as complex systems,[42] defined as systems with many nonsimple, nonpattern-repeating connections.[43] The complexity resulting from all these heterogeneous connections is often reduced by the spontaneous formation of patterns in the structure of both the components and the connections of the system.

The homogeneous patterns are not forced from the top down but arise from the actions of localized agents capable of adapting to environmental changes. The adaptations radiate out from successful individual agents and cause localized differences (or pockets of change) in whole populations of agents. Localized clumps of agents may not be brought into being by the operation of similar forces but, instead, by a radiation of adaptations through a single successful agent in which change may have been caused by chance. This follow-the-succeeder behavior may take place either in a single generation for species capable of learning or through evolution over many generations as successful agents leave more progeny and thereby grow into a greater percentage of the local population.[44] This phenomenon was observable in the late 1990s, when communications companies tried a variety of strategies to cope with the turbulent marketplace. Other companies copied any tactic that appeared successful, and many strategic plans followed apparently (or potentially) successful ideas. As more and more companies followed, an increased sameness emerged in the marketplace, which allowed those companies' suppliers to plan to follow them as well. This following behavior is evident, too, in consumers, when they are reluctant to adopt new technologies until the success of the product or service appears inevitable. Customers do not want to be stuck with an investment in the next Betamax tape player or anything else that might not catch on sufficiently to become a standard.[45]

So long as no new disruptive forces are introduced into a complex system, a new state of equilibrium will develop in which individual agents will have adapted to environmental changes. Adaptation often forces individuals to build increasingly complex structures to handle a wider range of problems, but if the environment continues to change (e.g., new technologies or economic factors emerge) turbulence will eventually weaken all but the strongest players and those that survive will be very complex.[46] This scenario suggests that if technical, economic, and

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[42]Many disciplines and many scholars, among them John von Neumann, George Dantzig, Herbert Simon, and Ilya Prigogine, have studied complex systems. See David Warsh, *The Idea of Complexity* (New York: Viking Press, 1984), 3-4.

[43]Mokyr, 80.

[44]See, e.g., Mayr, 175-206.

[45]For a detailed discussion of economic forces in networked communication, see Carl Shapiro and Hal R. Varian, *Information Rules: A Strategic Guide to the Network Economy* (Cambridge, Mass.: Harvard University Press, 1999).

[46]For an introduction to complex adaptive systems analysis, see, e.g., John Holland, *Hidden Order: How Adaptation Builds Complexity* (Reading, Mass.: Addison-Wesley, 1995).

political change continues and if the sector fails to reach a new equilibrium (in which the rate of change slows), there is a limit to the number of companies that can survive the extended turbulence. Those that do survive may develop very complex structures in response to the need to meet ever changing conditions. Such structures may require many adaptations in management, and when the environment stabilizes they may be vulnerable to collapse under their own weight.

As organizations try to encompass an increasing number of parts of the sector in which they operate, they discover that managing vast internal diversity presents difficult problems, particularly in times of rapid change or new competitive challenges, when entire organizations must respond quickly. After the cold war ended, for example, in many countries military organizations that attempted to consolidate in an effort to achieve operating efficiencies found that missions for air, ground, and sea forces instead required a variety of resources, skills, and management. Similarly, communications companies have found that entering new businesses is not so easy as it may look in a financial analysis or business plan. The management skills needed by producers of creative content (e.g., TV and film producers) are very different from those needed by managing engineers. The skills and expectations of a good cable-line installer may not be immediately suitable to installing high-speed Internet access. The diverse communications industries have developed different cultures which do not mesh over night, particularly given that each has for many years regarded the other industries as the enemy. Such problems, as well as internal battles for resources, have led some companies to divest units that might do better on their own or as part of a less diversified organizations.

In business as in war, greater speed, accuracy, and security of information offer important strategic and tactical advantages.[47] These are worth paying for, making it unlikely that an arms race for the fastest, cheapest, best, and most secure communications systems will end any time soon.[48] Nearly all the innovations working their way into the commercial sector were designed for military purposes, and research and development (R&D) in communications remain an important part of military budgets for all industrialized nations. Industries and firms use improvements to communications systems to gain advantages over competitors—for example, faster, cheaper communication can improve efficiency and provide better access to markets.

Security is crucial in any competitive situation. Country A (or Company A) does not want its competitor, Country B (Company B), to learn its strategy or tactics, even though A, of course, wants to know B's strategic and tactical plans. Communications assets that can protect a

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[47]For an overview, see, e.g., Thomas P. Coakley, *Command and Control for War and Peace* (Washington, D.C.: National Defense University Press, 1992); and Kenneth Allard, *Command, Control, and the Common Defense*, rev. ed. (Washington, D.C.: National Defense University, 1996; New Haven: Yale University Press, 1990).

[48]See Walter P. Fairbanks, *Information Superiority: What Is It? How to Achieve It?* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, P-99-4, June 1999), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html

competitor's own information while permitting access to information of the competitor clearly are worth almost any price. Networked computer communications systems allow countries and companies increased access to the competitors' information and, at the same time, increase the vulnerability of their own information. Improved access has led to the potential for information warfare for both the military and commercial enterprises.[49]

So long as competitors believe that lower costs, new territories, or increased security can be bought with better communications systems, any equilibrium that would allow some stability in the communications sector may be difficult to achieve. The Big Pipe and the Big Box may be further in the future than believers hope.

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[49]See James Adams, The Next World War: Computers Are the Weapons and the Front Line Is Everywhere (New York: Simon and Schuster, 1998); and the President's Commission on Critical Infrastructure Protection (Washington, D.C.: Office of the President, 1998). See also [On-line] URL: http://www.info-sec.com/pccip/pccip2/info.html

Chapter Six

Government As a Force for Concentration and for Diversity

This chapter looks at the policies that appear to be pushing the communications sector together (toward the Big Pipe, the Big Box, and the Big Company) and at those trying to maintain many pipes, boxes, and companies. Because the forces at work in the communications sector are moving it in many directions at once, this sector has become a very complex system and one difficult to predict.

Even in less turbulent times, government has been an important force affecting this sector, but policymakers have rarely, whether in a more or less turbulent period, devised a clear policy on the way they want the sector (and the industries and firms in it) to move, whether toward concentration or toward diversity. Regulation has instead been contradictory and asymmetrical, almost never hinting at the existence or impact of other laws. For example, laws governing competition that define marketshare often do not mesh with sector-specific laws regulating ownership levels. A regulator charged with maintaining competition may look at all the competitors of a broadcasting company, including cable, print, or satellite, for advertising revenue to determine whether the concentration of economic power is too great. At the same time, a sector-specific regulator for broadcasting in the same government may enforce increasingly stringent ownership limits on the same company, because only competition from other broadcasters is being taken into account.

Public policy regarding concentration and diversity is often confusing, because it tries to encourage both directions. In general, governments see concentration as good when it creates economic efficiencies of scale and scope, thereby increasing the industries' competitiveness with one another or with similar industries from other countries. Concentration has been encouraged (or ignored) when it enables an industry to put together enough resources to develop a new product or service that can compete with another product or service that has had little competition. Concentration has also been encouraged when regarded as necessary to allow a local industry to compete with larger invaders crossing borders on the winds of free trade.

Governments view concentration as bad when it reduces the benefits to consumers of the competitive struggle (lower prices, better quality), that is, until one or more competitors lose the battle and leave the market. The remaining firms often can charge higher prices and are unlikely to invest heavily in the new products or services that they would have thrown into a raging competitive battle. Governments thus see diversity as good, because it means continuation of the competitive struggle, lower prices, and the possibility of new products and services emerging. Governments see the same diversity as bad, however, when it does not allow for the economies of scope and scale necessary to develop products or reduce prices to the level necessary to fight off new competitors. In other words, although most governments embrace diversity to promote

competition, they are nevertheless willing to allow concentration if it allows companies to survive a competition they appear in danger of losing.

But even the most well-thought-out government initiatives have had unintended consequences, and, as discussed throughout this report, policies intended to promote concentration may have the opposite effect. This effect may be caused by inadequate understanding of the dynamics of the system or by unanticipated fundamental changes in conditions. Few policymakers (or business leaders) appear to have anticipated the changes in the competitive landscape that digitization brought. Digitization certainly increased competition, because it allowed the invasion of all communications industries and their former territories by other firms in the sector, from both inside and outside the home country. Digital diversity has meant that individual firms looking toward concentration for survival have demanded that government keep out of the way.

Sometimes forces put in motion by one part of government contradict forces put in motion by another part. This has been particularly true in the communications sector, because the various industries were historically supervised by different regulatory regimes and often had different regulators. Even when one regulatory body is responsible for sector-specific rules, a separate government unit is usually charged with enforcement of competition policy.

Perhaps the most important government force for diversity has been unintended. Multilayered, variously focussed legal frameworks have kept these highly regulated industries on their individual tracks, because going off track risks unexpected responses from government. Regulatory diversity may also be reduced in an unexpected way as communications companies become increasingly multinational and their businesses are treated as "services" under treaties such as the General Agreement on Tariffs and Trade (GATT**)**.[1] As a result, organizations such as the World Trade Organization (WTO) become the regulatory force for almost all issues, including politically sensitive issues, such as censorship and frequency allocation, when these are regarded as barriers to trade.[2] But uniform rules do not guarantee uniform responses, because interpretation and enforcement derive from various regulatory histories and cultures.[3]

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[1]"The General Agreement on Tariffs and Trade…first signed in 1947…was designed to provide an international forum that encouraged free trade between member states by regulating and reducing tariffs on traded goods and by providing a common mechanism for resolving trade disputes" [On-line]. URL: http://www.ciesin.org/TG/PI/TRADE/gatt.html

[2]See, e.g., Pradip Bhatnagar, "Convergence and the World Trade Organization," *Info* **1**, 2 (April 1999), 159-169.

[3]For a discussion of the impact of culture on multinational regulation, see *Regulating the Changing Media: A Comparative Study*, edited by David Goldberg, Anthony Prosser, and Stefaan Verhulst (Oxford, Eng.: Clarendon Press, 1998).

6.1 Government Policies That Move the Sector Toward Greater Diversity

6.1.1 Competition Policies

In the late twentieth century, governments everywhere professed faith in the ability of the marketplace to regulate communications services. “Free” markets, however, may often be unstable, and stability is necessary for the development of the Big Pipe, the Big Box, and the Big Company. Stability is necessary also for the introduction of competition itself. In Asia, several countries’ plans for competitive telecommunications foundered after the financial crisis of the late 1990s. Effective competition thrives not in the absence of regulation but in the presence of effective regulation of the competitors.[4]

The Big Pipe, the Big Box, and the Big Company all require governments to develop new attitudes toward competition policy, particularly with regard to redefinition of the concept of the “relevant market,” where laws governing competition must be enforced. Is it appropriate to look at the “relevant market” for TV advertising in a world where everyone is fighting everyone else for the same resources and customers? If competition rules change to recognize an integrated marketplace, they may lead to Big Companies that are larger and control more resources than ever before but still have less than total control over the new, enlarged market. An example: In 2000, Company A controls 40 percent of the national broadcasting advertising revenue, the maximum allowed under law. In 2005, the country agrees with industry analysts that the relevant advertising market is really a “converged” sector that includes broadcasting, cable, satellite, print, and the Internet. Company A (a broadcaster) now controls only 10 percent of the larger market and merges with Company B (a cable company that formerly had 30 percent of the cable advertising market); together they now have only 20 percent of the national advertising market. The new company, AB, is bigger, but once the market is redefined as “converged” it no longer looks like a monopoly threat.

The introduction of increased competition (diversity) into systems seems to increase cooperation (concentration; see **Chapter Five**), an effect visible in the communications sector. Not coincidentally, when new competitors appear companies have sought the apparent safety of getting bigger (making alliances with the big kids on the block).[5]

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[4]Peter Montagnon, “Doubts at the World Bank on Infrastructure Sell-off,” *Financial Times* (London), July 27, 1999, 6; and “The Short Arm of the Law,” *The Economist* (U.S. edition), Sept. 13, 1997, S-14.

[5]Interesting analogies to this economic behavior may be drawn from competition in biological systems. See, generally, Geoffrey M. Hodgson, *Economic and Evolution: Bringing Life Back to Economics* (Ann Arbor: University of Michigan Press, 1996); for specific application of these ideas to the communications sector, see Longstaff, *Competition and Cooperation: From Biology to Business Regulation* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, P-98-4, October 1998)), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html

Encouraging competition, however, may have other unforeseen consequences. For example, increased competition in the provision of information and entertainment programs is generally assumed to reduce costs to consumers that ultimately receive the messages, but this assumption rests on the premise that all entertainment and information messages are equally valuable and ignores that increasing the number of channels will increase competition for access to successful programming and, thus, drive up the prices to the consumer of these services.[6] To lower costs of acquiring programming, many firms become Big (becoming both senders and channels), risking incurring the wrath of competition regulators.

6.1.2 Regulation for a Unified Sector? A Unified World?

Perhaps the most thorough public discussion of the need for government to act as an initiator and coordinator of the three visions of convergence has been at the EU. The EU's *Green Paper on the Convergence of the Telecommunications, Media and Information Technology Sectors, and the Implications for Regulation: Towards an Information Society Approach*[7] (and several earlier papers funded by the European Commission[8] and policy declarations by the Council of Europe[9]) stressed the benefits to society of the information age, even while admitting that the same information age may bring serious problems for the existing regulatory framework of telecommunications and media in Europe. The *Green Paper* asked specifically whether a new framework was necessary to treat all communications industries (which believers think may come together) in the same way. Responses fell into two broad groups. One group advocated the development of a new regulatory structure to treat everyone in the same way and to abolish regulation specific to broadcasting, telephone, cable, and so on, thus leaving regulation largely to competition authorities. The other group believed industry rules remain important to maintain—in particular, public broadcasting authorities, which see generally applicable rules as a threat to government subsidies.

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[6]See, e.g., David Hancock, "Digital Television: A European Perspective," in *Changing Channels: The Prospects for Television in a Digital World*, edited by Jeanette Steemers (Luton, U.K.: University of Luton Press, 1998), 125-140.

[7]*The Green Paper on the Convergence of the Telecommunications, Media and Information Technology Sectors, and the Implications for Regulation: Towards an Information Society Approach* (Brussels: European Commission, COM(97)623, Dec. 3, 1997) [On-line] at URL: http://www.ispo.cec.be/ along with preceding documents and responses to the Green Paper.

[8]See KPMG, *Public Policy Issues Arising from Telecommunication and Audiovisual Convergence*, A report prepared under contract to the European Commission (September 1996); and Squire, Sanders & Dempsey, L.L.P.; and Analysys Ltd., *A Study on Adapting the EU Regulatory Framework to the Developing Multimedia Environment, A Study for the European Commission (Directorate-General XIII)* (Brussels-Luxembourg, Draft Final, Oct. 23, 1997). Both reports are available [On-line] at URL: http://www.ispo.cec.be/.

[9]See, e.g., The Information Society: A Challenge for Europe, 5th European Ministerial Conference on Mass Media Policy, Council of Europe, Thessaloniki, Greece, Dec. 11-12, 1997, MCM 97, 15.

Even if the time is not ripe for broad, all-encompassing rules that would govern all communications companies, there is another "convergence" issue for the EU. The EU is considering whether it is necessary to mandate harmonization of various communications policies of member countries. The reports prepared for the European Commission asserted that if the Big Pipe or Big Box or both are to be realized in Europe, member countries will need to cooperate to accommodate transborder flows of information commerce at all levels. To do so, the reports suggested, will require common approaches to such issues as copyright, privacy, content regulation, and taxation, because common policies may reduce much of the uncertainty in the sector and hasten realization of all the visions of convergence. In the United States, a consistent approach to coordinating regulation by the state governments has often been achieved by the FCC's "preemption" of regulatory power, thereby reducing the states' power to exercise authority, although this preemption continues to be challenged by the states.

There is less agreement in world capitals on whether harmonization should include harmonization with the regulations of countries on other continents. Such regulations have historically acted as a brake on invasion by foreign communications products. Many governments worry that planetary rules may break down fortress walls before locals get big enough to fight the giant invaders at the gates.

6.1.3 Support for Research and Development

Many participants in the EU convergence initiatives called for increased government support for R&D for communications products and services. An often unspoken but apparent subtext of the discussion is an argument for the support or development of European communications companies, to prepare them to do battle with the forces invading from North America and Asia. U.S. companies have continued to benefit from federal funding for information technology R&D. Early in 1999, a Presidential Advisory Committee (made up of academic researchers and communications business leaders) proposed increases in funding, recommending that government should increase spending by $1.3 billion between 2000 and 2005, to maintain U.S. leadership in the sector.[10]

Government funding for R&D can move the communications sector toward the Big Pipe and the Big Box if it is directed at technical problems that still make these visions uncertain. Because government-funded research must be made available to all, it can become the basis for technical standards in individual industries as well as across the entire sector (see section **4.1.4**). The danger inherent in government funding is that politicians may not fund research for the

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[10]President's Information Technology Advisory Committee: Interim Report to the President (Washington, D.C.: 1998). For the final report, see President's Information Technology Advisory Committee, Information Technology Research: Investing in Our Future (Feb. 24, 1999), [On-line]. URL: http://www.ccic.gov/report See also Steve Lohr, "Commission Wants More Funding for Research on Information Technology," The New York Times, Feb. 24, 1999, [On-line]. URL: http://www.nytimes.com/library/tech/99/02/biztech/articles/24tech-funding.html

technology that eventually prevails in other parts of the world, so local firms could be left with expensive research without application to larger world markets (reminiscent of the Japanese investment in analog high-definition TV).

6.1.4 Standards

The Big Pipe and the Big Box both require uniform standards for interconnection and interoperability of the various channels and their connection with appliances.[11] Standard setting has never been easy for regulators, but in a converging market, where the interests of many stakeholders (from many industries) will need to be dealt with simultaneously, it can become impossibly complex. Setting standards on a global level increases this technical and political complexity, therefore decreasing any likelihood that setting them can be done amicably. Winners will be determined by marketplace battles, with much economic bloodshed before they emerge.

Standards set by the marketplace may not allow many players to survive the battles to establish the Big Pipe and Big Box if the winning standard is proprietary. A company that risks a fight to the death to become the prevailing standard may understandably balk at allowing competitors to use the standard it risked so much to establish, especially if the company is still recovering from the demands of the battle. One way to become the winner (i.e., the standard most consumers choose) is to use "lock-in" to funnel customers into your pipe or box and keep them there. As a result, your customers will not want to use competing products or services (which will not be compatible with yours) and will therefore be locked into the system by substantial up-front investment.[12]

6.2 Policies That Move Things Toward Diversity

6.2.1 Promoting Competition

Governments that elect to embrace a free market economy (or variations on the theme) believe in the benefits of competition. Competition is thought to increase efficiency, reduce consumer prices, and encourage innovation. But no government has yet adopted a strictly laissez-faire attitude to competition, because rules keep the fight fair. Rules often do not forbid development of the Big Company, but they establish what conduct toward that goal is not acceptable. For example, the U.S. government alleged that in the 1990s the Microsoft Corporation engaged in illegal competitive practices as a way to develop its nearly complete monopoly of operating systems for PCs. Illegal competitive practices may lead to the

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[11]See, e.g., Martin C. Libicki, *Information Technology Standards: Quest for the Common Byte* (Boston: Butterworth–Heinemann, Digital Press, 1995)), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html

[12]For further information on "lock-in" strategies, see, e.g., Carl Shapiro and Hal R. Varian, *Information Rule: A Strategic Guide to the Networked Economy* (Cambridge, Mass.: Harvard University Press, 1999), 103-117.

development of monopolies and the end of competition. If the product or service provided is considered vital to the interests of the public and a monopoly develops, the situation will become a political problem. Many governments have asserted their authority to approve (or disapprove) mergers or acquisitions of large corporations to prevent concentrations of power, especially in sectors, such as communications, thought to be strategically important.

Governments have actively promoted competition in communications through rules that restrain the ownership of communications assets. Companies may be allowed to control only a certain percentage of the market in a particular channel or one channel in a particular geographic area. Both the EU and the United States, for example, prohibit cable and telephone services by the same company in the same area.[13] As the line between cable and telephony (e.g., Internet telephony over cable wires) blurs, such rules will be hard to enforce.

Rules that limit ownership are often relaxed if the industry encounters new competition (e.g., from a new technology or from a foreign invader) and if being big is considered necessary to survive and compete against the invader. For example, the limitation on ownership of broadcast stations has been all but lifted in the United States in the face of strong competition for viewers from cable and satellite services.

These government activities to curtail the growth of companies may be restrained when companies from two different industries merge, because such mergers do not look like a concentration in a particular industry. Thus, the merger of a telephone company and a software company may provoke less government interest than a merger between two telephone companies. In this way, the vertical integration said to be necessary for the Big Company (as it puts together capabilities of sender, channel, coder, directory, etc.) may not become a legal or political problem—or, at least not yet. As companies grow ever larger, they grow increasingly difficult for government to regulate. Indeed, many companies already have more assets than most developing countries. Sooner or later, these large companies will be a political problem, particularly if a dramatic economic downturn should occur and politicians start to look for villains (as in the 1930s). A serious economic downturn might have other serious implications for the forces of convergence by reducing commitments to free trade in favor of protection of domestic producers, slowing adoption of new products and services, and reducing the capital available for mergers and acquisitions.

6.2.2 Promoting Many Channels

Do many channels mean many pipes? Regulators may find the issue confusing, because individual senders in cable and satellite services are called channels (such as the Discovery

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[13]For the EU, see Directives 95/51/EC and 96/19/EC (COM) 97; for the United States, see the Telecommunications Act of 1996 (§302) at 42 USC 571-573.

Channel or Channel 74). Because these channels hand off the ultimate distribution of their messages to another entity, technically they are not channels, as that term is used in this report, but senders, and the policy considerations for them should be the same as govern other senders. Policymakers need to determine whether the existence of many senders is key to achieving public policy goals or whether a few senders must have a choice among many channels. Perhaps both are needed—both many senders and many channels—to meet all policy goals. Yet whether government efforts to support diversity of both channels and senders may ultimately prove prohibitively expensive or whether they will leave the many small channels and small senders too weak to survive the introduction of a new competitor is not yet known.

At the turn to the twenty-first century, market forces were favored policy tools for creating and assuring many senders and many channels. By reducing barriers to entry (e.g., reducing or eliminating licensing requirements) and barriers to the movement of messages across borders and across technologies governments hope to encourage resources to flow into this sector. This policy, too, however, often has unforeseen consequences.

When competition is introduced into networked industries such as communications, transportation, and energy, certain responses appear to follow.[14] As individual parts of a network are forced to abandon a stance of cooperation (to form a unified network) in order to compete with one another, they tend to develop competing channels, that is, one channel becomes many. This was the outcome, for example, in the airline industry in the United States in the mid-1980s and later in the telephone industry. Interconnection became difficult, so these industries developed their own infrastructures to keep competitors out. Each also tried to keep its customers away from competitors by developing a system of hubs, where connections could be made (or made conveniently) only to other nodes or services in its own system. Government tried to enforce access by competitors and limit hubbing but with limited success, because enforced access would increase regulation of a newly “deregulated” industry. Government efforts to increase competition thus can work in opposition to cooperative efforts to develop a Big Pipe or Big Box, but almost certainly, as the new competitors struggle to grow powerful enough to survive, those efforts will mean development of the Big Company.

6.2.3 Promoting Many Senders: The Politics of Culture

High-level laws regulating the rights of citizens commit the United States and member governments of the EU to preservation of many voices in communications. In 1982, the Council of Europe declared access of receivers to many sources of information critical to freedom of expression and human rights. The member states committed themselves to the following:

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[14]P. H. Longstaff, *Networked Industries: Patterns in Development, Operation, and Regulation* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, P-00-2, March 2000)), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html

- the existence of a wide variety of independent and autonomous media, permitting the reflection of diversity of ideas and opinions;
- the availability and access on reasonable terms to adequate facilities for the domestic and international transmission and dissemination of information and ideas;
- the promotion of international co-operation and assistance, through public and private channels, with a view to fostering the free flow of information and improving communication infrastructures and expertise....[15]

In the United States, the ability to receive information from many sources is considered a cornerstone of the right to free expression and to participation in the democratic institutions guaranteed by the Constitution. That ability is bolstered by congressional actions such as the Freedom of Information Act and Supreme Court restrictions on government censorship.

All three visions of convergence offer opportunities and dangers for policies of many voices. The Big Company, the Big Pipe, and the Big Box may all, by their very size, open opportunities for messages to move around the world, but their size may drive out smaller, weaker voices, leaving the world with large channel capacity but few "mass media" voices heard on it.

A converged communications industry with few voices was predicted as early as 1947, when Theodor Adorno and Max Horkheimer, among the earliest critics, saw a "fusion of all arts into one work"[16] in the production by the capitalist communications industry in the United States of cultural products for the undifferentiated masses that would result in standardization of the product. Adorno and Horkheimer feared this result would drive out individual creativity and cultural diversity.

By 1982, many governments had become alarmed by the spread of the "culture industries" (primarily from the United States), and that year the United Nations Educational, Scientific, and Cultural Organization (UNESCO) defined the problem in a report in the following way:

> the ownership and control of the means of production and of the distribution circuits, the trends toward the concentration and internalization of the most representative firms, and the subordination of creative artists to the market forces or to more or less overtly dictated consumer demand.[17]

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[15]Council of Europe, Committee of Ministers, Declaration on the Freedom of Expression and Information, adopted by the Committee of Ministers on 29 April 1982 at its 70th Session, section 8.II. d–f, [On-line]. URL: http://cm.coe.int/Ata/decl/1982/82dec.1.htm

[16]Theodor Adorno and Max Horkheimer, *Dialectic of Enlightenment* (London: Verso Press, 1947; 1979), 124.

[17]UNESCO, The Culture Industries: A Challenge for the Future of Culture (Paris: UNESCO, 1982), 21.

The report called on member states to develop response strategies to regulate the production and distribution of cultural products that they saw as threatening to world cultural diversity. In 1984, the United States withdrew from UNESCO. Some have argued that this move was a deliberate attempt to weaken the power of small countries to defend their "informational interests."[18] Others saw it as an attempt by the United States to redefine the public interest in terms of consumer desires and as a recognition of the growing North American communications companies' desire to seek growth outside their national borders.[19]

Does anyone really want one global culture? If not, can political processes stop it from happening in the face of international Big Pipes, Big Boxes, and Big Companies? In 1995, the most developed nations declared that diversity of cultures should be maintained:

> Citizens should be provided with access to all content, including a strong presence for indigenous cultural products and services. Diversity of content, including cultural and linguistic content, should be promoted.[20]

Agreement (at least, outside the United States) appears widespread that governments need to fight actively against a global (probably Americanized) culture and against the adoption of a global language (probably English), but technology is liable to make such efforts increasingly difficult. For example, the government of Quebec has attempted to prosecute one of its citizens who used only English in a site that demonstrates his photography.[21] Article 52 of the French Language Charter states that all Quebec-based catalogues, brochures, commercial directories, and similar publications must be in French.

Fear of cultural imperialism has also led to calls for governments to strengthen public broadcasting with subsidies even as they open these institutions to competition from domestic and international channels. Some governments have been called upon to provide similar subsidies for national content provided by local Internet information providers. These demands are not necessarily a repudiation of government commitment to competition in communications services but a recognition that competition from a giant competitor might kill off the small, local competitors and result in no competition at all.

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[18]Herbert Schiller, Culture Incorporated: The Corporate Takeover of Public Expression (London: Oxford University Press, 1989).

[19]For a discussion of this debate, see Keith Negus, "The Production of Culture," in *The Production of Culture/The Culture of Production*, edited by Paul du Gay (London, Thousand Oaks, Calif., and New Delhi: Sage Publications, 1997), 68-104.

[20]Resolution adopted by the G7 nations at the Conference on the Information Society, Brussels, February 1995.

[21]Tyler Hamilton, "Quebec Language Agency Cracks Down on English-Only Web Site," *Toronto Globe and Mail*, June 8, 1999, B-1.

Monopolies and oligopolies can reduce the leverage (and survivability) of diverse suppliers. In a world of a few Big Pipes, the leverage of independent message producers might be vastly reduced as those producers compete to sell to the Big Pipes that may be part of a Big Company with message-production facilities of its own.

Clearly, government cooperation is important to any foreign invader offering cultural products. Although stopping the importation of Internet data or satellite signals may prove more difficult, it may not be impossible. China has banned the receiving of foreign signals, but it enforces the ban only sporadically, leaving companies such as Star TV free to operate with only occasional interruptions (so long as the company complies with government constraints on content).[22] Governments might develop intranets that are not connected with the global Internet, in an effort to control foreign information and programming. But a breakdown in control over the movement of information may promote both sameness and difference:

> Bringing down borders can lead to a blurring of national identities. It can enable large population masses to dominate smaller cultures and define the emerging "global culture" by sheer economic force. It can also rekindle old divisions—ethnic, regional, religious—which national cultures now transcend.[23]

6.2.4 Promoting Many Senders by Mandating Access to Channels

Owners of the Big Pipe(s) will become the Big Sender(s) if they control the messages moving in the channel(s). If such is the outcome, government regulation to assure diversity of senders seems likely. Few governments would relish seeing so much control over messages sent by citizens concentrated in only a few hands—especially if those hands belong to noncitizens. Noncitizens would be hard to regulate and might respond with little sympathy to the actions of the government.

Many policymakers believe that government must make sure that those controlling the Big Pipe(s) will not deny access to messages that owners of the pipe do not approve of. A lack of diversity in information, particularly political information and opinions, is regarded as dangerous to freedom of expression and to democracy.

Governments also fear that those controlling the Big Pipe(s) may deny access to those whose messages compete with theirs for advertising and other revenues, thereby reducing the competition that is supposed to benefit consumers (who are also voters). This possibility puts

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[22]Laurie McGinley, "A Phoenix Rises in China: Rupert Murdoch's Satellite TV Is Thriving, Legalities Notwithstanding," *The Wall Street Journal*, May 26, 1999, B-1.

[23]Information Highway Advisory Council, Minister of Supply and Services, *Connection Community Content: The Challenge of the Information Highway*, Final Report of the Information Highway Advisory Council (Ottawa: 1995), 26.

regulators in the awkward position of mandating that some channels should provide competitors with access to facilities for the purpose of competing with them. The mandate carries with it the need to set the price for access, because the owner of the channel could charge a price so high it could make competition impossible.

In policy circles it is popular to speak of channel owners in such cases as bottlenecks because they can stop the flow of information or stop competition,[24] but that description of their role in a network is not accurate, because they control access to the network itself. Strictly speaking, a bottleneck is a point *within* a network where payload (messages, freight, etc.) back up because of an local obstruction or reduction of capacity.[25]

Policy responses to initial network access and to bottlenecks should not be confused; the problems are very different. In the case of true bottlenecks, government regulation deals with the capacity or efficiency, or both, of the channel for some public purpose. In the case of initial access to a network by competitors (e.g., access to cable systems by local broadcasters or access to local telephone networks by competitors), government is forcing the duties of a common carrier on the channel owner. At the turn of the century, finding the right approach for the many facets of access continues to confound regulators on both sides of the Atlantic and the Pacific.[26]

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[24]See, e.g., Campbell Cowie and Christopher T. Marsden, "Convergence: Navigating Bottlenecks in Digital Pay-TV," *Info* **1**, 1 (February 1999), 53-67.

[25]See Longstaff, Networked Industries.

[26]See, e.g., Committee of Experts on Media Concentrations and Pluralism, "Council of Europe, Secretariat Information Paper on the Possible Council of Europe Action on Conditional Access in the Digital Television Sector, Strasbourg, France," Dec. 16, 1997," MM-CM 98, 2. See also "Recommendation No. R (99) 1 of the Committee of Ministers to Member States on Measures to Promote Media Pluralism, Adopted 19 January 1999, Strasbourg, France," [On-line]. URL: http://www.coe.fr/cm/ta/rec/1999/99r1.htm For a review of the issue of forced access in many countries, see Dianne Northfield, "The Heart of the Maze—Access to Networks and Services," Chapter Five, *The Information Policy Maze: Global Challenges—National Responses* (Melbourne: RMIT University Press, 1999), 262-378.

Chapter Seven

Regulating for Concentration and Diversity: The Big Questions

Deciding on public policy responses to the changes in the communications sector is a difficult political problem, because the stakeholders all want the full force of government to move the system in their direction.[1] Some will demand that government protect consumers from fraud, invasion of privacy, monopolies, and the invasion by foreign cultures. Others will demand that government make the information society possible by becoming an early adopter of expensive systems, supporting R&D initiatives, passing innovative protections of intellectual property, refraining from imposing tax burdens, and making theft of and damage to communications services serious crimes. The strongest players will ask policymakers to sit on the sidelines while the market determines which pipes, boxes, and companies will rule in the new world. Those afraid they might be the losers will ask government to protect their industries. In short, government will hear demands that are variations on two themes:

- The information society (whatever that may be) is a "public good" and will not be built unless government resources are used to help build it, make it safe, give everyone access to it, and train them how to use it; and
- The marketplace will not build the information society (and the Big Pipe, the Big Box, and the Big Company) if government gets in the way with burdensome regulation.

Governments around the world are taking many approaches to these themes.[2] Some (many of the members of the EU) have made the first theme dominant, while others (particularly the United States) have taken the second theme as their lead.[3] Any time the theme of the public good is played, issues become tangled (and compete for resources) with other social policies—education, health, economic development, and job creation. When the second theme dominates, public policy regarding fair play in the market is often more widely discussed. But both themes are sounded in all countries.

The Big Pipe, the Big Box, and the Big Company all depend on active participation (and, in some cases, leadership) by government. From national defense authorities to local schools, lots of hardware and software (e.g., sending/receiving devices, encoding/decoding devices, prepackaged messages) need to be purchased to create a stable demand for these products, because stability is important to continued investment. Local educational institutions are expected to initiate training

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[1]For a comprehensive review of the issues created by changing technology, see D. Ypsilanti and P. Xavier, "Toward Next Generation Regulation," *Telecommunications Policy* **22**, 8 (1998), 643-659.

[2]See, e.g., World Communication Report: The Media and the Challenge of the New Technologies (Paris: UNESCO Publishing, 1997).

[3]See, e.g., Jon Van, "FCC Chief Backs a Hands-Off Approach," *Chicago Tribune*, June 15, 1999, 3-1.

for people of all ages to encourage them to use the complex new boxes and pipes. National governments are told by believers that they need to encourage adoption of broadband technologies through tax initiatives, regulations designed to relieve consumers' misgivings about privacy and security of information, and regulations that give product and service providers enforceable protection of intellectual property. National and regional government organizations must provide support for R&D and act as centers for management of the European Information Infrastructure (EII),[4] National Information Infrastructure (NII, in the United States),[5] Advanced Information Infrastructure (AII, in Japan),[6] and, ultimately, the Global Information Infrastructure (GII).[7]

A Canadian government agency, the Information Highway Advisory Council, that saw government's role as "pivotal" identified four activities for government to undertake:

1. Development of a coherent regulatory and policy framework,
2. Coordination of related policies and initiatives within an overall strategy for the Information Highway,
3. Use its power of procurement and be a catalyst in building the Highway, and
4. Become a model user, inspiring all Canadians to participate and share the benefits of the Highway.[8]

Strikingly similar lists for government action have surfaced in the United States and the EU,[9] all presenting tried and true methods for government subsidies for infrastructure development that do not look like subsidies to the companies that own the infrastructure (which would be dangerous politically). Such methods have also been used to build transportation and energy networks. New

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[4]European Commission, Green Paper on the Convergence of the Telecommunications, Media, and Information Technology Sectors and the Implications for Regulation: Towards an Information Society Approach (Brussels: The European Commission, COM (97)623, Dec. 3, 1997), vii, [On-line]. URL: http://www.ispo.cec.be/convergencegp/97623.html See also Jacques Arlandis, "Information Highways: The European Flavour," in Telecommunications: New Dynamics and Driving Forces, edited by A. Bianchi and G. Richeri (Amsterdam: IOS Press, 1996), 19-28.

[5]See National Telecommunications and Information Administration (NTIA), *National Information Infrastructure* [NII]: *Agenda for Action* (Washington, D.C.**:** NTIA, 1993), 58 Fed. Reg. 49, 028.

[6]See Program for Advanced Information Infrastructure, Ministry of International Trade and Industry, May 1994, [On-line]. URL: http://www.glocom.ac.jp/NEWS/MITI-doc.html

[7]See, e.g., , NTIA, *The Global Information Infrastructure: Agenda for Cooperation* (Washington, D.C.: NTIA, 1995). For information on the activities of fifty-three countries, see [On-line] URL: http://www.ntia.doc.gov/reports/giiagend.html

[8]Information Highway Advisory Council, *Connection, Community, Content: The Challenge of the Information Highway*, Final Report of the Information Highway Advisory Council (Ottawa, Ont.: Ministry of Supply and Services Canada, Information Highway Advisory Council Secretariat, Industry Canada, 1995), 19-23.

[9]See Green Paper, 623; and National Information Infrastructure: Agenda for Action.

networks need coordination, which is very costly if provided by marketplace mechanisms. They also need a large "early adopter," to begin a revenue stream to show investors. The adopter, or adopters, will need to be very visible and trusted, so others may see how the technology works. Putting access to new network technology where many people can see and use it (e.g., into schools and libraries) may also prove to be a marketing boost for products and services associated with the network.[10]

Reconciling the demands on government to encourage new networks while foregoing regulation of the networks will not be easy. Uncertainties about the who, what, and when of convergence make the who, what, and when of potential regulation uncertain, at least in the short term. This chapter reviews some regulatory conundrums, using tools developed in previous chapters[11] and focussing on the Big Questions for any new regulatory schemes for the communications sector: Why? What? How? Who? and When?

7.1 Why Regulate? Old Goals in New Packages?

If the broad goals of communications regulation were applied to a more concentrated sector, the regulatory landscape might not change very much. In the twentieth century, many of these goals have endured several changes in technology, because, at a strategic level, most countries consider communications vital to their safety, economic success, and to the cultural life of their citizens. Although the priorities underlying these goals may change and new structures for implementing them may need to be developed, the goals themselves remain relevant for many visions of the future, including the three discussed here, the Big Pipe, the Big Box, and the Big Company.

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[10]For a discussion of the role of government in building various kinds of networks, see P. H. Longstaff, *Networked Industries: Patterns in Development, Operation, and Regulation* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, P-00-2, March 2000)), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html

[11]The European Commission compiled a detailed examination of many of these policy issues in documents leading toward and commenting on its *Green Paper*; see KPMG, *Public Policy Issues Arising from Telecommunication and Audiovisual Convergence*, A report prepared under contract to the European Commission (September 1996); Squire, Sanders & Dempsey, L.L.P.; and Analysys Ltd., *A Study on Adapting the EU Regulatory Framework to the Developing Multimedia Environment, A Study for the European Commission (Directorate-General XIII)* (Brussels-Luxembourg, Draft Final, Oct. 23, 1997). Both reports are available on-line at URL: http://www.ispo.cec.be/; and European Commission Legal Advisory Board, *Position Paper on the Green Paper on the Convergence of the Telecommunications, Media, and Information Technology Sectors*, Adopted March 12 and 31, 1998 (Brussels: European Commission Legal Advisory Board, 1998), [On-line]. URL: http://www.echo.lu/legal/en/convergence/positionpaper.html For a joint Australian–U.S. project by the Centre for International Research on Communication and Information Technologies (CIRCIT) and the Harvard University Program on Information Resources Policy, which looks at these issues worldwide, see Dianne Northfield, *The Information Policy Maze: Global Challenges—National Responses* (Melbourne: RMIT [Royal Melbourne Institute for Technology] University Press, 1999); see URL: http://www.circit.rmit.edu.au/publics/index.html

Universal Access. Universal access to certain messages, such as education and emergency information (e.g., information about natural disasters), has been an important government policy in almost all countries. Universal access to these messages is said to be appropriate, because all citizens pay for them through various taxes and/or government subsidies. For point-to-multipoint networks (mass media) this access to the channel has generally been characterized by governments as a right of the receivers of those messages, not of the senders. In many cases government was (until recently) the only authorized sender/channel, and most governments retain the power to license access to some channels. Universal access by receivers to certain channels, e.g., to broadcasting, cable and telephony, is also a policy in many countries. Access consideration for the poor has led to a variety of internal and external subsidies as well as various forms of price regulation for "conditional access" services, all of them requiring additional payments from some consumers in order to support access by others.[12]

Diversity of Voices, or "Pluralism." Diversity of voices, or pluralism, is a commitment to the rights of senders to put messages into specific channels. Pluralism policies were intended to encourage a marketplace of ideas in which the best ideas could arise and, in that way, they also benefit receivers. Not all governments have taken this view, choosing instead to protect their citizens from what they regard as deviant senders, which compete with senders of government-approved messages. The goal of many voices can lead to restrictions on the number of broadcasting and cable assets one company can own, because the owner is the ultimate sender and chooses the messages that go into the channel. If there are few owners, there are few senders. At the introduction of broadcasting and, later, of cable, promoters promised these services would increase the number of voices, but in both cases reality was shy of the promise. Some wonder whether the hopes at the turn of the century for new communications technologies will suffer the same fate.[13] The Internet has been widely touted as the ultimate answer for many voices, but evidence suggests that, here too, size is important to success and small voices are liable to be lost. Researchers studying statistics on visitors to WWW sites have found that the distribution of visitors per site follows a universal power law characteristic of winner-take-all markets. Thus, top sites may increase their performance while small ones fade away.[14]

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[12]See, e.g., P.H. Longstaff, *Telecommunications Competition and Universal Service: The Essential Tradeoffs* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, P-96-2 May 1996)), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html See also Milton Mueller, "Telecommunications Access in the Age of Electronic Commerce: Toward a Third-Generation Universal Service Policy," Federal Communications Law Journal **49**, 31 (1997), 655-673.

[13]See, e.g., Peter Humphreys and Matthias Lang, "Digital Television Between Economy and Pluralism," in *Changing Channels: The Prospects for Television in a Digital World*, edited by Jeanette Steemers (Luton, U.K.: University of Luton Press, 1998), 9-35.

[14]Lada A. Adamic and Bernardo A. Huberman, *The Nature of Markets in the World Wide Web* (Palo Alto, Calif.: Internet Ecologies Group, Xerox Palo Alto Research Center, 1999); [On-line]. URL: http://www.parc.xerox.com/istl/groups/iea/webmarkets.html

Diversity of Messages. Unless they are regulated as common carriers, the Big Pipe and the Big Box may reduce the number of ultimate senders. Diversity of messages is also achieved by encouraging both creativity and new messages by means of government protection of intellectual property, through copyrights and patents. Exclusive control of popular messages (such as sporting events) has been regarded as in conflict with these goals for diverse messages.

Competing Providers. In many countries, creating and maintaining competing providers for channels (pipes) and access devices (boxes) is a relatively new goal. Newly enabled competition generally brings lower prices to consumers and innovation to the market more quickly than monopoly services owned or regulated by government. The introduction of competition has led to many new considerations. For example, to protect consumers from becoming dependent on a single channel (e.g., owing to investments in decoding devices), policymakers need to consider whether competing channels should provide equipment that is interoperable. Most governments assume that competition must be restrained by rules that set out acceptable kinds of competitive practices, i.e., strong companies shall not kill weak ones, which would lead to monopolies. Monopolies are considered bad, because they lead to higher prices and create a market lacking in the diversity necessary to respond to changes in the environment. Policymakers in most countries generally view both horizontally and vertically integrated companies with suspicion, on the assumption that an economic system with a few very large entities lowers the level of competition in the marketplace. Although this assumption is almost certainly true, industry cooperation is the natural response of competing entities either to new competition or to a reduction of an already scarce resource (i.e., consumers' time and money). This important paradox is seldom acknowledged in policy debates: The more competition put into a system, the more players cooperate by forming larger organizations in order to be among the survivors.[15] High levels of competition may lead inevitably to the Big Pipe, the Big Box, and the Big Company.

Quality of Service. Quality of service has been a focus of much regulation, although what defines quality may be difficult to decide; it usually includes acceptable levels of audio and video signal clarity as well as channel capacity. Many governments see this goal as best handled by market forces. If, however, competition in communications networks follows the pattern seen in transportation networks, such as airlines, the quality and the level of service, particularly outside population centers, both will decline. The Big Company will not deploy (or maintain) fully operational Big Pipes and Big Boxes where it cannot garner an acceptable return on investment.

Consumer Protection. Consumer protection has involved regulation of access to personal information (that is, privacy) and the creation of legal remedies for fraud and defamation. These

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[15]See P.H. Longstaff, *Competition and Cooperation: From Biology to Business Regulation* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, P-98-4, October 1998)), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html

polices, which increase consumer confidence in new products and services, are critical to the success of the Big Pipe and the Big Box, because both are capable of capturing enormous amounts of personal information and both increase the difficulty of enforcing protection against fraud, libel, and copyright infringement.

Cultural Protection. Cultural protection of products (messages) such as movies and TV programming has been public policy in many countries, on the ground that certain messages about their citizens' ethnic history, cultural preferences, and economic or political system are important to each citizen's sense of identity and personal fulfillment, while information about other societies and other cultural or religious preferences may be bad for their citizens and so often are banned or regulated. *Localism* is a related policy, prevalent especially in large countries such as the United States and Canada. This policy assumes that mass communication messages should originate locally, because local producers have a better understanding of local culture. It also links local politicians with local broadcasters and filmmakers.

Economic Efficiency. Economic efficiency goals assume that communications resources spent in inefficient delivery of goods and services (at higher costs to producers than necessary) could be put to better use in other parts of the economy. This goal often conflicts with other goals, i.e., getting goods and services to consumers at prices not burdened by the inefficiencies created by regulation designed to ensure diversity or quality.

Security. Secure communication has been assured by government to make certain that networks will not be damaged by vandalism or sabotage and that the messages in them will not be intercepted by unauthorized persons. Security assures the reliability necessary to encourage use of communications services.

Government Revenue. Government revenue will eventually be an important policy consideration for the communications sector, because communications services will figure largely in the economies of most countries. Long-term forbearance from using communications as a source of tax revenue seems unlikely, although in the short term many governments have seen forbearance as a way to help new services (such as electronic commerce) get off the ground. Taxation is especially probable if, as believers predict, old sources of revenue, such as local retail sales, are hurt or even killed by the new services.[16] New tax schemes may require some creativity, because locating the economic activity to tax in services such as those provided by the Internet and satellite can be difficult, increasing the difficulty of sorting out which country should tax multinational pipes, boxes, and companies.

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[16]In 1998 Congress created an Advisory Commission on Electronic Commerce to study these issues. See Electronic Commerce: Hearings Before the Committee on Commerce, House of Representatives, 105th Congress, Second Sess. (Washington, D.C.: U. S. Gov't Printing Office, 1998).

All these goals have been implemented in most countries for one or more of the existing industries, and the arguments made for them in old communications channels may still be valid for new or reorganized industries. All policy goals in communications can be reformulated to set out what Amartya Sen called the "capabilities" that governments want to create for citizens, such as access to certain information or services.[17] According to this approach, it would then be possible to look at all the resources available to create these capabilities and to decide whether government intervention would be appropriate. If the market were providing the required goods and services in some cases, then government might concentrate on market failures in others. It may be easier for policymakers to take such a broad approach in a communications market in which the old boundaries between industries have broken down and the entire sector might, theoretically, become part of the answer to market failures.

7.2 Regulation of What? Communications or Competition?

Some ardent believers say that government regulation is neither wanted nor needed for the information age, because consumers will have abundant choices and competition will guarantee low prices and a high quality of service. Believers sometimes see government as a giver, not of responsibilities, but of rights and resources. In many countries in the late 1990s a policy of "let it be" seemed the order of the day, but not because governments thought communications policies were then fully provided for by technology and market forces. Most were still trying to figure out what was happening and how to respond. By that time, political pressure was building to apply the policy goals discussed in this chapter to such new services as the Internet, particularly protection of consumers (from invasion of privacy and fraud), children (from pornography and violence), and competing service providers (from being frozen out of the Big Pipe and the Big Box).

Some policy analysts have argued that industry-specific regulation is no longer rational or fair, because it tends to offer advantages to incumbents (and usually was designed to do just that) at the expense of new entrants.[18] These analysts argue that the market has changed the face of the sector, so what should be regulated are market activities, by competition and antitrust laws.

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[17]Nicholas Garnham, "Amartya Sen's 'Capabilities' Approach to the Evaluation of Welfare: Its Application to Communications," *The Public* **4**, 4 (1997), 25-34.

[18]See, e.g., William H. Read and Ronald Alan Weiner, "FCC Reform: Governing Requires a New Standard," *Federal Communications Law Journal* **49**, 2 (1997), 289-325; a version of this article was published as William H. Read and Ronald Alan Weiner, *FCC Reform: Does Governing Require a New Standard?* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, P-99-1, April 1999)), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html In the EU, see, e.g., Gunter Knieps, "Interconnection and Network Access: The Case of Telecommunications," a paper presented at the International Telecommunications Society Conference, Turin, Italy, Sept. 2-4, 1999 [unpublished].

But few countries have used these laws in a sector that is moving from a cooperative organizational structure (in which each telephone and cable operator had a monopoly in a certain territory and thus cooperated with the companies in other territories) to a competitive structure (in which some kinds of cooperation, for example, for interconnection with similar companies and for universal service) are no longer in anyone's immediate interest. Some kinds of cooperation that might help implement the three visions of convergence (e.g., vertical and horizontal integration and product-tying arrangements) frequently are illegal. Although the competition laws have been applied with some success in limited cases, they are not generally designed to accommodate all the policy goals that are still (in principle) at issue for communications services.[19]

Competition laws and policies "are a series of compromises worked out among key businesses with government as mediator."[20] They cover many different kinds of businesses, not all of them burdened with the practical problems of networked industries, and the precedents they have set may not be easy to apply to communications. Laws governing competition appear to be enforced, with more or less vigor, by political parties when they come to power, making these laws an unpredictable variable in long-range planning for businesses.

Relying on competition may present difficult policy questions down the road. For example, if the market regulates communications services, will government be prepared to let some local companies fail? Will government feel obligated to prop up failing companies to maintain competition? Is the goal many competitors or would duopoly be good enough? Should government deal with anticipated market failures (e.g., some people may not be able to get or afford service) or wait until the failure is manifested in the market?

7.3 Regulate How? Merged or Separate Regulations?

Many communications policy questions continue to be analyzed by asking where a particular service falls with regard to the regulatory categories established when industries such as telephony and broadcasting seemed to be separate industrial species that needed separate regulatory systems. The first question in many legislative debates and court decisions has thus been equivalent to "is it a duck or a goose?" At the same time, digitization and new trade rules allow messages to move more freely around the world, which requires regulators to determine the nationality of the duck (or goose). This problem has led policy analysts to call for a new

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[19]For a discussion of this controversy, see, e.g., Colin R. Blackman, "Convergence Between Telecommunications and Other Media: How Should Regulation Adapt?" *Telecommunications Policy* **22**, 3 (1998), 163-170.

[20]Thomas F. Baldwin, D. Stevens McVoy, and Charles Steinfield, *Convergence: Integrating Media, Information and Communication* (Thousand Oaks, Calif., London, and New Delhi: Sage Publications, 1996), 315-316.

regulatory approach.[21] In 1998, the FCC's Office of Plans and Policy suggested that "convergence" might require the Commission (and "perhaps Congress") to "develop a new regulatory paradigm and language that fit the new global communications medium known as the Internet" and other technologies "evolving in unforeseen and unforeseeable ways."[22]

The EC's *Green Paper* (1997) asked whether policy should build on current structures, develop new structures for new communications services, or introduce a new model to cover all services. This choice is often referred to as symmetrical versus asymmetrical regulation, and includes policies that discriminate between established entities (e.g., former government monopolies) and new entrants.[23] The *Green Paper* suggested that any new regulatory schemes ought to be applied consistently, at the global level, in the absence of scarcity, and without regard for public or private ownership. Any new regulatory boundaries need to be sustainable in the light of new technological development, need to avoid dual regulation for the same service, and need to assure that similar services and networks will be regulated in the same way.

Responses to the *Green Paper* do not reveal consensus on the issue of symmetrical versus asymmetrical regulation.[24] The EC's Legal Advisory Board agreed that regulations need to be competitively as well as technologically neutral and suggested that policy ought to look for both what is common to all industries and what makes them different.[25] Predictably, the industries that stand to benefit from current protections or subsidies are reluctant to create a level playing field on which they would be forced to compete with large (often global) players in a new game of Big Pipes, Big Boxes, and Big Companies. Change to the regulatory structure will therefore probably be evolutionary, rather than revolutionary, and will be complicated by the promises of the information age (jobs, economic development, culture, international trade, etc.) that have made communications policy a part of these policy debates as well.

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[21]See, e.g., Jean-Claude Burgelman and Pascal Verhoest, "Convergence and Trans-European Networks: Some Policy Problems," in *Telecommunication: New Dynamics and Driving Forces*, edited by Annaflavia Bianchi and Giuseppe Richeri (Amsterdam, Oxford, Tokyo, and Washington, D.C.: IOS Press, 1996), 7-18; and, P. H. Longstaff, *Information Theory As a Basis for Rationalizing Regulation of the Communications Industry* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, P-94-4, June 1994)), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html

[22]Barbara Esbin, *Internet Over Cable: Defining the Future in Terms of the Past* (Washington, D.C.: Federal Communications Commission [FCC], Office of Plans and Policy Working Paper No. 30, August 1998), 118.

[23]Antonio Perrucci and Michela Cimatoribus, "Competition, Convergence, and Asymmetry in Telecommunications Regulation," *Telecommunications Policy* **21**, 6 (1997), 493-512.

[24]Summary of the Results of the Public Consultation on the Green Paper on the Convergence of the Telecommunications, Media, and Information Technology Sectors: Areas for Further Reflection, Working Paper of the European Commission (Brussels: European Commission, July 29, 1998, SEC (98) 1284.

[25]European Commission Legal Advisory Board, *Position Paper on the Green Paper on the Convergence of the Telecommunications, Media, and Information Technology Sectors*, adopted March 12 and 31, 1998 (Brussels: European Commission Legal Advisory Board, 1998), [On-line]. URL: http://www.echo.lu/legal/en/convergence/positionpaper.html

How can a government regulate a moving target? How can regulation be evolutionary? The best advice may be, “Start small, test often, leave room for growth, abjure theology...pick the layers carefully, and keep plugging.”[26]

7.4 Who Should Regulate? Global or Local?

If a global communications system is on the horizon, who should govern it? If a global Big Pipe, Big Box, or Big Company, or all three, is the goal of public policy, then a patchwork of regulation around the world may well get in the way of realization. Conflicting policies will make global deployment difficult, and dealing with many regulatory authorities will make planning unpredictable. In 1999, a policy round table in the United States asserted that global electronic commerce depends on “stable, widely supported global governance structures.”[27] On the other side of the Atlantic, the European Business Round Table on Global Communications concluded that “The global nature of the on-line economy makes it impossible for any single government or body to regulate.”[28] Both groups saw self-regulation at a global level as the preferred approach, which assumes a voluntary cooperative structure for global companies, something like a *meta* Big Company. The simultaneous voluntary cooperation of companies for self-regulation and competition among themselves could raise issues of illegal cooperation to defeat competition. An international charter for global communications has been proposed as a possible compromise.[29] It has been described as a “legally nonbinding multilateral understanding…. The issues to be tackled by the Charter range from interoperable technical (e.g., domain name systems) to legal solutions (e.g., tax, jurisdiction, copyright, labor law, consumer protection, trademarks, content).”[30]

On the other hand, a one-size-fits-all policy enacted at the global level may not be capable of dealing with differences at the local level and would almost certainly be dominated by a small group of powerful nations and companies, which would make such organizations as the International Telecommunications Union or the United Nations, which operate on a one-nation-one-vote basis, unlikely venues for regulation. A more decentralized system of policymaking might

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[26]Martin C. Libicki, *Information Technology Standards: Quest for the Common Byte* (Boston: Butterworth-Heinemann, Digital Press, 1995**)**, 362), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html

[27]*Toward Sustainable Competition in Global Telecommunications: From Principle to Practice*, Report of the 3rd Ann. Aspen Inst. Roundtable Int. Telecom., William J. Drake, Rapporteur (Washington, D.C.: The Aspen Institute, 1999), 104.

[28]*Conclusions of the Business Round Table on Global Communications* (Brussels, June 29, 1998), [On-line]. URL: http://www.ispo.cec.be/eif/policy/industryconclude.html

[29]This proposal was first made by Commissioner Bangemann of Directorate-General (DG) XIII in a speech in Venice, September 1997, [On-line]. URL: http://www.ispo.cec.be/infosoc/prome/speech/venice.html

[30]Michael Latzer, “European Mediamatics Policies: Coping with Convergence and Globalization,” *Telecommunications Policy* **2**, 6 (1998), 457-466; 463.

both allow more trial and error in many places and allow the system to find an appropriate policy that would emerge from below, rather than be dictated from above.[31]

Global regulation (by either public or private organizations) would face stiff resistance from national governments which have long seen control over communications as part of national sovereignty. In the United States the states retain important power over communications under constitutional doctrines of states' rights and through explicit grants of authority under federal law. Members of the EU retain sovereignty under principles of subsidiarity and also retain specific control over culture under the Maastricht Treaty.[32] Calls for establishment of a single regulatory body for the EU (something like the FCC in the United States) have met with little success.[33]

No trend starts from a tabula rasa. Societies around the world will, almost certainly, respond differently to new communications technologies owing to social, political, and economic differences. Societies with a tradition of freedom of expression are likely to be less fearful of new possibilities for communicating messages displeasing to the government. Societies with an educated, affluent population are more likely to have both the skills and the resources to use the new technology. These differences would seem to indicate that a one-size-fits-all approach to infrastructure, services, and policymaking may be ill advised. Even if such an approach were devised, its impact on each society would be different, thus defeating the premise.

The complexity of the global economic system and the variations in local economic conditions led economist Paul Krugman, of the Massachusetts Institute of Technology, to conclude that few (if any) economic policies are correct for all countries at all times; the correct policy will be dictated by how a country got where it is (which will not be the same as how other countries got where they are).[34]

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[31]For a discussion of decentralized policy, see Gerald W. Brock, *Telecommunications Policy for the Information Age: From Monopoly to Competition* (Cambridge, Mass., and London: Harvard University Press, 1994).

[32]The Maastricht Treaty, by which the European Union was created, was "approved at Maastricht in the Netherlands by the heads by heads of government of the twelve members of the European Community in December 1991 and was signed on February 7, 1992…. The treaty created joint foreign and monetary policies…. The European Union was established on November 1, 1993." Members of the EC became members of the EU. "Maastricht Treaty," Microsoft® Encarta® Online Encyclopedia 1997-2000, [On-line]. URL: http://www.encarta.msn (Accessed Dec. 18, 2000.)

[33]The Legal Advisory Board of the EC specifically opposed the idea of such a body; see European Commission Legal Advisory Board, *Position Paper on the Green Paper on the Convergence of the Telecommunications, Media, and Information Technology Sectors*, Adopted March 12 and 31, 1998, Brussels, [On-line]. URL: http://www.echo.lu/legal/en/convergence/positionpaper.html

[34]Paul Krugman, *The Return of Depression Economics* (New York: W.W. Norton 1999).

7.5 When Will Convergence Happen? When Would Regulation Be Appropriate?

The timing of a converged communications universe also is a matter of wide differences in opinion and depends on both theology and the definition of convergence. Believers see convergence occurring sooner than either agnostics or atheists, these last being those who don't see it happening at all. This divergence of view is understandable, given that people with a clear vision of something usually assume realization must be close at hand. Such clarity of vision may account for what Robert Lucky, of Bell Communications Research (now Telcordia, part of Lucent Technologies), calls the "hype cycle" for convergence.[35] Paul David, an economist from Stanford University, has called this "technological presbyopia":

> It's a form of farsightedness, which, in this case, makes it impossible to focus clearly on the existence of many immediate problems. It causes the sufferer to gaze too exclusively on the imagined bounties of a distant future. And to do so risks overlooking how long it will likely take to get from here to there, especially when "there" is defined in terms of novel, complex consumer goods by mass markets or the pervasive adoption of distributors' systems of production, which require significant investments in the fixed capital assets by many parties.[36]

Anthony Oettinger sees this view as an ecstasy that can turn into an agony when

> some products and services will be ripe, others only hype. Some…will be ripe but unwanted. Others will be seen as too complex; still others as too simple. And the ones successful at the expense of someone else's market often enrage the losers into political action that changes the rules of the marketplace.[37]

Several commentators and scholars have pointed out that those predicting the death of print and broadcasting (by the Big Pipe or the Big Box) ignore the history of the communications industry,[38] which reveals a recurring response to the introduction of new distribution technologies

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[35]Keeping the U.S. Computer and Communications Industry Competitive: Convergence of Computing Communications and Entertainment, A Colloquium Report of the National Research Council (Washington D.C.: National Academy Press, 1995), viii.

[36]Ibid., 6-7, quoting Paul David, Stanford University.

[37]Anthony G. Oettinger, *Telling Ripe from Hype: The Ecstasy and the Agony* (Cambridge, Mass.: Harvard University Program on Information Resources Policy, I-94-2, July 1994), [On-line]. URL: http://www.pirp.harvard.edu/pubs.html

[38]See, e.g., Everett M. Rogers, *Communications Technology: The New Media in Society* (New York: The Free Press, 1986); and, Roger Fidler, *Mediamorphosis: Understanding the New Media* (Thousand Oaks, Calif.: Pine Forge Press, 1997). See also Martin L. Ernst, "Electronic–Print Competition: Determinants of the Potential for Major Change," in *Mastering the Changing Information World*, edited by Martin L. Ernst (Norwood, N.J.: Ablex Publishing Corp., 1993); and Joost Kist, *The Role of Print on Paper in the Publishing House of the Future* (Cambridge, Mass.:

(channels): old channels do not go out of business but, instead, find new niches and coexist alongside them. The introduction of each new communications channel reveals this remarkably similar pattern,[39] itself similar to the pattern of coexistence of species in biological systems, where only a limited overlap occurs in the use of a scarce resource. In competition in both business and biological systems, the landscape might change dramatically were all competitors to pursue the same resource—in which case, a battle to the death would be probable, with only one or two industries or species left.[40]

Of course, there is no guarantee, nor has there ever been, that all communications channels will live forever. Some will find new niches totally unlike their earlier businesses. Some, after a time, will just go out of existence. Similar patterns can be seen in other networks when competition becomes intense. For example, the nineteenth-century transportation channels known as barge canals were made nearly extinct by the introduction of the railroad and automobile. In most countries, barge canals which once carried large amounts of commercial products remained commercially viable for a time after they concentrated their efforts on one part of the market—industrial commodities such as coal. Many survive now primarily as pleasure-craft channels. They have not died, but their share of the transportation market is much reduced, and they no longer serve their original or even second purpose. Many still in operation would probably have ceased were it not for government subsidies. The evolution of canals took more than a century, and for a long time canals survived as connections with the new transportation networks, such as railroads and highways, thereby forming large, multimodal networks.[41] Interconnection did not mean convergence, however, because each transportation channel had different cost structures and efficiently served different customers. A similar evolution may be occurring as print and other established channels find connections with new channels. Although they may interconnect, they may also maintain their distinctiveness as the most efficient source of communications services for certain customers.

It often takes a least one human generation for new communications technologies to be widely adopted and even longer for them to force other channels out of their markets.[42] This truism would seem to indicate a long period during which communications channels overlap, unless the pace of change accelerates. In the twenty-first century such experience will need to be

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Harvard University Program on Information Resources Policy, I-93-3, December 1993), both available on-line at URL: http://www.pirp.harvard.edu/pubs.html

[39]See W. Russell Neuman, *The Future of the Mass Audience* (Cambridge, Eng., and New York: Cambridge University Press, 1991), 115-121.

[40]In biology, these phenomena are together known as the competitive exclusion principle, which appears to operate also in economic systems. See Longstaff, *Competition and Cooperation: From Biology to Business Regulation*, 19-22, [On-line]. URL: http://www.pirp.harvard.edu/pubs.html

[41]For a history of canals and other networks, see Longstaff, *Networked Industries*.

[42]See Fidler, Mediamorphosis: Understanding the New Media, 29.

reinterpreted. Some believers have pointed to the rapid adoption of the Internet as evidence that old rules no longer apply, but this view generally ignores the fact the Internet was around for almost twenty years before it was widely adopted in the United States—and its adoption elsewhere has come more slowly. An argument can be made, however, that building faster communications channels may lead to more rapid adoption of all kinds of innovations, including new communications technologies.

Five classes of variables have been identified for the adoption rate of innovations:

1. Type of innovation decisions (optional, collective or authoritative);
2. Communication channels (external via mass media or internal via contact);
3. Nature of the social system (norms, degree of interconnectedness);
4. Extent of change agent's promotional efforts; and
5. Perceived attributes of the innovation (relative advantage, compatibility, "trialability," and "observability").[43]

Because communications networks are a variable in the speed of the adoption of innovation, a faster network may increase the speed of adoption to the point where the different starting places of different countries become less important. But because each community within a country may have different levels of the other four variables, the chances of a uniform rate of adoption for any particular communications technology seem slim, and predictions would be good only for particular groups. Even within cooperative regions, such as the EU and the United States, the distribution of economic development is not equal, and theorists have seen a trend toward increasing wealth for core areas while peripheral areas (usually rural) continue to decline.[44] Some have claimed that communications infrastructure itself will draw resources to areas where it is heavily deployed—leaving other areas to become economic backwaters.[45]

Beginning in 1998, voices were heard in policymaking circles questioning government's role in encouraging convergence. For example, the position paper of the EC's Legal Advisory Board stated that regulation should "tend neither to privilege one medium or one specific technology nor to artificially force convergence between competing infrastructures."[46] In 1999, the FCC took a similar hands-off approach to the development of markets for the Big Pipe and

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[43]Everett Rogers, *Diffusion of Innovations*, 4th ed. (New York: The Free Press, 1995).

[44]See e.g., Gunnar Myrdal, *Economic Theory and the Underdeveloped Regions* (London: Duckworth, 1957).

[45]See, e.g., Don Tapscott, The Digital Economy: Promise and Peril in the Age of Networked Intelligence (New York: McGraw-Hill, 1996), 290.

[46]Position Paper on the Green Paper on the Convergence of the Telecommunications, Media, and Information Technology Sectors.

the Big Box.[47] Without consensus on either the appropriate direction for or the ultimate goal of convergence, many have suggested that market forces must determine both, because the market is a "superior discovery process—especially under conditions of great uncertainty—less likely to make big mistakes and quicker to correct small mistakes."[48] Others believe that it is precisely in times of uncertainty that government should step in to "steer and stabilize."[49]

If one's vision of convergence includes the Big (integrated and international) Company, then such a giant was clearly in existence by the end of the twentieth century. If that vision includes an the assumption that Big Companies (and even small ones) actually made money on converged products or services, then paradise still, at that point, lay somewhat further in the future. By 2001, there was little hard evidence to show that consumers would pay the prices necessary to support the huge investments made in digital television or video-on-demand or even the costs of access to the Internet (including fees for access to long-distance services and infrastructure upgrades).

Governments around the world have seemed of two minds on the subject of timing. A report by the FCC's Office of Plans and Policy in August of 1998 concluded that because forces blur the borders between industries (for example, Internet services over cable lines), new regulatory models need to be developed. In another report, dated December of 1998, the FCC declared that the convergence envisioned in the 1996 Telecommunications Act (e.g., video services via phone lines) had not yet occurred.[50] In the EU, digital TV service offered in France (Canal +) had after two years penetrated to only 5 percent of the French market, and demand was said to be "almost nonexistent."[51] Movement to digital TV in Europe may take twice as long as the switch to color, according to Richard Cawley, of the EC's Directorate-General XIII, according to whom Europe does not have extra spectrum for simulcasting in both analog and digital during a transition period. Members of the EU use 8-MHz bands (instead of the 6-MHz used in the United States), and all other appropriate spectrum is already allocated to other uses. Cawley said digital might

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[47]See, e.g., *Broadband Today: On Industry Monitoring Sessions Convened by the Cable Services Bureau*, a Staff Report to William Kennard, Chairman (Washington, D.C.: FCC, October 1999), [On-line]. URL: www.fcc.gov/Bureaus/Cable/News_Releases/1999/nrcb9017.html

[48]Robert E. Litan and William Niskanen, *Going Digital: A Guide to Policy in the Digital Age* (Washington, D.C.: The Brookings Institution Press and The Cato Institute, 1998), 67.

[49]Ibid., 67, quoting Robert Kuttner, "Clinton's Talented and Tenacious Regulators," *Washington Post*, June 2, 1997, A-19.

[50]*FCC Fifth Annual Report on Competition in Video Markets* (Washington, D.C.: FCC, Dec. 17, 1998), [On-line]. URL: http://www.fcc.gov/Bureaus/Cable/News_Releases/1998/nrcb8024.html

[51]Mike Bracken, "Digital Television: Europe Divided on TV Standard," Reuters/Wired News Service, Sept.16, 1998.

gain a foothold through satellite services that broadcast in digital or through converter boxes that enable old analog TV sets to receive digital services.[52]

Most Europeans lagged far behind citizens in the United States in adoption of the Internet, and the number of people who announced their interest far exceeded the number willing to pay to use it.[53] A policy analyst for a European telecommunications company noted that the "buzz" around the Internet among young people and businesses in Europe may create expectations about speed and affordability that will make Internet adoption a political issue and force governments into footing the bills to upgrade current systems on both sides of the Atlantic, without waiting for the marketplace to do it. But Nico Van Eijk, of the Institute for Information Law in Amsterdam, thought the process will take a generation, probably too long for such factors to become political, because governments must see change within their life cycles (usually four to eight years). "There aren't many votes for 'pay now and your children will benefit,'" he said.[54]

[52]Interview with Richard A. Cawley, DG XIII, Brussels, Sept. 16, 1998.

[53]"Measuring the Information Society," "Results from the 1997 Survey," European Commission, DG XIII, Brussels, 1997. The survey was carried out in September of 1995 by the European Omnibus Survey (EOS) Gallup, [On-line]. URL: http://www.ispo.cec.be/infosoc/promo/pubs/measure.html

[54]Interview by the author with Van Eijk, Amsterdam, Nov. 2, 1998.

Chapter Eight

Conclusions

The forces at work in the communications sector (technical, political, social, and economic) are far more complex than the buzzword "convergence" can convey. Some forces are moving the parts of the sector together, others pulling them apart. The process (and the end point) might be better called coadaptation or realignment. The complexity of the forces means that the shape and timing of any new equilibrium in the communications sector are unpredictable. The sector offers many opportunities and many risks to those whose work it is to develop business plans or public policy.

The winners (in both business and policy) may be those who understand this unpredictability and can maintain flexibility in responding to change. They will need to look for forces that lead to both concentration and diversity. They will need to understand that no trend encounters a blank slate, and that the different starting points—technical, political, social, and economic—will dictate different ending places, at least in the short to medium term. For balance in all this turbulence, they will do well to keep at least one eye focussed on what all communications have in common in the technical, political, social, and economic spheres.

Perhaps Geoffrey Nunberg, principal scientist at the Xerox Palo Alto Research Center (California), summed it up best:

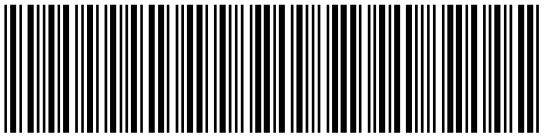
> Things converge, but they also diverge and reverge (a pity that Kepler never got around to inventing that verb, which would come in handy now). And for all that, it's easier to perceive the disappearance of old boundaries than the emergence of new ones. It isn't as if people aren't aware of this. After all, the same age that made *convergence* a buzzword has also brought late-career stardom to that old word *niche*.[1]

[1]Geoffrey Nunberg, "kon-`ver-jen(t)s: A History," *Forbes ASAP* (Oct. 4, 1999), 201-202.

Acronyms

ARPA	Advanced Research Projects Agency
ATM	asynchronous transfer mode
CEO	chief executive officer
EC	European Commission
EII	European Information Infrastructure
EU	European Union
FCC	Federal Communications Commission
GATT	General Agreement on Tariffs and Trade
GII	Global Information Infrastructure
IP	Internet Protocol
ISDN	integrated services digital network
MIT	Massachusetts Institute of Technology
NII	National Information Infrastructure
OECD	Organization for Economic Co-operation and Development
PC	personal computer
PTO	public telecommunications operator
R&D	research and development
STB	set-top box
TV	television
U.K.	United Kingdom
UNESCO	United Nations Educational, Scientific, and Cultural Organization
U.S.	United States
WTO	World Trade Organization
WWW	World Wide Web

PPLONGSTAFFCONVERGENCE



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