Ruling
the Waves

CYCLES OF DISCOVERY,
CHAOS, AND WEALTH
FROM THE COMPASS
TO THE INTERNET

Debora L. Spar

HARCOURT, INC.
New York San Diego London
Partenia is a lonely place. Strewn across the sands of the Sahara, it is formally located in Tunisia, or Algeria, or Libya, depending on to whom you talk or which way the winds are blowing. It is an ancient place, Partenia, a remnant of a world that hardly anyone can even remember. Yet in a very strange way Partenia is coming back.

In 1995, the Vatican dismissed an outspoken French bishop named Jacques Gailloit. Arguing that Gailloit had been far too liberal for the Church’s doctrine, Vatican officials removed him from his diocese outside Paris and sent him to Partenia. Clearly it was a symbolic move, for the Church never expected Gailloit to preach to the empty drifts of the Sahara. They simply wanted to defrock him gently, pushing the unruly bishop to one of the several jurisdictions reserved for retired, aging, or unwanted
priests. Gaillot, however, wasn’t prepared to go quietly, or to re-
nounce the liberal views that had angered his superiors in Rome. So he went to Partenia—virtually.

One year after his dismissal, Gaillot launched the world’s first “virtual diocese.” Named Partenia, it is a site for liberal Catholics, a “place of freedom,” according to Gaillot, where Catholics can discuss the issues that Gaillot had come to stand for: the problem of homelessness, the spread of AIDS, the evils of nuclear testing, and the wisdom of married priests. In the first six weeks of 1996, Partenia registered 250,000 hits. The Vatican, presumably, was not impressed with Gaillot’s move and spent a good deal of time trying to concoct a strategy for dealing with this unsettling cyber-priest. But there really wasn’t much that they could do, so they left Gaillot and his liberal site alone. Partenia had won.

In cyberspace, Partenia is everywhere. Dotted along the Internet’s web are millions of places where rebels like Bishop Gaillot reside. There are pornography sites accessible to straitlaced Singaporeans, Liberian gambling dens, and secluded banking services run from the tiny island of Anguilla. There are networks of Burmese dissidents, collecting information on the dictatorial regime in Rangoon and e-mailing it to thousands of supporters around the world. There are bootleg copies of academic papers and Snoop Doggy Dogg’s latest hits. In cyberspace, even solemn corporations indulge their rebel side, slipping around the real-world laws that govern things such as export controls and truth in advertising.

If we look at cyberspace from the viewpoint of Partenia, then, it looks very much like a frontier town—like California of the 1890s, or the Indies to which Europe scrambled in the seventeenth century. There are the usual hordes of rebels and rogues, plus scores of pioneers and gold-diggers, each scrambling to carve out new territories and stake their claims in them. There are people like Marc Andreessen and Jerry Yang (the respective founders of Netscape and Yahoo!), who ventured west to test their mettle and made incredible fortunes virtually overnight. There are prophets who scream of a brave new world and traveling salesmen hawking IPOs instead of snake oil. (The connection, of course, may not be that distant.) As on any good frontier, there are not a lot of rules or marshals in town, so justice is rough and the winners grab whatever they can. There are, to be sure, some remote au-
thorities (the U.S. Federal Communications Commission, the European Commission’s DG IV) who claim to be patrolling the area, but everyone knows that their guns are not loaded. For cyberspace, it seems, is a lawless realm, a place where unruly bishops can confound the Pope and Jerry Yang can start a multibillion-dollar industry before turning thirty.

This sense of anarchy permeates the farthest reaches of the Net. In Silicon Valley, along Route 128, and in the swanky cafe of Beijing and Rangoon, there is a palpable sense of exci-
tement, a prevailing belief that authority is dead and that digi-
tal technologies have killed it. And to some extent this is true. Digital technologies have created a revolution of sorts. They have allowed entrepreneurs to build empires out of fiber and thin air and to establish these empires in a realm without rules. They have challenged governments and their traditional author-
ity—not by design or intent, but purely as a result of techno-
logical accident. Because digital technologies allow information to flow seamlessly and invisibly across national borders, they make it very difficult for governments to do many of the things to which they have grown accustomed. Governments can’t pa-
trol their physical territories in cyberspace; they can’t easily en-
force property rights over ephemeral ideas and rapidly moving bits; they can’t control information flows; they even may not be able to collect taxes. Such is the nature of politics along the technological frontier.

Yet even in the midst of all this tumult, it is useful to main-
tain a sense of perspective, and of history. Cyberspace is indeed a brave new world, but it’s not the only new world. There have been other moments in time that undoubtedly felt very much like the present era, other moments when technology raced faster than governments and called forth whole new markets and social structures. Other entrepreneurs sensed that they, too, were standing on the edge of history, bending authority to their will and reaping fabulous profits along the way. Some of them
succeeded beyond their wildest dreams. Pioneers such as Thomas Edison and Guglielmo Marconi, for example, saw the fantastic opportunity of technology and ran nibly along its curve. They built empires where none existed and wrote rules to serve their own advantage. Other pioneers, however, were far less successful. Even if they had path-breaking technology, and even if they flourished for some time in a period of blissful chaos, many entrepreneurs eventually found themselves caught by a system that bit back—by markets that reasserted their old ways or governments that outpaced the technological frontier and claimed it for themselves. The new world in these cases fell back into the old, leaving the pioneers stranded on what once seemed to be the future.

This is a book that tries to yank the Internet out of the spotlight of the twenty-first century and back to its older and dimmer roots. It argues that while cyberspace is new and sparkling with opportunity, it is not that new and that much sparklier than other technologies were on the eve of their creation. We are undeniably living in a revolutionary period. We see this revolution every day and feel it crack the structures of our lives. We see it in the rush toward Silicon Valley, in the euphoria that drove Internet stocks to unbelievable heights, in the intrusion of e-mail and surfing and “dot.com” everything. At a more profound level, it is also clear that this revolution will seriously affect both business and politics. It will open vast new vistas for commerce and, in the process, will challenge relations between private firms and the governments that seek to regulate them. The information revolution is alive and well. It will change the way we work, they way we play, and the way in which we order our societies. It will change in particular how we think about governments, because cyberspace is a realm that seems inherently to ignore traditional authorities. Cyberspace, in fact, is a truly global phenomenon, something that spans borders impressibly and imperceptibly. Purely by accident, the Net shatters our notions of what a “state” does or what a “national economy” is. For cyberspace is bigger than any state and well beyond traditional powers of enforcement. What can the Pope do if Bishop Galliot uses his site to condemn celibacy in the priesthood and encourage the use of condoms? Not much. How
redrawing each letter, each sketch of just a few texts. The technology of the period was pen and parchment, and it survived for hundreds of years.

And then a young silversmith named Johannes Gutenberg came along. In 1453, after years of tinkering with typography and dies cast from various minerals, Gutenberg devised a rudimentary printing press. The technology was rather straightforward: blocks etched with different letters were simply inserted into a shallow box, inked, and then pressed against sheets of paper to leave a written imprint. But the implications wreaked slow-boiling havoc on Europe's established social order. Initially, the Church welcomed Gutenberg's machine, describing it as a supernatural invention that would enable priests to read more easily to their congregations. As the medium spread, though, the Church grew wary, seeing in moveable type the makings of a revolution. More Bibles were printed, the more people wanted to read them and to interpret the Church's doctrine for themselves. The more access people had to printing technologies, the more freedom they had to challenge the Church and to break its monopoly on priestly information. Thus the technology—a simple mix of ink and metal—became political. It created a space in which rebels could play and ignored the structure of existing rules.

Before too long this radical potential erupted. In 1517 a young German priest named Martin Luther used a Gutenberg-type press to publish copies of his "95 Theses," a list of arguments that directly challenged the Church and its practices. By themselves, the theses were not really all that radical; for centuries, disgruntled clerics had made similar arguments and compiled similar lists. But Luther had technology on his side. Rather than staying tucked to the door of a single local church, Luther's theses circulated widely around Europe, creating excitement just by virtue of their circulation and the renown that soon accompanied them. They stirred a priestly buzz, to be sure, but a buzz all the same. And the implications were dramatic. Luther's theses let loose the Reformation and the rise of Protestantism, the first sustained crack in Catholicism's religious control of Europe. Simultaneously, the expansion of printing technology made it easier and easier for laypersons to read, and thus to challenge the vested authority of the Church's priestly elite. By 1534, when King Henry VIII declared Catholicism illegal in Great Britain and made his subjects members of the newly created Church of England, the Catholic Church had been dealt a formidable blow. Printing technologies didn't cause this shift of power, of course, but they certainly facilitated it. Without Gutenberg, Luther would have remained a local hero—a thorn in the side of the Church, perhaps, but not the founder of an entirely separate structure. This, again, is the nature of power along the technological frontier.

But even Luther's victory was not complete. Technology challenged the Church, forcing it to change in some ways, but it certainly did not kill it. On the contrary, once Vatican officials realized the power of printing, they scrambled to use it for their own purposes. They established Catholic publishing houses to foster a Counter-Reformation, circulated the Bible and other key texts, and learned how to reach out to a growing mass of literate followers. While they undeniably lost the informal monopoly over printing that the monks had provided, they managed to control key forms of information and the power that accompanied them. Rules changed, and power shifted, but the patterns that had dominated before Gutenberg's time remained solidly in place.

An equally striking dynamic surrounded the development of radio, another major stage in the information revolution. In 1896, Italian inventor Guglielmo Marconi brought a small black box with him to Britain. It was an early prototype for a radio: a makeshift device that transmitted Morse code via electromagnetic waves. As soon as he crossed the border, customs officials smashed the box to pieces, fearing that it would inspire violence and revolution. So Marconi went home and continued to work on his invention, eventually creating a firm designed to develop the radio for commercial use. Before long, though, the government reappeared and declared a security interest in Marconi's device. By the start of the first World War, the Marconi Company had become a full-time contractor for the British government and the British Navy controlled the fledgling technology of radio transmission.

If we apply the patterns of printing and radio to today's information revolution, they imply an outcome strangely at odds with the view from Parthenia. They suggest that there is a certain
give-and-take along the technological frontier, a dance of regulation that moves power back and forth between firms and governments, between pioneers and bureaucrats. In this view, even the most radical technology will not necessarily force any particular authority to disappear, or even to change its fundamental mission. Instead, technology challenges authority for some period of time, but then, ironically, seems to invite this authority back in: the Church embraced the printing press in the end, the British government absorbed the company it once saw as dangerous. Perhaps the Internet is different. Perhaps it is so revolutionary, so international that it will disrupt the patterns that have prevailed in the past and dispel the myths we have built around them. Perhaps it really will deal governments a fatal blow and usher in new forms of social organization. Perhaps the future of power will be a world of Galliots and cybercafes, circles of communication or commerce without any central authority. But perhaps not. Certainly history suggests that we have been here before and come out largely where we started. With new rules, to be sure, and new forms of commerce, but still with a basic structure of authority and a recognizable state.

If we view cyberspace from history, therefore, rather than from Partenia, we see a more complex vision. Instead of a one-way scramble to a brave new world, it is a journey of twists and turns, a movement along a frontier whose boundaries shift and stumble and collide. It is a view filled with the normal characters of a frontier town: there are still the pirates and the pioneers, the tinkers and the traveling salesmen. Only in this view, the pirates and the pioneers aren’t necessarily the winners. Instead, once the technological frontier has moved beyond a certain point, power—and profits—seem to shift away from those who break the rules and back to those who make them.

*Ruling the Waves* is essentially a book of frontier stories. It begins with Portuguese explorers of the fifteenth century, follows the development of telegraph and radio in the middle of the nineteenth century, and then turns to the advent of satellite television and the Internet in the twentieth. Part of the book’s intent is simply to tell these stories, for they are fascinating in their own right and little-known outside of academic enclaves. The broader intent, though, is to use these stories to link current developments along the technological frontier back to their rightful ancestors: to show how Rupert Murdoch and Bill Gates are descended in many ways from Prince Henry and Samuel Morse, and to think about what Murdoch and Gates might be able to learn from these older pioneers.

The stories that are presented here were not chosen with scientific precision. Indeed there are dozens of other technologies and hundreds of other pioneers whose stories are just as intriguing and important: Edison and electricity, Bell and telephones, Watt and the steam engine. There are also dramatic developments outside the western world—particularly in China and the Islamic states—that fell beyond the research scope of this book. All the stories that are here, however, contain some common themes and parallels. All involve, for example, a sharp movement along the technological frontier—a moment in time when innovation leaps suddenly outward, creating new opportunities for commerce and tremendous enthusiasm among aspiring entrepreneurs. In each case, moreover, the technological leap also created a political gap. Innovation, in other words, enabled firms to play in some new sphere of activity, free from the rules or regulations that might bind them in another, more established realm. Finally, all of the stories presented here are about a particular type of technology. They are all about communication, about bringing information from one spot to another. There is nothing unique about these technologies, of course, and the patterns that emerge here might well apply across the technological spectrum. But communications technologies have a certain force to them, and a particular import. For communication is the sine of both commerce and politics, the channel through which information—and thus power—flows. Ever since God warned Eve to resist the apple, authorities have tried to control information flows. And ever since Eve took that first bite, pioneers have resisted these controls and tried to find ways around them. This is a book about their stories—about life on the technological frontier and the pirates, prophets, and pioneers who struggle to build their empires upon it.

This is also a book about ideas. In particular, it is a book about how markets get established and how firms and governments together shape their creation. Frequently, the worlds
of business and politics are described as belonging to wholly different spheres. There is business on one side, following the laws of the market and the dictates of competition, and government on the other, pulled by the demands of power and the desire to maintain it. This book takes a very different tack. Business, I argue, is inherently political and politics is—and has always been—marked by the interests of commerce. This overlap is everywhere: in trade policy, defense policy, and the politics of procurement or privatization. But it is particularly strong along the edges of the technological frontier. For it is here that markets are actually created, where industries spring to life and then settle, eventually, into some kind of ordered existence. As this process unwinds, power is distributed and structures are established. It is a hugely political enterprise, even if governments are not actively calling the shots or regulating commercial activity.

In fact, it is precisely the lack of established regulation that makes the technological frontier so political. In order for commerce to grow in any uncharted territory there need to be rules. Not regulation necessarily, or even governments—just rules. There need to be property rights, for example, and some sense of contracts. In higher technology areas, there need to be rules for intellectual property (who owns the operating system? under what terms?) and provisions for standardization (how do different products work together? which technical platform becomes the norm?). Without these rules, commerce may still emerge, but it will not flourish. There may be bursts of commercial activity and a handful of pioneers who cherish life on the edge, but wide-scale commerce will remain elusive. This is a powerful lesson of history and a tragedy that still affects large swaths of the global economy. Without rules, and particularly without rules of property and exchange, markets simply do not grow. Just look at Russia in the 1990s, or some of Africa’s more chaotic regions. A similar dynamic prevails along the technological frontier. New markets need new rules if they are to flourish, and their creation is a distinctly political act.

This connection between politics and business, rules and markets, unwinds slowly along the technological frontier. At any particular point in time, it is difficult to see how politics is shaping markets, or why entrepreneurs might want to do anything other than expand their empires and push technology’s edge. Which is why history is so critical. It provides a sense of perspective that can’t possibly exist in the present; it displays patterns that can appear only once the dust of the frontier has settled and the pioneers have moved on. And these patterns are strong. Indeed, it appears from the stories presented here that life along the technological frontier moves through four distinct phases: innovation, commercialization, creative anarchy, and rules. Each has its own rhythm and speed, a movement that shifts with the tides of the times and the nature of technological change. Yet there are clearly patterns and lessons to be drawn from them.

Phase One: Innovation

In the beginning, of course, there is innovation. This is the stage of tinkerers and inventors, a stage marked by laborious exploration and the sudden thrill of discovery. It is the sexiest phase along the technological frontier, a time that sparks the imagination and provides motivation for the next generation of dreamers and planners. It is not a phase in which lots of commerce occurs. Instead, most of the excitement that surrounds a technology during its earliest days is from fellow enthusiasts—people who treasure innovation simply for what it does, rather than for any commercial potential. Others tend to ignore technological breakthroughs or even disdain them. Telegraphy, for example, was derided for years as a worthless game, a newfangled obsession with invisible communication. When Samuel Morse demonstrated his machine before Congress in 1838, people just laughed, comparing the contraption to mesmerism or "animal magnetism." Likewise, when the radio arrived at the turn of the twentieth century, most people saw it as a hopelessly complex machine, good, perhaps, for military functions but without any broader appeal. Early users of radio were almost entirely amateur mechanics, people who were much more interested in the workings of the set than in anything that might be transmitted across it. Even the Internet was distinctly noncommercial at the outset. It was a security tool, a means of communication among a small and specialized
group. But a mass market? An instrument of commercial revolution? No one saw it coming.

During this first phase, there are no rules because none are needed: innovation hasn’t developed to the point where property rights are critical; there are no questions yet of access or unfair competition; and the societal impact of the new technology is minimal. Indeed, because the technology is still so experimental at this stage and confined to such a small group of users, there simply will not be many people outside this community who either understand the technology or have any concerns about its use. Even if concerns do arise, moreover—if, say, military officials suspect that the new technology has incendiary implications—then governments can generally still rein things in at this stage, imposing or establishing rules before a commercial market has had time to develop. Such was the case with television, which emerged out of radio technologies in the early twentieth century and was instantly besieged by governments wary of its social intent.

So long as governments do not suspect the potential for subversion, though, the innovation phase remains relatively free, open, and unchallenged. The scientists labor in their labs, the tinkerers work in their basements or garages, and innovation occurs. It’s the most important phase of the technological frontier but also in many ways the most peaceful. It often ends abruptly.

Phase Two: Commercialization

Once technology is out of the labs and in the public eye, a whole new cast of characters moves onto the frontier. These are the characters usually associated with the frontier: the pioneers, the pirates, the marshals, and the outlaws. They are the ones who define the new territory and bring it to life. In this second phase, the commercial benefits of innovation have become clear. People can now see how the technology will transfer to a mass market and what kinds of profits can be made from it. When the technology is truly revolutionary, they can also see how it carves out new spheres of commerce, spheres that exist beyond the realm of existing markets and beyond the reach of existing authorities. This potential ignites the frontier and draws more people toward it. And thus the familiar scramble ensues. Tempted by the dual visions of anarchy and wealth, entrepreneurs of all sorts rush onto the frontier to stake their claims. Speed is essential during this phase, as is a certain ability to see beyond the confines of established business practice. Not surprisingly, then, most of the pioneers who rush along the technological frontier are young: Marconi was twenty when he brought his black box to London; Marc Andreesen was twenty-three when he founded Netscape. These are the entrepreneurs who can see the opportunity that technology creates and are eager to build their own empires upon it. They also tend to be free spirits, individuals who delight in building their own worlds and operating by their own rules. Their interests during this early phase are largely territorial. Like all pioneers, they want to grab land, to stake a claim and call it their own, even if the property rights to this land are not yet fully secure and the commercial prospects are uncertain.

Pioneers, though, are not the only free spirits who move out to the frontier. Pirates come too, following naturally in the footsteps of the pioneers and often blending in easily with them. In the seventeenth century, pirates mingled indistinguishably with merchants, trailing ships across the Atlantic and strangling the trade that technological advances in navigation had created. In the nineteenth century, pirates plagued the nascent telegraph industry, “borrowing” patented technology to create their own competing systems. And in our own times, pirates wielding satellite dishes and smart cards have invaded the waves of the digital age, stealing television signals from the skies and encryption codes from the Net. Like their predecessors in the Caribbean, these pirates have a certain romance to them. They are rebels who delight in flouting society’s rules: when they hang, they hang proudly.

The funny thing about pirates, though, is that they seem to adhere to a certain historical rhythm. When technology is new, it doesn’t attract too many rogues. It’s simply too technical in the first phase of evolution, too specialized and uncertain. Once technology slips into the commercial realm, however, and begins to generate the extraordinary profits that can occur during
this second phase of expansion, the pirates flock. They follow the pioneers along the technological frontier, shadowing their gains and borrowing their technology. Because rules during this period are inherently ill defined, pirates can operate almost without restriction. If there are no rules, after all, no one can break them. This was the case during the heyday of ocean piracy, when states such as Britain and Spain simply were not able to draw any kind of workable distinction between pirates, privateers, merchants, and admirals. It is also the case today. How are we to define the teenager who downloads her favorite party music from an Internet site and sells copies to her friends? Is she a pirate of the digital age, or an aspiring entrepreneur? What about people such as Philip Zimmermann, the mathematician who created one of the world’s most sophisticated encryption algorithms and posted it on his web site? Is he a mathematical genius trying to share his knowledge, or a renegade intent on violating the security of the United States? It’s hard to tell. During these times of technological flux, the rules are just too flimsy.

What accounts for this flimsiness is the ability of new technologies to slip through the lines of existing law. It’s not that governments lack the interest or wherewithal to govern new areas of technology; rather, it’s just that the old laws are unlikely to cover emerging technologies and new ones take time to create — time that, initially at least, seems to favor the pirates and pioneers. For even as governments begin to understand the implications of telegraphy or hypertext, pioneers such as Morse or Andreasen are already forging ahead, grabbing territory and creating industrial structures. Unless governments manage to nip technology in the bud of innovation (as occurred with television), it’s very difficult for them to control this same technology once it has entered the expansionary period. Things are simply moving too quickly, and entrepreneurs are consciously trying to avoid the long arm of regulation. Then, as these entrepreneurs get wealthier, they have more at stake in this new realm and more resources available to protect themselves. So when the marshals show up, the entrepreneurs tend to outrun them, or outgun them, or simply ignore their protestations. When Rupert Murdoch began satellite broadcasts into the British market, for instance, the British gov-

ernment really could not do much to stop him since he was operating, quite literally, above their heads. Likewise, there are many aspects of the Internet economy that, at the turn of this century at least, remain far beyond the reach of any national government, such as content that streams in from foreign sources and information that hides under disguised names and slips across invisible borders. In this phase of technological development, therefore, the politics of the frontier are decidedly libertarian. Marketers take over, individuals steer their own fate and governments retreat. It is a period of wild expansion and even wilder expectations, of instant fortunes and dreams of anarchy. It is in many ways the defining moment of the frontier economy, and certainly the most romantic spot along technology’s arc.

**Phase Three: Creative Anarchy**

But this phase doesn’t last forever. For before long, problems begin to crop up along the frontier, compromising the commerce that has already emerged and threatening its long-term development. These problems are not the same for every technology; they appear with varying ferocity and after different gaps of time. Almost certainly, though, they will develop. And the pioneers that now people the frontier will demand their resolution.

Consider, for example, the issue of property rights. During the early phases of the technological cycle, ownership is a secondary and occasionally even irrelevant concern. Innovators don’t necessarily have much to own at this stage and many of them — though admittedly not all — are untutored newcomers to the world of formal rights. Many of the telegraph’s early inventors, for instance, never received either fame or credit for their work; and much of the modern Internet was created by enthusiasts who simply distributed their breakthroughs for free. A lack of property rights during the innovation phase, therefore, is seldom a constraint upon innovation itself. When commercial pioneers join the innovators, of course, this calculus changes: people like Henry O’Rielly, who built one of the first commercial telegraph systems in the United States, and Jim Clark, who
founded Netscape along with Marc Andreessen, have a much more instrumental view of technology and a more explicit interest in controlling it. Yet even as they rank the technology into its commercialization phase, many of these entrepreneurs are not particularly concerned about ownership. Instead they simply want to attack the frontier as quickly as they can, staking a claim and creating a market before others have had time to arrive. Certainly this was the case with O’Reilly, who threw himself into the nascent U.S. telegraph market in the late 1840s, determined to wire the entire eastern half of the country. A century and a half later, the infant Netscape adopted essentially the same strategy, storming into an unformed market and planning, in less than a year, to dominate it. In both cases, the pioneer’s hold on technology was tenuous—O’Reilly had “borrowed” freely from the patent held by Samuel Morse, and Netscape’s core technology was owned, at the time of its creation, by the University of Illinois—but ownership at this stage was less important than speed. The pioneers saw the allure of the new frontier and were determined to be there first.

As the technology matures, however, and markets widen, a demand for property rights is liable to emerge. Having carved out positions along the frontier, the more established pioneers no longer want to work in chaos or covet with pirates. Instead they want to own the market they now control, to control the dominant technology and keep interlopers at bay. They want property rights, in other words, and some means of enforcing them. This is one of the most common demands voiced during the phase of creative anarchy, and one of the most important. For if property rights are not established, the pioneers will tire of their labors before long and hopes of large-scale commerce will tumble back toward anarchy.

In some cases, the concern for property rights is complicated by what economists term the “problem of the commons.” In these cases, the creation of a new market rests with the use of a particular resource, one that, like the oceans or the airwaves, is large but far from infinite. In the early stages of development, the resource is plentiful enough to serve all comers. Every radio enthusiast in the 1920s, for example, could transmit signals to his heart’s content, just as the first settlers in New England could pull endless streams of cod from the banks of Newfoundland.

The View from Partenya

The more people who arrive on these frontiers, however, the harder it becomes for any of them to flourish, for the airwaves get congested over time and the fish run out. In these situations, the more established settlers will again petition for property rights, seeking to regain the solitude that success demands.

Meanwhile, two other problems tend to lurk along the technological frontier. These are problems of coordination and competition, and each can foster anarchy.

Consider first the problem of coordination. When a technology is initially evolving, bursts of innovation will tend to produce multiple devices and systems. Each individual inventor will produce his or her model of a telegraph, or his or her particular software package. And for some period of time, these disparate versions can happily coexist: customers simply use whichever model makes most sense for them, or is easiest or cheapest to employ. Eventually, though, this buffet of options breaks down and customers begin to value standardization over specificity. For what good is a telegraph, after all, if it receives messages only from certain sources? Or a mobile phone that can call only a discrete set of numbers? If these technologies are to develop into full-fledged markets, they need to develop some set of common standards, some means of coordinating their systems and allowing users to migrate freely among them. The problem, though, is that standards do not emerge by themselves. And thus as the pioneers race into a new market, each armed with his or her own technology and vision of the future, they may actually exacerbate the coordination problem that they desperately need to solve.

A final problem of the frontier concerns competition. Suppose that in the midst of anarchy a single pioneer manages—through law, guile, or sheer ingenuity—to control the key technologies for a given market. Then suppose that the same pioneer also manages to impose his own technical standard across this market. At this point, the problems of property rights and coordination will have been solved. The dominant firm can now banish outlaws from its field, spread a single technology across an unfolding market, and reap the financial benefits of scale. But the price of this solution is monopoly—putting the levers of a new and potentially vast market under the control of a single firm. And even if such a solution makes economic sense, it is
bound to be a political and commercial disaster. Every pioneer
will resent this intrusion; every erstwhile pirate will seek revenge.
Even consumers are likely to join the fray, protesting against an
undue concentration of power and seeking some formal means
of redress. To the aggrieved parties, then, monopoly is not a so-
lution to the problems of anarchy but a problem all its own. It
is a problem of dominance and control, a problem of innovation
(for monopolists are not supposed to innovate); and a problem,
at its heart, of justice. And like all good problems, it creates
chaos in its wake and demands an appropriate solution.

If commercialization is the most romantic stage along the
technological frontier, then, creative anarchy is the most frus-
trating. The technology is maturing, the market is widening, but
the nascent industry is caught by the inevitable struggles of its
own success. Resolving these problems becomes the next and
final phase of the frontier.

Phase Four: Rules

This last phase is the most difficult to imagine
from the viewpoint of Partenia. When a technology is new, it
usually looks so radical, so untamable, that those closest to its
creation can't conceive of it being governed. This is particularly
true—as with oceanic trade, radio, or cyberspace—when the
technology reveals a space that, for practical purposes at least,
hadn't been there before. How could anyone in Europe ever
hope to impose order on the vast and unregulated sea? How could
anyone own the air? Or patrol the reaches of cyberspace? Dur-
ing the innovation and commercialization phases, the very idea
of governance seems absurd. What occurs during the phase of
creative anarchy, though, is critical; for it is here that even the
pioneers begin to realize the costs of chaos. And once they real-
ize these costs, once they understand that a lack of rules can di-
minish their own financial prospects, they begin to lobby for
what they once explicitly rejected. Admittedly, it is not always
the pioneers who clamor for rules. Sometimes it is the state, and
sometimes a coalition of societal groups affected by the new
technology and the market it has wrought. In general, though,
rules get created because private firms want them.

The View from Partenia

In many ways, therefore, Ruling the Waves is a book about
rules. It is a book about why rules get established along the tech-
nological frontier, and who plays the greatest role in their cre-
ation. The book does not suggest that there is a single path along
this frontier. On the contrary, all of the stories that are presented
here suggest that rules are made in different ways and by differ-
ent people, depending on where the technology is developing
and what kinds of problems emerge during its evolution. In
some cases, the state steps in during the earliest days of anarch
writing rules to control the new technology before it has time to
develop. When the power of radio became clear, for example,
state officials in Germany, France, and Russia scrambled at once
to channel and constrain it. They sponsored the work of chosen
pioneers, linked the newly formed companies directly to the
state, and then used a series of international conventions to
parole the radio spectrum and establish technical standards. The
rules worked, for the most part, to the advantage of Europe's
radio firms, but they were set inarguably by the state.

In other cases, firms play a much bigger role in setting the
rules that bind them. Frequently, for example, firms resolve the
problem of coordination by forming industry associations or
standards arrangements. These are private groups, composed of
erstwhile pioneers, who get together to pursue what eventually
becomes a political agenda. They craft rules and technical stan-
dards because their businesses demand them, and because gov-
ernments, operating at their less-than-breakneck pace, may not
yet be able to provide them. This, for instance, is how the U.S.
telegraph firms tried to address the mass of incompatible wires
that had emerged by 1850, and how music firms today are ap-
proaching the threat of MP3 technologies. Note that none of
these standard-setting exercises is overtly political. They don't
involve governments or voting or lobbying. Yet they are all about
politics—about who gets power and sets the rules. By setting
standards, firms begin to define what is permissible in a certain
industry and what is not. They write rules and draw lines with-
out the intervention of the state.

Eventually, though, governments tend to reenter the scene.
There is nothing necessarily malicious in their return, nor
anything inherently anti-business. It's just that the time and
technology are ripe for their return. During the third phase of
This is a fairly common pattern along the technological frontier. We see it in the telegraph industry, where Britain's Eastern Telegraph Company relied on the state to protect its overseas interests and discourage new entrants, and in radio, where Telefunken, a leading German firm, grew to global prominence on the back of state protection and support. We see it already in cyberspace, too, as firms that otherwise decry government involvement scurry to secure whatever rules support their own interests. The very same encryption firms that have circumvented U.S. export controls, for example, have also lobbied the U.S. government to protect their intellectual property in foreign markets. Likewise, Netscape and Oracle, prominent pioneers of the information economy, have lobbied fervently for the U.S. government's antitrust suit against Microsoft. One firm's constraints, after all, are its rivals' competitive edge.

This relationship is the central irony of politics along the technological frontier. When technologies first emerge, there is a rush away from governments and a surge of individualism. Pioneers want to live along the cutting edge, forging a path away from the state and building empires in the air. Like Gaillot they are rebels, using technology to escape from authority and create their own versions of Partenia. Over time, however, the rebels tend to return to the state—not because they change their minds or lose their nerve, but simply because the state can secure the empires that they've built. The state can defend firms' property rights; it can regulate their interaction with a demanding consumer market; and it can help to keep the pirates at bay. And in fact, if we look at the cycle that prevails along the technological frontier, we see that even many of the original pirates eventually jump to the side of order, prospering from the same rules they once disdained. Sir Francis Drake, for example, was a privateer long before he became a knight (Queen Elizabeth I fondly referred to him as "her pyrate"), and Rupert Murdoch was commonly referred to as a pirate during his early years of traitorous dealings and legal gymnastics. The trick for pirates, it appears, lies in knowing when to jump, and to whom. Drake and Murdoch both became considerably more conservative once their business empires were well secured. They both also had powerful political patrons: Drake his Queen Elizabeth
and Murdoch, Margaret Thatcher. There are lessons here for other pirates.

In the spring of 1997, a lively fight broke out during an otherwise sedate Harvard conference. The conference concerned Internet governance, and the participants ran the spectrum of political and commercial views. Early in the day, one of the speakers, an Internet entrepreneur and sometime philosopher, gleefully pronounced the end of governments. In cyberspace, he argued, there would be no way for governments to track illegal activity, no way for them to print the money that defined their control, and no way for them to collect the taxes that permitted them to exist. In cyberspace, therefore, people like him could do whatever they wanted, and there was nothing government could do to prevent it. This speech incited the usual round of academic haranguing and noticeable unease in the audience. Then another of the speakers erupted—a gentleman who worked as one of the U.S. government’s top Internet policymakers. “You,” he bellowed, “are completely wrong. ‘Cause we still have black helicopters!” Matters disintegrated from then on, with neither the bureaucrat nor the entrepreneur willing to concede the other’s argument or back away from the fight. It was a good fight, in many ways, and an intriguing one. For essentially both men were right. Governments are more limited in cyberspace than they are in the physical world; in the short term, at least, governments will not be able to regulate, or even track, the information that flows across the Internet’s myriad paths. That’s why Pernia is such a powerful place. But as the Net matures, and as its technologies march further along their own frontiers, governments are likely to return—not only with black helicopters, but also with standards, and property rights, and the order that even the unruliest of pioneers is eventually bound to desire.

That, at least, is the lesson that history appears to offer. The frontier is a wild place, a land of anarchy and endless dreams. It draws pioneers and emboldens pirates and often showers riches on them both. In the end, though, power doesn’t flow necessarily to those who stake their claims or guard their turf; it goes to those who make the rules. History shows us how this process unfolds along technology’s edge.

CHAPTER 1

The First Wave

Piracy is the first stage of commerce.

HENRI PIREENE

Prince Henry of Portugal was a patient man. Determined to send Portuguese sailors around the Cape of Bojador, he spent years of his life fiddling with navigational instruments and ship design, trying to find some means to push the sailors farther out into the Atlantic and still bring them back safely. In the early years of the fifteenth century (the years of Henry’s reign) this was no easy task. Though innovations in the fourteenth century had already allowed ships to determine their course with decent accuracy and sail during overcast weather, sailing in Henry’s time remained a daunting prospect. The ships were slow and bulky, dependent on the weather, and essentially incapable of sailing across the open oceans. Henry wanted to change that. So he toiled for years, eventually using the capital that royalty had bestowed upon him to open a school for navigation in Sagres, the first of its kind.