THE FUTURE OF THE INTERNET
AS A DOMINANT MEANS OF COMMUNICATIONS AND COMMERCE: BUILDING BLOCKS OF PAST SUCCESS; PRINCIPLES AND POLICIES FOR THE 21ST CENTURY

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February 25, 2015

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February 25, 2015

Chairman Walden and Ranking Member Eschoo
Committee on Energy and Commerce,
U.S. House of Representatives

Re: The Future of the Internet

Dear Chairman Walden and Ranking Member Eschoo,

The Consumer Federation of America (CFA) applauds the Committee for holding hearings on the vitally important issue of the Future of the Internet. As the Consumer Federation of America (CFA) argued in recent comments in the Open Internet rulemaking, in order to understand the future of the Internet, policymakers must understand the foundation of its past success. To that end, CFA is submitting a series of analyses prepared over the past decade that examine and explain the key building blocks of the remarkable growth of the Internet.

Twenty five years ago, CFA was the first public interest group to recognize that the Internet would be a remarkably consumer-friendly and citizen friendly place for commerce and speech.[1] In that seminal analysis, we also concluded that the cornerstone of the value, importance and success of the Internet was the strong principle of nondiscriminatory access two the data network that two FCC decisions – Carterphone and the Computer Inquiries – guaranteed to the users and applications developers at the edge of the network. The "Virtuous Cycle" of innovation and investment that these decisions facilitated has long been recognized in the academic literature as the vital engine of economic progress of the Internet. The FCC relied on this important characteristic of the Internet in the National Broadband Plan and its Open Internet rules. The D.C. Court of Appeals recognized this important process in upholding the FCC's authority to take actions to ensure reasonable and timely deployment of broadband.

Over the past quarter century our analyses has shown that the single greatest threat to the future of the Internet has been the effort of the network owners (network ISPs),[2] like the cable telephone companies, to gut the principle nondiscriminatory access to communications for users.

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[1] Cooper, Mark, *Expanding the Information Age for the 1990s: A Pragmatic Consumer View* (Washington: American Association of Retired Persons and Consumer Federation of America, January 11, 1990). This was the first in a series of reports that analyzed the effects of decentralized, open networks, prior to the dramatic commercial success of the Internet (see Cooper, Mark, *Developing the Information Age in the 1990s: A Pragmatic Consumer View* [Washington: Consumer Federation of America, June 8, 1992], "Delivering the Information Age Now," *Telecom Infrastructure: 1993*, Telecommunications Reports, 1993; *The Meaning of the Word Infrastructure* [Washington: Consumer Federation of America, June 30, 1994].

[2] CFA was also among the first public interest groups to call on the FCC to ensure that the principles of nondiscrimination that had played such an important role in setting the conditions for Internet success would apply to broadband. Reply Comments of Center for Media Education, et al., Inquiry Concerning the Deployment of Advanced Telecommunications Capability to America Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, Federal Communications Commission, CC Docket No. 98-146, October 10, 1998; Petition to Deny Consumers Union, et al., Joint Application of AT&T Corporation and Tele-Communications Inc. for Approval of Transfer of Control of Commission Licenses and Authorizations, Federal Communications Commission, CS Docket No. 98-178, October 28, 1998.

Simply put, the network ISPs despise the principle of nondiscriminatory access to decentralized communications – in fact, resisted it from the very beginning – because it threatens their economic interest. Their interest lies in exercising central control, slowing innovation to preserve their power and taxing the innovation at the edge to increase their profits.

While much of the commercial activity on the Internet has its origins in U.S. companies, the core communications protocols – TCP/IP and WiFi – have always been managed as open protocols by a global, multi-stakeholder process in which government, academia, business and public interest groups have all played a part. If the Internet is to continue its march toward becoming a fully global engine of economic development and free speech, the successful model of cooperative, multi-stakeholder participatory governance must be perfected and extended to all aspects of the Internet management.

When the FCC classified broadband as an information service, it claimed that it had adequate authority to preserve nondiscrimination and it recognized that there were important goals of the Communications Act that were placed in jeopardy by that decision. The goal of universal service is the first goal mentioned in the Communications Act, but it was given little weight in the classification decision. In contrast, in amendments enacted in 2008 and 2009, Congress recognized the increasing importance of the adoption and utilization of broadband as indispensable to the economic development, social participation and political engagement of all people of the United States.

Looking back, it is possible that the approach taken by the FCC could have worked, if the network ISPs had accepted the authority it asserted and behaved well. Over the course of the past decade, they did neither and repeatedly litigated against the authority of the FCC to pursue the goals of the Act. It is time for the FCC to not only act decisively to ensure the principle of nondiscrimination, but also to put the other public interest goals back at the center of FCC policy.

The descriptions of the Open Internet Order that is pending before the FCC suggests to us that it is exactly what is needed to ensure that the principle of open access on which its success has rested is preserved in the future.

- It relies primarily on the section 706 authority recently upheld by the D.C. and 10th circuit appeals courts.
- It invokes Title II authority only where the record shows that the power it has under Section 706 is inadequate to address network ISP practices that pose a mortal threat to the virtuous cycle of innovation and investment.
- It puts key policy issues back on the table – like universal service, consumer protection and competition – that were never addressed when broadband was misclassified as an information service.

To ensure that the Committee has a full understanding of the foundation of the Internet success in crafting policies to ensure its future success, we submit excerpts from ten recent analyses we have presented in academic conferences and publications or filed at the

Commission. The excerpts are selected to focus on a range of important issues that are being considered by policymakers at present,

The resulting document entitled "The Future of the Internet as a Dominant Means of Communications and Commerce: Building Blocks of Past Success, Principles and Policies for the 21st Century, underscores the important role the FCC played in creating the conditions for the virtuous cycle. By retaining clear authority to pursue a flexible, light handed approach by the same public service principles that defined the birth and adolescence of the Internet, not just as a communication sector, but as the central engine of growth in the digital mode of production, not just nondiscrimination, but the full range of social and economic issues addressed by the Communications Act, we believe that the second quarter of a century of the Internet Age will be even more citizen and consumer friendly than the first.

Mark Cooper
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NOTE ON SOURCES

The papers are organized in three parts.

Part I deals with economics. It begins with a broad overview of the key features of the Internet ecology that have given rise to the virtuous cycle of innovation and investment. The next chapter in this part describes the institutional structure of the Internet as a focal core resource system of the digital economy. The final chapter in this part explains the economic advantages that the digital mode of production affords, which explains, in large measure, why it is spreading so rapidly.

Part II discusses the legal framework in which the Internet exists. It begins with a long view of the importance of non-discriminatory access to the means of communications and commerce in the half millennium of the capitalist economy. It identifies six public service principles that have been central to U.S. communications policy. The next chapter in this part reviews the role of universal service, which was enshrined as the primary goal of communications policy in the Communications Act of 1934. The next chapter in this part analyzes the challenge the FCC faces in using its power to achieve the goals of the Act. The final chapter in this part addresses the question of how broadband could be classified as a telecommunications service.

Part III identifies key challenges facing the digital economy, with the Internet as its core resources system. It begins by identify four areas where the digital economy is disrupting the social structure – architecture, economy, society, polity – and over a dozen specific social obligations it will be asked to shoulder as the dominant means of communications and commerce. Three specific challenges, which are receiving a great deal of policy attention at present, are analyzes in detail in the following chapters. The second chapter in this part examines the issue of digital exclusion and the evolving nature of universal service, made all the more

urgent by the immense power that digital communications confers on those who use it. The next chapter examines the specific factors that reduce adoption in the U.S. The next chapter in this part examines the problem that discrimination in access poses to the potential for the Internet to deliver on its promise. The final chapter examines the origins pressure for expanding the multi-stakeholder model of governance that has successfully guided the Internet in the past to accommodate the much broader and more diverse set of users on a fully global communications network.

Note on Sources:

The text has been excerpted from a series of academic papers and comments filed at the Federal Communications Commission. They have been edited to eliminate redundancy and have continuous pagination and endnote numbering. The noting style of the original publication has been preserved, as has the numbering of sections and exhibits, figures and tables. As a result, the style varies from chapter to chapter, but all references within a paper are consistently identified,

THE INTERNET INNOVATION SYSTEM

The Political Economy of Progressive Capitalism and the Success of the Internet: Toward a Theory of Dynamic Innovation and Distributive Justice in the Digital Mode of Production, The Digital Broadband Migration: First Principles for a Twenty First Century Innovation Policy Session on Jurisprudence for Innovation, Silicon Flatirons, Boulder, Colorado, February 9, 2015, forthcoming in *Journal on Telecommunications and High Technology Law,*

Comments of the Consumer Federation of America, In the Matter of The Open Internet Remand, Federal Communications Commission, GN Docket No. 14-28, July 15, 2014

INSTITUTIONAL STRUCTURE OF THE INTERNET

"Why Growing Up is Hard to Do: Institutional Challenges for Internet Governance in the "Quarter Life Crisis of the of the Digital Revolution," *Journal on Telecommunications and High Technology Law*, 2013.

THE POLITICAL ECONOMY OF COLLABORATIVE PRODUCTION IN THE DIGITAL INFORMATION AGE

"From Wifi to Wikis and Open Source: The Political Economy of Collaborative Production in the Digital Information Age," 5 *J. on Telecomm. & High Tech. L*. 125 (2006)

HISTORICAL ORIGINS OF PUBLIC SERVICE PRINCIPLES GOVERNING DIGITAL COMMUNICATIONS NETWORKS

"The Long History and Increasing Importance of Public Service Principles for 21st Century Public Digital Communications Networks**,"** *Journal on Telecommunications and High Technology Law*, 12(1) 2014.

Reply Comments of the Consumer Federation of America, In the Matter of Technological Transition of the Nation's Communications Infrastructure, Federal Communications Commission, GN Docket No. 12-353, February 25, 2013.

UNIVERSAL SERVICE: PROGRESSIVE, DEMOCRATIC CAPITALIST POLICY

The Political Economy of Progressive Capitalism and the Success of the Internet:

Toward a Theory of Dynamic Innovation and Distributive Justice in the Digital Mode of Production, The Digital Broadband Migration: First Principles for a Twenty First Century Innovation Policy Session on Jurisprudence for Innovation, Silicon Flatirons, Boulder, Colorado, February 9, 2015, forthcoming in *Journal on Telecommunications and High Technology Law,*

DECISION MAKING IN THE FACE OF COMPLEX AMBIGUITY

Initial Comments of the Consumer Federation of America, In the Matter of The Open Internet Remand, Federal Communications Commission, GN Docket No. 14-28, February 25, 2014.

THE LEGAL FOUNDATION FOR PUBLIC SERVICE PRINCIPLES TO GOVERN THE DIGITAL COMMUNICATIONS NETWORK

"Handicapping the Next Network Neutrality Court Case," *NARUC, Summer Meeting,* Sacramento, July 2010

THE SOCIAL RESPONSIBILITIES OF DOMINANT RESOURCE SYSTEMS

"Why Growing Up is Hard to Do: Institutional Challenges for Internet Governance in the "Quarter "Life Crisis of the of the Digital Revolution," *Journal on Telecommunications and High Technology Law,* 2013.

The Political Economy of Progressive Capitalism and the Success of the Internet: Toward a Theory of Dynamic Innovation and Distributive Justice in the Digital Mode of Production, The Digital Broadband Migration: First Principles for a Twenty First Century Innovation Policy Session on Jurisprudence for Innovation, Silicon Flatirons, Boulder, Colorado, February 9, 2015, forthcoming in *Journal on Telecommunications and High Technology Law,*

THE SOCIO-ECONOMIC CAUSES OF DIGITAL EXCLUSION IN AMERICA

Mark Cooper, *Broadband in America: A Policy of Neglect is not Benign, in* Overcoming Digital Divides: Constructing an Equitable and Competitive Information Society (Enrico Ferro et al. eds., 2009).

"Reply Comments -- National Broadband Plan, Public Notice #30, Center for Media Justice, Consumer Federation of America, Consumers Union, Open Technology Initiative, Public Knowledge, on Broadband Adoption*," Before the Federal Communications Commission, In the Matter of A National Broadband Plan for Our Future*, GN Docket No. 09-47, 09-51, 09-137, January 27, 2010

NETWORK MANAGEMENT

"The Importance of Open Networks in Sustaining the Digital Revolution," in Thomas M. Lenard and Randolph J. May (Eds.) *Net Neutrality or Net Neutering* (New York, Springer, 2006)

INTERNET GOVERNANCE

"Why Growing Up is Hard to Do: Institutional Challenges for Internet Governance in the "Quarter Life Crisis of the of the Digital Revolution," *Journal on Telecommunications and High Technology Law,* 2013.

PART I: ECONOMICS

THE INTERNET INNOVATION SYSTEM

OUTLINE

I argue that we need several sets of tools and data to understand how we managed to create the early economic success of the digital revolution and the challenges that inevitably arise from that success (Section II). In Section III I analyze the important role that the state played in fostering the success of the digital revolution…

Thus, in the great debate over regulation of the Internet's communications network the right and left are each exactly half right and, consequently, half wrong:

- The right is correct to trumpet the important role of entrepreneurship, innovation and private investment in driving the digital revolution, but is dead wrong in denying the critically important role that active public policy played in creating the environment for success and the vital role it will play in preserving and protecting that environment.
- The left is correct to trumpet the important role of active state policy, but is dead wrong in denying the critically important role that the private sector played in creating the digital revolution and the vital role it will play in continuing to innovate and expand the digital space.

To design policies that promote the continuing progress of the digital mode of production we must understand the ways in which it was created by the combination of public policy and private action and recognize the threats that "undisciplined" private or public power pose to the engine of growth.

II. THE BUILDING BLOCKS OF INTERNET SUCCESS

A. ANALYTIC FRAMEWORK

The success of the digital revolution rests on a unique innovation system that created virtuous cycles of innovation and investment.[1] The virtuous cycle framework posits that innovation and investment at the edge of the network are inextricably linked to innovation and investment in the communications network itself in a recursive, reinforcing feedback loop, as shown at the bottom of Exhibit II-1. Development of applications, devices, and content stimulates demand for communications that drives innovation and investment in the supply of communications network capacity and functionality. In turn, improving network functionalities and expanding capacity makes new applications possible, which stimulates new demand and allows the cycle to repeat. The challenge for the Commission is to develop a regulatory framework that protects and advances the "virtuous cycle," so that broadband deployment and adoption is stimulated.

My analysis of the virtuous cycles at the heart of the digital revolution will encompass four levels (as described in Exhibit II-1). In this section I analyze the economics of the Internet innovation system, focusing on the factors that have created a powerful "virtuous cycle." I use Shane Greenstein's account of computers and the Internet as General Purpose Technologies as

the framework. This represents the most micro level in the sense that he observes the activity of individuals and firms to extract principles of economic organization from case studies of three technologies that are directly relevant – computers, the Internet and Wi-Fi.

Exhibit II-1 identifies the processes that will be discussed in this and the next two sections. The virtuous cycle is the micro level base of the mode of production. It is embedded in an innovations system which is in turn embedded in a techno-economic paradigm. These three spheres are held together and given coherence by the socio-institutional paradigm. All of the layers are important, but the socio-institutional layer has a uniquely important role. As Perez put it:

> Technology is the fuel of the capitalist engine. That technical change should evolve by revolution has only little to do with scientific and technological reasons. It is the mode of absorption and assimilation of *innovations* in the economic and social spheres that requires technical change to occur in coherent and interrelated constellations…
>
> At the turning point, when the system stalls in recession, the state and other institutional, social and economic actors will establish the regulations and other changes in the framework to help launch the deployment period based on the solid expansion of production capital.
>
> The institutional sphere is the seat of politics, ideology and of the general mental maps of society… It is also the network of norms, laws, regulations, supervisory entities and the whole structure responsible for social governance.[2]

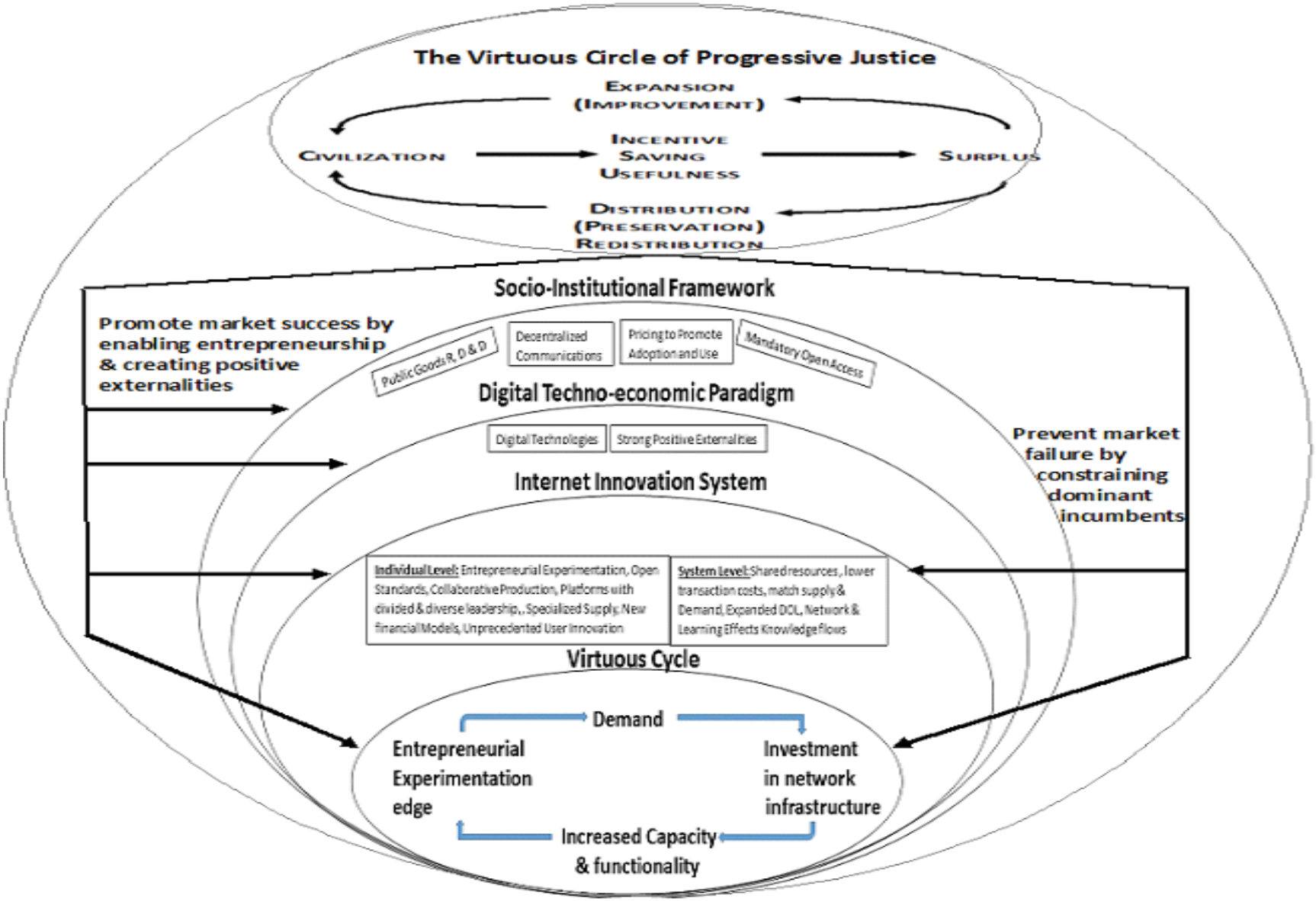
This section will examine the dynamics of the virtuous cycle. The next section will discuss the role that public policy played in creating it.

B. The Innovation System of the Digital Mode of Production in Communications

Greenstein's framework describes the process of entrepreneurial experimentation at the core of the virtuous cycles that developed in several digital technologies, including computers, the Internet, and Wi-Fi. While we frequently hear about positive systemic externalities that provide powerful economic forces to reinforce the "virtuous cycles," e.g. spill overs, network effects, feedback loops, etc., it is important to distinguish the micro level activities in which individuals and firms engage from the macro or system level unintended benefits to which they give rise.[3] Micro level behavior is one of the pillars on which the mode of production rests.

At the micro level we can identify a number of conditions that created a space that was extremely friendly to entrepreneurial experimentation, which Greenstein puts at the center of the success of the digital techno-economic paradigm. The "intentional" activities that constitute the core of the "virtuous cycles" that typify the digital techno-economic paradigm include the following:[4]

Exhibit II-1: The Political Economy of the Digital Mode of Production



- Neutrality of the communications protocols and network devices
- Avoiding engagement in costly bilateral negotiation over the cost and quality of access
- Freedom to experiment
- An unprecedented user-driven environment
- Interoperability
- Open standards
- Stressing the importance of platforms
- A new relationship to capital markets
- Dramatic increases in entry[5]

In the array of potential sources of information opened up by the digital revolution, the new paradigm provides the opportunity for the most edgy of all actors – consumers and users – to play a much larger role in driving innovation. "Of all the sources of ideas for new R&D projects outside the R&D lab itself, including suppliers, rivals, university and government labs or even a firm's own manufacturing operations, customers are far and away the most important,"[6] Cohen writes.

Greenstein singles out three critical features that enabled the micro level activity which gave rise to an explosion of entrepreneurial experimentation.

> [T]wo features especially stood out as a type of commercial computing network technology. First, the Internet was designed to have its intelligence at the end of the network. That is, users had to adopt applications in the PCs and workstations that were compatible with one another, but did not have to worry about any of the devices or protocols inside the network
>
> Second, once the commercial Internet had diffused…a remarkable set of new possibilities emerged: The Internet made it possible for users and vendors to move data across vast geographic distances without much cost, either in operational costs and/or in advanced set-up costs of making arrangements for transport of data.
>
> Together, those two features enabled enormous combinations of users and suppliers of data that previously would have required bilateral—and, therefore, prohibitively costly—agreements to arrange. In brief, it enabled a network effect where none had previously existed, involving participants who could not have previously considered it viable to participate in such a network.[7]

The fact that users and companies at the edge did not have to "worry about" the devices and protocols inside the network, "and could use ubiquitous telecommunications networks without bilateral – and prohibitively costly – arrangements," was essential and necessary for a communications environment that fostered innovation at the edge.[8] The arrangement involved the dramatic reduction in transaction costs that created a network effect. "Network neutrality" is a perfect description for a situation in which you do not have to "worry about" the insides of the network or negotiate to make agreements for transport of data through the network.

In addition, Greenstein notes that the Internet protocol itself was managed as an open standard subject to a multi-stakeholder governance process which emphasized consensus,

collaboration, and a strong learning process. This internal organization, along with a major boost from the state, prevented the incumbent telecommunications companies from hijacking the standard setting process.[9]

The impact of the "intentional," directed micro level activities described above was reinforced by undirected processes. There were strong positive external economies associated with the emerging techno-economic paradigm. These are widely referred to as:

> dynamic increasing returns… self-reinforcing, positive feedback cycles. Other external economies among users, increasing returns to learning and development of expertise, the nonrivalrous character of application of innovation to output, innovational complementarities, spillover pools.[10]

The system level characteristics that emerged as positive externalities to reinforce the "virtuous cycle" of the Internet innovation system include the following:[11]

- Expanded division of labor
- Divided and diverse technical platform leadership
- Specialization of supply firms
- Network effects
- Knowledge flows
- Learning externalities

Thus, the virtuous cycle draws on a technical-economic paradigm and the institutional structure that supports it. The technical-economic paradigm thrives on entrepreneurial experimentation, while the institutional structure is based on a variety of planned and unplanned collaborative undertakings (platforms, standards, open protocols, an ecology of outsourcing components). The collaborative undertakings involve actions that are intended to facilitate the entrepreneurial experimentation at the core of the new technical-economic-paradigm. The positive externalities created by an environment in which information flowed freely were a powerful, unintended consequence of the development of the new paradigm, which defined a new market structure.[12]

The new environment allows the division of labor, long recognized as an essential component of increasing productivity, to reach a level not previously achieved.[13] The environment created by experimentation deconcentrates markets.[14] The relationships between innovators and financial markets also change, if for no other reason than the scale and diverse scope of activities.[15]

This new technical-economic paradigm dramatically improves economic performance because it facilitates economic activity at the micro level that had been hampered by traditional market barriers or imperfections (transaction costs, access to capital, market power, etc.). It has the effect of reducing a number of other market imperfections that previously hampered the macro level performance of the system (provision of public goods, learning, spillovers, network effects, etc.)

C. INNOVATION SYSTEMS

In this section I discuss the innovation system layer. The study of innovation has blossomed in the past several decades as its impact on the speed and direction of economic growth has been acknowledged. From the residual in the estimation of production functions, it has become the centerpiece of analysis and policy. This section brings to bear two of the most prominent insights on the issue of the virtuous cycle's centrality to the Internet innovation system and the digital technical-economic paradigm.

First, I use Innovation Systems analysis, [16] a framework that has been articulated in a sub-discipline of the analysis of innovation. Here I describe the core concepts that have been developed to describe (any) set of innovations and then show that digital communications are a particularly powerful Innovative System. Next, I consider the Internet innovation system at the core of the digital technical-economic paradigm from a broad theory of technological revolutions. By presenting an analytically rigorous contrast between the technical-economic paradigm of the 20th century, the mass market phase of progressive industrial capitalism, and the emerging 21st century phase of the Information (Telecommunications) Age paradigm, we lay the basis for understanding the necessary direction for institutional change.

1. National Innovation Systems

One approach to the study of innovation that has received a lot of attention is the analysis of innovation systems, which takes an institutional and evolutionary view of technological change.[17] The Innovation Systems approach defines the system as a series of interrelated functions that determine the speed and nature of innovation (see Exhibit II-2). Entrepreneurial activity (experimentation) is at the center of the system, with six linkages. Knowledge creation is the next most important node in the system, which has four linkages.

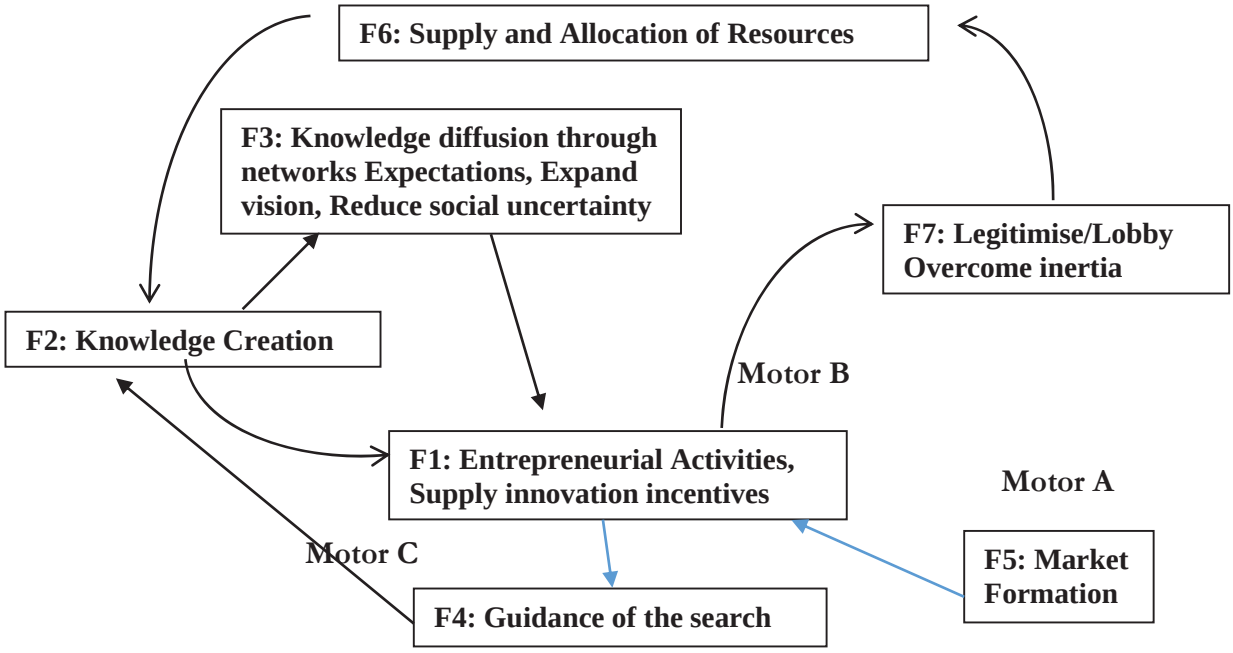
> Virtuous cycles play a prominent role in the analysis:
>
> A common trigger for virtuous cycles… is guidance of the search. In this case societal problems are identified and government goals are set… These goals lead to new resources, which, in turn, lead to knowledge development and increasing expectations about technological options. (Motor C)
>
> Another possible start for virtuous cycles are entrepreneurs who lobby for better economic conditions to make further technology development possible (function 7: counteract resistance to change). They either lobby for more resources to perform R&D which may leaded to higher expectations (Motor B), or they lobby for market formation since very often a level playing field is not present (Motor A). When markets are created, a boost in entrepreneurial activities (F1) is often visible leading to more knowledge formation (F2), more experimentation (F1), and increased lobby (F7) for even better conditions and high expectations [F3] that guide further research (F4).[18]

The description of the Internet offered by Greenstein can be interpreted as an Innovation System that produces powerful and unique innovation activities at key points:

- Greenstein identifies *entrepreneurial activity* as entrepreneurial experimentation, a uniquely innovative approach to activity.

- In the case of the Internet, *market formation* should be more broadly defined as the creation of a transaction space since non-market, collaborative exchanges play such an important part in the Internet's virtuous cycle.
- *Knowledge creation and exchange* is greatly facilitated by collaborative production and the clustering of activity in specific locations.
- *Diversified platform leadership* enhances the guidance of search.
- *Decentralization* facilitates the supply of resources.

Exhibit II-2: Functions and Motors for Virtuous Cycles in the Innovation System

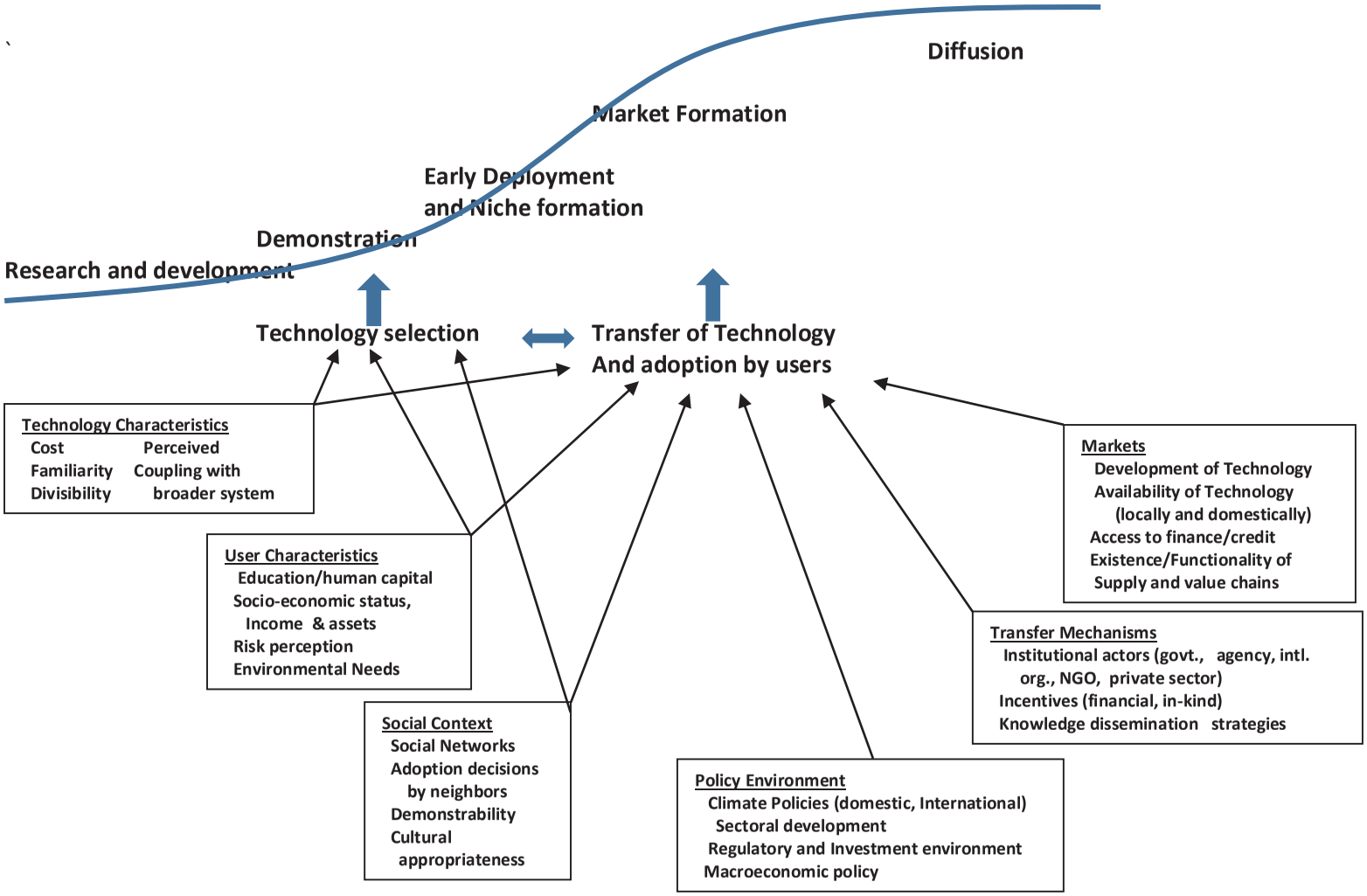


Source: M.P. Hekkert, et al., "Functions of innovation systems; A new approach for analyzing technological change," *Technological Forecasting & Social Change,* (4) 2007:426.

2. Diffusion of Innovation

The study of the diffusion of innovation produced a prodigious literature and is the original source of much of the framework of Innovation Systems analysis. In keeping with the central themes of this paper, Exhibit II-3 presents a framing that emphasizes market formation while Exhibit II-4 emphasizes the role of policy. Both are from the climate change literature, which is driven by a profound market failure – a global environmental externality – the response to which requires a thorough transformation of the mode of production in the energy sector.

Exhibit II-3: A Model of Technology Transfer and Adoption



Source: Bonizella Biagini1, et al., "Technology transfer for adaptation," Nature Climate Change, 4 (2014), p. 829.

Exhibit II-3 shows the diffusion process going through five phases, from research and development to diffusion. The key challenges that affect the flow of the process are technology selection, predominantly a supply-side issue, and technology adoption, a demand-side issue. Six sets of factors are seen as influencing the outcome of these two tasks. The dominant factors that affect both technology selection and diffusion are technology and user characteristics, and social context. The earlier discussion of the virtuous cycle identified factors in each of the six areas that triggered the powerful innovation cycle.

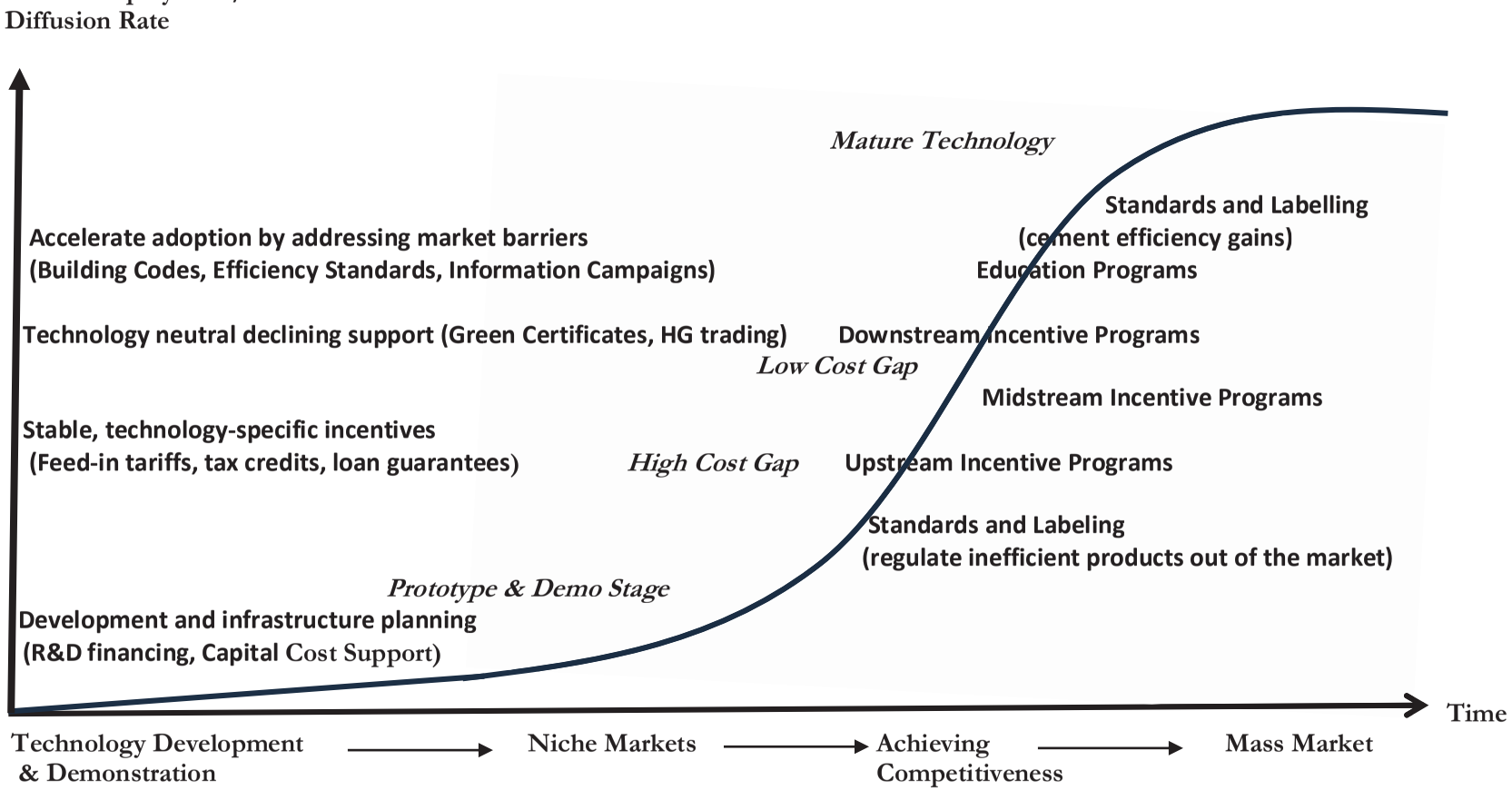
The following description of the graph in Exhibit II-4 ties together many of the themes discussed in this section and connects them to the theme of the next section: policies that support innovation invoke a cycle of policy implementation that helps the market progress.

> The graph illustrates a cycle of market transformation, which begins with inefficient models being regulated out of the market through minimum energy performance standards (MEPS). Next fleet efficiency is raised using incentive programs. Incentives programs target HE technologies with the best efficiency rating identified by the labeling program. They raise the efficiency ceiling through a combination of upstream, midstream and downstream programs that address specific market barriers. Incentives increase demand, and thus market penetration, for early-stage HE technologies, leading to economies of scale for manufacturers. Economies of scale, and the learning effects engendered by increased demand, streamline production and decrease the costs of production. The efficiency gains achieved through the incentive program can then be cemented by implementing standards that are more ambitious, resulting in a continuous cycle of improvement. This cycle can be repeated indefinitely as innovation produces more and more efficient technologies. Other market interventions, such as most-efficient awards, energy-efficient procurement or awareness programs can help complement this cycle to further accelerate the diffusion rate.[19]

III. The Key Role of Government

Writing rules to preserve the Internet innovation system and the virtuous cycle on which it thrives are among the most important socio-institutional undertakings of our time. Law, as an expression of enforceable social rules, is arguably the most important aspect of the socio-institutional paradigm. An explanation of the early success of the digital revolution is incomplete if it does not recognize that the state has a role to play in two respects: promoting market success and preventing market failure. It also has a direct role to play in understanding the current jurisprudence of virtuous cycles.

Exhibit II-4: Tailoring Support to Meet Needs Along the Innovation Chain
(Impact of Interventions on Highly-Efficient (HE) Technology Diffusion Rate)



Sources: Entries above the curve, International Energy Agency, *Energy Technology Perspective, 2014: Harnessing Electricity's Potential*, 2014, p. 55. Entries below the curve, Stephane de la Rue du Can, et al., "Design of incentive programs for accelerating penetration of energy-efficient appliances," *Energy Policy*, Energy Policy, 72, 2014, p. 59

Judge Silberman's dissent in the *Open Internet Rule* provides a useful starting point to frame the discussion. [20] He complains that the FCC failed to demonstrate the presence of market power as the basis for a rule that seeks to "control" the market power of network operators. Judge Silberman's focus on market power is instructive with respect to analysis of the virtuous cycle not only because it is too narrow but because it is the wrong way to think about the fundamental processes of the digital revolution. Digital technologies and the dynamic economic processes they support need to be viewed positively. They provide unique mechanisms to overcome pervasive market barriers and imperfections that afflicted pre-digital technologies, and they capture positive externalities that have long eluded those technologies.[21] The court majority recognized exactly what Judge Silberman missed: market power narrowly defined is not the only potential threat to the "virtuous cycle" and the positive role of policy in promoting market success, which was recognized by the Congress in the 1996 Telecommunication Act is much broader than preventing market failure.[22]

A. Promoting Market Success

The Greenstein analysis discussed in Section II examines neither how the network neutrality that existed on the eve of the commercial Internet explosion came into existence nor why it was so vital to its success. Tim Wu, among many others, has identified a series of regulatory decisions that paved the way.

> [T]he FCC ordered Bell to allow the connection of the "Carterphone," a device designed to connect a mobile radio to a Bell Telephone… the FCC went further and specified something simple but absolutely essential: the familiar RJ-45 telephone jack… The modular jack made it unnecessary for a Bell technician to come and attached one's phone to the phone line. More crucial, with the phone jack in place, any innovator – any person at all – was suddenly free to invent things that could be usefully attached to the phone lines…
>
> They also made possible the career of Dennis Hayes, a computer hobbyist ("geek" is the term of art) who, in 1977 built the first modulator/demodulator (modem) designed and priced for consumers, the so-called Hayes Modem…
>
> [T]he FCC issued a rule banning AT&T from directly entering the market of "data processing" or "online services." These were the earliest precursors of what we now call Internet service…
>
> In short, with strange and unprecedented foresight, the FCC watered, fertilized, and cultivated online computer services as a special, protected industry, and, over the years, ordained a set of rules called the *Computer Inquiries,* a complex regime designed both to prevent AT&T from destroying any budding firms and also to ensure that online computer service flourished unregulated.[23]

Francois Bar notes how the FCC made a number of additional decisions that magnified the importance of a) a continuing commitment to access to the core communications network and b) the decision not to regulate behavior in the data transmission area.

> The FCC allowed specialized providers of data services, including Internet Service Providers (ISPs) and their customers, access to raw network transmission capacity through leased lines on cost-effective terms. Regulatory policy forced open access to networks

> whose monopoly owners tried to keep them from using the full capabilities of the network in the most open and free manner.
>
> Thanks to the enduring FCC policy of openness and competition, specialized networks and their users could unleash the Internet revolution. Open network policy assured the widest possible user choice and the greatest opportunities for users to interact with the myriad of emerging new entrants in all segments of the network. To be sure, the FCC strategy emerged haltingly but its direction never changed. Indeed, the Commission consistently backed cost-based access to the network (initially through leased lines and later through unbundled network elements). The de facto result of this policy, and of more conscious choices symbolized by the *Computer III* policies, was to prevent phone company monopolies from dictating the architecture of new data-related services. The Commission thus supported competition and innovation, time and again, by unfailingly keeping the critical network infrastructure open to new architectures and available to new services on cost-effective terms. The instruments of FCC policy were to make leased lines (and, lately, network elements) available on cost-oriented terms and to forebear from regulating Internet and other data services. This steady policy set in motion, and sustained, a virtuous cycle of cumulative innovation, new services infrastructure development, increasing network usage with evident economic benefit for the U.S. economy.[24]

Thus, this was not a one-off policy but a sustained commitment. In this context, Wu's use of the adjectives "strange and unprecedented" seem inappropriate to describe the FCC's foresight that paved the way for the Internet protocols that triggered the growth of the new communications economy. In fact, they were not unique. The FCC repeated the feat in helping to create the conditions for the explosive growth of another communications protocol, Wi-Fi. Here, Greenstein acknowledges the role of the FCC.

> More surprising, a wireless fidelity technology now popularly known as Wi-Fi became dominant. Wi-Fi did not arise from a single firm's innovative experiment. Rather, Wi-Fi began as something different that evolved through economic experiments at many firms. The evolution arose from the interplay of strategic behavior, coordinated action among designers, deliberate investment strategies, learning externalities across firms, and a measure of simple and plain good fortune….
>
> Federal spectrum policy cooperated with these technical initiatives indeed, nothing would have succeeded in its absence. The Federal Communications Commission (FCC) holds authority to license or bar companies from using spectrum. In late April of 1996, after several groups had begun discussing designs, the FCC initiated a "Notice for Proposed Rule Making" to make available unlicensed spectrum for what became known as Unlicensed National Information Infrastructure (U-NII) devices.
>
> Events then took on a momentum all their own. Technical successes became widely publicized. Numerous businesses began directed experiments supporting what became known as hot spots, which was another innovative idea….
>
> A hot spot was a use far outside the original motivation for the standard. Yet because nothing precluded this unanticipated use from growing, grow it did… The growing use of Wi-Fi raised numerous unexpected technical issues about interference, privacy, and rights to signals. Nevertheless, they did not slow Wi-Fi's growing popularity Web sites sprouted up to give users, especially travelers, directions to the nearest hot spot. As demand grew, suppliers gladly met it. As in a classic network bandwagon, the growing number of users

attracted more suppliers and vice versa.[25]

Again, a federal regulatory decision created access to a communications resources space but did not regulate activity within the space. The unfettered experimentation made possible by that decision combines with the recognition of the need for accessible standards to create a powerful network effect. Thus, FCC action embodies an enigma and resolves an inherent contradiction: sharp regulatory action is necessary to create a space for individual entrepreneurship, but regulatory restraint ensured freedom from regulation to conduct entrepreneurial experiments in that space.

There were a host of other widely recognized ways in which public policy supported the development of the digital techno-economic paradigm. Public policy tilled the ground in which the seeds of the digital revolution could flourish by providing key building blocks that would not have been provided by dominant, incumbent communications sector companies. These include:

- Large, sustained support for basic research, development, and initial deployment of key technologies, particularly in the 1960s.
- A commitment to develop decentralized communications networks for strategic defense, with funding from the Department of Defense to develop the Internet Protocols and the development of a browser.[26]
- In the early years, the role of a quasi-governmental agency in the management of the network of networks while norms were being developed.
- A significant market in the public sector.
- A long standing New Deal tradition of pricing to promote use (that is, bill-and-keep for interconnecting communications companies and flat rate pricing for end users).

B. Preventing Market Failures

While broad government policies promoted the success of the digital revolution, specific FCC policies prevented negative behaviors from undermining its chances for success in the communications sector. To begin the analysis we must recall the nature of the network owners. They are large, bureaucratically organized incumbents that dominated the 20th century communications networks in both voice and video. They pursue their interests when left unregulated and frequently do significant harm to freedom of entrepreneurial experimentation at the edge of the network that is the driving force in the virtuous cycle.

- Their actions can dampen the willingness and ability of the edge to experiment by:
    - imposing counterproductive “worry” about the network and its devices,
    - increasing costs substantially by forcing edge entrepreneurs to engage in bilateral negotiation,
    - undermining interoperability, and

- chilling innovation through the threat of "hold up" of successful edge activities.

- As incumbents they have a conservative, myopic bias and are certain to be far less innovative and dynamic than the edge based on:
  - a preference for preserving the old structure,
  - the pursuit of incremental, process innovation rather than radical, product innovation, and
  - a proprietary culture that prefers restrictions on the flow of knowledge.
- Competition is much weaker in the network segment of the digital platform than in the edge segments, which means network owners:
  - face less pressure to innovate,
  - have the ability to influence industrial structure to favor their interests at the expense of the public interest,
  - can use vertical leverage (where they are integrated) to gain a competitive advantage over independent edge entrepreneurs, and
  - have the ability to extract rents, where they possess market power or where switching costs are high.

It should not be surprising that many of these concerns are forward-looking since it is the opportunity to experiment that is the most valuable trait of the Internet innovation system. The Communications Act is very much a forward-looking statute which regulates behavior to achieve goals and prevent harms, rather than correcting harms after the fact.[27]

At the same time, the network operators have indicated that they have the incentive and ability to engage in antisocial conduct, as summarized in Exhibit IV-1. Services that compete with the franchise offerings of network owners, voice and video, have been singled out for attack.

The left side of Exhibit III-1 includes broadband era behaviors that took place after the cable modem order articulated principles and policies about network neutrality and Internet freedom. The early rounds of debate in the period before the cable modem order revealed behaviors that would be devastating to innovation and competition, as shown on the right side of Exhibit III-1.

> A term sheet offered by Time Warner to unaffiliated ISPs who had requested access to its network during the summer of 2000 gives a new and troubling specificity to the threat to innovation. There in black and white are all the levers of market power and network control that stand to stifle innovation on the Internet. Under these conditions, the commercial space left for the unaffiliated and small ISPs (where much innovation takes place) is sparse and ever shrinking.

Extending the time horizon further into the past substantiates concerns about the incentive and ability of incumbents to stifle decentralized freedom to innovate, including opposition to the most fundamental policy decisions (like Carterphone and the Computer Inquiries). AT&T's negotiations with Mindspring are a prime example of these problems.[28]At every step along the trajectory, AT&T was hostile to a decentralized communications protocol,

Exhibit III-1: Broadband Network Operatory Discriminatory Behaviors that Threaten the Virtuous Cycle

Post Cable Modem Order Abuses

Blocking:

Madison River blocking VoIP ports (2005)

Cingular's blocking of Paypal (2006)

AT&T blocking of Slingbox iPhone application (2010)

Skype blocking on mobile networks (2010):

FaceTime blocking over mobile devices unless using Mobile Share plan (2012)

Verizon blocking access to tethering apps (2012)

Degradation:

Comcast degrading Bittorrent Traffic (2007)

Netflix degradation on Comcast (2013-2014)

Comcast refusal to connect Netflix CDN (2013)

Discrimination:

Comcast exemption of Xfinity online video app on Xbox and TiVo from data caps (2012)

AT&T sponsored data plan on wireless network (2014)

T-mobile "Music Freedom" exemption of popular music streaming sites from data caps (2014)

Raising rivals' costs:

Comcast/Verizon interconnection agreements with Netflix (2014)

Continuing problems with wireless data roaming (2010-2014)

Pre-Cable Modem Order Abuses

Time Warner demanded the following:

- Prequalification of ISPs to ensure a fit with the gatekeeper business model
- Applying ISP must reveal sensitive commercial information as a precondition to negotiation
- Restriction of interconnecting companies to Internet access sales only, precluding a range of other intermediary services and function provided by ISP to the public (e.g. no ITV [interactive TV] functionality)
- Restriction of service to specified appliances (retarding competition for video services)
- Control of quality by the network owner for potentially competing video services
- Right to approve new functionalities for video services
- A large nonrefundable deposit that would keep small ISPs off the network
- A minimum size requirement that would screen out niche ISPs
- Approval by the network owner of the unaffiliated ISPs home page
- Preferential location of network owner advertising on all home pages
- Claim by the network owner to all information generated by the ISP
- Demand for a huge share of both subscription and ancillary revenues
- Preferential bundling of services and control of cross market of services
- Applying ISP must adhere to the network operator's privacy policy

including the freedom to attach "foreign exchange equipment" to the network and the obligation to afford data nondiscriminatory access to the telecommunications network. It scoffed at the idea of a decentralized communications protocol. Thus, the conceptual clarity of the threat and the record of past behavior suggests that the Commission has a strong evidentiary basis to take measures that will prevent harmful behavior by network owners.

Traditional concerns about large incumbents abusing market power have received a great deal of attention, too much in the sense that other sources of market failure which undermine or weaken the "virtuous cycle" deserve at least as much. The fundamental point is that "[l]eading incumbent firms and new entrants face different incentives to innovate when innovation reinforces or alters market structure."[29] The incumbents will invest in innovation that supports the platform and their leading role in it. [30] In particular, they will prefer proprietary standards.[31]

> If one assumes—and this is a strong assumption—that technological diversity (e.g., the variety of approaches adopted to address a technological challenge) both promotes technical advance and is associated with a larger number of firms within an industry, then… larger firm size may come at the cost of the benefits of technological diversity.[32]
>
> In all these examples, no single firm initiated an economic experiment that altered the state of knowledge about how to best operate equipment or perform a service. Rather, many firms responded to localized user demand, demonstrations of new applications, tangible market experience, vendor reaction to new market situations, and other events that they could not forecast but which yielded useful insights about the most efficient business actions for generating value.[33]

Nevertheless, while traditional concerns about pricing abuse are raised there is a recognition in the literature of the barrier to entry and the threat to experimentation that network owner market power may pose.

> The flow of events during more recent experience has also depended on the choice made by incumbent firms…
> In each platform, it is rare to observe more than a small number of firms acquiring leadership positions. It is unsurprising, then, that questions about how incumbent firms react to new entry and defend existing positions in valuable markets have attracted antitrust scrutiny.[34]

Greenstein identifies many anticompetitive concerns that arise from vertical integration, such as network owners taking action to gain an advantage in the competition for complements.

> After signing deals with content providers, a carrier has an incentive to protect its own commercial interests and directed experiments, pricing in a way to disadvantage other potential providers of new Internet applications. In other words, a carrier takes the position as a complement in production to someone else's service that potentially substitutes for a service they or a business partner provide. Carriers also can choose to enter service markets where they can use their discretion to disadvantage a potential competitor.
>
> First, a carrier can use preinnovation contracting to generate market conditions that limit entry of innovative content providers. Second, carriers can use post innovation bargaining to strategically aid their competitive position. There are a variety of reasons why both of

> these are a general concern because the carriers may intend to imitate content providers, may intend to compete through provision of their own service, or may intend to compete with alliance with another content provider. And there are a variety of ways for a carrier to take such action.[35]

Incumbents have been willing to push to the edge of network neutrality and beyond, and to litigate even modest constraints on their behavior despite the issue being under close public scrutiny. This strongly suggests that they will behave in ways that harm the public and the dynamism of the virtuous cycle if it serves their interest. Moreover, there is no reason to dismiss Judge Silberman's concern. Simple rent seeking, distinct from vertical leverage, is a concern since it will slow adoption and weaken the virtuous cycle.[36] The FCC could make the showing, especially when major mergers threaten excessive consolidation.

THE INSTITUTIONAL STRUCTURE OF THE INTERNET

I. INTRODUCTION

A. The Quarter-life Crises of Industrial Revolutions

The popular press tends to mark the birthdays and anniversaries of innovations and product by the date at which they became widely available to the general public. While this standard is never precise and there is a flow of inventions before commercialization, it is a useful benchmark for measuring social change. By that standard there is no doubt that the early years of the 21st century are a key period for the digital revolution and its most important manifestation, the Internet. The adolescence of the Internet is ending, which is typically marked by the shouldering of new, adult responsibilities. In humans it has come to be called the quarter-life crisis.

> The **quarter-life crisis** is a period of life following the major changes of adolescence, usually ranging from the late teens to the early thirties, in which a person begins to feel doubtful about their own lives [sic], brought on by the stress of becoming an adult. The term was coined by analogy with mid-life crisis.[37]

The web celebrated its 20th birthday in 2011[38] and the PC its 30th.[39] The age of the Internet is also in the range of 20-30 years.[40] The Internet Society,[41] which houses the key bodies that set policy for the Internet, turned 20 in 2012. Search engines, which provide a critical function for navigating the vastness of cyberspace, are about 15 years old.[42] Broadband Internet service is in the same age range.[43] Using the dating technique of initial widespread commercial availability to calculate the age of wireless technologies that are playing an increasingly important role in the digital revolution we reach the same conclusion. In 2012, U.S. cellular service is about 30 years old[44] and Wi-Fi is about 20.[45]

To be a true quarter-life crisis, the life expectancy of the digital revolution would have to be about a century,[46] as proved to be the case for the first two industrial revolutions (se Exhibit I-1), but the math is less important than the fact that the digital revolution is confronted with a broad range of maturation challenges in terms of new issues and concerns that are pressing on its future. As the discussion below shows, the maturation challenges confronting the Internet cover a host of issues, including concerns about

- the central technologies that underlie the revolution (e.g., Internet governance, communications network management, cyber security),
- the economy (e.g., antitrust, consumer protection, intellectual property),
- social issues (e.g., universal service, privacy, personal security), and
- the polity (e.g., free speech, surveillance).

As suggested in Exhibit I-1, it can be argued that the 1st and 2nd industrial revolutions also went through similar quarter-life crises as new social institutions were developed to ensure that the emerging mode of economic production serves the broader goals of society. However, it also can be argued the quarter-life crisis of the digital revolution promises to be particularly challenging because the digital revolution involves a uniquely powerful and dynamic set of changes.[47] These changes include:

EXHIBIT I-2: LIFE CYCLE OF INDUSTRIAL REVOLUTIONS[48]

Invention	Date	Political Turmoil	Primary Mass Communications
1st Industrial Revolution			
Flying Shuttle	1733		
Cotton Mills	1742		
Water Frame	1764		
Spinning Jenny	1765		
Steam Engine	1769		
Steam Ship	1775	Age of	
Threshing Machine	1784	Revolution	
Power Loom	1785	1775	
Cotton Gin,	1793		
Interchangeable Musket Parts	1798		
Steam Locomotive	1804	Luddism	
Steamboat Service on the Hudson River	1807		
Typewriter	1829		
Telegraph, revolver	1836		Penny Press
Sewing Machine	1844,1851	1848	Telegraph
	1860s		Photography
2nd Industrial Revolution			
Bessemer Steel	1855		
Synthetic Dye	1856		
Machine Gun	1862		
Transatlantic Cable, dynamite	1866		
Modern Typewriter	1867		
Tungsten Steel	1868		
Barbed Wire	1873		
Telephone	1876		
Phonograph,	1877		Telephone
Incandescent Light bulb	1879	Progressive Era	
Induction Electric Motor	1888	State	
Diesel Engine	1892	Regulation	
Radio	1901		
Airplane	1903		
Model T Ford, Assembly Line	1908, 1913		Radio
	1930s	New Deal	
	1940s		Television
3rd Industrial Revolution			
Transistor	1947		
Integrated Circuit	1958		
Micro Computer	1968	Caterfone/	
Internet	1969	Computer Inquiries	
Microprocessor, E-mail	1971		
Modem	1997		
PC-IBM	1980		
Commercial Internet	1986		
Commercial Wireless Service	1984		
World Wide Web	1991		
ISOC	1992	CALEA, DMCA,	
	1996	Telecom Act	Broadband
	1998	ICANN	
	1999	COPA,	
	2000		YouTube
	2003	WSIS	
	2004		Social media
	2012	SOPA,PIPA	

- the unique, decentralized nature of the Internet as a communications medium;
- the speed with which changes are taking place;
- the central role that communications play in modern economies;
- the scale and scope of change that is having a pervasive impact on many aspects of daily life; and
- the fundamental importance of many of the values affected.

Confronted with a challenge of this magnitude, and having a set of fully developed institutions in hand, there is a tendency to assume, or hope that "old law maps to new interactions."[49] The old law we have today was defined by the maturation challenges of the 2nd industrial revolution, which makes many of the institutions over a hundred years old.[50] Because they are old does not necessarily mean they are outdated, and it certainly does not mean the values they express and seek to implement are no longer valid; it does mean they will be challenged to change.[51] Here, too, it can be argued that the quarter-life crisis of the digital revolution is likely to pose major challenges to the existing social institutions that can be expected to be called on as the vehicles for addressing the challenges (asserting authority) for a number of reasons:

- a lack of clear lines of authority stemming from the transnational nature of the communications;
- concern that institutions that move slowly and rely on rigid rules will have difficulty addressing the challenges without undermining the economic engine at the core of the new communications system that thrives on diversity and dynamic innovation; and
- a decline in the general legitimacy and capacity of the incumbent political institutions.

B. Purpose and Outline

This paper presents a comprehensive framework for analyzing the quarter-life crisis of the digital revolution with a focus on the Internet as an important (perhaps the most important) resource system at the heart of the digital economy. The way the Internet supports the flow of communications plays a key role in the remarkable success of the digital revolution. The institutions that manage the development and operation of the Internet as a resource system are unique in many respects and have come under pressure as the digital revolution and the Internet mature. The ultimate objective of the paper is to gain insight into how the governance institutions can **adapt** to the demands of the quarter-life crisis.

I choose the word **adapt** purposely, rather than reform, because reform is frequently associated with some sort of failure – "**Reform** means the improvement or amendment of what is wrong, corrupt, unsatisfactory."[52] The characterization grounded in failure does not apply as a general proposition to the Internet and the digital revolution. This is a case where the need for change derives from remarkable success, not failure, because the dramatic growth of the resource system strains its own governance institutions and because the resource system has expanded so rapidly and penetrated so deeply into so many aspects of social life that it is having a huge impact on society. The fact that the driving force for change is a broad pattern of success, rather than failure, does not make it less urgent, but it does create a somewhat different orientation than reform driven by failure – the challenge of preserving and extending what is working well is prominent, if not paramount.

The analysis covers three levels—resource system (Sections II and III), socio-ecological setting (Section IV and V), and governance institutions (Section VI and VII). The Internet governance debate has come to include all three of these levels, with social policy issues taking center stage. The extent to which the social policy issues can be separated from the resource system issues is hotly debated. This paper argues that doing so is important because preserving the technical basis of success is so important.

Section II presents an analytic framework I call new institutional analysis to explain the success of the Internet as a "focal core resource system" in the 21st century economy. It develops the framework by combining concepts from the Institutional Analysis and Development (IAD) framework of Elinor Ostrom[53] with New Institutional Economics (NIE) offered by Douglass North.[54] By identifying the aspects of the resource system that combined to create its success, the institutional analysis is a useful tool for understanding how the unintended consequences of success create internal pressures for change, in addition to outlining the ways in which the socio-ecological setting places demands on the resource system. Several leading Internet analysts approach the Internet governance debate from the point of view of network theory.[55] I argue that the network framework is virtually identical to the new institutional analysis of a resource system. I prefer the latter because of the very rich set of analytic concepts and proposition that have been built up from a long and large body of empirical analysis…

Section V identifies the key dilemmas that confront the resources system in responding to the demands for change from the socio-ecological setting of the system….

Section VI presents high-level principles to guide the adaptation of Internet governance. It discusses the support for multi-stakeholder approaches as the widely supported institution for responding to the maturation challenges. It then presents a review of the literature of regulatory reform, which highlights the failure of the discussion of regulatory reform to give adequate attention to participation in the governance process.

Section VII makes the case for "participatory governance" as an institutional response to the need for a 21st century governance institution to guide the digital revolution. It argues that "participatory governance," is an approach that recognizes the declining ability and value of governmental agency oversight over the complex, dynamic and global activities of the digital economy, while asserting that civil society and economic actors can be mobilized to fill the gap that is developing between the need for oversight and the inability of the state to provide it. Extending the finding that the Internet thrived because it was located between the market and the state, Section G argues that the very factors that are making it difficult for the state to oversee economic activity in the digital economy—dynamic technological change on a global scale—also make it possible to increase direct public involvement in the process of overseeing these sectors because of the dramatically increased ability of the public to communicate and organize for collective action.

II. THE SUCCESS OF THE INTERNET AS A FOCAL CORE RESOURCE SYSTEM IN THE DIGITAL ECONOMY

A. The Success of the Internet Resource System

1. New Institutional Analysis

In this section, I describe the success of the Internet as a resource system in the context of an overall analytic framework that can be described as new institutional analysis. I argue that North and Ostrom analyze the creation, evolution, and adaptation of social institutions and social processes with similar concepts from opposite points of view.[56] North analyzes the issue from the macro level of political, economic, and social institutions focusing on the economic performance of societies across long periods of time.[57] Ostrom analyzes the issue from the micro-level performance of specific resource systems, which are embedded in social, economic, and political settings.[58] Combining the two we have not only a complete conceptual framework but also a rich set of methodological tools for empirical analysis.

My goal is not to present a comprehensive account and reconciliation of the work of Ostrom and North. Rather, it is to extract the elements from these very large bodies of work that shed light on why the Internet has been so successful as an institution and what this teaches us about the direction of change that should be followed as it adapts to its maturation challenges.

To appreciate the value of putting the effort into this conceptual framing, I start with the observation that Elinor Ostrom's Nobel Prize Lecture, entitled "Beyond Markets and States: Polycentric Governance of Complex Economic Systems,"[59] describes the current state of the IAD framework as "developing a more general theory of individual choice that recognizes the central role of trust in coping with social dilemmas."[60] In fact, one of the articles she cites as capturing the recent developments of IAD argues that "it has become clear that the real 'glue' that keeps an institution alive over time are the social mechanisms, i.e. trust, legitimacy, and transparency."[61]

The policy challenges that Ostrom derives from her work on resource systems are the challenges that Internet governance faces.

> Extensive empirical research leads me to argue . . . a core goal of public policy should be to facilitate the development of institutions that bring out the best in humans. We need to ask how diverse polycentric institutions help or hinder the innovativeness, learning, adapting, trustworthiness, levels of cooperation of participants, and the achievement of more effective, equitable, and sustainable outcomes at multiple scales.[62]

This statement of the real-world challenge of building institutions to create cooperation in the face of a social dilemma fits the ongoing debate about Internet governance perfectly. The search for polycentric modes of governance that fall between the market and the state where a community self-organizes to build institutions based on trust, legitimacy, and transparency is the search for the holy grail of Internet governance.

Douglass North's framing of the purpose and focus of New Institutional Economics is very similar

in spirit and substance.

> Institutions provide the basic structure by which human beings throughout history have created order and attempted to reduce uncertainty in exchange. Together with the technology employed, they determine transaction and transformation costs and hence the profitability and feasibility of engaging in economic activity. . .
>
> There is a different, and I think, better story. It concerns the endless struggle of human beings to solve the problems of cooperation so that they may reap the advantages not only of technology, but also of all the other facets of human endeavor that constitute civilization.[63]
>
> Institutions form the incentive structure of a society and the political and economic institutions, in consequence, are the underlying determinant of economic performance. Time as it relates to economic and societal change is the dimension in which the learning process of human beings shapes the way institutions evolve. That is, the beliefs that individuals, groups, and societies hold which determine choices are a consequence of learning through time . . . .[64]

2. The Conditions for the Institutional Success of the Internet

The usefulness of the analytic framework goes beyond the fact that the central institutional problem it identifies fits the current Internet governance debate well. The "clear set of findings" that are the basis for the generalizations that IAD offers to explain successful institutionalization of a resource system provides a remarkably precise understanding of why the Internet succeeded as a "focal core resource system." As shown in Table II-1, a good case can be made that the Internet possessed most, if not all, of the empirically identified characteristics that make for successful cooperation to deal with a social/economic dilemma.

In the beginning and for a significant period of development, the architects and users of the Internet were a fairly small, homogeneous set of engineers who shared norms, values, and a pragmatic problem-solving world-view. The perceived benefits expected from cooperation were quite large and non-commercial. The essential principle of the Internet was to allow local autonomy around a core set of communications protocols. The protocols were designed to resolve conflicts over resources in a low-cost manner (best effort, with the end-points responsible for dealing with the quality of output). The nature of the users and the resources system made it "easy" to decentralize decision-making and rely on distributed knowledge and assets to build the system.

These characteristics of the Internet resource system were reinforced by an external environment that was supportive. The most important external actor, the government, spawned the idea in the first place.[65] The Federal Communications Commission (FCC), which had regulatory authority over a closely related, essential complementary resource system on which the Internet was dependent, also made key decisions that supported the growth of an autonomous, decentralized resource system.[66] The Internet would not have functioned beyond a minimal scale without access to a key, related external resource system – the

Table II-1: Resource System Characteristics Conducive to the Internet's Success

RULES, FUNCTIONS & INFLUENCES	DESIGN PRINCIPLES	FAVORABLE CONDITIONS
Structure and Units		
Boundary Rules Position Rules	Clarity of Membership Clarity of Resource Congruence between Membership & Resource	Size of resource system: Very large territories are unlikely to self-organize given the high cost of defining boundaries ... monitoring use patterns and gaining ecological knowledge. Very small territories do not generate substantial flows of valuable products. Thus, moderate size is most conducive to self-organization.
Control Appropriation Rules Provision Rules	Fair, orderly, efficient Incentive to contribute Reflect local conditions and be congruent	Predictability of system dynamics: System dynamics need to be sufficiently predictable that users can estimate what would happen if they were to particular rules or no entry territories.
Users and Uses		
Collective Choice	Participation Power to act	When users... have full autonomy at the collective choice level to craft their own rules, they face lower transactions costs as well as lower costs in defending a resource against invasion by others. When some users of any type of resource system have entrepreneurial skill and are respected as local leaders as result of prior organization for other purposes, self- organization is more likely.
Payoff	Cost/Benefit	Users need to observe some scarcity before they invest in self-organization. Distribution of costs is proportional to benefits.
Governance		
Monitoring	Present Community Professional Monitor appropriation & condition of the resource	Due to the cost of observing and managing a system, self-organization is less likely with mobile resources. Group size is always relevant, but its effect on self-organization depends on other variables and the types of management tasks envisioned. Norms/social capital: Users of all types of resource systems who share moral and ethical standards regarding how to behave in groups they form, and thus the norms of reciprocity, and sufficient trust in one another to keep agreements will face lower transaction costs in reaching agreements and lower costs of monitoring.
Enforcement	Graduated response Accountable	Rapid, low cost arenas to resolve conflicts
Information:	Local Knowledge Flow for monitoring	When users share common knowledge of relevant system attributes, how their actions affect each other, and rules use in other systems, they will perceive lower costs of organizing.
Socio-ecological Setting		
External Drivers	Government Recognition of rights to organize	The long term sustainability of rules devised at a focal level depends on monitoring and enforcements as well as their not being overruled by larger government policies... Larger scale governance systems may either facilitate or destroy governance systems at a focal level.
	Economics	Market integration may effectively remove control of a resource from a user group... external integration alters local incentives, frequently by decreasing dependence on the resource used by a community... when members are not as dependent on the resource, their welfare is not as strongly tied to cooperative behavior.
	Nested enterprise	When a resource is connected to a larger socio-ecological system, governance activities are organized in multiple, nested layers. Establishing rules at one level, without rules at the other levels will produce an incomplete system that may not endure over the long term.

Source: ELINOR OSTROM, UNDERSTANDING INSTITUTIONAL DIVERSITY 259 (2005); Cox et al., *supra* note 27, at 15; Ostrom, *supra* note 17, at 422.

telecommunications network – that was the focal core communications resource system of the 2nd industrial revolution. The FCC instituted key policy decisions that forced the dominant incumbents in the telecommunications resource system to leave the Internet alone,[67] enabling the Internet to develop according to a radically different set of design and governance principles, while utilizing the existing communications resource system.

An important implication of these observations is that the unintended consequences of dramatic success can alter the internal and external relations of the resource system so much that the original conditions of success are no longer obtained. Thus, even a successful resource system must be able to adapt to change. Over the course of the youth and adolescence of the Internet resource system, its remarkable success transformed almost every one of those conditions. We now have a large number of much more diverse users spread over a vast geographic space creating an exaflood of much more complex and heterogeneous outputs. The complexity and heterogeneity challenge the predictability. Diversity reduces the sharing of norms. The expansion of the Internet as a communications resource system brings it into conflict with the telecommunications resource system on which it depended for its success. Commercialization changes the motivations of actors and their willingness to cooperate, leading some commercial interest to seek to completely overturn the constraint on telecommunications resource behavior that the FCC imposed.[68]

Challenges to predictability, norms and cooperation trigger a search for new or "better" management mechanisms. Given the tendency to try to fit new relations into old laws, we should not be surprised to find many policy advocates turning to the state or the market to address the challenges. Yet, in significant measure the Internet succeeded because it was between the state and the market, utilizing tools from each to build a dynamic resource system based on a radically different communications principle.

B. The Basic Elements of Institutional Analysis

1. Building Success between the Market and the State

Both North and Ostrom locate their analytic frameworks between the market and the state based on a similar critique of neoclassic economic analysis and its overreliance on markets as the answer to every question and/or the solution to every problem. [69] Indeed, these two Nobel laureates provide the bookends for over a decade of Nobel prizes in economics that were given to scholars who demonstrated that the neoclassical approach to economics that dominated much of the 20th century was far too narrow.

Each framework argues that neoclassical economic analysis is so severely limited by its assumptions as to be restricted in its usefulness and counterproductive in the search for knowledge about change and stability across time. They identify a series of important situations/challenges that are not well suited to simple market solutions. Their analyses demonstrate that humans have much greater deliberative capacity and intentional ability to build organizations and institutions to meet economic challenges, so the resulting reality of economic life is far more complex than neoclassic theory admits.

The two frameworks share a similar schizophrenia about government. They are leery of government solutions from above/outside. External mandates have a tendency to make matters worse, not better, either because the outsiders do not have the necessary local knowledge to

understand how to make the resource system work (and are too arrogant to ask) or because their interests are different from the local interests. However, both frameworks also recognize that meeting the challenge of building institutions/organization to solve economic problems requires supportive government action at some level, and the larger and more complex the resource system, the greater the need for governmental policy support.[70]

North's description of how and when the supportive decisions of the state can provide critical support, rare as it is, identifies a pattern of action that I argue typified the behavior of the state in the context of the birth and youth of the Internet.

> In rare cases the government designs and enforces a set of rules of the game that encourage productive activity. . . . Because there is a widespread prejudice among many neoclassical economists that simply an absence of government intervention is a sufficient condition for good economic performance in a particular market, it is important to stress that the performance characteristics of any market are a function of the set of constraints imposed by institutions (formal rules—including those by government—informal norms, and the enforcement characteristics) that determine the incentive structure in that market. . . . The crucial point is to recognize that efficient markets are created by structuring them to have low costs of transacting and these conditions will vary with each kind of market and with each market over time. . . . Well-functioning markets require government, but not just any government will do. There must be institutions that limit the government from preying on the market. Solving the development problem therefore requires the crafting of political institutions that provide the necessary underpinnings of public goods essential for a well-functioning economy and at the same time limit the discretion and authority of government and of the individual actors within government. . . . [A]n underlying structure that credibly commits the state to a set of political rules and enforcement that protects organizations and exchange relationships.[71]

Ostrom's description of nested resource systems expresses a similar view:

> [O]fficials and policy analysts who presume that they have the right design can be dangerous. They are likely to assume that citizens are short-sighted and motivated only by extrinsic benefits and costs. Somehow, the officials and policy analysts assume that they have different motivations and can find the optimal policy because they are not directly involved in the problem (citation omitted). They are indeed isolated from the problems. This leaves them with little capability to adapt and learn in light of information about outcomes resulting from their policies. All too often, these "optimal" policies have Leviathan-like characteristics to them . . . . While smaller-scale, community-governed resource institutions may be more effective than centralized government in achieving many aspects of sustainable development, the absence of supportive, large-scale institutional arrangements may be just as much a threat to long-term sustenance as the presence of preemptive large-scale governmental agencies. Obtaining reliable information about the effects of different uses of resource systems and resource conditions is an activity that is essential to long-term sustainability. If all local communities were to have to develop all of their own scientific information about the physical settings in which they were located, few would have the resources to accomplish this. [72]
>
> Furthermore, the long-term stability of rules devised at a focal. . . level depends on monitoring and enforcement as well as their not being overruled by larger government policies. . . . Larger scale governance systems may either facilitate or destroy governance systems at a focal. . . level.[73]

Institutions located between the market and the state can ground their economic success (superiority) in a number of possible economic dilemmas. Ostrom has been closely associated with the debate over social organization to exploit common-pool resources and produce public goods[74] but that is far from the only economic dilemma that non-market institutions may be called on to address. North argues that the exploitation of knowledge poses a challenge that markets may not meet well and his list of challenges includes other well-known sources of market failure.

> Just how does it work? Sociologists looking empirically at information networks describe an immensely complicated communications structure that pulls the dispersed knowledge together in order to use it effectively in the growth of productivity of the modern economy. . . . It is only when that specialized knowledge can be integrated with other complementary knowledge at low cost that it is very valuable. The interconnections necessary to combine distributed knowledge effectively entail much more than an effective price system, although that is an essential prerequisite. The essential public goods, asymmetric information, and ubiquitous externalities require that institutions and organizations be created to integrate this dispersed knowledge . . . .[75]

The economic dilemma that the Internet navigates could be classified as a common-pool resource, a public good with a massive (positive) externalities or a transaction cost problem (asymmetric information plus others).[76] Any of these would provide a basis for concluding that there was an economic benefit that could be captured by cooperation. Or, it can be argued that the immense power of the Internet and its remarkably quick rise to dominance reflects the fact that it addresses **all** of these perennial sources of market failure in significant ways. The importance of the Internet resource system is magnified by the fact that communications and information flow are increasingly central to economic activity and have long been at the heart of important political and social processes. Thus, the Internet provides uniquely useful solutions to several increasingly important social/economic dilemmas. Failing to recognize the broad economic basis of the Internet's success seriously underestimates its value and power as a cooperative solution to important social and economic dilemmas.[77] More importantly, in order to avoid undermining the dynamic economic engine of the Internet in the process of responding to the maturation challenges, the rich and complex set of social and economic dilemmas it addresses must be considered.

As suggested by the above quotes, the challenge for institutional analysis has been to describe the rules that make resource systems work/economies perform well and to convince policymakers (among others) that the market or the state are not the only way to write effective rules. In the Internet space, we know the rules and the institutions. My goal is to understand why they worked so well and to caution policymakers that great care is needed in adapting them to the maturation challenges, lest the policies adopted undermine the ability of the resource system to continue it dynamic development. The proposed solution is to expand and reinforce governance institutions between the market and the state.

2. Creating Resources by Increasing Predictability

Both North and Ostrom launch their analysis from the desire and need to analyze systems that generate resources for groups of humans because the production and distribution of economic resources are central to human life and wellbeing.

> The revolution in technology of the past several centuries has made possible a level of

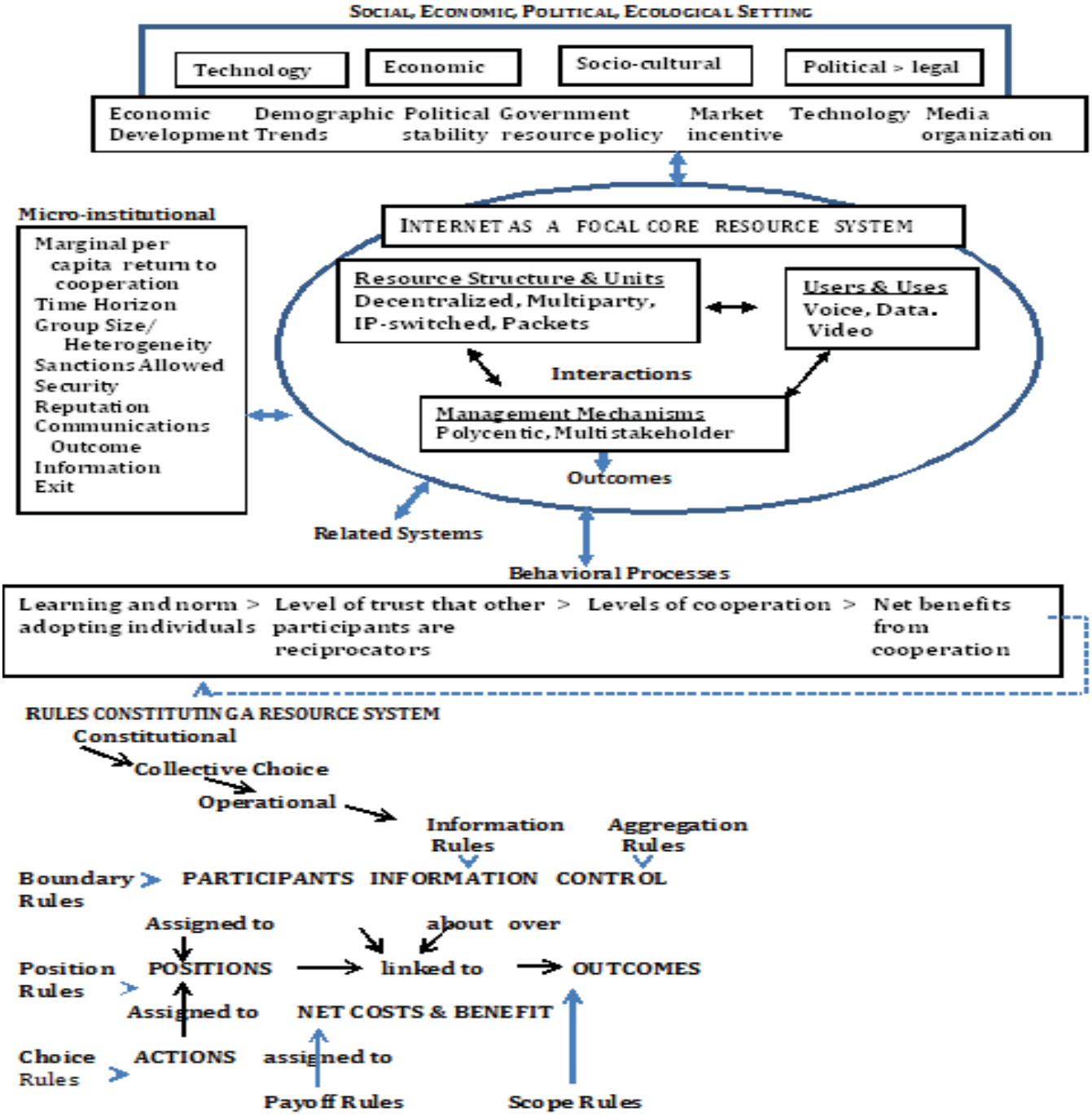
> human well-being of unimaginable proportions as compared to the past, but it also has produced a world of interdependence and universal externalities, and in consequence a whole new set of uncertainties.[78]

The ultimate goal of social institutions/organizations is the reduction of uncertainty through cooperation to capture collective benefits that exceed the benefits available from individual action. Figure II-1 presents a summary of the comprehensive variables and processes that the IAD approach has derived from experimental and field studies of cooperative responses to economic dilemmas. Predictability of actions results from roles that are clearly defined by formal rules and informal norms as to who can do what, rules and norms that are well monitored and backed by enforcement mechanisms. Predictability is enhanced by providing incentives and enforcing constraints on activity with sanctions. Effective sanctioning that maintains the order tends to be graduated. Trust in the action of others is the key to predictability of action and lowering transaction costs. Information and communications are central to developing rules and enforcing them.[79]

Consistency/congruence across these levels and between the elements of each level is a key feature of a successful social response to a resource challenge. Both of the frameworks are focused on the causes and responses to external and internal pressures for change and the ability of the institutions that humans have built to adapt.

> Successful economic development will occur when the belief system that has evolved has created a "favorable" artifactual structure that can confront the novel experiences that the individual and society face and resolve positively the novel dilemma. . . . Put simply the richer the artifactual structure the more likely are we to confront novel problems successfully. That is what is meant by adaptive efficiency; creating the necessary artifactual structure is an essential goal of economic policy.
>
> Adaptive efficiency . . . entails a set of institutions that readily adapt to the shocks, disturbances, and ubiquitous uncertainty that characterize every society over time. The foundation of these flexible institutions resides in widely held beliefs embodied in the informal constraints of the society.[80]
>
> In light of still further evidence about the performance of self-organized systems that are consistent with the earlier derived design principles, we can conclude that there are ways of organizing governance that increase the opportunities for adaptation and learning in a changing and uncertain world with continuing advances in knowledge and technologies. . . .
>
> The contemporary use of the term *robustness* in regard to complex systems focuses on adaptability to disturbances: "the maintenance of some desired system characteristics despite fluctuations in the behavior of its component parts or its environment."[81]

Figure II-1: Variables and Processes that Influence the Development and Adaptation of the Internet Resource System



Source: Marco A. Janssen et al., Working Together: Collective Action, the Commons and Multiple Methods in Practice (2010);, Elinor Ostrom, *A General Framework for Analyzing Sustainability of Socio-Ecological Systems*, Science Magazine, July 24, 2009, at 24; Nives Dolsak & Elinor Ostrom, *The Challenge of the Commons, in*, The Commons in the New Millennium: Challenges and Adaptation, (Nives Dolsak & Elinor Ostrom eds. 2003).

Change depends on the ability of the institutions to buffer themselves and the origin and nature of the forces creating the pressure for change. These pressures can be internal to the resource system (e.g., depletion of resources, conflicts over interpretation of rules) or external (e.g., external intervention, competition for scarce resources, change in the characteristics of the resource).[82]

C. The Internet as a Focal Core Resource System

1. The Elements of the Internet Resources System

To study this complexity one must examine the formal and informal rules of social institutions and organization that humans develop to increase the predictability of behavior. As shown on the left side of Figure II-1, above, the resource system can be conceptualized as composed of three aspects or sets of elements—the structure and units, users and uses, and the management mechanism—that interact to produce the outcome. The resource system is embedded in a socio-ecological setting and supported by behavioral processes.

In Figure II-1, above, I modify Ostrom's basic set of definitions in two ways. First, I combine the structure and units into one aspect of the resource system that captures the generally technical nature of the system. Second, the aspect that I label management mechanism is called the governance system by Ostrom. Ostrom used the term governance system broadly to include the decisions and choices made about the constitution of the resources system. The Internet governance debate has come to use the term governance even more broadly to apply to both the management of the resource and the host of issues that arise from the socio-ecological setting.

This distinction is well-recognized in the Internet governance debate. For example, a paper from the United Nations Conference on Trade and Development (UNCTAD) noted:

> It is important in this regard to distinguish "governance of the Internet" (that involves the physical and logical infrastructure of the Internet, and would probably be more appropriate to refer to as the management of the core resources of the Internet) from "governance on the Internet" (which concerns activities that take place over the Internet, particularly the exchange of information, goods and services).[83]

Throughout the remainder of the paper, I use the term Internet governance to refer to the very broad set of issues that have arisen in the international debate about the future of the Internet, while I reserve the term management mechanisms for the narrower questions of the operation of the structure, units, users, and uses of the resource system.

As shown on the right side of Figure II-1, the resource system produces beneficial outcomes by institutionalizing rules that govern the resource. There are three broad categories of rules that define a resource system.

- Constitutional rules govern the way the overall resources system is constituted, particularly how collective choice rules are defined.
- Collective choice rules embody the procedures by which the operational rules are

changed.

- Operational rules govern the activities that take place within the borders of the resource system. There are seven operational rules that define the resource system by assigning participants to positions that are associated with actions that yield payoffs, subject to monitoring and control.

The central question posed by North is at the operation level, "just how does it work?" It can be answered in terms of Figure II-1 as follows. The Internet is a resource system in which anyone can do anything as long as it comports with the Internet protocols (IP). The protocols create a flow of resource units continuously. They place no restrictions on content. If there is congestion, the users are told to back off and each knows what needs to be sent to complete the communication. Users have the opportunity to design their uses or operate their networks in ways that can deal with the capacity of the system to handle traffic. Decentralized, user-based, local knowledge is allowed to play a large role in the resource system, another important characteristic that enables it to produce large benefits. The success of the system encourages the community of users to invest substantially in its maintenance and expansion. There may be some uses that the resource system is not well-suited for, but there are always work-arounds, and the vast array of activities that it came to support swamped the things it could not do precisely because there is so much freedom for users to figure out how to get things done.

The essence of the Internet resource system came to be described as a series of layers configured as an hourglass, as depicted in Figure II-2 by the National Academy of Sciences. The description that has become common is that the unique, revolutionary idea of the hourglass is that the protocols and standards at the waist enable any network in the bottom strata to communicate with every other network in the bottom strata, regardless of the application used, as long as the communication adheres to the protocols and standards at the waist. Interestingly, the hourglass can be described as two sections connected by a channel, which better fits the idea of information flows. The functionality of the hourglass lies in the fact that the two sections can contribute to the system functioning as the source of the flow is renewed with the turning over of the glass. This highlights a key characteristic of the Internet. It can be argued that networks and applications are strong complements in the creation of a successful resource system, and it is fair to say that the success of the Internet resource system reflects the "equal" contribution of the two sections – content and networks; hardware and software.

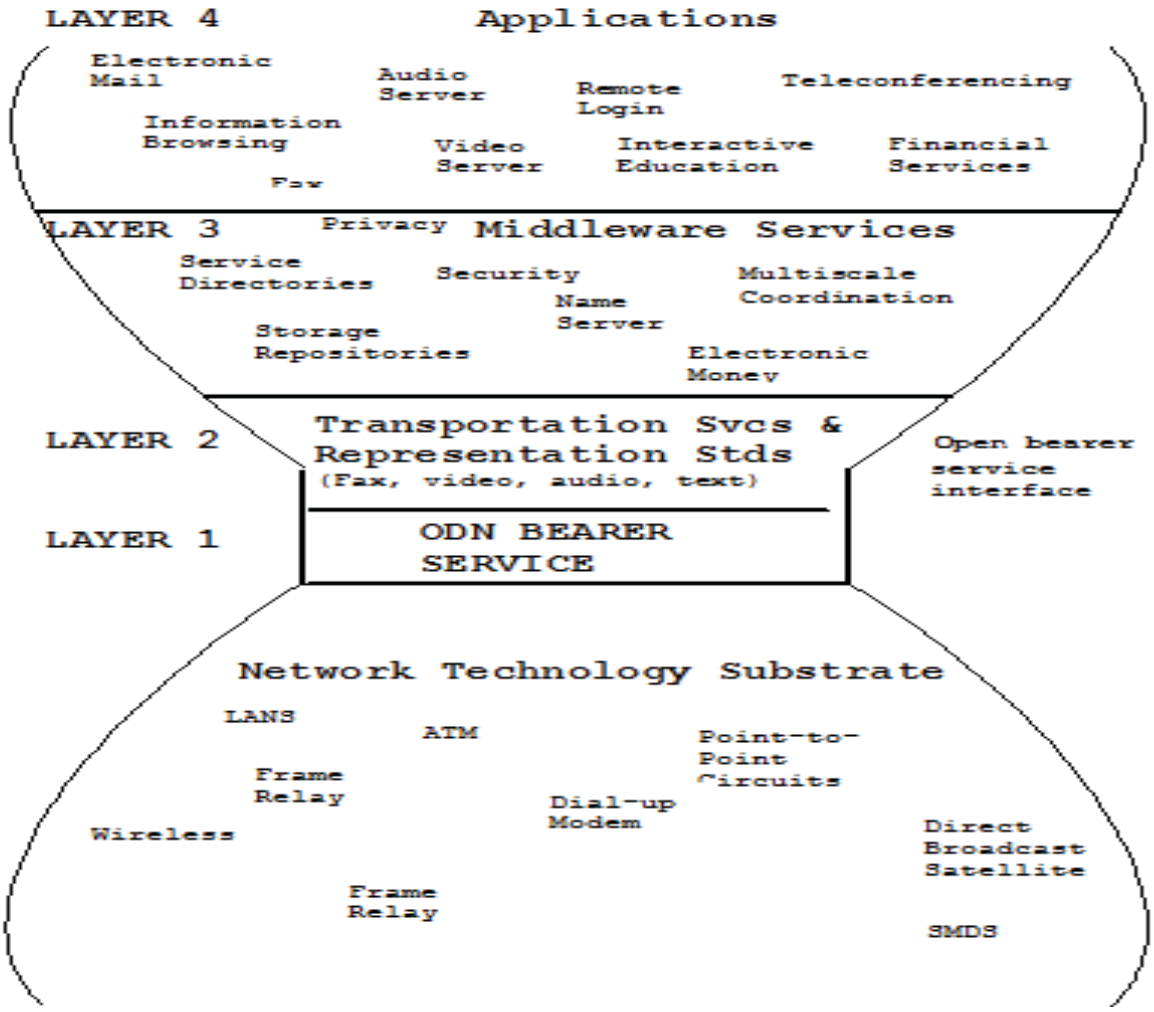
2. Networks as Resource Systems

With the Internet defined as a network of networks, it is not surprising that analysts of the Internet governance issue frequently adopt network theory as a framework. Network theory is virtually identical to the analytic framework that I have outlined in this section. As Mueller described networks, the quality of being between market structures and hierarchical structure is an essential characteristic of a network.

> A network was said to be based on *the relationship* rather than *the transaction*; it was composed of longer-term bonds of reciprocity and trust among economic actors that were too stable to be classified as market transactions and too loose to be classified as formal hierarchies.[84] The economic advantage of the network flows from the characteristics of the network that allow it to utilize local knowledge.

Many of the advantages attributed to this form of organization were related to its efficiency in sharing and processing information and knowledge. Networks were characterized as relying on lateral as opposed to hierarchical channels of communication, which made it possible to more efficiently exploit complementary skills and knowledge dispersed among multiple actors. As learning and innovation vehicles, network organizations compared favorably to "passing information up and down a corporate hierarchy or purchasing information in the marketplace" because they facilitated the development of "new interpretations" and "novel linkages," and took advantage of the unique economics of information, in that sharing does not deplete it. . . . Based on the preceding discussion, it now is easier to see how the Internet triggers an explosion of new kinds of network organization and peer production processes; and also how the Internet enables a vast expansion of transnational issue networks or policy networks.[85]

Figure II-2: The Internet Hourglass at the Heart of the Resource System



Source: National Research Council, Realizing the Information Future 3 (National Academy Press 1994), *available at:* http://www.scientificcomputing.com/news-HPC-Internet-Architectures-Hourglass-Shape.aspx (updated version). at 45.

THE POLITICAL ECONOMY OF COLLABORATIVE PRODUCTION IN THE DIGITAL INFORMATION AGE

INTRODUCTION

In August 2005, *Wired* magazine's cover story stated that collaborative production is the near future's "main event."[86] *Wired*, marking the 10th anniversary of the initial public offering of Netscape, also declared that a revolution was occurring that penetrates to the core of daily life with the transformation of consumers into producers.[87] Among the evidence of this transformation is hyperlinking, which creates the electricity for "ordinary folks to invest huge hunks of energy and time into making free encyclopedias, creating public tutorials for changing a flat tire, or cataloging the votes in the Senate."[88] *Business Week* confirmed this transformation when it ran a similar story a month later with the headline, "It's A Whole New Web."[89]

In the presence of digital computer/communications platforms, the dramatic growth of collaborative activities constitutes the emergence of a new mode of information production based on the superior economics of collaborative production. This new mode of production challenges fundamental concepts of the role and function of property and commercial relationships in the production of information goods. However, to develop definitions of and describe the success of collaborative production, the definition of public goods and common pool resources must be extended.[90] This is because although public goods and common pool resources exhibit traits of non-rivalry and non-excludability, collaborative goods exhibit characteristics of anti-rivalry and inclusiveness.[91] In addition, concepts such as commons and non-commodified relations must be included to understand fully the dynamics of collaborative production.

The dramatic success of collaborative networks poses a challenge, not only to the dominant economic paradigm, but also to a broad range of received social science thinking.[92] Traditional economic analysis hypothesized that large producers would reap the benefits of network externalities by tracking usage and targeting users with a form of cyberspace direct mail on steroids combined with instant point and click gratification that would deliver sales of large, bundled packages.[93] Sociologists feared an acceleration of isolation in the *Bowling Alone* syndrome,[94] as the focal point of interaction shifted from the face-to-face physical world to the anonymous, fleeting interactions in cyberspace.[95] Political scientists, applying the *Logic of Collective Action*, expected collaborative processes to break down under the weight of free riders.[96]

There is mounting evidence, however, that they were all wrong, as new forms of collaboration bind people together in productive, social, and economic relations to produce and self-supply an increasing array of micro-products that meet their needs.[97] The ever-declining costs of digital production and distribution have thwarted the predicted dominance of large bundles of information goods.[98] Large numbers of producers have seen increasing returns by hooking up with large numbers of consumers to sell differentiated products in two-sided markets or, better still, by consumers becoming producers in technology-facilitated environments.[99] People are no longer passive participants in the economy, as they were in the media available in

the 20th century.[100] When offered the opportunity to participate and communicate in the digital information age, people quickly accept.[101] The potential for collective action was far greater than anticipated.[102] As a result, group formation has been widespread due to the high value of heterogeneity and the ability of people to see and act on shared interests in a non-commodified digital space that facilitates communication.[103]

To fully understand the emergence of collaborative production, this paper extends familiar economic concepts to make an adjustment of the existing economic rationale for bringing information 'under a legal regime of property rights' to accommodate the notion of collaborative production.[104] Information products, in the traditional framework of market structure, are not simple private goods. Spectrum is a common pool resource and communications facilities are public goods.

In the structural view of industrial organization[105] and the institutional view of economics[106] adopted in this paper transaction costs play a key role. Structural analysis teaches that when basic economic conditions change as dramatically as they have in the past couple of decades, society should not be surprised to find fundamental changes in economic structure, conduct, and performance. Institutional economics focuses on cooperation and transaction costs as a challenge to economic systems.[107] Institutional analysis argues that in addition to the costs of production – the supply-side transformation costs in the economy – transactions are a central part of the total cost. Indeed, transaction costs are of equal, if not greater, importance than the transformation costs of production processes, especially when services become the focus of the economy. Above all, humans struggle "to solve the problems of cooperation so that they may reap the advantages not only of technology, but also of all the other facets of human endeavor that constitute civilization."[108]

I. ANALYTIC FRAMEWORK

A. Traditional Public Goods

1. Characteristics of Traditional Public Goods

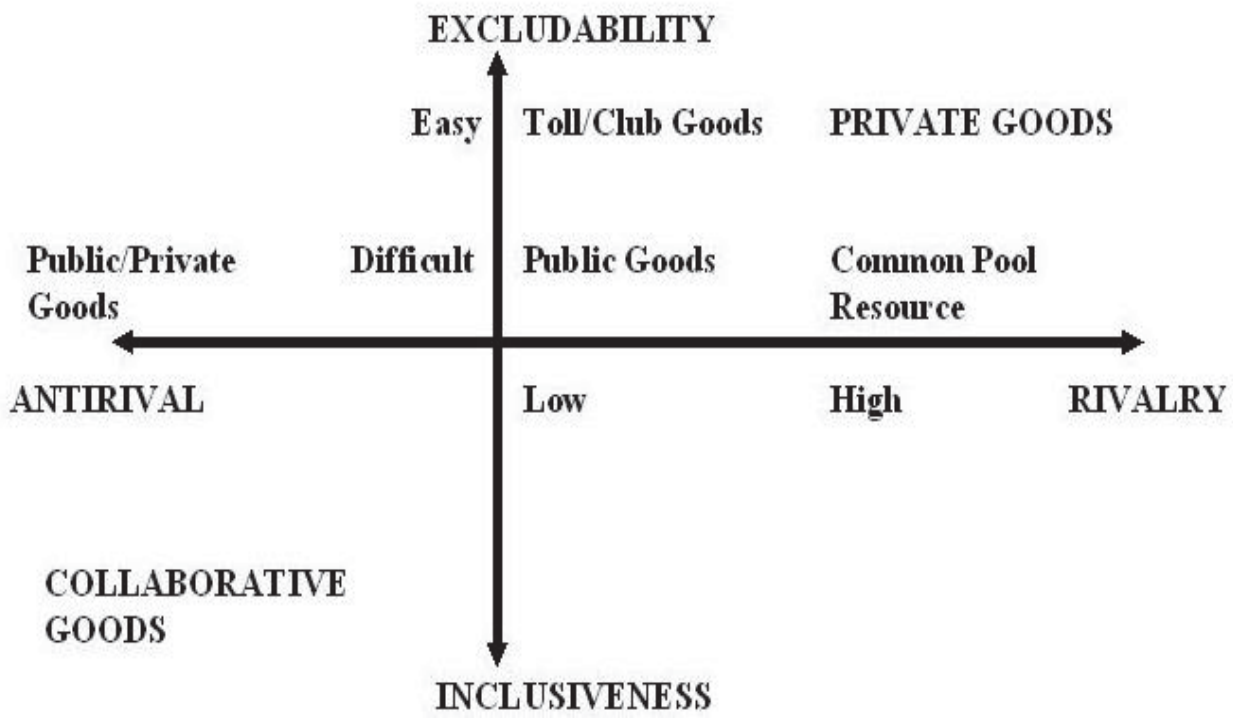
Economic analysis recognizes that under certain conditions competitive markets do not produce socially desirable outcomes.[109] In the case of public goods and externalities, the problem is not a lack of competition, but the inability of profit-driven market transactions to produce the goods or capture the values that best serve society. Markets with externalities and markets with public goods are "not likely to allocate resources efficiently, even though they might otherwise be competitive."[110] Externalities occur when the market price does not reflect the costs or benefit to the consumer or producer or others, not party to the transaction.[111] Public goods benefit all consumers, "even though individuals may not pay for the costs of production."[112] Both externalities and public goods affect the invisible hand theory in that it "may not guide the market to an economically efficient amount of production."[113]

These market failures occur where goods lack the critical characteristics that enable transactions in private property. (See Exhibit 1). In the neoclassical paradigm, scarcity is about rivalry and property is about exclusion. As Landes and Posner note, "[a] property right is a legally enforceable power to exclude others from using a resource."[114] A private good is

rivalrous since "consumption by one person reduces the quantity that can be consumed by another person"[115] and **exclusive** since "consumers may be denied access."[116]

The central claim for the superiority of private goods is that where resources are rivalrous or subtractable, efficiency requires they be devoted to their highest valued use.[117] Exclusion gives the owner of the resource the incentive to husband the resource, especially where investment is necessary to replenish it.[118] Market allocation solves the subtractability problem by directing resources to their highest value uses.[119] The classic "tragedy of the commons" is the case where the failure to grant rights of exclusion leads to either under investment in the resource or overuse.[120]

Exhibit 1: Characteristics of Collaborative Goods



When rivalry and excludability conditions are absent, the provision of goods in markets becomes problematic, particularly for private firms. **Nonrivalry** occurs where increased consumption of a good by one person does not decrease the amount available for consumption by others.[121] Here allocation does not promote efficiency, since consumers do not consume anything in the traditional sense and there is no scarcity to allocate. **Nonexcludability** means the consumers are not economically prevented from consumption either because the producer surplus is eaten up by the difficulty of exclusion or compensation cannot be extracted from "free riders."[122] Exclusion is valueless and there is little incentive to invest.

This gives rise to the familiar typology of goods shown in the upper right hand quadrant of Exhibit 1. Note that I present the two characteristics as continua to underscore the absence of

sharp dividing lines. Goods are more or less rivalrous and excludable. There is no precise point where they pass from being a private good to a public good.

A public good exhibits *nonrivalry in consumption* and *nonexcludability*.[123] When producers cannot exclude individuals from consuming their good, the individuals using the good for free may withhold their support for the good, seeking a free ride. Where the costs of exclusion are high, the cost may outweigh the value of the good. This prevents producers from providing public goods, even when those goods are beneficial to the public.

There are additional problems in private provision. Transactions may not take place for a variety of reasons such as excessive transaction costs or the inclination to try to "hold-up" transactions, seeking a larger share of the rents.[124] There is the "tragedy of the anti-commons" – the excessive fragmentation of property rights preventing transactions from taking place.[125] In this case, which might be considered a condition of excessive rivalry, producers and consumers cannot execute transactions as the institutional arrangement creates such huge transaction costs and problems.

Common pool resources (CPR) and their associated governance rules have also received increasing attention.[126] These resources are non-excludable, but they are rivalrous. The solution to the problems associated with common-pool resources is not necessarily private property, though. "If exclusion costs are comparatively high, common ownership solutions may be preferable."[127] The possibility of co-existence of different governance regimes is particularly important for common-pool resources because many CPRs incorporate characteristics of private and public goods.[128] In some instances, this is known as the "comedy of the commons."[129] The "comedy of the commons" is the opposite of the "tragedy of the commons" – the notion that users of commonly held property such as forests, fisheries, and most notably air, work together to ensure that overexploitation does not occur.[130]

2. Traditional Goods and the Technology Sector

Traditional public goods have played a particularly large role in the communications space. For centuries, society has treated communications networks as infrastructural, public goods. However, the distinctively American approach to the provision of these projects was to blend private capital with public interest obligations. Deemed to be "affected with the public interest," privately built communications networks first took the form of common carrier regulation and later took on price, quantity, and entry regulation.

Typically, infrastructure is a large investment that affects many aspects of the economy and exhibits substantial economies of scale.[131] Costs decline as more people use the infrastructure and the value of the economic activity it supports expands. Given the size of the investment and the need to expand consumption over a long period, it is difficult for private developers to realize an adequate return on such projects. The number of suppliers is likely to be limited. A natural monopoly, or at best a duopoly, develops – that is if any producer enters the market.

As an empirical matter, there are five clear linkages between communication infrastructure and public goods. First, infrastructure generates positive externalities by

stimulating economic activity; public goods capture externalities that private, market transactions cannot.[132] Second, as a practical matter, for most of their economic life, infrastructure projects tend to be un-congested and non-rivalrous, especially in low-density, low-income areas.[133] Third, traditionally, society makes communications infrastructure a matter of public policy because private developers are unlikely to provide needed communication infrastructure adequately.[134] Fourth, because communications infrastructure networks connect people, the value of the network grows as more people connect to it.[135] Finally, communications networks traditionally receive special treatment from the government with franchises, subsidies, or special contracts.[136]

B. Collaborative Goods

Although it is certainly possible to analyze communication and information goods in the traditional framework of public goods, in the emerging information economy there must be an expansion of the underlying economic concepts used to define these goods.[137] The emergence of collaborative production on a large scale suggests something more, something different from common-pool resources and public goods.

Similar to public goods which represent a collective decision to provide an input for communications infrastructure, collaborative production entails a production process in which private appropriation of shared resources is accomplished.[138] However, collaborative production is a continuous direct relationship between producers outside the traditional market place. It is genuine joint production, not the collective supply or management of an input for private appropriation.

Collaborative production goods exhibit traits of anti-rivalry and inclusivity. The key characteristics of collaborative production goods occur where having numerous producers participate in the production of the goods increases its value and where the value of the good goes up as the number of people who use it increases. All three examples, discussed in greater detail later in this paper, wireless mesh networks, open source software and peer-to-peer networks exhibit these characteristics.[139]

Anti-rivalry occurs when the use and/or sharing the production of the good by one person increases the value of the good to others.[140] **Inclusiveness** occurs when the value of a good increases as the number of people using and/or producing the good increases.[141] Eric von Hippel's work on user driven innovation and free revealing reinforces the distinction between anti-rivalry and inclusiveness.[142] He identifies a **private/collective** good as a good for which individuals volunteer to support the supply of the good to the community of producers.[143] This provides a nuanced difference from a common pool resource in that an independent private action produces the resource for the community.[144] Innovators freely reveal private effort because they can "*inherently* obtain greater private benefits than free riders."[145]

In the information economy, just as it is necessary to distinguish between anti-rivalry and inclusiveness, it is also necessary to distinguish between inclusiveness and **network effects.** Network effects, also known as demand side economies of scale, occur when the costs of producing or the benefits of consuming a good spill over onto those who are producing or consuming the good, beyond the transaction.[146] The benefits of the network effect accrue to

members of the network, directly or indirectly. The classic example of a direct network effect is a telephone. The value of the telephone grows as the number of people on the network increases due to the increasing number of reachable people. The classic example of an indirect network effect is software. The value of an operating system goes up as the number of people using it increases because more companies produce applications for it. Although there is no direct connection between the members of the network, the benefits still accrues to network members.

Frischmann argues for an additional distinction "between network effects and infrastructure effect."[147] The externalities of public and social infrastructures are diffuse because they "positively affect the utility of nonusers, that is, members of society who are not using the infrastructure itself also benefit."[148] Frischmann gives both a social and economic example of these diffuse externalities.[149] Socially, the increase in political discourse among Internet users also benefits non-users.[150] Economically, the increase of fertilizer due to an irrigation project increasing agricultural output affects distant fertilizer plants.[151]

David Reed describes two characteristics of adaptive network architectures in the spectrum that parallel the concepts of anti-rivalry and inclusiveness.[152] The first characteristic, cooperation gain, is the focal point of his analysis.[153] Cooperative gain, much like the anti-rivalry principle identified earlier, is the phenomenon where "[c]ompared to systems of dedicated, isolated links, networks provide much more transport capacity at much greater transport efficiency… [creating] major economic benefits."[154] The second characteristic is network optionality.[155] Network optionality, much like the inclusiveness principle discussed above, comprises two network externalities.[156] First, the "system-wide option value of flexibility in a network scales proportionally to the square of the number of nodes."[157] Second, "the option value that accrues due to the ability to dynamically assign capacity depending on shifting demand can increase superlinearly as the number of cooperating nodes in a network."[158] Yochai Benkler illustrates this when he states that the sharing of spectrum points toward the gain from network optionality by stressing the value of expanding "the set of usable combinations."[159] Property rights are inefficient in the dynamic allocation of spectrum, Benkler argues, because "[p]roperty rights in bandwidth inefficiently fence a sub-optimal resource boundary."[160]

Exhibit 1 locates these characteristics of anti-rivalry and inclusiveness as extensions of the existing dimensions. In the rivalry dimension, we start at private goods that exhibit high rivalry, which means that use by one subtracts from the use by another. We move to public goods, which exhibit low rivalry, where use by one does not subtract from use by the other. For anti-rivalry goods, we hypothesize the opposite effect, use by one adds to the potential for use by another. In the excludability dimension, we start with private goods, where it is easy to keeping people out. We move to public goods, where excludability is difficulty. For inclusive goods, we hypothesize to the opposite effect – the benefit of pulling people in.

Information goods are extremely good candidates to be collaborative goods because information is "an extreme nonrival good" and an "unusually" non-exclusive good.[161] A person can only own information if that person keeps the information to himself; once that information has been released to the public the person who distributed cannot control who else gains the information.[162]

Although information is hard to control, that alone does not guarantee collaboration. Collaborative production is not successful just because of weak property rights; there must also be benefits to those that participate.[163] Collaborative production must increase value to the group. Collaborative production must motivate individuals to participate voluntarily as the individuals capture non-rivalrous benefits. It must allow free revealers to recognize that the potential gains of opportunistic behavior will evaporate if the cooperative behavior breaks down. Cooperation becomes the rule, rather than the exception.

The challenges to collaborative goods are also greatly different from those of public goods. In the world of private goods, the problem is the inclination to free ride, to withhold payment or support for the provision of public goods, or to overuse the common pool resource, even though that may be bad for the public. In the world of collaborative goods, the challenge is to understand the willingness of producers to support or freely reveal innovations that enhance shared benefits, even though they do not appear to capture as much private value as they could by withholding.

II. SOURCES OF ECONOMIC ADVANTAGE FOR COLLABORATIVE PRODUCTION IN THE DIGITAL AGE

A. Technological Conditions

In order for anti-rivalry and inclusiveness to dominate, communications and information must be available; for example, the areas examined in this paper have been deeply affected and benefited mightily from the revolution in computer and communications capacity. Of equal importance are the principles that organize interconnected computers into powerful networks; for example, distributed computer capacity able to communicate at high speeds and low cost is a platform that allows more readily for collaborative production.[164]

Historically, dramatic changes in communications and transportation technology have affected society deeply.[165] However, the convergence of a highly interrelated set of activities in the communications, computer, and information industries in the late twentieth century created not merely a new environment in which information is produced and distributed, but also a revolutionary change in a wide range of economic activities.[166] The digital communications platform "links the logic of numbers to the expressive power and authority of words and images. Internet technology offers new forms for social and economic enterprise, new versatility for business relationships and partnerships, and a new scope and efficiency for markets."[167]

Because society can distribute computing intelligence widely and quickly, society has transformed interactivity.[168] "As rapid advances in computation lower the cost of information production and as the cost of communications decline, human capital becomes the salient economic good involved in information production."[169] Users become producers as their feedback rapidly influences the evolution of information products. Society has also been transformed as the ability to embody knowledge in tools and software lowers the cost of transfer dramatically.[170]

Recent analyses of technological innovation have also provided strong evidence that the digital communications platform transformed the very fabric of the innovation process.[171] The

technological revolution altered the information environment to make distributed solutions more feasible by fostering the uniquely user-focused character of the communications-intensive Internet solution. Technological advance is also making user-based design an attractive option.[172] It allows individuals to participate in task portioning and decision-making.[173]

The very technologies at the core of this revolution reinforce the dynamic of this change because they are platforms within networks. "A platform is a common arrangement of components and activities, usually unified by a set of technical standards and procedural norms around which users organize their activities. Platforms have a known interface with respect to particular technologies and are usually 'open' in some sense."[174] They are important because there are strong complementarities between the layers and each layer sustains broad economic activity in the layer above it.[175]

Communications and computer industries have always exhibited network effects and strong economies of scale.[176] Digitization reinforces these economic characteristics because economies of scope reinforce economies of scale. The embedded architecture of the network is at least as important as the technological characteristics. The technologies themselves would not be as powerful nor would the effect on the rest of society be as great if the platform had not evolved as an "ultrarobust" network.

B. Economic Advantages

In the digital environment, as described in Exhibit 2, there are three economic advantages created by collaborative production: 1) a higher level of sharing resources lowers the transformation costs of production; 2) transforming consumers into producers reduces the gap between consumers and producers; and 3) there is a greater value on the demand-side as participants facilitate and tap the energy of groups forming networks.

1. Supply-Side Transformation Resource Savings

The advantage in the transformation process rests on two factors. First, each set of activities accomplishes greater coordination by applying a combination of technological and human coordination.[177] For instance, mesh wireless communications rely more on embedding cooperation in the technology: the algorithms and protocols of communications devices. Open source, in contrast, relies more on human cooperation, greatly enhanced by digital communications. Peer-to-peer networks made up of non-technologists stand between the two. Technology does much of the work, but the functioning of the network requires the cooperation of the people using it. Most importantly, these networks survive with varying levels of human cooperation and skill.

Second, in each case, networks share critical resources: spectrum, code, storage, and bandwidth.[178] Sharing requires a process, a principle of cooperation that organizes the critical factors of production. The sharing of resources creates significant efficiencies for the networked activities and confers benefits to the collaborating parties. The capacity of the network expands. When the benefits are larger, the cost is lower. When it is easy to communicate, collaboration is more likely.

Exhibit 2: Sources of Comparative Advantage of Collaborative Production

ACTIVITY	SHARED RESOURCE	PROCESS	BENEFIT
SUPPLY SIDE TRANSFORMATION RESOURCE SAVINGS			
Mesh Networks	Spectrum	Embedding Coordination in algorithms	Dynamic occupation of spectrum
Open Source software	Code	Embodied knowledge in software	Exploiting rich information in real time
Peer-to-Peer	Storage, Bandwidth, Content	Torrenting Viral communications	Reduction in cost and expansion of throughput Broad exchange, Collaboration
TRANSACTION COST REDUCTION			
All	Local knowledge	Consumer as Producer	Fit between consumer needs and output
DEMAND-SIDE VALUE CREATION			
All	Network	Self-organizing	Increased option value

2. Transaction Cost Reductions

Collaborative production also produces an economic advantage because it transforms consumers into producers.[179] Reducing or removing the distinction between user and producer results in substantial transaction cost savings. The distance shortens between what producers produce and what consumers consume because the consumer turned producer knows what he wants more than a producer who is not a consumer. The consumer's and producer's interests are identical as they are the same person.

Users know what they need and want. Transferring that knowledge to producers creates inefficiency. Producers who are also users and volunteer for tasks that interest them inherently understand the production problem more clearly and can produce for their needs more easily instead of for the masses. They have the locally specific knowledge necessary to solve problems.[180] There is also an agency problem when consumers are not producers.[181] When producers are separate from consumers, the producer may not be able to meet the needs of individual consumers precisely. However, when the developer is also the consumer, he will act in his own best interest when producing a product.[182]

3. Demand-Side Value Creation

Collaborative production creates economic advantage on the demand-side due to group formation.[183] This is the demand-side since the size of the network, the number of network members that are reachable, and the pattern of interactions dictate the value of the network to the members. As the value of the network increases, the possibilities for communications (and therefore commerce) also increase. As consumers decide which group, and therefore network, to join they also change the group to fit their needs. This increases the value of the group to the consumer even more.

Reed identifies three types of networks that create value (see Exhibit 3).[184] First, there are one-way broadcast networks.[185] Also known as the Sarnoff "push" network, the value of one-way broadcast networks is equal to the number of receivers that a single transmitter can reach. [186] An example of a one-way broadcast network is the wire service.[187] Second, there are Metcalfe networks.[188] In a Metcalfe network, the center acts as an intermediary, linking nodes.[189] Classified advertising is an example of the Metcalfe network.[190] Third, there are Group Forming Networks, also known as Reed Communities.[191] In this network, collateral communications can take place.[192] The nodes can communicate with one another simultaneously.[193] Chat groups are the classic example of this type of network.[194]

Collateral communications expands the possible connections dramatically. Network optionality, when realized in group-formation, generates much greater value than traditional models. As more people join the network, the value of the network increases.[195] In addition, networks that "support the construction of communicating groups create value that scales *exponentially* with network size, i.e. much more rapidly than Metcalfe's square law… [called] Group Forming Networks."[196]

Exhibit 3 shows how the value of being part of the network scales as the number of members increases. The Sarnoff value is N. The Metcalfe value is N^2. The Reed community value is 2^N. The key difference between the Metcalfe network and the Group Forming Network is multi-way communications. Group Forming Networks use group tools and technologies such as chat rooms and buddy-lists that "allow small or large groups of network users to coalesce and to organize their communications around a common interest, issue, or goal."[197] The exponentiation increases value very quickly and may cause the number of connections/communications to exceed the ability of individuals to maintain them. Thus, it is a theoretical upper limit. On the other hand, as Reed points out, the formation of even a small subset of the theoretically possible groups would dramatically increase the value of the network - N^3 in Exhibit 3. Even if not all groups form, the potential value in the option to form groups is higher. The critical point is that to capture the value of group forming networks, the members of the network must have the freedom to self-organize groups. With that freedom, they create the groups of greatest value to the users.

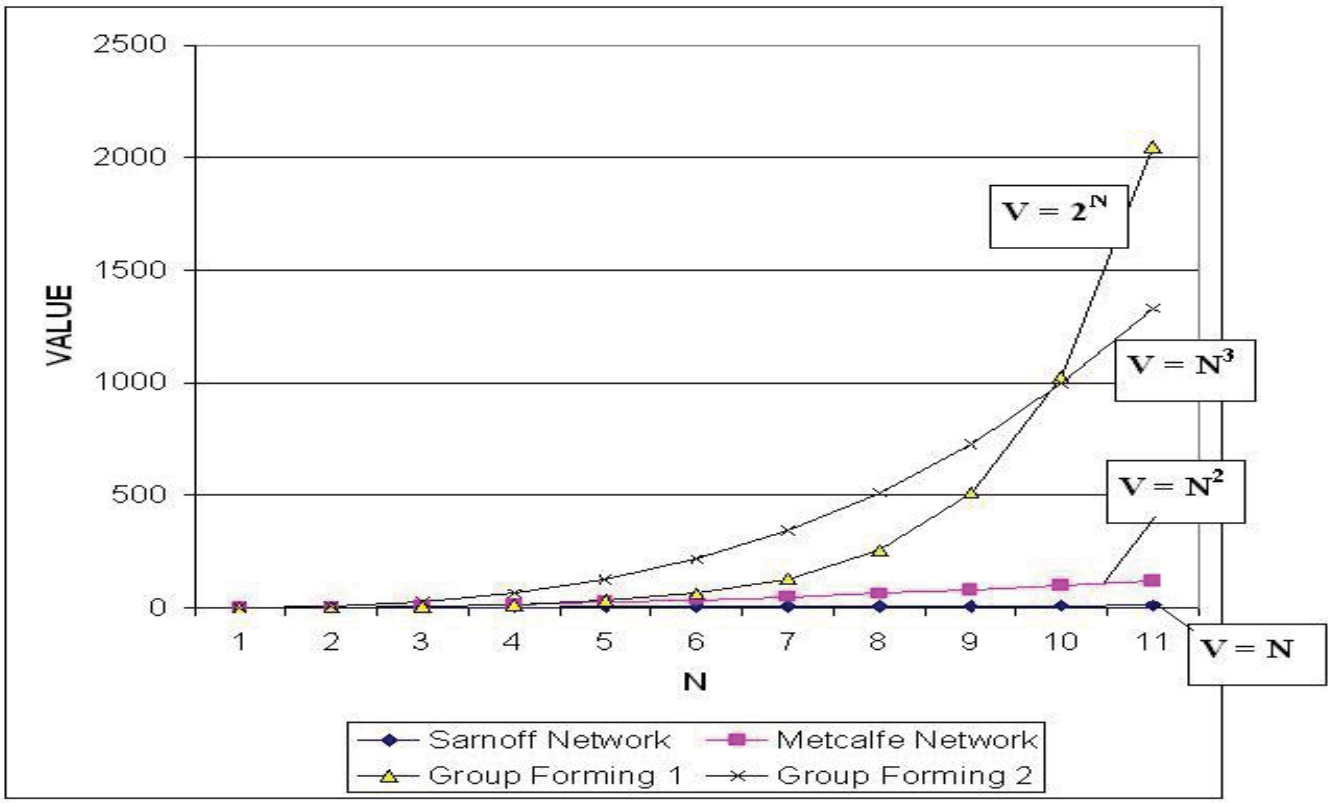
C. *Cooperation in a New Age of Collective Action*

Since cooperation lies at the core of the emerging mode of production, it is important to understand why a new solution to the challenge emerges. Conventional collective action arguments say that a large group is less likely to generate collective goods because each member would receive such a small fraction of the benefit that they would lose their desire to produce collectively. [198] However, with the emerging collaborative production the opposite is true as

seen in open-source software: the larger the group connected by the Internet, the more likely it is to have the motivation and resources to create code.[199] User-driven innovation causes individuals to volunteer, particularly the core group of lead users.[200]

The existence of heterogeneous resources available in the network definitely improves the efficiency of collaborative responses, but this may not be a necessary condition. The critical condition is the ease of communications. The Internet, for instance, spawned innovation, as participants of group projects were able to work together over long distances and share their specific skills in a "seamless process."[201]

Exhibit 3; Value of Traditional and Groups Forming Networks



Source: David Reed, "That Sneaky Exponential – Beyond Metcalf's Law to the Power of Community Building, *Context,* Spring 1999.

New communication technologies allow for reduction in cost of sending information long distances, increase "noticeability, and make ineffective communicative networks effective."[202] Communications technology allows large numbers of people with common interests to interact and share information "in a way that undermines many widely held beliefs about the logic of collective action."[203]

It may well be that the literature on collective action was always too pessimistic.[204] For example, the literature that stresses the tragedy of the commons assumes "individuals do not know one another, cannot communicate effectively, and thus cannot develop agreements, norms,

and sanctions" was never correct in physical space and certainly is not correct in cyberspace.[205] The ability to communicate changes everything – especially when a collective payoff flows from cooperation.

In addition, the recognition of shared interest plays a key role in establishing the necessary cooperation. When a monitored and sanctioned system is agreed upon, it "enhances the likelihood that agreements will be sustained, they are capable of setting up and operating their own enforcement mechanism."[206] Due to the benefits received from cooperation, the effect of breaking those agreements may deter those inclined to break the agreements, as it will affect not only the individual, but also the group as a whole.[207] Thus, even prior to the advent of digital communications platforms, the ability to communicate and exchange information was central to the ability to organize around shared interests and take collective action, but the capacity to do so has been fundamentally enhanced by the recent technological revolution.

III. INTERNAL ORGANIZATION OF DIGITAL PRODUCTION

A. Supply-side Resource Savings

1. Open Mesh Networks

Mesh networks in the spectrum commons exhibit the advantages of collaborative production on the supply side.[208] As people add devices, the total capacity of the system increases due to those devices routing communications throughout the network (see Exhibit 4).[209] Depending on how well these devices share the network traffic, the capacity of each device may decline, but at a slower rate than if they did not share communications.[210] If the graph showed a cost curve, it would show that the cost per unit of capacity is lower for both total capacity and on a per station basis in the repeater network.[211]

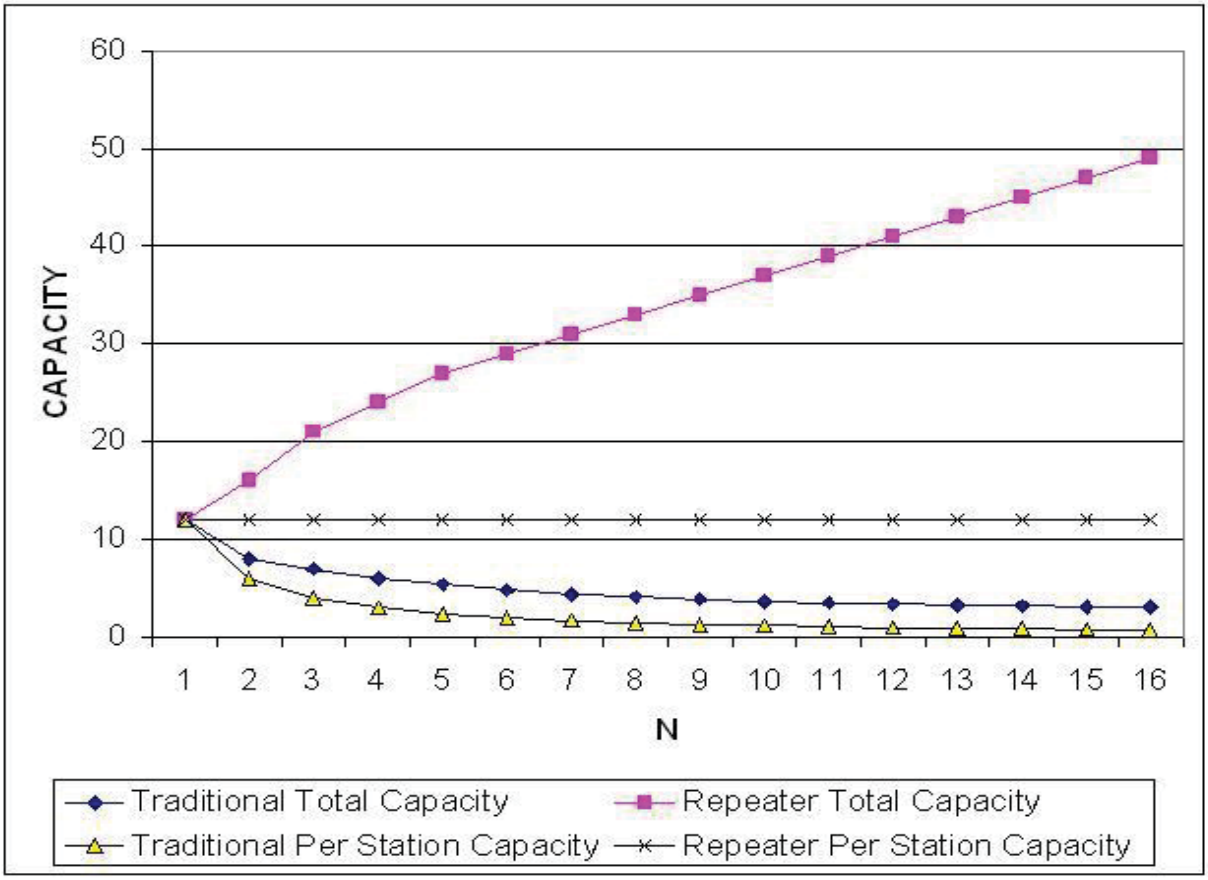
The technologies at the heart of the digital revolution are also at the heart of the deployment of open wireless networks in the spectrum commons. The potential spectrum carrying capacity has been the direct beneficiary of the convergence of progress in digital technology and the institutional development of networks.[212] When users add radios that help by cooperating in receiving and forwarding signals, i.e. act as repeaters, carrying capacity of the network increases.[213] Smart nodes get their expanding brainpower from decentralized computational capacity to communicate seamlessly, utilizing embedded coordination protocols.[214]

Smart technologies in mesh networks cooperating to deliver messages also show the beginning of anti-rivalry characteristics.[215] The ability of each node to receive and transmit messages, even when they are neither the origin nor the destination, expands the capacity of the network. This intelligence is the key to mesh networks' immense capacity.[216]

The spectrum commons in which these networks exist exhibits the characteristic of inclusiveness, since the more nodes on the network, the greater the value to users.[217] The denser the nodes in the commons, the greater is the commons' communications capacity.[218] The combination of digital technology and network organization has turned the old logic on its head; adding users on a mesh network improves performance.[219] Mesh networks allow devices to

share their resources dynamically, allowing more communications to take place with less power.[220]

Exhibit 4: Spectrum Capacity In Traditional And Repeater Networks



Source: D. P. Reed, "How Wireless Networks Scale: The Illusion of Spectrum Scarcity," Silicon Flatirons Telecommunications Program, March 5, 2002, pp. 10, 14.

However, even with new technology, there is still the challenge of how to ensure cooperation among users. Since cooperation is the key to the capacity gain, if users chose not to cooperate, the mesh network will not work.[221] Therefore, more devices are transitioning to "embed coordination" to ensure cooperation.[222] For example, radios become smart by embedding intelligence – algorithms – that take on the functions necessary to transmit a signal after listening to the spectrum and finding available frequencies to use and determining the power necessary.[223]

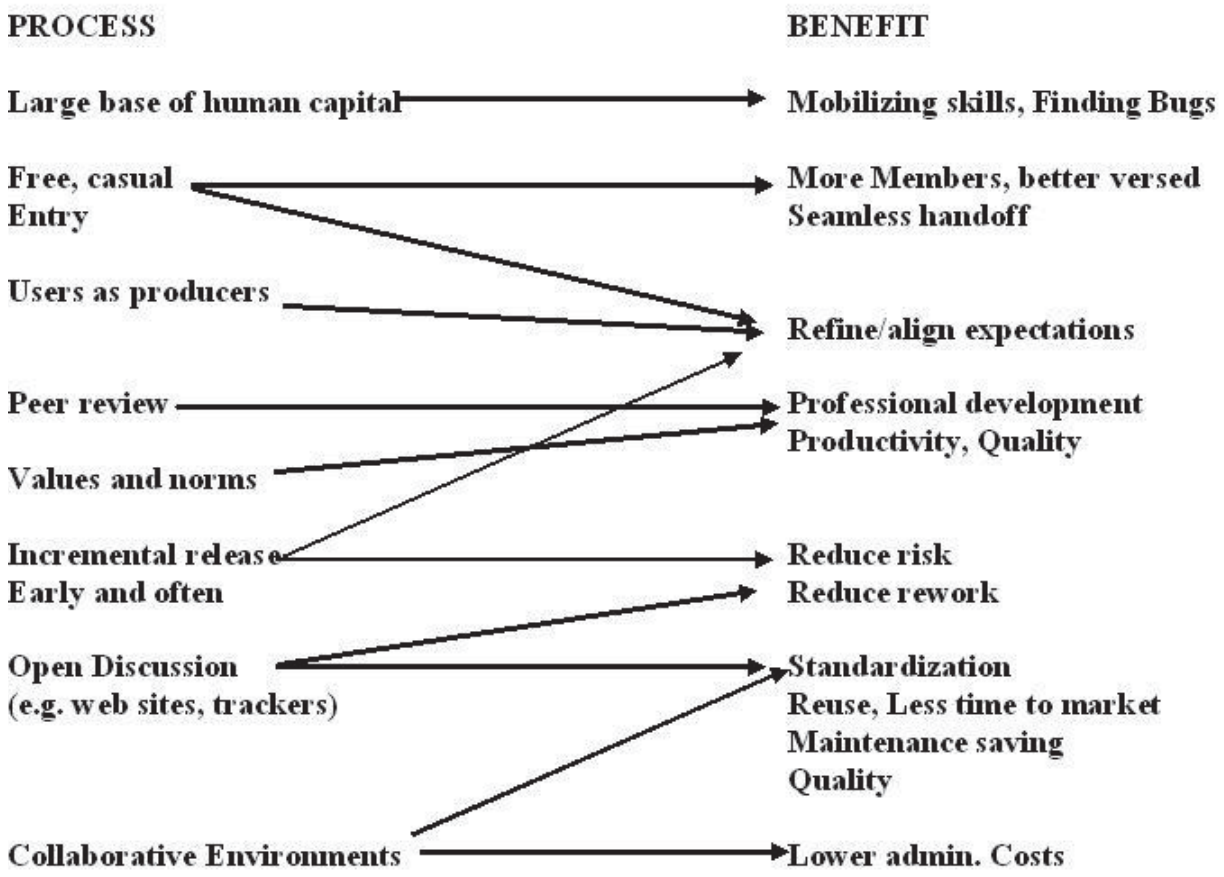
2. Open Source

The digital environment is particularly challenging for the production of goods used to produce other

goods and services, called functional information goods, such as software. This is due in part to people not consuming functional goods for their intrinsic value, like viewing a movie, but to meet other needs, like writing a document with word processing software. Because software is a tool that will be used by different people in different ways under different circumstances, it is more difficult to design and build than cultural goods.[224]

Just as mesh networks defy the conventional wisdom of collaboration, so does open source. "[T]he sharing of rich information in real time" deeply affects the basis for collective action "because (a) constituents have symmetry of absorptive capacity, and (b) software itself is a capital structure embodying knowledge."[225] The capacity of groups to produce open source software increases due to the sharing and exchange of information between humans much as occurs between devices in mesh networks: collaboration increases capacity and lowers cost (see Exhibit 5).[226]

Exhibit 5: Benefits of Open Source



The increase in low cost communications and distributed computer intelligence has a particularly powerful impact on the ability to produce information products where users are technically savvy.[227] With a vast array of diverse individuals available to address the complex problems of producing software, the human resource pool is expanded. By drawing from this pool, there is an increase of the chances that someone, somewhere will have the necessary skills to solve a problem. By keeping systems open and promoting interoperability, the chances increase that the project will have a solution to any problems encountered. While the decentralized approach encourages multiple attempts to solve a problem, there is also the

advantage of quickly communicating solutions so that everyone can move to the next problem after a solution is found.[228]

3. Peer-to-Peer Networks

As hardware and communications costs declined and larger, faster PC's penetrated the market and larger, video files began to move over broadband connections, both the central servers and backbone capacity of the Internet quickly became economic bottlenecks.[229] The evolving infrastructure of the Internet made it inevitable that users would eventually develop software to escape this bottleneck by tapping into the abundant resources available on the network's edges.[230] By building a multi-level redundancy and additional communication points into the network, the network becomes more robust and scalable.[231]

Peer-to-peer networks are part of the evolving communications infrastructure.[232] The immense carrying capacity of current peer-to-peer networks exists precisely because those networks are decentralized.[233] The value of decentralized communicating nodes is realized when the nodes directly communicate with one another as they allow peer-to-peer networks to be efficient, robust, and scalable.[234] This open architecture allows for efficient solutions when there are scarce resources by exploiting resources that are more abundant.[235] Peer-to-peer network spread the distribution costs among millions of computers giving "content owners far more flexibility in making their works available to the public" and spawning "new business applications that utilize distributed computing technology."[236]

While open source software is the collaboration of a few highly skilled individuals working together, peer-to-peer networks represent a broader phenomenon. They draw in both technical and non-technical participants because of the widespread deployment of devices and software capable of simple deployment of peer-to-peer networks allowing non-technical people an easy way to join peer-to-peer networks.[237] As with open source software, people must be willing to participate, but the level of engagement is much more variable and potentially lower in peer-to-peer networks. However, the level of engagement varies. On the passive end of engagement are peer-to-peer file sharing networks. These networks only require that participants put up and take down files. At the other extreme, very active collaboration is possible. Wikis require that participants co-produce a document by sequentially editing and or commenting on an emerging product.[238]

B. Transaction Cost Reductions

1. Open Mesh Networks

As technology advances, smart technologies will allow for more transmissions in open mesh network due to changes in the frequency, timing, and spacing of transmissions.[239] Due to the way the network is organized, when transmitters leave the network, the work they were doing can be taken over by other transmitters regardless of whether the transmitters are repeaters or not.[240] Seamlessness is essentially already built into devices, as it is a matter of technical protocol.[241] As carrying capacity is developed, the full set of physical transactions must take place in all cases for the open mesh networks to become dynamic environments. The embedding

of coordination protocols in a commons approach avoids the costs and challenges of negotiating, clearing, billing, and enforcing rights that will make transactions more costly.[242]

A traditional analysis of such a common-pool resource would focus on the allocation costs, external benefits of different rules, and transaction costs. However, as open mesh networks are non-depletable, the only relevant allocation cost is the congestion cost. Unlike traditional common-pool resources, when dealing with open mesh networks, any rules urging a restriction of capacity should be suspect and any promoting increases in capacity should be preferred. As discussed above, because open mesh networks are dynamic, the transaction costs associated with negotiating clearance rights to transmit are high.[243] This challenge will become even greater as more transmitters and receivers become mobile. Solving the transaction problem at the physical level and avoiding haggling is over rights is the most attractive solution.[244]

2. Open Source

At the institutional level of open source projects, there is a large base of contributors because entry into open source development is easy, free, and casual,[245] which allows open source participants to tackle complex and diverse projects.[246] Many of the programmers of open source are also the users of the products. At the individual level, there are a large number of motivations for participating in open source development[247] and open source projects allow for self-selection of tasks.

Two aspects of open source help reduce transaction costs. First, the demand-side advantage to open source is that programmers are also consumers.[248] This increases the value of the product and the "willingness to pay" in a non-commodified sense of contributing time and effort to the collaborative.[249] Second, the agency costs of separating users from producers discussed in the case of open source are, of course, transaction costs.[250] In open source, the technical skills of the programmer community play an important role.[251] von Hippel underscores the potentially revolutionary development that flows from the transformation of users into producers because users can "build, consume, and support innovations on their own, independent of manufacturer incentives" and allows for a "diffusion of innovation by and for users… to get what they really want."[252]

3. Peer-to-Peer Networks

When looking at the transaction cost advantages of peer-to-peer networks, the production and distribution of music continue to be the focal point.[253] The costs involved with searching for music decreases and the information quality received improves.[254] This, in turn, reduces the total costs and increases demand for music.[255] In addition, especially important for the artists, peer-to-peer networks change how music is produced and distributed[256]

Distribution of recorded music over the Internet decreases the costs of producing, manufacturing, and distributing music because there is no longer a cumbersome centralized distribution system.[257] Peer-to-peer networks further reduce costs by lowering record company overhead and marketing, which currently account for approximately a quarter of the cost of music.[258] This eliminates up to three-quarters of the costs; one author notes that while the

average price per CD in 2001 was about $17.99, the production cost was about fifty cents and the artists only received about twelve cents.[259] While some say artists receive more, even those authors do not place the amount much higher than a dollar, net of costs.[260] Thus, the costs of music decrease dramatically by reducing, or even eliminating, the role of intermediaries. Distribution of music over peer-to-peer networks allows this decrease as producers of goods and services find new ways to deal directly with consumers. In addition, consumers also are able to establish relations with one another, or to become producers in their own right

C. The Demand-Side Value Enhancement

1. Open Mesh Networks

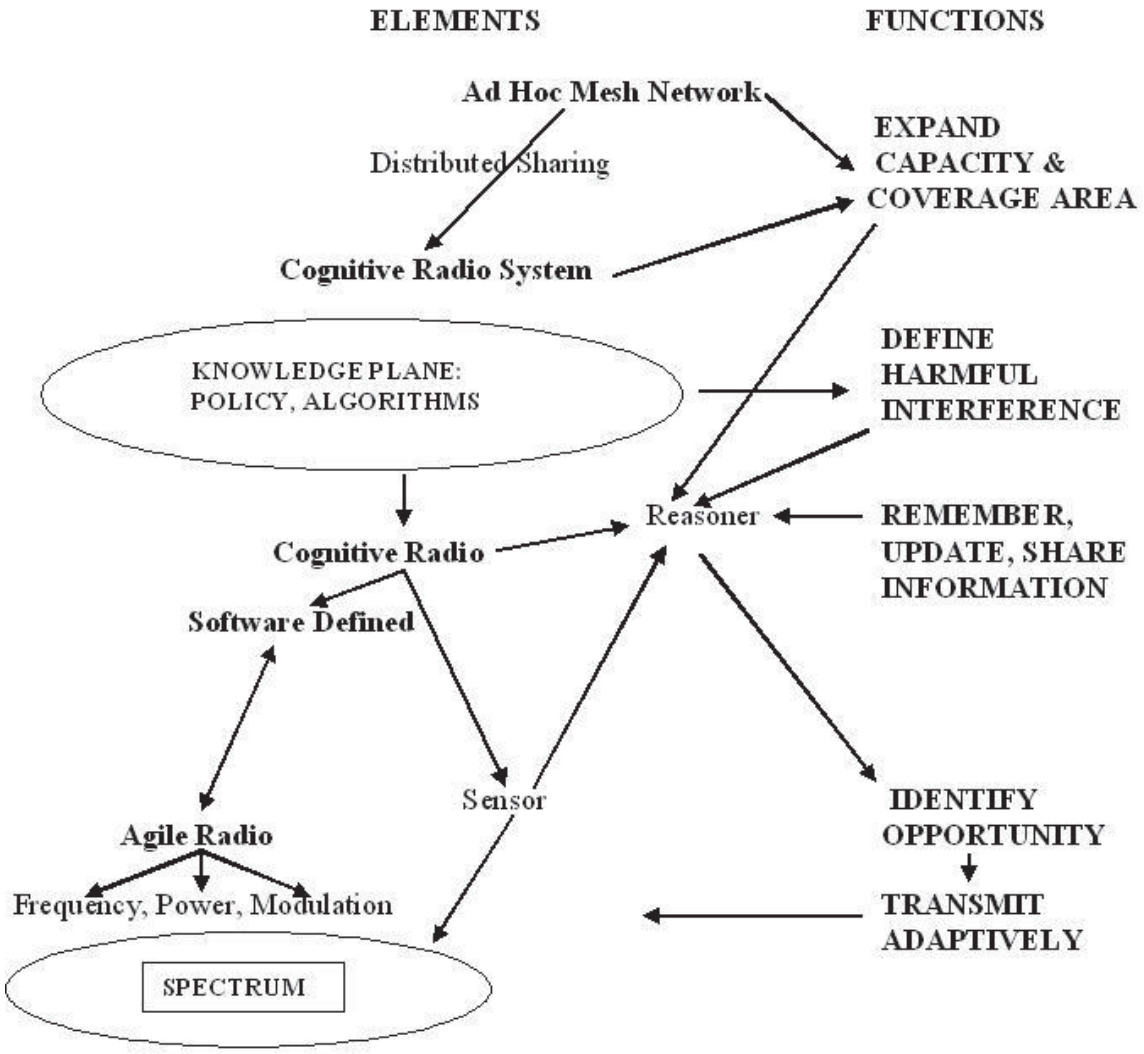
Although the benefit of open wireless networks lies primarily on the supply-side, there are benefits to the demand-side. In order to capture the full benefits of a spectrum commons, people must form ad hoc mesh networks.[261] To appreciate this, we must understand the devices used in and the creation of ad hoc mesh networks (see Exhibit 6).[262]

Devices used for open wireless networks will need to detect use of the spectrum, assess the quality of service it needs for its own transmission, and ascertain whether transmitting in the space available and in the necessary manner can be done without interfering with other devices.[263] These devices become cognitive as they "identify, remember, update, share opportunity information, and exploit the opportunity information with adapted transmission to avoid causing harmful interference."[264] Exhibit 6 illustrates this concept starting on the bottom left and working to the top right: each of the concepts subsumes construction of the one below as a complex network.

To make a cognitive device, one starts with the basic building block of the network: a device that uses software, as opposed to hardware, to change its frequencies, power, and modulation.[265] When one adds sensors and a reasoning system to the device, the device becomes cognitive and aware of the rules of the network.[266] Embedded logic systems allow them to decide when to transmit without breaking the law adding intelligence to the network.[267] Mesh wireless networks then integrate these devices as access points and relay nodes (repeaters) used to support any communication meant for any destination.[268]

The group forming value emerges as ad hoc network allow radios to join and leave the network. Therefore, they adapt as necessary, since the "connections are transient and formed in an ad hoc as-needed basis" allowing for the development of a "self-healing networking in which routing continues in the face of broken nodes or connections."[269] Unlike the networks that existed in the spectrum during the twentieth century, cognitive devices in ad hoc networks show the ability of human intelligence to build incredibly complex, replicable networks that embed coordination. At the core of the network is the reasoner – "a software process that uses a logical system to infer formal conclusions from logical assertions."[270] It works by "inferring statements from other statements… represented in a machine understandable way… that allows not only first-order logics, but also higher-order, class-based reasoning."[271]

Exhibit 6: Mesh Network Elements and Functions



2. Open Source

The demand-side values are enhanced with open source because at the core of its success is peer-review at both the institutional and individual levels. Individually, peer review among programmers promotes professional development and motivates participation.[272] Institutionally, peer review promotes quality by vetting output across a large audience. The reliance on open communication through mail lists, websites, Wikis, and collaborative tools helps create an environment inductive to peer review.[273]

In addition, there is a clear set of group values and norms used to evaluate programs. Standardization and reuse are important.[274] Communication is important among all members of the community shown by project administrators making frequent releases and builds of programs available.[275] Social commitment –

a broad category that includes altruism – and ideological motives, such as personal motivation to do a good job or a dislike of proprietary code, also come into play.[276]

3. Peer-to-Peer

The demand-side of peer-to-peer networks encourages three different forms of relationships between individuals: exchange, viral communications, and collaboration.[277] Peer-to-peer networks foster exchange between equals by the search capability of the network and the direct relationships between nodes. As the capacity for networks to communicate increases, peer-to-peer networks exhibit classic demand-side economies of scale. Viral communications and collaboration enhance the ability to market and expand the ability to innovate as shown with the new emerging relationship between artists and fans.[278] In addition, peer-to-peer collaboration can be anonymous, where individuals sequentially add to or modify a product,[279] and they can be interactive co-production.[280]

The demand-side is also changed because the relationship between artists and audiences changes. The hold of the recording companies weakens and their ability to make stars decreases, as "there is a greater probability of discovering other high quality music items by lesser known artists with the new technology."[281] The ability to sample "is an information-pull technology, a substitute to marketing and promotion, an information-push technology."[282] The cost structure of the industry changes as it adopts digital technologies. Performance improves, as "variable costs relative to fixed costs are more important for music downloads than for CDs."[283] The ability for lesser-known artists to succeed increases due to "a less skewed distribution of sales among artists."[284] In fact, we do observe this pattern. The payoff for artists and society is increasing diversity.[285] In addition, it creates the opportunity for the artists to gain more from "piracy" than the publishers as illegal recordings may create a larger demand for live performances as an artist's popularity increases.[286]

IV. Conclusion

There is a twilight zone in economics between market failure and market success inhabited by public goods and externalities. Collaborative production, and the goods it creates, will play a key role in filling this zone and creating economic growth in the digital age. The location of these goods with respect to traditional economic analysis is clear. In the industrial economy of the 20th century, economic analysis grappled with goods that were non-rivalrous and non-excludable.[287] However, in the digital economy of the 21st century, computer and communications technologies expand the challenge of economic analysis. Anti-rivalry and inclusiveness are critical economic conditions. The value of anti-rival and inclusive goods increases as more users participate freely in their production, consumption, and distribution.[288] By failing to implement policies that allow collaborative production to thrive in group-forming networks, society will suffer greatly.

To avoid this pitfall, it is necessary to understand the broad policy implications of choosing a mode of production. Developing specific policies in a number of areas will promote the efficient expansion of collaborative production. Broad policy goals must be developed with

a clear understanding of what implications these goals will have for the telecommunication world.

A. *Broad Policy Goals*

Several characteristics of the collaborative mode of production give policymakers reasons to support it, including five economic and socio-political characteristics. First, there is accommodating uncertainty. Decentralized user driven focus has clear advantages in flexibility.[289] It is less dependent on small numbers of network owners guessing what the demands on the network will be. It avoids large lumpy investment. It helps to lower the cost of updating and versioning. Flexibility enhances the ability of the structure to accommodate uncertainty.

Second, there is innovation. The decentralized end-user driven innovation is likely to accommodate far more experimentation and innovation.[290] As I have shown, the experience of unlicensed spectrum in the age of digital technology shows that networked platforms exhibit the fundamental characteristic of user-driven innovation and aggressive atomistic competition because of its decentralized nature.

Third, there are incentives and infrastructure. Centralized networks give network operators an incentive and ability to exercise market power, to reduce or control communications to maximize private profits.[291] The social cost of the exercise of market power in communications networks grows because it retards the ability to achieve collaborative gains.[292] In collaborative production systems with embedded coordination, decentralized investment, and cooperation gain, this ability to abuse market power is reduced.[293]

Fourth, there is the democracy principle. Although this paper has focused on economic issues, there is no doubt that decentralized open networks have desirable political characteristics.[294] The licensing regime that protected broadcasters excluded people from projecting their voices, thus limiting their right to speak.[295] Because of the one-way broadcast nature of twentieth century electronic mass media, the First Amendment concentrated on the ability to hear diverse points of view, also known as listeners' rights.[296] Open wireless and peer-to-peer networks expand the ability to speak and help ensure First Amendment rights by returning them more closely to their original formulation.[297]

Fifth, there is the idea of creativity. There is a socio-cultural benefit in the growth of collaborative production independent of the aspect of political expression.[298] The pleasure in creativity, attributed to the open source coder, is simply an example of the broader principle that self-expression through creative production is satisfying. Similarly, the desire to contribute without compensation is strong. People want to participate in the production of culture.

B. *Communications Policy*

This analysis has broad implications for many areas of public policy (see Exhibit 7). The key principle of expanding the flow of information from the ends of the network, the end-to-end principle, is the cornerstone of the value creation. The unimpeded flow of communications is the key to collaboration on the supply-side and group formation on the demand-side. Future

allocative and adaptive efficiency will depend upon a pervasive computing environment in which the endpoints are mobile.

Open wireless networks in the spectrum commons are better able to support such activity. Massive mobile computing is the future; the Sarnoff broadcasting networks are the past. A progressively expanding swath of unlicensed spectrum should be the main policy. Unlicensed spectrum is not the exception; it should be the rule. If unlicensed space becomes congested, it is necessary to move licensed applications out of the way, especially in the lower frequencies.

Network neutrality is vital to supporting the economics of collaboration. Tollgates and barriers restrict the flow of information and the ability of groups to form. Policymakers must resist the efforts of incumbents to throttle down the flow of information in the digital communications platform. As long as wire owners have leverage over last mile, middle mile, or backbone facilities, they cannot be allowed to undermine innovation in applications and content by withholding network functionality or discriminating against content or applications. Ironically, the torrent has barely begun and the oligopoly network owners are already complaining about bandwidth hogs consuming too much capacity, which will set off a campaign to restrict communications by price, or profit maximizing discrimination. Differentiation that utilizes enhanced network functionality is fine; discrimination that denies access to network functionalities is not. Open interfaces that promote seamless communications must remain the organizing principle of the network. The unfettered, many-to-many quality of the network must be preserved.

Exhibit 7: Comprehensive Policy

PRESERVE EXISTING USER RIGHTS

Preserve nondiscriminatory Interconnection and carriage (network neutrality) in communications networks

Protect fair use and fight to preserve routine, unregulated uses.

REFORM THE CURRENT SYSTEMS OF PROPERTY RIGHTS

Include broadband connectivity in the definition of universal service

Defend and expand community broadband

Liberate orphaned and dormant (out of print) works

Reduce the burden of search costs to discover existing rights

PREVENT EXTENSION OF RIGHTS THAT IMPAIR COLLABORATION

Oppose discrimination in communications networks

Resist copyright holders defining communications architecture to protect their rights

Refuse to create new transmission privileges (e.g. the webcaster treaty)

Oppose technology mandates that undermine functionality (e.g. the broadcast flag)

Oppose excessive enforcement measures (e.g. criminalization or expansion of secondary or vicarious liability

Telecommunications is infrastructure in the digital information age. More than ever, a ubiquitous and adequate communications network that is available, accessible, and affordable for all should be the objective of public policy. Because communications are so central to this economy, it is absurd not to have an industrial policy to ensure the achievement of this public policy. Universal service is more important in the 21st century than it was in the 20th because it creates a large market. In this network the sources of efficiency and innovation are dispersed and, frequently, accidental or surprising. The next big thing is not likely to come from the research and development departments of the incumbents.

There is a wide range of intellectual property issues that swirl around collaborative production, too many to address in this paper. From the point of view of information flow and communications, content owners should not dictate network architecture. If Hollywood and the music companies have their way, they will tag every file, fingerprint every user, and monitor every transaction. They will do so by forcing transactions back through a central server, which undermines the efficiency of exploiting distributive resources in peer-to-peer networks.

PART II: LEGAL FRAMEWORK AND CHALLENGES

HISTORICAL ORIGINS OF PUBLIC SERVICE PRNCIPLES GOVERNING DIGITAL COMMUNICATIONS NETWORKS

INTRODUCTION

The day after the 2012 presidential election, AT&T filed a petition asking the Federal Communications Commission to consider how telecommunications would be regulated under the Communications Act of 1934 as the architecture of the communications network is transformed from primary reliance on analog technology and copper wires to digital technologies and fiber optic cable. This has become known as the "sunset" of the public switched telecommunications network ("PSTN"). Less than six months later, in response to Hurricane Sandy, Verizon announced that it would not repair the copper telephone wires that the storm had destroyed on Fire Island. Instead, it proposed to use a wireless, digital service, to provide basic telephone service. This triggered an intense debate, as many in the community objected to what was perceived to be a significant reduction in the quality of service.[299]

What AT&T is asking for and Verizon sought to implement, is a dramatic change in the policies and principles that had governed the communications network for over 100 years, a change that is tantamount to administrative repeal of the public service principles at the heart of the Act. This paper shows that the change is unwarranted and unnecessary. Rather than abandon the public service principles that have successfully guided the U.S. telecommunications sector, history, law, policy, technology and economics all suggest that the commitment to these principles should be affirmed and the scope of the principles expanded in the age of digital communications.

Section I locates the six public service principles that have guided telecommunications policy in the U.S. in the long history of the development of transportation and communications networks in the capitalist era. Section II shows that pseudo-access competition in communications and transportation networks does not support the public service principles. These principles must be imposed and enforced externally to ensure that these vital infrastructure industries support economic development and democratic discourse in the polity. Section III reviews the legal grounds on which the Commission can ensure that the public service principles that have guided the successful deployment of the PSTN in the 20th century transfer into the public digital communications network ("PDCN") that is rapidly becoming the dominant means of communications in the 21st century.

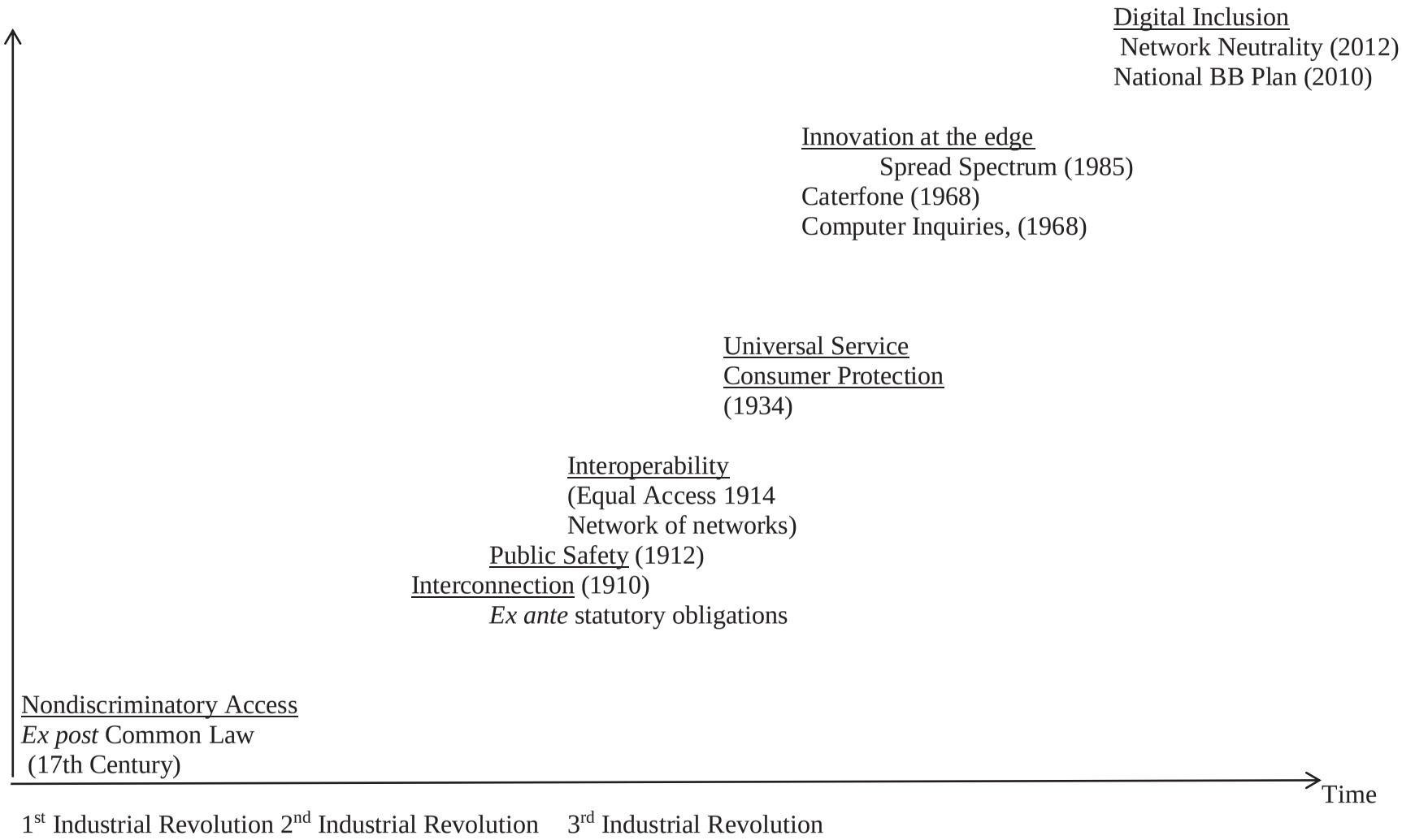
I. PUBLIC SERVICE PRINCIPLES IN THE TRANSPORTATION AND COMMUNICATIONS SECTORS

A. ORIGIN OF THE PRINCIPLE THAT ACTIVITIES ARE "AFFECTED WITH THE PUBLIC INTEREST"

The legal principle that some activities constitute a public service and therefore incur obligations in the way they are offered to the public stretches back to the mid-14th century. Over the ensuing centuries, the specific activities that are considered to be "affected with the public interest" and the nature of the obligations have varied.[300] One area where the march of history has consistently been to strengthen and expand public service principles, however, has involved the means of communication and commerce (see Exhibit I-1).

EXHIBIT I-1: THE PROGRESSIVE EVOLUTION OF PUBLIC SERVICE PRINCIPLES IN THE COMMUNICATIONS SECTOR

Extent of connectivity



> Although the original economic reasons for the idea of a "common" calling disappeared, the concept underwent an important transformation. . . . [S]ometime during the latter part of the seventeenth century, most trades began to do business generally with the public. Accordingly, the idea of a common calling began to lose significance in most kinds of business. Certain kinds of businesses, however, most notably common carriers by land and water and innkeepers were treated differently. This treatment marks the beginning of the idea of a public service company.[301]

Reflecting this historical and legal pattern of development, discussions that deal with the public service principles that govern telecommunications services and attach to telecommunications service providers reach back to the 18th century. They point to how the common law dealt with services that were provided in the transportation sector. A mid-18th century Blackstone commentary described the principle as it applied to innkeepers:

> [I]f an inn-keeper, or other victualler, hangs out a sign and opens his house for travellers, it is an implied engagement to entertain all persons who travel that way; and upon this universal assumpsit, an action on the case will lie against him for damages, if he without good reason refuses to admit a traveler.[302]

A 1701 court decision that used the blacksmith as an example offered similar reasoning:

> Whenever any subject takes upon himself a Publick [sic] Trust for the Benefit of the rest of his fellow Subjects, he is . . . bound to serve the Subject in all the Things that are within the Reach and Comprehension of such an Office. . . . If on the Road a Shoe fall off my Horse, and I come to a Smith to have one put on and the Smith refuse to do it, an Action will lie against him, because he has made Profession of a trade which is for the Publick Good. . . One that has made Profession of a Publick Employment is bound to the utmost Extension of that Employment to serve the Publick.[303]

It is important to note that while activities that were associated with transportation, like innkeepers and blacksmiths, incurred the public service obligation under common law, the underlying transportation facilities actually incurred even stronger obligations under statute. Navigation projects, canals, and turnpike trusts, chartered under obligations of providing service to the public, were the early vehicles of the emerging capitalist political economy to provide for transportation infrastructure.[304] Created in the 15th through 18th centuries, and building on principles of common law, these were private undertakings with a public franchise to collect tolls on the section of a road or waterway whose upkeep was the responsibility of the franchise holder as a trustee for the public. Fees were assessed and access provided on a nondiscriminatory basis. While different rates could be charged to different types of traffic, discrimination within categories was forbidden.[305]

Thus, it is historically correct to say that the principle of nondiscriminatory access to the means of communications and commerce has been part of the DNA of capitalism since its birth. It is analytically important to make this statement strong and broad because the movement of goods and ideas is essential to the success of the capitalist economy and the democratic polity.[306] As capitalism was dissolving feudalism, the emerging social order discovered an important new social, political and economic function: mobility. Physical and social mobility were anathema to feudalism, but essential to capitalism and democracy. Providing for open and adequate highways of commerce and means of communications were critical to allow commerce to flow, to support

a more complex division of labor, and to weave small distant places into a national and later global economy. This principle came to the new world with the Anglo-Saxon settlers who ultimately dominated the American continent.[307]

B. The Preservation and Extension of Public Service Principles for the Transportation and Communications Sectors in the Industrial Era

With the rate of economic change accelerating throughout the industrial era, pressures mounted on the institutional legal structure that governed nondiscriminatory access to the means of communications and commerce. By the late 19th century, direct public responsibility for roads, as opposed to franchise trusts, became the norm and provided nondiscriminatory access.[308] Maintaining a network of transcontinental roads became a governmental responsibility, first city, then state, then national. Other means of communications and commerce, railroad, canals, telegraph, telephone, tended to remain in private hands with substantial public support and public service obligations.[309]

The institutional structure grappled with the emerging industrial mode of production throughout the 19th century, as the nature and scale of economic activity changed. Public service obligations on the means of communications and commerce increased.

> It was originally supposed that they [railroads] would add, and . . . they have added, vastly, and almost immeasurably, to the general business, the commercial prosperity, and the pecuniary resources of the inhabitants of cities, towns, villages, and rural districts through which they pass, and with which they are connected. It is, in view of these results, the public good thus produced, and the *benefits thus conferred upon the persons and property of all the individuals composing the community,* the courts have been able to pronounce them matters of public concern.[310]

Here there is an interesting contrast between England and the U.S. In England, the common law approach allowed central authority to expand rapidly, moving beyond regulation to nationalization.[311] In the U.S., common law was cabined by constitutional law. Expanding the scope of central authority required much more compelling evidence to fit within constitutional constraints. It was only when the expanding economy and increasingly complex division of labor drove interstate commerce to the heart of the economy that the federal role could expand.[312] It did so by the end of the 19th century.[313]

Moreover, in a typical American pattern, the Interstate Commerce Act did not spring *sui generis* into existence. The field had been well plowed by the states in the American federalist system, which had been grappling with and extending their oversight over the burgeoning industrial economy. State promotion and regulation of canals and railroads began in the mid-19th century and progressed steadily over the course of the century.[314] More local utility services—water, gas, electricity, telephone—were promoted and regulated at the municipal level.[315]

The important role of state and local activity in the development of the uniquely American institutional approach to public service principles should not be overlooked. Not only was the legal field plowed at the state and local levels, but a significant public sector was built up to deliver local services in a variety of contexts where the regulated private sector had failed to live up to the public service expectations.[316] While electronic communications were

predominantly privately owned in America, there has been a substantial local public sector for a number of utility services, with electricity having one of the larger sectors. (over a quarter of customers served) The institutional diversity was important.

By the end of the 19th century, as the 2nd industrial revolution pushed the scale and complexity of the economy to a much higher level and spilled across state borders, law and practice had paved the way for the institutionalization of public service obligations. The evolving relationship between the private firms delivering these uniquely public services and the state and local governments had laid the foundation for the federalization of this policy

The railroads, which had become the dominant means of commerce and communications in the 19th century, were the focal point of economic and legal activity. The recognition of the importance of the railroads was the basis for the extension of public service principles:[317]

> The railroad, as an improved means of communication and transportation, has produced indescribable changes in all the manifold transactions of every-day life which go to make up what is called commerce. Successful commerce brings prosperity, which in turn makes possible the cultivation and development of the graces and attributes of the highest civilization.[318]

The positive contribution of the railroads to economic progress was the primary justification for imposing public service obligations, but the harmful effects of failing to provide service on a nondiscriminatory basis was the proximate cause of a more direct and aggressive enforcement of the public service obligation on carriers. The Cullum Commission Report outlined the immense benefit of the railroads, explored the interstate nature of commerce, recounted state efforts to deal with railroad abuses and recommended national legislation to address a lengthy list of complaints.[319]

Electronic communications entered the picture in the mid-19th century and rapidly joined the railroads as a critically important public service infrastructure. The state courts that had been grappling directly with the new means of communications and commerce drew strong analogies between transportation and communications.[320] A quote from an 1886 Indiana court case links the past to the present:

> [The telephone] has become as much a matter of public convenience and of public necessity as were the stagecoach and sailing vessel a hundred years ago, or as the steam-boat, the railroad, and the telegraph have become in later years. It has already become an important instrument of commerce. No other known device can supply the extraordinary facilities which it affords. It may therefore be regarded, when relatively considered, as an indispensable instrument of commerce. The relations which it has assumed towards the public make it a common carrier of news, – a common carrier in the sense in which the telegraph is a common carrier, – and impose upon it certain well-defined obligations of a public character. All the instruments and appliances used by a telephone company in the prosecution of its business are consequently, in legal contemplation, devoted to a public use.[321]

This quote captures the long history of the concept of public obligation that attached to services that play the vital role of supporting the flow of commerce and communications. The early date of this observation, 1886, is notable, since the telephone had just begun to be adopted. Traditional practice did not excuse it from public service obligations because it was new. The

quote points to several transportation carriers—stagecoaches, sailing vessels and steamboats—that were not infrastructure industries and were likely competitive but still were required to shoulder public service obligations. Thus, competition did not excuse important activities from the public service principles, reminding us that it is the nature of the service, not the conditions of supply that creates the pubic obligations. This citation also suggests the dual nature of communications networks as both a means of commerce and a means of democratic expression.

Interestingly, the above legal characterization came the year before the passage of the first piece of progressive federal legislation, the Interstate Commerce Act, which underscores the clear shift in the approach to nondiscrimination that was about to take place. A quarter of a century after the Interstate Commerce Act created a federal, statutory basis for direct oversight over the public service principles in the railroad industry, the principles were extended to electronic communications, by the enactment of the Mann-Elkins Act of 1910 which placed the interstate telecommunications under the Interstate Commerce Act,[322] stating: "[n]ow the telegraph line and the telephone line are becoming rapidly as much a part of the instruments of commerce and as much a necessity in commercial life as the railroad."[323]

C. The Expansion of the Public Service Principles during the Quarter-life Crisis of the 2nd Industrial Revolution

The *Hockett* case, decided in 1886, and the other activities around nondiscriminatory access and the expanding concept of public service principles (identified in Exhibit I-1) all took place in a period that we have called the quarter-life crisis of the second industrial revolution[324] (see Exhibit I-2, above, p. 23), which spans the Progressive Era and the New Deal. What we see in those policy changes is the adoption of a new approach to ensuring that important traditional principles are preserved as the dominant mode of production in a changing society. This is the moment when the mode of production that is rising to dominance and maturing is asked to shoulder the burdens of social goals and public aspirations that are deeply embedded in society. And, in a progressive society, it is the moment to move those social goals to a higher level.

The response to the maturation challenges of the second industrial revolution went well beyond simply reaffirming the importance of and commitment to nondiscriminatory access. The Progressive Era approach to nondiscrimination exhibited other important characteristics that indicate a new, more far-reaching approach, as discussed below. The following are the key characteristics that public service principles were to embody in the 21st century:

1) It shifted from *ex post* to *ex ante* regulation of nondiscrimination.[325]

2) It layered oversight across sector specific regulation and general antitrust law.[326]

3) It introduced the concept of equal access between network operators, thereby highlighting the fact that society was becoming a network of networks—a concept that the digital revolution would take to a much higher level.[327]

The latter point deserves emphasis. The economic value of interconnection and interoperability of networks in a continental economy was compelling. One-and-a-quarter centuries ago, in one of the first and most important acts of the Progressive Era at the federal level, the United States adopted the Interstate Commerce Act, which shifted the nation from an *ex post*, harm-based theory of nondiscrimination under common law to an *ex ante*, prophylactic theory of nondiscrimination under sector-specific law.[328] The approach was first applied to the railroads, the dominant means of transportation.[329] Twenty-five years later, and in spite of the promises of AT&T executives, Vail and Kingsbury,[330] the new approach to public service principles was extended by statute and statutory enforcement to electronic telecommunication.[331] Private carriers were to provide nondiscriminatory access as a matter of law; individuals did not have to prove they had been harmed by the denial of service.[332]

The Progressive Era not only shifted from *ex post* to *ex ante* oversight of nondiscriminatory electronic communications, it layered public *ex ante* and *ex post* oversight on the industry. Some of the most important federal actions in the telecommunications space have been initiated by the Department of Justice ("DOJ") under the Sherman Act, not the FCC and its predecessor agencies, including the consent decree of 1914, the final judgment of 1956, and the modification of final judgment in 1984.[333]

Moreover, while the Sherman Act is overwhelmingly based on an *ex post* harm-based approach, one extremely important exception involves business conduct that threatens to fundamentally alter the market structure to the detriment of competition. In merger review under the Clayton Act, the DOJ routinely acts in an *ex ante* prophylactic manner, blocking mergers that raise significant competitive concerns. At roughly the same time, legislation explicitly gave the sector-specific, federal regulatory agency oversight over telecommunications mergers.[334] In the Communications Act of 1934, the Congress required the FCC to review mergers under a much broader public interest standard than the DOJ applies.[335] Thus, *ex ante* regulation at the FCC including merger review is reinforced by *ex-ante* merger review at the DOJ and backstopped by *ex post* regulation at the DOJ.

The quintessential expression of the expanding public service principles and obligations of the carriers who make up the PSTN is the Communications Act of 1934. In the first sentence of the Act, the purpose is defined as follows:

> [T]o make available, so far as possible, to all people of the United States a rapid, efficient nationwide and world-wide wire and radio communications service with adequate facilities at reasonable charges, for the purposes of national defense, for the purpose of promoting safety of life and property through the use of wire and radio communications, and for the purpose of securing a more effective execution of this policy by centralizing authority heretofore granted by law to several agencies and by granting additional authority with respect to interstate and foreign commerce in wire and radio communications.[336]

The commitment was broad and pragmatic, involved wired and wireless communications, and recognized the centrality of communications to a number of social goals. The definition of the goals was inclusive and evolutionary, and the commitment to the form of governance was

secondary to the statement of goals. It chose the form of governance that dominated the response to the quarter-life crisis of the 2nd industrial revolution—expert agency regulation—but

regulation is for the purpose of achieving the goals, not as an end in itself. The public service principles broadly stated in the first paragraph of the Act are then given specificity in later titles of the Act, as suggested by Exhibit I-2. The arrows in the exhibit show how the broad goals of the Act stated in the first sentence are given elaborate in the specific language in the sections of Title II.

D. The Increasing Need for Public Service Principles in the Electronic Communications Sector of the 2nd Industrial Revolution

Is all this concern about nondiscrimination, integration, and universal service, etc., in communications necessary? Four hundred years of experience suggested to Progressive Era policymakers that it was. The shift from *ex post* to *ex ante* and the layering of regulation of integration was driven by two factors, both very much akin to the underlying forces that drove the broader progressive movement, as summarized in Exhibit I-3 and discussed below.

First, the importance of interconnection had grown as the division of labor became more complex and the scope of the economy expanded. Alfred Chandler, a preeminent American economic historian, described the vital role of transportation and communications in the expansion of the economy during the second industrial revolution as follows:

> But of far more importance to the expansion of the factory system was the reliability and speed of the new transportation and communication. Without a steady, all-weather flow of goods into and out of their establishments, manufacturers would have had difficulty in maintaining a permanent working force and in keeping their expensive machinery and equipment operating profitably. Moreover, the marketing revolution based on the railroad and the telegraph by permitting manufacturers to sell directly to wholesalers, reduced requirements for working capital and the risk of having unsold goods for long periods of time in the hands of commission merchants. Reduced risks and lower credit costs encouraged further investment in plant, machinery and other fixed capital.[337]

Stone ties Chandler's observation back to Adam Smith through the important role that transportation and communications play in supporting the more complex division of labor:

> In short, the division of labor, as Adam Smith observed, is limited by the extent of the market. And the extent of the market is limited, in turn, by the speed, reliability, and cost of communications. Rapid and extensive communications, thus, radically transform production as well as distribution….
>
> The telegraph, in short, was not simply another new invention. Virtually every economic activity was significantly affected. Although its commercial capabilities were not recognized in the nations of Europe (with the exception of Great Britain), the telegraph in the United States was, together with the railroad, critical in the development of national markets.[338]

EXHIBIT I-2: TITLE I GOALS AND TITLES II AND III TOOLS OF THE COMMUNICATIONS ACT

EXTENSION OF LINES

S. 214 (a)…No carrier shall discontinue, reduce or impair service to a community, unless and until there shall first have been obtained from the Commission a certificate that neither the present nor future public convenience and necessity will be adversely affected thereby…
(d) The Commission may after full opportunity for hearing, in a proceeding upon complaint or its own initiative without complaint, authorize or require by order any carrier, party to a proceedings, to provide itself with adequate facilities or require for the expeditious and efficient performance of its services as a common carrier and to extend its line…

UNIVERSAL SERVICE

S. 254 (b) Universal Service Principles – The Joint board and the Commission shall base policies for the preservation and advancement of universal service on the following principles:

(1) Quality and Rates –Quality services should be available at just reasonable, and affordable rates. (2) Access to Advanced Services – Access to advanced telecommunications and information services should be provided in all regions of the nation.

S. 254 (c) (1) Universal service is an evolving level of telecommunications service that the Commission shall establish periodically under this section, taking into account advances in telecommunications and information technologies and services. The Joint Board in recommending, and the Commission in establishing definitions of the services that are supported by Federal Universal service support mechanisms shall consider the extent to which such telecommunications services

(a) are essential to education, public health or public safety; (b) have, through the operation of market choices by customers, been subscribed to by a substantial majority of residential customers; (c) are being deployed to public telecommunications networks by telecommunications carriers; and (d) are consistent with the public interest, convenience and necessity.

ACCESS FOR PERSONSWITH DISABILITIES

225: In order to carry out the purpose established under section 1 … the Commission shall ensure that interstate and intrastate communications relay services are available, to the extent possible and in the most efficient manner, to hearing-impaired and speech-impaired individuals in the United States.
255: A provider of telecommunications service shall ensure that the service is accessible to and usable by individuals with disabilities, if readily

TITLE I

For the purpose of regulating interstate and foreign commerce in communications by wire and radio so as to make available, so far as possible, to all people of the United States a rapid, efficient nationwide and world-wide wire and radio communications service with adequate facilities at reasonable charges, for the purposes of national defense, for the purpose of promoting safety of life and property through the use of wire and radio communications…

PUBLIC SAFETY

229: The Commission shall prescribe such rules as are necessary to implement the requirements of the Communications Assistance for Law enforcement Act… shall include rules to implement Section 105.... that require common carriers to require appropriate authorization to activate interception of communication or access to call-identifying information and to prevent any such interception or access without such authorization…The Commission shall review the policies and procedures.... and shall order a common carrier to modify any such policy or procedures that he Commission determines does not comply
Title III: It is the propose of this Act...to maintain control of the Unites States over all the channels of radio transmission… No person shall use or operate any apparatus for the transmission of energy or communications… except under and in accordance with this act and with a license in that behalf granted and under the provision of this Act.

INTERCONNECTION AND CARRIAGE

201: It shall be the duty of every common carrier… to establish physical connections with other carriers… through routes and charges… and provide facilities and regulations for operating such through routes… All charges, practices, classifications, and regulations for and in connection with such communications service shall be just and reasonable…
202: It shall be unlawful for any common carrier to make nay unjust or unreasonable discrimination in charges, practices, classifications, regulations, facilities or services for or in connection with like communications service, directly or indirectly.... or to make or give any undue or unreasonable preference…or to subject any particular person, class of persons or locality to any undue or unreasonable prejudice or disadvantage.
251: Interconnecting: (a) General Duty of Telecommunications Carriers – Each telecommunications carrier has the duty—(1) to interconnect directly or indirectly with the facilities and equipment of other telecommunications carriers; and (2) not to install network features, functions or capabilities that do not comply with the guidelines and standards established…

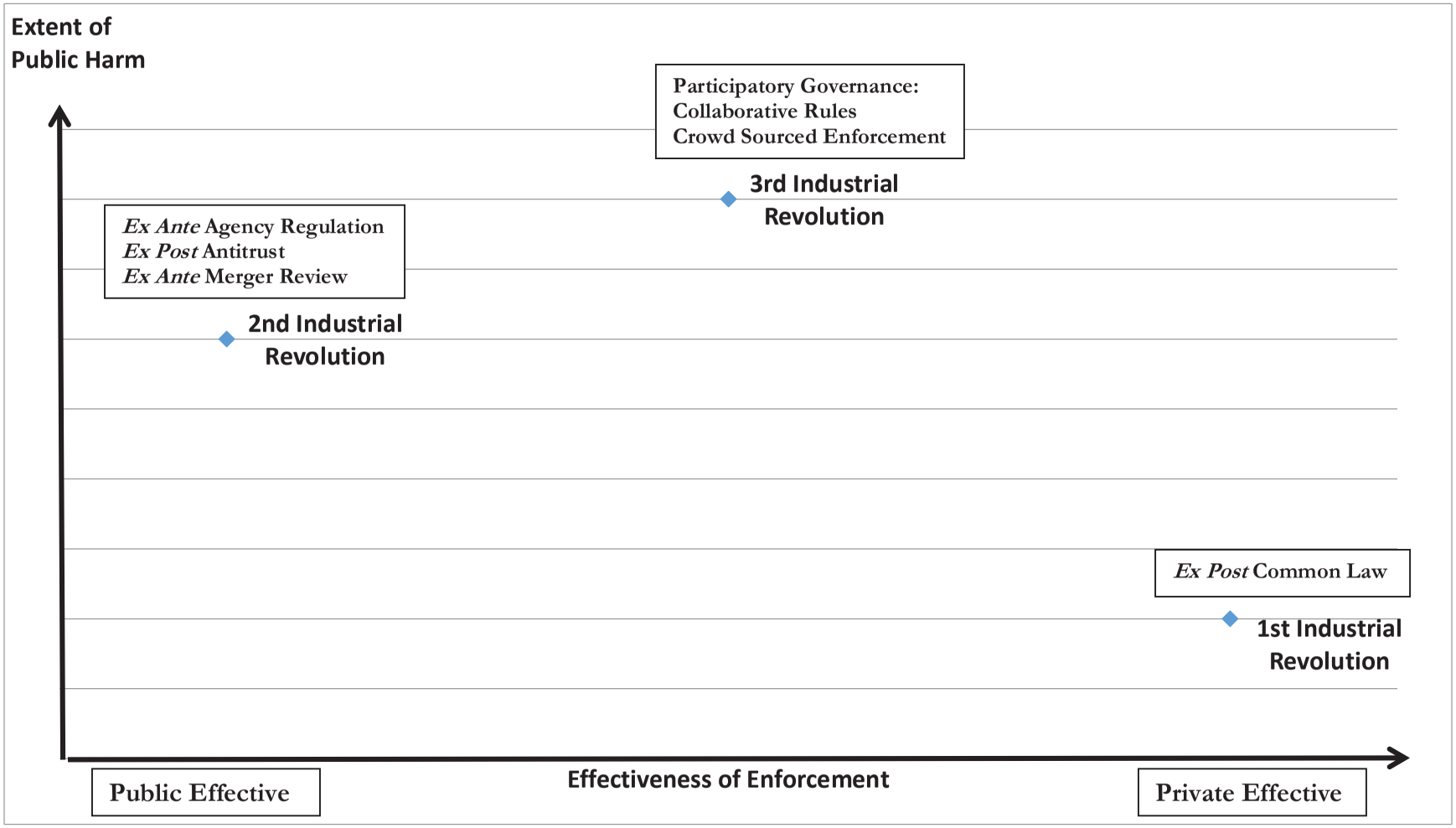
CONSUMER PROTECTION

258: No telecommunications carrier shall submit or execute a change in a subscriber's selection of a provider of telephone exchange services or telephone toll service except in accordance with such verification procedures as the Commission shall prescribe.

PRIVACY

222: Every telecommunication carrier has a duty to protect the confidentiality of proprietary information of, and relating to other telecommunications carriers... and customers

EXHIBIT I-3: ECONOMIC CONDITIONS DICTATE THE NATURE OF EFFECTIVE ENFORCEMENT



Second, key changes in society created a need for a change in the mechanisms for enforcing the public service principles. The ability of individuals to exercise their rights to nondiscriminatory access had been obliterated by the massive increase in size and power of the dominant owners of the means of communications and commerce. The suggestion that private individuals could effectively assert their rights under common law when confronted with massive corporate power and resources, not to mention the legal expertise of the newly created corporate general counsels invented by the railroads, was not very credible as stated bluntly by the Cullum Committee Report, "The Common law fails to afford a remedy for such grievances."[339]

While the focus of attention has traditionally been on the economic factors and forces, the social bases of public service principles should also be recognized. Important social values have been involved including provision of necessities, appropriate standards of living, the ability to participate in modern life, and equality of opportunity.[340] Universal service and consumer protection can be seen as principles that bridge the social and economic dimensions.[341] Just as the economic dimension of public service obligations expanded, the broader social values have expanded as well, underscoring the progressive nature of expanding public service principles.

Thus, the economic costs and social injustice of the uneven enforcement of the private right to nondiscrimination that would result from massive corporations pursing their private interests under common law had become too great for society to tolerate. Policy turned to a broader set of multi-layered public service principles imposed by regulation to enforce a broader right of access and achieve a higher level of integration. Simply put, the means of communications had become so important to the progress and practice of capitalism and democracy that, at the moment of ascendance of the 2nd industrial revolution, they were deemed sufficiently vital to merit both *ex ante* and *ex post* oversight that takes into consideration its "merely commercial aspects" **and** its broadly sociopolitical impacts.[342]

E. The Quarter-life Crisis of the 3rd Industrial Revolution

The contemporary debate over the public service principles and obligations of the public switched network is taking place at roughly the same point in the lifecycle of the 3rd industrial revolution, as shown in Exhibit I-2 above. Digital communications have become the dominant means of communications. We are living through the quarter-life crisis of the digital revolution and we ask how it will shoulder its new responsibilities across a dozen or more important social issues. Today, we confront exactly the same questions that society grappled with in the maturation of the second industrial revolution. Should public service principles apply to the means of communications in the 21st century? Does it merit this close scrutiny?

History, law, economics and policy make the answer to these questions emphatically YES.[343] If anything, the commitment should be even stronger and the scrutiny closer in the 21st century political economy.

The convergence of communications and commerce, the increasing importance of communications in economic, social and political life, and the more dynamic, interconnected nature of the digital economy means the failure of integration can impose greater harm than ever.

All of the key, economy-enhancing characteristics that Chandler attributes to the railroad and the telegraph in the middle of the 19th century certainly apply to digital communications technologies at the beginning of the 21st century with greater force.[344] Specifically:

- For some products that can take a purely digital form, digital technologies reduce or eliminate the need for physical distribution networks, which can cut the cost of the delivered goods and services by more than one-half.
- For many physical goods and services, digital technologies transform the production process.
- For all products, digital technologies lower transaction costs and dramatically reduce the need for inventory by ensuring a closer (in some cases perfect) fit between what is produced and consumed.
- Even more importantly, digital technologies empower and facilitate innovation by the users of the network on a pervasive basis, supporting a dramatic and unique transformation of the division of labor.
- Of equal or greater importance, the increase in citizen participation in political discourse made possible by the new means of communications can enrich democracy.

Because of the increasing public benefits of the seamless flow of information and data, more than in the past, the harm of failing to adhere to the public service principles is greater and the inability of *ex post* action to remedy it is magnified. In a decentralized economy one never knows from where innovation will come or how important it will be.[345]

In a profoundly interconnected society that has become a highly recursive system, with dynamic, real-time networks, discrimination can be devastating to rapidly evolving, highly interconnected activity.[346] In digital networks, discrimination can be subtle, but potent. With a small number of critical choke points that possess a great deal of vertical leverage and the ability to extract massive rents, thereby wasting important resources, the incentive and ability to discriminate in these networks is strong.[347]

The case for the *ex-ante* public service obligation is at least as strong when it comes to non-economic issues. As digital networks become the dominant means of communications and expression, the exercise of political rights becomes dependent on access to and the flow of information over those networks. Where basic rights are involved, "replacement" dictates that the right is not diminished as the medium of political discourse changes, but also expands on the new networks.[348] In light of the importance and power of digital communications networks, I argue it makes even less sense to rely on *ex post* regulation than it did a century and a quarter ago when it was abandoned by progressive era policy makers.

However, in making the case for the increased importance of the public service principles on the basis of the dynamic, recursive nature of the digital age, I also lay the foundation for arguing that the approach to imposing and enforcing the public service principles must evolve as well.[349] More than five hundred years of history teaches that regulated common carriage is not synonymous with public service principles and obligations. On the contrary, for three-quarters of

the history of capitalism in the Anglo-American world, nondiscrimination was enforced by common law, so we should be open to alternative ways of ensuring nondiscrimination in the digital economy, even though we reject the *ex post* approach.

The lesson is not that we need to impose the expert agency model exactly as it was during the second industrial revolution or during the third industrial revolution. Rather, the lesson is that the public service principles need to be preserved, even expanded, to support the high level of performance of a networked society, and implemented with a form of regulation that best supports the functioning of the new mode of production. The form of regulation needs to fit the nature of the networks and develop as they do. The digital communications sector requires a more flexible, dynamic *ex ante* approach to ensuring the implementation of the public service principles. Indeed, as I argue in the next section, it was a decision to replace the common carrier approach with a more flexible, less intrusive policy that created an environment that was uniquely favorable to the birth and growth digital revolution in communications.

II. Pseudo-Access Competition And Ubiquitous, Seamless, Integration Of Infrastructure Networks

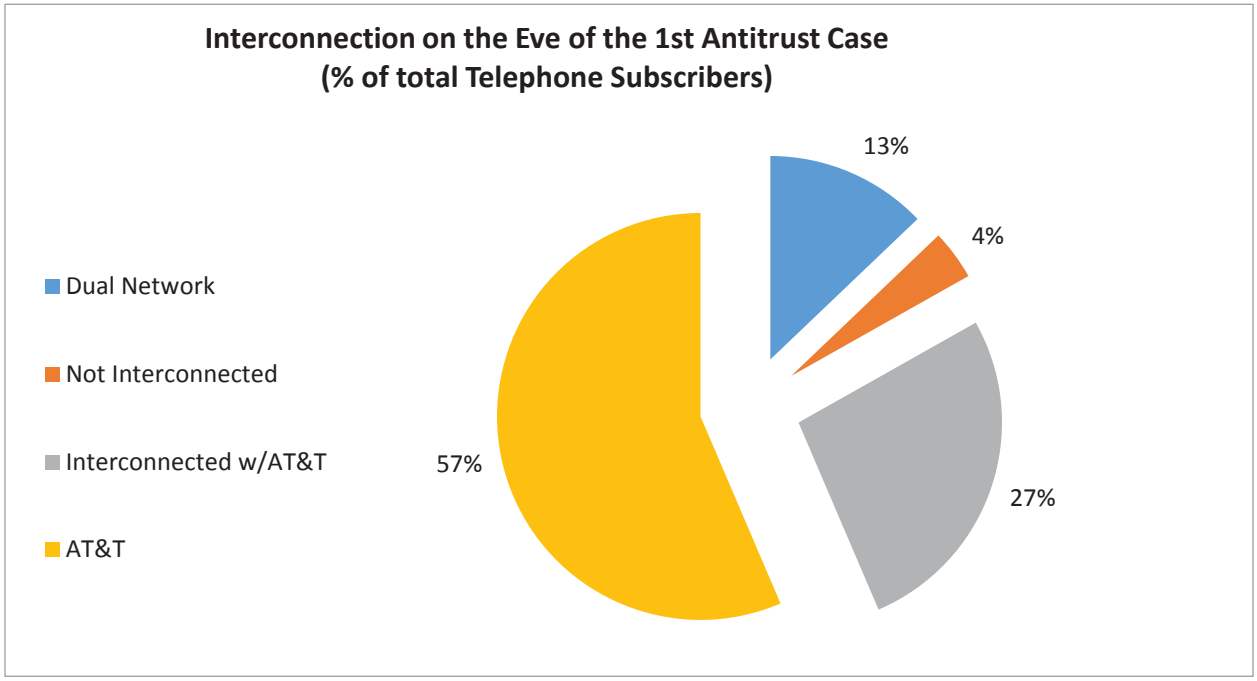
As we have seen, competition (or the lack thereof) does not determine whether public service principles govern an activity and impose obligations on service providers. The state of competition is a factor that should be examined, particularly in the current policy context, where one goal of public policy is to promote competition. In this context, the question of whether public policy can simply rely on competition to ensure the principles will inevitably arise. As discussed in the next section, the 1996 amendments to the Communications Act provide specific standards for answering this question. Here I examine how access competition affected interconnection in various circumstances in several industries in the U.S.

A. The Evil Empire v. the Benevolent Despot, or something in between

The events of the early competitive period in the U.S. telephone sector are fairly well agreed upon. Their interpretation and meaning are not. Two primary theories are offered to explain the integrated near-national monopoly that developed. In one view, it was the result of AT&T's nefarious strategy to end competition, using the promise of interconnection to convince regulators not to impose severe restraints and to later allow acquisition of the Independents. [350] From the other view, AT&T saw the benefits of an integrated national monopoly and embraced a policy of natural monopoly that was consistent with the underlying economics and the public interest.[351]

After the expiration of the Bell patents, a short intense period of construction of independent phone networks occurred, mostly in areas where AT&T did not to provide service.[352] Competition in long distance service was much weaker. As shown in Exhibit II-1, at the height of the competitive period, 'Independent' accounted for over 40 percent of all telephone subscribers. During this period, however, 13% of all telephone subscribers (mostly businesses) had service from dual networks.

Exhibit II-1: Telephone Subscription and Interconnection Patterns In the Competitive Era



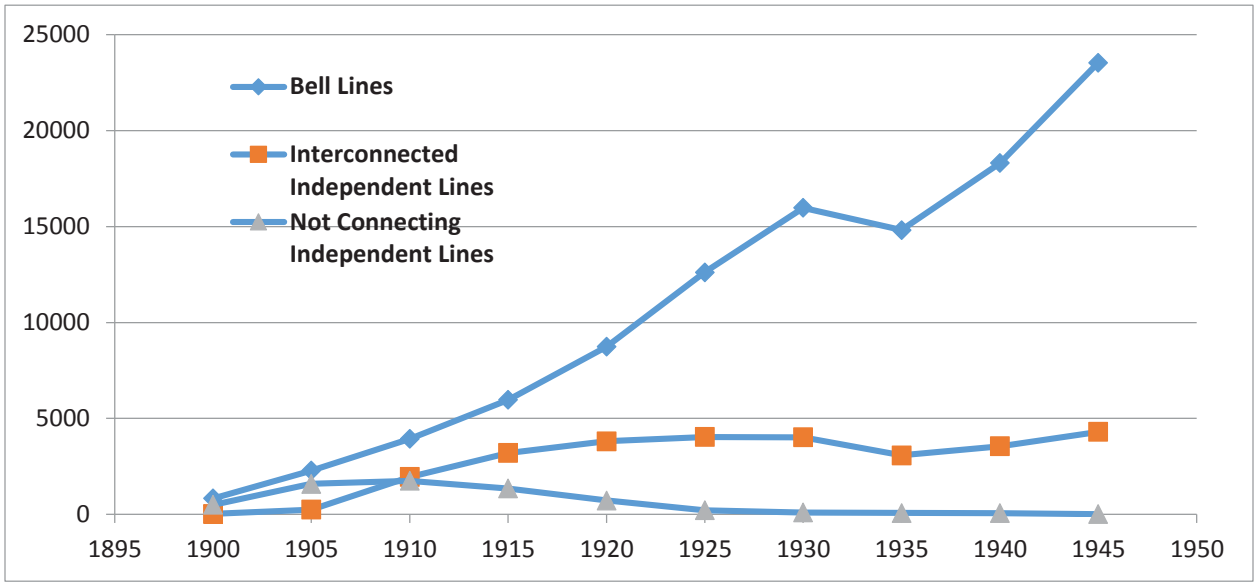
Sources: Alan Stone, *Public Service Liberalism* (1991). Except dual network subscribers, which are from Milton Mueller, *Universal Service (*1998). Percentages are calculated assuming dual networks involve subscribers to AT&T local and an independent.

Initially AT&T refused to interconnect with independent networks, but as pressures mounted, they reversed course (see Exhibit II-2). Thus, as shown in Exhibit II-2 in 1900 only 4 percent of independent lines were interconnected; by 1905, 13 percent of independent phone subscribers were served by independent companies that interconnected with AT&T and by 1910, the number had risen to 53 percent and in 1920 it was 84 percent. The pressures came (1) from Independents, who needed access to a long distance network to provide service that could compete with AT&T, (2) from local businesses, who disliked the need for dual service, and (3) from local regulators who saw duplication as wasteful and the denial of interconnection harmful to local interests.

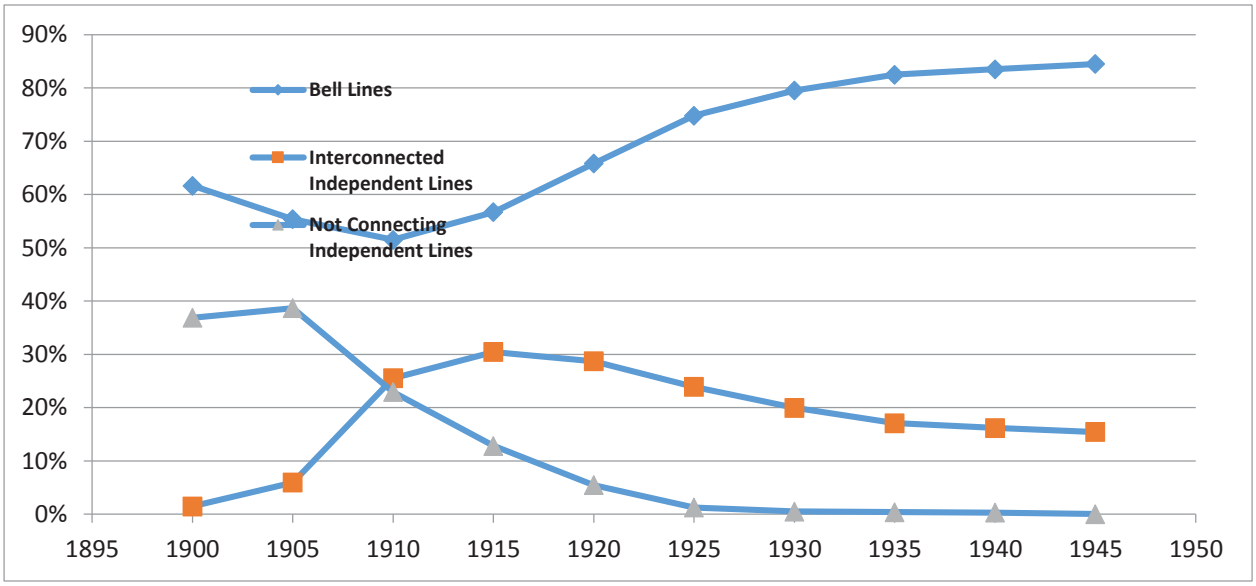
The dominant carrier, AT&T, agreed to interconnect as part of a strategy that intended to restrict competition. The Independents had difficulty agreeing to interconnect with one another, particularly to build an independent long distance network to compete with AT&T, which would have greatly enhanced their ability to become viable, long-term competitors for AT&T. Interconnection with AT&T came at a price. AT&T asserted control over quality and imposed the condition that termination of calls in areas where AT&T faced a competitor had to be on the AT&T-affiliated local exchange. In other words, AT&T used its dominant position in long distance as vertical leverage to advantage its local services.

EXHIBIT II-2: INDEPENDENT LINES INTERCONNECTED WITH AT&T

Number of Subscribers



Percent of Subscribers

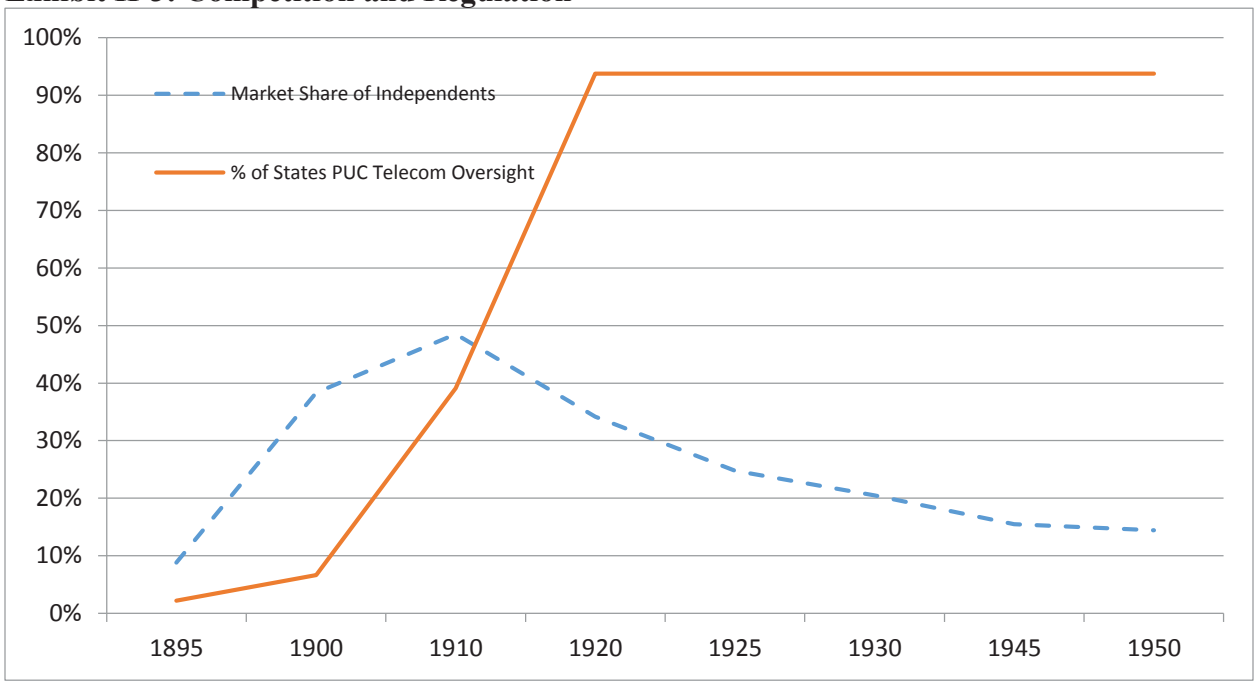


Source: Department of Commerce, *Historical Statistics of the United States: Colonial Times to 1970, Part 2* (Washington D. C., 1975). P. 783)

As the states grappled with the problem of lack of interconnection, federal policymakers took notice. It was during the competitive era that state regulation was imposed on local telephone companies, with one of the causes being the need for dual service and one of the consequences being the elimination of competition (See Exhibit II-3). From the peak of access

competition with over 40% of subscribers being to non-AT&T companies (and 55% of all service territories, since the Independents tended to serve smaller towns and rural areas) the Independents shrank to 18% by 1965.

Exhibit II-3: Competition and Regulation



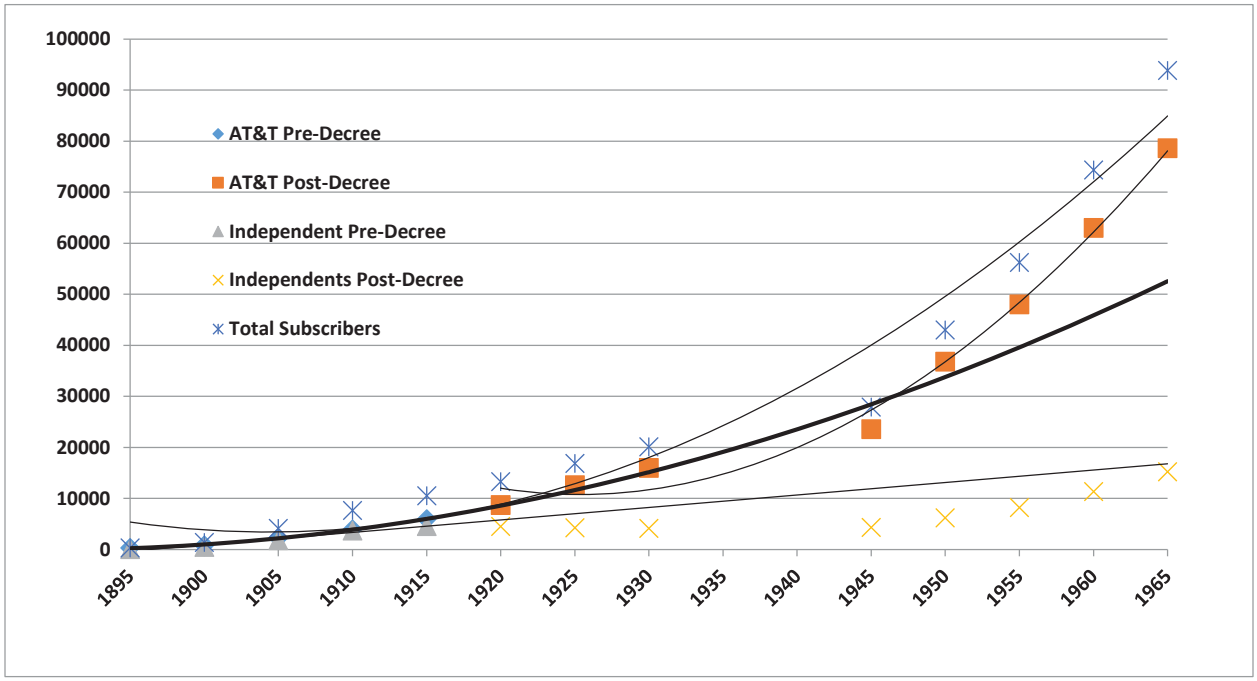
Source: Department of Commerce, *Historical Statistics of the United States: Colonial Times to 1970, Part 2* (Washington D. C., 1975). P. 783);Sources: Alan Stone, *Public Service Liberalism* (1991).

It is difficult to see much difference in the growth of subscribership between the competitive and the post-competitive periods, although the institutional changes make it difficult to sort out "causality." The co-linearity of important variables means the competing explanations persist and drive analysts toward qualitative historical accounts (see Exhibit II-4). To be sure, the entry of Independents extended telephone service to areas where AT&T had chosen not to go, but generally avoided head-to-head competition. Ultimately, growth under the monopoly models looks quite like growth during the competitive period. Competition did not affect subscription to promote universal service.

B. Pseudo-Access Competition does not Lead to Ubiquitous, Seamless Network Integration

The period of access competition did not produce interconnection. Advocates of competition argue that the problem was that there was not enough competition, so the Independents still saw their subscriber base as a source of local market power to be exploited. If there had been more competition, the theory goes, Independents would have realized the futility of separate networks and shared the benefits of interconnecting.

Exhibit II-4: Subscriber Growth Competitive Period and After (000 Subscribers)



Source: Department of Commerce, *Historical Statistics of the United States: Colonial Times to 1970, Part 2* (Washington D. C., 1975). P. 783)

> The competing telephone companies, as the discussion above demonstrates, failed to interconnect because there was too little competition rather than too much competition. These companies tried to use local exchanges as strategic bottlenecks in developing telephone systems. [353]

In this theory, the competitive access approach to interconnection requires not only a sufficient number of viable competitors to eliminate the allure of exploiting the local monopoly; it also requires vertical separation between local and long distance and vigorous antitrust oversight to prevent collusion.

> Separating the exchanges from the companies (or associations) providing long distance might have fostered interconnections and prevented the Bell system from establishing a monopoly over the national telephone system. Lacking any system-building incentives, local exchanges would have had strong incentives to either interconnect with each other or interconnect with a common-long distance company. There is no reason to believe that local exchange would have foregone these opportunities for mutually advantageous trades. This policy would have maintained a quasi-competitive local exchange market and, perhaps, a quasi-competitive long-distance market. On the other hand, the incentive to collude between competitive local exchanges and between local exchanges and long-distance companies might have required vigilant oversight over such an industry.[354]

The question is not whether there is a range on the supply curve where marginal costs are rising, but how many competitors are sustainable when that scale has been reached. The question of economic viability of competitors becomes critical.[355] Less than a decade after the consent

decree required AT&T to interconnect and provide equal access to its long distance network, the competing firms that were identified in the decree were on the brink of bankruptcy as the result of destructive competition in which rates were driven to non-compensatory levels and asked the court to lift the decree so they could merge..[356] The Independents were too small to survive, but too big to be convinced that they should give up their local market power to join an integrated national network. The policy sweet spot of access competition is extremely small and the goal of "quasi-competition" is not all that attractive.

The challenge of finding this policy sweet spot is particularly difficult where there are multiple potential sources of vertical leverage and monitoring complex behavior is particularly difficult. Not only must policy hope that minimum efficient scale will support enough competition to induce integration, but it must prevent vertical integration across a number of linked products and police collusion.

Faced with this improbable scenario in which access competition can be relied on (in part) to yield interconnection, an alternative approach is to argue that ubiquitous, seamless integration is no longer desirable. Mueller argued that demand side economies of scale and advancing technologies change the policy terrain, as suggested by his observation that integration is "no longer an unqualified good, as it may have been in the era of Vail."[357] With technological change "in the present environment, it is easier to achieve various levels or gradations of compatibility and interconnection. Thus, it is unlikely that users will be confronted with the stark choice between interconnection and no interconnection they faced in the past."[358]

Underlying this alternative view of interconnection are hypotheses about technology and consumer demand.

> As fears about privacy and security grow, and technologies such as voice mail and caller ID gain popularity, one can only conclude that today's users are as interested in controlling and restricting access as they are in broadening it. To many people, the indiscriminate intrusion of a universal "information superhighway" into their home or business is about as welcome as the presence of an eight-lane interstate highway in their backyard.
>
> The typical business card today carriers three or four different user addresses – one each for a telephone, a cellular phone, a fax and an electronic mail address, or a pager. There may be additional information about internal, enterprise networks. Compared to that, the advertisements of the dual service era, in which businesses had to list two different telephone numbers, seem simple… Indeed, a large number of users now have two incompatible and unconnected "telephones" on their desk. One is the traditional voice telephone connected to the PSTN, the other is a computer equipped with Internet voice transmission software…
>
> It is possible that technological and institutional difference between the past and the present have tilted the social optimum away from integration and toward more tolerance of heterogeneity, fragmentation, and competition."[359]

The argument is based on several dubious assumptions. Heterogeneity and competition at the application layer does not require fragmentation at the physical layer. At the time these observations were offered, the Internet almost certainly rode on the public switched network. In that sense, they were not "incompatible and unconnected." In short order, Voice over Internet

Protocol ("VOIP") rendered the two completely compatible and connected. It is the incumbents who have historically resisted interconnection and interoperability, that have blocked it on occasion and would certainly like to change the terms and conditions of interconnection in the digital age.

The value of ubiquitous seamless integration lies in the optionality of group formation, which argues that the value of the communications network does not lie in who you did talk to, but who you could talk to. The problem is that the subgroups of consumers who would like to talk to each other are hard to know in advance and the choices of subscribers with whom one wants to communicate may not be static. [360] Who you want to talk to may change over time. That option value has grown dramatically in the digital age and is reduced by fragmentation of networks. Designing networks that cater to individual consumer needs is difficult and would result in severe fragmentation. This ignores the transaction costs of knowing which service reaches which customers and suppliers.

The tsunami of data and the sharing of information on social media suggest that users value access a great deal more than they value restriction of access. Users would certainly like more control of their data, but they clearly want to have and use access.

C. Deregulated Network Industries do not Embrace Seamless Integration

Infrastructure network industries in other circumstances without regulated integration suggest that seamless integration is not an outcome to be expected in the marketplace.[361] The inclination to use local market power to extract rents and undermine competition, rather than interconnect was as strong at the turn of the 21st century as it was at the turn of the 20th,where deregulation in the airline and railroad industries, made interline movements the first victims of deregulation, as network operators want to drive end-to-end traffic onto their networks and they develop elaborate strategies for doing so.[362] In each of the cases of deregulation, the post-deregulation of the industry looked nothing like the pre-deregulation competition theory predicted, yet policy makers are urged to just plow ahead, in spite of the fact that behavior contradicts the theoretical basis for deregulation.

The telecommunications sector is not an exception. The reconstitution of integrated local and long distance companies through mergers by firms that also dominate wireless and have joint ventures with their closest cable rivals, bears no resemblance to the "sweet spot" that the pre-divestiture theory identified as the place where quasi-competition might produce "voluntary" integration between independent networks. Special access services, which allow competitors to interconnect with the wireline telecommunications network, have been a source of constant complaint about abuse since the industry was deregulated.[363]

The FCC has successfully asserted jurisdiction over roaming charges for wireless interconnection.[364] In the realm of interconnection, even though the FCC asserted authority to compel interconnection, the telecommunications carriers have ignored, pushed the limits of, and violated the FCC's rules in a short period of time, suggesting that absent the public policy principles that require integration, it will not be observed.

In fact, in each of these network infrastructure industries we observe a period of pseudo-access competition (quasi-competition is too strong a word).[365] Small, "mom and pop," service providers crop up in unserved areas to extend service. Head-to-head competition does not make sense to these entrants and is quite rare. Interconnection also is not attractive to them, as they guard their local monopoly as a source of potential rents. In order to get going, the small entrants rely on inferior technology, offer services on non-compensatory rates, and fail to maintain their quality of service. In short order, there is a wave of bankruptcies and buyouts. Advocates of competition, ignoring economies of scale and the rigors of minimum efficient scale, wave their arms in the air and complain about the evils of concentration.

This pattern occurred in the railroads (1860s-1870s), telephone (1910s-1930s), cable industry (1970s- 1990s) and cellular service (2000-2010).[366] Incumbent telecommunications carriers strangled competition where it represented a threat, as in the 'Baby Bell' approach to interconnection with the competitive local exchange carriers after the Act. To the extent there is end-to-end seamless integration of infrastructure communications networks, that is the result of mandated integration.

Ironically, a claim that an especially weak form of pseudo-access competition (especially weak because it was not head-to-head, intramodal competition, but intermodal competition) would discipline market power in broadband access played a key role in leading the FCC to misclassify high-speed data transmission as an information service. Pseudo-competition quickly gave way to a monopoly, or at best a cozy duopoly in access.[367] As shown in the Section III, speculation about the possibility of future competition that might develop was a very weak and illegal basis on which to pin the future of the public service principles of the Communications Act. Congress placed a much higher value on the principles and established a much more rigorous process to relax regulation, a process that the FCC mistakenly ignored.

D. The Inadequacies of Command and Control Regulation to Guarantee Public Service Principles in the Digital Communications Space

As noted above, the 20th century approach to promoting the public service principles of the communications sector relied on command and control regulation. Some would like to extend it, lock, stock and barrel to the 21st century digital network.[368] Yet, there are good reasons to believe that command and control regulation is not well-suited to the new mode of production. Repeating the historic pattern, new enforcement mechanisms are needed.

First, the dynamic, complex, and interconnected nature of the 21st century economy, particularly those sectors touched by digital technologies, makes it difficult for centralized, bureaucratic oversight to write and enforce regulation.[369] Ponderously slow-moving common carriage may have been well-suited for railroad tracks, copper wires, electricity grids, and water pipes whose products are relatively homogeneous and static, but it is ill-suited to the dynamic digital environment. Given that common carriage was the exception in the long history of public service principles we should be open to alternative ways of ensuring nondiscrimination in the digital economy, even as we reject the *ex post* approach.

The magnitude of the difference between the digital communications space and other infrastructure networks is stunning. Two analogies that are frequently made are the highway

system and electricity. The former is a public sector undertaking. The latter is a regulated private utility. In the five decades from 1960 to 2010, the output of these two infrastructure industries increased by more than four-fold. In contrast, the traffic flowing on the Internet has been almost doubling every year since 1996. 2011. The increase in the diversity of traffic was also orders of magnitude greater than in the other network infrastructure industries as well.

Second, the legitimacy of the state to exercise authority is weakened in an increasingly complex environment, where the complexity is, in part, the result of the enrichment and growth of the communications capabilities. The command and control model reflected the passive representational pattern of the 19th and 20th century. The command and control regulation rests on the assumption of delegation of authority from a passive public to an expert agency through institutions of representative democracy. In light of the dramatic increase in communications and empowerment at the edge, the traditional approach to democratic participation has become stale. The 21st century citizenry is vastly more heterogeneous and active. The borderless, transnational nature of the Internet resource system compounds the problem of weakening state authority. Because information flows are so fluid and multinational, it is argued that the challenge to national authority is well beyond the typical international challenge.[370]

The above two factors involve very fundamental economic and political problems with command-and-control regulation. These have been compounded by more superficial, but important factors. The traditional approach to formal notice and comment regulation was based on the belief that expert agencies could do a better job than political bodies like legislatures in designing regulation to deal with the day-to-day functioning of industries. Once the regulatory agency becomes politicized, it loses its advantage.[371] The model of an expert agency relied upon to implement broad goals has been undermined by the politicization of the regulatory process. Moreover, traditional regulation is not likely to work very well because the ability of the state to implement and enforce regulation has been undermined by systematic and persistent defunding of regulatory agencies.[372] Decades of anti-government and pro-market rhetoric have taken their toll. The agencies now lack the resources to do their jobs. In the United States, the number of regulatory and antitrust employees per dollar of value they oversee in the economy at large and the communications sector is one-fifth the level it was in 1970.[373] Compared to profits and assets, agency budgets are less than half the level they were in 1970.

None of these factors is likely to be reversed any time soon. Rather than expending a great deal of effort trying to rehabilitate an enforcement mechanism that is not likely to work very well, even if it is resurrected, public policy should embrace new approaches to advancing and enforcing the expanding set of public service principles.

E. Expansion of Access in the 3rd Industrial Revolution: Creating Space Between the Market and the State

The search for a new model to advance the public service principles without undermining the dynamic nature of the core communications resource system of the digital economy need go no further than the examples provided by the digital revolution itself. The Internet protocols and the development of Wi-Fi are remarkable communications systems based on brutally simple obligations of interconnection and integration that are open to all on a nondiscriminatory basis and supported by voluntary standards, managed by multi-stakeholder processes that promote

interoperability. A key spark is provided by a regulatory decision of guarantee access, while a backstop of the threat of further governmental oversight ensures that access is available.

In both cases, the government had an important role in creating the environment in which an entirely new approach to communications could thrive. This is a space that lies between the market and the state in the sense that the abuse of power by dominant communications companies and government regulators was held in check.

The Caterfone and the Computer Inquiries launched in the late 1960s ensured that nondiscriminatory access to the telecommunications network would extend to the flow of data and that innovation in customer premise equipment could flourish.[374] The dominant incumbent telecommunications carrier despised the idea of a decentralized communications protocol and would have quickly throttled it by denying access had they been allowed to, just as they had done a century earlier at the start of the telephone age. Without decisive public policy action by the FCC, the telecommunications companies might have defeated decentralized communications altogether, certainly would have slowed its development down and probably would have distorted its growth, if only by forcing the government to regulate the space more intensely. The voluntary action of the developers of the new communications protocol to fill the space opened by government action was a key ingredient for success. The social institutions they developed and used to manage the decentralized network for thirty years deserve close study and deference as candidates for the future governance structure of the communications network.

Caterfone and the Computer Inquiries must be seen as the origin and foundation for a significant shift in the thrust of public policy with respect to the communications network. They introduce the possibility for innovation at the edge of the network as a primary driver of economic activity.[375] Once any device can connect and transmit information, individuals are free to invent new uses and applications. Functionalities that were monopolized by the network operator or, more importantly, never dreamed of by them, become possible. The critically important change is to ensure that traffic flows first and shift a heavy burden onto the network operator to show that it should not. When the broader digital revolution located an immense amount of intelligence (computational power) at the edge of the network with the personal computer, the possibilities became virtually limitless.

AT&T's desire for centralized control did not go quietly into history. It repeatedly complained that services and communications by innovators should be stopped. By resisting the attempts of AT&T to burden the decentralization of innovation, the FCC established an environment in which innovation at the edge could flourish to become the driving force for economic and productivity growth.

The mid-1980s spread spectrum rulemaking adopted by the FCC to allow everyone and anyone to have access to radio frequencies, which had been considered garbage by the commercial users of the public airwaves, subject to simple rules of use, had a similar effect.[376] It ensured access to an irreplaceable, raw communications resource in the most deregulatory, free market approach imaginable, unlicensed, universal access. The private sector concluded, to its credit, that a common communications protocol would expand the market and the best approach was to create voluntary institutions to adopt and defend those standards. Had they not done so, there is a good chance that the government would have stepped in to ensure interoperability, with

rules that would have been significantly less friendly to innovation, entrepreneurship, and consumers.

In both cases, the rules were structured in such a way that the government did not have to get involved in the day-to-day regulation of behavior. In both cases, because of the deregulatory age in which these decisions were made, the presumption was shifted in favor of the freedom to act. The incumbent network operators had to show that devices would harm the network, or data traffic should not be allowed to flow, which they rarely, if ever were able to show.

For three decades encompassing the birth, childhood and adolescence of the digital communications revolution, Internet traffic flowed freely over the telecommunications network (free as in speech, not as in beer) under the Computer Inquiries to devices that were made possible by the Carter phone decision. Shifting to an approach that offered *ex ante* freedom and required the powerful incumbent to prove *ex post* harm to the network, rather than requiring the entrants to show *ex ante* they would do no harm (by offering a simple certification standard and process) is a key pillar on which future interconnection policy should stand.

The model worked precisely because it was located between the market and the state. The state used its power to create a space that was free from the worst instincts of both the market and the state, and the private actors who wanted to enter that space realized that they needed to regulate themselves in a manner consistent with the principle of nondiscrimination, which they equated with interoperability.

Unlike the Internet and the Wifi communities, which engaged in vigorous and effective voluntary self-organizing efforts to develop protocols and processes to keep their respective spaces open, ,the telecommunications infrastructure network operators had the opportunity after the Cable Modem Order with the declaration of the four Internet freedoms, and again after the Wireline Broadband Order, and the Network Neutrality Order to follow the model of the IP-community and the Wi-Fi-community. They could have filled the space opened by the Cable Modem and Wireline Broadband Orders with a vigorous voluntary process to demonstrate a commitment to the four freedoms. They failed utterly to do so, immediately attacking and infringing the principles. History repeats itself; incumbent network operators have never willingly conceded constraints on their market power in half a millennium. Forced to operate networks in an open access manner, they make the most of it, but they do not create such networks. Open spaces like the Internet and Wi-Fi protocols are the meat and potatoes of new entrants and entrepreneurs; but anathema to entrenched network incumbents.

The flexible, multi-stakeholder approach to implementing public service principles that are well-defined in statutes, is a challenging process, but one that has proven successful and holds much greater potential for success than the alternatives. This approach has been embraced broadly by the Internet community and important policymakers. Exhibit II-5—drawn from an OECD policy Communiqué that U.S. authorities helped to develop and have embraced—reflects the importance of the public service principles, the vital role that the state plays in implementing the principles, and also the desire to have voluntary, multi-stakeholder processes accomplish as much of the goals as possible. The key observation here is that striving to use flexible, civil society processes as much as possible does not require one to disavow the importance of the role of the state in defining and defending the public service principles.

Exhibit II-5: Public Service Principles in the Global Context: OECD Communiqué on Principles for Internet Policy-Making

We recognized the essential contribution of stakeholders, including business, civil society, the Internet technical community and academic institutions, to the ongoing development of the Internet and the enrichment of society using the Internet….

We emphasized that, in certain cases, public support and investment may be needed to ensure the greatest practical availability of these networks in our countries, in particular in rural and remote areas, and that such public intervention should support market competition and promote private investment initiatives…

The roles, openness, and competencies of the global multi-stakeholder institutions that govern standards for different layers of Internet components should be recognized and their contribution should be sought on the different technical elements of public policy objectives. Maintaining technology neutrality and appropriate quality for all Internet services is also important to ensure an open and dynamic Internet environment. Provision of open Internet access services is critical for the Internet economy…

Suppliers should have the ability to supply services over the Internet on a cross-border and technologically neutral basis in a manner that promotes interoperability of services and technologies, where appropriate. Users should have the ability to access and generate lawful content and run applications of their choice. To ensure cost effectiveness and other efficiencies, other barriers to the location, access and use of cross-border data facilities and functions should be minimized, providing that appropriate data protection and security measures are implemented in a manner consistent with the relevant OECD Guidelines…

Governments may be able to achieve certain policy goals through flexible, adaptive means by encouraging, facilitating and supporting the development of codes of conduct that are supported by effective accountability mechanisms… Such co-operative efforts should be balanced and consistent with the applicable legal framework and where those co-operative efforts are not forthcoming, other policy options consistent with these principles should be considered in consultation with relevant stakeholders…

Strong privacy protection is critical to ensuring that the Internet fulfills its social and economic potential. Current privacy challenges are likely to become more acute as the economy and society depends more heavily on broadened and innovative uses of personal information that can be more easily gathered, stored, and analysed… Privacy rules should be based on globally recognized principles, such as the OECD privacy guidelines, and governments should work to achieve global interoperability by extending mutual recognition of laws that achieve the same objectives. Cross-border enforcement co-operation will further protect privacy and promote innovation. Privacy rules should also consider the fundamental rights of others in society including rights to freedom of speech, freedom of the press, and an open and transparent government.

Low barriers to entry enabled by the open platform nature of the Internet environment have been crucial to online creativity and innovation. Policies and practices should continue to encourage and promote an Internet environment which is conducive to launching creative and innovative technologies, businesses, and other endeavours that respect recognized legal rights without having to obtain permission or affirmative co-operation from established service providers.

Encouraging investment and innovation in the Internet marketplace requires clearly defined legal rights and a robust and fair process to protect those rights, including users' rights, consistent with the need of governments to enforce applicable law. It is important in this regard that governments, industry and civil society work together to foster respect for the law and protect fundamental rights. Sufficient government enforcement resources and industry co-operation should also be available to ensure that Internet-based activities comply with law. Current legislative and regulatory provisions could be reviewed to ensure that they can be effectively enforced and are consistent with fundamental rights.

Source: Communiqué on Principles for Internet Policy-Making OECD High Level Meeting On the Internet Economy, 28-29 June 2011

UNIVERSAL SERVICE: PROGRESSIVE, DEMOCRATIC CAPITALIST POLICY

In this section I argue that the core universal service provisions of the Communications Act of 1934, as amended by the Telecommunications Act of 1996, exhibit democratic egalitarian principles. Implementation of the Act left a great deal to be desired in the dozen years after 1998, but activity has recently shown signs of life.

A. THE COMMUNICATIONS ACT, AS AMENDED BY THE TELECOMMUNICATIONS ACT OF 1996

In Exhibit VII-1 I highlight key principles in bold. The 1934 Act reflected the culmination of progressive policy development that began during the progressive era. I have listed the statements of policy in the order in which they were enacted. The Title I statement is from the 1934 Act (later amended to specifically identify groups that suffer from inequality or are seen as the target of discrimination: "*without discrimination the basis of race, color, religion, national origin or sex"*).

The language is broadly inclusive (referring to all people, not just citizens) and emphasizes efficiency but bases the standard on a pragmatically progressive goal, adequacy of facilities, and reasonableness of charges. It identifies other important public purposes.

Sections 201 and 202 were also included in the 1934 Act. In fact, this language ties back to the 1910 Mann Elkins Act which extended the Interstate Commerce Act of 1887 to the telephone network (one of the earliest pieces of federal Progressive Era legislation). Interconnection of and access to telecommunications networks on rates, terms and conditions that are just, reasonable and not unduly discriminatory were at the center of national communications policy and remain at the center of the debate over network neutrality.

The remainder of Exhibit VI-1 is taken from the Telecommunications Act of 1996, which went into a great deal of detail. Again, it can be seen as pragmatically progressive. It uses terms like "reasonable" and "affordable." It distinguishes between rural and urban, recognizing that the cost of serving rural areas is high, but declares the goal of comparability of service and rates nonetheless.

The level of service is expected to evolve as technology advances. Other important public purposes are specified, including education, health and safety. The spread of technology through market processes first is a touchstone for triggering the obligation to treat services as covered by the universal service goals. The process for defining those services eligible for support is consultative between the Federal Communications Commission and the Joint Board, which is made up of state regulators.

Exhibit VII-1: The Universal Service Language of The Communications Act as an Example of the Application of Democratic Egalitarian Principles

Title I: For the purpose of regulating interstate and foreign commerce in communications by wire and radio so as to make available, so far as possible, to **all people of the United States** a **rapid, efficient** nationwide and world-wide wire and radio communications service **with adequate facilities at reasonable charges,** for the purposes of **national defense**, for the purpose of **promoting safety of life and property** through the use of wire and radio communications…

INTERCONNECTION AND CARRIAGE: 201: It shall be **the duty of every common carrier… to establish physical connections with other carriers**… through routes and charges… and provide facilities and regulations for operating such through routes**… All charges, practices, classifications, and regulations for and in connection with such communications service shall be just and reasonable**…

202: It shall be **unlawful for any common carrier to make any unjust or unreasonable discrimination in charges, practices, classifications, regulations, facilities or services** for or in connection with like communications service, directly or indirectly**.... or to make or give any undue or unreasonable preference…or to subject any particular person, class of persons or locality to any undue or unreasonable prejudice or disadvantage**.

S. 254 (b) Universal Service Principles – **The Joint board and the Commission** shall base policies for the preservation and advancement of universal service on the following principles:

(1) Quality and Rates –**Quality services should be available at just reasonable, and affordable rates**. (2) Access to Advanced Services – Access to advanced telecommunications and information services should be provided in all regions of the nation. (3) ACCESS IN RURAL AND HIGH COST AREAS.-- **Consumers in all regions of the Nation, including low-income consumers and those in rural, insular, and high cost areas,** should have access to **telecommunications and information services**, including interexchange services and advanced telecommunications and information services, that **are reasonably comparable to those services provided in urban areas** and that are **available at rates that are reasonably comparable to rates charged for similar services in urban areas**.

S. 254 (c) (1) Universal service is **an evolving level of telecommunications service** that the Commission shall establish periodically under this section, taking into account advances in telecommunications and information technologies and services. The Joint Board in recommending, and the Commission in establishing definitions of the services that are **supported by Federal Universal service support** mechanisms shall consider the extent to which such telecommunications services

(a**) are essential to education, public health or public safety**; (b) have, through **the operation of market choices by customers, been subscribed to by a substantial majority of residential customer**s; (c) are **being deployed to public telecommunications networks by telecommunications carriers**; and (d) **are consistent with the public interest, convenience and necessity**.

ACCESS FOR PERSONS WITH DISABILITIES: 225: In order to carry out the purpose established under section 1 … the Commission shall ensure that interstate and intrastate communications relay services are available, to the extent possible and in the most efficient manner, **to hearing-impaired and speech-impaired individuals** in the United States.

255: A provider of telecommunications service shall ensure that the service is accessible to and usable by individuals with disabilities, if readily available.

The concern about universal service expressed in the 1996 Act was reinforced by a new section added to the law, Section 706. It charged the Commission and the states with the task of determining on a regular basis whether the deployment of advanced telecommunications was "reasonable and timely." If deployment was not reasonable and timely, it authorized very broad powers for the FCC and the states to take measures to address the problem.

> SEC. 706. ADVANCED TELECOMMUNICATIONS INCENTIVES.
>
> (a) IN GENERAL- The Commission and each State commission with regulatory jurisdiction over telecommunications services shall encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans (including, in particular, elementary and secondary schools and classrooms) by utilizing, in a manner consistent with the public interest, convenience, and necessity, price cap regulation, regulatory forbearance, measures that promote competition in the local telecommunications market, or other regulating methods that remove barriers to infrastructure investment.
>
> (b) INQUIRY- The Commission shall, within 30 months after the date of enactment of this Act, and regularly thereafter, initiate a notice of inquiry concerning the availability of advanced telecommunications capability to all Americans (including, in particular, elementary and secondary schools and classrooms) and shall complete the inquiry within 180 days after its initiation. In the inquiry, the Commission shall determine whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion. If the Commission's determination is negative, it shall take immediate action to accelerate deployment of such capability by removing barriers to infrastructure investment and by promoting competition in the telecommunications market.
>
> DEFINITIONS- For purposes of this subsection:
>
> (1) ADVANCED TELECOMMUNICATIONS CAPABILITY- The term `advanced telecommunications capability' is defined, without regard to any transmission media or technology, as high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology.
>
> (2) ELEMENTARY AND SECONDARY SCHOOLS- The term `elementary and secondary schools' means elementary and secondary schools, as defined in paragraphs (14) and (25), respectively, of section 14101 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 8801).

B. Developments Since the 1996 Act

Section 706 was not entered into the U.S. Code in 1996, when the rest of the Telecommunications Act of 1996 was. In 2008, Congress enacted an amendment to Section 706, The Broadband Data Improvement Act, and it was codified. It was much more consistent with the concept of a virtuous cycle. Along with the American Revival and Revitalization Act (2009), it shifted the focus of universal service policy to recognize the importance of adoption and utilization as opposed to the mere availability of digital communications. It is use that drives the virtuous cycle and delivers the vast social benefits of digital communications.

The Broadband Data Improvement Act listed a series of findings about the impact of broadband, which was the motivation to improve the quality and frequency of the FCC's analysis of broadband deployment under Section 706.

> The Congress finds the following:
>
> (1) The deployment and adoption of broadband technology has resulted in enhanced economic development and public safety for communities across the Nation, improved health care and educational opportunities, and a better quality of life for all Americans.
> (2) Continued progress in the deployment and adoption of broadband technology is vital to ensuring that our Nation remains competitive and continues to create business and job growth.
>
> (3) Improving Federal data on the deployment and adoption of broadband service will assist in the development of broadband technology across all regions of the Nation.
> (4) The Federal Government should also recognize and encourage complementary State efforts to improve the quality and usefulness of broadband data and should encourage and support the partnership of the public and private sectors in the continued growth of broadband services and information technology for the residents and businesses of the Nation.

The following year, in the Broadband Technology Opportunities Act, the Congress authorized funds to develop programs to accelerate the deployment and use of broadband. It also charged the FCC with developing a National Broadband Plan. The substantive issues reflected the earlier findings of the Broadband Data Improvement Act.

> The national broadband plan required by this section shall seek to ensure that all people of the United States have access to broadband capability and shall establish benchmarks for meeting that goal. The plan shall also include—
>
> (A) an analysis of the most effective and efficient mechanisms for ensuring broadband access by all people of the United States;
>
> (B) a detailed strategy for achieving affordability of such service and maximum utilization of broadband infrastructure and service by the public;
>
> (C) an evaluation of the status of deployment of broadband service, including progress of projects supported by the grants made pursuant to this section; and
>
> (D) a plan for use of broadband infrastructure and services in advancing consumer welfare, civic participation, public safety and homeland security, community development, health care delivery, energy independence and efficiency, education, worker training, private sector investment, entrepreneurial activity, job creation and economic growth, and other national purposes.
>
> (3) In developing the plan, the Commission shall have access to data provided to other Government agencies under the Broadband Data Improvement Act (47 U.S.C. 1301 note).

The Broadband Technology Opportunity Program directly references the Broadband Data Improvement Act. The issues that were raised by these two Acts are at the heart of the virtuous cycle and go well beyond the 20th century approach to universal service. Availability of service

is a small part of universal service in the digital age; adoption and utilization are much more important. The Broadband Technology Opportunity Program ordered the FCC to develop a National Broadband Plan with no finding of untimely or unreasonable deployment.

The FCC used the concept of the virtuous cycle as the foundation of its National Broadband Plan.[377] Shortly after the release of the National Broadband Plan, the FCC's sixth Section 706 report concluded that broadband deployment in the U.S. was not "reasonable and timely," triggering the obligation to adopt policies to address the problem.[378] This was the first report issued after the Broadband Technology Opportunities Act and the first to find that deployment of broadband was not timely and reasonable. This change was of considerable significance since, after more than a decade, the classification of broadband as an information service had failed to achieve the primary goal of the Act. A decade may not seem like a long time, but in cyberspace, it is an eternity.

The FCC then defined preservation of the Open Internet as one policy necessary to preserve the virtuous cycle.[379] The D.C. Circuit Court of Appeals upheld the FCC claim of authority based on the concept of the virtuous cycle, although it rejected the specific Open Internet rules.[380]

As legal background, it should also be noted that in upholding the FCC Universal Service Reform order a few months after the D.C. Circuit Court upheld the FCC's Section 706 authority, the 10th Circuit Court of Appeals affirmed that the FCC has authority to implement universal service reform under Section 254 of the Act as well as Section 706.[381] While the Court affirmed the 706 authority, it devoted most of its attention to analyzing (and accepting) the FCC's authority to regulate non-common carrier (information) services that had been swept into Title II through Section 254 of the Act.

Thus, both the concept and authority for the universal service goals of the Act were strengthened.

C. The Convergence of Economics and Law

In the Open Internet proceeding the FCC proposes to adopt an Open Internet order that meets the legal standard the Court laid down under section 706. It seeks input on other approaches that might be necessary or better suited to achieve the goals of the Act. The policy challenge is to preserve the balance between social responsibility and freedom of economic action, but to do so in a manner that preserves and enhances the virtuous cycle of the Internet innovation system. The solution is not simply to go back to the 20th century regulatory institutions, rather it is to evolve those institutions in a manner that preserves their essential values and goals but fits the new economic reality.

The law is converging to the economics. In ruling on the FCC's data roaming order, the D.C. Circuit Court of Appeals upheld regulations that required dominant firms to offer data roaming services but relied on private negotiations, with the FCC exercising "backstop" regulatory oversight.

> there is a gray area in which although a given regulation might be applied to common carriers, the obligations imposed are not common carriage *per se*. It is in this realm—the

> space between *per se* common carriage and *per se* private carriage—that the Commission's determination that a regulation does or does not confer common carrier status warrants deference. *Cf. U.S. Telecom Association*, 295 F.3d at 1331–32 (deferring to Commission's interpretation of "common carrier"). Such is the case with the data roaming rule…
>
> True, providers must offer terms that are "commercially reasonable." But the data roaming rule, unlike the voice roaming rule, imposes no presumption of reasonableness. And the "commercially reasonable" standard, at least as defined by the Commission, ensures providers more freedom from agency intervention than the "just and reasonable" standard applicable to common carriers… The rule itself actually spells out sixteen different factors plus a catch-all "other special or extenuating circumstances" factor that the Commission must take into account in evaluating whether a proffered roaming agreement is commercially reasonable…. The Commission has thus built into the "commercially reasonable" standard considerable flexibility for providers to respond to the competitive forces at play in the mobile-data market. Although the rule obligates Verizon to come to the table and offer a roaming agreement where technically feasible, the "commercially reasonable" standard largely leaves the terms of that agreement up for negotiation.[382]

The data roaming order involved the regulation of service that the FCC, for the purposes of achieving the broad goals of the Communications Act, defined as non-common carrier, mobile services under Title III. Given the current legal terrain, the Open Internet rules also involve the regulation of non-common carrier services -- broadband Internet. The Commission asserted, and the D.C. Circuit Court accepted, the proposition that it could regulate Title I service using Section 706. In the ruling the Court pointed to the approach it had approved in the data roaming order.[383]

These three rulings affect four of the most important public service principles I identified in the IP transition docket: interconnection, universal service, non-discrimination and innovation at the edge.[384] They establish a rich and complex set of legal authorities.

Above all, they make it clear that the authorities overlap. A service can fall under more than one authority simultaneously and are complementary (in the sense that they trigger different tools for different purposes). Therefore, there is no conflict between asserting authority and developing power under each of the Titles and Sections of the Act. In fact, as I argue below, it would be imprudent for the Commission not to pursue all of the authorities it has available.

In designing the new regulatory structure that puts flexibility and entrepreneurial experimentation at the center, we should not forget the successful models developed by the FCC also had bright lines. Where a practice was deemed to pose a fundamental and pervasive threat to the freedom to experiment, the Commission took flexibility away. It controlled the ability of the incumbents to do harm, kept them out of information services, and made spectrum available on an unlicensed basis.

The regulatory structure that is emerging for non-common carrier services seeks to achieve the goals of the Communications Act, as amended by the Telecommunications Act of 1996, by allowing more scope for individual initiative (subject to the authority of the Commission). Given the history of the success of Commission policy in supporting the Internet innovation system, it makes sense for the Commission to endeavor to stay out of regulating the

day-to-day relationships in the space between the market and the state. In any event, the recent court ruling constrains the way it can regulate these services under the current classification.

Exhibit VII-2 shows the law as defined in the three cases noted above. It also includes another potential source of authority, Title II. The first policy challenge for the Commission is to develop the powers under Section 706 to the fullest extent possible and to evaluate whether that is sufficient to achieve the goals of the Act. If it concludes that the powers are not sufficient, it must explore additional powers under Title II.

Exhibit VII-2: Emerging Structure of Authority and Power Under the Telecommunications Act of 1996

Goal	Authority	Power/Enforcement
Seamless Interconnection	Title III	Non-common carrier regulation => individual negotiations subject to factors
Universal Service	S. S. 254	Title II ETC classification applies
	S. 706b	Independent source of authority
Reasonable Network Management Transparency Blocking Non-discrimination	S. 706a	An independent source of authority, Non-common carrier regulation => individual negotiations subject to factors
	Title II	Circumstances and actions that require more Power

The most important point to recognize in taking an "all of the above" approach is that there is no conflict between Section 706 authority and the other authorities in the statute because Section 706 complements other authorities. It is the "new" law, layered atop the existing statute to accomplish the "additional" goals of communications law expressly outlined in the first sentence of the 1996 Act: to "accelerate rapidly private sector deployment of advanced telecommunications and information services." It applies to telecommunications capability wherever it resides in the Act. Nowhere in the 1996 Act does it say it supplants any existing authority, nor did the 1996 Act repeal any existing authority. The recent court cases have made it clear that Section 706 and other authorities can be invoked simultaneously (although they need not be).[385] While Section 706 authority is extremely broad, the courts have interpreted its power as narrow – i.e. restricting it to non-common carrier approaches. The FCC needs to define the power it exercises under Section 706 to the greatest extent possible in order to preserve the environment in which the Internet flourished.

D. Ambiguity in the Classification of High-Speed Data Transmission

While the law and economics are converging, there remains significant ambiguity in the underlying powers and authorities because of the interplay of law and practice. The FCC faces uncertainty in asserting authority and power to protect the virtuous cycle.

1. Ancillary Authority Under the 1934 Act

The 1934 Act was written in an age in which voice telephony was the primary communications activity. By the 1960s, the growth of data transmission had increased to the point where the question of how to treat it arose. The FCC relied on the doctrine of ancillary authority to issue the ruling in the Computer Inquiries.

Ancillary authority was a legal principle that evolved in regulatory practice and legal opinion to deal with a fundamental weakness in Communications law. The law is static, the industry is dynamic. As communications technology evolves it presents the authorities who have the day-to-day responsibility of overseeing the industry with the challenge of determining how technological developments affect the goals of the Act and where technological developments fall under the Act, if the Commission concludes that development threatened the goals. The Congress provided a very broad and evolutionary remit to the regulatory agency in the first paragraph of the Communications Act that could easily support this flexibility.

A pragmatic approach to jurisprudence, dictated by words like 'rapid,' 'efficient,' 'adequate' and 'reasonable,' allowed flexibility in interpretation and implementation to ensure that the agency could pursue the broad goal with ancillary authority. The court set two primary constraints on the ancillary authority of the agency. The FCC had to show that the ability of the agency to achieve the overall goal was being placed at risk by technological developments. It also had to show that the authority it was using, ancillary to the broad goals of Title I, had a nexus to the tools the Congress had given the agency specifically in other titles of the 1934 Act.

2. Regulatory Flexibility Under the 1996 Act

It can be argued that the amendments to the 1934 Act adopted by the 1996 Act dramatically altered the legal terrain of FCC authority with respect to "adequate facilities" in two important ways. It recognized the importance of flexibility, but adopted a different approach to providing it to the agency. Sections 706 and 254 (discussed above) give the agency the authority to evolve regulations in order to address the two key purposes identified in the first sentence of the 1934 Act:

- Section 706 directly addresses the issue of the "reasonable and timely" deployment of facilities, thus addressing the goal of adequacy. The language of Section 706 is targeted at advanced telecommunications services, which are defined broadly, and uses the key terms from the first sentence of the Act.
- Section 254 directly addresses the evolution of services with comparable functionality at reasonable and comparable charges.

Section 10 provides another source of flexibility. It allows the FCC to forbear from regulating under Title II, where regulation is no longer "necessary" in the public interest. While the new approach to flexibility in Sections 706 and 254 increases or extends FCC authority, Section 10 provides flexibility in the opposite direction, allowing the FCC to forbear from regulating if doing so does not jeopardize the goals of the Act *or* advance the goal of promoting competition. Carriers can ask for forbearance. Nevertheless, the touchstone of policy is still just, reasonable, and in the public interest. Forbearance hinges on competition achieving goals and ensuring public interest is protected.

SEC. 10. COMPETITION IN PROVISION OF TELECOMMUNICATIONS SERVICE

(a) REGULATORY FLEXIBILITY- Notwithstanding section 332(c)(1)(A) of this Act, the Commission shall forbear from applying any regulation or any provision of this Act to a telecommunications carrier or telecommunications service, or class of telecommunications carriers or telecommunications services, in any or some of its or their geographic markets, if the Commission determines that-- (1) enforcement of such regulation or provision is not necessary to ensure that the charges, practices, classifications, or regulations by, for, or in connection with that telecommunications carrier or telecommunications service are just and reasonable and are not unjustly or unreasonably discriminatory; (2) enforcement of such regulation or provision is not necessary for the protection of consumers; and (3) forbearance from applying such provision or regulation is consistent with the public interest.

(b) COMPETITIVE EFFECT TO BE WEIGHED- In making the determination under subsection (a)(3), the Commission shall consider whether forbearance from enforcing the provision or regulation will promote competitive market conditions, including the extent to which such forbearance will enhance co33mpetition among providers of telecommunications services. If the Commission determines that such forbearance will promote competition among providers of telecommunications services, that determination may be the basis for a Commission finding that forbearance is in the public interest.

(c) PETITION FOR FORBEARANCE- Any telecommunications carrier, or class of telecommunications carriers, may submit a petition to the Commission requesting that the Commission exercise the authority granted under this section with respect to that carrier or those carriers, or any service offered by that carrier or carriers.

(d) LIMITATION- Except as provided in section 251(f), the Commission may not forbear from applying the requirements of section 251(c) or 271 under subsection (a) of this section until it determines that those requirements have been fully implemented.

(e) STATE ENFORCEMENT AFTER COMMISSION FORBEARANCE- A State commission may not continue to apply or enforce any provision of this Act that the Commission has determined to forbear from applying under subsection (a).'.

It is noteworthy that two of the three sources of flexibility are located outside of Title II, giving them broad applicability (much like ancillary authority). Section 706 addresses the entire Act. Section 10 is framed as an amendment to Title I, which applies to the telecommunications that are regulated under Title II. It is equally interesting to note that Section 254 explicitly reaches beyond Title II to include advanced telecommunications and information services, which typically lie outside of Title II.

The primary implication of this argument is that the legal ambiguity facing the Commission is, in several respects, now even greater than before the recent D.C. Appeals Court ruling. First, even if one argues that the Congress laid out a new approach to flexibility for the purpose of "reasonable deployment" of broadband, the legal terrain of the other purposes of the Act are unchanged.

Second, Congress took a different approach to universal service, so it is not directly covered in the Section 706 legal structure. The FCC could argue that it should fall under Section 706, but it would be best to make that argument after it has used its full power and authority

under Section 254. If it invokes Section 706 before it implements Section 254, the court could easily argue it is not ripe.

Third, the 1996 Act did not create an alternative legal structure that gets in the way of ancillary authority with respect to the other public service principles of the Act; consumer protection, public safety, and consumers with disabilities.

Making matters even more complex is the fact that the FCC could reclassify High-Speed Data Transmission as a telecommunications service. It could conclude that the information service classification was in error or that circumstances have changed to such an extent that the information service classification is no longer appropriate. Since the classification of high-speed data was upheld based on agency discretion, the agency can change its mind. The path to "reclassification" is marked by two recent legal signposts that need to be carefully interpreted.

First, the D.C. Appeals court discussion of the conditions under which the Commission can change its mind might apply to reclassification, but it should be noted that Section 706 (and Section 254) directly invite a continuous reevaluation of the terrain, so the Commission does not have to explain why it is asking questions in the first place. Reclassification requires the FCC to justify the entire exercise, which will lead to trouble if it invokes reasonable network deployment or universal service before it has explored the available alternatives.

Second, the fact that the original decision was upheld under the theory of agency discretion means that it can use discretion to reverse the decision. Flip-flopping to expand the Commission's authority, however, would likely be received very differently than using discretion to reduce its authority. Justice Scalia's dissent that complained about the extreme discretion being granted to the Commission signals the danger.[386]

DECISION MAKING IN THE FACE OF COMPLEX AMBIGUITY

The discussion in Part I established that the value of the virtuous cycle is virtually incalculable. Severe damage to the principle would be catastrophic. This section demonstrates that the Commission now faces complex ambiguity in the decision making environment. Prudence demands that, faced with tremendous uncertainty and outcomes that are incommensurable, the FCC adopt a precautionary principle to prevent the catastrophe, i.e. damage to the virtuous cycle.[387]

Given two decades of complex ambiguity in this space, it is a mistake to think that any one of the sources of power and authority is enough. A better approach would recognize and adapt to the new legal terrain, keep options open, seek to quickly implement new rules and place only a specific set of assets at risk. This will not only keep options open but advance the principle of building resilience through redundancy and diversity of authority and power.

VIII. PORTFOLIO ANALYSIS OF COMPLEX AMBIGUITY

A. Framework

How does one make effective decisions in an environment where the occurrence (probability) and impact (outcomes) of significant events, actions, or policies are unpredictable or unknown? As shown in Exhibit VII-1, the analysis starts from the premise that decision makers are confronted with two dimensions of knowledge that create ambiguity. In my framework ambiguity arises where the decision maker lacks knowledge about both probabilities and outcomes. Complexity arises where ambiguity affects more than one dimension of the action or decision. The two sources of ambiguity create four regions of knowledge: risk, uncertainty, vagueness, and the unknown. Decision makers will encounter different problems and challenges in each of the regions.

The modern underpinnings of this analysis go back almost one hundred years to the Knightian/Keynsian discussion, which first distinguished uncertainty from risk. In the past half century, and particularly the past two decades, the effort to map the terrain of knowledge to improve decision making has received a great deal of attention in fields as diverse as financial portfolio analysis, project management, technology risk assessment, Black Swan Theory, military strategy, and space exploration. Appendix B presents an account of the derivation of the framework from these literatures. Here I summarize the practical advice that one can extract from these literatures.

Risk - hedging to increase rewards: In some circumstances the decision maker can clearly describe the outcomes and attach probabilities to them. Risk analysis allows the decision maker to spread and hedge risk by creating a portfolio that balances more and less risky assets, particularly ones whose variations are uncorrelated.

EXHIBIT VIII-1: AMBIGUITY DEFINED BY FOUR REGIONS OF KNOWLEDGE

The Regions of Knowledge

Knowledge About Probabilities of Outcomes

Vagueness: The decision maker may not be able to clearly identify the outcomes, but knows that the system will fluctuate.	**Risk:** The decision maker can clearly describe the outcomes and attach probabilities to them.
Unknowns: In the most challenging situation, knowledge of the nature of the outcomes and the probabilities is limited.	**Uncertainty:** The decision maker can clearly describe the outcomes but cannot attach probabilities to them.

Knowledge about Nature of Outcomes

Strategic Sequencing of Decisions Based on the Map of the Terrain of Knowledge

Risk — **Hedge to the edge of flexibility**

Real Options — **Choose sequences of hedges to preserve options**

Vagueness — **Identify Long term paths that minimize expected costs/maximize value**

The Unknown — **Value diversity, prefer options that support multiple assets and add system robustness**

Actions in the Regions

Region of Knowledge	Challenge Outcome	Probability	Strategy	Action
Risk	Known	Known	Hedge	Identify the trade-offs between cost and risk. Spread and hedge to lower portfolio risk by acquiring assets that are uncorrelated (do not overlap).
Uncertainty	Known	Unknown	Real Options	Buy time to reduce exposure to uncertainty by hedging to the edge of flexibility and by choosing sequences of hedges that preserve the most options. Acquire small assets with short lead times and exit opportunities
Vagueness	Unknown	Known	Fuzzy Logic	Avoid long-term paths that are least controllable. Minimize surprises by avoiding assets that have unknown or uncontrollable effects. Create systems that can monitor conditions and adapt to change to maintain system performance.
Unknowns	Unknown	Unknown	Diversity & Insurance	Buy insurance where possible, recognizing that diversity is the best insurance. Build resilience with diversified assets by increasing variety, balance and disparity of assets. Fail small and early. Avoid relying on low probability positive outcomes and betting against catastrophic negative outcomes.

Uncertainty - real options to buy time: In some circumstances the decision maker can clearly describe the outcomes but cannot attach probabilities to them. Here, the decision maker would like to keep options open by not deciding if the wait to decide can yield more information that leads to better decisions. If the decision maker cannot wait then the path chosen should be flexible so that it affords the opportunity to deal with the outcomes that occur.

Vagueness – fuzzy logic to adapt to uncontrollable outcomes: In yet another circumstance, decision makers understand that the system will fluctuate but may not be able to clearly identify outcomes. Here, the decision maker wants to avoid areas of vagueness. If vagueness cannot be avoided, the decision maker should take an approach that can monitor the condition of the system and adapt as it changes.

The Region of Unknowns – insurance and diversity to avoid or survive surprises: In the most challenging situation, knowledge of the outcomes and probabilities is limited. But even in this state of ignorance, decision makers have strategies and policies to insulate the system. The analyst must look deeper inward to the characteristics of the system and identify those that are most important. The decision maker seeks to build robust systems that ensure critical internal functions are performed adequately and system viability is maintained under the most trying of circumstances.

Unlike financial markets, where assets tend to be highly liquid, deploying technology resources and making regulatory decisions is typically lumpy and illiquid. So additional advice about the sequencing of decisions should be derived from theories of decision making in complex, ambiguous situations.

Hedging against risk is the obvious cornerstone of portfolio building, but it turns out that risk is the easiest knowledge to navigate. Responding to uncertainty, real option analysis informs the decision maker about which hedges to buy first. Assessing vagueness helps identify pathways or longer-term sequences of choices to pursue that would avoid uncontrollable effects. The general advice in the region of the unknowns is to pursue diversity as a source of robustness. This is reinforced by the observation that assets and policies which support multiple technologies, contribute to system robustness, or can be shared are particularly attractive.

Decision makers should examine preferred alternatives based on risk, vagueness, and uncertainty to uncover evidence of surprises that may be lurking beyond the area where the analysis has shed light. Ensuring that the system is functional (i.e. has sufficient resources) is paramount. When analyzing sufficiency, time is of the essence. Long-term predictions are extremely ambiguous. Flexibility requires that options are kept open as long as possible. The time frame for making incremental decisions should only be as long as the longest lead time of the options being considered. If there are preferable options with shorter lead times they should be chosen as long as they achieve system sufficiency, since there will be adequate time to bring inferior options online later if preferable options are exhausted.

Unintended consequences are important to consider. One common unintended consequence is inconsistency in recommendations from the other three regions.

Beyond the existence of an incommensurable outcome and uncertainty, the communications sector exhibits several characteristics that make it a particularly good environment for decision makers to apply an approach that endeavors to directly deal with complex ambiguity.

- It is a recursive, scalable infrastructure network that is critical to a broad range of activities in society.
- As a result, reliability, interconnection, interoperability, ubiquity, and affordability are highly desirable attributes that are the goals of public policy.
- The communications sector is not only increasingly central to the economy but has the unique characteristic of being central to the polity, since it is the primary vehicle for speech. This increases the complexity that decision makers face.
- Regulators are under a great deal of pressure due to the tension between a desire to rely on market competition and the need to preserve the network attributes deemed to be vital, particularly in the transition from traditional regulation to a much lighter regulatory regime.
- It has undergone recent dramatic changes that disturb the basic economics of the sector.
- It has undergone recent dramatic changes that disturb the basic legal structure of the sector.

The increasingly interconnected, recursive, scalable nature of the digital age creates the conditions under which complex ambiguity confronts decision makers with increasing frequency and force. The transformation of society by digital communications systems requires a new approach to decision making that is better able to deal directly with increasingly complex ambiguity. Widespread recognition and adoption of this approach by society suggests that policy makers should have confidence in its prudence.

B. Portfolio Analysis of Options to Protect the Virtuous Cycle

The analytic framework helps to organize knowledge about the situation the FCC faces and select the actions that give it the best chance of achieving its goals. It is a tool that requires two critical steps before it can be applied, steps I have provided in the earlier analysis.

- In order to navigate, you must know where you want to go (Part I). The framework does not define goals.
- In order to navigate, you must have information about the terrain that is to be traversed. The framework only illuminates the terrain, it does not create it.

New law requires new practice and norms. The authority and power of the FCC under Sections 702, 254, and Section 10 will evolve under the 1996 Act, much as ancillary authority evolved under the 1934 Act. The complex ambiguity of the legal terrain means the Commission has options and must chart a course that maximizes its ability to achieve the goals of the Act.

Reviewing the history of these issues from the point of view of universal service goals, we can identify a complex set of interrelated questions that must be answered to give the Commission maximum capability (legal power) to achieve the goals (see Exhibit VIII-2). The situation facing the Commission easily qualifies as one of complex ambiguity. It must win both authority and power by demonstrating why and how it needs to exercise authority over specific actors. It must make these showings for each of the purposes of the Act.

Exhibit VIII-2: Complex Ambiguity in FCC Authority

Source of Authority	**Regulatory Reach (Effectiveness)**			**Prospect of Denial of Authority/Power**	
	Why	Who & What	How	Authority	Power
Title I ancillary	Accomplish general purposes of the Act	Information providers	Regulation has a nexus to Title II authority	Bleak (two losses) '96 Act may limit	Difficult (non-common carrier rule may apply)
Section 706	Inadequate or unreasonable deployment	Anyone	Anything that has a nexus to deployment finding, but is not core common carrier-like rule	Clear	Unclear (narrow non-common carrier rule)
Title II	Meets Common Carrier definition	Common carrier	Title II regulations for which the Commission has not chosen to forbear	Difficult (change of mind)	Clear w/ authority '96 Act may limit
Section 254	Meets universal service definition	Telecom or Information service providers	Eligible Telecommunications Carrier (ETC) rules perhaps others	Unclear	Clear w/ authority

The choice of which authority to invoke requires an examination of three key constraints on authority: the need to justify its exercise, the scope of its reach in terms of who will be regulated, and the nature of the tools of regulation the Commission will have at its disposal. The court cases make it clear that those constraints deeply affect the ability to use authority to achieve the goal. Exhibit VII-3 evaluates four potential sources of authority to enable the FCC to achieve the goal of a Broadband Network Compact.

One should also consider the prospects of prevailing in the claims of authority and power. An approach that has little chance of being upheld despite being attractive from the perspective of why, who, and how to regulate may be inferior to an approach that is less attractive in terms of authority and power but has a much higher probability of being upheld. Portfolio analysis is based not only on the calculation of expected payoffs (probability of success x value of outcome), but more importantly on combining assets to achieve the maximum expected outcome from a portfolio by balancing risk and reward and the correlation between the risks.

Exhibit VIII-3 presents my evaluation of the current lay of the land in terms of power and authority. Needless to say, the nooks and crannies of the new legal terrain are going to be explored in excruciating detail over the near future. My goal at present is to map out the major features of the terrain so that the largest obstacles can be negotiated.

Exhibit VIII-3: The New Terrain of Legal Authority & Power Under the 1996 Act

		AUTHORITY		
		Weak	**Unclear**	**Strong**
P O W	**Weak**	**Ancillary Authority (Cabined by the 1996 Act)**		**706 Transparency (weak but could be stronger)**
E R	**Unclear**		**Title II with forbearance (Hard to get, has limitations)**	**706 Network Management (power undefined)**
	Strong			**254 Universal service (Yet to be decided, but Significant potential)**

Handicapping court rulings on authority and/or power in the current environment involves unknown unknowns. Pointing to that region of the terrain of knowledge may have gotten Secretary of Defense Rumsfeld in trouble, but it aptly describes the fog of war and the current legal and judicial terrain of decision making that the FCC confronts. While the decision maker should be attuned to the possibility of big positive surprises, the one thing that should be avoided is unnecessary exposure to catastrophic negative surprises.

> Simply put, don't get yourself in the Fourth Quadrant (Unknown/Unknowns)… the most obvious way to exit the Fourth quadrant is by "truncating," cutting certain exposures by purchasing insurance, when available… Avoid Optimization; learn to love redundancy… one can buy insurance, or construct it, to robustify a portfolio… Avoid prediction of small-probability pay offs.[388]

In Exhibit VIII-4 I evaluate the outcomes and prospects for each of the policy implementations to achieve the goals of the Act. The graph in Exhibit VIII-4 locates each of the major options, with reward defined as the effectiveness of the power to implement the element of the network compact. Effectiveness is the ability of power that has been authorized to achieve the goal. Risk of failure is the likelihood of being upheld on both authority and power. I provide the primary cause of the location as defined by the negative rating (i.e. low effectiveness or high risk of failure). I identify the strategic action for each in bold. Each approach has a different value.

This analysis indicates that the FCC needs a nuanced, multi-pronged strategy. Applying the principles of strategic decision making to the terrain on which the FCC treads, I conclude that the prudent strategy should:

- Assert the FCC's independent authority and see it explore the powers it has under several of the key, new Sections of the 1996 Act to create a robust portfolio of tools to pursue the core goals of the Communications Act.
- Maximize the power of transparency under Section 706 to promote competition and provide consumer protection.
- Develop regulation of reasonable network management to the greatest extent possible under Section 706.

- Implement effective universal service mechanisms under Section 254.
- Explore Title II with forbearance (Section 10) for those goals of the Act that cannot be accomplished under the authorities and powers of Sections 706 and 254, particularly for public safety, privacy, consumer protection, and consumers with disabilities.

Exhibit VIII-4: Strategic Response to Ambiguity of Power and Authority

Legal Basis	Effectiveness of Authority	Power	Strategy/Action
Title I			
Section 706			
Transparency	High	Low	Strengthen remedy
Network Management	New, unclear	Constrained	Test limits of power
Ancillary Authority	Rejected by D.C. court	Shrunk by '96 Act	Give it a rest, examine potential for areas where
Title II goals impacted	Requires mind changing	High, but limited by '96 Act	Pursue for primary goals fill gaps left by 706
Universal Service			
Consumers with disabilities		Potentially high	
Consumer protection			
Competition			
Gaps in Network management Left by 706			

C. Evaluating Prospects of Successfully Exercising Authority

1. Ancillary Authority

Efforts to develop the new tools in the Act have the highest probability of success because they are most likely to be seen as implementing the will of Congress as interpreted by the courts. Title I ancillary authority is now the least promising of the strategies for network neutrality. The basic conditions for an ancillary authority argument may still be strong, but the law has changed. The prospects for Title I ancillary authority have been dramatically reduced by two defeats at the Appeals Court level and the strong argument made for Section 706 by the court. In this view, Section 706 is an important part of a new Congressional approach to affording the FCC broad powers to develop tools to achieve the goals of the act. Congress gave a specific grant of authority to the Commission in the case where the most important goals (adequate facilities recast as reasonable and timely deployment) are not being achieved. The biggest mistake made in reclassification may have been the assumption that ancillary authority existed. Ancillary authority may fare better for the other goals of the Act that are not addressed by the new approach to flexibility.

2. Section 254

It is worth pursuing with great vigor the question of whether Section 254 provides an independent grant of authority to pursue policies that "make available to all Americana" both "advanced telecommunications and information services." It not only keeps options open, but advances the principle of building resilience through redundancy and diversity of authority and power. Given two decades of complex ambiguity in this space, it is a mistake to think that any

one of these sources of power and authority is enough. It can be argued that universal service could comfortably reside under all three authorities and, given its importance in the Act, should. Title II classification affords access to the traditional common carrier powers, Section 254 affords the ability to address information services, and Section 706 provides a range of regulatory approaches not available under Title II or Section 254.

3. Section 706

Section 706's authority to impose transparency requirements has been upheld. While this is not viewed as very effective, it certainly could play an important role. The first FCC action to enforce non-discrimination after the information service classification was initiated by a third party discovery of discriminatory behavior that was taken up by the mass media and evolved into an official complaint. The FCC's Open Internet Order includes measures to rapidly deal with complaints from the public. Crowdsourcing enforcement and mobilizing public opinion could have a significant impact on High-Speed Data Transmission service providers.[389] The Commission could beef these processes up, demand rigorous transparency, and encourage public involvement. Augmenting the transparency function creates diversity within the portfolio since it is a unique source of power.

Developing multiple sources of authority is a key strategy. It creates robustness. I consider Sections 706 and 254 to be closer to the efficient frontier because they represent new authority that has yet to be developed. The limitation that the court placed on the power that can be exercised pursuant to 706 authority is unclear, however (a new source of ambiguity). The Court's reasoning that the FCC cannot use the regulatory authority conferred by Section 706 in any way that resembles common carriage is "new" law. The FCC can seek to overturn it on appeal or explore what it means with a new order that attempts to implement it. The latter is a superior strategy; testing the limits of "new" law with concrete rules keeps the option open to appeal later while seeking to secure as much power as possible. Moreover, the constraints placed on Section 706 power for purposes of network management need not apply to Section 254, since 254 has an independent basis of authority within Title II.

4. The Option of Reclassifying Broadband as a Telecommunications Service

It can be argued that the ongoing legal conflict over network neutrality was triggered by the decision to classify broadband as an information service. This was not seen as undermining the Commission's ancillary authority to regulate network practices at the time, but for several reasons the solution is not to "just reclassify."

First, the controversy antedates that decision in the form of the open access debates of the late 1990s. It is also much wider than classification since Section 706 applies no matter how it is classified.

Second, given our experience since the passage of the 1996 Act, it is a mistake to claim that reclassifying high-speed data transmission as a telecommunications service is easy or likely to succeed. Title II now involves not only a change of mind, but a new classification of data transmission, which was never classified as a Title II telecommunications service. The fact that it is perceived as having a high value should not cloud the independent judgment of its prospects.

Third, there remains the distinct possibility that it would have less value than is generally assumed because of the past flexibility in Title II and the weakening of Title II by the 1996 Act. As discussed above, Title II relies on ambiguous terms like 'not unjust,' 'unreasonable' and 'unduly discriminatory.'

Fourth and perhaps most importantly, the general approach to utility-common carrier regulation is challenging from the point of view of the Internet innovation system and the virtuous cycle. Utility-common carrier (Title II) regulation is about homogeneity and stability. It thrives in static environments and, inevitably, reinforces the stasis of the environment because it operates best by creating silos with categories of producers and consumers, definitions of acceptable behavior, and permissions required to act. These service category "do's don'ts" are hashed out in administrative proceedings and court cases that can span years or even decades. The cost of delay can be ignored because the sector is so static.

Digital communications networks are the antithesis of common carrier telecommunications networks. They thrive on diversity and prosper only where dynamic change is the key to success. The essence of utility regulation is antithetical to the experimentation, innovation and entrepreneurship that has been the hallmark of the digital economy. In a dynamic environment, the costs of delay and the value of lost services – innovation that is never brought to market – are severe. Greenstein's description of how experimentation worked makes this point clear, *because nothing precluded this unanticipated use from growing, grow it did… The growing use of Wi-Fi raised numerous unexpected technical issues about interference, privacy, and rights to signals. Nevertheless, they did not slow Wi-Fi's growing popularity?*

In the utility-common carrier approach everything is precluded until it is permitted and problems immediately end up at the Commission for adjudication. "Brutally simple" bright lines that opened the way to entrepreneurial behavior are what worked in the past, not detailed regulation of behavior.

Nevertheless, preserving the option of Title II can be an important strategic asset (threat) to energize the Title II proceeding on the basis of the Commission trying to achieve the goals of the Act under the court ruling as best it can. Ultimately, the Commission may have to invoke Title II selectively (with forbearance) or reverse the information service classification of high-speed data transmission in order to effectively pursue the goals of the Act. This adds significantly to the policy portfolio. The argument will be easier to make after all the other avenues have been exhausted. It will also be more compelling to make these arguments when all of the Title II authorities and powers affected by the information service classification are in play.

Thus, this analysis also suggests why the use of Title II authority should be selective and targeted. The Communications Act gives it the flexibility to do so in the form of regulatory forbearance (Section 10). This does not mean the "bright line" cannot be drawn, it means they must be carefully drawn. The FCC needs to implement the substance of process for network neutrality that fits the economic reality of the digital economy.

THE LEGAL FOUNDATION FOR PUBLIC SERVICE PRINCIPLES TO GOVERN THE DIGITAL COMMUNICATIONS NETWORK

This section shows that the FCC has the tools to maintain and advance the public service principles of the communications network as it transitions from 20th century time-division multiplexing ("TDM") switching facilities to 21st century Internet protocol ("IP") switching facilities. Its ability to maintain and advance these principles has been made more difficult by an initial decision that appears to have placed its authority to implement the Communications Act for advanced telecommunications services in doubt, but that is a reversible error.[390]

The FCC ended up in the wrong place because it took the wrong approach to a narrow consideration of only one of the public service obligations of telecommunications carriers. Consideration of the full range of issues and the full body of evidence demonstrates that there is strong legal, historical, policy, technological, and economic evidence to support the classification of high-speed data transmission as a telecommunications service. Thus, when considering the full range of policy issues raised by the petitions to sunset the PSTN, classifying high-speed data transmission would not be a matter of "reclassifying" high-speed data transmission as a telecommunications service; it is more a correction of its partial misclassification as an information service.

III. ADVANCED TELECOMMUNICATIONS SERVICES ARE TELECOMMUNICATIONS SERVICES THAT ARE GOVERNED BY THE PUBLIC SERVICE PRINCIPLES OF THE ACT

As noted above, the goals of the Communications Act of 1934, referred to as the public service principles or public interest obligations of telecommunications carriers include integration (nondiscriminatory interconnection and carriage), universal service, public safety, access for people with disabilities, consumer protection, and protection of consumer privacy. The goals are stated in the first sentence of the Communications Act and the statute links those goals directly to the tools for achieving them, which are laid out in Titles II and III. In these subsequent Titles, Congress not only defined the public interest goals with precision, it also identified the specific tools and procedures that the Commission should use to accomplish them. The Telecommunications Act of 1996 reaffirmed the commitment to these goals and strengthened them in several ways.

AT&T's petition to sunset the PSTN reveals the fundamental flaw in the approach taken by the FCC to the definition of services since the passage of the Telecommunications Act of 1996. In updating the Communications Act of 1934, Congress embraced the framing of the definition of services and the approach to regulation that had been developed by the FCC and the courts over the previous quarter of a century. Congress explicitly intended for the public service principles to apply to the evolving telecommunications environment by defining telecommunications services, "regardless of the facilities used" to deliver service to the public.[391]

In affirming and expanding the commitment to universal service, Congress stated that "the Joint Board and the Commission shall base policies for the preservation and advancement of universals service on the following principles."[392] Among these was access to advanced telecommunications and information services.[393] The definitions clause of the Universal Service section declares that "[u]niversal service is an evolving level of telecommunications services that the Commission shall establish periodically under this section, taking into account advances in telecommunications and information technologies and services."[394] The next section, entitled "Access by persons with disabilities," was tied to this definition of telecommunications services.

The close fit between the language of the statue and the underlying technology led the court in the initial test of the definition of telecommunications service applied to cable modem service to conclude that, as a matter of law and policy, high-speed data transmission is clearly a telecommunications service, stating:

> Among its broad reforms, the Telecommunications Act of 1996 enacted a competitive principle embodied by the dual duties of nondiscrimination and interconnection. See 47 U.S.C. § 201 (a)… § 251 (1) (1)… Together, these provisions mandate a network architecture that prioritizes consumer choice, demonstrated by vigorous competition among telecommunications carriers. As applied to the Internet, Portland calls it "open access," while AT&T dysphemizes it as "forced access." Under the Communications Act, this principle of telecommunication common carriage governs cable broadband as it does other means of Internet transmission such as telephone service and DSL, "regardless of the facilities used." 47 U.S.C. § 153(46). The Internet's protocols themselves manifest a related principle called "end-to-end": control lies at the ends of the network where the users are, leaving a simple network that is neutral with respect to the data it transmits, like any common carrier. On this the role of the Internet, the codes of the legislator and the programmer agree.[395]

A. Providing for Forbearance from Regulation

The Telecommunications Act allowed the Commission to forebear from applying specific rules in specific circumstances, if it found that those rules were no longer "necessary in the public interest" to accomplish the goals of the Act.[396] It never contemplated that the Commission would give up its authority to adopt policies to achieve the goals. Yet that is exactly what has happened because the Commission mishandled the distinction between information services and the telecommunications facilities that communications carriers use to deliver those services "to the public for a fee."[397]

In outlining the conditions under which the FCC could forbear from regulation, Congress was precise and identified the public service principles as touchstones. The statute requires the Commission to ensure that key public service principles will be protected. It invokes the key nondiscrimination and consumer protection language from section 201, as well as a broader concern about consumer protection, as the following language from the statue makes clear:

> (a) REGULATORY FLEXIBILITY- Notwithstanding section 332(c)(1)(A) of this Act, the Commission shall forbear from applying any regulation or any provision of this Act to a telecommunications carrier or telecommunications service, or class of telecommunications carriers or telecommunications services, in any or some of its or their geographic markets, if the Commission determines that--

> (1) enforcement of such regulation or provision is not necessary to ensure that the charges, practices, classifications, or regulations by, for, or in connection with that telecommunications carrier or telecommunications service are just and reasonable and are not unjustly or unreasonably discriminatory;
> (2) enforcement of such regulation or provision is not necessary for the protection of consumers; and
> (3) forbearance from applying such provision or regulation is consistent with the public interest.
> (b) COMPETITIVE EFFECT TO BE WEIGHED- In making the determination under subsection (a)(3), the Commission shall consider whether forbearance from enforcing the provision or regulation will promote competitive market conditions, including the extent to which such forbearance will enhance competition among providers of telecommunications services. If the Commission determines that such forbearance will promote competition among providers of telecommunications services, that determination may be the basis for a Commission finding that forbearance is in the public interest.
> (d) LIMITATION- Except as provided in section 251(f), the Commission may not forbear from applying the requirements of section 251(c) or 271 under subsection (a) of this section.[398]

This framing very carefully and explicitly separates the public service principles from the competitive aspirations of the Act. Subsection (b) allows the promotion of competition to meet subsection (a)(3), but subsections (a)(1) and (a)(2) must also be met. Moreover, there are some provisions that are not subject to forbearance.

B. THE TORTUOUS ROUTE TO MISCLASSIFICATION OF HIGH-SPEED DATA TRANSMISSION

The strong continuity of the 1996 Act and the regulatory framework that had developed over the quarter century before the amendments to the 1934 Act were adopted provides an important context for the tortuous route that the FCC took to the misclassification of high-speed data transmission as an information service. As shown in Exhibit III-1, the classification of mass market, high-speed data transmission service has been up in the air for over a decade.

To begin with, the definition of high-speed data transmission service as an information service rested on a theory of "contamination," *i.e.*, that the combination of telecommunications and information services in a "bundle" turns the whole bundle into an information service. This was a reversal of long-standing Commission policy and the regulatory structure that provided the model for the 1996 Act.[399] Previously, the presence of telecommunications in the bundle created a telecommunications service.

The issue was first litigated before the Ninth Circuit Court of Appeals in 1999, in *Portland v. AT&T*, when Portland attempted to impose conditions of nondiscrimination on cable modem service. The court concluded that the underlying service was a telecommunications service, which should be subject to the nondiscrimination provisions of the Act.

Exhibit III- 1: The History of a Close Call, The Regulatory and Judicial Treatment of Mass-Market, High-speed Data Transmission SERVICE HAS Been up in the Air for Over a Decade

Year	Event	Implications for Current Classification Review
1998	Stevens Report	Ambiguous on Classification
1998	Public Interest Groups Petition for Title II Classification	Need for Nondiscrimination demonstrated
2000	*Portland v. AT&T Cable*: 9th Circuit Court of Appeals finds cable modem service involves telecommunications is subject to Title II	Title II Classification asserted
2000	FTC imposes commercial access condition on AOL-Time Warner	Concern about bottleneck provider expressed
2002	FCC issues Cable Modem Declaratory Order classifying Cable	Need to address Communications Act principles affirmed
2003	*Brand X v. FCC* – 9th Circuit Court of Appeals affirms its *Portland v. AT&T* and overturns Cable Modem order	Information Service rejected; telecommunications affirmed
2004	Chairman Powell declares Four Internet Freedoms	Importance of Non-discrimination, Consumer protection affirmed
2005	FCC uses Title II authority to investigate undue discrimination by Madison River	Importance of Non-discrimination affirmed
2005	Supreme Court reverses 9th Circuit (6-3) on procedural grounds and upholds FCC information service classification	Information service upheld, Justices debate Title I authority
2005	FCC extends the Information service definition to mass market, high-speed data transmission services offered by telephone companies.	Title I authority claimed; Need to address Communications Act principles affirmed
2005	FCC turns Four Internet Freedoms into a policy statement	Importance of Non-discrimination, Consumer protection affirmed
2006	AT&T agrees to network neutrality Bell South merger condition	Ability to distinguish service demonstrated
2007	FCC finds Comcast illegally discriminated against peer-to-peer applications.	Need for non-discrimination affirmed Technical ability to offer separate services demonstrated
2010	Open Internet Proceeding initiated	Need for Non-discrimination stated, Title I authority asserted
2010	National Broadband Plan	Importance of Communications Act principles affirmed Failure to achieve Communications Act goals documented
2010	D.C. Appeals Court overturns FCC action against Comcast	Title I authority questioned
2010	Broadband Internet Access Notice of Inquiry	Recognizes important of all Communications Act principles Documents failure to achieve goals of the Act.

Later that year, the Federal Trade Commission imposed open access requirements on Time Warner as a condition of approving the AOL-Time Warner merger.

In 2002, the FCC issued it Cable Modem declaratory ruling, which declared it an information service, in contradiction to the Ninth Circuit decision.

Brand X, a small, non-facilities based Internet Service Provider (ISP), appealed the decision to the Ninth Circuit, which affirmed its earlier conclusion, that the high-speed data transmission is a telecommunications component of the service.

While the Supreme Court review of *Brand X v. AT&T* was pending, the FCC engaged in two acts that seemed intended to quiet fears that classifying high-speed data transmission would undermine the principle of nondiscrimination in telecommunications.

First, Chairman Michael Powell, a vigorous defender of the information service classification, declared that there were four Internet freedoms that should be preserved. They cover several of the public service principles, including integration (ability to connect devices, access content and use applications) and consumer protection (obtaining service plan information).[400] These were later turned into a policy statement of the Commission[401] and were proposed as part of a new Open Internet rule. Second, the FCC brought an enforcement action against a small telephone company for blocking VOIP, an Internet application that competed with its voice service. In the consent decree, Title II authority was invoked twice—section 201 (a) in the introduction and section 208 in the body of the consent decree. In other words, three weeks before the oral argument in the *Brand X* case and less than four months before the ruling, the FCC was using its Title II authority to prevent undue discrimination in access to the telecommunications network. Two years later, the FCC found that a cable operator had violated the nondiscrimination policy of the Commission.

A split (6-3) Supreme Court reversed the Ninth Circuit and upheld the FCC's definition of high-speed data transmission as an information service, based on purely procedural grounds, concluding the agency should be afforded *Chevron* deference in an ambiguous situation.

The reversal of the Ninth Circuit ruling was even a closer call than the math indicates. In his concurrence Justice Breyer emphasized the closeness of the decision saying, "I join the Court's opinion because I believe that the FCC's decision falls within the scope of its statutorily delegated authority—though perhaps just barely."[402]

The dialogue between the Justices foreshadowed the controversy that continues to this day. While defending agency discretion, Justice Breyer went on to point out that agency discretion might not apply in cases where "Congress may have intended not to leave the matter of a particular interpretation up to the agency, irrespective of the procedure the agency uses to arrive at that interpretation, say, where an unusually basic legal question is at issue."[403] In a second concurrence Justice Stevens pointed out that overturning an Appeals Court for second-guessing the agency "would not necessarily be applicable to a decision by this Court that would presumably remove any pre-existing ambiguity."[404] Substance trumps process. If the Court's interpretation of a law clears up the ambiguity in a way that supported the Appeals court, it

would not be bound to overturn the Appeals Court on procedural grounds. The nature of the underlying law and the nature and the extent of the ambiguity are critical considerations.

Scalia's dissent argued the substance and reached a conclusion that supported the Ninth Circuit. "After all is said and done, after all the regulatory cant has been translated, and the smoke of agency expertise blown away, it remains perfectly clear that someone who sells cable-modem service is 'offering' telecommunications. For that simple reason… I would affirm the Court of Appeals."[405] Most telling, however, was the exchange between Scalia and Thomas, first at oral argument and then in Scalia's dissent. He took special issue with the suggestion by the FCC and the majority that Title I authority could be used to replace the Title II authority that had been abandoned with the decision to classify the service as a Title I service.

> In other words, what the Commission hath given, the Commission may well take away–unless it doesn't. This is a wonderful illustration of how an experienced agency can (with some assistance from credulous courts) turn statutory constraints into bureaucratic discretions. The main source of the Commission's regulatory authority over common carriers is Title II, but the Commission has rendered that inapplicable in this instance by concluding that the definition of "telecommunications service" is ambiguous and does not (in its current view) apply to cable-modem service. It contemplates, however, altering that (unnecessary) outcome, not by changing the law (i.e., its construction of the Title II definitions), but by reserving the right to change the facts. Under its undefined and sparingly used "ancillary" powers, the Commission might conclude that it can order cable companies to "unbundle" the telecommunications component of cable-modem service. And presto, Title II will then apply to them, because they will finally be "offering" telecommunications service! Of course, the Commission will still have the statutory power to forbear from regulating them under section 160 (which it has already tentatively concluded it would do). Such Möbius-strip reasoning mocks the principle that the statute constrains the agency in any meaningful way.[406]

The decision to classify mass market, high-speed service as an information service was premature, based on a very short period of experience with service. Both of the orders that classified mass market, high-speed data transmission service presumed that the FCC had adequate authority,[407] ancillary to it general authority under Title I of the Act to implement the policies necessary to carry out the purposes of the Act and both orders affirmed that policy was necessary,[408] although they devoted almost no attention to those policies.

At every key point in the regulatory and judicial process, the FCC asserted that it needed and had the authority to implement policies to promote the Communications Act goals under both Title I and Title II. The assumption repeatedly made by the Commission, that it would be able to exercise substantial "ancillary" authority under Title I to accomplish the goals provided for in Titles II and III has also now been called into question.

The National Broadband Plan affirmed the urgent need for policy, which the D.C. Circuit Court decision calls into question by threatening the agency's authority. At the same time, the technological and economic assumptions on which the information service classification rested no longer apply, if ever they did.

Because those proceedings involved only one of the many important public obligations in Title II, the Commission never thoroughly vetted the full range of implications of the definitional

exercise for universal service, public safety, and consumer protection; not to mention innovation at the edge. It recognized that there could be important implications of its actions and launched proceedings to consider them, but it implemented the definitions without ever completing those inquiries. With the AT&T petition to sunset the PSTN and Verizon's unilateral decision to abandon it, the Commission is forced to confront all of the implications of its actions that it never addressed in classifying high-speed data transmission as an information service.

When the full range of public service principles and the explicit language of the Act are considered, classification of high-speed data transmission is consistent with the long-standing practice and with the intent of Congress. It clears up ambiguity introduced by the FCC, not the underlying statutory language.

Exhibit III-2 summarizes the approach that could be taken to argue that the classification of high speed data as an information service was premature, **based on a short period of experience with mass market, high speed data transmission. Subsequent developments remove the ambiguity and uncertainty surrounding some of the key** legal, technology, economic and policy issues A **full consideration of all of the issues indicates that a classification as a telecommunications service is superior.**

D. Misclassifying High-speed Data Transmission Makes it Difficult, if not Impossible, to address The Public Service Goals of the Act

Initial comments filed by Public Knowledge ("PK") in response to AT&T's PSTN petition add an important perspective by walking through the diverse ways in which VOIP has been handled by the Commission with respect to each of the principles (See Exhibit III-3). VOIP is a useful test case since its very name captures the key endpoints of the transitions from the preeminent service in the telephone age (voice) into the digital age (Internet Protocol).

Exhibit III-3 highlights two key aspects of the transition.

(1) The extension of the principles has been inconsistent.

(2) The legal authority on which the application of the principles to the IP space is tied to Title II justifications, but ancillary jurisdiction or the capability of a VOIP call to touch the PSTN, could well be eliminated if the FCC sunsets the PSTN.

Because the FCC erroneously classified high-speed data transmission as an information service, it struggled to execute its primary responsibilities to pursue the public service goals of the Act. The petition of AT&T and the action of Verizon in seeking to sunset the PSTN brings the flaw in the FCC classification of high-speed data into clear focus.

Exhibit III-2: Factors That Strongly Favor a Telecommunications/Title II Classification of High Speed Data Transmission

Factors causing change in non-discrimination/information service classification

Technology: Claim of technological integration was always dubious and separation of transmission and content has become more evident: Hundreds of carriers offer wholesale high speed data transmission service, functionalities are widely available from 3rd party services user patterns and company marketing indicate consumers and producers know the difference between transmission and service

Economics: Discriminatory practices repeatedly occur threatening competition in applications and content, Competition has failed to develop as predicted (e.g. broadband over powerline, satellite).

Law: Title II classification was supported by history at least as much as Title I. Title I authority had been used and it was assumed to be available to prevent undue discrimination and the other policy goals of the Act, but the Title I safety net has now been called into question.

Policy: The National Broadband Plan supersedes the Universal Service (Stevens) Report

Basis for concluding that the other Communications Act Principles support Title II telecommunications classification

Technology: There is no technological complexity that would allow the FCC discretion to alter or abandon these goals and authorities.

Economics: These goals have not been achieved and the increasing importance of high-speed data transmission makes them all the more important and urgent (per the National Broadband Plan).

Law: These issues were never addressed in the rulemakings or court proceedings that dealt with nondiscrimination. There is no legal ambiguity that would allow the FCC discretion to alter or abandon the clear language of the statute

Policy: The National Broadband Report establishes a firm evidentiary basis for immediate implementation of policies to accomplish these goals, but the uncertainty about FCC authority hampers its ability to do so. Weakening the tools available to achieve these goals would be contrary to clear Congressional intent.

Exhibit III-3: The Inconsistent Treatment of Voice Over Internet Protocol[409]

PUBLIC GOALS	VOIP TREATMENT	LEGAL AUTHORITY
Adequate Facilities		
Numbering	**Grandfathered, but new numbers must be be purchased from incumbents**	**Ancillary authority**
Reliability	**back up power**	
Universal Service		
USF	**Covered for purposes of revenue collection, Excluded for purposes of revenue disbursement**	**Ancillary authority, Capability of reaching the PSTN**
Disability	**Applies, Contribution to TRS required**	**Ancillary authority**
Public Safety	**E-911**	
Interconnection		
Duty	**NA**	
Numbering	**Applied**	**Ancillary Authority**
Consumer Protection	**Slamming, cramming rules do not apply although they could if enough complaints arise**	**Unclear**

Source; "Comments of Public Knowledge," ***In the Matter of Technological Transition of the Nation's Communications Infrastructure, Federal Communications Commission,*** **GN Docket No. 12-353, January 28, 2013**

E. SPLIT AUTHORITY

Consolidating the authority for all the public service principles under Title II is the simplest and most direct path to ensuring they apply to 21st century telecommunications services. It is not the only way that the end result could be achieved. The D.C. Circuit court might uphold the assertion of ancillary authority to govern network neutrality, which is the basis on which the Computer Inquiries always rested. The FCC could then assert authority to implement the other public service principles under Title II. T It is interesting to recall that the D.C. Appeals Court noted that the FCC's argument "places particular emphasis on the [Computer Inquiries]."[410] The D.C. Appeals Court ruling drew the roadmap.

> The crux of our decision in CCIA was that in its Computer II Order the Commission had linked its exercise of ancillary authority to its Title II responsibility over common carrier rates – just the kind of connection to statutory authority missing here… In other words, we viewed the Commission's Computer II Order—like the Supreme Court viewed the regulations at issue in Southwestern Cable—as regulation of service otherwise beyond the Commission's authority in order to prevent frustration of a regulatory scheme expressly authorized by the statute.[411]

The split basis for authority might seem odd, but that was the situation for over thirty years under the Computer Inquiries, which always rested on ancillary authority. Because the data flow covered by the Computer Inquiries did not intersect with the other public service principles, the conflict did not present itself forcefully. Responding to the D.C. Appeals Court ruling, the FCC has many provisions throughout the Act on which to rest either independent or ancillary

authority, including Sections 151, 152, 230, 201, 202, 251, 254, 256, 257, 301, 303, 304, 307,309, 316, 616, 628, and 706. The long list of candidates reflects the convergence of communications onto broadband. The expression triple play, so commonly applied to broadband services -- refers to voice, video and data. Voice and video (broadband and cable) are the services to which Titles II, III and VI apply. The FCC's ability to implement the Communications Act policies in the 21st century rests on its ability to exercise the many authorities Congress afforded it to guide the communications network toward the public service goals of the Act.

F. CONCLUSION

The Open Internet Order is an effort to set a range constraint on the behavior of network operators because their private interests are far from synonymous with the public good. At the same time, it is important to allow private interests to find efficient solutions to the challenging problems of resource demands that are expanding exponentially as a result of the virtuous cycle. The FCC has sought to strike a balance that looks very much like the successful implementation of rules that ensured access to networks and essential factors of production (spectrum) in the past but also refused to be drawn into the day-to-day regulation of the space it had created for experimentation and innovation.

The FCC can pursue all four of these options simultaneously by conducting different proceedings on different schedules. The idea that the FCC would have this split, even fragmented jurisdiction for different sections of the Act may seem odd, but that has always been a fact of life under the Act. Not only has the Congress given it different powers and authorities in different Titles, but the split basis for authority regarding network management was the situation for over thirty years under the Computer Inquiries, which rested on Title I ancillary authority applied to Title II common carriers. Jurisdictional inconsistency is the rule rather than the exception in the complex communications space. It also heads in an important system-building direction, since Sections 706 and 254 are systemic tools that cut across the key Titles and definitions of the Act. This is the "new" law that needs to be developed. Until the Commission tries to do so the courts will likely send it back to the drawing board.

Whatever one thinks about the legality of where the D.C. Court of Appeals has drawn the line between public (core common carrier) and private (negotiations), it makes perfectly good sense to be cognizant of the difference between the two and of the need to balance them in public policy. The court must exercise constraint to avoid undermining the FCC's ability to prevent private action that threatens the virtuous cycle.

It also makes very good sense to reject the view of Judge Silberman and the laissez faire capitalists who believe only market power matters and, worse still, policy action to ensure the openness of the communications network should be taken *ex poste* after sufficient harm has been done to create the basis for an antitrust case. The result of such an approach would be to strangle entrepreneurial experimentation and stifle innovation. Unfortunately, heavy-handed regulation can have exactly the same effect. The fact that the FCC is struggling to find the balance (and taking its time to do so) is a hopeful sign that progressive, democratic capitalism can evolve a set of institutions to support the digital mode of production.

It would be a luxury to hit the pause button and take time to reflect on these complex challenges, but the law does not allow it. The political process, reflected in instantaneous, critical caricatures, does not treat delay kindly. Decisions about appeal must be made quickly. Thus, one of the most important direction-setting decisions comes early. The Commission has chosen to explore the power it has under Section 706 while continuing to develop other regulatory approaches.

If the 1996 law were written differently, or the reclassification route (which is now over a decade old) had not been taken, the terrain would have been different and the best strategy might have changed in kind. The reality is the Commission must navigate the terrain on which it treads, not that of a squandered, alternate universe. The "all of the above" approach makes perfect sense for the FCC as it confronts the complex ambiguity that has typified the terrain of communications policy since the passage of the 1996 Act.

In an editorial, *The New York Times* opined on the decision to pursue Section 706, cautioning that, "Having failed twice to write rules acceptable to the appeals court, the F.C.C.'s credibility is at stake. It has to prove that its latest strategy can work."[412] It went on to claim that "reclassifying broadband… is more likely to survive a court challenge than using the F.C.C.'s power to promote broadband." While this is at odd with my interpretation, it is clear that reclassification is very far from a certainty. Under the conditions of complex ambiguity and an incommensurable outcome, a strategy that "can work" involves a sequence of choices that preserve options and layer outcomes, rather than simple binary choices.

PART III: SOCIAL OBLIGATIONS AND CHALLENGES FOR THE DOMINANT MEANS OF COMMUNICATIONS AND COMMERCE

THE SOCIAL RESPONSIBILITIES OF DOMINANT RESOURCE SYSTEMS

A. Social Policy Elements of the Quarter-life Crisis

1. A Framework for Analyzing Social Order

Ostrom and North identify four dimensions of the socio-ecological setting in which any specific institution/organization/resource system is embedded—technology, economy, socio-cultural, and the polity.

> It is the interaction between institutions and organizations that shapes the institutional evolution of an economy. If institutions are the rules of the game, organizations and their entrepreneurs are the players. Organizations are made up of groups of individuals bound together by some common purpose to achieve certain objectives. Organizations include political bodies (political parties, the Senate, a city council, regulatory bodies), economic bodies (firms, trade unions, family farms, cooperatives), social bodies (churches, clubs, athletic associations), educational bodies (schools, universities, vocational training centers). The organizations that come into existence will reflect the opportunities provided by the institutional matrix.[413] [A]n essential question we must ask is, who makes the rules and for whom and what are their objectives.[414]

The framework I use describes these domains as four realms of social order, as summarized in Table IV-1. It focuses the discussion on the institutional attributes that are central to new institutional analysis. The specific elements that constitute the framework were developed based on Lessig's discussion of Internet code, which argued that a social phenomenon, like the Internet and its governance, can be constrained by four "modalities of regulation" – architecture, the market, law, and norms.[415] The "modalities of regulation" all constrain action, but in different ways—actions can be permitted/promoted or banned/prohibited by different constraints. One critically important insight in Lessig's analysis is that the weights and importance of the "modalities of regulation" can be configured in different ways to achieve the same outcome.

I expanded and elaborated on the core concept of "modalities of regulation" to a broader view of society.[416] I argue that social order relies on the institutionalization of core functions in each of the realms. The purpose of institutions in each realm is to provide the function and realize a value that is important to society by incenting and constraining behavior, which reduces uncertainty and increases predictability in behavior that is enforced. The "modality of regulation" in each realm directs behavior toward the goal. Participants occupy roles configured in organizations that are constrained by norms and rules. I identified these realms of social order in an analysis of one of the key social values that was embraced during the quarter-life crisis of the communications sector of the 2nd industrial revolution – universal service, which is now referred to as digital inclusion.

2. The Social Goals of the Public Communications Network

The quarter-life crisis comes about when the activities made possible by an industrial revolution deeply affect the routines and values by which the social order is defined. It is a natural part of the maturation of the digital revolution that louder and louder calls for public obligations will be heard as it becomes the dominant means of communications and commerce. Figure IV-1 locates the primary issues that have been identified in the U.S (top graph) and raised in the ongoing international debate over Internet governance in relation to the four realms of social order. Generic issues are arrayed inside of the specific issues. The U.S. issues reflect

activities in which the Consumer Federation has been active. The middle graph is based on an analysis of the issues discussed in various meetings of groups formed by the Internet Governance Forum. The bottom graph summarizes the issues as perceived by leading analysts of Internet Governance in a major collection of papers published by the United Nations Information and Communication Technologies Task Force. The issues are similar in both contexts.

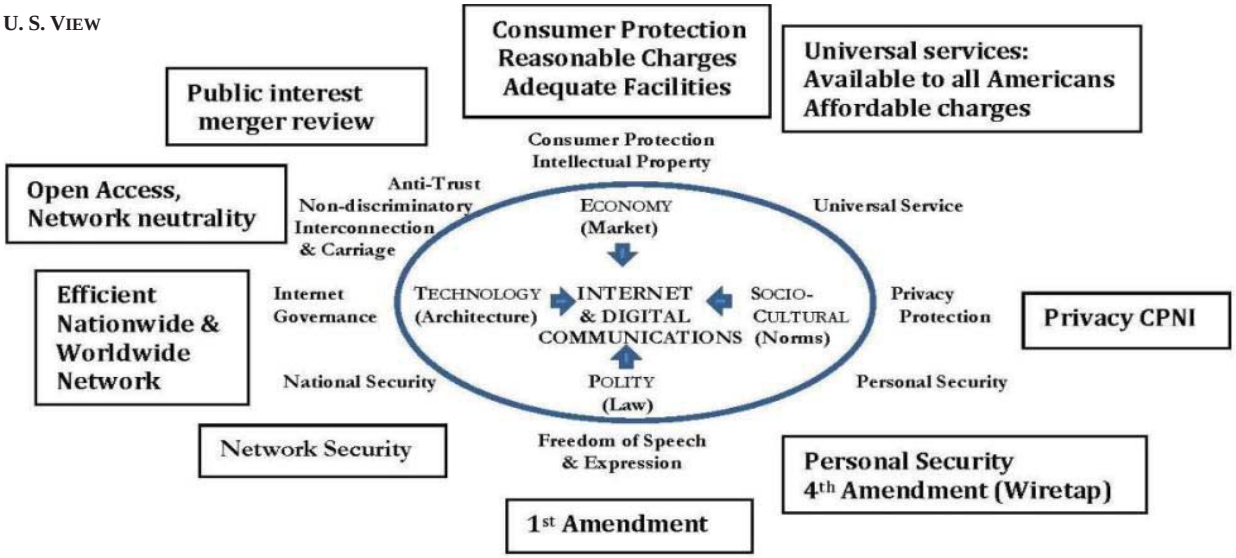
Table IV-1: Political Economy of Order defined by Social Institutions

	REALMS OF SOCIAL ORDER			
	Technology	**Economy**	**Socio-Cultural**	**Polity**
UNITS/OUTCOME				
Value Created	Comfort/ Security	Well-being Equity	Fulfillment Dignity, Self-awareness	Freedom Autonomy, Agency
Affected Activity	Movement	Exchange	Self-Expression Creation of Meaning	Speech Mobilization
Measure of Progress	Expanding the range of things humans can do by reducing constraints & increasing affordances	Improving material well-being & distributing it justly	Enabling fulfillment character development & connectedness; Enhancing the ability to to self-consciously produce the cultural artifacts that create shared meaning	Expanding the sphere of freedom Increasing individual autonomy/action and facilitating collective translation into authority
STRUCTURE				
Primary Institution	Place/Space	Enterprise/ Union	Family/Church	State/Media
POSITIONS/USERS				
Roles Governed	Inhabitant/ User	Consumer/ Producer	Person/ Member	Citizen/ People
GOVERNANCE				
Modality of Regulation	Architecture	Property rule	Norms – Meaning	Law
Enforcement Agents	Builder/ Operator	Seller/Buyer	Peers/Group	Police/Courts
Nature of Constraint	Physical	Monetary	Opprobrium	Sanction
Timing of Constraint	Before	During	Before/After	After

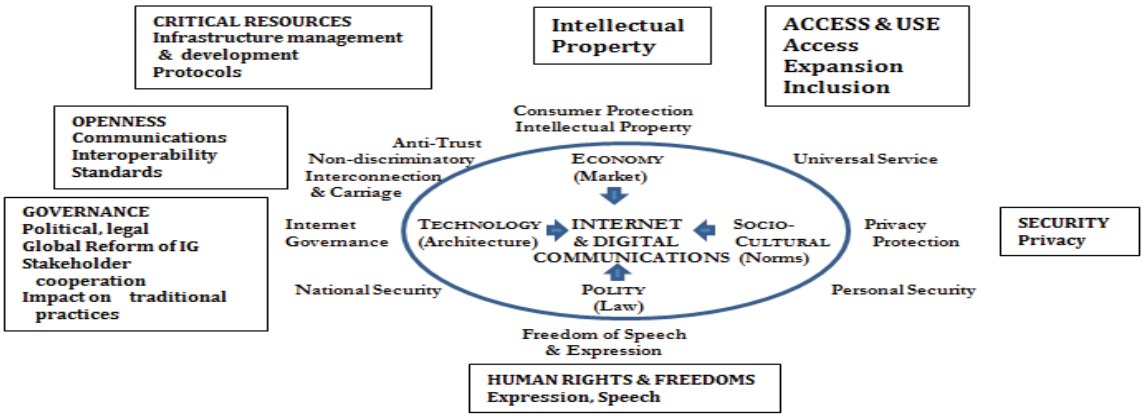
Source: Updated from Mark Cooper, *Inequality in the Digital Society: Why the Digital Divide Deserves All the Attention It Gets*, 20 CARDOZO ARTS & ENT. L. J. 73 (2002).

Figure IV-1: Issue Clusters in the Internet Governance Debate

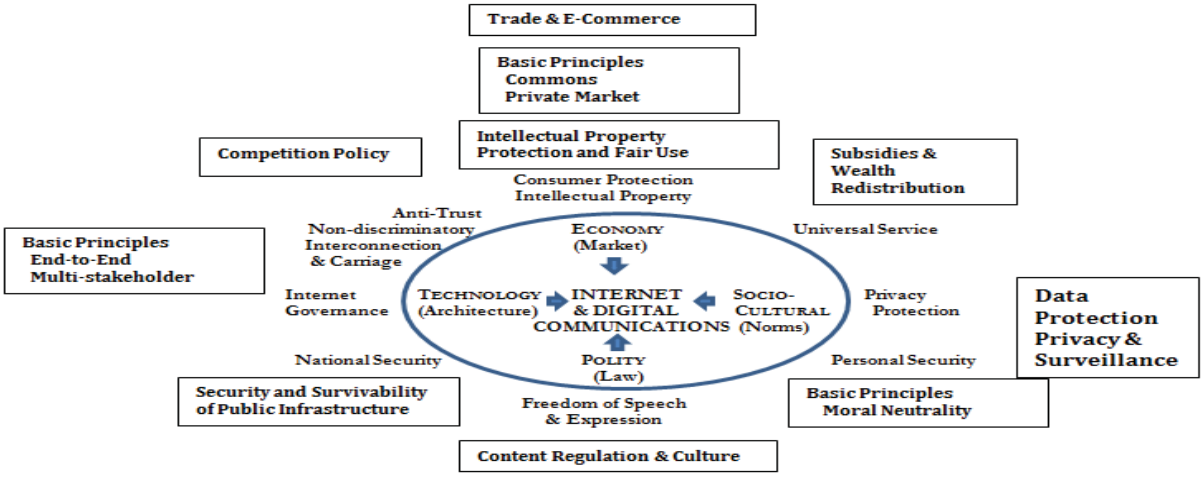
U. S. VIEW



Elena Pavan, *Frames and Connections in the Governance of Global Communications*, p. 124.



Milton Mueller, John Mathiason, and Lee W. McKnight, "Making Sense of "Internet Governance," pp.108-113.



Viewing the quarter-life crisis through the lens of the U.S. debate over the future of the public switched telephone network serves three purposes. First, it reminds us that the maturation challenges do not arise only or simply in the context of relations between developed and developing nations. The issues are endemic to the digital revolution at all levels of economic development. Second, the historical background of these issues in the United States, where the Internet got its start, provides an important perspective on why it succeeded and, therefore, how success can be ensured globally. Third, a longer view of history also serves to underscore the fact that public obligations are not associated with a specific technology.

One of the areas where the maturation challenges can be seen most clearly in the United States is in the debate over how to deal with the public interest obligations of the public switched telephone network (PSTN). The obligations that the PSTN was asked to shoulder did not grow from the PSTN itself; they came from society and were imposed when the PSTN became the primary means of communications. Over the course of a century, the obligations that were placed on the communications resource system increased as the role of the communications network in modern society increased. The density of obligations shown in Figure IV-1 flows from the importance of communications. The means of communications are one of the most important infrastructures in any modern society because they support the flow of commerce and ideas. In the information age, they may be **the** most important infrastructure.

The quintessential expression of the public obligations of the public switched telephone network is the first section of the Communications Act of 1934. The purpose of the Act was

> [t]o make available, so far as possible, to all the people of the United States . . . a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges, for the purpose of the national defense . . . and for the purpose of securing a more effective execution of this policy by centralizing authority heretofore granted by law to several agencies and by granting additional authority with respect to interstate and foreign commerce in wire and radio communication, there is hereby created a commission to be known as the "Federal Communications Commission" . . . .[417]

The commitment was broad and pragmatic, applied to wired and wireless communications and recognized the centrality of communications to a number of social goals. The definition of the goals was inclusive and evolutionary, and the commitment to the form of governance was secondary to the statement of goals. It chooses the form of governance that dominated the response to the quarter-life crisis of the 2nd industrial revolution, but regulation is for the purpose of achieving the goals; it is not an end in itself.

Table IV-2 summarizes the recommendation of three major international efforts to identify key issues that have emerged surrounding the Internet. It presents three perspectives from policy papers issued by major international bodies. It starts with the broad statements of principles that are offered as justification for the adoption of the specific policy recommendations. These international perspectives not only share the basic understanding of the keys to the success of the digital revolution, they also exhibit underlying tensions inherent in the maturation challenges. The tension is between the benefits of the free flow of information and other behaviors that impose costs or threaten values. Balance is the key word that flows through many of the statements of principles.

Table IV-2: Socio-Ecological Challenges in the Quarterlife Crisis of the Internet

BROAD STATEMENTS OF PRINCIPLES

The Heads of State and Governments recognized the importance of the Internet… is a central element of the infrastructure of the emerging information society, while recognizing that there are differing views on the suitability of current institutions and mechanisms for managing process and developing policies for the global Internet.. In particular, the WSIS principle relating to the stable and secure functioning of the Internet was judged to be of paramount importance…This historical lens was useful to identify the guiding principles and factors that have enabled or contributed to the Internet's successful development, including the open and decentralized nature of its architecture and the underlying technological development of its core standards. (WSIS)

The Intergovernmental Council for the Information for All Programme of UNESCO… Agrees upon a set of values, basic rights and obligations in the information society which should guide the actions and be observed by the members of the information society…. Internet in particular and ICTs more generally should be recognized as a key public service for building a people-centred, inclusive and development-oriented information society and are crucial to promote the exercise and enjoyment of universally recognized human rights… Everyone shall be able to connect, access, choose, produce, communication, innovate and share information and knowledge on the Internet… Active participation in public life through the use of Internet and other ICTs shall be enabled on a non-discriminatory basis… Internet and other ICTs shall serve to reduce digital divide and deploy technology and applications to ensure inclusion… Technological and methodological standards, access solutions, portability and interoperability shall allow the widest possible access to content and content production, and encourage the evolution and improvement of the Internet and other ICTs and bring about greater inclusion and overcome forms of discrimination (UNESCO).

The Internet has grown and diffused extremely rapidly across the globe, and continues to bring significant benefits to economies and societies… The policy-making principles in this communique are designed to help preserve the fundamental openness of the Internet while concomitantly meeting certain policy objectives such as the protection of privacy, security, children on line, and intellectual property rights, as well as the reinforcement of trust in the Internet… Recognizing the reliance of our economies on the Internet, the global nature of the Internet, and the various approaches implemented to stimulate the Internet economy, including innovative governance strategies in convening diverse groups of stakeholders to forge consensus-based on policies, we agreed as governments, private sector stakeholders and civil society to the following basic principles for Internet policy-making (OECD).

TENSIONS IN THE OECD Communiqué INTERNET POLICY GOALS

Freedom of Expression: The Internet economy, as well as individuals' ability to learn, share information and knowledge, express themselves, assemble and form associations, depend on the global free flow of information...While promoting the free flow of information, it is also essential for governments to work towards better protection of personal data, children online, consumers, intellectual property rights, and to address cyber security. In promoting the free flow of information governments should also respect fundamental rights. (OECD)

Freedom of expression and creative use of ICTs should not be restricted, except when impinging upon the basic human rights of others….Everyone has a right to freedom of expression, participation and interaction on the Internet that should not be restricted, except in those narrowly defined circumstances that are based on internationally recognized laws and universal human rights standards (UNESCO).
Ensure that all measures taken in relation to the Internet, in particular those on grounds of security or to fight crime, do not lead to violation of human rights (WSIS)

Internet Governance:: As a decentralized network of networks, the Internet has achieved global interconnection without the development of any international regulatory regime. The development of such a formal regulatory regime could risk undermining its growth… The Internet's openness to new devices, applications and services has played an important role in its success in fostering innovation, creativity and economic growth. This openness stems from the continuously evolving interaction and independence among the Internet's various technical components, enabling collaboration and innovation while continuing to operate independently from one another. The roles, openness, and competencies of the global multi-stakeholder institutions that govern standards for different layers of Internet components should be recognised and their contribution should be sought on the different technical elements of public policy objectives. (OECD)

The WGIG identified a vacuum within the context of existing structures, since there is no global multi-stakeholder forum to address Internet-related public policy issues. (WSIS)

Member states and respective stakeholders should take all steps necessary to develop trustworthy Internet and other ICTs ensuring security, reliability, and stability of critical and pervasive applications and services (UNESCO)

Personal Security: Suppliers should have the ability to supply services over the Internet on a cross-border and technologically neutral basis in a manner that promotes interoperability of services and technologies, where appropriate. Users should have the ability to access and generate lawful content and run applications of their choice… providing that appropriate data protection and security measures are implemented in a manner consistent with the relevant OECD Guidelines and reflecting the necessary balance among all fundamental rights, freedoms and principles. (OECD)

Everyone should have a freedom of association on the Internet and ICT-mediated assembly. Member States should take preventive steps against monitoring and surveillance of assembly and association in a digital environment (UNESCO).

Cyber-security: Policies to address security threats and reduce vulnerabilities are important to the continued vitality of the Internet. The implementation of internationally recognised, market-driven security standards and best practices to promote online security should be encouraged. Policies to enhance online security should not disrupt the framework conditions that enable the Internet to operate as a global open platform for innovation, economic growth, and social progress and should not be used as pretense for

protectionism. Policies should also aim to enhance individual and collective efforts for self-protection and promote trust and confidence. Their consistency with, and potential impact on, other economic and social dimensions of the Internet should be carefully assessed through a multistakeholder process prior to adoption and implementation. (OECD)

Member states should implement preventive measures and coordinate strategies to ensure security on the Internet of society against cybercrime including acts motivated by racism, racial discrimination, xenophobia and related intolerance, hatred, violence, all forms of child abuse, and trafficking and exploitation of human beings (UNESCO)

Intellectual Property: Policies and practices should continue to encourage and promote an Internet environment which is conducive to launching creative and innovative technologies, businesses, and other endeavors that respect recognised legal rights without having to obtain permission or affirmative co-operation from established service providers…. Intellectual property protection is a fundamental tool for the advancement of innovation and creativity on the Internet. New and complementary approaches balanced to ensure effective protection of intellectual property should also be encouraged where necessary, and should also ensure protection of legitimate competition and fundamental principles such as freedom of expression, access to lawful content and Internet services and technologies, fair process, and privacy. Sound Internet policy should encompass norms of responsibility that enable private sector voluntary co-operation for the protection of intellectual property. Appropriate measures include lawful steps to address and deter infringement, and accord full respect to user and stakeholder rights and fair process. (OECD)

Intellectual property of the creations in a digital environment should be a subject of and shall be protected under the intellectual property rights legislation. Unauthorized copying and distribution of copyrighted materials must not be condoned. Legal frameworks facilitating owners of intellectual property to share their knowledge and creations should be supported to promote open access to knowledge and foster creativity. Application of international intellectual property conventions should be based on the fair balance between the interests of the rights holders and of the public ;(UNESCO)

Efforts should be made to render consumer protection laws and enforcement mechanisms fully and practically applicable and to protect consumers during online purchase of physical and digital goods and only services (WSIS).

Network Management: Appropriate limitations of liability for Internet intermediaries have, and continue to play, a fundamental role, in particular with regard to third party content…. [I]identify the appropriate circumstances under which Internet intermediaries could take steps to educate users, assist rights holders in enforcing their rights or reduce illegal content, while minimising burdens on intermediaries and ensuring legal certainty for them, respecting fair process, and more generally employing the principles identified in this document. In achieving these current objectives the social and economic costs and benefits, including impacts on Internet access, use, security and development of the policy options should be assessed as part of their development process as should also be their compatibility with the protection of all relevant fundamental rights and freedoms and their proportionality in view of the seriousness of the concerns at stake. (OECD)

All stakeholders shall work together to prevent against abusive uses of ICTs, protection of private data and privacy and violation of human rights on the Internet and other ICTs by combination of legislative measures, user education, including use of media and information literacy skills, self-regulation and co-regulation measures and technical solutions without disrupting the free flow of information. (WSIS)

Privacy: Strong privacy protection is critical to ensuring that the Internet fulfills its social and economic potential… Privacy rules should be based on globally recognised principles, such as the OECD privacy guidelines, and governments should work to achieve global interoperability by extending mutual recognition of laws that achieve the same objectives…. Privacy rules should also consider the fundamental rights of others in society including rights to freedom of speech, freedom of the press, and an open and transparent government. (OECD)

Everyone has a right to the protection of personal data and private life on the Internet and other ICTs. Users should be protected against the unlawful storage, abuse or unauthorized disclosure of personal data, and against the intrusion of their privacy. (UNESCO)

Efforts should be made, in conjunction with all stakeholders, to create arrangements and procedures between national law enforcement agencies consistent with the appropriate protection of privacy, personal data and other human rights. (WSIS)

Sources: OECD, *Communiqué on Principles for Internet Policy-Making,* OECD High Level Meeting, The Internet Economy: Generating Innovation and Growth, Paris, June 28-29, 2011; *Report of the Working Group on Internet Governance,* Chateau de Bossey, June 2005; UNESCO, *Code of Ethics for the Information Society,* October 16, 2011.

SPECIFIC RECOMMENDATIONS ACROSS THE REALMS OF SOCIAL ORDER

WORKING GROUP ON INTERNET GOVERNANCE	OECD PRINCIPLES FOR INTERNET	UNESCO CODE OF ETHICS FOR THE THE INTERNET SOCIETY
Technology		
Administration of the root zone files and root server system of the DNS IP Addressing The WGIG agreed that the continued Internationalization of the Internet and the principle of universality reinforces the need for a review of existing governance mechanisms Multilingualism: Domain names, IP addressing	Promote and protect the global free flow of information The Internet economy as well as individual's ability to learn, share information and knowledge, express themselves, assemble and form associations, depends on the global free flow of information. Promote the open, distributed and interconnected nature of the Internet	The basic technical standards used on the Internet and other ICTs must always be open to allow interoperability and innovation. Develop trustworthy Internet and other ICTs ensuring security, reliability and stability of critical and pervasive applications and services. Technological and methodological standards, access solutions, portability and interoperability shall allow the widest possible access
Economics		
Interconnection costs, Consumer Rights, Spam	Promote investment and competition in high-speed networks and services Promote and Enable the Cross-Border delivery of Services Promote Innovation	Internet in particular and ICTs more generally should be recognized as a key public service for building a people-centred, inclusive and development-oriented information society Affordable access to the Internet should serve as a tool for development,
Socio-Cultural		
Privacy rights, data protection Multilingualism, Content	Strengthen consistency and effectiveness in privacy protection (global level) Promote Creativity Public policy should help foster a diversity of content, platforms, applications, online services and other user communications tools… to allow users to fully benefit	Affordable access should serve as a tool for social cohesion active social participation in public life through the use of Internet on a non-discriminatory basis. Information should be made available, accessible and affordable across all linguistic, cultural and social groups
Political		
Maximize individual empowerment Encourage co-operation to promote Internet security Governments, in cooperation with all Stakeholders Should explore and develop tools and mechanisms including treaties and, cooperation to allow for effective criminal investigations and prosecution of crimes committed in cyberspace against networks and technological resources.	Freedom of expression Internet stability, security and cybercrime Individual empowerment: the Internet offers potential for individual to exercise control over the information that they receive as well as the personal information that is disclosed about them.	Everyone should have a freedom of association… a right to freedom of expression, participation and interaction on the Internet Every person shall be able to connect, access, choose, produce, communicate, innovate and share information and knowledge on the Internet.

B. Challenges from the Socio-ecological setting

The long list of challenges is provided on the left side of Table V-1. Yet, as the right side of Table V-1 shows, the economic dilemmas to which the Internet provided a potent solution have not disappeared and the challenges of governance confront all the potential candidate institutions that might be seen the vehicles to respond, including the state.[418]

1. The Continuing Limitations of the Market

The immense economic and socio-ecological importance of the resource system drives some to turn to the market for solutions, because the market is an important contributor to the success of the Internet. Yet, the underlying public goods, externality, common-pool resource, and transaction cost problems to which the institutional organization of the Internet resource systems was a remarkably successful response have not gone away. Replacing the core Internet principles with an exclusive reliance on the market, threatens the functioning of the Internet system by creating the danger of rising transactions costs, restriction of flow by contracting failures and the exercise of opportunistic power relations.

There is clear recognition of continuing and potential economic dilemmas, including the major problem of the potential exercise of market power by large players strategically located in the resource system.

> There is also an awareness that one of the more critical risk factors in this market-driven environment is the creation of "bottlenecks" in the delivery of services to customers. Such bottlenecks admit the introduction of "gatekeepers" which, in turn, admit the potential to impose rentals on those parties who are forced to pass services through the bottleneck. If there is a failure of competitive pressure in the access market there is a significant risk of such forms of forced distortions appearing in the market through the exploitation of such bottlenecks to extract scarcity rentals from those parties who are forced to pass their services through such points of constraint and imposed third party control.[419]
>
> These agreements and the cost structure they imply will be private information of the networks and may be only loosely (if at all) linked to the underlying traffic patterns or infrastructure costs . . . .
>
> This results because the LEs [large eyeball networks] believe they have bargaining power over content providers, large and small, under the assumption that eyeball customers are less vulnerable to switching to another access provider than are content ASes [Autonomous Systems]. . . .
>
> ISPs with a significant number of "eyeballs" can attempt to use access as a basis to negotiate favorable interconnection terms. [420]

Table IV-2 summarizes the recommendation of three major international efforts to identify key issues that have emerged surrounding the Internet. It presents three perspectives from policy papers issued by major international bodies. It starts with the broad statements of

Table V-1: Maturity Challenges Driven by Change

PRESSURES FOR CHANGE

"Unintended Consequences" of the successful resources system

- Structure and Units
  - Size
  - Geographic scope
  - Complexity of tools
- Users and Uses
  - Commercialization
  - Diversity
  - Speed
  - Latency

Demands emanating from the socio-ecological setting

- Polity
  - Human Rights & Freedoms
    - Expression, Speech
  - Content Regulation & Culture
  - Surveillance
- Technology
- Security and Survivability of Public Infrastructure
- Critical resources
  - Infrastructure management & development
  - End-to-end principle
    - Protocols/standards
    - Communications
    - Interoperability
- Economy
  - Basic Principles
    - Commons
    - Private Market
  - Trade & E-Commerce
  - Intellectual Property & Fair Use
  - Subsidies/ Wealth Redistribution
  - Competition Policy/Antitrust
- Access & Use Access
  - Expansion
  - Inclusion
- Social
  - Data Protection
  - Privacy

INSTITUTIONAL CHALLENGES

Challenges to which the market may not be the solution

- Externalities
  - Loss of scalability
  - Loss of end-to-end
  - Free riding
- Transaction cost increases
  - Contract failure
  - Asymmetric Information
    - Bargaining, Monitoring
- Strategic Behavior
  - Rent seeking
  - Opportunism
  - Investment
    - Distorted, Insufficient
- Behavioral
  - Perception
  - Calculation
    - Overly simplistic heuristics
  - Implementation
    - Game of chicken gone wrong

Governance challenges that render the state ill-suited as the solution

- Authority
  - Geographic Scope
    - Borderless
    - Decentralized
    - Distributed
- Ability
  - Speed and flexibility
  - Knowledge
    - Quantity
    - Operational necessity
    - Local
- Capacity
  - Politicization
  - Resource

Ongoing challenges confronting the state and Internet governance

- Legitimacy
- Access
  - Availability
  - Adoption

principles that are offered as justification for the adoption of the specific policy recommendations. These international perspectives not only share the basic understanding of the keys to the success of the digital revolution, they also exhibit underlying tensions inherent in the maturation challenges. The tension is between the benefits of the free flow of information and other behaviors that impose costs or threaten values. Balance is the key word that flows through many of the statements of principles.

> However, the market failure risks to the system are more profound and include a fundamental transaction cost problem that can lead to an increase in costs, or a breakdown of transactions altogether.

> In sum, such bilateral constraints – due in part to the limitations of legacy interconnection regimes because of the architecture – conceal end-to-end value information that might otherwise provide the basis for signaling the magnitude and direction of direct and indirect externalities. The lack of such an appropriate signaling mechanism may result in the foreclosure of markets for certain services (e.g., QoS differentiated services for the general Internet). Historically, this potential loss was traded off against the benefits of lower uncertainties associated with the simpler interconnection environment. Volume and destination-based value accounting resulted not only from architectural constraints, but were also a "satisficing" response to residual uncertainty of who should pay whom. Other value proxies would have introduced higher uncertainties and bargaining costs. . . .
>
> [A] *possible* concern that might arise in the future is that the increased complexity of the interconnection space may raise bargaining costs, and in the extreme pose a threat for the equilibrium that has sustained E2E [end-to-end] connectivity in the Internet thus far. . . .
>
> Uncertainties over how to allocate (shared or standalone) costs, especially across multiple Areas (when multi-homed) involving different contracts, may raise the risks of peering bargaining failures. Many large networks (and some small networks) will not accept peering requests from smaller networks, even if there are likely to be cost or performance benefits for the larger network.[421]

Having pointed out the recognition that there are continuing economic dilemmas that the market may not be able to resolve, it is also necessary to note that there is still a strong preference for exploring market solutions before regulatory approaches are implemented.

> [A]s NIE explains, firms search for contractual (or regulatory) guarantees against opportunistic behavior . . . . In some cases, reputational constraints and the power of social norms may be effective; in others, vertical integration may become a necessary step. . . and, in still other cases, parties may remain vulnerable to the possibility of hold-up . . . . And in yet other cases, such as the network management issue, some form of regulation may be necessary to enable these markets to function reliably and effectively.[422]
>
> Some skeptics of regulation have called for a continuing "hands off" approach to the Internet and have even suggested that the FCC itself is an antiquated institution that should be abolished. But as this [a]rticle demonstrates, the challenges for the relevant firms to cooperate without the aid of government encouragement and oversight may be too much to expect. By contrast, "a public signal to invest the necessary resources in a coordinated solution, and structured opportunities to come together, may suffice to allow private parties to achieve efficient outcomes." Notably, the norms of Internet cooperation cannot be taken for granted and ultimately will require some form of norm entrepreneurship . . . .[423]
>
> Interconnection policy is going to become the battleground for the new telecom regulatory debates . . . .
>
> Before more interventionist regulatory approaches are applied, we believe any policy focus should be on improving transparency into the workings of the Internet ecosystem in general and interconnection markets, more specifically. . . . (a) information about industry-wide cost models; (b) information about traffic trends and distributions, and (c) information about interconnection agreement terms and conditions.[424]

B. THE CONTINUING LIMITATIONS OF THE STATE

Whatever the level of concern about the ability of the market to deliver solutions to the economic dilemma, there is a much higher level of concern that the market cannot solve the challenges emanating from the socio-ecological setting. This was quite evident in the lengthy list of challenges and tensions outlined in Section IV. This stimulates a search for new authority in the nation state, which is the incumbent institution with primary responsibility for tending to

the key realms of social order. Yet, every one of the internal challenges that strain the Internet resource system management mechanism would strain the state. Moreover, the state suffers other types of problems that hinder its ability to provide responses to the maturation challenges, without undermining the Internet resource system.

First, the borderless, transnational nature of the Internet resource system is a unique challenge to the ability of the state to craft policy. Because information flows are so fluid and multinational, it is argued that the challenge to national authority is well beyond the typical international challenge. It is frequently noted that the "bad" acts and actors are beyond the borders of state authority, but it should be noted that the good acts and actors are too.[425]

Second, the dynamic, complex and interconnected nature of the 21st century economy, particularly those sectors touched by digital technologies, makes it difficult for centralized, bureaucratic oversight to write and enforce regulation.[426] Traditional regulation is ill-suited, even inimical to an economy that thrives on flexibility and is driven by rapid innovation.

Third, the model of an expert agency relied upon to implement broad goals has been undermined by the politicization of the regulatory process. The traditional approach to formal, notice and comment regulation was based on the belief that expert agencies could do a better job than political bodies like legislatures in designing regulation to deal with the day-to-day functioning of industries. Once it becomes politicized, it loses its advantage.[427]

Finally, traditional regulation is not likely to work very well because the ability of the state to implement and enforce regulation has been undermined by systematic and persistent defunding of regulatory agencies.[428] Decades of anti-government and pro-market rhetoric have taken their toll. The agencies now lack the resources to do their jobs. In the United States, the number of regulatory and antitrust employees per dollar of value they oversee in the economy at large and the communications sector is one-fifth the level it was in 1970. Compared to profits and assets, agency budgets are less than half the level they were in 1970.

None of these factors is likely to be reversed any time soon. The critique of the state is widespread, if not universal. Pavan presents a concise summary that sweeps across all of the issues discussed up to this point.

> [W]e are standing in an epoch of overall political uncertainty caused, in the first place, by the fact that states have to face multiple and complex issues that extend beyond the boundaries of their sovereignty and, more importantly, that require an incredibly large amount of competency to be managed adequately. This does not mean that states have lost their functions: institutions continue to be the sole agents in charge of producing policies. What changes is that they can no longer perform their functions "behind closed doors" but, rather, find themselves forced to act within a very crowded environment, populated by a multiplicity of non-institutional actors who possess the required knowledge and the expertise for managing complex and dynamic global issues. How to translate the necessity for multiactor collaboration into efficient governance arrangements remains an open question.
>
> This is particularly true in the case of information and communications matters, where technical and social aspects are both relevant and so interwoven that, when it comes to their regulation, governments have to coordinate a plurality of interests, knowledges, agendas, and priorities but often are not equipped with the necessary competencies to do so. In the Internet case we have the extreme situation in which governments

> were also the last actors to be involved in the management of a system that had self-managed itself for years. The underlying question of how we shift from "government to governance" in the IG [Internet governance] domain becomes, in general, a question about how we can effectively relate traditional steering activities, for which states are responsible, with broader coordination tasks that go back to the very origin of the Net itself and that combine the multiple perspectives and needs of all institutional and non-institutional Internet users. What is the role of different actors' categories in the governance dynamics of the Internet? How to (re)conciliate perceptions, positions, and political interests?[429]

C. Key Resource System Challenges

1.. The Relationship between the Social Demands and the Internet Architecture

Figure IV-1 and Figure IV-2 above showed the location of the maturation challenges emanating from the social structure in terms of their grounding in the realms of social order. The discussion in Section II pointed out that the distinction between governance of and on the Internet is a useful tool for sorting policy approaches. A key challenge is operationalizing the distinction.

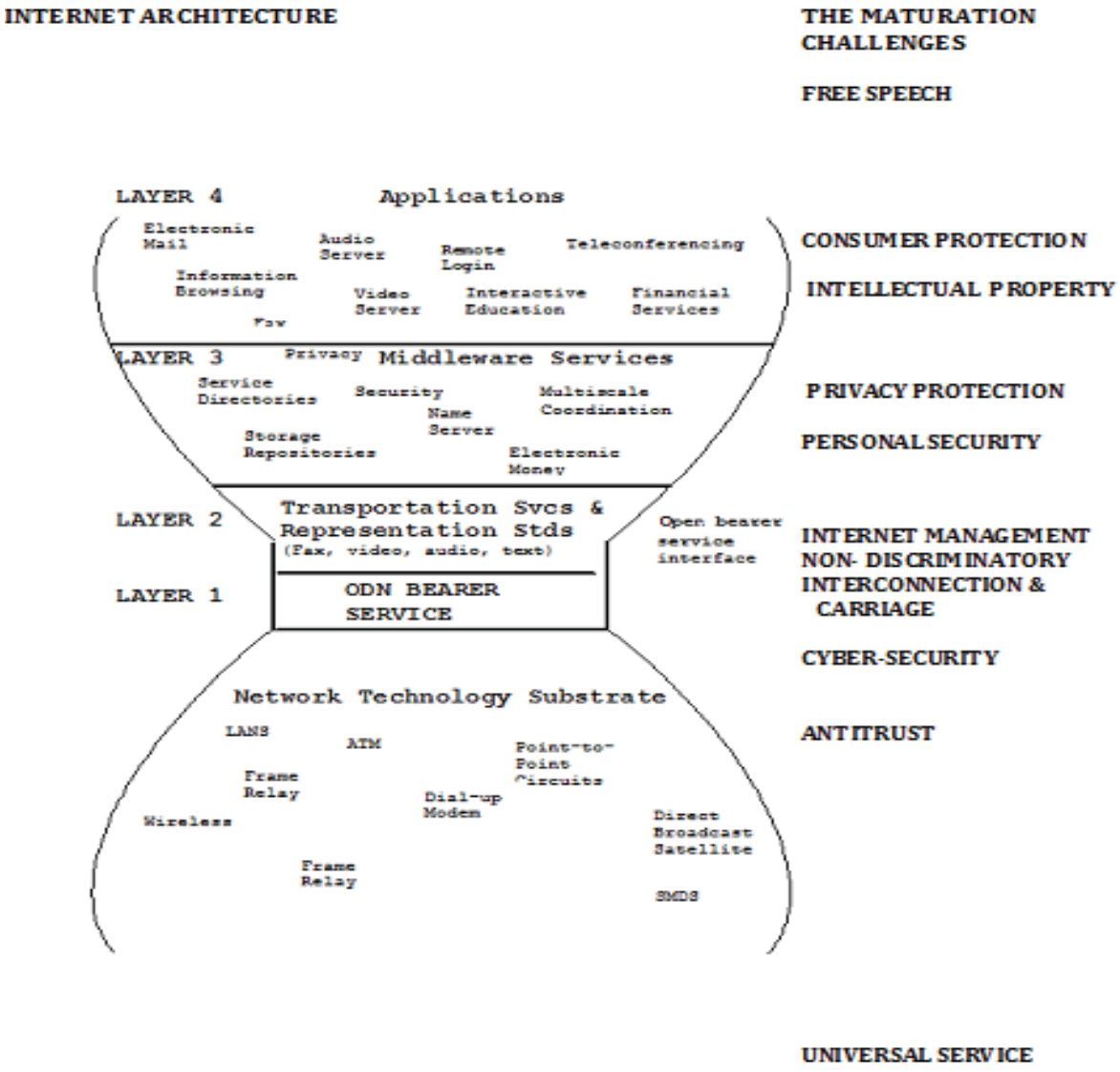
One approach is to note that the maturation challenges can be lined up with the Internet hourglass introduced earlier, as shown in Figure V-1. While the correspondence is not one-to-one, the argument can be made that the modalities of regulation that address each of the various challenges map reasonably well across the layers of the hourglass. Addressing higher-level problems with solutions at lower layers risks paying a heavier price in terms of harm to the resource system than is necessary. The complex link between the resource system and the socio-ecological environment is also recognized by the UNCTAD analysis:

> Of course, it is not possible to establish a clear-cut separation between all infrastructural/technological matters on one side and political and socio-economic questions on the other. Policy decisions very often have technological implications and vice versa. A crude device to categorize public policy issues that need to be addressed and the responses that could be explored in each case could be to distinguish between the management of the Internet as a global utility and the international governance issues posed by the use people make of that utility.[430]

Aside from the reference to a "utility," which will make many in the Internet governance debate cringe, the call for an effort to make the distinction between technology and policy is important in the Internet governance debate as discussed in Section III below. Moreover, as discussed in Section III, the UNCTAD analysis does not envision "utility" style regulation as the solution for the technical issues that arise in the management of the core resources of the Internet.

In Figure V-1, I put two challenges outside of the confines of the hourglass – freedom of speech located above the content layer and universal service located below the network strata. The reason as suggested earlier is that these two are essential outcomes of the resource system, the primary purposes and function that the system serves in society.

Figure V-1: The Challenges at Various Layers of the Internet Ecology

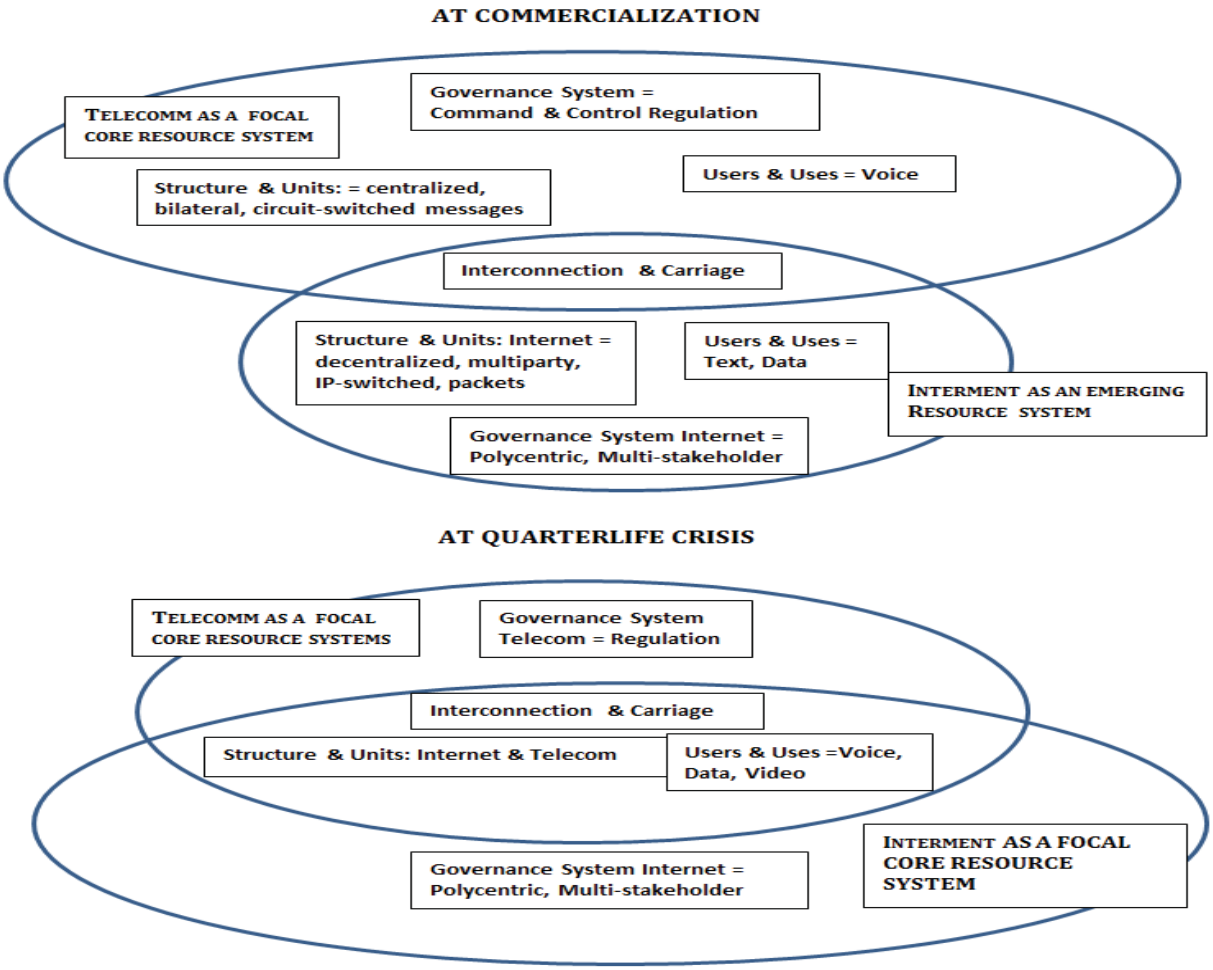


b. The Relation between the Telecommunications Resource System and the Internet Resource System

A fundamental challenge to the institutional *status quo* is the distribution of resources and obligation between the two communications resource systems that coexist at present. As noted above and suggested by Figure V-2, the Internet was dependent on the dominant telecommunications resource system for its growth. The existing telecommunications infrastructure carried Internet communications. Interconnection and carriage were crucial functions on which the Internet relied. Over time, while that underlying relationship remains, as the

Internet matures, it captures more and more of the function of the pre-existing resource system. There are three sources of conflict that are expressed in the quarter-life crisis:

Figure V-2: Shifting Relationships Between the Internet and Telecommunications Resource Systems



- First, there is a shift of resources, which throws the incumbent telecommunications resource system into crisis.
- Second, the governance structure of the incumbent telecommunications resource system is fundamentally different than the emergent system.
- Third, the telecommunications resource system bears the social obligation of universal service, the broadband Internet resource system does not (at least in the minds of many companies).

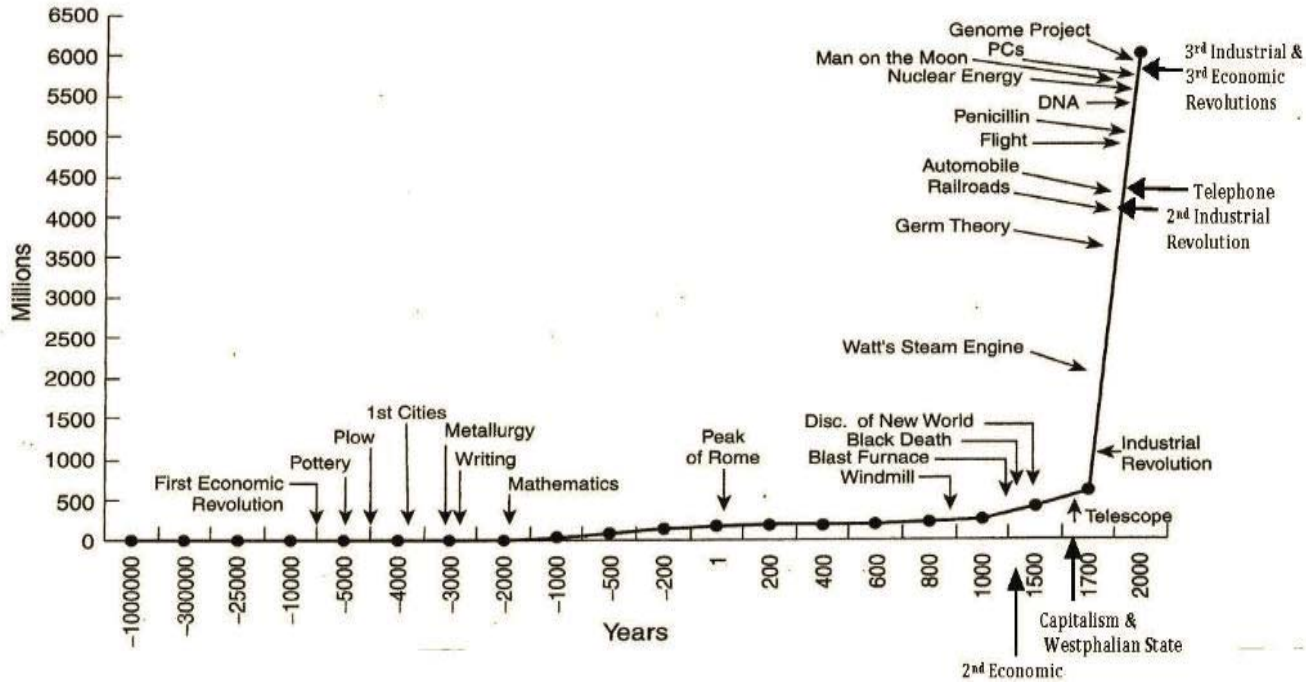
III. Success As a Source of Pressures for Change

A. Speed and Scope of Change

1. Economic Development

My discussion of the role of nondiscriminatory access takes an long view to underscore the enduring importance of the principle. As noted earlier, North deals with long sweeps of human history to locate the key factors and dates in the process of economic change. The top graph in Figure III-1 is reproduced from his latest work. The bottom graph shows the period of the two industrial revolutions to provide a magnified scale for the last four centuries. When the outcome is measured by the growth of the population, which North argues is a good indicator of the ability to meet human needs, the evolution of the human environment sped up dramatically with the 2nd industrial revolution, North's conclusion that the solution to the puzzle of economic development lies in the ability to pull together and integrate dispersed knowledge is readily apparent in Figure III-1.

Figure III-1: Measuring the Economic and Industrial Revolutions by population growth



Source: Douglass North, Understanding The Process Of Economic Change (2005). P. 89.

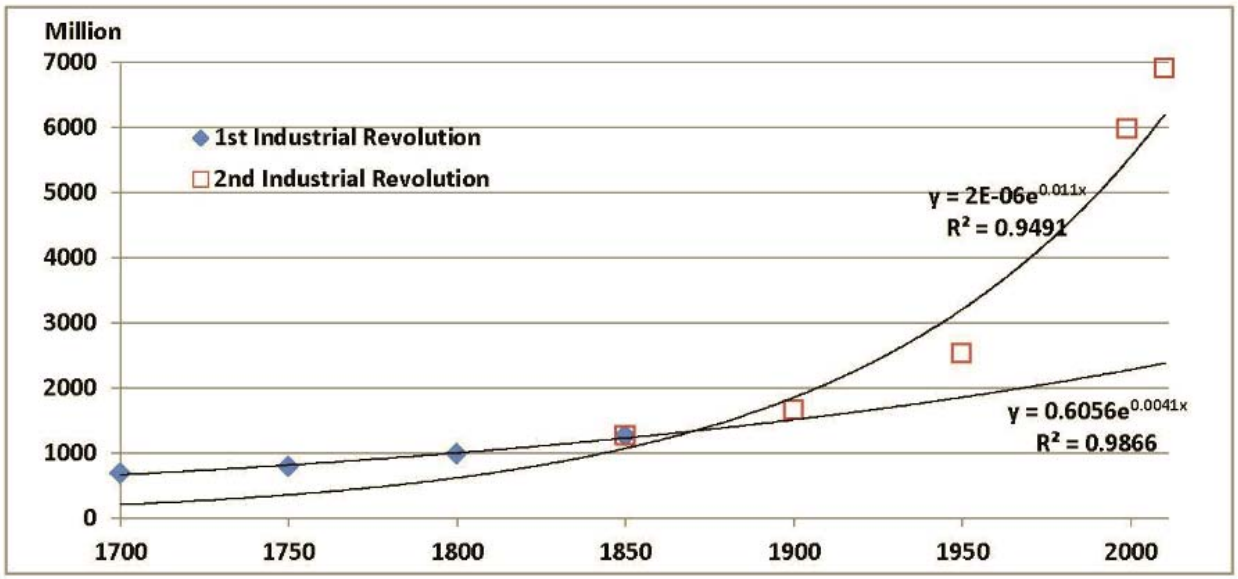
North identifies two economic revolutions: the first being the invention of agriculture 10 millennia ago, the second being the knowledge revolution, one millennium ago. The 2nd economic revolution, dating from the Renaissance, gathered speed in the wake of the 1st industrial revolution. North included the PC in his analysis, which I believe is a good symbolic

marker for what I call the 3rd industrial revolution. I have added in key technologies and dates suggested by this analysis:

- the telephone, since this analysis focuses on communications resource systems,
- makers for the 2nd economic and 2nd industrial revolutions, and
- the emergence of modern capitalism and the Westphalian state which, not surprisingly, emerged at roughly the same time as preconditions for the 1st industrial revolution.

Figure III-1 uses the world population growth to examine whether there was a significant shift in expansion between the 1st and 2nd industrial revolutions. There clearly was.

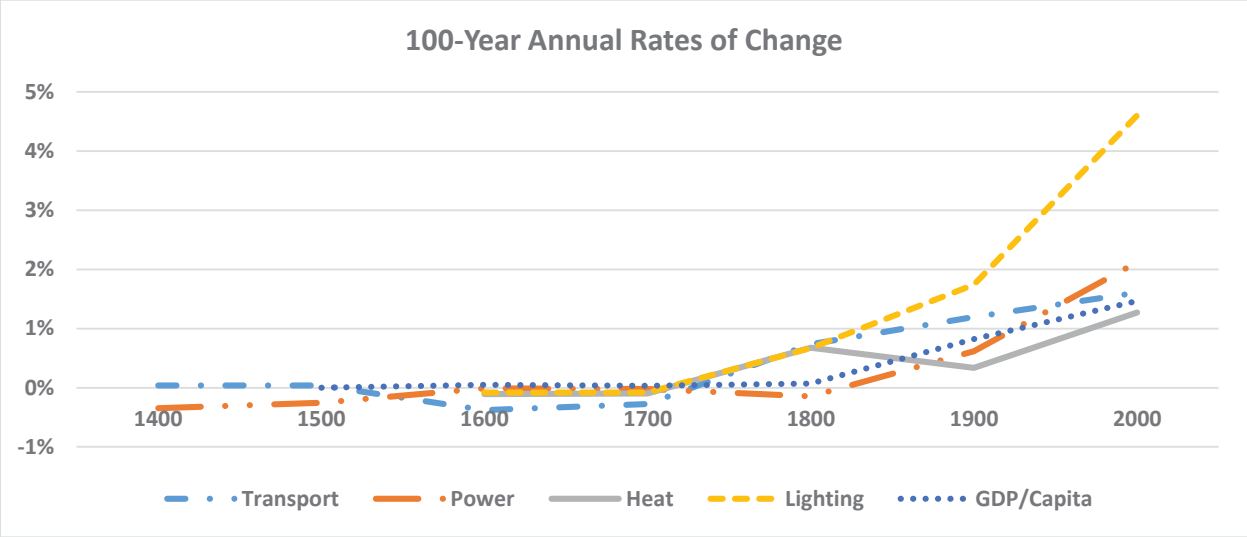
Figure III-2 The Evolving Human Environment during the Industrial Revolution\



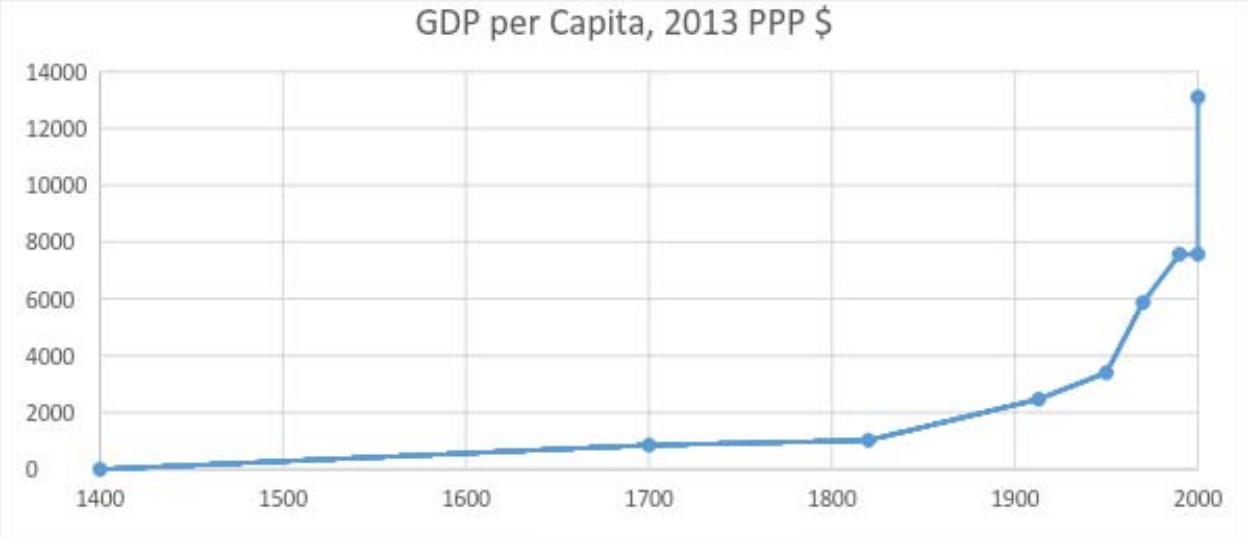
Source: W***orld population,*** **WIKIPEDIA, http://en.wikipedia.org/wiki/World_population.**

The growth in population reflect the underlying improvement in the material conditions of the species. Direct measures of living conditions, as shown in Figure III-3 support this view. As shown in Figure III-3, the progress of well-being has followed a similar pattern. If we accept the proposition that human civilization dates back roughly 11 millennia,[431] then the capitalist era represents approximately 5% of human history, with the industrial era covering the second half of that period. Measured by population, per capita income, heat, power, transportation, and lighting, well over 90% of human progress has taken place in the very short period of capitalist industrialization.

Figure III-3: The Recent Revolution in the Improvement of the Human Condition



Source: Sovacool, Benjamin, K. and Michael H. Dworkin, *Global Energy Justice* (Cambridge University Press, 2014), p. 48



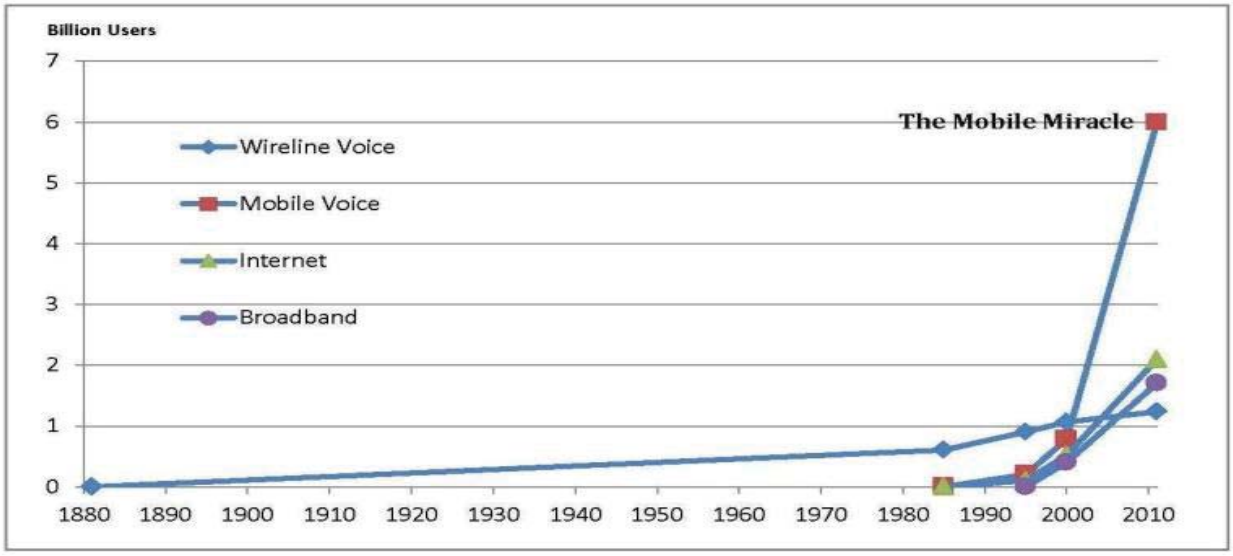
Sources: Thomas Pikety, *Capitalism in the 21st Century*, 2014, Table 2.5; CIA World Fact Book.

B. The Communications Sector

The Internet and the digital revolution make an immense amount of diverse activity possible, but it is just not any activity. It involves communications and the flow of information and knowledge. Communications networks have been extremely important resources systems as drivers of economic growth for centuries. As the role of knowledge in economic activity has expanded, communications systems have become more important.

Figure III-4 focuses on communications technologies since the invention of the telephone and measures the output as the total number of subscribers. Measured as penetration (subscribers per 100 population) the graph would look much the same. Measured by the volume of output in terms of the spread of personal (one-to-one) communications the 2nd industrial revolution moved slowly (broadcasting, e.g., one-to-many like radio moved faster). The digital revolution and the Internet have accelerated the pace by an order of magnitude and expanded the scope of personal communications from voice to data and video.

Figure III-4: Penetration of Electronic Communications Technology



Source: Int'l Telecomm. Union, World Telecommunication/ICT Statistics, http://www.itu.int/ITUp/ict/publications/world/material/WTID_indicators.xls (last visited Oct. 23, 2012).

Given the observation about the central role of knowledge in the 2nd economic revolution, one can argue that the 3rd industrial revolution has accelerated the process of change with at least as much force, if not more, than at any time in the past. It is such a profound development in the 2nd economic revolution, that the digital revolution may eventually merit the title of the 3rd economic revolution in addition to being the 3rd industrial revolution.[432]

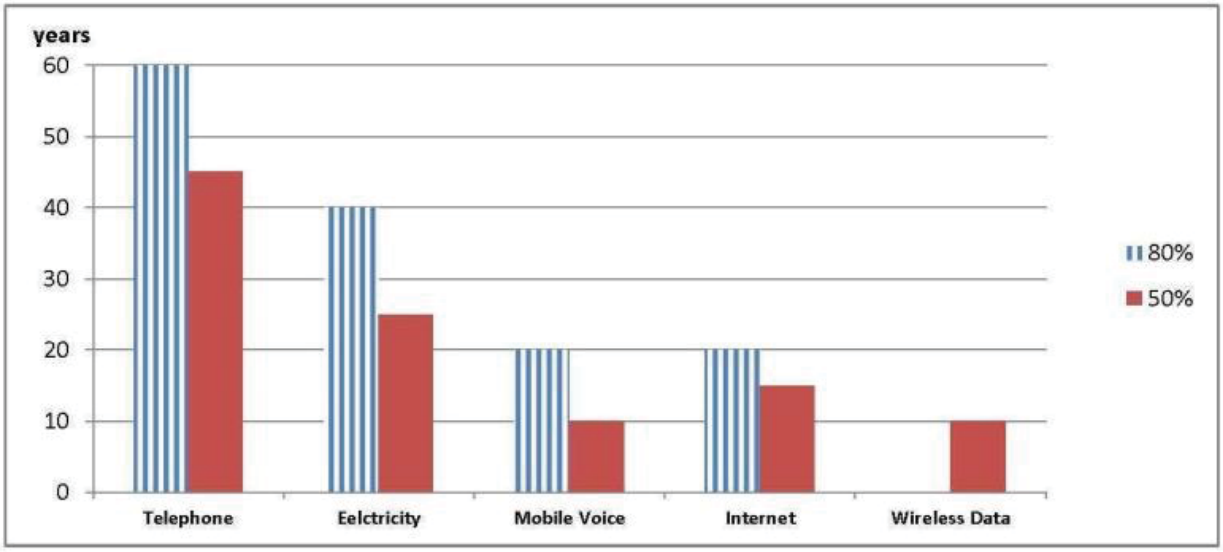
Not surprisingly, recent progress in communications has outstripped many other important economic spheres. One can argue that, measured by the ability to reach people and access information, 90% of progress took place not in the last 250 years, but in the last 25. It is not unreasonable to argue that this represents the communications sector "catching up" with other spheres that exhibited significant progress earlier, during the first industrial revolution. It may also reflect the potential for accelerated progress that results from the digital mode of production.

Figure III-4 suggests that mobile voice deserves the title of mobile miracle that is frequently applied to it,[433] with four times the penetration in a couple of decades than wireline telephony achieved in a century and a quarter. Internet connectivity is 50 percent higher than the

penetration of wireline telephony in a couple of decades, primarily because of wireless. Broadband has exceeded the penetration of wireline telephony in about a decade. The aggregate statistics merit the term revolution, but they must not blind us to continuing challenges in terms of the spread of technologies, as discussed below.

Figure III-5 presents a second perspective on the spread of the digital revolution in the United States. It shows the number of years that key technologies of the 2nd industrial revolution (electricity and telephone) took to achieve high levels of penetration (50% and 80%) in the mass market. These are compared to the number of years it took key technologies of the 3rd industrial revolution (mobile voice, Internet, and mobile data) to reach similar levels of penetration. The speed of penetration is much faster in the digital age. To some extent, the penetration of earlier technologies paves the way for later technologies, but that does not negate the impact of the new technologies, nor does it negate the pressures for change. On the contrary, the dependence of the Internet for essential inputs from existing resource systems with very different governance models became an important source of conflict and pressure for change.

Figure III-5: Milestones in the Penetration of Key Mass Market Technologies



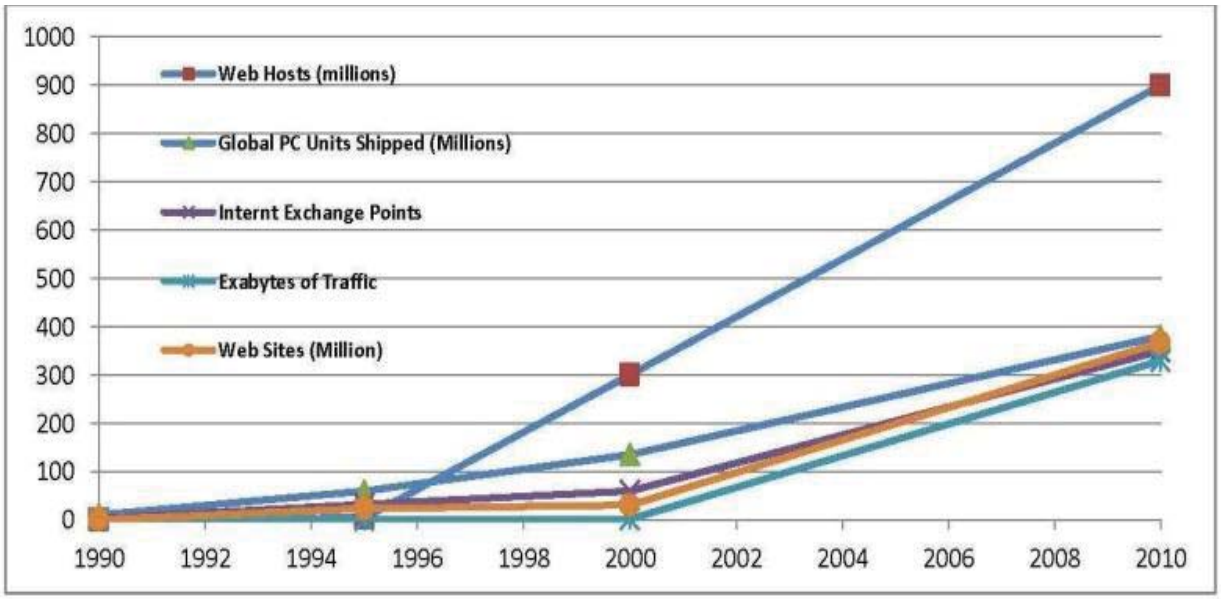
Source: U.S. Bureau of the Census, *Statistical Abstract of the United States, various issues, Historical Statistics of the United States, Colonial Times to 1970, (*Installed Generating Capacity) *available at* http://www2.census.gov/prod2/statcomp/documents/CT1970p2-01.pdf; ITU, ICT Data and Statistical Database, http://www.itu.int/ITU-D/ict/publications/world/material/WTID_indicators.xls.

As shown in Figure III-6, the growth in the output was not only in the number of subscribers, but also in the massive quantity and quality of the traffic. Data flows changed dramatically from relatively simple balanced data flows to a wide variety of applications demanding different network functions and very uneven network flows. In fact, one leading

analyst of the industry identifies over half a dozen dimensions of major change in the Internet resource system including:

- "the infrastructure over which the Internet itself rides,"
- "the topology of the Internet,"
- "technology at the edge,"
- "type of traffic,"
- "volume of traffic,"
- "types of market participants and their relationships," and
- "methods of compensation for exchange of traffic."[434]

Figure III-6: Expansion of Traffic, Equipment and Services



***Source: How We Got from 1 to 162 Million Websites on the I*nternet, ROYAL PINGDOM (Apr. 4, 2008), http://royal.pingdom.com/2008/04/04/how-we-got-from-1-to-162-million-websites-on-the-internet/ (last visited Oct. 4, 2012); *Internet traffic*, WIKIPEDIA, http://en.wikipedia.org/wiki/Internet_traffic (last modified Apr. 25, 2012, 5:09 AM); *Internet 2012 in Numbers*, ROYAL PINGDOM (Jan. 17, 2012), http://royal.pingdom.com/2012/01/17/internet-2011-in-numbers/ (last visited Oct. 4 2012); *Market share of leading PC vendors*, WIKIPEDIA, http://en.wikipedia.org/wiki/Market_share_of_leading_PC_vendors (last modified Sep. 10, 2012 10:11 PM); Michael Kende, *Overview of Recent Changes in the IP Interconnection Ecosystem*, ANALYSIS MASON 1, 6 (Feb. 23, 2011), http://www.analysysmason.com/About-Us/News/Insight/Internet_exchange_points_Feb2011/Related-report-download/.**

While we tend to emphasize the output (or demand side) of the resource system, it is important to recognize the supply side. Delivering an exaflood of data to two billion people requires an immense amount of investment. The dramatic growth of users was sustained by the deployment of capital assets. In the early days, telecommunications infrastructure did not have to be deployed since the Internet rode on the existing telecommunications network. Broadband technologies were deployed in the mid-1990s, soon after the full commercialization of the Internet.

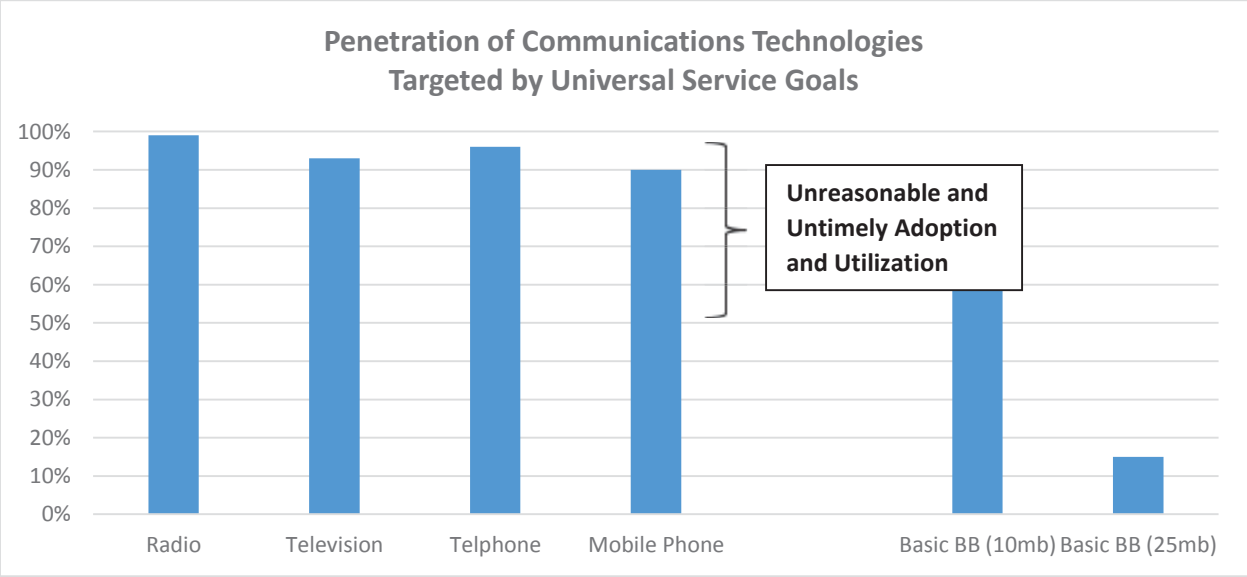
In addition to the immense expansion of the telecommunications infrastructure to meet communications needs, the ease of entry and decentralized nature of the services offered played a critical role in driving demand and functionality. After a couple of decades of development, there was one host for every 2.5 subscribers on the Internet. There is one website for every six Internet subscribers. The growth of users,[435] usage,[436] and applications in the mobile space has been even more rapid.[437] The ability to add applications thrives in a space where knowledge is decentralized and entry is easy.

IV. The Continuing Challenge of Digital Exclusion

The pace of change in the communications space has been accelerating sharply since the shift from physical communications to electronic and then to digital. It took more than a century to get wireline telephony to one-fifth of the global population. Wireless reached four times as many people in one-fifth the time. Today, more people have mobile phones than are functionally literate. I do not mean to suggest that one replaces the other, but the remarkable spread of mobile communications is testimony to the unique value of communications to the human species; a value that is realized by the digital revolution. Information and communications are central to effective markets and democratic polities and communications would appear to be of unique value to humans. Whether or not this revolution in communications turns up in productivity or economic growth statistics, it represents an immense improvement in well-being. That improvement makes the continued failure to achieve universal service all the more troubling.

Despite being a leader in broadband implementation and adoption, The U.S. till has ground to cover. Exhibit IV-6 shows that in contrast to the dominant communications technologies of the 20th century (which penetrated well over 90% of households), basic broadband as defined by the FCC has reached only 60% of households. This level is unreasonable and untimely because it is the progressive American standard, as established in the 1996 Act, to which policy should be held.

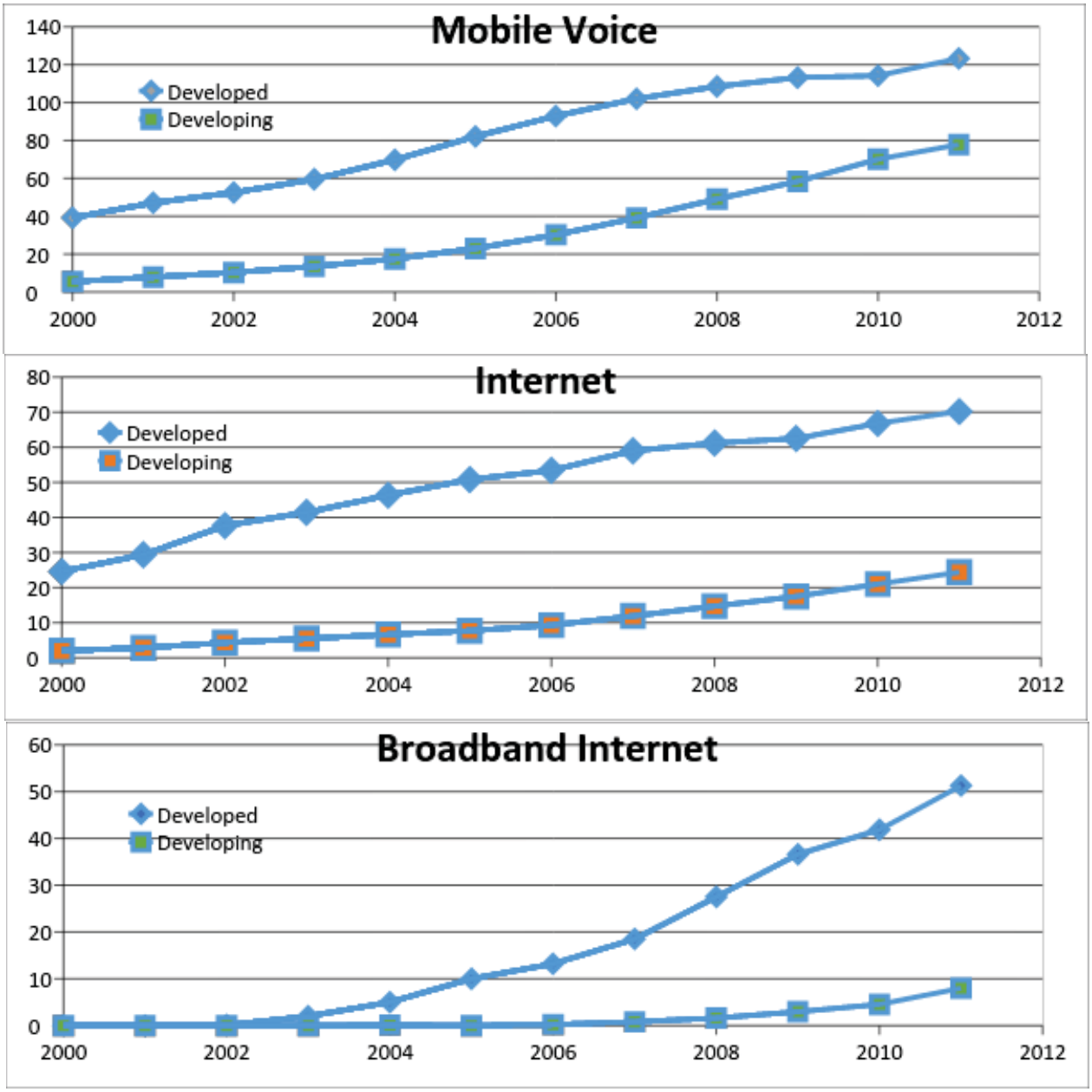
Exhibit IV-6: Percent of U.S. Households with Various Communications Services



Source: Statistical Abstract of the United States. FCC Broadband Reports

The revolution is more unfinished globally. Exhibit IV-5 shows that Internet adoption and wireless broadband are well below 50%. Those numbers must rise quickly to the 80% range and then confront the challenge of making mobile broadband adequate and its adoption ubiquitous.

Exhibit IV-5: Subscribers per 100 Population, Developed and Developing Nations



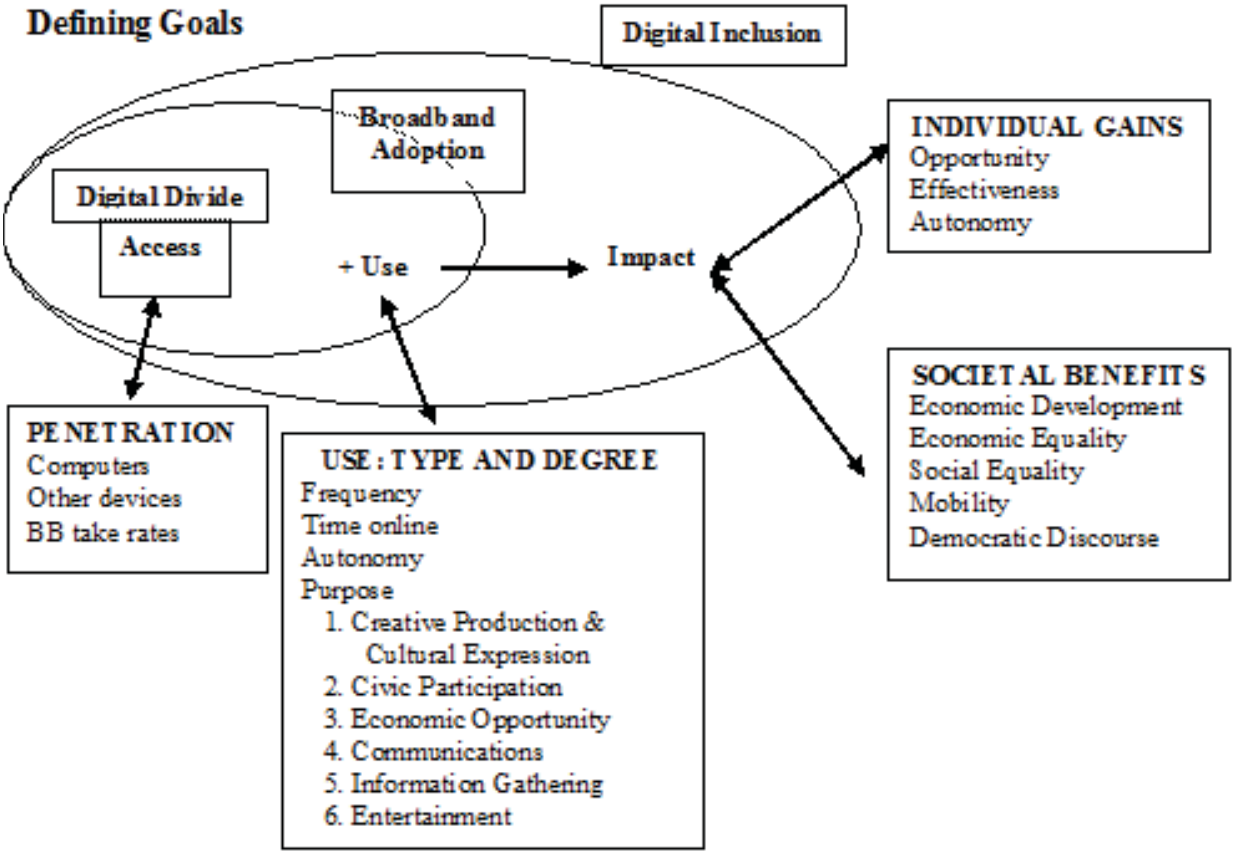
Source: ITU, ICT Data and Statistics

I. FRAMING THE ISSUE OF DIGITAL EXCLUSION

A. Access and Use

Concern about the pattern of adoption of digital information and communications technologies (ICT, primarily computers, Internet access, and broadband service) has been voiced since the Internet first began to penetrate widely, originally as a concern about a digital divide[438] and more recently as a concern about digital inclusion,[439] which is directly linked to the broader concept of social inclusion.[440] As shown in Exhibit I-1, as the impact of the technologies on all aspects of daily life (economic, social, cultural and political) has become clear, growing attention in the academic and policy literatures has shifted the framing of the question from one of access to the technology to a much broader concern about use[441] and individual efficacy.[442] The broader concept considers the impact of the technology on individuals and society.[443]

Exhibit I-1: Digital Inclusion Definition and Goals



The reason that the definition of success has expanded with the penetration of broadband is that digital ICTs have proven to be transformative technologies.[444] Digital technology fundamentally alters the conditions for success across a wide range of economic, social and civic activities at both the individual and societal levels. The empirical evidence overwhelmingly supports the view that maximum utilization[445] of broadband infrastructure can deliver benefits to households[446] and the nation – consumer welfare,[447] economic growth,[448] worker training,[449] civic participation,[450] e-government services,[451] education,[452] training,[453] community development,[454] ability/disability.[455] Simply put, in the 21st century it is extremely difficult for households or societies to thrive without adoption and utilization of broadband to the maximum extent possible.[456]

The impact that receives the greatest attention is the economic impact.[457] For individuals the benefits have been documented for educational attainment,[458] worker productivity, skill and compensation levels[459] and autonomy, [460]and entrepreneurship, especially among women,[461] as well as social development.[462] Being networked is valuable and communications are useful in accomplishing the outcome.[463] Differences in usage with broadband compared to dial-up are dramatic.[464] The high speed and capacity of broadband connections, as well as in their always-on feature, magnifies the value and impact of connectivity dramatically.[465] Broadband users are able to accomplish more online, such as sharing music and photos, shopping, banking, trading stocks, and becoming informed,[466] and are more active and creative with their online activities than narrowband users.[467] The earlier one adopts, the greater the benefit.[468]

Adoption and use of technology by individuals has benefits at the societal level through network effects and feedback loops creating a virtuous circle of development.[469] The benefits at the societal level have also been well-documented.[470] While the impact is frequently measured in terms of dollars invested in new technologies, the real pay-offs to digital technologies came in the form of intangibles,[471] including the impetus to reorganize industries,[472] network effects and spillovers, [473] and the impact on innovation.

While economic analysis tends to dominate the discussion of the benefits of digital technologies, the impacts that are of concern include other factors like social equality and mobility,[474] to civic discourse.[475] The pattern of analysis and debate that was observed with respect to the economic impact of digital ICTs was repeated in the realm of civic discourse. Initial hopes for the ability of the Internet to "save" democracy[476] were followed by pessimism that it had failed to strengthen democratic participation[477] and civic engagement. This pessimism was ultimately replaced by solid evidence that Internet activity enhances civic engagement.[478]

The pattern was repeated yet again in the realm of social isolation. Initial concerns that Internet use would result in people "Bowling Alone" in cyberspace proved unfounded.[479] Initial results were mixed, but as Internet use spread and became routinized, the bottom line was clearly positive; on balance, digital communications strengthens social connectedness. [480]

B. The Policy Context

Whether framed as a digital divide or digital exclusion, the issue has been charged politically. At the beginning of the Bush administration, when the digital divide debate was most

intense, the transition from dial-up to broadband had just begun. While it was clear that a digital divide already existed in Internet access,[481] it could be argued at that time that it was unclear how the digital gap would play out as broadband spread through society, since only about one-eighth of all households had broadband. Thus, one of the key issues in the debate over the digital divide at the beginning of the Bush administration was the question of whether broadband service would simply diffuse naturally throughout society (see Exhibit I-2).

Exhibit I-2: Normalization v. Stratification Models of Diffusion

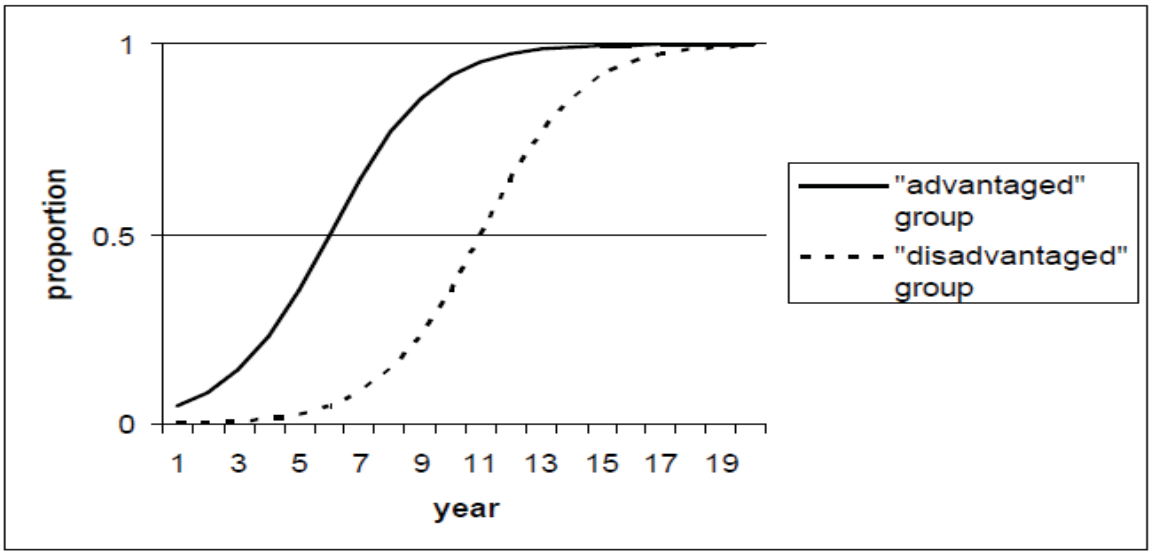
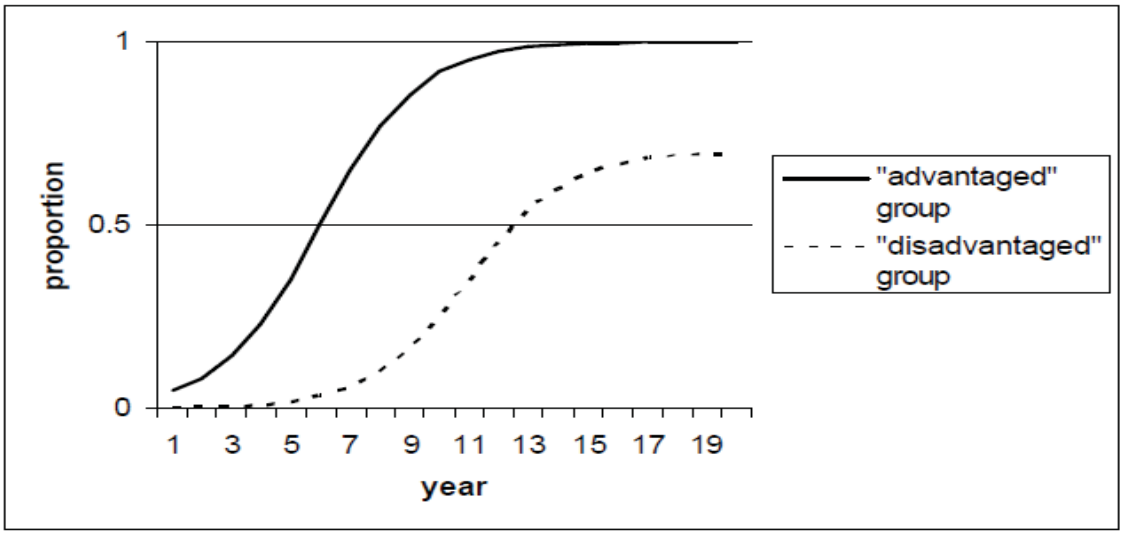


FIGURE 2: PATTERNS OF DIFFUSION CONSISTENT WITH A STRATIFICATION MODEL



Source: Steven P. Martin and John P. Robinson, "The Income Digital Divide: An International Perspective," *IT & Society,* 7 (1) 2004, p. 4.

The lead spokesperson in the Bush Administration at the time (and later John McCain's telecommunications policy point person), FCC Chairman Michael Powell made no bones about his belief that the pattern where technology trickles down from the first adopters, who are

wealthy, to the rest of society is the normal pattern.[482] If broadband is following a normal pattern of diffusion, then one could argue, as the Bush administration did, that there was no need to adopt policies to accelerate the process.[483]

On the other hand, some, like the Clinton Administration,[484] took a more interventionist view of the need to address the failure of Internet to penetration more even across society. They took a stratification view and argued that the urgent concern about digital exclusion stems from the fact that the process of cumulative disadvantage affects both individuals and nations[485] and inequalities can cumulate and reinforce one another.[486] As the technologies layer one atop the other to create a more potent platform, the skills and resources necessary to overcome digital exclusion mount, making it more difficult to gain inclusion. Other advanced industrial nations have debated digital exclusion and concluded it is an important problem.[487]

C. Outline

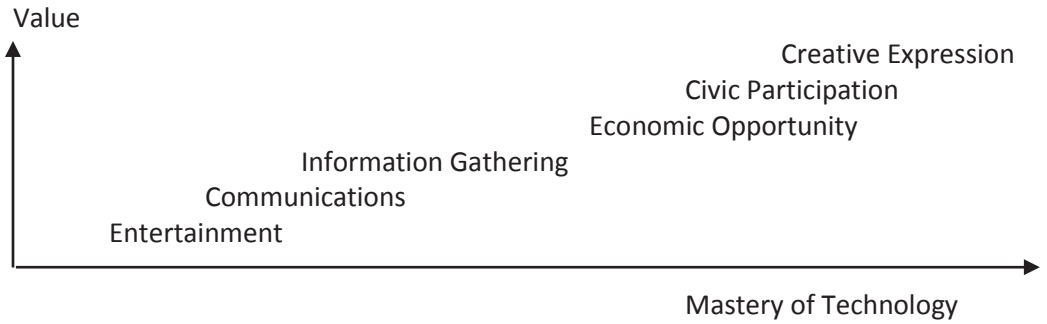
This paper examines the critical issue of the importance of digital exclusion and the processes by digital adoption takes place from three perspectives. The next Section examines patterns of use to underscore the disadvantage households suffer when they are disconnected. Section III examines the empirical evidence on the diffusion and adoption of the key technologies. Finally, Section IV presents an econometric model of adoption that demonstrates the complexity of the adoption process.

II. THE INCREASING IMPACT OF DIGITAL EXCLUSION

A. THE DRAMATIC INCREASE IN ONLINE ACTIVITY

The broad findings of the literature on the impact of connectivity noted above can be rendered in a more meaningful fashion by comparing the activities in key realms of daily life of individuals who have broadband at home to those who do not have the Internet at home. Focusing on counts of important daily activities that affect economic and civic engagement is a convenient way to highlight the difference between the connected and the disconnected, but the ease of the measurement should not obscure important qualitative and nuanced conception of use (see Exhibit II-1).

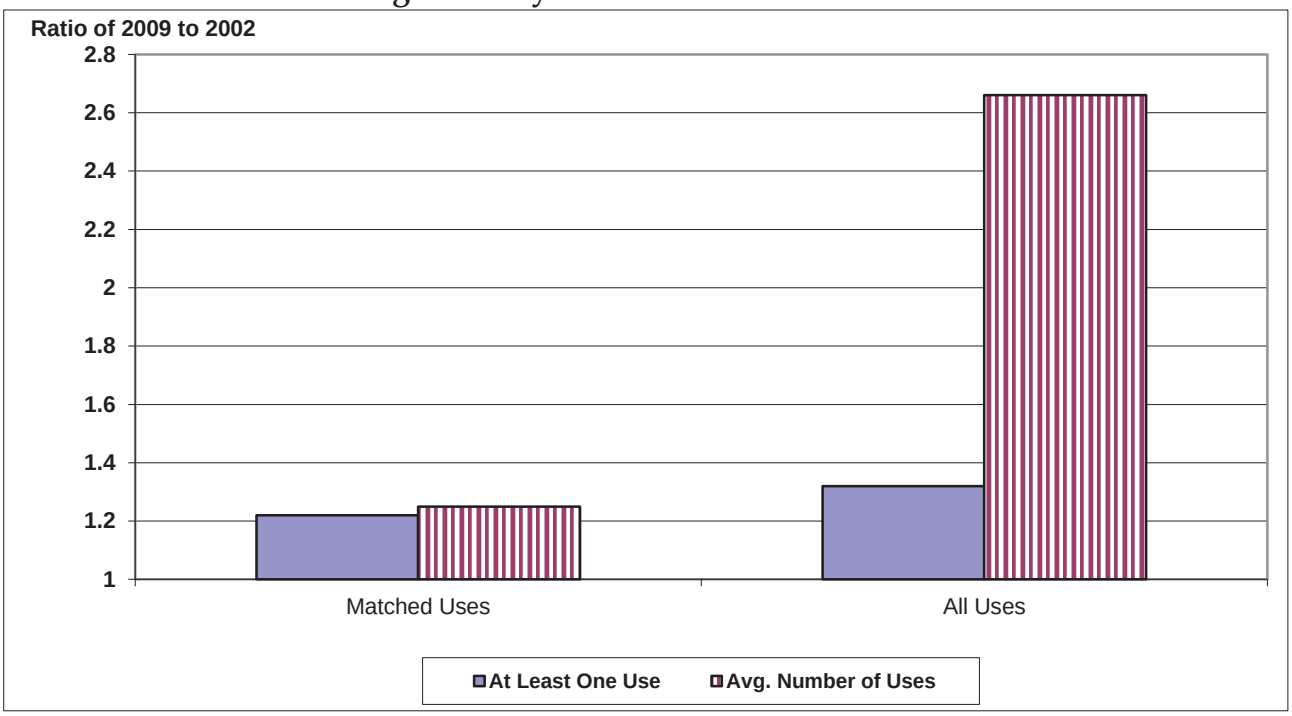
Exhibit II-1: Hierarchy of Internet Activities



The literature identifies at least six types of activities on the Internet that are placed in a rough hierarchy of policy relevance[488] These are generally assessed according to their "value" in society and the extent to which the usage demonstrates (or requires) mastery of the technology. While the judgments are "subjective," there is general agreement on the ranking of uses. The higher the level of the usage, the grater the necessary technical skills. Creative expression embodies the production and sharing of content online. This is generally deemed to be the highest level of use. Civic participation and access to economic opportunity are also rated highly. Information gathering and communications have become quite routine and are less often singled out as the standard that needs to be achieved. Finally, entertainment is seen as least important form the public policy point of view.[489]

Exhibit II-2 provides data on the usage characteristics of households to capture the concern about cumulation from the usage point of view. Broadband households make much more intensive use of the technology. Exhibit II-2 compares usage characteristics of all households that said they used the Internet in early 2002 to early 2009. In the 2002 data set three quarters of the Internet users at home were dial-up users. In 2009, four-fifths of the Internet users at home were broadband users. The exhibit is based on a summation of responses to a question that asked, "did you use the Internet yesterday" for specific activities. This is the best measure of the intensity of Internet use.

Exhibit II-2: The Increasing Intensity of Internet Use



Source: Pew Internet and American Life Project, *Daily Tracking,* March 2002; *Spring Tracking,* March-April 2009

Over time, the survey has asked about more and more potential uses (23 in 2009 v. 9 in 2002), as the Internet has become a more common platform for more activities. Although it is

appropriate to ask about more uses, to present a complete picture, we also include a subset of five uses that were included in both the 2002 and 2009 surveys (e-mail, news, weather, product purchase, online auction). The exhibit shows the ratio of responses in 2009 to 2002.

In the matched activities, 2009 respondents were 22 percent more likely to say they did at least one of the five activities "yesterday." They said they did 25 percent more of this small set of activities. Including all the activities, the 2009 respondents were 32 percent more likely to have said they engaged in at least one of the activities and they engaged in 166 percent more activities. Usage is growing more prevalent and intense as the technology penetrates and those who have not adopted the technology are falling farther and farther behind.

Exhibit II-3 shows the growth of individual activities across time. By 2000, almost two-thirds of adult respondents to the PEW surveys said they used the Internet and almost half said they used it on a daily basis (i.e. when asked whether they had used the Internet yesterday, in a March 2000 survey, about half said yes). Since then, not only has the percentage of respondents who says they use the Internet grown, but the percentage who says they use it on a daily basis has grown even faster.[490]

The uses of the Internet have expanded as well, as shown in Exhibit II-3. Basic uses, like e-mail and search for information are ubiquitous, with 80 to 90 percent saying they engage in these activities and over 50 percent saying they did so "yesterday." Economic activities, like buying a product, looking for a job, or banking online have become quite common, with majorities saying they engage in these activities. Use of social websites and video sharing sites has become common as well. Activities that show creative use or production by individuals have also grown with one-seventh to one-quarter of respondents saying they engage in these activities, although daily activity is much lower in this realm.

B. The Disadvantages of Being Disconnected

In order to fully appreciate the impact of not being connected it is illuminating to compare and contrast the level of various activities in physical space and cyberspace. We find that being disconnected cuts a household off from the important and growing opportunities in cyberspace. By being cut off from cyberspace activities, digital exclusion makes the maldistribution of opportunities in society worse, not better.

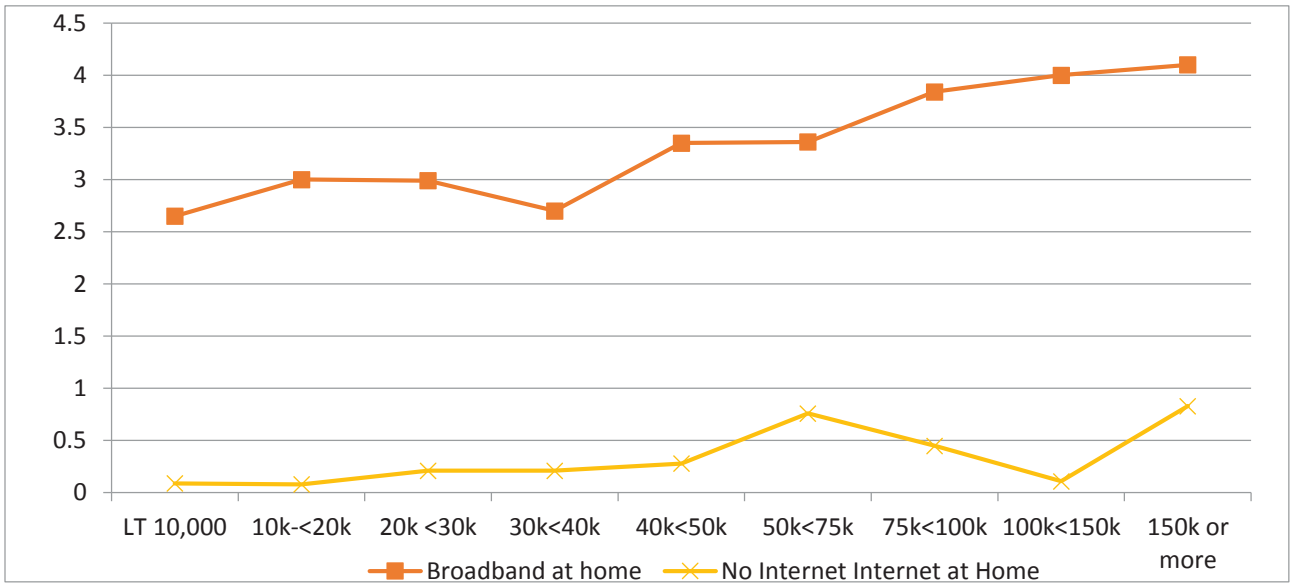
Exhibits II-4 contrasts the level of online activity for those with broadband at home to that for those without the Internet at home. It controls for income as a critical background factor. Households with broadband average seventeen times as much Internet activity per day as households without the Internet at home (3.4 versus 0.2).

Exhibit II-3: Internet Activities Across Time (percent of Respondents)

	Yesterday											Ever Do it									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Activity																					
E-Mail	43-52	42-53	46-51	48-53	45-51	49-54	52-53	56-60	56-60	57-58		91-93	93-95	93-95	91-93	93	90-91	90-91	90-92	89-92	89-90
Buy a Product	3-4	2-6	3-4	5	3		6	6-7		8		46 -49	51-59	67-62	61	65-67	67	71	66-71		75
Look For a Job	5		4	7	4	7	5		6	9		38		47	43	42	44	46		47	52
Bank online	4		7-10	9		12-15		21	19	24		18		30-32	34		41-43		53	55	57
Rate a Product					2	3		3		3						26	30		32		31
Do an Auction		2-3	3-4		3	3	3	3		3			15-17	20-22		23	24	27	26		27
Craig's List						6	4-6	6		9							22	30	32		49
Visit Gov't Site	6-7	5-7	8-10	9-11	10		14		10-13			47-51	57-60	56-62	65-67	54		66		59-66	
Soc. Network Site						2-3	9		13-19	27							7-11	16		29-35	45-47
Watch Video on a share site							8	15		19								33	48		62
Write a Blog			1		1		1-2	5	5	2				3-7		5		7-10	8-13	11-13	11
Read a Blog					3	5-7		10	10-12							17	23-27		29	32-36	
Post Comment										8									18-22		26
Work on Others' Web site										4								11-13	13		15
Remix						3			3	2							18		9	11-17	15
Share own Stuff										4								19	22		30
Twitter									2-4	5-9										6-11	11-19

Source: Pew Internet and American Life Project, Trend Data

Exhibit II-4: Number of Internet Activities Yesterday by Income and Connectivity



Source: Pew Internet and American Life Project, *Spring Tracking*, March 2009.

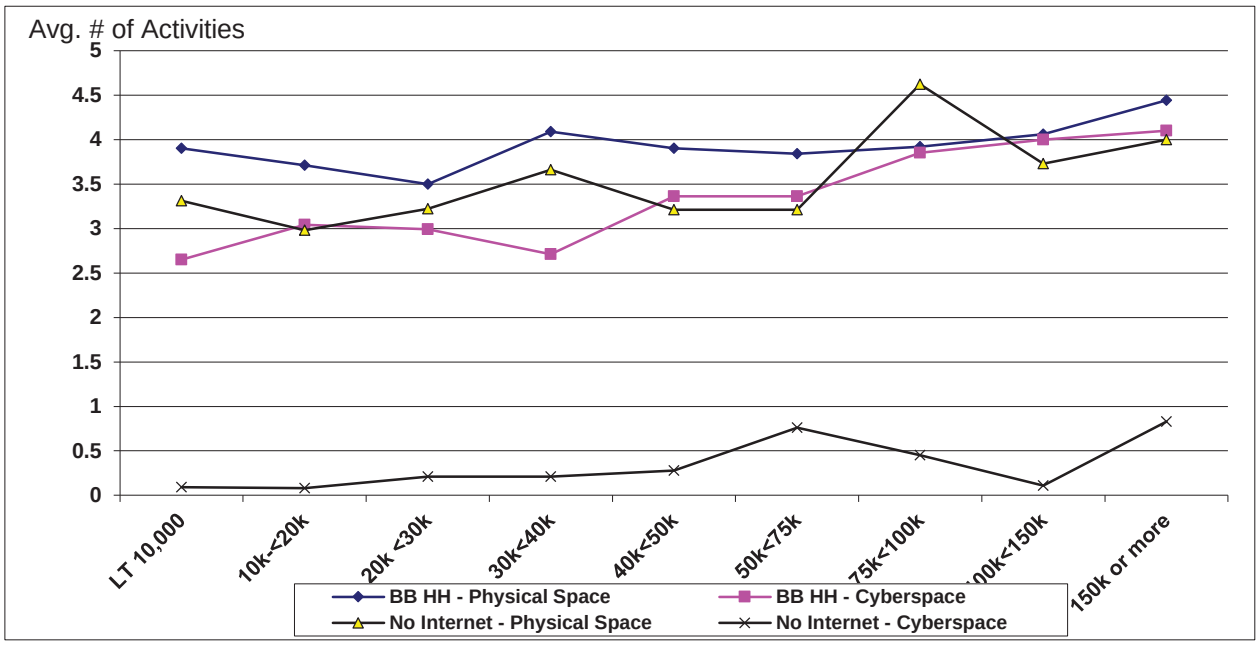
To add context to this comparison, Exhibits III-5 and III-6 show levels of activity in physical space and cyberspace. These Exhibits are based on a count of activities respondents reported with very specific reference to the economic recession, an event that was very prominent at the time of the interview. Exhibit III-5 shows the levels of activity of respondents seeking personal help as well as general information about the current economic crisis. The Exhibit controls for income to account for the fact that higher income households tend to have higher levels of activity in general. Broadband households engage in high levels of activity in both physical space and cyberspace in seeking advice/info. Disconnected households engage in very similar levels of activity seeking advice/info in physical space, but they are cut off from the activity in cyberspace. This is as stark a contrast as one will see in this type of analysis.

Exhibit II-6 shows a similar analysis for political and civic engagement. The questions were geared to the ongoing election, so they were quite specific. The pattern is similar, although the difference between broadband households and non-Internet households in physical space activity is somewhat larger. Households with incomes above $75,000 who do not have Internet have much lower levels of political activity. They fall into a category Horrigan calls Internet avoiders, which appears to be a non-participatory group. Households with incomes below $75,000 participate at a higher level in physical space and there is a clear, positive relationship between income and political participation. Being disconnected creates a severe inequality in political participation for those households.

The cause of concern about digital exclusion exacerbating inequality in society is borne out in this data. People who do not have the Internet at home end up with much lower levels of

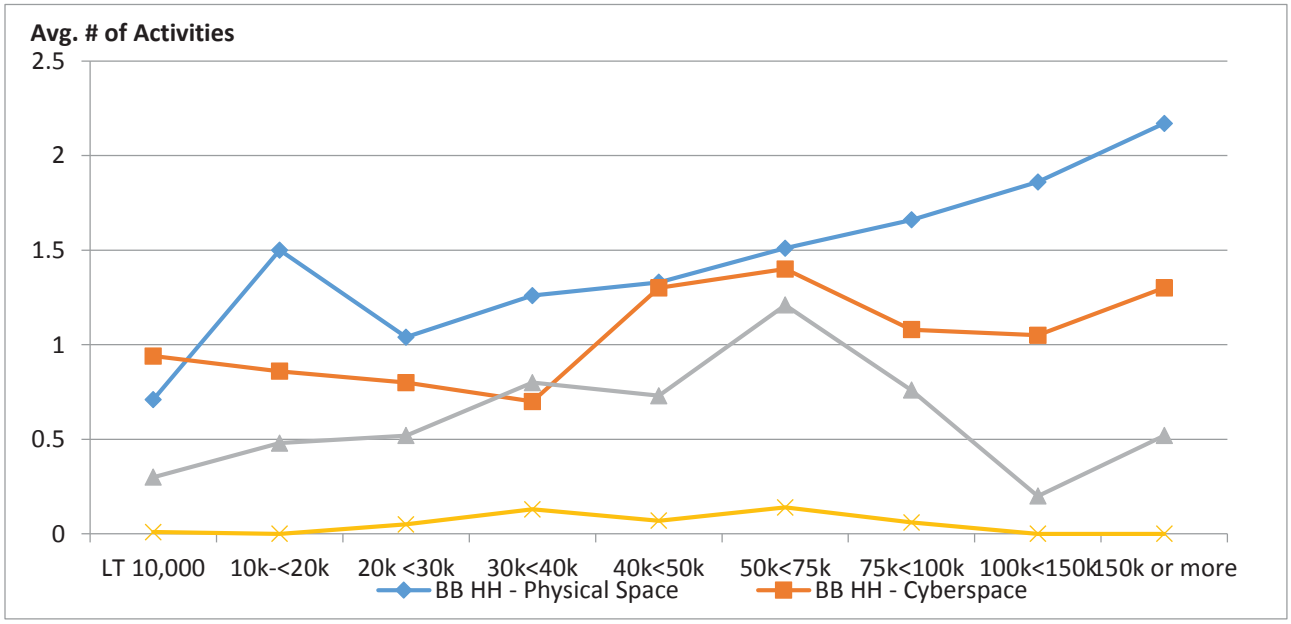
activity than those who have broadband at home. Being disconnected creates the bulk of the deficit of activities for the excluded households.

Exhibit II-5: Economic Advice Activity in Physical Space and Cyberspace



Source: Pew Internet and American Life Project, *Civic Engagement database*, August 2008

Exhibit II-6: Political Activity in Physical Space and Cyberspace



Source: Pew Internet and American Life Project, *Civic Engagement database*, August 2008

III. Will Digital Exclusion Disappear through the Operation of the Market?

A. Normalization, Stratification or Cumulation in Technology Diffusion

The central question in the debate at the onset of the broadband era was whether or not the technology would diffuse naturally through the population and whether the rate of diffusion was unacceptably slow. The argument was applied to both people within nations and across nations. As depicted in Exhibit I-1, this was called the normalization model. Those on the other side of the debate put forward what was known as the stratification model, as shown in Figure 2 of Exhibit I-1. They argued that each successive generation of technology would exhibit the same slow diffusion for a significant part of the population so that inequality would persist through the generations of technology.

The current data suggest that the stratification model was closer to reality – at least in the sense that the digital divide has persisted. There remains a substantial segment of the population across and within nations that is still disconnected. In a sense, the situation is worse than the stratification model suggested because the technologies are cumulative, as suggested by Exhibit III-1. On the one hand, each subsequent generation of technology creates greater functionality, so that those who have it are much better off. On the other hand, each generation of technology becomes more demanding in terms of cost (resources) and skill to master. Those who did not get in on the earlier rounds of technology adoption find it harder to catch up. The rich get richer and the poor get poorer, at least in a relative sense.

The curves in Exhibit II-1 are drawn to capture several key characteristics of the diffusion of complementary technologies. First, not all technologies penetrate to 100 percent. Second, later technologies will penetrate more quickly because the basic platform technology has smoothed the way. Third, the cumulation of technologies may raise the overall penetration level as more uses are found for the platform and therefore more users are attracted to it. Fourth, the disconnected are disadvantaged.

B. U.S. Diffusion Data

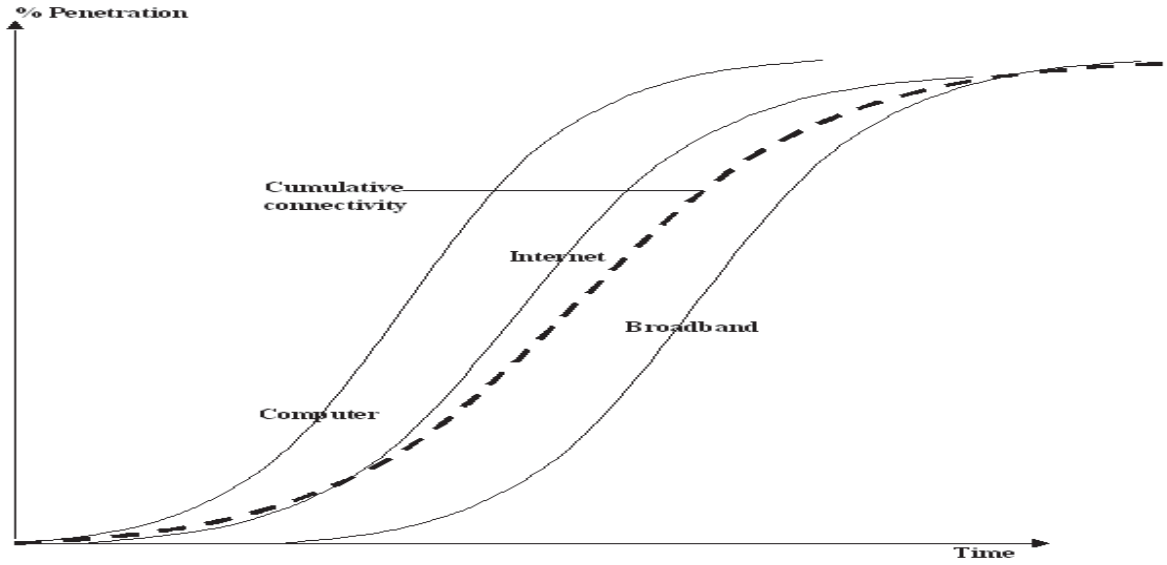
Exhibit III-2 presents the U.S. diffusion data for the three critical technologies in broadband adoption (computers, Internet access and broadband access). In the U.S., it took about twice as long for Internet penetration to reach 60 percent as it did for broadband penetration to reach 60 percent. Each subsequent generation of technology spreads faster for the early adopters, but the gap between the haves and have nots grows. There is also some indication that adoption of the earlier technologies is leveling off well short of 100 percent penetration, with computers at 80 percent and Internet at less than 70 percent. The prospect of a permanent digital divide with 20 to 30 percent of households excluded from cyberspace is an ominous possibility.

If the 20+ percent of the people who do not use the Internet and the 30+ percent of the people who do not have broadband were randomly distributed, one could argue that this is a simply a personal choice and there is little cause for concern or basis for public policy. That is not the case. Adoption follows clear socio-economic patterns. From the very beginning of the

discussion of the digital divide through the current analysis of digital exclusion it has been clear that there are demographic and socioeconomic dimensions to unequal access and use of digital technologies.

Exhibit III-1: A Cumulative Diffusion Model

Stratified Diffusion with Cumulative Technology



Stratified Diffusion with Cumulative Technology and Digital Exclusion

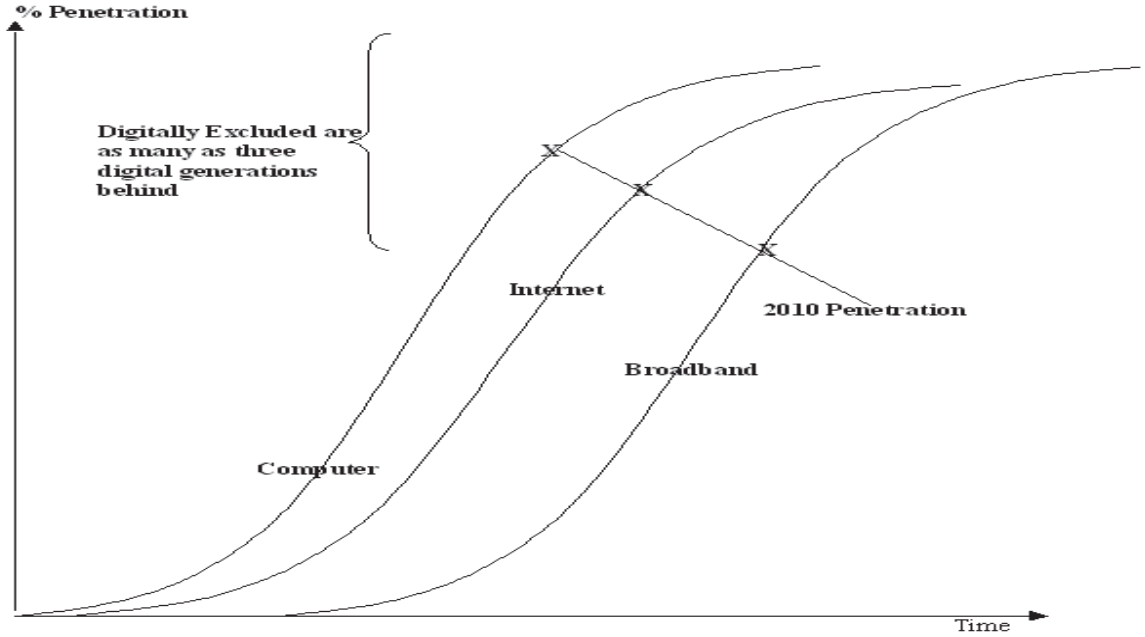
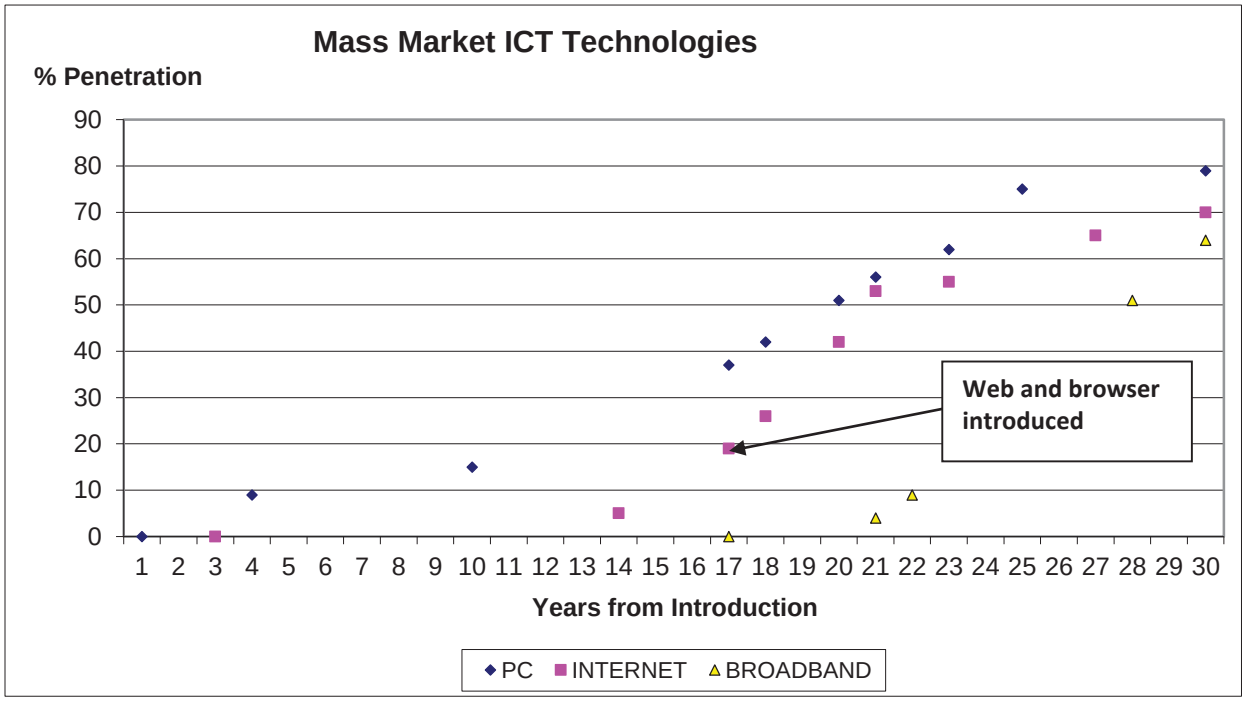
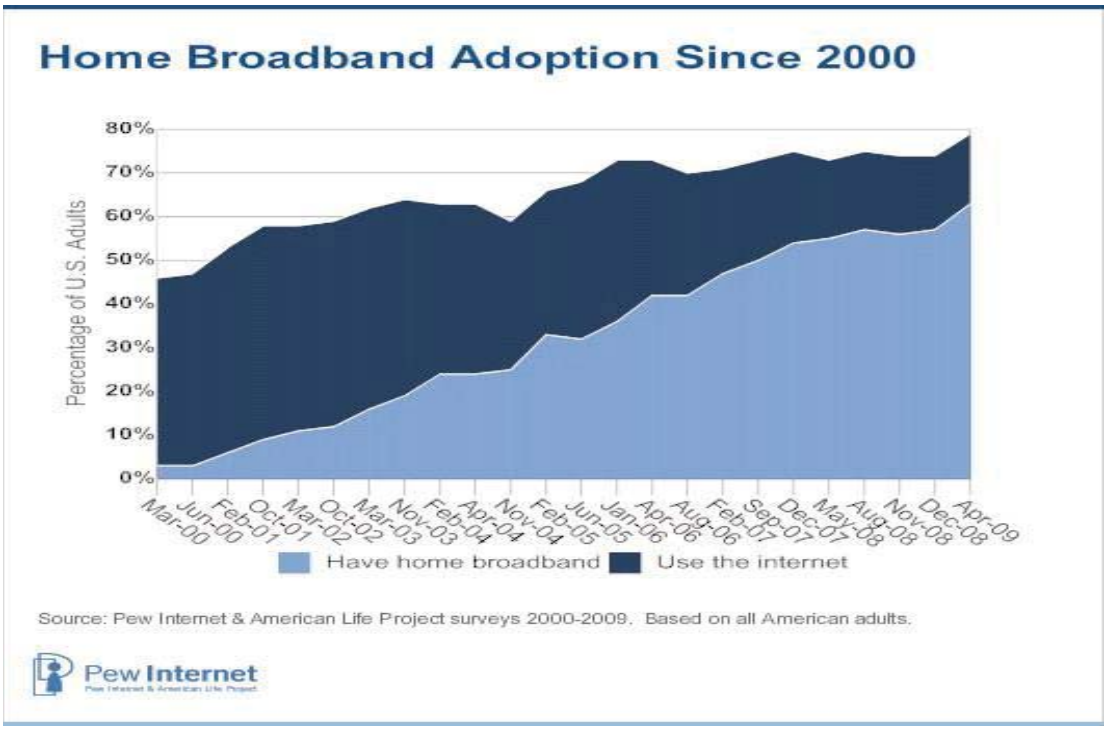


Exhibit III-2: Penetration of Mass Market ICT Technologies in the U.S.



Source: M. Cooper, 2003, "Making the Network Connection," in M. Cooper (Ed.), *Open Architecture as Communications Policy* (Center for Internet and Society, Stanford University), P. 141, updated with NTIA, 2010.

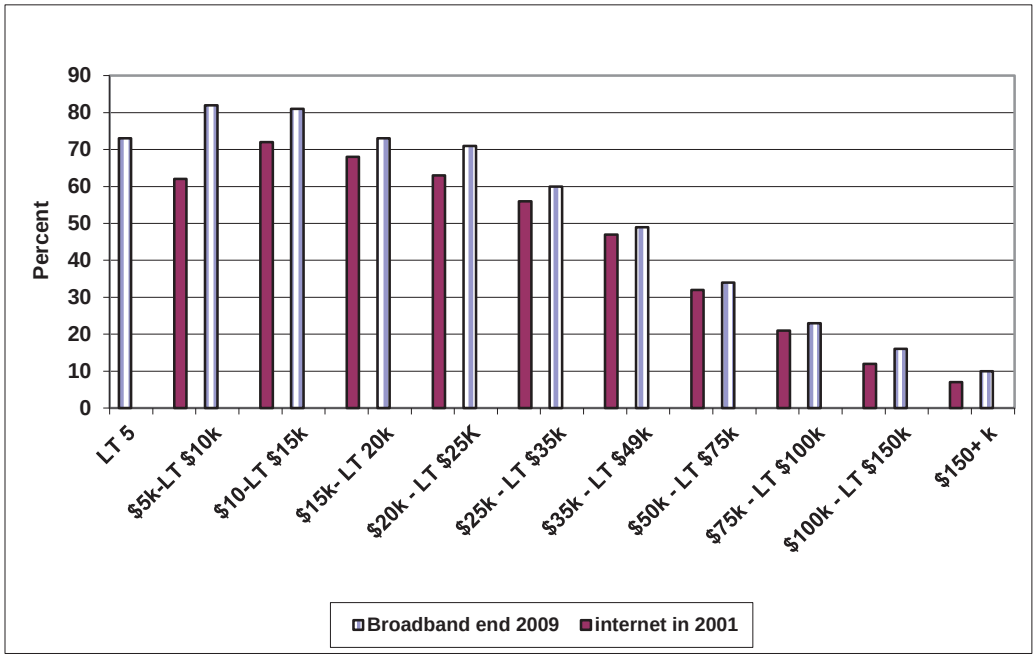


Key demographic and socioeconomic factors can be used to describe the landscape of who does and does not use the technologies. These basic underlying causes of the digital divide have received a great deal of attention. The persistence of the importance of these factors can be seen in a comparison of Internet adoption in 2001 to broadband adoption at the end of 2009.

As shown in Exhibit III-3, it can be argued that little progress has been made in closing the digital divide or addressing digital exclusion.[491] The highest levels of penetration have stabilized above 90 percent for the wealthiest households (incomes above $100,000), while it remains at around 30 percent of the lowest income households (incomes below $15,000) and less than 50 percent for households with incomes up to $25,000. The trickle down is very slow and the NTIA's most recent analysis concluded that "too many Americans still rely on slow, narrowband Internet access or do not use the Internet at all."[492]

Exhibit III-3: The Digital Divide Persists in Broadband:

Households without Broadband 2009 v. Households without Internet 2001

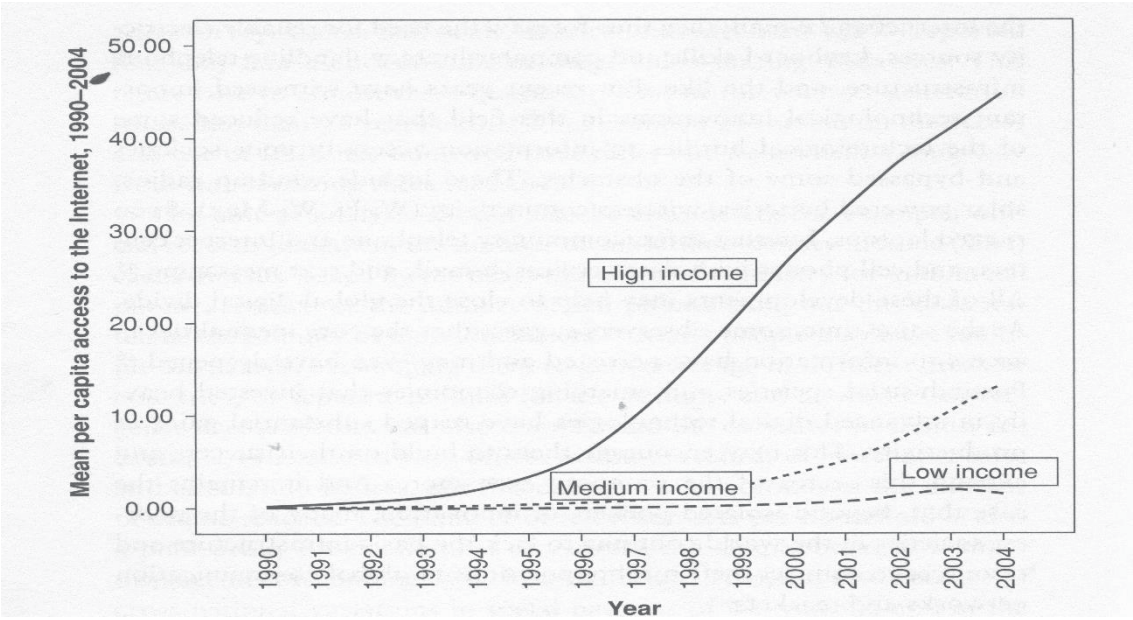


Source: MarkCooper, 2004 for 2001, NTIA, 2010, 2009.

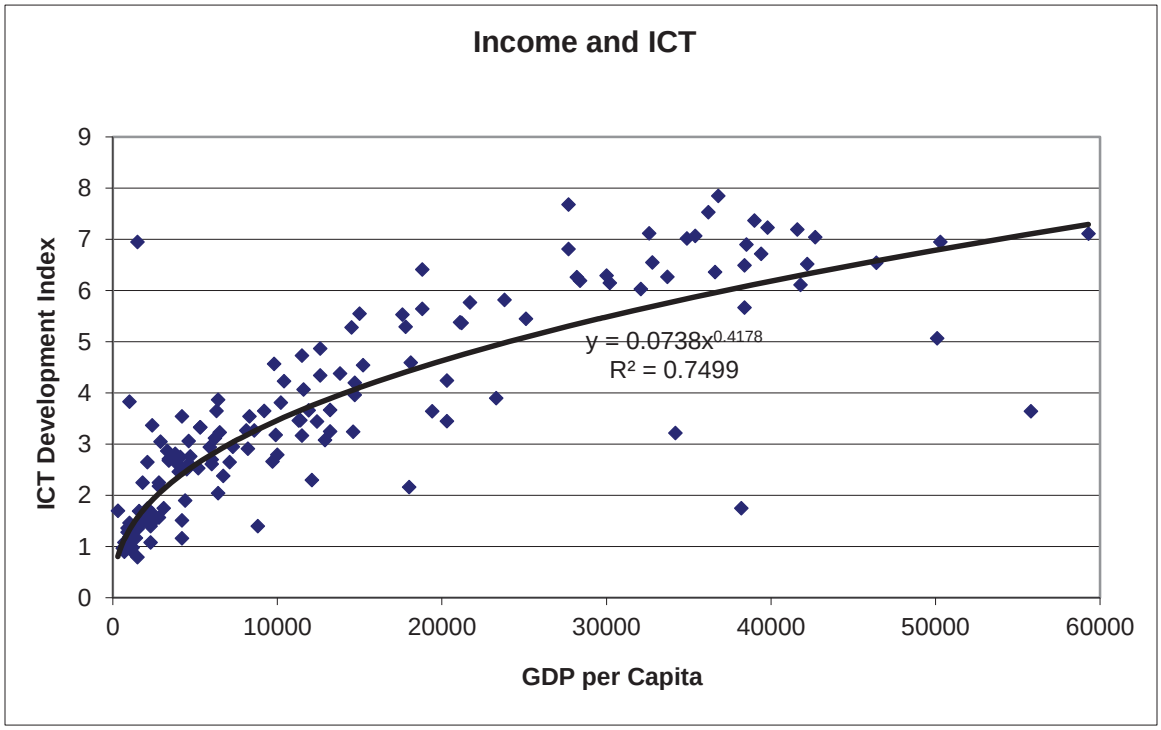
C. INTERNATIONAL DATA

The evidence on the cumulative process is even stronger at the international level (as shown in Exhibit III-4). Lower income nations have fallen farther behind on Internet. Recognizing the gap that occurs globally at about $30,000 of per capital income, the global divide is striking. About 6 billion people have low incomes and low ICT development; about 1 billion have high incomes and high ICT development.

EXHIBIT III-4: THE GLOBAL GAP IN ACCESS TO THE INTERNET



Source: Pippa Norris and Ronald Inglehart, *Cosmopolitan Communications: Cultural Diversity in a Globalized World* (Cambridge: Cambridge University Press, 2009), p.112.



Source: ITU for ICT and IMF for GDP.

Looking back at the normalization model, there are no signs that adoption is converging

on 100 percent after more than a quarter of a century. The shortfall is substantial and systematic across income groups and larger with each generation of new technology. It is always possible to argue that not enough time has passed for the normalization to have taken place, but three decades is an eternity in cyberspace. The disconnected have been effectively excluded and the conclusion of the national broadband plan report, that it is time to implement aggressive policies to address the problem is well supported by the data.

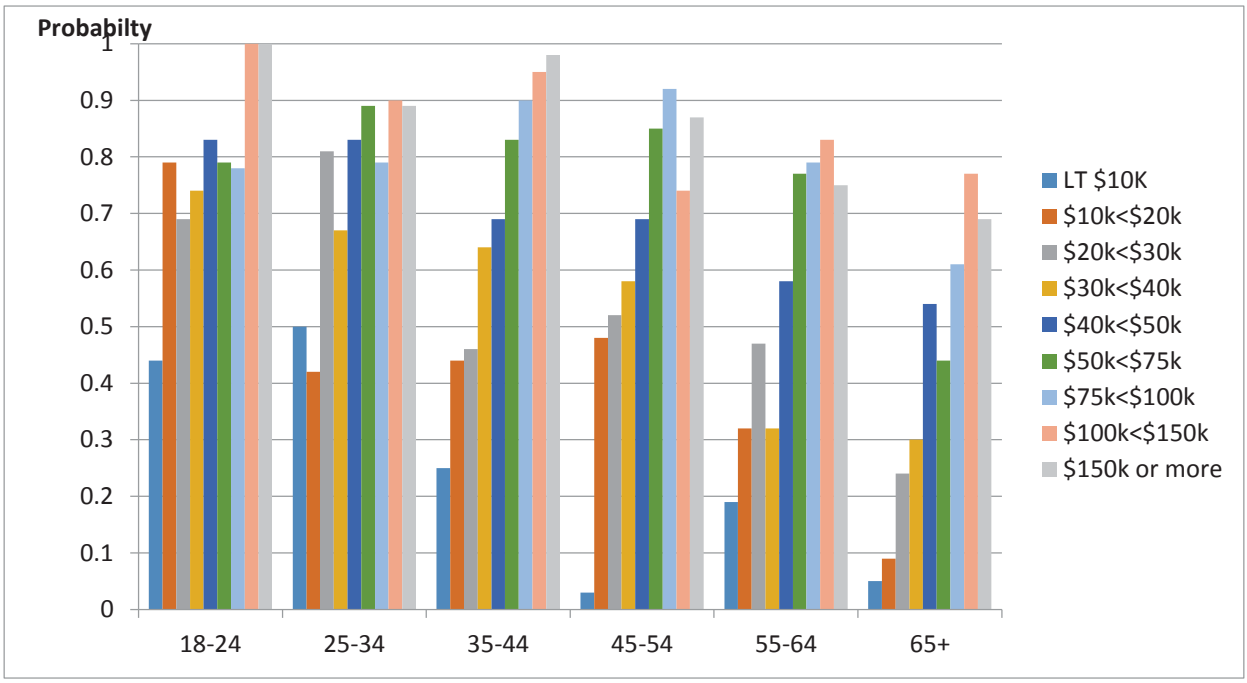
THE SOCIOECONOMIC CAUSES OF DIGITAL EXCLUSION

A. DEMOGRAPHIC DETERMINANTS OF ADOPTION

While income is a powerful predictor of9 adoption, as shown above, it is not the only background determinant of digital adoption. Income and education are highly correlated socioeconomic variables and both affect adoption. Age is also a critical demographic factor. Race/ethnicity also play a role, but controlling for income and education shows that a large part of the effect of race and ethnicity is through their impact on income and education. Because people of color tend to have lower incomes and less educations, in America, the racial and ethnic dimension of digital exclusion overlap are accounted for by the income and education factors. The influence of gender on access and use has declined over time, although it continues be important in some aspects of use.

Exhibit IV-1 shows that higher income respondent are more likely to subscribe to broadband and older respondents tend to have lower rates of adoption, across income categories.

Exhibit IV-1: Age, Income and Broadband at Home: Probability of Subscribing

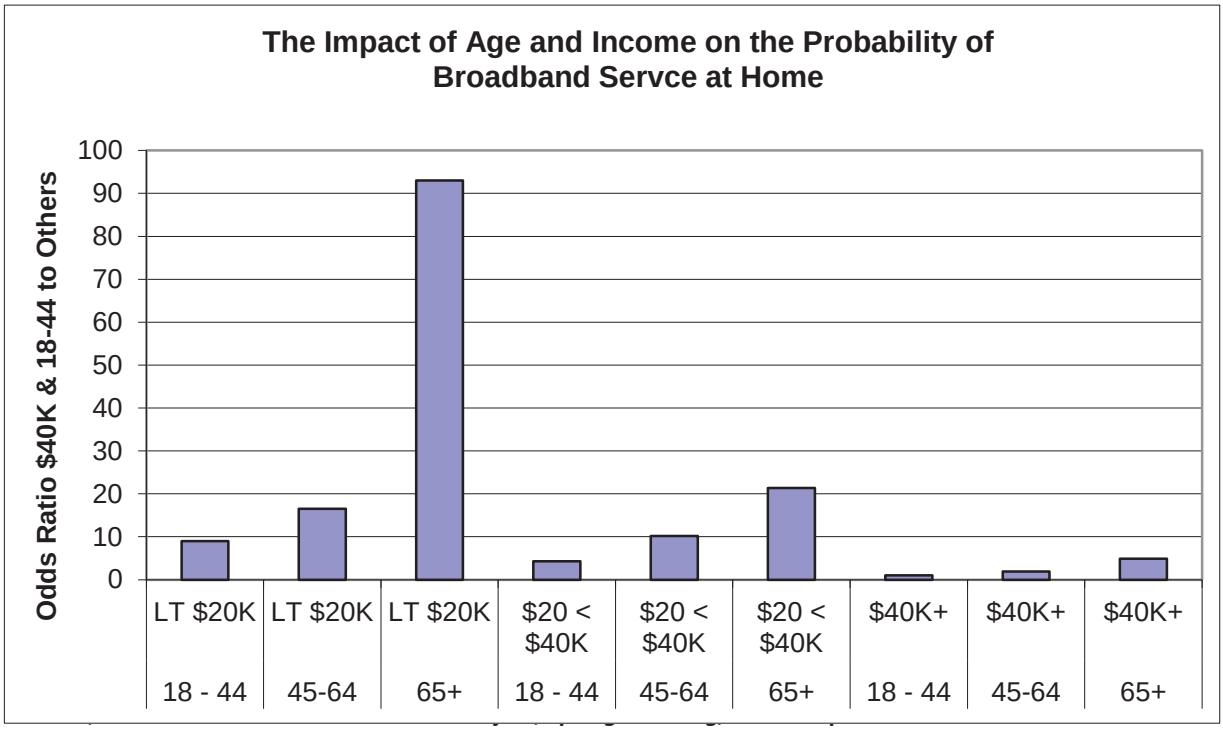


Source: Pew Internet and American Life Project, *Spring Tracking*, March-April 2009

Following Dimaggio, et al, Exhibit IV-2 presents the odds ratio of the group with the highest take rate of broadband to the other groups.[493] We use the penetration of broadband at home in the category of younger (ages 18-44) middle/upper income (income above $40K) respondents. The younger middle/upper income group has achieved nearly universal broadband

service. In this data set, which is from early 2009, 92 percent of this category had broadband at home. This category is far ahead of other socioeconomic categories.

EXHIBIT IV-2: A SIMPLE, MULTIVARIATE MODEL OF DIGITAL EXCLUSION



The highest take-rate group has a take rate that is over eight times as high as older, lower income (65 and over, less than $20K), who have a take rate of 11 percent, and they are 93 times as likely to have broadband based on the odds ratio;

a take rate that is 2.6 times as high as older lower middle income (65 and over, $20K to < $40K), who have a 35 percent take rate and they are 21 times as likely to have broadband, based on the odds ratio;

a take rate that is 2.2. as high as middle age, lower income adults (age 45 < 65) with a 41 percent take rate and they are 17 times as likely to have broadband based on the odds ratio;

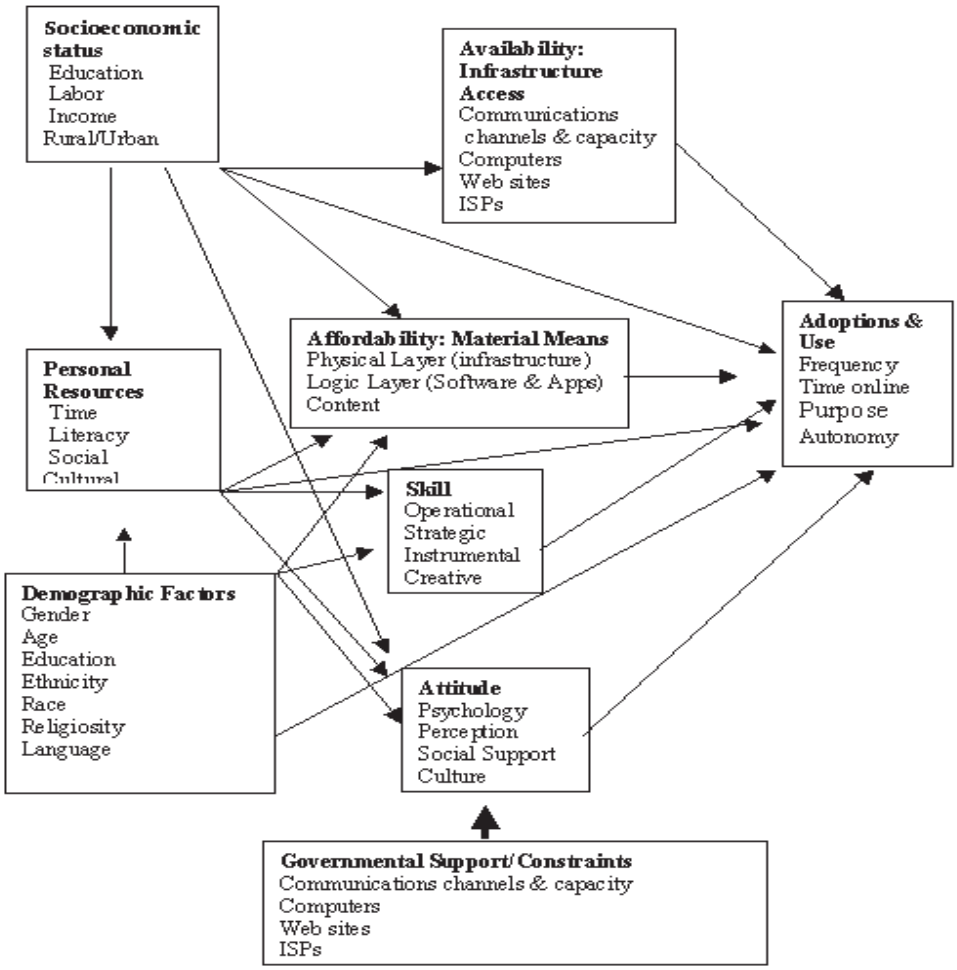
a take rate that is 1.7 times as high as younger, low income adults who have a 53 percent take rate and they are 13 times as likely to have broadband based on the odds ratio;

a take rate that is 1.6 times as high as middle age, lower middle income adults, with a 56 percent take rate and they are 9 times as likely to have broadband based on the odds ratio.

B. Complex Models of Adoption

The complex models of broadband adoption that have been suggested in the social science literature have adopted a resource framework that identifies different types of "capital" and resources that are necessary to adopt a technology (see Exhibit IV-3). The endowment of resources available to households on the demand side of the market, which reflects the underlying distribution of resources in society, plays a key role, as do supply-side factors such as price, availability and the nature of the services reflect the supply-side of the market Behavioral factors (motivation and perception) play an important role.

Exhibit IV-3: Digital Divide Indicators Relations Modeling



Source: Karine Barzilai-Nahon, "Gaps and Bits: Conceptualizing Measurements for Digital Divide/s," *The Information Society,* 2006, 22. p. 273.

The enumeration of the detailed factors that affect adoption gets quite long, as shown in Exhibit IV-4 synthesizes about half a dozen discussions. Exhibit IV-3 identifies four main categories of proximate causes of broadband adoption and digital exclusion—Availability, Affordability, Skill and Attitudes.

Exhibit IV-4: Major Categories of Factors Affecting Digital Exclusion

Availability:	Physical: proximity and access to ICT equipment and services. Bandwidth (services), Applications (Content), Hardware (Devices
Affordability:	The user can afford to use the equipment Financial: ability to pay for ICT equipment and services Temporal (time to spend on different activities)
Skill:	The user has the required cognitive skill and knowledge to use the equipment to identify information needs and find, use, evaluate and store information. Multi-literacies: Technological, Language, Numbers, Creative and critical skills Operational: Navigation, Usability (physiological limitations), Experience Technology Design: 'human-machine' interface, hardware and software designed to meet needs of a population, Complexity, Diversity, Intensity
Attitude:	The user has the individual inclination and social location to use the technology Psychological: The user feels comfortable about using the equipment. Perception: Interest, Motivation, Relevance, Practical value Social resources (Interpersonal relationships): Co-participation and sharing; Social network positions and relations in workplace, home or community (spaces & places; planning) Organizational forms and regulations that structure access to digital content in particular ways. Cultural: Status credentials appropriate for the user to be in the location and use the equipment Content: meaning and significance to culture or lived reality. Local language, local content, effective user control and interface; Production: ability of individuals to develop content of their own.

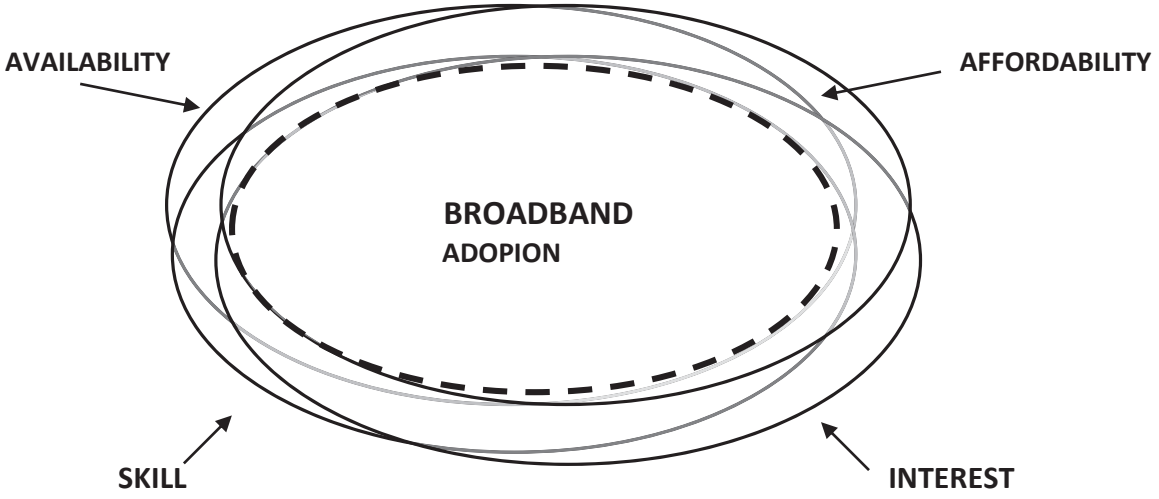
Source: Jan A.G. M. van Dijk, *The Deepening Divide: Inequality in the Information Society* (Thousand Oaks: Sage, 2005), p. 24; Karine Barxilai-Nahon, "Gaps and Bits: Conceptualizing Measurements for Digital Divides/s," *The Information Society*, 2006, 22. p. 273.Dahms, 2009, M., 2009, "Shifting Pocus from Access to Impact: Can Computers Alleviate Poverty?" in Enrico Ferro, et al. (Eds.) Overcoming Digital Divides: Constructing an Equitable and Competitive Information Society (Hershey:IGI Global, 2010), p. 450); Selwyn and Faser, 2009, Beyond Digital Divide: Toward an Agenda for Change, in E. Ferro, et al., (Eds.) Overcoming Digital Divides: Constructing an Equitable and Competitive Information Society (IGI), p. 5, 7; Dunn, 2009, p. 330; Comunello, 2009,pp. 592, 596, 597; Hill, Davies and Williams, "older People and Internet Engagement: Acknowledging Social Moderators of Internet Adoption, Access and Use," Information, Technology & People, 21(3) 244-266.pp. 254-255..

The means of material access to broadband service are only a part of the problem. Households have to be motivated to acquire the services and have the skills to use it. Motivation includes the perception that there is content and applications worth paying for. Households must have the technical skill to adopt and use the technology. Finally, the nature of the technology and efforts to enhance its adoption are important. Closing the digital divide is no longer seen as primarily or simply a matter of making the technology available. Success comes when individuals master the technology and put it to a wide range of uses. Defining the ultimate object

according to the nature and extent of use shifts the focus of what determines a successful outcome significantly. It is important to appreciate the full complexity of the challenge.

Exhibit IV-5 integrates the background factors and the proximate causes into one overall framework. The four proximate causes of broadband adoption and digital exclusion overlap because of the strength of the background factors. Exhibit IV-5 makes this point in two ways. It is drawn to scale to reflect the fact that about two-thirds of all households have appropriated broadband. Second, it highlights the modest percentage of households that are affected by only one of the four factors that result in digital exclusion. When survey respondents are asked about what keeps them from adopting the Internet or broadband, they are (or should be) allowed multiple responses. As a result, each individual cause will represent a small percentage of the total causes and households giving only one cause will represent a small share of the total.

Exhibit IV-5: Complex Causes of ICT Adoption



Source: P. Verdegem and P. Verhoest, "Profiling the Non-User: Rethinking Policy Initiatives Stimulating ICT Acceptance," *Telecommunications Policy,* 31, p. 644.

C. A Sociological Model of Digital Exclusion in the U.S.

This section uses recent survey data to demonstrate that the "models" of broadband adoption developed in the literature apply to the U.S. While the theoretical literature is rich in explanation of the complex causal model, the empirical literature tends to focus on traditional demographic and socioeconomic factors. Very few data sets include the complete mix of factors that affect broadband adoption. While demographic and socioeconomic data is generally available, data on technology specific resources, skill and attitudes for analysis of the adoption of technologies within countries is not generally available. Where data is available, it is quite old. Cross-national studies use structural indicators of skills – like education or telephone penetration as proxies. To gain further insight into the complex causes of broadband adoption, this section

uses an early 2009 survey by the Pew Internet and American Life project (as well as several other recent Pew survey), which included key questions on attitudes. The Pew data supports the general findings of the social science literature.

Method

The Pew survey data includes a standard set of background and technology questions, as described in Exhibit IV-6. For the purposes of this analysis, the early 2009 survey has two important features. First, it included a series of questions about why households do not have Internet service, which is quite rare. The survey had two sets of questions that help define the technology resource variables. One set addressed why the respondent did not have the Internet at home. One set addressed why the household did not have broadband at home. We have combined these two. The list of possible factors inhibiting internet service was long and had a number of items that the literature indicated are important household resource factors. We summed the individual responses into an index of activity

Interest
- I'm just not interested
- Don't need/want it
- It's a waste of time
- Too busy

Availability
- Don't have access
- Don't have a computer

Affordability
- Expense
- Price

Skill
- It too difficult
- Too old to learn
- Just don't know how
- Physically unable

Fear
- Worries about computer viruses
- Worried about spyware
- Worried about spam

The fear category had very few respondents so it was dropped from the analysis.

Second, the survey asks questions about activities the respondent engaged in on the Internet in both general terms and also on a daily basis. That is, it asks whether each of a set of activities was engaged in "yesterday." We use the "yesterday" responses to build an index of Internet use both because "yesterday" is an easy recall measure and because it represents regular use. We sum all the activities that were engaged in yesterday into a measure of Internet use.

This data set also had two sets of questions that focused on specialized uses that were oriented toward hot topics – the election campaign and the economic recession. We sum the responses to this long list of questions about the use of the Internet in these two contexts. Although these questions are somewhat weaker than the "yesterday" questions, because the uses were very specific and topical, these questions provide insight into two areas of Internet use that are deemed quite important – political and economic activity – in a focused manner.

Exhibit: IV-6: Variables

Category of Variable	Variable Name	Type of Variable	
Background			
	Age	Ordinal	Age: 1 = 18-24, 2 = 25-34, 3 = 35-44, 4 = 45-54, 5 = 55-64, 6 = 65+ or more
	Parent	Dummy	0 = "no", 1= "yes"
	Race		
	Black	Dummy	0 = "no", 1= "yes"
	Hispanic	Dummy	0 = "no", 1= "yes"
	Gender	Dummy	1 = "male," 2 = "female"
	Rural	Dummy	0 = "no", 1= "yes"
Socioeconomic Status	Education	Ordinal	Education: 1 = LT HS, 2 = HS Grad, 3= Some Coll, 4 = Coll. Grad or more
	Income	Ordinal	Income: 1 = 10<, 2 = 10 < 20, 3 = 20 < 30, 4= 30 <40, 5 = 40 < 50,
Technology			6= 50 < 75, 7 = 75 < 100, 8 = 100 < 150, 9 = 150 or more
Lack of:	Material	Dummy	0 = "no", 1= "yes"
	Interest	Dummy	0 = "no", 1= "yes"
	Skill	Dummy	0 = "no", 1= "yes"
Computer	Access	Dummy	0 = "no", 1= "yes"
Broadband	In Home	Dummy	0 = "no", 1= "yes"
Activity Count	Activity	Interval	Sum of activities yesterday;

Home Broadband range (0-17), Mean = 2.246, median = 1, SD = 2.68
Civic Participation range (0-9), Mean = 1.386, median < 1, SD = 1.741
Post-Election range (0-6), Mean = 1.09, median <1, SD = 1.431

Results

A standard model of socioeconomic and demographic characteristics that has been found to predict technology adoption works well in these data sets. Exhibit IV-7 presents the results for the Pew data set that included the technology resource variables. We ran the model twice, once with broadband in the home as the primary dependent variable, once with no Internet in the home as the primary dependent variable. The results are similar. We ran the models with ordinary least squares and probit regressions, since several of the dependent variables are categorical. The ordered probit results, which are similar to the OLS approach results, are discussed here.

Exhibit IV-7:
Multistage Access Model as a Technology Adoption Model Highlighting Technology Resources: Home Broadband Data Set

	Computer Access	Broadband Access	No Internet	Internet Activity Broadband	Internet Activity No Internet
	Beta in	Beta in	Beta in	Beta in	Beta in
	Sig. only	Sig. only	Sig. only	Sig. only	Sig. only
Age	-0.125	-0.113	-0.0826	-0.159	-0.169
Education	0.449	0.162	0.133	0.216	0.228
Income	0.253	0.106	0.113	0.0475	0.048
Rural	-0.081	-0.217		-0.045	-0.118
Parent		0.215			
Race					
Black		-0.048			
Hispanic					
Gender	.262			-0.110	-0.110
Computer	Na	1.686	2.017	1.793	1.526
Broadband	Na	Na		.983	1.182
None	Na	Na		-0.316	-1.182
Availability	Na	-6.389	-1.135	-5.336	
Affordability	Na	-6.552		-4.292	-.469
Interest	Na	-6.480	-6.555		5.104
Skill	Na	-5.362	-5.562		-3.994
Pseudo R^2	.33	0.49	0.53	0.16	0.16
Pseudo R^2 (demog. Covariates only)		0.24	0.25	0.08	0.08

As these models go, the results are strong. The effects of all of the independent variables are in the expected direction. Several of them are statically significant and quantitatively meaningful. The model explains a substantial amount of the variance in the dependent variables.

Age, education and income are the most important background variables. Rural location is also a consistent, significant predictor of adoption and use. Use of a computer at work, home or school is a consistent and important factor affecting broadband adoption and use in this data set.

The technology resource variables are strong predictors of broadband access and generally strong predictors of use.

The pattern of explained variance underscores the fact that all three sets of factors are important. The computer is the pivotal factor in broadband adoption and use. However, the fact that the background factors "explain" more than half the variance in computer use makes it important to include them in the analysis. It is also important to recognize that a significant part of the impact of the background and resource factors on use is indirect through the effect on computers and access.

An exercise that tries to isolate the impact of the different types of factors leads to the conclusion that they are all important. The bottom line in Exhibit IV-7 shows the levels of explained variance when the background factors alone are regressed on the dependent variables. While dropping important factors from the model can be said to result in a misspecification, the exercise does suggest that broadband adoption and use are the result of complex interactions of these sets of factors. The inclusion of the technology variables doubles the amount of explained variance.

While the Pew survey data infrequently included the questions on the technology factors that affect broad adoption, it regularly conducts surveys that include the background questions and larger sets of specialized questions about different types of uses of digital connectivity. Two surveys conducted in 2008 provide an opportunity to assess whether the same "model" fits the specialized uses. As shown in Exhibits IV-8, the background factors affect the adoption of digital technologies similarly across the data sets. The relationships between independent and dependent variables have the same signs.

However, as shown in and IV-9, the model explains less of the variance in the measures of the more specialized uses. One would expect the more specialized uses to be more "idiosyncratic" with respect to individuals and the level of explained variance for these types of outcome variables is generally lower.

D. Population Clusters

While these causal analyses and models are common, they may not be intuitive. An alternative approach that may be more intuitive identifies social groups with distinct

characteristics and overlays those groups on a map of digital engagement. The clusters used in an analysis of digital engagement in one U.K. study were as follows.

Cluster	Traits
Isolated	older, retired
Disadvantaged	low income, less educated, unemployed
Rural	middle-aged, white, rural
Urban Minorities	African, urban, male
Young Independent	single, young, student
Up and Coming	Young adults, higher income, employed

Exhibit IV-8: The Basic Technology Adoption Model Across Recent Pew Surveys (OLS Beta's are shown)

Dependent Variable		Computer Access	Computer Access	Computer Access
Data Set		Home Broadband	Civic participation	Post-election
		Beta in Sig. only	Beta in Sig. only	Beta in Sig. only
Age	Age	-0.262	-0.269	-0.285
Parent	Parent	0.044		
Race	Race			
Black	Black		-0.031	-0.101
Hispanic	Hispanic			0.052
Gender	Gender			
Rural	Rural	-0.028	-0.031	-0.025
Education	Education	0.224	0.257	0.195
Income	Income	0.294	0.25	0.304
Adjusted R2		.29	0.29	.32

Dependent Variable		Broadband at Home	Broadband at Home	Broadband at Home
Data Set		Home Broadband	Civic participation	Post-election
Age	Age	-0.087	-0.139	-0.115
Parent	Parent	0.047		
Race	Race			
Black	Black	-0.048	-0.064	
Hispanic	Hispanic			-0.028
Gender	Gender		-0.022	-0.023
Rural	Rural	-0.063	-0.064	-0.027
Education	Education	0.092	0.121	0.122
Income	Income	0.119	0.147	0.152
Computer	Access	0.521	0.465	0.495
Adjusted R2		.46	.46	.49

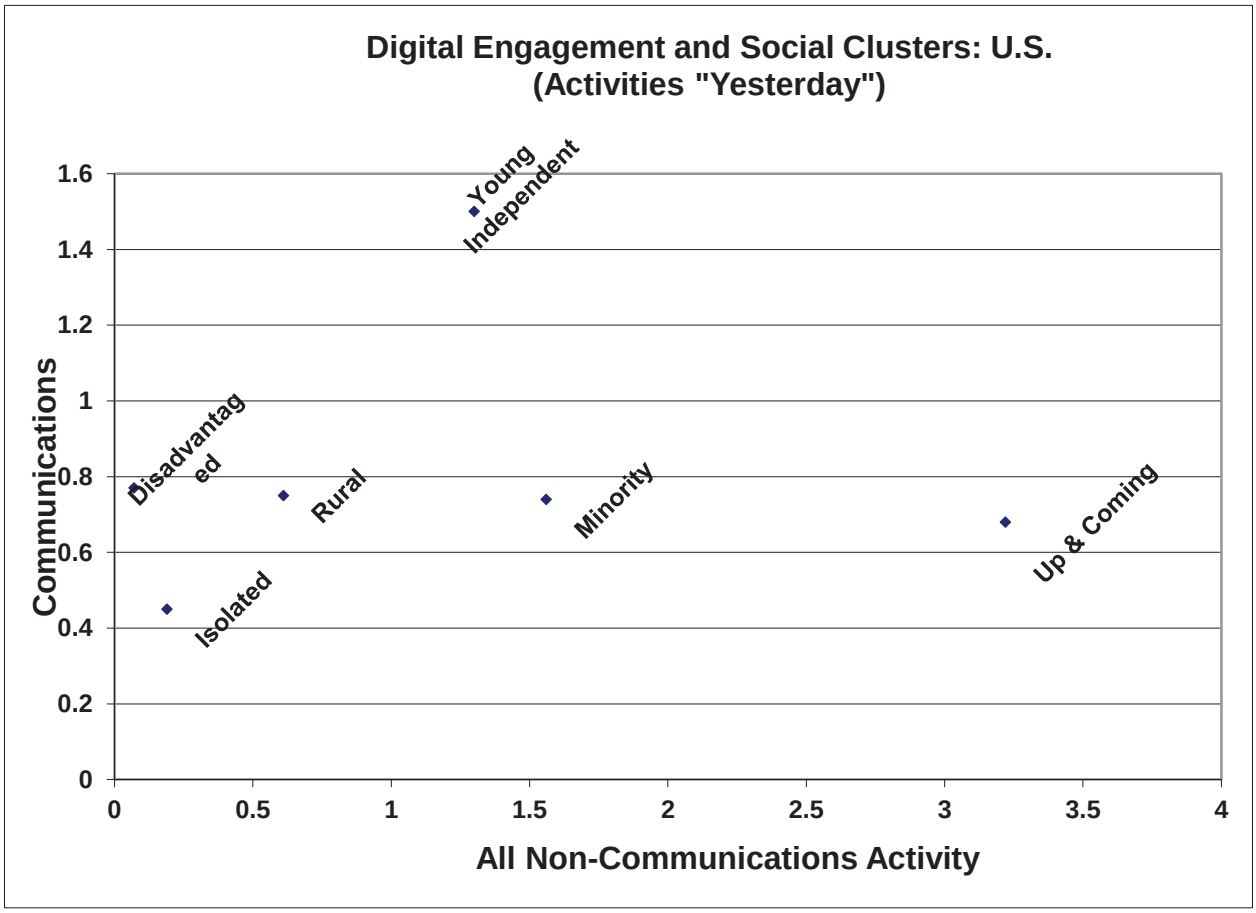
Dependent Variable		Internet Activity	Internet Activity	Internet Activity
Data Set		Home Broadband	Civic participation	Post-election
Age	Age	-0.167	-0.185	-0.163
Parent	Parent			
Race	Race			
Black	Black			
Hispanic	Hispanic			-0.028
Gender	Gender	-0.033	-0.033	-0.089
Rural	Rural	-0.026	-0.027	-0.057
Education	Education	0.155	0.193	0.163
Income	Income	0.087	0.076	0.041
Computer	Access	0.093	0.057	0.122
Broadband	In Home	0.314	0.314	0.261
Adjusted R2		.34	.36	.32

Exhibit IV-9: Specialized Activities Measures (OLS Betas)

	Communication	Political Comm.	Info Gathering	Entertainment	Civic Participation	Physical Civic
Date base:	Home Broadband	Post-Election	Home Broadband	Home Broadband	Civic Participation	Civic Participation
Independent Variables	Beta in Sig. only	Beta in Sig. only	Beta in Sig. only	Beta in Sig. only	Beta in Sig. only	Beta in Sig. only
Background						
Age	-0.22	-0.129	-0.053	-0.221	-0.135	-0.035
Parent			0.042	-0.094	0.085	
Black		0.064		-0.032	-0.026	0.052
Hispanic					-0.036	
Gender	0.078	0.044	-0.043	-0.093		-0.03
Rural						
Education	0.139	0.147	0.155		0.106	0.165
Income	0.05	0.094	0.078	-0.05	0.049	0.123
Computer	0.109	0.194	0.02	0.103	0.06	0.057
Broadband	0.27	0.219	0.253	0.242	0.199	0.06
R2	.31	.32	.21	.17	.14	.11

Exhibit IV-10 shows the results for the U.S. The U.S. data produces a very similar results to the UK results in Exhibit Iv-11. The first three clusters have much lower levels of usage. The last two groups have much higher levels of usage.

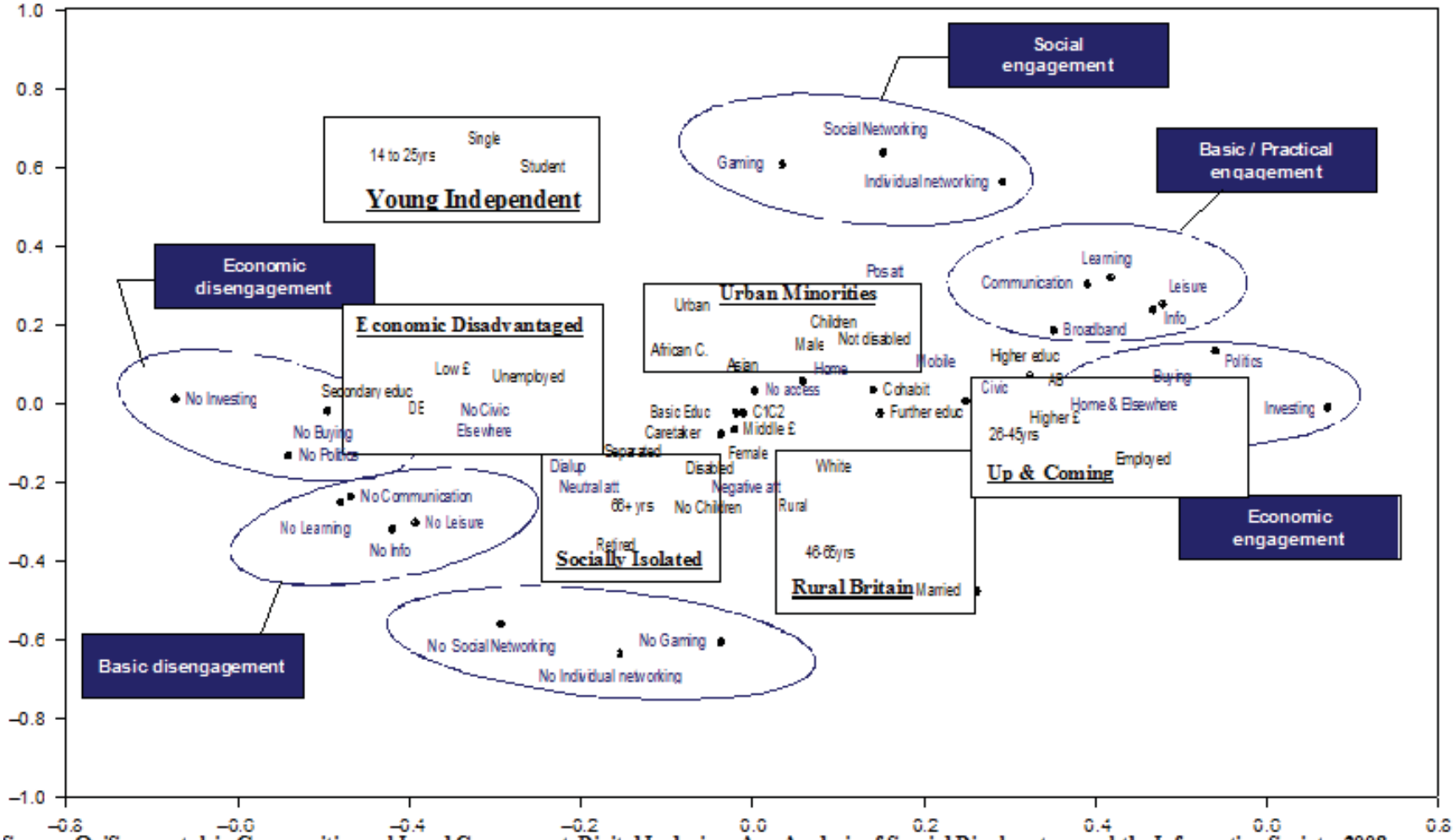
Exhibit IV-10:



Source: Clusters from Communities and Local Government, Digital Inclusion: An Analysis of Social Disadvantage and the Information Society, 2008; U.S. data from Pew Internet and American Life Project, *Spring Tracking,* March-April 2009

Recognizing the complex causality of digital exclusion should not be taken as an excuse for inaction. Rather, having seen the immense value of expanding digital inclusion, complexity calls for careful policy designed to address the problem and realism in expectation about results. There is a sense in which the adherence to then normalization view inhibited the consideration of policies in the U.S. As shown in Exhibit IV-12, other advanced developed nations have devoted much more attention to the issue and developed a portfolio of policies to address all of the causes of digital exclusion. This analysis supports the declaration in the National Broadband Plan that "It's now time to act and invest in our nation's future by bringing the power and promise of broadband to us all."[494]

Exhibit IV-11: Distribution of Types of Digital Engagement and Socio-Economic Clusters



Source: OxiS, reported in Communities and Local Government, Digital Inclusion: Ana Analysis of Socaial Disadvantage and the Information Society, 2008, Figures 13 and 14

Exhibit IV-12: Policies Implement in Advanced Industrial Nations

Accessibility to all technologies for citizens regardless of ability should be a goal that concerns the strategic need for government or other authoritative organisations to stipulate (and monitor adherence to) standards.
Design and usability standards issues

- Mandatory regulations for ICT accessibility for government purchasing (USA)
- Design for all networks and centres (FIN, GR, NL, N)
- Promotion of design for all in appropriate higher education courses and amongst industry (N)
- National resource centres demonstrating participation, accessibility and assistive devices (N)
- Web design and usability standards also encompass issues about:

Accessibility standards and guidance for web developers (A, BG, CZ, DK, EE, FIN, IRL, I, LT, NL, N, PL, RO, UK)

- (naming and shaming) Portals that monitor compliance of government/all web sites with minimum benchmarking standards (NL, PL)
- 'Best on Web' networks, centres or competitions that test and show-case 'off the shelf' products (DK)

Infrastructure issues

- The return path on set top boxes (UK)
- Roll out of dark fibre and other infrastructure (I, NZ)
- WiMax as an alternative to local loop expansion (I, SI, TKY)
- Support for new infrastructure technologies (I)
- Public Access Centres (BG, CZ, FIN, H, I, LV, N, PL, P, RO, UK and others)
- Incentives and encouragement to adopt and utilise technology (all countries)
- Grants and loans for everyone, excluded, children or specific groups to purchase technology (FIN, I, LV, P, RO)
- Free laptop for every child (this will provide benefits for parents and grandparents)

Literacy and digital competence: Enhancing basic literacy and technological literacy will improve life chances and facilitate lifelong learning

- National skills strategy (I)
- Lifelong learning goals (BG, CZ, EE, FIN, IRL, LT, NL, N, UK)
- ICT strategy for schools and/or school children (A, D, IRL, NL, N, UK)
- ICT support strategy or policy for teachers, third sector and/or carers (P, RO)
- Awareness and confidence building (A, CZ, EE, FIN, GR, LV, LT, NL, PL, RO, CH, UK)
- Support and training for all or excluded groups (CZ, IRL, LV, LT, NL, UK)
- Online/DVD literacy materials (A, CZ, D, I)
- Online/DVD digital literacy materials (A, CZ, D, I)
- ICT mentors (H, UK)
- Annual contest abut ICT for grandparents and grandchildren (HUN)
- 'Netsafe Now' Once a year event about safety on the internet (DK)

Technology to enhance independence and ageing;

- Support and/or funding for the development of assistive technologies
- Establishment of interoperability/compatibility standards for assistive living technologies
- National resource centres and demonstration initiatives and centres on ambient assisted living (I, NL, SI)
- Centres of excellence for inclusive technologies for older people (I)
- Entertainment and communications portal for older people (I, NL, PL, P, RO, S)
- Development of online activities for the University of the 3rd Age (AUS, CZ)

Support to provide older and disabled people with basic digital literacy Awareness and confidence building (A, CZ, EE, FIN, GR, LV, LT, NL, PL, RO, CH, UK)

- 'Connected not excluded' initiative to reduce ICT anxieties for older people (D)
- Development and support for voluntary organisations assisting older people to use ICT (POL)
- Support and training (A, BG, CZ, DK, FIN, I, LT, N, P, S, UK)
- Online/DVD digital literacy materials
- ICT mentors (H, UK)
- Annual contest abut ICT for grandparents and grandchildren (H)

- ‘Netsafe Now’ Once a year event about safety on the internet (DK)

Technology for inclusion:

Simplify the life of users and improve the efficiency of service delivery to all citizens

- Single portals (AUS, CZ, EE, GR, LV, LT, NL, P, RO, SI, TKY, UK)
- Interoperability goals, XML schema and guidelines (FIN, D, I, N, P, RO, SI, UK
- Style guidelines and WAI compliance (A, BG, CZ, DK, EE, FIN, IRL, I, LT, NL, N, PL, RO, UK)
- Data sharing (EE, F, LT, N, PL, UK)
- Secure data exchange (EE, F, LT, N, NZ, PL, UK)
- Electronic signatures (A, BG, SL)
- Public key infrastructure from trusted sources (EE)

Promotional issues associated with enhancing the use of technology for inclusion:

- A champion and/or mandatory requirements
- Promoting the benefits of technology for excluded groups
- Providing more opportunities for practitioners, IT specialists and excluded groups to meet together to discuss common needs

List of Nations

A, Austria; AUS, Australia; BG, Belgium; CH, Switzerland; CZ, Czechoslovakia; D, Germany; DK, Denmark; EE, Estonia; F, France; FIN, Finland; GR, Germany; H, Hungary; HUN, Hungary; IRL, Ireland; I, Italy; LT, Lithuania; LV, Latvia; N, Norway; NL, Netherlands; NZ, New Zealand; P, Portugal; POL, Poland; RO, Romania; SI, Singapore; SL, Slovakia; TKY, Turkey; UK, United Kingdom

Source: Communities and Local Governments, An Analysis of International Digital Strategies: Why Develop a Digital Inclusion Strategy and What Should be the Focus, October 2008.

NETWORK MANAGEMENT

I. LEVERAGE IN THE PHYSICAL LAYER

A. New Sources of Market Power in New Network Economy Industries

The growing concern about digital information platform industries derives from the fact that the lower layers do not appear to be very competitive.[495] It has become clear that the physical infrastructure and the code layers confer immense leverage to dominant firms and are unlikely to exhibit a great deal of horizontal competition.[496] There are not now nor are there likely to be a sufficient number of networks deployed in any given area to sustain vigorous competition. Vigorous and balanced competition between operating systems has not been sustained for long periods of time.

Scale and scope economies may be so strong in the lower layers that that may give rise to a unique characteristic of a market called tipping. Interacting with network effects and the ability to set standards, the market tips toward one producer. Firms seek to capture these positive externalities and accomplish technological "lock-in."[497] These processes create what has been called an "applications barrier to entry." After capturing the first generation of customers and building a customer and programming base, it becomes difficult, if not impossible, for later technologies to overcome this advantage.[498] Customers hesitate to abandon their investments in the dominant technology and customer acquisition costs rise for latecomers.

This creates an immense base of monopsony power. I use the term monopsony broadly to refer to the ability to control demand. If a firm is a huge buyer of content or applications or can dictate which content reaches the public (a cable operator that buys programming or a operating system vendor who bundles applications), it can determine the fate of content and applications developers. In fact, network effects are also known as demand side economies of scale. To the extent that a large buyer or network owner controls sufficient demand to create such effects, particularly in negotiating with sellers of products, they have monopsony power.

The platform nature of digital communications creates unique new sources of vertical leverage. In old economy industries, vertical leverage is exploited by business practices. Companies vertically integrate to internalize transactions. They may withdraw business from the open market, driving up the cost of inputs for competitors or denying supply to the market.[499] If they constitute a large share of the market or refuse to buy or sell intermediate inputs (or raise the costs to rivals) the impact can be anticompetitive.

In a platform industry, vertical leverage can take an additional and more insidious form, technological integration/manipulation.[500] Introduction of incompatibilities can impair or undermine the function of disfavored complements or components. The ability to undermine interoperability or the refusal to interoperate is an extremely powerful tool for excluding or undermining rivals and thereby short circuiting competition. The mere threat of incompatibility or foreclosure through the refusal to interoperate can drive competitors away.

One of the most important factors in creating a positive feedback process is openness in the early stages of development.[501] In order to stimulate the complementary assets and

supporting services, and to attract the necessary critical mass of customers, the technology must be open to adoption and development by both consumers and suppliers.[502] This openness captures the critical fact that demand and consumers are interrelated.[503] If the activities of firms begin to promote closed technologies,[504] this is a clear sign that motivation may have shifted.[505] While it is clear in the literature that the installed base is important, it is not clear that an installed base must be so large that a single firm can dominate the market. As long as platforms are open, the installed base can be fragmented and still be large.[506] In other words, a large market share is not synonymous with a large market.[507] A standard is not synonymous with a proprietary standard.[508] Open platforms and compatible products are identified as providing a basis for network effects that is at least as dynamic as closed, proprietary platforms[509] and much less prone to anti-competitive conduct.[510]

The economic literature provides ample basis for concern that the physical layer of communications platforms will not perform well without a check on inherent market power. In this layer, barriers to entry are substantial and go far beyond simple entrepreneurial skill that needs to be rewarded. At the structural level, new entry into these physical markets is difficult. Rents in markets with barriers to entry other than entrepreneurial skill are larger than they need to be to attract investment and do not dissipate so quickly.

Similarly, at the code layer of the computer industry, it did not take Microsoft long to discover that once the physical layer of the computer (a platform itself) was commoditized, Microsoft possessed the market power position in the computer platform. In fact, Microsoft has recognized well the potency of the physical layer as it moves from the computer world into the digital communications platform. It vigorously opposed the expansion of a competing applications developer into the facility layer and is supporting both efforts to impose non-discrimination obligations on network operators and development of an alternative distribution network – unlicensed spectrum.

The dominant players in the physical and code layers can readily distort the architecture of the platform to protect their market power.[511] They have a variety of tools to create economic and entry barriers,[512] such as exclusive deals,[513] retaliation,[514] manipulation of standards,[515] and strategies that freeze customers out.[516]

The emerging model for closed communications platforms is one in which the owner of a dominant technology at the lower layers of the platform can leverage control to achieve domination of applications and content. Given proprietary control for network layers in which there is a lack of adequate alternatives, owners can lock in consumers and squeeze competitors out of the broader market.

Firms can leverage their access to customers to reinforce their market dominance[517] by creating ever-larger bundles of complementary assets.[518] As the elasticity of demand declines over the course of the product life cycle, market power lodged in the physical layer results in excessive bundling[519] and overpricing of products under a variety of market conditions.[520] Control over the product cycle can impose immense costs by creating incompatibilities,[521] forcing upgrades,[522] and by spreading the cost increases across layers of the platform to extract consumer surplus.[523]

These anti-competitive behaviors are attractive to a new economy monopolist for static and dynamic reasons.[524] Preserving market power in the core market by erecting cross-platform incompatibilities, raising rivals' costs, or preventing rivals from achieving economies of scale can preserve market power in the core product and allow rents to persist.[525] Profits may be increased in the core product by enhanced abilities to price discriminate. Conquering neighboring markets has several advantages. By driving competitors out of neighboring markets, new monopolies may be created or the ability to preserve market power across generations of a product may be enhanced by diminishing the pool of potential competitors.

The economic literature has recognized the potential anti-consumer, anti-competitive impact of bundling. The possibility of extracting "consumer surplus" has hinged on key assumptions about the nature of demand and underlying cost.[526] Over the past two decades the anticompetitive potential of bundling has been explored and documented in detail. Indeed, almost immediately after bundling was declared benign, the potentially anticompetitive effects of bundling reemerged in the literature because it was noted that one had to assume extreme conditions to have confidence in its efficiency benefits. Firms whose market power is neither total nor permanent can use bundling to defend or extend their market power. Under a wide range of assumptions, the dynamic[527] ability of bundling to undermine competition has been demonstrated through a number of mechanisms including inducing exit,[528] restricting entry by raising barriers,[529] relaxing price competition,[530] distorting investment,[531] retarding innovation,[532] and extending market power into new markets.[533]

To the extent that there is a new, digital network economy of the 21st century, the refusal to interconnect or interoperate, the withholding of network functionalities, or the denial of access to content and applications are important socio-economic transgressions that demand much greater scrutiny because they destroy the beneficial externalities that these networks are all about. They are anticompetitive in the sense that they diminish significantly the level of competition for content and applications and undermine the rich sources of economic progress in the networked economy. They are anti-social because they undermine the ability of citizens to speak and be heard.

Antitrust authorities and much of public interest regulation focuses on price as the measure of market performance, but in the digital age innovation and choice are at least as important. Thus, I distinguish between consumer harm and economic harm. Consumer harm is measured in terms of excess prices and profits. Economic harm is measured in terms of chilling of innovation and denial of consumer choice, which imposes indirect costs on the consumer and dulls the competitive process.

1. Cable Market Abuse

Cable modem service was launched under a cloud of legal uncertainty that permitted the cable operators to treat it like their video business, as a closed proprietary platform. The technology itself was capable of pervasive and precise discrimination, as the following description shows. Several documents from Cisco Systems, which provided the majority of the technology, provide great detail. Exhibit 3 describes the cable operators' use of strategic leverage in the platform. The Exhibit shows both the video and the data sides of the platform. The data side is the subject of this discussion.[534]

Quality of service has solved the problem by putting absolute control, down to the packet, in your hands.

The ability to prioritize and control traffic levels is a distinguishing factor and critical difference between New World networks employing Internet technologies and "the Internet."

Preferential queuing gives you the ability to specify packet types—Web, e-mail, voice, video—and create policies for the way they are prioritized and handled.

Conditional Access (CA) systems provide for selective access and denial of specific services. They also employ signal security techniques, such as encryption, to prevent a signal from being received by unauthorized users. In addition to protecting traditional broadcast content, a contemporary Conditional Access system also must support interactive applications, such as electronic commerce, video-on-demand, and high-speed data access. And it must protect against tampering with authorized applications, downloading viruses, or downloading unauthorized applications to the set-top.

For example, if a "push" information service that delivers frequent broadcasts to its subscribers is seen as causing a high amount of undesirable network traffic, you can direct Committed Access Rate to limit subscriber-access speed to this service. You could restrict the incoming push broadcast as well as subscriber's outgoing access to the push information site to discourage its use. At the same time, you could promote and offer your own or partner's services with full-speed features to encourage adoption of your service, while increasing network efficiency.

Committed Access Rate also lets you discourage the subscriber practice of bypassing Web caches. It gives you the ability to increase the efficiency of your network by allocating high bandwidth to video and rich media coming from a Web-cached source and low bandwidth to the same content coming from an uncached source. Further, you could specify that video coming from internal servers receives precedence and broader bandwidth over video sources from external servers.

Another backbone-based control capability is preferential queuing (PQ) that ensures that important traffic gets the fastest handling at each point where it is used. Because it is designed to give strict priority to important traffic, PQ can flexibly prioritize according to network protocol, incoming interface, packet size, source or destination address.[535]

At one time or another these "conditions" were written into a contract with a service provider, a consumer service agreement or implemented in the network (see Exhibit 4). In comments at the Federal Communications Commission, the High Tech Broadband Coalition noted "troubling evidence of restrictions on broadband consumers' access to content, applications and devices."[536] The advanced telecommunications networks of cable operators were closed for the first six years of deployment.[537] When they talked about granting access, they made it clear that they would control who could sell, under what terms and conditions, using what functionalities, and at a price that made it a very unattractive business.

A Term Sheet offered by Time Warner to unaffiliated ISPs who had requested access to its network during the summer of 2000 gives a new and troubling specificity to the threat to innovation. There in black and white are all the levers of market power and network control that stand to stifle innovation on the Internet. Time Warner demanded the following:

(1) Prequalification of ISPs to ensure a fit with the gatekeeper business model
(2) Applying ISPs must reveal sensitive commercial information as a precondition to negotiation
(3) Restriction of interconnecting companies to Internet access sales only, precluding a range of other intermediary services and functions provided by ISP to the public (e.g. no ITV [interactive TV] functionality)
(4) Restriction of service to specified appliances (retarding competition for video services)
(5) Control of quality by the network owner for potentially competing video services
(6) Right to approve new functionalities for video services
(7) A large nonrefundable deposit that would keep small ISPs off the network
(8) A minimum size requirement that would screen out niche ISPs
(9) Approval by the network owner of the unaffiliated ISP's home page
(10) Preferential location of network owner advertising on all home pages
(11) Claim by the network owner to all information generated by the ISP
(12) Demand for a huge share of both subscription and ancillary revenues
(13) Preferential bundling of services and control of cross marketing of services
(14) Applying ISP must adhere to the network operator's privacy policy.[538]

Under these conditions, the commercial space left for the unaffiliated and smaller ISPs (where much innovation takes place) is sparse and ever shrinking.[539] This may explain why ISPs have become active in fighting AT&T/AOL hegemony.[540] It took tremendous courage to put the Term Sheet in the public record in violation of the nondisclosure agreements that Time Warner had demanded,[541] especially in light of the threats and actions that AT&T, Time Warner and AOL have hurled at those who have challenged their proprietary plans.[542]

The largest ISP, AOL, capitulated to the cable monopolists. After a five-year struggle for carriage, AOL signed a three-year contract for access to less than one-half of AT&T's lines under remarkably onerous conditions.[543] AOL is paying $38 at wholesale for a service that sells for $40 in the cable bundle. It allowed AT&T to keep control of the customer and to determine the available functionality. It apparently agreed to a no–compete clause for video. As AOL put it, the deal turned the high-speed Internet into the equivalent of a premium cable channel, like HBO. Nothing could be farther from the Internet as it was. Why did AOL agree? It was desperate for carriage. You cannot be a narrowband company in a broadband world, and DSL just does not cut it. The AOL-AT&T agreement punctuates a seven-year policy of exclusion.

From the point of view of the technical design features of the Internet that unleashed the dynamic forces of innovation, the fact that these negotiations must take place at all is the truly chilling proposition. Under the current marketplace model blessed by the FCC for broadband Internet service, it is a given that the owners of the infrastructure can use control over access to gain a strategic advantage in negotiations for open access. Lawrence Lessig and Tim Wu provide an instructive example in the case of home networking, pointing out that "the restrictions on home networking are a patchwork… some… providers explicitly allow home networking.

Many others express no clear opinion. But others have banned home networking and at least one major cable provider has threatened home networkers with criminal punishment."[544]

Lessig and Wu point out the uncertainty of future discrimination is sufficient to chill innovation, noting that the:

> question an innovator, or venture capitalist, asks when deciding whether to develop some new Internet applications is not just whether discrimination is occurring today, but whether restrictions might be imposed when the innovation is deployed. If the innovation is likely to excite an incentive to discriminate, and such discrimination could occur, then the mere potential *imposes a burden on innovation today.*[545]

2. THE TELEPHONE COMPANY ABUSE

Telephone companies were forced to execute their exclusion in a more subtle manner, since the Telecommunications Act of 1996 requires them to allow competitive local exchange carriers (CLECs) and unaffiliated Internet Service Providers on their systems. They must embed their anticompetitive strategy in day-to-day business conduct.[546] Nevertheless, the telephone companies continued to press hard for the legal right to discriminate by gaining the legal authority to exclude competitors from another interconnection point in the physical layer, the remote terminal, which would cut most competitors off from a large part of the residential market.

A major source of potential discrimination lies in the architecture of the network. The technical capabilities of the network controlled by the proprietor can be configured and operated to disadvantage competitors. The proprietary network owner can seriously impair the ability of competitors to deliver service by restricting their ability to interconnect efficiently and deploy or utilize key technologies that dictate the quality of service. Forcing independent ISPs to connect to the proprietary network or operate in inefficient or ineffective ways, or giving affiliated ISPs preferential location and interconnection, can result in substantial discrimination. Similarly, forcing CLECs to make digital to analog to digital conversions to implement cross connects raises costs. The result is a sharp increase in the cost of doing business or degradation of the quality of service.

ISPs have identified a range of ways the dominant telephone companies impede their ability to interconnect in an efficient manner. Refusing to peer with other ISPs and causing congestion by "deliberately overloading their DSL connections by providing them with insufficient bandwidth from the phone company's central offices to the Internet"[547] create a roadblock that forces ISPs to enter into expensive transport arrangements for traffic.[548] Refusing to guarantee quality of service to unaffiliated ISPs and imposition of speed limits[549] has the effect of restricting the products they can offer.[550] The network owners then add insult to injury by forcing ISPs to buy bundles of redundant services,[551] preventing competitors from cross connecting to one another,[552] restricting calling scopes for connection to ISPs,[553] and refusing to offer a basic service arrangement or direct connection to the network.[554] The effect is to undermine competition and restrict service offerings.[555]

The most critical architectural decisions are to impose network configurations that prevent competition for the core monopoly service, voice.[556] This bundling of competitive and noncompetitive services places competitors at a disadvantage.[557] Ironically, Cox complains that it is being discriminated against when incumbent telephone monopolists bundle voice and data, while it pursued a similar exclusionary tactic with respect to the bundling of video and data.[558] Independent ISPs have pointed out that their ability to offer voice is being frustrated by architectural decisions that deny them the ability to offer the voice/data bundle.[559] Moreover, incumbents are reserving the right to offer additional services, like video, over lines for which independent ISPs are the Internet access service provider.[560]

Telephone companies also leverage their control over the network into an abuse of the affiliate relationship. The use of corporate resources including logos and joint advertising has been a constant source of cross-subsidy.[561] Assets have been transferred to the advantage of the affiliated ISP, including customer accounts, CPNI, bottleneck facilities and collocation space.[562] Employees, senior management and boards of directors have been co-mingled, facilitating the cross-subsidization and anti-competitive advantage given to affiliates.[563]

Even after the service is "generally" available, it appears that the incumbent delivers wholesale services to its affiliate more quickly than it is made available to competitors. The telephone companies manipulate the availability of capacity, denying unaffiliated ISPs access to their DSLAMs or CLECs access to their central office space.[564] Competitors and regulators maintain that incumbents have been guilty of unfairly steering customers to affiliates at the expense of competitors.[565] The affiliates get the preferential first spot in the list of options, and this gives them a huge advantage.[566] Joint marketing is a concern,[567] with suggestions that incumbents may offer only one option. The detailed control of the network confers an immense information advantage on the system operator. The potential for competitive abuse of information is substantial.[568] Independent ISPs note that the affiliated ISP has been given access to network information in advance, thereby being assured of preferential access to capacity.[569]

Controlling a bottleneck, network owners charge prices and place conditions on independent content providers that undermine their ability to compete.[570] Minimum terms and volume discounts, which are not imposed on the affiliated ISP or are cross-subsidized by the parent company, place independent ISPs at a disadvantage.

In the context of these anticompetitive practices, cable and telephone companies promise to allow one-click access to the Internet as a 'guarantee' that their business models will not undermine the dynamic nature of the information environment. They refuse, however, to be bound by an enforceable obligation to provide this nondiscriminatory access. The private promise is laughable. One-click access glosses over the fact the consumer must click through architectural principles, usage restrictions and business relationships that are anathema to innovation on the Internet.

- Wire owners monopolize the access business and leverage their market power to undermine competition.
- The click-through-only approach does not allow independent ISPs to compete for consumer dollars until after the cable and telephone companies have

charged consumers between $30 and $40 for Internet access. The price is too high and allows the network owner to cross subsidize its own affiliated ISP.

- By setting the price so high, companies undercut any serious competition because there is little discretionary income to compete for.

Guaranteeing one click access does not solve the problem:

- it does not address architectural decisions that restrict bandwidth or undermine the development of disruptive services;
- it does nothing to address the problem that the wire owner is still in control of functionality. The network owner retains the right to impose restrictions on the products and functionalities that independent ISPs can offer to the public by imposing acceptable use policies as a business strategy.

3. Intermodal Competition Does Not Discipline Cable's Market Power

With ISPs excluded from or hampered in their ability to use the underlying telecommunications facilities, the network owners have been free to pursue an aggressive strategy to leverage their market power; cross technology competition has been inadequate to discipline them. In the early phase of deployment of the new, high-speed services, prices rose moderately, quite the opposite of what one would expect from a digital technology seeking to increase penetration.[571] One incident that drives home the failure of the rivalry between telephone and cable companies to discipline anticompetitive behaviors is the slowdown decision by the telephone companies. As the Chairman of the Illinois Commerce Commission put it:

> The ICC ruling requires the company to allow its competitors meaningful access to their network at reasonable prices…
> In a carefully worded letter to members of Congress last month, Whitacre [CEO of SBC] harshly criticized the ICC decision and said that SBC Ameritech has "been forced to halt indefinitely further deployment and activation of new DSL facilities in Illinois…"
> As we all know, the competitiveness of a market easily can be measured by one player's ability to control the supply of a good. Whitacre's statement is clear: SBC Ameritech controls the market so completely that it can determine if more than a million consumers in Illinois will have access to broadband services…
> Whitacre wants to extend his monopoly over the local telephone network to high-speed Internet access. Maybe that is why SBC was able to reduce service and increase the price for DSL service by 25 percent last month.[572]
> The incumbents had just executed a classic price squeeze on ISPs. They had dropped prices at retail for about a year and waited until the independent ISPs had gone under. The price squeeze was similar to that affected in the cable modem world. The price for access to the network is far above costs and leaves little margin for the unaffiliated ISP.[573] The margins between the wholesale price ISPs are forced to pay and the retail price affiliated ISPs charge is as small as $1 on the telephone network.[574] For cable networks, the margins are as low as $5. In other words, independent ISPs are forced to look at margins in the single digits and never much above 20 percent. Cable and telephone company margins for these services are well in excess of 40 percent.[575]

As a result, many competitive residential DSL providers have either gone bankrupt, sold out or ended the DSL portion of their business, leaving consumers in many U.S. regions a single

choice for DSL service: the local phone company. The competitive fallout opened the door for price hikes.[576] Telephone companies continue to impose long installation times and service interruptions on DSL customers of their competitors.[577] This led to a re-thinking on Wall Street as "long term pricing pressures may turn out to be pricing power."[578]

One of the key elements underlying this ability to avoid competition is a sharp segmentation of the market by technology. Looking carefully at specific product and geographic markets reveals little competitive overlap of different facilities.[579] It has been apparent from the beginning of high-speed service that technological differences give different facilities an edge in different customer and geographic markets.[580]

Business and residential markets are segmented and concentration is higher within each segment (see Exhibit 5). Cable dominates the residential high-speed Internet market, with a 65 percent market share for all "broadband" services and an 82 percent market share for the advanced services residential market. Digital Subscriber Line service, the telephone industry's high-speed offering, dominates the non-residential market with a 90 percent market share. Businesses are disinclined to use cable:

Cable modem service presents serious security and reliability issues that, while present for residential users, are of far greater concern when used to support business applications… In addition, service quality for cable modem service is not equivalent to ILEC standards… Additionally cable modem transmission speeds are not consistent, due to the "shared platform" architecture… Finally, cable modem platforms do not offer business customers a sufficient level of security.[581]

DSL, as deployed, is ill suited to multimedia video applications. For the next generation telephone network technologies, "most experts agree that the VDSL business case isn't for everyone and won't realize its full revenue potential for decades."[582] Cable operators devoted less than two percent of the capacity of their systems to cable modem service. They could easily expand that if they so desired. This gives them an immense advantage over telephone companies. Tom Hazlett has characterized the situation as follows:

Cable operators possess substantial market power in subscription video markets. Moreover, they use this leverage to restrict output in broadband access. This is not profitable in a narrow financial calculus, but is rational due to strategic considerations…[583]

Satellite, which provides some high-end niche market competition for cable in the video space, lacks the ability to effectively bundle in high-speed Internet. Cable recognizes this and is aggressively bundling high-speed Internet with basic cable service.

The FCC hopes that competition between two different technologies or modes of communications – that is, a policy of "intermodal" competition – will be sufficient to drive prices down. It has resisted and opposed efforts to stimulate competition within the technologies – "intramodal" competition. This, too, is a radical departure from the first generation of the Internet.[584] The dial-up network on which the Internet was born and thrived was a common carrier, an open network operated under the obligation to provide nondiscriminatory access to

telecommunications services. The FCC has steadfastly opposed any such obligation for advanced telecommunications networks.[585]

The policy of relying on a small number of closed networks has failed and continues to fail. Instead of vigorous competition, the FCC's policies have created what *Business Week* calls "a cozy duopoly of broadband providers: the Bells and the cable-TV companies." *Business Week* concludes that this duopoly has not served the public well. "The two sides have been slow to push for higher broadband speeds or fast price declines."[586]

Chilling innovations and charging high prices for access has had a negative effect on broadband penetration in the U.S. Buried at the end of the FCC's most recent report on broadband is the fact that the United States ranks well down the list for rates of broadband penetration in advanced industrial countries.

- In the past four year, the U.S. has fallen from third to eleventh by one count or fifteenth by another count.[587] When per-capita income is taken into account, the U.S. is performing miserably in getting high-speed Internet in American households.[588]
- Cross national comparisons of price included in the report show that Americans pay fifteen to twenty times as much, on a megabit basis, as consumers in Japan.[589] Three years ago the price gap was half as large.[590]
- One out of every two American households with incomes above $75,000 has high-speed Internet connections at home. One out of every two American households with incomes below $30,000 does not have any Internet connection at home at all. [591]

Moreover, while an FCC report proudly notes that penetration of broadband into American homes has tripled in the past three years,[592] it ignores that overall Internet[593] and telephone penetration has been flat.[594] The U.S. has made very little progress in connecting the disconnected in our society, even though the upper income, well-connected get more and more services.

B. Harm

1. Consumers: Denial of Choice and High Prices

With costs falling[595] and demand lagging in the midst of a recession, both cable operators and telephone companies raised prices. Cable companies imposed a severe interruption of service on their customers, which, in a highly competitive market, would have been suicidal.[596] In 2003, Comcast, the dominant high-speed modem service provider, raised the price of stand-alone cable modem service by $10 to $15 per month.

In 2003, some of the Bell companies offered discounts, but the cable companies refused to respond to telephone company pricing moves. Exhibit 6 shows why. DSL service is not competitive on price on a megabit basis. Since DSL cannot compete on a quality-adjusted basis, the cable operators ignore it. Their advertising harps on their speed superiority. Exhibit 6 also

shows why dial-up is not a substitute for high-speed access. It is far more expensive on a megabit basis. This led the Justice Department to declare early on that high-speed Internet is a separate product from dial-up. Moreover, dial-up lacks the other key feature of high-speed service, it is not always on.

With the dominant technology insulated from cross-technology competition and operating a closed network, cable companies have strategically priced their digital services. This becomes quite apparent to any consumer who tries to buy the service in the marketplace. If a consumer adds a digital tier, the average charge would be an additional $15. If a consumer adds cable modem service, the consumer must pay $45 ($55 to $60 if basic cable is not taken). Moreover, if the consumer wants to keep an unaffiliated ISP, the charge is an additional $15.

Yet, the two services are supported by the same system upgrade. The difference between the two services in operating costs cannot explain the dramatic price difference. Comcast, which prices digital services at $15, claimed that its margin is 80 percent.[597] Operating costs would be in the range of $4 to $5. Digital service also generates some advertising revenue and significant pay per view revenues. Thus, total revenues per subscriber are in the range of $20 to $25 per month and the margin is $15 to $20 dollars.

Cable operators report this cost is in the range of $7 to $8.[598] In fact, barebones Internet service is available for less than $10. Thus, the margin for cable modem service is in the range of $35 or more. With identical capital costs and similar operating costs on digital video and high-speed Internet, the difference represents strategic pricing of cable modem service.

The price that the cable operators have put on cable modem service is driven by the raw exercise of market power. Bill Gates' suggestion that this service should be priced at $30 may be too generous, if only facility costs are included. In any event, cable modem service is dramatically overpriced. Cable operators are extracting massive monopoly rents.

2. Producers: Eliminating Internet Service Providers

Although the primary impact of a bearer service flows from the broad range of activity it supports, a case can be made that even at the core of the directly related industries the value of open networks is clear. Open communications networks and unrestricted service development, particularly in the delivery of digital products, opened the door to the growth of a whole new industry -- Internet service providers[599] – that played a key role in the successful commercialization of the Internet.

Similarly, after the FCC required carriers to offer unbundled transmission services to information service providers under tariff, many new providers entered the information service industry and developed innovative new service offerings, which in turn facilitated the explosive growth of Internet services. With access to unbundled transmission service, information service providers concentrated on development of new services – like online communities or burglar, fire or theft protection – while being assured of a means to deliver these services to their customers. Unbundled wholesale transmission capacity proved to be a critical building block for the development of the entire information services industry.[600]

Online service providers numbered about 400 to 500 in the late 1980s when the commercialization began. That number grew to between 7,000 and 8,000 service providers in the late 1990s. Buying wholesale telecommunications service from telephone companies and selling basic Internet access combined with a variety of additional services to the public, they translated the complex technologies that had to be combined to use the Internet into a mass market service. Once the Internet was commercialized, they rapidly covered the country with dial-up access and translated a series of innovations into products and services that were accessible and useful to the public. Some of the underlying innovations that the ISPs adapted and popularized had been around for a while, like the Internet protocol itself, e-mail, file transfer and sharing, and bulletin boards. Some of the innovations were very recent, like the web, the browser, instant messaging and streaming. Thousands of ISPs tailoring services to customer needs supported the rapid spread of Internet subscription and use.

Interestingly, a close look at the data suggests that there is a real sense in which the Internet, delivering access to the World Wide Web, rendered accessible by the development of web browsers, became the killer application for the PC (Exhibit 7). Although the PC had enjoyed success prior to commercialization of the Internet, it was only after the advent of selling Internet access service to the public that PC sales exploded. PC prices played a role as well, but it can be argued that the demand stimulation created by the killer application laid the groundwork for the price reductions. The initial PC price reduction of the mid-1980s sustained the moderate growth of the PC for about a decade. In the mid-1990s, PC prices were stable, as Internet use escalated. In the late 1990s, PC prices came down, although the sharp increase in demand came first. Thus, in an important way, the application that triggered demand contributed to the cycle of economies of scale that is so important in the computer industry.

The closing of the Internet produces a very different picture of the ISP sector (see Exhibit 8). In contrast to the commercial Internet, which witnessed a steady flow of innovations and the growth of a large customer service sector that stimulated the adoption of Internet service by a majority of households, the broadband Internet is a wasteland. The body of potential innovators and customer care providers has shrunk. Throughout the history of the commercial narrowband Internet, the number of service providers was never less than 10 per 100,000 customers. At present, and for most of the commercial history of the industry, there have been 15 or more ISPs per 100,000 subscribers. On the high-speed Internet there are now less than 2 ISPs per 100,000 customers. For cable modem service there is less than 1 Internet service provider per 100,000 customers. For DSL service, there are fewer than 2.5 ISPs per 100,000 customers. Viewed on a market size basis, the impact is even starker (see Exhibit 9).

The loss is important. At a minimum, ISPs provide customer care, extend service throughout the country, and adapt applications to customer needs. They are like the mechanics and gas stations in the automobile industry. There are now just too few ISPs on the broadband Internet. A small number of entities dominating the sale of high-speed Internet access and dictating the nature of use is the antithesis of the environment in which the narrowband Internet was borne and enjoyed such rapid growth. Changing the environment changes the nature of activity. One thing we never heard about on the narrowband Internet was a complaint about the slowness of innovation. High-speed service is into its sixth year without a major innovation to drive adoption. Complaints about high and rising prices for high-speed Internet have come earlier and louder than they did for narrowband service.

III. Public Policy Implications

Current communications network policy has gotten both the Communications Act and the antitrust principles wrong. Lessig argued in a number of proceedings involving access to broadband facilities that we would be better off if we used communications policy rather than antitrust to ensure nondiscriminatory access. In fact, if we look back on the history of network industries, during what has come to be known as the American century, they were frequently the target of both regulatory policy and antitrust actions. There are two reasons for this, I think. First, market power in network industries has always been very potent. Second, the goals of the two strands of public policy are not identical. There is growing evidence that the digital communications platform will not be open without vigorous public policies and it will not thrive as a closed platform. Our understanding of how to use antitrust and communications law to achieve that goal must evolve as the nature of the underlying economic structure does, but the goal should not change.

A. Infrastructure

My primary argument rests on the large positive externalities that flow from open communications networks. Such benefits are typically hard to measure. They require a leap of faith, but five centuries of commitment to the development of infrastructure should have created a strong basis for the belief in these investments. The point that public policy has missed recently is that these externalities were paid for through public policy. The public bought the infrastructure, directly or indirectly.

When the National Research Council revisited the issue of broadband Internet deployment in 2002, it discovered the obvious – you cannot build infrastructure on a three-year payback. Adopting the financial model of merchant builders, it conducted an analysis of the economics of building Internet infrastructure under conditions of competition. It used a three-year payback period and found that investment was subject to the tyranny of the take rate. Markets simply would not provide financial returns to meet the demands of investors unless one firm captured virtually all of the customers and services.

The NRC should not have been surprised by this finding, as none of the ubiquitous national networks of our continental economy was deployed under these circumstances. Railroads were massively subsidized by land grants. Highways have been built by public funds. Telephones and cable were shielded by exclusive franchises. Risk capital is simply too expensive to finance such networks.

We are willing to pay for these networks, as long as they are available to all on a nondiscriminatory basis and support the highly complex and interconnected activities of our postindustrial economy[601] because adequate and open infrastructure creates great fluidity and opportunities (positive externalities) in an information-based economy that individuals and businesses cannot capture directly through private actions. Economists fret about a free-rider problem when people use a network without accounting for every jot and twiddle of costs, but it is just as likely that the network can be creating shared user-benefits. All of the great national networks were built with a mix of public and private interests.

B. Competition

The behavior of the lower level monopolists undercuts the claims of a new economy in one important respect. If the new economy provides such powerful forces for natural monopoly, why are these dominant entities forced to resort to so many unnatural anticompetitive tactics some from straight out of the old economy, others variations on old practices, and some largely from the new economy? The strategies adopted by dominant players at the start of the digital information age are not all that different from the strategies adopted by the Robber Barons at the start of the second industrial age. They sought to control the economy of the twentieth century by controlling the railroads and oil pipelines that carried the most important products of that age – heavy industrial inputs and output. The dominant firms in the digital communications platform are seeking to control the economy of the digital information age by imposing a proprietary, closed network on the essential functionalities of the new economy – controlling the flow of the most important inputs and outputs of the information age – bits.

The remarkable array of anticompetitive weapons that owners have at the lower layers of the platform flows from its network nature. Higher levels of the platform are completely dependent on the lower levels for their existence. Without an obligation to treat applications and content suppliers fairly and interconnect and interoperate in a way that maximizes functionality, the incentive to innovate will be squelched. The dynamic innovation of decentralized development is replaced by the centralized decision making of gatekeepers.

Some argue that we should go back to the mid-19th century, before the antitrust laws and communications policy required non-discriminatory interconnection or carriage.[602] I take the opposite view. I believe that the twentieth century came to be known as the American century precisely because antitrust and public interest regulation promoted infrastructure that is open, accessible, and adequate to support innovations and discourse.

VI. GOVERNANCE INSTITUTIONS FOR THE DIGITAL REVOLUTION

A. Principles for Adaptation of Internet Governance

The combination of the weakness of the competing institutions (the market and the state) and the success of the Internet resource system suggests that enhancing the polycentric institution between the market and the state remains a viable, preferable approach to respond to the challenges. But, it is also clear that the existing institutions must adapt to meet the challenges. This section offers a series of principles for adapting Internet governances to the maturation challenges derived from the conceptual and empirical framework described in Parts I and II. It lays the foundation for the argument in the next section that "participatory governance" is a critically important institutional innovation needed to preserve and extend the success of the Internet resource system. It locates the concept in relation to the Internet governance debate, the broader crisis of legitimacy of the state, and the ongoing debate over regulatory reform.

1.Priorities for Preserving the Internet Principles by Expanding the Space of Governance Between Market and State

Meeting the challenge of "how we shift from 'government to governance' . . . relat[ing] traditional steering activities . . . with broader coordination tasks that . . . combine the multiple perspectives and needs of all institutional and noninstitutional Internet users"[603] requires an approach that

- recognizes the state will almost certainly be the origin of the fundamental steering choices, but
- ensures that it sets a course that preserves the Internet principles, while expanding the scope of autonomy between the market and the state

.

I have argued that this was exactly the effect of the late 1960s Carterphone and Computer Inquiry proceedings, so this is not an impossible task. Moreover, the understanding that this is the essential challenge permeates the Internet governance debate. The International documents discussed in Section III recognize the balance that must be struck between policy goals and the preservation of the dynamic Internet resource system. Table VI-1 adds to this body of evidence in a somewhat different way. It summarizes four analyses from the 2004-2005 period, which was a high point in the international debate over Interne governance because of the approach of the World Summit on the Information Society meeting in Tunis.[604] These are fairly comprehensive discussions that included explicit recommendations. They can be summarized in a small number of principles to guide the adaptation of Internet governance substantive policymaking effort.

Table VI-1: Foundations of Internet Success and Recommendations for Responding to the Maturation Challenges

Key to Sources: Petru Dumitriu, "The World Summit on the Information Society (WSIS): From Geneva (2003) to Tunis (2005). A Diplomatic Perspective, "**in** J. Kubalija and V. Katundjun (Eds.) Multistakeholder Diplomacy, Challengers & Opportunities (2006); **Milton Mueller, John Mathiason and Lee W. McKnight, "Making Sense of 'Internet Governance': Defining Principles and Norms in Policy Context in Don MacLean (Ed.) Internet Governance: A Grand Collaboration (United Nations ICT Task Force, 2004);** *William Drake, Reframing Internet Governance Discourse: Fifteen Baseline Propositions, In Don MacLean (Ed.) Internet Governance: A Grand Collaboration (United Nations ICT Task Force, 2004);* United Nations Conference on Trade and Development (UNCTAD), "Internet Governance," in Don MacLean (Ed.) Internet Governance: A Grand Collaboration (United Nations ICT Task Force, 2004).

PRINCIPLES	PURPOSES
Structure & Units	
The global commons	**The Internet is based on global open, and non-proprietary standards. They are published and accessible to anyone without payment of fees.**
POLICY RECOMMENDATIONS: We need to keep those doors open. Nevertheless, maximum caution is necessary when attempting to privatize essential commons. **Do not allow the commons to be privatized.**	
End-to-End Principle	**Architectural principle creates an interoperable, neutral, transparent platform supporting a wide variety of applications and services**
POLICY RECOMMENDATIONS: Preserve the technical standard Management of resources should not be overloaded with policy… Resource allocation should be consistent with the end - to-end principle… Regulation of the fraudulent and criminal activity must be directed at responsible endpoints, not at the internetworking process itself. In all these cases, the substantive character of the issue at hand, rather than the fact that the Internet is the medium through which the problematic activity is conducted, should be the determining criterion as to what level of "governance" (from consensus building and cooperation to rule-making) and what instruments should be applied.	
Inclusiveness	**The Internet has been driven "from the bottom up"**
POLICY RECOMMENDATIONS: This feature could be enhanced by consolidating or by building from scratch governance structures that are genuinely open and inclusive of governments. *The effective inclusion of developing countries requires much greater attention…. Greater attention is needed to the inclusion of civil society organizations, small and medium-sized enterprises and individual users.* First, it must be recognized that whatever the merits of the case for their reform, the loose constellation of organizations that have so far underpinned the development of the Internet have achieved remarkable success in ensuring the stability and unit of a highly decentralized network of networks with no centre and not strong rule-making authority… In order for any reform proposal to be viable, not just technically but also politically, it must provide strong evidence that it will ensure the continued stability and quality of service of the Internet, prevent its fragmentation and maintain the "bottom-Up" processes through which standards and policies have been developed so far. *Technical and policy issues often cannot be neatly separated*	
Private Market	**Fosters decentralized, small scale investment and variation in approach**
POLICY RECOMMENDATIONS: Do not transform standards commons into a basis for regulating the private market. *With respect to the substance of rule systems, efficiency means devising frameworks that do not inhibit technological change, unduly constrain the development of markets, or make it difficult for governments and stakeholder to reach agreements.* No one size fits all solutions are likely to emerge… a number of questions in which technological and policy issues are particularly intertwined are likely to be best treated within a network of international frameworks (as opposed to a unified, structured organization) of cooperation and coordination for the development of the Internet… In such a cooperative framework flexibility should be a paramount consideration… Structural flexibility and lightness are also needed in order to prevent governance solutions from being rendered obsolete by technological evolution.	
Functionality/ and *Congruence*	**The Internet… development actually started from the need to perform a function.**
POLICY RECOMMENDATIONS: If we decide to use the Internet as a tool for achieving social development objectives, the governance model we follow should not be meant only to monitor, to restrict and to regulate. We need to allow and enhance functionality by representing and adequately using a balance of interests, capabilities and needs that exist in exist in real life. *Efficiency concerns suggest that form should follow function to the extent possible… In general terms, it is desirable to optimize institutional forms so that they match the issues to be managed. This overarching concern applies to both the substantive rules and institutional procedures in governance mechanisms.* [E]volution is more likely to produce results than a voluntarist top down approach. The current system of management of core Internet resources is the result of a process that has taken place over a remarkably short time. It is clear that this evolution has not yet reached a stage of maturity that is acceptable to all stakeholders. It must also complete a process of genuine internationalization (which is not necessarily equivalent to full-fledged intergovernmentalization, but which implies representatively requirements beyond the participation of individuals/organizations of various nationalities. In doing so it is essential to reconcile demands for change with the need to ensure continued delivery of the critical services.	

Users and Uses

Moral Neutrality **Self-reliance**	**Transparency, speed and accessibility of information and content and services. But this communications enabling power applies to "bad ""as well as "good" information communications behavior.**

POLICY RECOMMENDATIONS: Private networks or users can build electronic "fences" or adopt filters or practices that can, to some extent, shelter themselves from undesirable forms of while maintaining some form of compatibility and interconnection with the rest of the world. Whereas and traditional notions of government and governance imply uniformity, Internet permits variation in policies adopted in response to the same problem.

Resource scarcity, Scale and dependence increase value of control concentration, & control

POLCY RECOMMENDATIONS: Concentration and control raise legitimate grounds to investigate bottlenecks and the economic and political impact of legacy control. *Equity concerns are equally important and will become more so as the Internet becomes increasingly pervasive and thus affects a wider range of social interests.... What about situations... where concentrated market structures allow powerful firms to in effect set generally applied rules via their business strategies, rather than through collaborative decision making?*

Internet for development Infrastructure development should be decentralized and competitive

POLICY RECOMMENDATIONS: In order to help governments reach their economic and social aims, one should not look for methods to control the Internet, but for means to use its comparative advantage and prevent ICTs from becoming a factor that broadens, Instead of narrows, divides... We need to turn the technological advances into economic and social benefits; to attach societal assets to technological virtues, and to explore potential that have been unchartered. **Digital divide subsidies, if there are to be any, should go to end users and not to centralized suppliers or governments. Providing resources to end users...to acquire those elements of end user infrastructure should serve to stimulate and encourage development while maintaining a maximum degree of choice and diversity in supply.**

Governance

Polycentric **Multi-stakeholder**	**Distributed and multifarious, cannot be regulated in a top down manner** *Internet governance involves a heterogeneous array of formalized public and private sector rules that vary widely in their institutional attributes. Entails a heterogeneous and highly distributed array of prescriptions and processes that reflects the Internet's core features rather than centralized "one size fits all" control over a single system.* Spontaneous expression of the consensus and discipline of the main players on the use of standards and protocols

POLICY RECOMMENDATIONS: Multistakeholder governance should be encouraged government, private business, civil society and international organizations. If we replace the naturally normative work that has been emerging spontaneously with more systematic work, we need a common understanding of what should be expected from the parties involved. After defining those contours of governance, we may gradually move toward agreement on rules, decision-making procedures, and institutions. *Viewing these governance mechanisms in an integrative manner would allow us to evaluate the full diversity of public and private sector practices that help to shape bot the infrastructure and transactions and content, to systematically assess what works... and to consider whether there are any holes, tensions or cross- cutting issues... [I]f properly structured, it could well build a stronger global consensus that would underpin the Internet's continuing growth as an open and vibrant medium.* A sustained effort of capacity building for Internet policy making is needed so that the majority of the developing countries can effectively participate in the management/governance systems.

Specialization	Inclusion does not rule out specialization as a prerequisite for efficiency and effectiveness.

POLICY RECOMMENDATIONS: Internet governance should count on specialization. The separate and complementary functions of public and private governance structures, the legitimate roles of different actors, and the need to create organic and as building blocks.

Self-restraint Accountability	The highly technical nature of the work on standards and protocols does not imply ignoring social consequences.

POLICY RECOMMENDATIONS: While accepting the need for more governance, it is equally important for public policy to refrain from regulating what does not need to be regulated. Normal democratic procedures... will inevitably be slow in an environment of rapid change and technological development. Governments should be knowledgeable about prospects in the technical field. The same conclusion is valid for national policies and laws of the powerful countries when they set rules that affect the global community. *If they are not designed to maximize efficiency and flexibility, they may not be functionally effective or politically sustainable.* Of course, it is not possible to establish a clear-cut separation between all infrastructural/technical matters on the one side and political and socio-economic questions on the other. Policy decisions very often have technological implications and vice versa. A crude device to categorize public policy issue that need to be addressed and the responses that could be explored in each case could be to distinguish between the management of the Internet as a global utility and the international governance issues posed by the use people make of the utility.

Sources: Petru Dumitriu, *The World Summit on the Information Society (WSIS): From Geneva (2003) to Tunis (2005). A Diplomatic Perspective, in* Multistakeholder Diplomacy, Challenges & Opportunities 33 (Jovan Kurbalija & Valentin Katrandijev eds., 2006); Milton Mueller, John Mathiason & Lee W. McKnight, *Making Sense of "Internet Governance": Defining Principles and Norms in Policy Context, in* Internet Governance: A Grand Collaboration 100 (Don MacLean ed., 2004); William J. Drake, *Reframing Internet Governance Discourse: Fifteen Baseline Propositions, in* Internet Governance: A Grand Collaboration 122 (Don MacLean ed., 2004); U*NCTAD, supra* note 51.

Structure and Units

1. To the greatest extent possible, preserve the end-to-end principle based on open, non-proprietary standards.
2. Recognize that markets have played a central role in deploying infrastructure and developing applications to drive Internet success, but
3. policy must also recognize that (a) the threats of scarcity and the exercise of market power require vigilant attention; (b) the political goal of the flow of information is not always synonymous with private or governmental interests; and (c) the social goal of universal service is not guaranteed by markets.

Users and Uses

1. Protect free flow of information, recognizing that both good and bad information may flow freely and states or private corporations are not always the best arbiters of which is which.
2. Promote the universal deployment of resources for development and the widest possible array of uses, which are the fundamental measure of success of the resource system.

Management and Governance

1. Apply a braod subsidiarity principle to policy, which means, in general, tasking institutions with responsibilities for which they are well-suited and, in particular, not burdening technical standards with socio-ecological policy responsibilities.
2. Strengthen polycentric, inclusive, multi-stakeholder governance institutions.

B. The Multi-stakeholder Approach to Governance

1. Support for Multi-stakeholder Approaches in the Internet Space

One area where there has been considerable consensus at a high level of generalization in the Internet governance debate involves the institutional process for policymaking. For most of the issues raised, it is generally accepted that adaptation should flow from the existing institutions that have relied on multi-stakeholder principles. Where multi-stakeholder institutions are absent, they should be created. The observations on governance process of the three international groups identified in Section III are summarized in top part of Table VI-2. The goals of participation, transparency, fairness, and data-based decision-making are endorsed with few countervailing concerns. Thus the conception of how multi-stakeholder processes should work is universally supported.

The bottom part of Table VI-2 reflects the magnitude of the challenge in another way. It shows the four sets of Internet stakeholders identified by the WGIG document. Each of the stakeholder groups corresponds fairly closely to one of the realms of social order. Moreover, the four sets of stakeholders have a great deal to do. The essential challenge for the multi-stakeholder process is to get the many different sets of stakeholders to collaborate to ensure that they all fulfill their long list of responsibilities.

TABLE VI-2: PRINCIPLES AND STAKEHOLDERS FOR INTERNET GOVERNANCE

Purposes and Principles

WORKING GROUP ON POLICY MAKING

Meaningful participation in global policy
Multi-stakeholder forum to address Internet-related policy issues
Functions: Audit, Arbitration, Coordination
Regulation Structure: multilateral, transparent
Ensure transparency, fair process, and accountability
democratic inclusive: governments, private sector, civil society,
Regional, national International coordination, International Orgs.

OECD PRINCIPLES FOR INTERNET GOVERNANCE

Encourage multi-stakeholder co- development operation in policy development processes:
Foster voluntarily developed codes of conduct
Develop capacities to bring publicly available, reliable, data into the policy-making process:
Limit intermediary liability
Give appropriate priority to enforcement efforts

UNESCO CODE OF ETHICS

Member states are responsible for ensuring an an inclusive, relevant, up-to-date and legal environment for the development of the information society

Sources: OECD, *Communiqué on Principles for Internet Policy-Making*, OECD High Level Meeting, The Internet Economy: Generating Innovation and Growth, Paris, June 28-29, 2011; *Report of the Working Group on Internet Governance*, Chateau de Bossey, June 2005.

Internet Stakeholder Groups and Responsibilities

Governments (Polity)

Public policymaking and coordination and implementation, as appropriate, at the national level, and policy development and coordination at the regional and international levels.
Creating an enabling environment for information and communication technology (ICT) development.
Oversight functions.
Development and adoption of laws, regulations and standards.
Treaty-making.
Development of best practices.
Fostering capacity-building in and through ICTs.
Promoting research and development of technologies and standards.
Promoting access to ICT services.
Combating cybercrime.
Fostering international and regional cooperation.
Promoting the development of infrastructure and ICT applications.
Addressing general developmental issues.
Promoting multilingualism and cultural diversity.
Dispute resolution and arbitration.

Civil society (Socio-cultural)

Awareness-raising and capacity-building (knowledge, training, skills sharing).
Promoting various public interest objectives.
Facilitating network-building.
Mobilizing citizens in democratic processes.
Bringing perspectives of marginalized groups, including, for example, excluded communities and grass-roots activists.
Engaging in policy processes.
Contributing expertise, skills, experience and knowledge in a range of ICT policy areas.
Contributing to policy processes and policies that are more bottom-up, people-centred and inclusive.
Research and development of technologies and standards.
Development and dissemination of best practices.
Helping to ensure that political and market forces are accountable to the needs of all members of society.
Encouraging social responsibility and good governance practice.
Advocating for the development of social projects and activities that are critical but may not be "fashionable" or profitable.
Contributing to shaping visions of human-centred information societies based on human rights, sustainable development, social justice and empowerment.

The private sector (Economy)

Industry self-regulation.
Development of best practices.
Development of policy proposals, guidelines and tools for policymakers and other stakeholders.
Research and development of technologies, standards and processes.
Contribution to the drafting of national law and participation in national and international policy development.
Fostering innovation.
Arbitration and dispute resolution.
Promoting capacity-building.

Academic/technical Community (Technology).

The contribution to the Internet of the academic community is very valuable and constitutes one of its main sources of inspiration, innovation and creativity.
Similarly, the technical community and its organizations are deeply involved in Internet operation, Internet standard-setting and Internet services development.
Both of these groups make a permanent and valuable contribution to the stability, security, functioning and evolution of the Internet. They interact extensively with and within all stakeholder groups.

Source: Report of the Working Group on Internet Governance, Chateau de Bossey, June 2005

2. Broader Challenges of Legitimacy

The interest in a multi-stakeholder approach is not only consistent with the organic Internet governance institution,[605] it also responds to the perceived decline in the legitimacy of the state. An EU White Paper from 2003 on parliamentary democracy notes the challenge of maintaining the connection between representative political institutions and the public as the information age progresses.

> Parliamentary territorial representation entails the involvement of a select few in law- and policy-making and provides a reliable basis for well-organized deliberation and decision-making. It enables in many cases more or less effective and reliable legislative action judged to be legitimate. Of course, such arrangements risk a de-coupling between Parliament and the "the people." Two institutional arrangements were supposed to limit such de-coupling, namely regular parliamentary elections and a free press. But, as suggested in this [p]aper, much more is needed. Modern citizenry does not consist of a homogeneous mass public, or merely supporters of one or more parties. They are increasingly complex in their judgments and engagements. They make up an ensemble of publics and differentiated interests and competencies.[606]

Thus, the fundamental challenge in the economy of preserving a dynamic diverse product space in which consumers play a more active role has a direct parallel in the polity. A diverse, knowledgeable citizenry that wants to be and is engaged in the policy process challenges the incumbent institutions. It can be argued that the Internet is ahead of the polity in that it has provided a partial solution that took this direction, but it should also be recognized that the framework for promoting and channeling civil society engagement to build a legitimate and effective set of institutions is a work in progress.

The key to achieving the goal of enhancing democratization identified in the White Paper is that as the state recedes; it must use the remaining "legal connection" to promote participatory governance to ensure a larger direct role for the public. The principles of parliamentary reform offered as a response to this growing democratic deficit can be applied broadly to governance.

> [W]e suggest consideration of reforms of parliamentary functions, role, and institutional arrangements guided by principles such as the following:
>
> The principle of exercising high selectivity – with respect to the policy areas in which Parliament engages itself directly, for example in the formulation of specific or detailed laws and policies. This calls for explicit consideration of the reasons for such focused involvement.
>
> The principle to delegate whenever possible – a form of subsidiarity principle – to self-organizing policy sectors, at the same time holding accountable these sectors or key or powerful actors in these sectors. Part of this entails establishing effective monitoring and accounting arrangements.
>
> Institutionalizing these self-organizing policy sectors would serve also to legitimize the collective deliberations and decisions in these self-governing communities.
>
> The principle of focusing on strategic problems and issues that cannot be readily delegated or dealt with through private interests or civil society . . . .[607]

This is a road map for transferring active decision-making from the state to civil society. It is consistent with Ostrom's observations on the nesting of governance of resource systems in complex environments.

> Given the wide variety of ecological problems that individuals face at diverse scales, an important design principle is getting the boundaries of any one system roughly to fit the ecological boundaries of the problem it is designed to address. Since most ecological problems are nested from very small local ecologies to those of global proportions, following this principle requires a substantial investment in governance systems at multiple levels—each with some autonomy but each exposed to information, sanctioning, and actions from below and above.[608]

C. The Many Flavors of Alternative Governance

1. Evaluating Alternatives on the Participation Dimension

Reflecting the central theme of increasing direct participation in governance, Figure VI-1 arrays the various approaches to governance along two dimensions—the extent of state involvement and the extent of public involvement. I use the term "alternative governance" because a number of adjectives have been used to describe both the substance and process of regulatory change.[609] At the origin, the role of the industry is dominant. Along the X-axis the role of the state increases. Along the Y-axis the role of civil society increases.

Figure VI-1: The Growing Stock of Regulatory Approaches

Table VI-3 provides definitions for the various types of regulation that have been discussed in the literature. They are listed in order running from least to most regulatory, as I understand the thrust of the

There are two polar opposites identified in this approach – "no regulation" is the least regulatory and traditional regulation the most. No regulation is the condition in which the transaction is not governed by direct involvement of the state or any explicit regulatory mechanism. Rather, the invisible hand of the market is presumed to ensure socially desirable outcomes.[610] At the opposite extreme, traditional, formal, statutory regulation occurs where the state (through its representative institutions) sets the goals and empowers the administrative apparatus of the state to write, implement, and enforce rules. Between the polar opposites, we have long had a number of mixed approaches and the number has been growing in the past two decades. Pure self-regulation occurs where the sellers in the market band together to produce rules to discipline the behavior of sellers in the market, presumably to promote the common interest of the sellers. In the case of pure self-regulation, sellers adopt the institution of regulation on a purely voluntary basis. The invisible hand pushes sellers into collective action.

The large number of self-regulatory approaches appears to be grounded in the recognition that there is an incentive and collective action problem with self-regulation. The concern about the inadequacy of self-regulation includes heterogeneity of the space that is being addressed. This leads to schemes that contemplate legislative mandates and the need for monitoring and enforcement.

Once the state becomes involved, we are no longer in the realm of pure self-regulation. However, these days the literature offers up a series of concepts of self-regulation in which it is no longer "voluntary," but still is free from state command and control. These include enforced, coerced, stipulated, mandated, and social self-regulation. In some of these cases, the threat of state regulation is seen as the factor that motivates sellers to implement "self-regulation" to avoid having regulation imposed by the state. In other cases, the state requires the industry to self-regulate, but does not take part in framing or implementing the regulatory scheme.

Co-regulation receives a great deal of attention when the options on the table move beyond self-regulation. Note that all of the attention given to co-regulation is an affirmation that self-regulation is not deemed to be adequate. In co-regulation the state imposes the obligation to institute a regulatory scheme and retains backstop authority. The thrust of the argument is to back down reliance on the state and increase reliance on the industry. The Ofcom definition in Table VI-3 is indicative of the thrust of this approach to regulatory change. It envisions a trade-off between the role of the state and the role of the industry. State authority certifies the co-regulatory structure. The partnership is between the state and the industry. And there is little or no mention of any change in the role of the public.

Table VI-3: Describing Alternative Types of Regulation

ALTERNATIVE TYPES OF REGULATION

No regulation (Ofcom, 7)) Markets are able to deliver required outcomes. Citizens and consumers are empowered to take full advantage of the products and services and to avoid harm.

Self-regulation (Ofcom, 7) Industry collectively administers a solution to address citizen or consumer issues, or other regulatory objectives, without formal oversight from government or regulator. There are no explicit ex ante legal backstops in relation to rules agreed by the scheme (although general obligations may still apply to providers in this area).

- Pure Self-regulation (EMR 23)
- Stipulated Self-regulation (KLS 121)
- Robust, Enforceable Self-regulation (FTC)
- Enforced Self-regulation (EMR at 22)
- Coerced Self-regulation (EMR at 16)
- Mandated Self-regulation (R at 12)
- Social Self-regulation (GA 9)

Co-Regulation (Ofcom, 7) Schemes that involve elements of statutory regulation, with public authorities and industry collectively administering a solution to an identified issue. The split of responsibilities may vary, but typically government or regulators have legal backstop powers to secure desired objectives. (EMR)

Collaborative Regulation (EMR 15) The role and structure of the state are fundamentally transformed in a changing society. Governance is seen as a process of interaction between different social and political actors, and growing interdependencies between the two groups, as modern societies become ever more complex, dynamic, and diverse.

Reflexive Regulation (W 2) an entire infrastructure aimed at establishing… the right incentives for those bearing the costs of regulation; the right participatory structure for shaping the instruments so that all those affected have a voice in shaping them; the guarantee of legal certainty; and the possibility to hold actors accountable for the consequence of particular actions (GA 4)

Civic Regulation (GA 7, 11) The goal of civil regulation is to fill the vacuum left by the contracting state and to compensate for the "deficit of democratic governance that we face as a result of economic globalization… Under civic regulation, the various manifestations of civil society act in a variety of ways to influence corporations, consumers and markets…From civil regulation perspective, the state's role is to provide mechanisms that will empower the institutions of civil society to make corporations more accountable.

- Regulatory Pluralism ((GA at 10)
- Informational Regulation (GA 7)

Participatory Governance (GA 7) various manifestations of civil society act in a variety of ways to influence corporations, consumers and markets, often bypassing the state… However, the evolving role of civil regulation has not taken place entirely divorced from state intervention… a number of next generation policy instruments are geared to empower various institutions of civil society to play a more effective role in shaping business behavior.

TRADITIONAL, COMMAND AND CONTROL REGULATION

Statutory Regulation (GA at 4) Objectives and rules of engagement are defined by legislation, government or regulator, including the processes and specific requirements on companies with enforcement carried out by public authorities.

Formal (Ofcom 7)
Statutory (Ofcom, 7)
Notice and Comment (Ofcom)
Command and Control (EMR at 12, GA 2)
State Regulation (EMR at 16)

Sources and key:

B	**T.R . Burns, The Future of Parliamentary Democracy: Transition and Challenge in European Governance, Green Paper for the Conference of the Speakers of EU Parliaments, 22-24 September 2000, http://www.camera.it/_cppueg/ing/conferenza_odg_Conclusioni_gruppoesperti.asp**
EMR	**Hans Bredow Institute, Final Report: Study on Co-Regulation Measures in the Media Sector, University of Hamburg, June 2006http://ec.europa.eu/avpolicy/docs/library/studies/coregul/final_rep_en.pdf**
GA	**Neil Gunningham, Compliance, Enforcement and Innovation http://www.oecd.org/dataoecd/18/38/33947825.pdf**
GB	**Neil Gunningham, Regulatory Reform Beyond Command and Control, Earth System Governance: Theories and Strategies for Sustainability at the Amsterdam Conference on the Human Dimensions of Global Environmental Change, 24-26 May 2007http://www.2007amsterdamconference.org/Downloads/AC2007_Gunningham.pdf**
H	**Denis D. Hirsch, "The Law and Policy of Online Privacy: Regulation, Self-Regulation, or Co-Regulation, Theory Working Papers New York University School of Law http://lawpublications.seattleu.edu/cgi/viewcontent.cgi?article=2003&context=sulr**
kln	**Bert-Japp Koops, et al., Starting Point for ICT Regulation, B-J Koops, et. al (Eds.), Starting Points for ICT Regulation, ITER, The Hague, 2006http://rechten.uvt.nl/prints/upload/2006627908423120379 44.pdf**
OfCom	**Office of Communications, Identifying Appropriate Regulatory Solutions: Principles for Analysing Self- and Co-Regulation, 10-Dec-08http://stakeholders.ofcom.org.uk/consultations/coregulation/statement/**
R	**Ira S. Rubinsien, Privacy and Regulatory Innovation: Moving Beyond Voluntary Codes NELLCO Legal Scholarship Repositoryhttp://lsr.nellco.org/cgi/viewcontent.cgi?article=1181&context=nyu_plltwp**
SLK	**Laura Stein, et al., Civil Society, Participation in Multi-stakeholder Processes: in Between Realism and Utopia, LSE Research Online, 2009, http://eprints.lse.uk/27901**
W	**Sabine Weiland, Reflexive Governance — a Way Forward in Coordinated Natural Resource Policy?, REFGOV, Working paper series: REFGOV-GPS-19, draft versionhttp://refgov.cpdr.ucl.ac.be/?go=publications&cat=1&subcat=2**

Thus, I view the existing discussion of change in regulation as involving a substantial reduction in the role of the state's command and control over market actors and actions with little, if any, contemplation of an increase in the role of the public. I consider the self- and co-regulation arguments in the literature as overwhelmingly about deregulation, not about regulatory reform. Advocates assert that there really is no need for regulation, but, if there are problems, the enlightened self-interest of producers will call forth collective, voluntary, purely self-regulatory actions to solve the problem. If this does not happen, then the threat of regulation is posited as enough incentive to induce producers to engage in effective self-regulation. Failing that, the government could mandate or stipulate self-regulation, but should not directly regulate. However, the self-regulation experimental phase is never limited in time and the conditions that indicate failure are never specified; nor are the actions that would be taken if failure is admitted. Co-regulation introduces a dollop of state assertion of authority with little involvement of either the state or the public. Co-regulation is intended to address the failure of self-regulation

(primarily the incentive and collective action problems) with the state acting as a backstop, but depending primarily on producers to act.

This seems to be a treadmill never intended to get to effective regulation, and a review of the literature supports such a view. The available contemporary alternative regulation literature can easily reinforce the concern of those who fear alternative regulation is a cover for weak regulation. The literature provides a severely disproportionate amount of attention to the ways in which alternative regulation gives greater deference and influence to the industry interests that are affected by regulation.

Fortunately, co-regulation does not exhaust the possibilities for approaches to regulation that reduce the role of the state, however. There is some discussion of increasing the role of other stakeholders in the regulatory process. Collaborative and reflexive regulations envision broader notions of involving and representing **all** stakeholders and interests in the regulatory process. Participatory governance and civic regulation focus on the participation of civil society groups.

2. Participatory Governance

This section picks up on the public participation threads in the literature and weaves them into an alternative. It argues that the narrow focus on expanding the freedom and influence of producers is unjustified as a general proposition and counterproductive to the effort to respond to the quarter-life crisis. There is every reason to believe that the pubic (consumers) can benefit from and contribute to improved regulation as much as industry (producers), just as end-user innovation has enhanced the performance of many areas of the digital economy.[611] Balancing the approach may also reduce political tension. If regulatory approaches can be identified that are seen as effective but more flexible than traditional regulation, resistance may be reduced on both sides.

With all these alternatives forms of regulation available, it is natural to ask whether certain characteristics of or conditions in a sector point toward different forms of regulation as likely to be more successful or preferable. The regulatory reform literature provides the key link between the maturation challenges and the alternative forms of regulation.

As shown in Table VII-1, replacement is the central concept. Replacement occurs "when people can no longer do things off-line but can only perform them online, the government should then create guarantees for accessibility."[612] The shift of activity online and the nature of that activity lay the basis for regulation. In the case of the Internet, it is a combination of things that could not be done offline and things that can be done much more efficiently online that creates the urgency to provide access and ensure that the activities that took place in physical space are available in cyberspace.

When the activities that have been replaced involve fundamental rights or important political activities are at issue, the need for regulation is greater. The list of fundamental rights and important activities includes human rights, the rule of law, and state security. These are prominent in several of the maturation challenges that the Internet faces.

Where the need for regulation might be met with self-regulation, other considerations can mitigate against it, if the activities are so important that they cannot be left to uncertain self-regulation. Finally, where technology has stabilized significantly and there is a need for uniformity, self-regulation may not be the preferred approach because it cannot produce the desired homogeneity. Complex goals, complex products and services delivered by diverse companies raise concerns about the ability of self-regulatory schemes to succeed.

Table VII-1: Characteristics that Place Limits on Self/Co-Regulation

Replacement/High Risk: "when people can no longer do things off-line but can only perform them online. The government should then create guarantees for accessibility."[1]

Fundamental Rights/Strong Public Interest Concerns: – "[Co-regulation] is only suited to cases where fundamental rights or major political choices are not called into question,[1] Self-regulation is not suitable if fundamental norms and values of democratic rule or law are at stake… this holds especially with respect to protecting classic human rights of citizens and preventing and investigating infringements of the rule of law and state security. In these cases, agreements between parties cannot suffice and legislation will be necessary."[2]

Industry Lack of incentives/organization: "We will establish whether the industry has a real incentive to resolve the issue, rather than just a publicly stated intention… where such incentives do not exist, a purely self-regulatory solution is less likely to succeed. But a form of co-regulation may be appropriate if weaknesses in incentives can be strengthened through statutory regulation… we should consider the incentives for members to cheat… and what monitoring and enforcement measures could be put in place for the scheme to be effective."[3]

Heterogeneity of Products: "We should therefore consider whether measurable objectives and simple rules can be established for the operation of the scheme. This include considering the complexity of the citizen and consumer objective, the diversity of the companies potentially taking part, the number and complexity of the service covered, and the availability of expertise in designing a solution."[3]

Instability of Technology/ Heterogeneity of Products: "if… stability is achieved. Then to promote legal certainty, perhaps codification of norms established by self-regulation could take place."[2] "[Self-regulation] should not be used where rules need to apply in a uniform way."[2]

Source: [1] **Dutch Guidelines for Regulation** [2] **European Governance: White Paper, European Commission**, cited in **Bert-Japp Koops, et al., Starting Point for ICT Regulation, B-J Koops, et. al (Eds.), Starting Points for ICT Regulation, ITER, The Hague, 2006http://rechten.uvt.nl/prints/upload/20066279084231203794 4.pdf, 133-136,** [3] **Office of Communications, Identifying Appropriate Regulatory Solutions: Principles for Analysing Self- and Co-Regulation, 10-Dec-08http://stakeholders.ofcom.org.uk/consultations/coregulation/statement/, 16.**

With an array of diverse problems and a large set of possible solutions, it is critical to have a clear idea of what successful alternative governance would look like. The literature provides clear insights (see Table VII-2). Even reviews that are friendly toward reducing reliance on traditional regulation recognize that key weaknesses of the alternatives must be addressed.

> The widely observed lack of openness and transparency points to a fundamental question of co-regulation as regards the scope of relevant stakeholders. Most of the systems do not include consumer or viewer/listener groups in a way, which provides for formal influence with the process of decision making. . . . While transparency is a generally accepted value of good regulation the openness to specific groups is a design feature of a co-regulatory system. How the interests are balanced defines the working

of the system, its acceptance and legitimacy.[613]

Even though the objective of regulatory reform is to reduce the role of the state, one of the key ingredients of success is political – the establishment of the legitimacy of the alternative regulatory process. Legitimacy is a quintessentially political concept that is accomplished by (1) designing internal structures and processes that are seen as participatory, transparent, and fair and as building trust, leadership, and skills among the participants and (2) achieving external results that are effective.

Table VII-2: Attributes of an Effective Alternative Regulation Structure

Transparency/Openness
- Clarity of Purpose
  - Dialogue
  - Consensus
  - Informing policy process
  - Influencing decisions
  - Planning
  - Implementation
  - Monitoring and evaluation
  - Data gathering and analysis
- Clarity of Process/Rules
  - Governance
    - Convening
    - Decision rules
      - Voting
        - Unanimity (Veto)
        - Super Majority
        - Majority
      - Non-Voting
        - Rough Consensus
      - Right of Appeal, Dissent
- Scope of "Authority"
  - Rules only
  - Review of operations & goals

Enforcement – Compliance
- Accountability
- Fairness
- Speed
- Appropriateness
- Complaint and Audit
- Adequacy of Resources

Participation
- Public Awareness
  - Rights - Redress
  - Public consultation
- Inclusiveness
  - Access
  - Representativeness
  - Organization of groups
  - Resources
  - Expertise
  - Role of independents
- Adequacy of Resources
  - Overall
  - For NGOs
- Industry Coverage
  - Achieve Critical Mass
  - Avoid "Capture" & Ballot packing

Legal Clarity
- Relationship to government
- Formal
  - Sponsored
  - Recognized
  - Status of Decisions
    - Safe Harbor
    - Reg.-Neg.
    - Sponsored
    - Recognized
    - Preferred
    - Advisory
- Informal
  - Bully Pulpit- Nudge
  - Procurement
  - R&D
- International

Desired Results
- External
  - Credibility
  - Legitimacy
  - Effectiveness
  - Efficiency
  - Adaptability
  - Flexibility
- Internal
  - Building Trust
  - Shared Knowledge & Expertise
  - Culture of Cooperation & Leadership

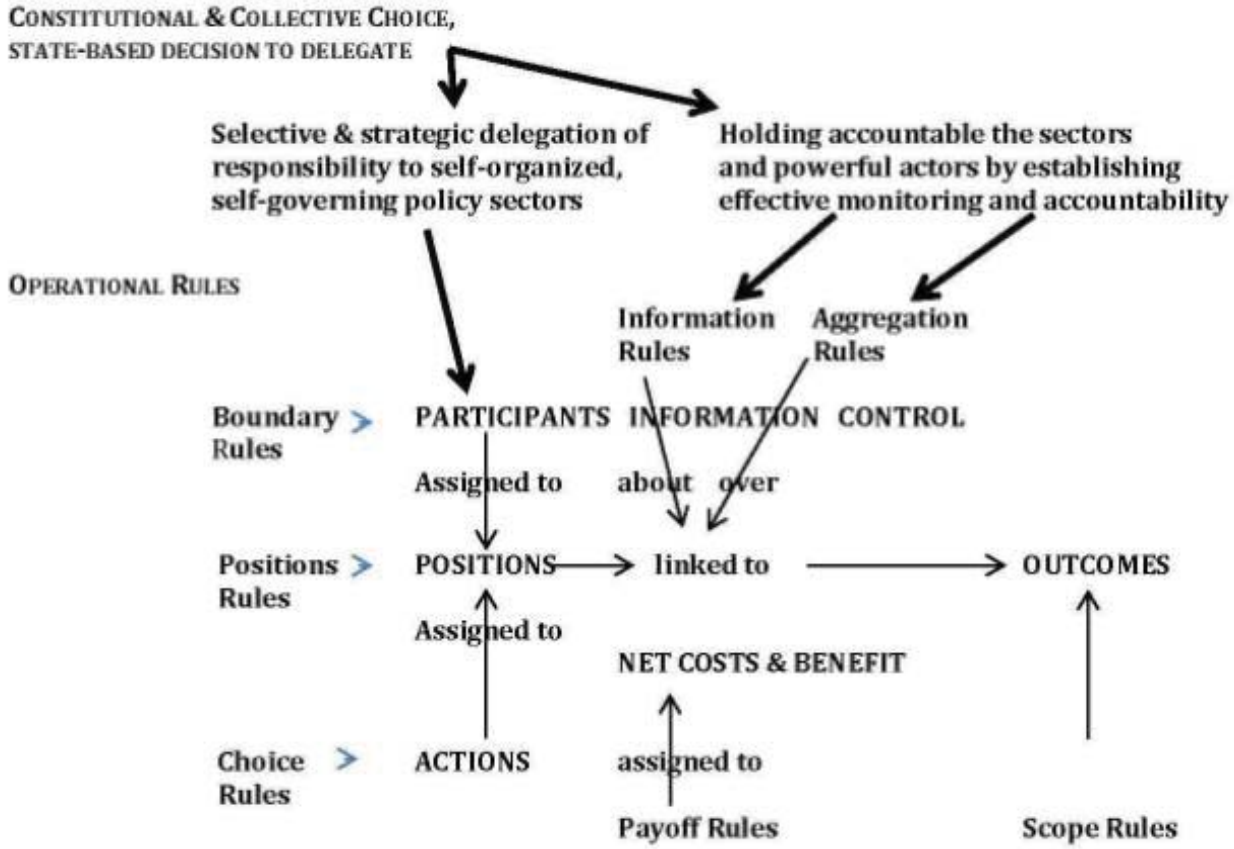
2. Expanding the Space for Alternative Governance

a. Constitutional and Collective Choice Decisions

The process by which the space for alternative governance can be expanded can be seen as a challenge in the realm of Constitutional and Collective Choice decision-making, as depicted in Figure VII-1, which

uses the recommended principles of parliamentary reform discussed above.

FIGURE VII-1: EXPANDING THE SPACE BETWEEN STATE AND MARKET



In building the legitimacy of alternative governance models in both the economy and the polity, the state has the important role of gracefully getting out of the way, while providing the important legal underpinning that makes significant contribution to the legitimacy of the alternative governance model. The state must provide legal clarity in selectively delegating more authority to autonomous, self-organizing policy sectors. Whether it chooses to delegate or regulate, it must reserve authority over areas where replacement has occurred and important values are at stake. In all cases, it is extremely important to seek to ensure that the institutions exhibit the key characteristics for successful oversight, including monitoring institutions for transparency, participation, and accountability.

The process of institutionalization discussed earlier is important. While it is clear that the state plays an important part in launching the authority of the alternative governance approach, over time, successful and effective alternatives build independent authority and trust. The ability of the state to revoke the authority shrinks. Eventually, any effort to rescind the authority becomes illegitimate.

As described in Figure VII-2, participatory governance is envisioned as a multi-stakeholder process that involves industry, civil society, and technologists in both the writing and enforcement of rules. The ultimate goal is to foster compliance, rather than enforcement. The participants are the three sets of non-governmental interests. The activities are rule writing and enforcement. It is supported by the state in the

delegation decision.

FIGURE VII-2: THE STRUCTURE OF PARTICIPATORY GOVERNANCE

We can envision two sets of possibilities, beginning with increasing activity that feeds into the regulatory process with the ultimate goal of shrinking the scope of regulatory process as the alternatives demonstrate their ability to do their job of governances (preserving the dynamic expansion of the Internet, while ensuring that the social goals are advanced).

Codes of conduct need to be developed by the multi-stakeholder process – not solely at the discretion of the industry. Codes of conduct that are developed through collaborative processes could be afforded special treatment by regulatory agencies and go into force on a fast track, but they need not be if self-regulatory enforcement and norms are strong enough. Enforcement of rules would open the door to crowd-sourcing enforcement in which the public participates directly. Complaints that are the result of the collaborative process could be granted special status and be handled in an expedited manner by the regulatory agency, or their enforcement could be through industry-based sanctions and processes.

In order to ensure that participatory governance attracts the participation necessary to make it effective and legitimate, it must fill the four voids left by the exit of the state (transparency, participation, legal clarity, and enforcement) and compensate for the failure of self-regulation. The right to appeal directly to the state would continue to exist, but the burden for success for complaints would be heavy for issues that had not been subjected to the participatory process. Complaints outside of the multi-stakeholder process cannot be prohibited, but they should bear a significantly heavier burden (a higher threshold and burden of proof). On the other hand, failure of businesses to participate should also come at a price, making complaints subject to accelerated consideration.

The most important ingredient is to ensure that the output of the new institutions is given a great deal of weight. This will provide an incentive to participate. The greater the authority of the intervening institutions, the more attention the structure should and will get. The multi-stakeholder group will have to be representative. Collaborative deliberation should be inclusive. In both cases, internal decision rules will have to be implemented (e.g., veto, super majority, majority, concurrence, and dissent).

The multi stakeholder processes would be subject to standards of representativeness, inclusiveness, and participation, which are more explicit and likely to result in better representation than the current, inchoate approach that prevails in traditional regulation. Thus, the resulting structure will have a statutory core as the underlying legal foundation, but the bulk of the work of rule writing and enforcement will be transferred into the co-regulatory and participatory activities.

3. Enhancing the Democratic Process

Participatory governance can address many of the areas of concern about effective regulation. It can enhance public awareness, transparency, and independence of the regulatory structure by drawing members of the public and leaders of the public interest community into the process. Participatory governance also brings additional resources to enforcement, resources that are volunteered by the public in the form of participation, although the structure needs to provide additional resources for technical expertise.

The idea is to deepen democratic participation by building civil society institutions that fill the gap left by the traditional institutions of the polity. This idea has strong roots in democratic thinking in two highly developed aspects of democratic theory – the contemporary view of the public sphere and the traditional view of the press. I believe there are generally strong parallels between the two. The unique role of the press as a civil society, public sphere institution that provides oversight over the polity and the economy has similarities to the role I envision for participatory governance. The above citations from the White Paper on representative democracy made this point directly. Elections are the primary form of participation in representative democracy that is no longer deemed sufficient for more knowledgeable, engaged publics. The press provides a primary oversight function.[614]

Democracy theorists and institution builders have believed for a quarter of a millennium that the press plays a central role in democracy by fulfilling two functions. The most prominent in their thinking was the role of the fourth estate to monitor and report on the other estates in society,[615] as shown in Table VII-3. However, in their prolific production of pamphlets they practiced the Fifth Estate function of mobilizing the populace to political action. The challenge with respect to participatory governance is to design structures that allow the Fifth Estate to compensate for the declining oversight functions of the state. Table VII-3 identifies the key functions of the press, which is defined as non-governmental oversight. It plays both mediated (Fourth Estate) and direct (Fifth Estate) roles.[616]

Table VII-3: Journalism as a Paradigm for Non-governmental Oversight[617]

Role	Relationship to the Public	Function	Complex Democracy's Ideal Media
Fourth Estate	Mediated	Monitorial	The Checking function Independent of both government and private economic power Grounded in the pluralism of the life world Nurture non-market structures to capture positive externalities
Fifth Estate	Direct	Participatory	Participatory Democracy's Ideal Media Pluralist: Distribute politically and culturally salient media in an egalitarian manner Supports interest group formation Mobilize interests Convey public opinion to policymakers Communal: promote agreement on common good Inclusive Thoughtfully discursive Self-Reflective Inform public about itself Contest dominant opinion Criterion to measure government responsiveness

Source: C. Edwin Baker, *Media Markets and Democracy* (2003), Chapter 6.

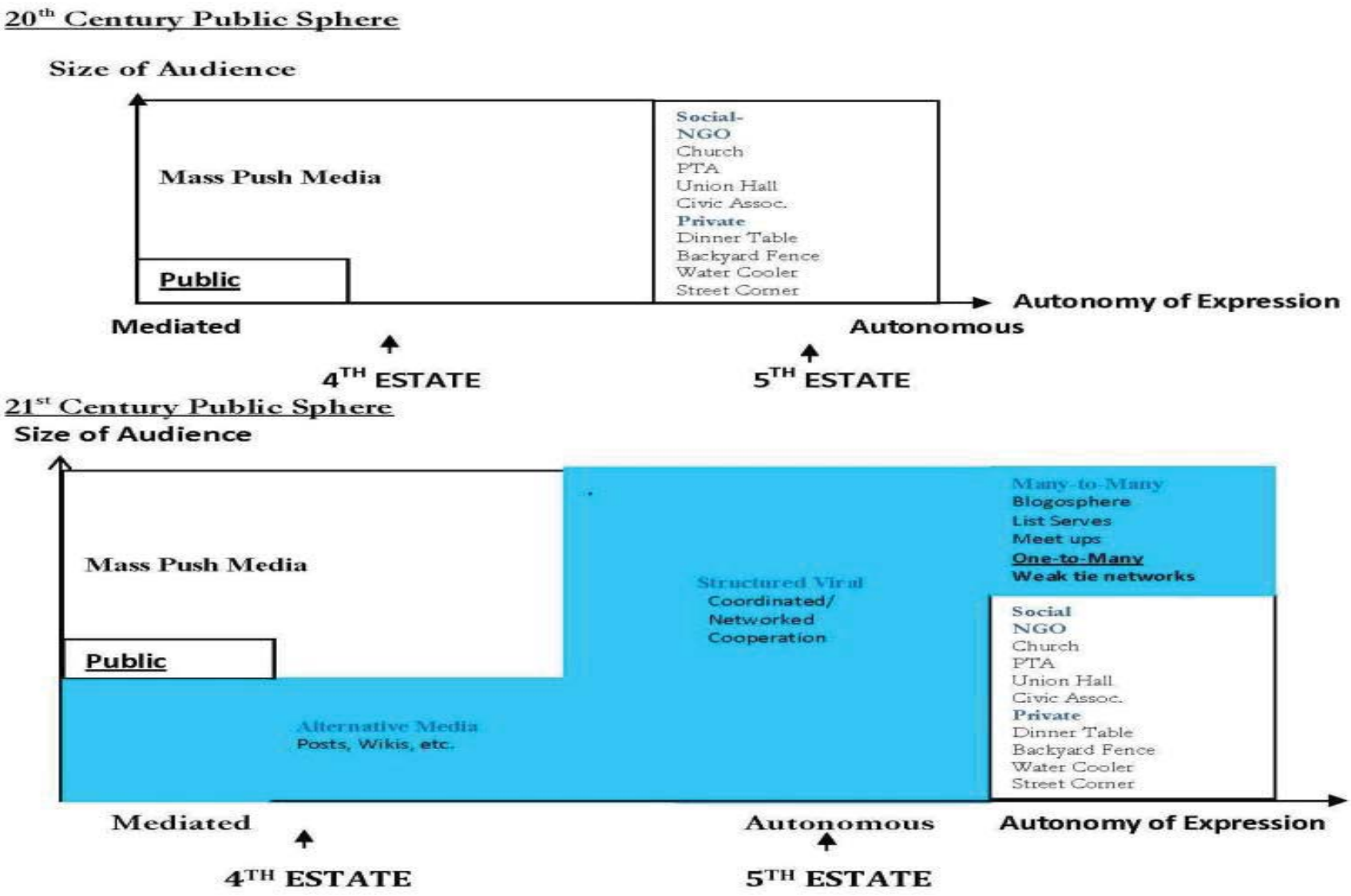
I refer to the Fifth Estate for ease of reference and because the concept is being applied to the impact of the Internet on the contemporary communications and media landscape. It captures the essence of the direct participatory role of the public. Dutton describes the Fifth Estate[618] as follows:

> More generally, the networks comprising the Fifth Estate have two key distinctive and important characteristics: 1. The ability to support institutions and individuals to enhance their 'communicative power' . . . by affording individuals opportunities to network within and beyond various institutional arenas. 2. The provision of capabilities that enable the creation of networks of individuals which have a public, social benefit (e.g. through social networking Web sites).[619]

The analogy between the press and participatory governance can be strengthened by locating these two institutions within the public sphere.[620] The public sphere mediates between the private sphere (which comprises civil society in the narrower sense, the realm of commodity exchange and of social labor) and the Sphere of Public Authority, which deals with the state. The public sphere crosses over both these realms. Through the vehicle of public opinion it puts the state in touch with the needs of society. This area is a site for the production and circulation of discourses, which can be critical of the state. These distinctions between state apparatuses, economic markets, and democratic associations are essential to democratic theory. The study of the public sphere centers on the idea of participatory democracy and how public opinion becomes political action.

Figure VII-3 depicts a map of the media in a public sphere that has become much more complex and the make-up of the media much more diverse. The Figure is drawn to emphasize

FIGURE VII -3: INCREASING DIVERSITY IN THE EXPANDING DIGITAL PUBLIC SPHERE



the fact that the growth has been in those areas of the media that are best suited to Fifth Estate functions. The challenge is to harness the Fifth Estate energy to accomplish the Fourth Estate oversight functions.

The Fifth Estate function is distinct from the Fourth Estate function, although it is generally hoped that monitoring society and informing the public will get them to act, but mobilizing is a different type of activity and the ability of Fourth Estate activity to mobilize people in the 20th century is debatable. The ability of unmediated viral communications to create strong collective action in the digital age has been widely noted.[621] Unmediated communications predominates in cyberspace because the medium is naturally suited to do this. There is a lively debate about whether the commercial mass media accomplished it function in the 20th century when commercialism overwhelmed journalism.[622] The goal of participatory governance is to expand the role of public sphere institutions as the state role shrinks. In the analogy to the press, I propose that participatory regulation can play a Fourth Estate function and infuse it with Fifth Estate energy.

D. CONCLUSION

Because the Internet and the digital networks on which it rides have become central institutions in societal and global communications and commerce, they can be described as "affected with a public interest."[623] The concept of public obligations falling on private enterprises is as old as capitalism itself.[624] While this term might strike fear into the hearts of some Internet stakeholders, because it evokes the specter of the utility-style common carrier regulation of the 20th century, the concept has a much longer and richer history that encompasses many forms of regulation that are much less intrusive. While common carrier, public utility regulation was applied to certain large infrastructure industries over the course of the 20th century, many activities deemed to be affected with the public interest have been governed by criminal[625] and common law[626] (e.g., restaurants and other public places), prudential regulation (e.g., banks and insurance companies), or subject to self-regulation (e.g., professions like medicine and law).

On the one hand, it can be argued that in the 500-year history of the treatment of the public interest in capitalist society, command and control regulation is the exception, not the rule. On the other hand, it can also be argued that in the 500-year history of capitalism, the means of communications and transportation of commerce have always been regulated and have been required to shoulder unique responsibilities.

Thus the history of the concept of "affected with a public interest" argues for a careful consideration, not whether the Internet should shoulder new responsibilities, but how the obligations that the digital revolution must shoulder can be implemented in a way to preserve its dynamic nature. There is no reason to believe that one-size will fit all. In fact, the challenges have different causes and interact with the Internet ecology in different ways. Therefore, different institutional structures are likely to be better suited to meet specific challenges.

This analysis indicates that the successful model should not be asked to take on tasks for which it is not well suited. Internet governance involved highly technical issues that were debated primarily by technicians in an open format. The challenges that are primarily economic, social, and political will be difficult for the Internet institutions to deal with. The ability to separate technical from policy issues is sufficient to promote this balanced outcome. To a significant degree technology creates possibilities, while policies influence which paths are

chosen. The perception of the nature of the challenges varies greatly across stakeholders and nations, with some seeing the functionalities technology provides as positive or negative, depending on the point of view of the stakeholder. In every area, technology has two sides, as noted above. For example,

- The ability to gather, store, and seamlessly transfer large quantities of information about consumers is seen as a threat to privacy by public interest advocates, while content owners and Internet companies see it as a positive way to fund the distribution of content.
- The ability to gather, store, and seamlessly transfer large quantities of perfectly replicable data is seen as a threat to intellectual property by content owners, who brand it as piracy, while public interest advocates see it as a major improvement in the ability of consumers to make fair use of content.
- The ability to monitor and prevent disruptive uses of the Internet is seen as an important tool to improve cyber security by some, or as a threat to freedom of speech, an invasion of privacy, or denial of freedom of assembly, by others.
- The winner-takes-most nature of digital markets that creates huge, dominant entities in many areas of the digital economy is seen as the efficient outcome by some and a major threat of abusive market power by others.

If we try to solve each of these important social policy challenges by tinkering with the basic structure of the resource system to impose changes, we run a very high risk of destroying its core structure (its communications protocols and governance institutions) and undermining its ability to function at the high level to which we have become accustomed. Responses to the maturation challenges should be crafted at the layer and in the realm in which they arise. Because the digital revolution has had such a profound and beneficial impact across all the realms of social order, reaching across layers and realms to solve problems, is likely to have negative, unintended consequences. This is particularly true when the technology layer is involved.

The goal of a communications standard is to make activity possible. The more activity the standard supports, the better. The goal of policy is to direct activity in socially beneficial directions and dissuade socially harmful actions. The combination of successful self-regulation of the Internet and the light handed regulation of nondiscrimination on the telecommunications network was the bedrock of the digital revolution and produced decades of unparalleled innovation and growth in communications. They deserve a great deal of deference. Above all, those who would abandon the model or break the Internet altogether by abandoning its principles bear a heavy burden of proof. This applies to both governments and corporations.

ENDNOTES

1 Carlota Perez, *Technological Revolutions and Finance Capital* (Edward Edgar, 2002), All this economic and social effort becomes a set of externalities for further investment and wealth creation based on market expansion and compatible innovations. Thus there is a virtuous cycle of self-reinforcement for the widest possible use and diffusion of the available potential. (42) There are two areas, though, where cost reduction innovations are crucial for the growth of the whole economy: the core inputs and the infrastructure. If these are cheaper and better, more and more producers will use them to modernize their products and processes and to increase their own markets. A virtuous cycle ensues, as this growth in demand will in turn facilitate further gains in productivity in the inputs and the infrastructure themselves. (137)

2 Perez, 2002:155-156.

3 Malerba, 2005:77, Until the advent of the internet, the telecom service industry did not experience major technological and market discontinuities. With the internet and its open network architecture, modular components and distributed intelligence, both the knowledge base and the types of actors and competencies have changed significantly.

4 Malerba, 2005: 77. Regulation, liberalization/privatisation and standards have played a key role in the organization and performance of the sector. They had major effects on the behaviour of incumbents and have transformed the structure of the industry.

5 Malerba, 2005: 72-73. The process of convergence has generated the entry of several new actors coming from various previously separated industries, each one emphasizing different sets of competencies… Specialised competencies and specific knowledge have increasingly become a key asset for firms survival and growth. Even more important in the new telecom environment is the combination of existing and new competencies – software programming, network. Networks among a variety of actors (not only firms, but also standard-setting organisations and research organisations) are relevant.

6 Cohen, 2010:172.

7 Greenstein, 2010:489-490.

8 Malerba, 2005:73. Demand plays a key role in innovation not just in terms of user–producer interaction, but also in terms of emerging characteristics. This is particularly true in the internet services sector, where the changing requirements of the final users – from standardised services like internet access and e-mails, to more complex applications such as intranets, extranets and platforms for electronic commerce – have stimulated firms to upgrade the quality of services…. Demand has often proven important in several respects: a major cause in the redefinition of the boundaries of a sectoral system; a stimulus for innovation and a factor shaping the organisation of innovative and production activities. In addition, the emergence of new demand or the transformation of existing demand has been one of the major elements of change in sectoral systems over time.

9 Greenstein, 2010:517.

10 Cohen 2010:177-181.

11 Malerba, 2005: 75. The knowledge base has changed over time and has affected the boundaries and structure of sectoral systems. In general, in several sectors a rich, multidisciplinary and multi-source knowledge base and a rapid technological change have implied a great heterogeneity of actors. In addition to firms within a sector, some actors have proven particularly important for innovation. In particular, suppliers and users have become relevant in the organisation of innovative activities. Suppliers and users have also affected the boundaries of sectoral systems by greatly affecting sectoral linkages and interdependencies.

12 Cohen, 2010:158, [O]ne might usefully distinguish among the sources on the basis of the degree to

which they are tied to specific firms (e.g., learning by doing, or R&D fixed cost spreading), versus those which are tied to technologies that can potentially stand apart from the firms that may have first introduced them (e.g., network externalities or learning by using). In this latter case, the nature of the innovation, and possibly its complementarity with other technologies, will tend to drive market structure rather than the reverse.

13 Greenstein, 2010: 488, The specialization of supply frames one of the distinctive strategic issues of the modern era. Firms with quite different capabilities, specializing in one or a small set of components, cooperate with others at the boundary of their respective firms. In personal computing, for example, an array of distinct firms arose that specialized in supplying different parts of the PC (e.g., many firms provided the electronic components), while different firms provided the software. An entirely different set distributed the final product and became involved in servicing it. The benefits of allowing users to mix and match components and service outweighed most of the benefits of coordinating production entirely inside one firm.

14 Greenstein, 2010: 480, Innovative conduct related to the commercial Internet did give rise to platforms, but it also gave rise to markets characterized by an extraordinarily high division of technical leadership. In turn, that resulted in an unprecedented dispersion of uncoordinated innovative conduct across a wide range of components affiliated with the Internet; Commercial Internet markets involve new organizational forms for coordinating firms with disparate commercial interests, such as open source platforms. Their presence and successful operation accounts for some salient unanticipated innovative conduct; The aspirations of entrepreneurs and incumbent firms in commercial Internet markets touched an extraordinarily large breadth of economic activity; Shane Greenstein, “”Economic Experiments and Neutrality in Internet Access,” *Innovation Policy and the Economy*, (8) 2007:59…61, Highlighting economic experiments, in contrast, emphasizes how the environment allowed for a range of alternative commercialization strategies in terms of pricing structures, marketing strategies, and the like when market participants had choices among several options. This provided great leeway for a diversity of commercial outcomes.

15 Greenstein, 2010: 512, With the Internet, the relationship between the investor community and entrepreneurial community took a different scale and pace than it had in prior technology-induced waves, such as with PCs, LANs, and client–server systems. In part, this was due to the breadth of perceived opportunities. Rather than being a brief race among several dozen firms to develop new components and related systems, the Internet invited a wide range of new thinking across many activities—in back-office computing, home computing, and information retrieval activities in numerous information-intensive industries, such as finance, warehousing logistics, news, entertainment, and more.

16 A definition of an innovation system geared to empirical analysis of systems that covers the main features of the system discussed in these comments can be found in Anna Begek, et al., “Analyzing the Dynamics and Functionality of Sectoral Innovation Systems – A Manual, Dynamics of Industry and Innovation: Organizations, Networks and Systems, Copenhagen, 2005:4…8, “the goal of an innovation system is to develop, diffuse and utilize innovations. Taking a system approach implies that there is a system with related components (actors, network, institutions)…. The contribution of a component or set of components to the overall goal is here referred to as a ‘function.”

17 Luc Soete, Bart Verspagen and Bas Ter Weel, “Systems of Innovation,” *Handbooks in Economic,* Volume 1:1163…1177). The NSI [National System of Innovation] concept represented for policymakers an alternative to industrial policies, while at the same time providing strong support for the role of public authorities in creating the “right” institutional conditions for a knowledge-driven economy to flourish…. The central idea in modern innovation systems theory is the notion that what appears as innovation at the aggregate level is in fact the result of an interactive process that involves many actors at the micro level, and that next to market forces many of these interactions are governed by nonmarket institutions. Because the efficiency of this process observed at the macro

level depends on the behavior of individual actors, and the institutions that govern their interaction, coordination problems arise… Not surprisingly, economists in the institutional tradition of innovation studies and scholars of evolutionary theories became the strongest proponents of the notion of systems of innovation. In these views the system of innovation is a continuous process where institutions (habits and practices), learning, and networks play a central role in generating innovation and technological change…the innovation systems literature has led to five main insights: the importance of a broader set of innovation inputs than just R&D, the importance of institutions and organizations, the role of interactive learning, leading to a dynamic perspective rather than a static allocative one, the role of interaction between agents, and, finally, the role of social capital. Each one of those specific points opens up links with literatures and approaches that are not so common in (mainstream) economics

18 M.P. Hekkert, et al., "Functions of innovation systems; A new approach for analyzing technological change," Technological Forecasting & Social Change, (4) 2007:426.

19 de la Rue du Can, et al., 2014,

20 D.C. Cir. 2014, Concurring in Part and Dissenting in Part.

21 "Why Growing Up is Hard to Do: Institutional Challenges for Internet Governance in the "Quarter Life Crisis of the of the Digital Revolution," *Journal on Telecommunications and High Technology Law,* 2013:3-4, framed the analysis of change as follows: "The ultimate objective of the paper is to gain insight into how the governance institutions can **adapt** to the demands of the quarter-life crisis. I choose the word **adapt** purposely, rather than reform, because reform is frequently associated with some sort of failure – "**Reform** means the improvement or amendment of what is wrong, corrupt, unsatisfactory." The characterization grounded in failure does not apply as a general proposition to the Internet and the digital revolution. This is a case where the need for change derives from remarkable success, not failure, because the dramatic growth of the resource system strains its own governance institutions and because the resource system has expanded so rapidly and penetrated so deeply into so many aspects of social life that it is having a huge impact on society. The fact that the driving force for change is a broad pattern of success, rather than failure, does not make it less urgent, but it does create a somewhat different orientation than reform driven by failure – the challenge of preserving and extending what is working well is prominent, if not paramount."

22 D.C. Cir. 2014:41-42, While the majority decision rejects this claim, based on a potential threat to the "virtuous cycle" from the inability of consumers to respond to network owner behavior that would harm the "virtuous cycle," these comments show many other sources of harm. "In any event, it seems likely that the reason Verizon never advanced this argument is that the Commission's failure to find market power is not "fatal" to its theory. Broadband providers' ability to impose restrictions on edge providers does not depend on their benefiting from the sort of market concentration that would enable them to impose substantial price increases on end users—which is all the Commission said in declining to make a market power finding. Rather, broadband providers' ability to impose restrictions on edge providers simply depends on end users not being fully responsive to the imposition of such restrictions."

23 Tim Wu, *The Master Switch,* Knopf, 2010:190-191.

24 Francois Bar,et. al., *defending the Internet Revolution in the Broadband Era: When Doing Nothing is Doing Harm,* Working Paper, Berkeley Roundtable on the International Economy (BRIE), August 1999, cited in Cooper, 2002:68-69.

25 Greenstein, 2007:69… 70…71.

26 Greenstein, 2010:508, 509.

27 Unlike the antitrust laws that are generally backward looking, with the notable exception merger review.

28 See Mark Cooper, "Open Access To The Broadband Internet: Technical And Economic

Discrimination In Closed, Proprietary Networks," *University of Colorado Law Review,* Vol. 69, Fall 2000:1037.

29 Greenstein, 2010: 479.

30 Cohen, 2010:137-138…139. In short, platform leaders have incentives to expand the scope of platforms from which they profit, and they have incentives to aspire to continuity in the use of that platform. Entrants, in contrast have incentives to consider whether to commit to an existing platform, or to join another that might compete with it. In turn, that translates into high incentives for incumbents to support design of new proprietary standards for an existing platform, but not nonproprietary standards that might lead to more competition between platforms. On the other hand, entrants of applications prefer to make them compatible with as many platforms as possible, which leads to incentives to work toward non-proprietary standards, or other technological tools to reduce the cost of supporting cross-platform applications…. As a result, the nature of the innovation the large incumbents firms pursue will be different. The key findings are that larger, incumbent firms tend to pursue relatively more incremental and relatively more process innovation than smaller firms. Whether new ventures and entrants (as opposed to small firms more generally) are chiefly responsible for "radical" innovation—though often talked about—suffers from a dearth of rigorous empirical study. One exception is… evidence from the personal computer software industry that new firms tend to create new software categories, while established firms tend to develop improvements in existing categories… some have argued that smaller firms, especially new ventures, are more capable of innovating than larger firms or, similarly, are more capable of spawning more significant or distinctive innovations than larger incumbents…the share of R&D dedicated to process innovation indeed rises with firm size. And the implication that larger firms pursue relatively more incremental innovation is consistent with previously cited findings.

31 Greenstein, 2010: 492-493, that translates into high incentives for incumbents to support design of new proprietary standards for an existing platform, but not nonproprietary standards that might lead to more competition between platforms. On the other hand, entrants of applications prefer to make them compatible with as many platforms as possible, which lead to incentives to work toward nonproprietary standards, or other technological tools to reduce the costs of supporting cross-platform applications.

32 Cohen, 2010:154.

33 Greenstein, 2010:500-501.

34 Greenstein, 2010:497

35 Greenstein, 2007:93…94.

36 Bronwyn H. Hall, "Innovation and Diffusion," In Fagerberg, J., D. Mowery, and R. R. Nelson (eds.), *Handbook of Innovation,* Oxford University Press, 2004, page reference to October 8, 2003:28. Highly concentrated providers of new technology will tend to have higher prices, slowing adoption. Paul Stoneman and Giuliani Sattisti, "The Diffusion of New Technology," *Handbooks in Economic Volume 1,* 2010:747\, The more competitive an industry the nearer are its prices likely to approximate marginal costs and thus its profits approach zero… The lower are costs, *ceteris paribus* lower are prices going to be. The lower are prices the greater will be the extent of diffusion at any point in time. In addition, the faster costs fall the faster prices are likely to fall.

37. Quarter-life crisis, Wikipedia, http://en.wikipedia.org/wiki/Quarter-life_crisis (last modified Aug. 19, 2012, 10:16 PM). Given that this paper is about an advance in the generation and distribution of knowledge that may prove to be among the great economic revolutions in human history, this paper relies, to the greatest extent possible, on sources that are readily available on the Web (i.e. not behind pay walls). Since the primary purposes of citations are to allow the reader to check facts, evaluate interpretations, and add to the body of knowledge by reinterpretation and extension (remixing), the ability to make sources instantaneously available is a symbolic marker of how much has been

accomplished by the digital revolution. The fact that Wikipedia, a new form of collaborative knowledge enterprise, is the most frequent single source for this paper reinforces this message, as does the fact that Wikipedia provides many live links to available resources.

38. Julia Felsenthal, Heather Murphy & Chris Wilson, *Happy 20th Birthday, World Wide Web!*, Slate (Aug. 5, 2011, 5:54 PM), http://www.slate.com/slideshows/business _and_tech/happy-20th-birthday-world-wide-web.html; *World Wide Web*, Wikipedia, http://en.wikipedia.org/wiki/World_Wide_Web (last modified Sept. 30, 2012, 7:51 AM).

39. Chloe Albanesius, *On Eve of PC's 30th Birthday, IBM and Microsoft Debate Its Future*, PC Mag.com (Aug. 11, 2011, 11:06 AM), http://www.pcmag.com/ article2/0,2817,2390897,00.asp; *Personal computer*, Wikipedia, http://en.wikipedia.org/wiki/ Personal_computer (last modified Sept. 28, 2012, 6:04 PM).

40. The Internet protocol is over 40 years old. The first actual network of networks is 25 years old, and thefirst commercial network to join the network of networks did so 23 years ago, all of which makes the point that the adolescence of the Internet is over. *Internet*, Wikipedia, http://en.wikipedia.org/wiki/Internet (last modified Sept. 25, 2012, 4:06 PM).

41. *Internet Society*, Wikipedia, http://en.wikipedia.org/wiki/Internet_Society (last modified Oct. 1, 2012, 3:14 AM).

42. *History of Google*, Wikipedia, http://en.wikipedia.org/wiki/History_of_Google (last modified Sept. 30, 2012, 12:43 PM).

43. *Broadband*, Wikipedia, http://en.wikipedia.org/wiki/Broadband (last modified Sept. 29, 2012, 10:11 PM); *DOCSIS*, Wikipedia, http://en.wikipedia.org/wiki/DOCSIS, (last modified Sept. 25, 2012, 11:06 PM).

44. *Mobile phone*, Wikipedia, http://en.wikipedia.org/wiki/Mobile_phone (last modified Sept. 30, 2012, 5:14 PM).

45. *Wi-Fi*, Wikipedia, http://en.wikipedia.org/wiki/Wi-Fi (last modified Sept. 29, 2012, 2:53 PM).

46. The quarter life calculation assumes a life span of a century, which is a reasonable historical period in which a technological revolution will be paramount before it is replaced by another. Thus, the "start" of the first industrial revolution is dated from the mid- to late 1700s, the second industrial revolution dates from the mid- to late 1800s, and the Internet from the mid- to late 1900s. *Industrial Revolution*, Wikipedia, http://en.wikipedia.org /wiki/Industrial_Revolution (last modified Sept. 28, 2012, 4:30 PM).

47. Comparing general purpose technologies can be misleading, especially when one is only just reaching maturity, but the evidence on information technologies supports the conclusion that the technologies are spreading quickly and evolving rapidly in terms of price declines, which have traditionally been a major measure of impact. The technologies on which the Internet is based are probably moving faster than the overall IT sector. Boyan Jovanovic & Peter L. Rousseau, *General Purpose Technologies*, *in* Handbook of Economic Growth 1181, 1182 (Philippe Aghion & Steven N. Durlauf eds., 2005).

48 Cooper, 2013..

49. This observation was offered in an article reporting a (rare) criminal case involving personal security on the Internet. Somini Sengupta, *Case of 8,000 Menacing Posts Tests Limits of Twitter Speech*, N.Y. Times, Aug. 27, 2011, at A1 (internal quotation marks omitted), *available at* http://www.nytimes.com/2011/08/27/technology/man-accused-of-stalking-via-twitter-claims-free-speech.html.

50. Much of the structure was put in place during the Progressive Era, which is generally dated from the 1890s, *Progressive Era*, Wikipedia, http://en.wikipedia.org/wiki/Progressive_Era, (last modified Sept. 29, 2012, 9:39 PM), although the New Deal updated and extended the institutional structure.

New Deal, Wikipedia, http://en.wikipedia.org/wiki/New_Deal, (last modified Sept. 30, 2012, 10:41 PM).

51. Each of the industrial revolutions "stand[s] on the shoulders of giants," i.e. the previous industrial revolution. *Standing on the shoulders of giants*, Wikipedia, http://en.wikipedia.org/wiki/Standing_on_the_shoulders_of_giants (last modified Sept. 27, 2012, 11:34 PM). But each needs a new set of institutions to support the larger structure. Economist Douglass North uses the construction metaphor "scaffolding" to describe the institution building process. Douglass North, Understanding the Process of Economic Change ix, 52 (2005). It is interesting to note that the expression dates from the 12th century, early in what North refers to as the second economic revolution – a revolution based on knowledge. *Id.* at 87.
52. *Reform*, Wikipedia, http://en.wikipedia.org/wiki/Reform (last modified Sept. 19, 2012, 9:24 PM).
53. Ostrom's body of work is huge; her Nobel Laureate lecture provides a summary. Elinor Ostrom, Prize Lecture: Beyond Markets and States: Polycentric Governance of Complex Economic Systems (Dec. 8, 2009), *available at* http://www.nobelprize.org/nobel_prizes/economics/laureates/2009/ostrom_lecture.pdf.
54. North's body of work is huge; his Nobel Laureate lecture provides a summary, although he has continued to add to this body for well over a decade. Douglass North, Prize Lecture: Economic Performance through Time (Dec. 9, 1993), *available at* http://www.nobelprize.org/nobel_prizes/economics/laureates/1993/north-lecture.html.
55. *See, e.g.*, Milton L. Mueller, Networks and States: The Global Politics of Internet Governance (2010); Elena Pavan, Frames and Connections in the Governance of Global Communications: A Network Study of the Internet Governance Forum (2012).
56. The compatibility between these two schools of thought is underscored by the fact that the first person Ostrom cites in her Nobel Prize lecture is Douglass North. See Ostrom, *A General Framework for Analyzing Sustainability of Social-Ecological Systems*, 325 Science 419, 422 (2009b), at 408.
57. North, 1993, at ¶¶ 3-4 ("This essay is about institutions and time. It . . . provides the initial scaffolding of an analytical framework capable of increasing our understanding of the historical evolution of economies and a necessarily crude guide to policy in the ongoing task of improving the economic performance of economies . . . . Institutions form the incentive structure of a society and the political and economic institutions, in consequence, are the underlying determinant of economic performance. Time as it relates to economic and societal change is the dimension in which the learning process of human beings shapes the way institutions evolve . . . . ").
58. Ostrom, 2009b, at 432 (referring to the level at which most IAD analysis has been conducted as the "[m]icrosituational level of analysis.") The elements that constitute the analytic framework are microlevel detail. "To specify the structure of a game and predict outcomes, the theorist needs to posit the: 1. characteristics of the actors involved (including the models of human choice adopted by the theorist); 2. positions they hold (e.g. first mover or row player); 3. set of actions that actors can take at specific nodes in a decision tree; 4. amount of information available at a decision node; 5. outcomes that actors jointly affect; 6. set of functions that map actors and actions at decision nodes into intermediate or final outcomes; and 7. Benefits and costs assigned to the linkage of actions chosen and outcomes obtained." Id. at 415. This description of the analytic questions leads to seven types of operational rules.)
59. Ostrom, 2009b, at 408.
60. *Id.* at 409.
61. Michael Cox, Gwen Arnold & Sergio Villamayor Tomás, *A Review of Design Principles for Community-Based Natural Resource Management*, Ecology & Soc'y, Dec. 2010, Art. 38 at 12 (2010) (*quoting* Ingvild Harkes, Fisheries Co-Management, the Role of Local Institutions and

Decentralization in Southeast Asia (May 15, 2006) (unpublished Ph.D. thesis, Leiden University), *available at* https://openaccess.leidenuniv.nl/bitstream/handle/1887/4385/Thesis.pdf) (internal quotation marks omitted).

62. Ostrom, 2009b, at 435-36.
63. Douglass North, Institutions, Institutional Change and Economic Performance 118, 133 (1990).
64. North, 1993, at ¶ 4.
65. *See generally* Janet Abbate, Inventing the Internet (1999).
66. Robert Cannon, *The Legacy of the Federal Communications Commission's Computer Inquiries,* 55 Fed. Comm. L.J.. 167, 169 (2003).
67. Lessig puts it bluntly: "Phone companies, however, did not play these games, because they were not allowed to. And they were not allowed to because regulators stopped them." Lawrence Lessig, The Future of Ideas: The Fate of the Commons in a Connected World 148 (2001).
68. For a detailed outline of this conflict, *see* Open Architecture as Communications Policy: Preserving Internet Freedom in the Broadband Era (Mark Cooper ed., 2003).
69. *See, e.g.*, Amy R. Poteete, Marco A. Janssen & Elinor Ostrom, Working Together: Collective Action, the Commons and Multiple Methods in Practice 217, 218, 220-22 (2010) ("The conventional theory was pristine in the simplicity of its model of human behavior but made strong assumptions about information conditions. Individuals are assumed to have complete information about the structure of the situation they are in, including the preferences of other actors, the full range of possible actions, and the probability associated with each outcome resulting from a combination of actions. Each individual is assumed to select the strategy leading to the best expected outcome for self. . . . Based on the conventional theory, many analysts thought that the *only* way to solve the commons problem was to impose a solution from the outside. Fortunately, scholars who conducted case studies of diverse resource systems all over the world were not blinded by the conventional theory. . . . The clear and unambiguous predictions derived from the conventional theory of collective action have been replaced with a range of possible outcomes, including some that are far more optimistic. . . . We need to recognize that what has come to be called rational-choice *theory* is instead one *model* in a family of models that is useful for conducting formal analyses of human decision in highly structured, competitive settings. . . . A broader theory of human behavior views humans as adaptive creatures who attempt to do well given the constraints and opportunities of the situation in which they find themselves (or the ones they seek out). Humans learn norms, heuristics, and full analytic strategies from one another, from feedback from the world, and from their own capacity to engage in self-reflection and imagine a differently structured world. They are capable of designing new tools—including institutions—that can, for good or evil purposes, change the structure of the worlds they face. . . . If, as we assume, decision making relies on learning and adaptation, other-regarding preferences and norms, and heuristics, then trust can play a central role in influencing the prospects for collective action.") (citation omitted). *See also* North, 2005,, at 5, 65 ("The rationality assumption has served economists (and other social scientists) well for a limited range of issues in micro theory but is a shortcoming in dealing with the issues central to this study. Indeed the uncritical acceptance of the rationality assumption is devastating for most of the major issues confronting social scientists and is a major stumbling block in the path of future progress. The rationality assum ption is not wrong, but such an acceptance forecloses a deeper understanding of the decision-making process in confronting the uncertainties of the complex world we have created. . . . Neo-classical economic theory provides an understanding of the operation of markets in developed economies but was never intended to explain how markets and overall economies evolved. It has three fundamental deficiencies which must be overcome to understand the process of economic change. It is frictionless, it is static, and it does not take into account human intentionality.") (footnote omitted); N, 1990, at 111, 112 ("There is in economics a (largely) implicit assumption that

the actors can correctly identify the reason for their predicaments (i.e., have *true* theories), know the costs and benefits of . . . choices, and know how to act upon them. Our preoccupation with rational choice and efficient market hypotheses has blinded us to the implications of incomplete information and the complexity of environments and subjective perceptions of the external world that individuals hold. There is nothing the matter with the rational actor paradigm that could not be cured by a healthy awareness of the complexity of human motivation and the problems that arise from information processing. Social scientists would then understand not only why institutions exist, but also how they influence outcomes. . . . Integrating institutional analysis into *static* neoclassical theory entails modifying the exiting body of theory. . . . Path dependence is the key to an analytic understanding of long-run economic change. . . . [I]t extends the most constructive building blocks of neoclassical theory—both the scarcity/competition postulate and incentives as the driving force—but modifies that theory by incorporating incomplete information and subjective models of *reality* and the increasing returns characteristic of institutions. The result is an approach that offers the promise of connecting microlevel economic activity with the macrolevel incentives provided by the institutional framework. The source of incremental change is the gains to be obtained by organizations and their entrepreneurs from acquiring skills, knowledge, and information that will enhance their objectives." *Id.* at 112.) (internal citation omitted).

70. North, 2005, at 122, 132-33 ("Economists of a libertarian persuasion have for some time labored under the delusion that there is something called laissez faire and that once there are in place 'efficient' property rights and the rule of law the economy will perform well without further adjustment. . . . Transaction costs—here measurement and enforcement costs—will vary in each case; in order to reduce such costs there must be an institutional structure that will provide incentives for the players to compete at those margins, and those margins alone, that will be socially productive. Typically this entails a set of formal (usually a mixture of laws, rules, and regulations) and informal constraints to produce the desired results. . . . The mechanisms for contract enforcement appear to have had their beginnings in internal codes of conduct of fraternal orders of guild merchants, which were enforced by the threat of ostracism. These codes evolved into merchant law and spread throughout the European trading area; gradually they became integrated with common and Roman law and enforcement was eventually taken over by the state. The last point is critical. The economic institutional structure was made possible by the evolution of polities that eventually provided a framework of law and its enforcement.")(internal citation omitted).

71. *Id.* at 67, 76-77, 85, 105.

72. Ostrom, 2005, at 256, *supra* note 31, at 278) (citation and footnotes omitted).

73. Elinor Ostrom, 2009b, 422.

74. *See, e.g.*, Ostrom, 2009b, at 408-09 ("Contemporary research on the outcomes of diverse institutional arrangements for governing common-pool resources (CPRs) and public goods at multiple scales builds on classical economic theory while developing new theory to explain phenomena that do not fit in a dichotomous world of 'the market' and 'the state.' . . . The market was seen as the optimal institution for the production and exchange of private goods. For nonprivate goods, on the other hand, one needed the government to impose rules and taxes to force self-interested individuals to contribute necessary resources and refrain from self-seeking activities. Without a hierarchical government to induce compliance, self-seeking citizens and officials would fail to generate efficient levels of public goods . . . .")

75. North, 2005, at 120-21. Elinor Ostrom, Roy Gardner and James Walker, Rules, Games & Common-Pool Resources (1994) at 193, 194, 217. "Policymakers responsible for the governance of small-scale, common-pool resources should *not* presume that the individuals involved are caught in an inexorable tragedy from which there is no escape. Individual may be able to arrive at joint strategies to manage these resources more efficiently. To accomplish this task they must have sufficient information to pose and solve the allocation problems they face. They must also have an arena

where they can discuss their joint strategies and perhaps implement monitoring and sanctioning. In other words, when individuals are given an opportunity to restructure their own situation they frequently, but not always, use this opportunity to make commitments that they sustain, thus achieving higher joint outcomes without recourse to an external enforcer. . . ." But once individual communicate (especially if they can communicate with one another repeatedly), they can build up trust through their discussions and through achieving better outcomes. If individuals come to these situations with a willingness to devise sharing rules and to follow a measured reaction, then communication facilitates agreement selection and the measured reaction facilitates agreement retention.

76. *See, e.g.*, Yochai Benkler, The Wealth of Networks (2006); Brett Frischmann, *An Economic Theory of Infrastructure and Commons Management,* 89 Minn. L. Rev. 917 (2005). Benkler is most closely associated with the commons argument, although he has a very broad perspective; Frischmann emphasizes the externalities view.

77. Mark Cooper, *From Wifi to Wikis and Open Source: The Political Economy of Collaborative Production in the Digital Information Age,* 5 J. on Telecomm. & High Tech. L. 125 (2006) (arguing that the digital economy goes beyond the traditional four good framework based on rivalry and exclusion because it creates a new type of good, collaborative goods – that increases in value because they exhibit antirivalry and inclusiveness. *Id.* "[C]ollaborative production goods occur where having numerous producers participate in the production of the goods increases its value and where the value of the good goes up as the number of people who use it increases." *Id.* at 133.).

78. North, 1990, at 20.

79. Identifying similar vitally important social bases of action and gives an example that is relevant to the issues examined in this paper. *Id.* at 75 ("Norms of honesty, integrity, reliability lower transaction costs. . . . The traders from the Islamic world developed in-group social communication networks to enforce collective action. While effective in relatively small homogeneous ethnic groups, such networks did not lend themselves to the impersonal exchange that arises with the growing size of markets and diverse ethnic traders. In contrast, the Genoese developed bilateral enforcement mechanisms which entailed creation of formal legal and political organizations for monitoring and enforcing agreements—an institutional/organizational path that permitted and led to more complex trade and exchange.").

80. North, 2005, at 69-70, 78.

81.Elinor Ostrom, *Understnting Institutional Diversity,* 2005,, at 257, 258.

82. North, 1990, 29 (noting a number of sources of change including: the inevitable imperfection of understanding of realty, *id.* at 2, the fit between the institutions and reality, *id.* at 3, complexity, *id.* at 23, processes by which human activity changes the environment in which institutions exist, *id.* at 116, and entrepreneurship, *id.* at 125); *see also* Elinor Ostrom and Xavier Basurto, *Crafting Analytic Tools to Study Institutional Change,* 327 J. Institutional Econ., 317, 324-27 (2011) (outlining various processes of rule change).

83. United Nations Conference on Trade and Dev. (UNCTAD), *Internet Governance*, *in* Internet Governance: A Grand Collaboration 256 (Don MacLean ed., 2004) [hereinafter *UNCTAD*].

84. Mueller, Milton L. Mueller, Networks and States: The Global Politics of Internet Governance (2010); at 34.

85. *Id.* at 45.

86 K. Kelly, *10 Years That Changed the World*, Wired, August 2005, at 132.

87 *See* Yochai Benkler, *From Consumers to Users: Shifting the Deeper Structure of Regulation Toward Sustainable Commons and User Access*, 52 Fed. Comm. L.J. 561, 562 (2000) (providing an early, scholarly discussion of the transformation of consumers into producers).

88 Kelly, 2005.

89 Robert D. Hof, *It's a Whole New Web*, Business Week, Sept. 26, 2005, at 79.

90 The most prominent example of open source software, Linux, "ought to be at the worse end of the spectrum of public goods because it is subject additionally to "collective provision." Steven Weber, The Success of Open Source 5 (2004).

91 *Id*. at 154 (introducing the concept of antirivalness).

92 Peter Levine, *The Internet and Civil Society: Dangers and Opportunities*, Information Impacts Magazine, May 2001 (expressing concern over the decline of face-to-face relations); Peter Levine, *Can the Internet Rescue Democracy? Toward an ON-Line Commons*, *in* Democracy's Moment Reforming the American Political System for the 21st Century (Ronald Hayuk and Kevin Mattson eds., (2002); S. Coleman & J. Gotze, Bowling Together: Online Public Engagement in Policy Deliberation (2002) (regarding social relations).

93 Y. Bakos & E. Brynjolfsson, *Bundling and Competition on the Internet: Aggregation Strategies for Information Goods*, 19 Mktg. Sci. 63, (2002).

94 *See* Robert D. Putnam, Bowling Alone: The Collapse and Revival of American Community (2000) (arguing that isolation and solitary activities had diminished the value of social capital).

95 Peter Levine, *The Internet and Civil Society*, 20 Rep. Inst. Phil. & Pub. Pol'y 1, 2 (2000).

96 *See* Marcur Olsen, The Logic of Collective Action (1965).

97 *See* Arthur Lupia & Gisela Sin, *Which Public Goods Are Endangered? How Evolving Communications Technologies Affect The Logic of Collective Action*, 117 Pub. Choice. 315 (2003) (regarding collective action); *See also* Coleman & Gotze, *supra* note 7.

98 Hal R. Varian, *Copying and Copyright*, 19 J. Econ. Persp. 121, 122 (2005).

99 Glenn Ellison & Sara Fisher Elision, *Lessons about Markets from the Internet*, 19 J. Econ. Persp. 139, 140 (2005).

100 Kelly, *supra* note 1; Hof, *supra* note 4.

101 *See* Coleman & Gotze, *supra* note 7.

102 *See* Lupia & Sin, 2003, at 315.

103 The phenomenon includes everything from AOL buddy lists to MySpace friends, to the Wikis and collaborative activities. Kelly, *supra* note 1; Hof, *supra* note 4.

104 This article uses the definition of intellectual property created by William Landes and Richard Posner: "ideas, inventions, discoveries, symbols, images, expressive works (verbal, visual, musical, theatrical), or in short any potentially valuable human product (broadly, "information") that has an existence separable from a unique physical embodiment, whether or not the product has actually been "propertized," that is, brought under a legal regime of property rights." William M. Landes & Richard A. Posner, The Economic Structure of Intellectual Property Law 1 (2003).

105 Frederic Scherer & David Ross, Industrial Market Structure and Economic Performance (3d ed. 1990).

106 North, 1990, at 3.

107 Both sides of the debate over spectrum governance claim Coase as a forefather, in part because of his critique of the Federal Communications Commission management of spectrum. *See* R.H. Coase, *The Federal Communications Commission*, 2 J.L. & Econ. 1 (1959).

108 North, 2005, at 118-33.

109 David Besanko & Ronald R. Braeutigam, Microeconomics: An Integrated Approach 727 (2002).

110 *Id*.

111 *Id*.

112 *Id*.

113 *Id*.

114 William M. Landes & Richard A. Posner, The Economic Structure of Intellectual Property Law 1 (2003). at 12.

115 Besanko & Braeutigan, *supra* note 24, at G-7.

116 *Id*.

117 John B. Taylor, Economics 184 (1998).

118 *Id*. at 48.

119 *Id*. at 184.

120 *Id*. at 481.

121 *Id*. at 407.

122 *Id*. at 407.

123 *Id*. at 406.

124 Erik G. Furubotn & Rudolf Richter, Institutions and Economic Theory: The Contribution of the New Institutional Economics 131, 139 (2000).

125 Michael A. Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111 Harv. L. Rev. 621, 622 (1998).

126 *See, e.g.*, Charlotte Hess & Elinor Ostrom, *Artifacts, Facilities, and Content: Information as a Common-Pool Resource*, 66 Law & Contemp. Probs. 111 (2001).

127 Erik G. Furubotn & Rudolf Richter, Institutions and Economic Theory: The Contribution of the New Institutional Economics 131, 139 (2000). at 101.

128 *Id*. at 102.

129 *See* Carol Rose, *The Comedy of the Commons: Commerce, Custom and Inherently Public Property*, 53 U. Chi. L. Rev. 711 (1986).

130 Elinor Ostrom, Roy Gardner & James Walker, Rules, Games & Common-Pool Resources bookjacket (1994).

131 Alfred. E. Kahn, The Economics of Regulation: Principles and Institutions 11 (1988).

132 Taylor, *supra* note 32, at 598.

133 Brett M. Frischmann, *An Economic Theory of Infrastructure and Commons Management*, 89 Minn. L. Rev. 917, 952 (2005).

134 *Id*.

135 Besanko & Braeutigam, *supra* note 24, at 200.

136 For an account of the early history of the telegraph and telephone in America which includes examples of various types of special treatment, *see* Alan Stone, Public Service Liberalism: Telecommunications and Transitions in Public Policy (1991).

137 *See* Mark Cooper, Making the Network Connection, in Open Architecture as Communications Policy (Mark Cooper ed. 2004).

138 Weber, 2004, at 5.

139 Although I believe the two characteristics are separate, some believe the two are the same. *See id*.

140 *Id*.

141 Carl Shapiro & Hal Varian, Information Rules 178-84 (1999) (emphasizing demand side economies of scale and network externalities, which drives toward the concept of inclusiveness argued here).

142 Eric von Hippel, Democratizing Innovation 91 (2005).

143 *Id*.

144 *Id*.

145 *Id*.

146 Besanko & Braeutigam, *supra* note 24, at 199-200.

147 Frischmann, 2005, at 973.

148 *Id*. at 973-74.

149 *Id*.

150 *Id*.

151 *Id*.

152 David P. Reed, *Comment for FCC Spectrum Policy Task Force on Spectrum Policy*, ET Docket No. 02-135, July 8, 2002, at 10.

153 *Id*.

154 *Id*.; Spectrum is a highly developed example analyzed in detail by Reed. He identifies how, as opposed to property rights that are to combat the "tragedy of the commons" by preserving property, "spectrum capacity increases with the number of users, and if proportional to N, each new user is self-supporting!" David P. Reed, *How Wireless Networks Scale: The Illusion Of Spectrum Scarcity*, Silicon Flatirons Telecommunications Program, Boulder Colorado (March 5, 2002).

155 Reed, 2002, at 67.

156 *Id*.

157 *Id*.

158 *Id*.

159 Yochai Benkler, *Open Spectrum Policy: Building the Commons in Physical Infrastructure*, 23, *available at* http://www.newamerica.net/Download_Docs/pdfs/Doc_File_122_1.pdf.

160 *Id*.

161 Rishab Aiyer Ghosh, Why Collaboration is Important (Again), in Code: Collaborative Ownership and the Digital Economy 1-2, 2005.

162 *Id*.

163 Ostrom, Gardner & Walker, 1994, at 220.

164 M. Castells, The Internet Galaxy – Reflections on the Internet, Business, and Society 28 (2001).

165 Frances Cairncross, The Death of Distance (2001).

166 We can track the technological transformation across all dimensions of society [M. Cooper, *Inequality In Digital Society: Why The Digital Divide Deserves All The Attention It Gets*, 20 Cardozo Arts & Ent. L. J. 73, 93 (2002)], including the economy [BRIE-IGCC E-conomy Project, Tracking a Transformation: E-commerce and the Terms of Competition in Industries (2001)], the workforce [I. H. Simpson, *Historical Patterns Of Workplace Organization: From Mechanical To Electronic Control And Beyond*, Current Sociology, 47 (1999); *see also* B. Bluestone & B. Harrison, Growing Prosperity: The Battle for Growth With Equity in the Twenty-First Century (2001)], the polity [E. C. Kamarck & J. S. Nye Jr. eds., Governance.Com: Democracy in the Information Age (2002)], and civic institutions [A.L. Shapiro, The Control Revolution: How the Internet is Putting Individuals in Charge and Changing the World We Know (1999)].

167 Erik Brynjolfsson & Brian Kahin, Understanding the Digital Economy: Data, Tools and Research 1 (Erik Brynjolfsson & Brian Kahin eds. 2000).

168 Castells, The Internet, 79.

169 Y. Benkler, *Coase's Penguin, Or Linux And The Nature Of The Firm*, 2 (2001), *available at* http://www.law.duke.edu/pd/papers/Coase's_Penguin.pdf.

170 "Advances in scientific understanding decrease the costs of articulating tacit and context-dependent knowledge and reduce the costs of technology transfer. Further, such knowledge can be embodied in tools, particularly software tools, which make the knowledge available to others cheaply and in a useful form." Ashish. Arora et al., Markets for Technology: The Economics of Innovation and Corporate Strategy 112, 113 (2001).

171 This is also called "the changing technology of technical change." *Id*. at 112.

172 Eric von Hippel, *Economics Of Product Development By Users: The Impact Of 'Sticky' Local Information*, 44 Mgmt. Sci. 629, 642 (1998).

173 Ashish. Arora et al., Markets for Technology: The Economics of Innovation and Corporate Strategy 112, 113 (2001).

174 Shane Greenstein, *The Evolving Structure of the Internet Market*, *in* Understanding The Digital Economy, *supra* note 82, at 155.

175 *See* Shapiro & Varian, 1996, at 9-15.

176 *Id*. at 22-23.

177 *See* Section IV, *infra*, for a description.

178 *Id*.

179 *Id*.

180 Eric Von Hippel, Open Source software Projects as User Innovation Networks (2002); Perspectives on Free and Open Source Software 271 (Joseph Feller et al. eds. 2005).

181 *Id*. at 277.

182 von Hippel, *supra* note 57, at 276-77.

183 Section IV, *infra*, describes the value of group formation in each of the three areas studied in this paper.

184 *See* David P. Reed, *That Sneaky Exponential – Beyond Metcalfe's Law to the Power of Community Building* (Spring 1999), *available at* http://www.reed.com/Papers/GFN/reedslaw.html.

185 *Id*.

186 *Id*.

187 *Id*.

188 *Id*.

189 *Id*.

190 *Id*.

191 *Id*.

192 *Id*.

193 *Id*.

194 *Id*.

195 *Id*.

196 *Id*.

197 *Id*.

198 Weber, 2004, at 155.

199 *Id*.

200 *See generally* von Hippel, 2005,

201 Weber, 2004, at 83-84.

202 Lupia & Sin, 2003, at 329.

203 *Id*.

204 *See generally* Ostrom et al., 1994, at 319.

205 *Id*.

206 *Id*. at 220.

207 *Id*. at 296.

208 Reed, 2002,69.

209 *Id*.

210 *Id*.

211 *Id*.

212 "There is a 'new frontier' being opened up by the interaction of digital communications technology, internetworking architectures, and distributed, inexpensive general purpose computing devices." Reed, , at 2.

213 R. J. Berger, *No Time for a Big Bang: Too Early to Permanently Allocate Spectrum to Private Property*, Center for Global Communications 7 (2003).

214 Reed, 2002b..

215 Reed, *2002*.

216 L. Berlemann, S. Mangold & B.H. Walke, *Policy-based Reasoning for Spectrum Sharing in Cognitive Radio Networks*, IEEE Int'l Symp. on New Frontiers in Dynamic Spectrum Access Networks (Nov. 8-11, 2005).

217 *See* Reed, 1999.

218 Reed, 2002b.

219 *Id*.

220 Reed, 1999..

221 T. X. Brown, *An Analysis of Unlicensed Device Operation in Licensed Broadcast Service Bands*, IEEE Int'l Symp. on New Frontiers in Dynamic Spectrum Access Networks (Nov. 8-11, 2005) (noting the superior characteristics where participation is broad); Lehr and Crowcroft, *Managing Shared Access to a Spectrum Commons*, IEEE Int'l Symp. on New Frontiers in Dynamic Spectrum Access Networks (Nov. 8-11, 2005) (emphasizing the importance of requiring participation).

222 Berleman, 2005..

223 Reed, *supr2002*.

224 Srdjan Rusovan, Mark Lawford & David Lorge Parnas, *Open Source Software Development: Future or Fad?, in* Perspectives on Free and Open Source Software, *supra* note 95 (describing the complexity problem facing software); s*ee also* Weber, 2005, at 61-62.

225 Giampaolo Garzarelli, *Open Source Software and the Economics of Organization*, ii (April 30, 2002), *available at* http://opensource.mit.edu/papers/garzarelli.pdf.

226 Weber, 2005, at 81.

227 Josh Lerner & Jean Tirole, *Some Simple Economics of Open Source*, 50 J. of Indus. Econ. 197, 202 (2002) (describing "the third era" of open source as "the widespread diffusion of Internet access early in the 1990s led to a dramatic acceleration of open sources activities.").

228 Joseph Feller & Brian Fitzgerald, Understanding Open Source Software Development 86 (2002).

229 *See* Brief of American Civil Liberties Union as Amicus Curiae Supporting Respondents, at 12-13, MGM Studios Inc. v. Grokster Ltd., 125 S. Ct. 2764 (2005) (No. 04-480) (noting the volume of material moving).

230 *See* Brief of Computer Science Professors Harold Abelson et al., at 10, MGM Studios Inc. v.

Grokster Ltd., 125 S. Ct. 2764 (2005) (No. 04-480); Brief of Creative Commons, at 11, MGM Studios Inc. v. Grokster Ltd., 125 S. Ct. 2764 (2005) (No. 04-480) (on sharing of capacity at the edges).

231 Duncan J. Watts, Six Degrees (2003) (identifying the superiority of multiscale, ultrarobust networks); *see generally* Cooper, *supra* note 52, at 117-26 (describing the structure of the Internet).

232 *See* Brief of Sixty Intellectual Prop. & Tech. L. Professors et al., at 28, MGM Studios Inc. v. Grokster Ltd., 125 S. Ct. 2764 (2005) (No. 04-480).

233 *See* Albelson, 2005; Brief of Creative Commons, 2005..

234 *See* Albelson, 2005, at 10-11.

235 *See* Creative Commons, 2005, .

236 Brief of Distributed Computing Indus. Ass'n, at 15, MGM Studios Inc. v. Grokster Ltd., 125 S. Ct. 2764 (2005) (No. 04-480).

237 Lee Rainee & Mary Madden, The State of Music Downloading and File Sharing Online, Pew Internet and American Life Project 2 (2004) (estimating 34 million KaZaa Media Desktop File Sharing Applications actively running in June of 2003); Lerner & Tirole, *supra* note 142, at 204 (estimating, "Computer system administrators, database administrations, computer programmer, and other computer scientists and engineers represent about 2.1 million jobs in the united states.").

238 However, it is interesting to note that it is the activities that require little participation that are getting the most attention, especially as far as legal attention such as with file sharing.

239 Arnon Tonmukayal & Martin B.H. Weiss, *An Agent-Based Model for Secondary Use of Radio Spectrum*, IEEE Int'l Symp. on New Frontiers in Dynamic Spectrum Access Networks (Nov. 8-11, 2005).

240 Brown, 2005.

241 J. Giacomoni & D.C. Sicker, *Difficulties in Providing Certification and Assurance for Software Defined Radios*, IEEE Int'l Symp. on New Frontiers in Dynamic Spectrum Access Networks (Nov. 8-11, 2005).

242 Berger, 2003, at 4.

243 Benkler, Open Spectrum..

244 N. Ikeda, *The Spectrum as Commons: Digital Wireless Technologies and the Radio Policy*, Research Institute of Economy, Trade and Industry, at 10 (2002).

245 Lerner & Tirole, *supra* note 142 (noting the dramatic increase in participation in open source projects in the 1990s); Weber, *supra* note 5, at 65-72 (describing the wide range of participation in projects).

246 Weber, 2004, at 59-65 (discussing "distributed" work).

247 Karim R. Lakhani & Robert G. Wolf, *Why Hackers Do What They Do: Understanding Motivation and Effort in Free/Open source Software Projects*, *in* Perspectives on Free and Open Source Software, *supra* note 95; Rishab Aiyer Ghosh, *Understanding Free Software Developers: Findings from the FLOSS study*, *in* Perspectives on Free and Open Source Software, *supra* note 95.

248 von Hippel, 2005.

249 Weber, 2004, at 74 (emphasizing the importance to programs of participation to solve a problem that concerns them in the suggestion that programmers "scratch and itch.").

250 von Hippel, 2005, at 276.

251 *Id*.

252 *Id*.

253 William W. Fisher, III, Promises to Keep 18-31 (2004).

254 Brendan M. Cunningham, Peter Alexander & Nodir Adilov, *Peer-to-Peer Sharing Communities*,

Information Economics and Policy, 16 (2004).

255 Fisher, 2004, at Appendix.

256 *See* Mark N.Cooper, *Time for the Recording Industry to Fact the Music: The Political, Social and Economic Benefits of Peer-to-Peer Communications Networks* (2005), *available at* http://cyberlaw.stanford.edu/blogs/cooper/archives/BENEFITSofPEERtoPEER.pdf.

257 Fisher, 2004, 260, app. tbl.A.1 (2004); Dereck Slater et al., Berkman Ctr. For Internet and Soc'y, Harvard Law School, Content and Control: Assessing the Impact of Policy Choice on Potential Online Business Models in the Music and Film Industries AV-I (2005), *available at* http://cyber.law.harvard.edu/media/files/content_control.pdf.

258 *Id*.

259 Bill Wittur, *Selling Minor Chords in Exchange for a Happy Tune*, Music Dish, (Dec. 12, 2004) *available at* http://musicdish.com/mag/index.php3?id=4859.

260 Fisher, 2004, at 260, app. tbl.A.1.

261 Giacomoni, 2005..

262 Berleman et al., 2005..

263 *Id*. at 4.

264 Robert J. Degroot et al., *A Cognitive-Enabled Experimental System*, IEEE Int'l Symp. on New Frontiers in Dynamic Spectrum Access Networks (Nov. 8-11, 2005).

265 Berleman et al., 2005..

266 *Id*.

267 *Id*.

268 *Id*. at 4-8.

269 Giacomoni, 2005.

270 Berleman et al., 2005..

271 *Id*.

272 Feller & Fitzgerald, 2002, at 88.

273 Weber, 2004, at 81 (putting it simply, "Talk a lot.").

274 *Id*. at 75.

275 *Id*. at 80.

276 Lakhani & Wolf, 2005.

277 Brief of Sovereign Artists, 2005, at 6-7, MGM Studios Inc. v. Grokster Ltd., 125 S. Ct. 2764 (2005) (No. 04-480).

278 *See* Brief of Distributed Computing Indus. Ass'n, 2005, at 19.

279 Brief of Sovereign Artists, 2005, 192.

280 *Id*. at 38.

281 Ram. D. Gopal et al., *Do Artists Benefit from Online Music Sharing?*, 79 J. of Bus. 1503, 1530 (2006).

282 Martin Peitz & Patrick Waelbrock, File-Sharing, Sampling, and Music Distribution 5 (Int'l U. in Germany, Working Paper No. 26, 2004), *available at* http://ssrn.com/abstract=652743.

283 Martin Peitz & Patrick Waelbroeck, An Economist's Guide to Digital Music 35 (CESifo Working Paper No. 1333, 2004), *available at* http://ideas.repec.org/p/ces/ceswps/_1333.html.

284 *Id*.

285 Gopal et al., 2006, at 1525-29.

286 Amit Gayer & Oz Shy, *Publishers Artists and Corporate Enforcement*, Info. Econ. & Pol'y (forthcoming 2006) (manuscript at 2-3, on file with author).

287 Taylor, *supra* note 32; *see generally*, Ostrom, *supra* note 45.

288 *See* Section II, *supra*.

289 W. Lehr, *The Economic Case for Dedicated Unlicensed Spectrum Below 3 GHz*, 8 (2004), *available at* http://itc.mit.edu/itel/docs/2004/wlehr_unlicensed_doc.pdf.

290 *Id*.

291 Reed, 2002.

292 Lehr, 2004, at 16-23.

293 Lehr, 2004 (arguing unlicensed spectrum provides a check on market power).

294 *See* Yochai Benkler, *Free as the Air to Common Use: First Amendment Constraints on Enclosure of the Public Domain*, 74 N.Y.U. L. Rev. 354 (1999); Yochai Benkler, *Property Commons and the First Amendment: Toward a Core Common Infrastructure* (White paper for the Brennan Center for Justice) (2001), *available at* http://www.benkler.org/WhitePaper.pdf.

295 Mark Cooper, Spectrum and Speech in the 21st Century (2006), *transcript available at* http://cyberlaw.stanford.edu/blogs/cooper/archives/spectrum%20is%20speech.pdf.

296 *Id*.

297 Lawrence Lessig, Code and Other Laws of Cyberspace (1999).

298 *See* Brief of Creative Commons, 2005.

299The New York State Attorney General strenuously opposed the move and public interest groups demanded a full proceeding. Emergency petition of New York Attorney General Eric T. Schneiderman for an Order preventing Verizon from illegally installing voice link service in violation of its tariff and the Commission's May 16, 2013 Order, N.Y. P.S.C. Case No. 13-C-0197 (June 26, 2007), *available at* http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={A3F0A269-8613-4437-AEB3-35ACCF6E5A47}.

300 Alan Stone, Public Service Liberalism: Telecommunications and Transitions in Public Policy 29 (1991).

301 *Id.*

302 3 William Blackstone, Commentaries *164, *cited in* James B. Speta, *A Common Carrier Approach to Internet Interconnection*, 54 Fed. Comm. L. J. 225, 254 n. 142 (2002).

303 Stone, 1991, at 30 (*citing* Holt, C.J. in Lane v. Cotton, 12 Mod. 472, 484 (1701)).

304 Mark N. Cooper, *Making the Network Connection: Using Network Theory to Explain the Link Between Open Digital Platforms and Innovation*, *in* Open Architecture as Communications Policy: Preserving Internet Freedom in the Broadband Era 111-12 (Center for Internet and Society, Mark N. Cooper, ed. 2003); Andrew Odlyzko, *Pricing and Architecture of the Internet: Historical Perspectives from Telecommunications and sportation* (2004), *available at* http://www.dtc.umn.edu/~odlyzko/doc/pricing.architecture.pdf.

305 Odlyzko, 2004.

306 Cooper, 2003.

307 Stone, 1991, at 17 (noting things might have been very different if the French and Indian Wars had gone the other way).

308 *Turnpike Trusts*, Wikipedia (Oct. 12, 2013, 6:55 PM), http://en.wikipedia.org/wiki/Turnpike_trusts.

309 *Id.*

310 Olcott v. Supervisors, 83 U.S. 678, 692 (1872), *cited in* Stone, *supra* note 4, at 35.

311 Cooper, 2013.

312 *Id.*

313 *Id.*

314 Odlyzko, 2004.

315 *Id.*

316 Stone, 199, at 159.

317 S. Rep. No. 49-46, at 4 (1886), *cited in* Stone, *supra* note 300, at 32-33.

318 *Id*.

319 S. Rep. No. 49-46, at 180 (1886).

320 *See, e.g.*, Hockett v. State, 5 N.E. 178 (Ind. 1886), *cited in* Speta, *supra* note 302, at 262 n. 187.

321 *Id.* at 182.

322 *Mann-Elkins Act*, Wikipedia (Nov. 11, 2013, 10:44 PM), http://en.wikipedia.org/wiki/Mann-Elkins_Act.

323 45 Cong. Rec. 5534 (1910), *cited in* Stone, *supra* note 300, at 33.

324 Why Growing Up is Hard to Do: Institutional Challenges for Internet Governance in the "Quarter Life Crisis of the of the Digital Revolution," *Journal on Telecommunications and High Technology Law*, 2013.

325 Mann-Elkins Act, ch. 309, 36 Stat. 539 (1910).

326 The Sherman Act and the Interstate Commerce Act apply to interstate commerce. *See* Sherman Act, 15 U.S.C. §§ 1-7 (2013); Interstate Commerce Act, 49 U.S.C. § 1-80504 (1994).

327 United States v. AT&T, 552 F. Supp. 131 (D.D.C. 1982), *aff'd* Maryland v. United States, 460 U.S. 1001 (1983).

328 It is more than mere historical coincidence that the U.S. railroad system achieved full, national standardization at exactly this moment. *See, Standard Gauge*, Wikipedia (Oct. 30, 2013, 3:58 PM), http://en.wikipedia.org/wiki/Standard_gauge.

329 *Id*.

330 *A Brief History: The Bell System*, AT&T (Mar. 2005), http://www.corp.att.com/history/history3.html.

331 47 U.S.C. § 251 (2013).

332 *Id*.

333 1-2 Alfred E. Kahn, The Economics of Regulation: Principles and Institutions 140-45, 295-306 (1988).

334 Stone, *supra* note 300, at 193, 201 (pointing out that the Interstate Commerce Commission was inserted and the DOJ removed from merger review from 1920 (by the Willis Graham Act) to 1934, when the dual jurisdiction was created).

335 Advisory Comm. on Pub. Interest Obligations of Digital Television Broadcasters, The Public Interest Standard in Television Broadcasting (Nov. 1998), http://govinfo.library.unt.edu/piac/novmtg/pubint.htm.

336 47 U.S.C. § 151 (1996).

337 Alfred D. Chandler, Jr., The Visible Hand: The Managerial Revolution in American Business 245 (Harvard UP 1977), *cited in* Stone, *supra* note 300, at 25.

338 Stone, 1991, at 26.

339 *An Act to Regulate Commerce: Hearing on S. 2851 before the Senate*, 50th Cong. (1888) (statement of Shelby Cullum, Chairman, Comm. on Interstate Commerce).

340 Stone, 1991, at 24, 36.

341 *See generally* Mark N. Cooper, *Inequality In The Digital Society: Why The Digital Divide Deserves All The Attention It Gets*, 20 Cardozo Arts & Ent. L. J. (2002), first presented at Bridging The Digital

Divide: Equality In The Information Age, Cardozo School Of Law, November 15, 2000; Mark Cooper, *The Digital Divide Confronts the Telecommunications Act of 1996: Economic Reality versus Public Policy*, *in* The Digital Divide: Facing a Crisis or Creating a Myth? (Benjamin M. Compaine ed., 2001); Mark Cooper, *Universal Service: A Constantly Expanding Goal*, Consumer Perspectives on Universal Service: Do Americans Lose Under a Connection-based Approach? (Washington, D.C.: New Millennium Research Council, June 2003); "Dividing the Nation, Digitally: When a Policy Of Neglect is Not Benign," The Impact of the Digital Divide on Management and Policy: Determinants and Implications of Unequal Access to Information Technology, Carlson Sch. of Mgmt., U. Minn., August 28, 2004; Mark Cooper, *Broadband in America: A Policy of Neglect is not Benign*, *in* Overcoming Digital Divides: Constructing an Equitable and Competitive Information Society (Enrico Ferro et al. eds., 2009).

342 *Associated Press v. U.S.*, 326 U.S. 1, 28 (1945).

343 The consumer-friendly and citizen-friendly nature of the Internet was evident early on in its development. *see* Mark Cooper, Expanding the Information Age in the 1990s: A Pragmatic Consumer View (1990); Delivering the Information Age Now, Telecom Infrastructure: 1993, Telecomm. Reports (1993).

344 *See* Mark Cooper, *From Wi-Fi to Wikis and Open Source*, 5 J. on Telecomm. & High Tech. L. 125, (2006); Mark Cooper, *Structured Viral Communications*, 9 J. on Telecomm. & High Tech. L. 15 (2011); Mark Cooper, *The Economics of Collaborative Production in the Spectrum Commons*, IEEE Symposium on New Frontiers in Dynamic Spectrum Access Networks 379-400 (2005); Mark Cooper, *Collaborative Production in Group-Forming Networks*, The State of Telecom: Taking Stock and Looking Ahead(Columbia Institute on Tele-Information, 2005); Mark Cooper, *The Economics of Collaborative Production*, The Economics of Open Content: A Commercial Noncommercial Forum (MIT , 2006).

345 Cooper, *Structured Viral Communications*, *supra* note 344; Cooper, *From Wi-Fi to Wikis and Open Source*, *supra* note 344.

346 Mark Cooper, "The Importance of Open Networks in Sustaining the Digital Revolution," in Thomas M. Lenard and Randolph J. May (Eds.) *Net Neutrality or Net Neutering* (New York, Springer, 2006); "Anticompetitive Problems of Closed Communications Facilities," in Mark Cooper (Ed.) *Open Architecture as Communications Policy* (Palo alto, Center for Internet and Society, Stanford Law School, 2003); Mark Cooper, *Cable Mergers and Monopolies: Market Power in Digital Media and Communications Networks* (Washington, D.C.: Economic Policy Institute, 2002);

347 *See* Mark Cooper, *Antitrust As Consumer Protection in the New Economy: Lessons from the Microsoft Case*, 52 Hastings L.J. 813 (2001).

348 Symposium, Mark Cooper, *What's 'New' About Telecommunications in the 21st Century Economy: Not Enough to Abandon Traditional 20th Century Public Interest Values*, J. on Telecomm. & High Tech. L. (2003).

349 Cooper, 2013, at 56.

350 David S. Evans, Breaking Up Bell: Essays on Industrial Organization and Regulation (1983); Milton Mueller, Universal Service: Competition, Interconnection and Monopoly in the Making of the American Telephone System (1997); Alan Stone, Public Service Liberalism: Telecommunications and Transitions in Public Policy (1991); Susan P. Crawford, Captive Audience: The Telecom Industry and Monopoly Power in the New Gilded Age (2013).

351 Crawford, *supra* note **Error! Bookmark not defined.**; Stone, 1991,

352 The beneficial effect of the expiration of the patent, which afforded open access to the underlying technology, is another example of the beneficial effect of the principle discussed in this paper. The fact that the Constitution embodies the great suspicion of monopoly both reflects the intellectual tradition of the framers and the uniquely American approach.

353 Robert Bornholz, *The Early History of Competition in the Telephone Industry, in* Breaking Up Bell: Essays on Industrial Organization and Regulation, at 33.

354 *Id.*

355 Mueller argues that supply side economies of scale are less important than people thought, citing statements by industry executives and findings that marginal costs are rising. He depicts the supply curve as one with only slightly rising marginal costs. Mueller misses the fact that there is a wide range of production in which the average costs are falling. The important question for competition is not simply whether marginal costs are rising or falling, but whether the minimum efficient scale in the industry is small enough to support vigorous competition. If it is not, then the industry will not be vigorously competitive. He does recognize that current network economics may indicate the industry is in a range of declining cost, which makes competition difficult.

356 Stone, at 131-135(arguing that comparative analysis of market performance in areas before, during, and after competition across time, as well as between areas with and without competition, leave the claims for the superiority of competition, at a minimum, in doubt).

357 Mueller, at 187.

358 One final point made by Mueller is important. He notes that the way we use the concept of universal service today is quite different that the one used by Vail in 1908, although the concept as used in 1934 is closer to contemporary usage. Mueller is right about Vail, who intended it as a commitment to interconnection, which is important. But the fact that the public service obligations of communications and transportation carriers have evolved over the course of half a millennium is not the insult that Mueller seems to think it is. Because his analysis is ahistorical, seeking to derive lessons for interconnection policy today by focusing on the short period of access competition, which lasted for only a couple of decades in a history that is approaching six hundred years, he vastly overstates its potential. The public service obligations evolve in a progressive manner over time, an evolution that has accelerated with the acceleration of technological progress. It is a fact of life, not a mistake of analysis.

359 Mueller, at 186-88.

360 David Reed, *That Sneaky Exponential: Beyond Metcalfe's Law to the Power of Community Building* (Jan. 3, 2014, 10:00 PM), http://www.reed.com/dpr/locus/gfn/reedslaw.html; Cooper, Wi-Fi to Wikis and Open Source, *supra* note 344, at 135.

361 Mark Cooper, *The Downside of Deregulation: A Consumer Perspective After A Decade of Regulatory Reform*, Plenary Session, Consumer Assembly, February 12, 1987; *Protecting the Public Interest in the Transition to Competition in Network Industries*: *The Electric Utility Industry in Transition*, N.Y. State Energy Res. and Dev. Auth. (1994); Mark Cooper, *Restoring the Balance of Public Values and Private Incentives in American Capitalism*, *in* Cato Inst., Too Much Deregulation or Not Enough (2002); Mark Cooper, *Recognizing the Limits of Markets, Rediscovering Public Interest in Utilities*, in Electric and Natural Gas Business: Understanding It! (Robert E. Willett ed., 2003); The Failure Of Market Fundamentalism: What Are The Issues In The ICT Sector? The New Economics of ICT: Implications of Post-Neoclassical Economics for the Information Communications Technology Sector (2009).

362 Mark Cooper, *Freeing Public Policy From The Deregulation Debate: The Airline Industry Comes Of Age (And Should Be Held Accountable For Its Anticompetitive Behavior)*, A.B.A., F. on Air & Space L., (1999) (airlines have developed the hub and spoke structure, which was not predicted by deregulatory theory); Mark Cooper, *The Trouble with the ICC and the Staggers Act*, Pac. Shipper (1987); Mark Cooper, Report for the Coal. For Rail Fairness and Competition, *Bulk Commodities and the Railroads After the Staggers Act: Freight Rates, Operating Costs and Market Power* (1987), http://digitalcollections.library.cmu.edu/awweb/awarchive?type=file&item=425293; Surface Transportation Board, Comments of The Consumer Federation Of America On November 2008

Report Of L.R. Christensen Associates, Inc., Ex Parte No. 680, Study Of Competition In The Freight Rail Industry, (2008) (railroads have developed "paper barriers" to prevent short lines from interconnecting with multiple long-haul railroads).

363 FCC, FCC Issues Comprehensive Data Request in Special Access Proceeding, (Sept. 19, 2011), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-309670A1.pdf

364 The interconnection between the wireless and wireline networks has been subject to FCC authority under title III throughout.

365 Crawford, 2013.

366 *Id.* at 21 (noting each of the short periods of competitive access gives way to monopoly markets.)

367 *Lessons From 1996 Telecommunications Act: Deregulation Before Meaningful Competition Spells Consumer Disaster*, Consumer Fed'n of America and Consumer's Union (February 2001), http://consumersunion.org/pdf/lesson.pdf; Mark Cooper, *The Failure of 'Intermodal Competition in Cable and Communications Markets*, Consumer Fed'n of America and Consumers Union (April, 2002), http://www.consumerfed.org/pdfs/intercomp.20020423.pdf.

368 Crawford, 2013.

369 *See also*, Office of Communications, Identifying Appropriate Regulatory Solutions: Principles for Analyzing Self- and Co-Regulation 4 (2008), http://stakeholders.ofcom.org.uk/binaries/consultations/coregulation/statement/statement.pdf (stating "[I]ndustry-led approaches can play an important role in delivering regulatory objectives: these can help address an issue quickly and flexibly while benefiting from industry expertise, often at a lower cost to society than formal regulation. Timeliness and flexibility of solutions are particularly critical in fast moving, technologically complex communications markets."); Neil Gunningham, Reconfiguring Environmental Regulation: The Future Public Policy Agenda 9 (2005), http://www.lafollette.wisc.edu/research/environmentalpolicy/gunninghamreconfigure.pdf (quoting Daniel Fiorino, *Rethinking Environmental Regulation: Perspectives from Law and Governance*, 23 Harv. Envtl. L. Rev. 441, 464 (1999)) (stating "A common theme is that traditional regulation is not suited to meet many contemporary policy needs (although as we emphasize below, it still has a role to play), and indeed it is partly in response to the perceived shortcomings of the regulatory *status quo* . . . . 'underlying each strand in the literature is the belief that the increased complexity, dynamism, diversity, and interdependence of contemporary society makes old policy technologies and patterns of governance obsolete.'); Denis D. Hirsch, *The Law and Policy of Online Privacy: Regulation, Self-Regulation, or Co-Regulation?*, 34 Seattle U. L. Rev. 439, 458 (2011).

370 Elena Pavan, Frames and Connections in the Governance of Global Communications: A Network Study of the Internet Governance Forum xxix (Lexington Books, 2012) (concisely summarizing all of the issues discussed up to this point, "[W]e are standing in an epoch of overall political uncertainty caused, in the first place, by the fact that states have to face multiple and complex issues that extend beyond the boundaries of their sovereignty and, more importantly, that require an incredibly large amount of competency to be managed adequately. This does not mean that states have lost their functions: institutions continue to be the sole agents in charge of producing policies. What changes is that they can no longer perform their functions 'behind closed doors' but, rather, find themselves forced to act within a very crowded environment, populated by a multiplicity of non-institutional actors who possess the required knowledge and the expertise for managing complex and dynamic global issues. How to translate the necessity for multifactor collaboration into efficient governance arrangements remains an open question. This is particularly true in the case of information and communications matters, where technical and social aspects are both relevant and so interwoven that, when it comes to their regulation, governments have to coordinate a plurality of interests, knowledges, agendas, and priorities but often are not equipped with the necessary competencies to do so")(internal citations omitted).

371 *See* Jo Becker & Barton Gellman, *Leaving No Tracks*, Wash. Post, June 27, 2007, at A01, http://voices.washingtonpost.com/cheney/chapters/leaving_no_tracks. (suggesting that while producers complain about the involvement of public interest groups, it is certainly true that there has been a politicization of the process on both sides and industry has generally gotten the best of it, symbolized by Vice President Dick Cheney's campaign against environmental regulation in which he told his clients to "match the science").

372 *See* Mark Cooper, Presentation at The Digital Broadband Migration: The Dynamics of Disruptive Innovation, Silicon Flatirons Center, *Crowd Sourcing Enforcement: Building a Platform for Participatory Regulation in the Digital Information Age* (Feb. 12, 2011), http://siliconflatirons.com/documents/conferences/2011.02.13/MarkCooperPresentation.pdf.

373 Mark Cooper, *Crowd Sourcing Enforcement: Building a Platform for Participatory Regulation in the Digital Information Age*, presentation at *The Digital Broadband Migration: The Dynamics of Disruptive Innovation*, Silicon Flatirons Center (Feb. 12, 2011), http://siliconflatirons.com/documents/conferences/2011.02.13/MarkCooperPresentation.pdf.

374 Robert Cannon, *Where Internet Service Providers and Telephone Companies Compete: A Guide to the Computer Inquiries, Enhanced Service Providers and Information Service Providers*, 9:1 CommLaw Conspectus (2001) *available at* http://ssrn.com/abstract=274660.

375 Tim Wu, The Master Switch 190-91 (Knopf, 2010). (writing "The phone jack and the Caterfone decision made it possible to sell to the public devices like fax machines and competitively price (non-Bell) telephones. They also made possible the career of Dennis Hayes, a computer hobbyist ('geek' is the term of art) who, in 1977 built the first modulator/demodulator (modem) designed and priced for consumers . . . . He built, that is, the first consumer device that allowed personal computers to talk to each other, and with that you can spy the first causal relations between the federal deregulation of the 190s and the birth of the Internet . . . with strange and unprecedented foresight, the FCC watered, fertilized, and cultivated online computer services as a special protected industry, and, over the years, ordained a set of rules called the *Computer Inquiries*, a complex regime designed both to prevent AT&T from destroying any budding firm and also to ensure that online computer services flourished unregulated. What matters so much for the fate of telecommunications and our narrative is that he infant In short, in these obscure and largely forgotten regimes, the new FCC played surrogate parent to the Internet firms.)

376 Mark Cooper, *Governing the Spectrum Commons: A Framework for Rules Based on Principles of Common-Pool Resource Management*, Stan. Center for Internet and Soc'y, Telecomm. Pol'y Research Conf. (March 2, 2006), http://cyberlaw.stanford.edu/attachments/GOVERNING%20THE%20SPECTRUM%20COMMONS.pdf; Mark Cooper, *Efficiency Gains and Consumer Benefits of Unlicensed Access to the Public Airwaves: the Dramatic Success of Combining Market Principles and Shared Access* (2012), http://www.markcooperresearch.com/SharedSpectrumAnalysis.pdf; Comments Of The Consumer Fed'n Of Am. to *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auction*, Dkt. No. 12-268, WT Dkt. No. 08-166, WT Dkt. No. 08-167, WT Dkt. No. 08-167, ET Dkt No. 10-24 (January 25, 2013), *available at* http://apps.fcc.gov/ecfs/document/view?id=7022112311.

377 Federal Communications Commission, *Connecting America: The National Broadband Plan*, 2010, p. 15.

378 Sixth Broadband Deployment Report, 25 F.C.C.R. at 9558 ¶ 2.

379 Preserving the Open Internet, GN Docket No. 09-191, WC Docket No. 07-52, Report and Order, 25 FCC Rcd 17905 (2010) (Open Internet Order), aff'd in part, vacated and remanded in part sub nom. Verizon v. FCC, No. 11-1355 (D.C. Cir. Jan. 14, 2014).

380 *Verizon v. FCC*, 740 F.3d 623 (D.C. Cir. 2014)

381 United States Court of Appeals for the Tenth Circuit, No. 11-9900, May 23, 2014:51.

382 *Cellco Partnership v. FCC*, 700 F.3d 534, 541, D.C.Cir. 2012:21…24.

383 D.C. Circuit, 2014: 47-50.

384 Cooper, 2014.

385 Citing NARUC II, the D.C. Circuit, 2014:60:51"Since it is clearly possible for a given entity to carry on many types of activities, it is at least logical to conclude that one may be a common carrier with regard to some activities but not others."

386 National Cable & Telecommunications Ass'n v. Brand X Internet Services, S. Ct. 2688 (2005).

387 :Johnathan Aldred, 2013, "Justifying Precautionary Policies: Incommensurability and Uncertainty," *Ecological Economics,* 96: 132, a qualitative version of the Precautionary Principle is developed which draws its normative content from a blend of formal decision theory and political philosophy. It is argued that precautionary action can be justified by some flexible combination of uncertainty and incommensurability. The 'greater' the uncertainty, the 'less' incommensurability is required to justify precautionary action, and vice versa.

388 Taleb, *Black Swan,* 2010, pp. 317-373.

389 Cooper, 2013.

390 Mark Cooper, Address at NARUC Summer Meeting, Handicapping the Next Network Neutrality Court Case (July 2010).

391 Brief of Petitioner Earthlink Inc., Brand X Internet Service, et. al v. FCC, 2002 WL 32191908 (9th Cir. Oct. 11, 2002) (quoted in Earl W. Comstock and John W. Butler, *Access Denied: The FCC's Failure to Implement Open Access to Cable as Required by the Communications Act* in Open Architecture as Communications Policy 326 (Mark Cooper ed., 2003).

392 47 U.S.C. § 254(b).

393 47 U.S.C. § 254(b)(2).

394 47 U.S.C. § 254(c)(1).

395 AT&T Corp. v. City of Portland, 216 F.3d 871, 879 (9th Cir. 2000).

396 47 U.S.C. § 160.

397 *Id.*

398 *Id*.

399 Comstock and Butler, *supra* note 391, at 304.

400 Michael Powell, *Preserving Internet Freedom: Guiding Principles for the Industry*, 3 J. on Telecomm. & High Tech. L. 5, 12 (2004).

401 Appropriate Framework for Broadband Access to the Internet over Wireline Facilities Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services Computer III Further Remand Proceedings, *Policy Statement*, FCC 05-151, CC Dkt. No. 02-33, CC Dkt. No. 01-337, CC Dkt. Nos. 95-20, 98-10, GN Dkt. No. 00-185, CS Dkt. No. 02-52 (Aug. 5, 2005), *available at* http://fjallfoss.fcc.gov/edocs_public/attachmatch/FCC-05-151A1.pdf.

402 National Cable & Telecommunications Ass'n v. Brand X Internet Services, 545 U.S. 967, 1003 (2005) (Breyer, concurring).

403 *Id.* at 1004 (Breyer, concurring)

404 *Id.* at 1003 (Stevens, concurring).

405 Id. at 1014 (Scalia, dissenting).

406 *Id.* at 113-14.

407 Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities, *Declaratory*

Ruling & Notice of Proposed Rulemaking, 17 FCC Rcd. 4798, ¶ 75-81 (2002); Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, *Report & Order & Notice of Proposed Rulemaking*, 20 FCC Rcd. 14,853, ¶ 61-77 (2005).

408 17 FCC Rcd. 4798, at ¶ 108, 110, 111; 20 FCC Rcd. 14,853, at ¶ 61-77.

409 Technological Transition of the Nation's Communications Infrastructure, *Reply Comments of Public Knowledge*, GN Dkt. No. 12-353 (January 28, 2013), *available at* http://www.publicknowledge.org/files/13.02.25%20PK%20Reply%20Final.pdf.

410 *Comcast Corp.*, 600 F.3d at 655.

411 *Id.* at 656.

412 The Editorial Board, The F.C.C. Tries Again, New York Times, February 22, 2014

413. Poteete et al., *supra* note 36, at 236 (referring to three realms of the social order—social economic and political—as part of the setting).

414. North, *supra* note 15, at 15.

415. *See* Lawrence Lessig, Code and Other Laws of Cyberspace app. at 235 (1st ed. 1999).

416. Mark Cooper, *Inequality in the Digital Society: Why the Digital Divide Deserves All the Attention It Gets*, 20 Cardozo Arts & Ent. L. J. 73 (2002).

417. Communications Act, ch. 652, 48 Stat. 1064 (1934) (codified as amended at 47 U.S.C. § 151 (1996)).

418. Mueller, 2010, at 210-11 (expressing the dilemma in reflecting on the challenge of confronting the problem of content regulation: "As many others have argued, the stunning success of the Internet as a medium of expression and engine of economic development was based on the end-to-end principle. The network was designed to be as neutral a platform as possible; it is a mover a [sic] bits that leaves the definition of applications and content to the end users. A neutral network eliminates gatekeepers and similar barriers to access. . . . A neutral network maximizes access to the public and minimizes the ability of an intermediary to substitute its own judgments for those of end users. . . . Even if we recognize that some content will be illegal and that there may be no right to produce or access it, regulation by nation-states should stay congruent with the end-to-end principle and target its enforcement activity at the edge as well. If we try to engineer the network itself to police and censor content, we give states and network operators too strong a gatekeeping role.").

419. Geoff Huston, A Report on the OECD/BEREC Workshop on Interconnection and Regulation, CircleID, (June 28, 2012, 12:33 PM), http://www.circleid.com/posts/20120628_report_on_oecd_berec_workshop_on_interconnection_and_regulation.

420. Peyman Faratin, David Clark, Steven Bauer, Willian Lehr, Patrick Gilmore & Arthur Berger, *Complexity of Internet Interconnections: Technology, Incentives and Implications for Policy*, Paper prepared for 35th Research Conference on Communication Information and Internet Policy, 21 (Sep. 28-30, 2007) *available at* http://cfp.mit.edu/publications/CFP_Papers/Clark%20Lehr%20Faratin%20Complexity%20Interconnection%20TPRC%202007.pdf;, at 16-18.; *see also* David Clark, William Lehr and Steven Bauer, *Interconnection in the Internet: the Policy Challenge*, Paper prepared for 39th Research Conference on Communication Information and Internet Policy (Sep. 23-25, 2011) *available at* http://groups.csail.mit.edu/ana/Publications/Interconnection_in_the_Internet_the_policy_challenge_tprc-2011.pdf (building on their previous work).

421. Fid., at 12, 16, 18. (footnote omitted).

422. Phil Weiser, *The Future of Internet Regulation*, 43 U.C. Davis L. Rev. 529, 543-44 (2009) (citations omitted).

423. Phil Weiser, *The Future of Internet Regulation*, Selected Works of Phil Weiser 53 (Feb. 2009), http://works.bepress.com/cgi/viewcontent.cgi?article=1000&context=phil_weiser (citations omitted) (quoting material from the internet version of the article not appearing in the print version).

424. Faratin et al., 2007, at 22.

425. *See* Mueller, 2010, at 243.

426. "[I]ndustry-led approaches can play an important role in delivering regulatory objectives: these can help address an issue quickly and flexibly while benefiting from industry expertise, often at a lower cost to society than formal regulation. Timeliness and flexibility of solutions are particularly critical in fast moving, technologically complex communications markets." *Identifying Appropriate Regulatory Solutions: Principles for Analysing Self- and Co-Regulation*, Office of Communications (U.K.) 4 (Dec. 10, 2008), http://stakeholders.ofcom.org.uk/binaries/consultations/coregulation/statement/statement.pdf [hereinafter *Ofcom Statement*]; "A common theme is that traditional regulation is not suited to meet many contemporary policy needs (although as we emphasize below, it still has a role to play), and indeed it is partly in response to the perceived shortcomings of the regulatory *status quo* . . . . 'underlying each strand in the literature is the belief that the increased complexity, dynamism, diversity, and interdependence of contemporary society makes old policy technologies and patterns of governance obsolete.' Neil Gunningham, *Reconfiguring Environmental Regulation: The Future Public Policy Agenda*, conference paper presented at *Environmental Law in a Connected World*, La Follette Sch. Pub. Affairs, U. Wis. – Madison 9 (Jan. 31, 2005) *available at* http://www.lafollette.wisc.edu/research/environmentalpolicy/gunninghamreconfigure.pdf (quoting Daniel Fiorino, *Rethinking Environmental Regulation: Perspectives from Law and Governance*, 23 Harv. Envtl. L. Rev. 441, 464 (1999)); *See also* Denis D. Hirsch, *The Law and Policy of Online Privacy: Regulation, Self-Regulation, or Co-Regulation?*, 34 Seattle U. L. Rev. 439, 458 (2011).

427. *See* Jo Becker & Barton Gellman, *Leaving No Tracks*, Wash. Post, June 27, 2007, at A01, *available at* http://voices.washingtonpost.com/cheney/chapters/leaving_no_tracks (While producers complain about the involvement of public interest groups, it is certainly true that there has been a politicization of the process on both sides and industry has generally gotten the best of it, symbolized by Vice President Dick Cheney's campaign against environmental regulation in which he told his clients to "match the science.").

428. *See* Mark Cooper, *Crowd Sourcing Enforcement: Building a Platform for Participatory Regulation in the Digital Information Age*, presentation at *The Digital Broadband Migration: The Dynamics of Disruptive Innovation*, Silicon Flatirons Ctr. (Feb. 12, 2011), http://siliconflatirons.com/documents/conferences/2011.02.13/MarkCooperPresentation.pdf.

429. Pavan, *supra* note 19, at xxix. (citations omitted).

430. *UNCTAD*, *supra* note 51, at 256.

431 http://en.wikipedia.org/wiki/Civilization,

432. Joel Mokyr, *Innovation in an Historical Perspective: Tales of Technology and Evolution*, *in* Technological Innovation and Economic Performance 23, 36 (Benn Steil, et al. eds., 2002) (arguing that the digital revolution is one of a handful of General Purpose technologies precisely because it has the ability to be recombined.).

433. *Can Competition Repeat the Mobile Miracle for Broadband?*, ITU News (Dec. 2010), https://itunews.itu.int/En/524-Can-competition-repeat-the-mobile-miracle-for-broadband.note.aspx (last visited Oct. 4, 2012).

434. *See* Anna-Maria Kovacs, *Internet Peering and Transit*, Tech. Pol'y Inst. 2 (Apr. 4, 2012), http://www.techpolicyinstitute.org/files/amkinternetpeeringandtransit.pdf.

435. *See Global mobile statistics 2012 Part A: Mobile subscribers; handset market share; mobile operators*, mobiThinking (June 2012), http://mobithinking.com/mobile-marketing-tools/latest-mobile-stats/a.

436. *See Global mobile statistics 2012 Part B: Mobile Web; mobile broadband penetration; 3G/4G subscribers and networks*, mobiThinking (June 2012), http://mobithinking.com/mobile-marketing

tools/latest-mobile-stats/b.

437. *See Global mobile statistics 2012 Part E: Mobile apps, app stores, pricing and failure rates*, mobiThinking (June 2012), http://mobithinking.com/mobile-marketing-tools/latest-mobile-stats/e.

438 The initial concern about a digital divide goes back at least to the mid-1990s in a series of reports by the National Telecommunications Information Administration (NTIA, National Telecommunications Information Administration, 2010, *Digital Nation: 21st Century America's Progress Toward Universal Broadband Internet Access;* NTIA, 2007, *Networked Nation;* NTIA 2002. A Nation Online: How Americans Are Expanding their Use of the Internet. February. Washington, D.C.: U.S. Department of Commerce; NTIA 2000. Falling Through the Net: Toward Digital Inclusion. October. Washington, D.C.: U.S. Department of Commerce; NTIA 1999. Falling Through the Net: Defining the Digital Divide. November. Washington, D.C.: U.S. Department of Commerce; NTIA 1998. Falling Through the Net II: New Data on the Digital Divide. July. Washington, D.C.: U.S. Department of Commerce; NTIA 1995. Falling Through the Net: A Survey of the "Have Nots" in Rural and Urban America. July. Washington, D.C.: U.S. Department of Commerce; Stevenson, S., "Digital Divide: A Discursive Move Away from the Real Inequities," *The Information Society*, 25, points out precursors in the National Information Infrastructure policy debates in 1992-1994.

439 FCC, 2009b, Notice #16 Broadband Adoption, DA-09-2403, November 10, 2009.

440 Digital inclusion is the contemporary expression of the recognition of the importance of social inclusion. social inclusion "expresses a dynamic and multifaceted understanding of the unfolding circumstances of people, groups or neighborhood at the margins of society… Social inclusion is therefore dependent on more than mere access to opportunities and to make the resources an individual would need to make use of them. It implies the existence, within a certain setting, of shared goals and meanings and a feeling of belonging to a community. Smith, S., 2009, "From Inclusive Spaces to Inclusionary Texts: How E=Participation Can Help Overcome Social Exclusion," in Enrico Ferro, et al. (Eds.) *Overcoming Digital Divides: Constructing an Equitable and Competitive Information Society* (Hershey: IGI Global, 2010, p. 537).

441 "Usage is the final stage and ultimate goal of the process of technological appropriation in the shape of particular applications (van Dijk, J.A.G.M. and A. van Deurson, 2009, "Inequalities of Digital Skills and How to Overcome Them," in Enrico Ferro, et al. (Eds.) *Overcoming Digital Divides: Constructing an Equitable and Competitive Information Society* (Hershey: IGI Global, 2010), p. 279); Adoption is not the only relevant concern of diffusion research. The *degree of use* of that technology is also an important variable that describes the extent of diffusion o that innovation" (Akhter, S. H., 2005, "The Influence of Time on Transactional Use of the Internet: Buying, Banking, and Investing Online, in Enrico Ferro, et al. (Eds.) *Overcoming Digital Divides: Constructing an Equitable and Competitive Information Society* (Hershey: IGI Global, 2010), p. 490); "But after fifteen or more years of many initiatives and meager results it has become increasingly clear that there is a need to move beyond measuring availability and accessibility, to measuring usage and, more importantly, to measure impact (Dahms, M., 2009, "Shifting Pocus from Access to Impact: Can Computers Alleviate Poverty?" in Enrico Ferro, et al. (Eds.) Overcoming Digital Divides: Constructing an Equitable and Competitive Information Society (Hershey: IGI Global, 2010), p. 440); With the traditional demographic gaps in material access to the Internet starting to narrow in the United States, researchers have started to focus on other dimensions that distinguish different types of Internet users and subsequently, the variability in benefits that are derived from different types of Internet usage" (Davidson E. L. and S. R. Cotton, "Connection Disparities: The Importance of Broadband Connections in Understanding Today's Digital Divide," in Enrico Ferro, et al. (Eds.) Overcoming Digital Divides: Constructing an Equitable and Competitive Information Society (Hershey: IGI Global, 2010), pp. 346-37; Cotton, S.R and S. Jelenewicz, 2006, "A disappearing Digital Divide Among College Students? Peeling Away the Layers of the Digital Divide," *Social Science Computer Review*, 24(4) 497-506; Davison, E. and S. R. Cotton. 2003. "Connection

Discrepancies: Unmasking Further Layers of the Digital Divide." *First Monday* 8, 3. http://firstmonday.org/issues/issue8_3/davison/index.html; DiMaggio, P., Hargittai, E., Celeste, C., and Shafer, S. 2004. Digital inequality: From unequal access to differentiated use. In Social inequality, ed. K Neckerman, pp. 355-400. New York: Russell Sage Foundation, Hargittai, E. 2002. "Second-level digital divide: Differences in People's Online Skills *First Monday* 7(4). http://firstmonday.org/issues/issue7 4/hargittai).

442 Media literacy can be defined as "the ability to access, analyze, evaluate, and create messages across a variety of contexts (Livingstone, S. 2003. Children's Use of the Internet: Reflections on the Emerging Research Agenda," *New Media and Society*, 5, 147-166). New media literacy, like traditional literacy, does not only involve receiving information (which refers to the third level of the model), but also producing it (which refers to the fourth level of the model): first of all, people achieve a better understanding of a medium, through direct experience of content production and second, "the Internet par excellence is a medium which offers hitherto unimagined opportunities for ordinary people to create online content (Comunello, F., 2009, "From the Digital Divide to Multiple Divides: Technology, Society, and New Media Skills," in Enrico Ferro, et al. (Eds.) Overcoming Digital Divides: Constructing an Equitable and Competitive Information Society (Hershey: IGI Global, 2010, pp. 599)-600).

443 Warschauer, M. 2003. *Technology and social inclusion: Rethinking the digital divide*. Cambridge, MA: MIT Press; Barzilai-Nahon, K. 2006, "Gaps and Bits: Conceptualizing Measurements for Digital Divide/s," *The Information Society*, 22.

444 Berkeley Roundtable on the International Economy, 2001, *Tracking a Transformation: E-Commerce and the Terms of Competition in Industries* (Washington, D.C.: Brooking, 2001); Dutton, W.H. et. al. (Eds.), 2005, *Transforming Enterprise: The Economic and Social Implications of Information Technology* (Cambridge: MIT, 2005)

445 Bridges.org. 2001. Spanning the digital divide: Understanding and tackling the issues. Cape Town: Bridges.org. http://www.bridges.org/files/active/1/spanning the digital divide.pdf; Chen, W., and Wellman B. 2003. The Determinants of the global digital divide: A cross-country analysis of computer and Internet penetration. 38. Santa Cruz Center for International Economics, University of California, Santa Cruz, Working Paper; Crump, B., and McIlroy, A. 2003. The digital divide: Why the "don't-wants-to" wont Compute: Lessons from a New Zealand ICT Project. First Monday issue8 12/crump/index.html; International Telecommunication Union, Telecommunication Development Bureau. 2003. Gauging ICT potential around the world. Geneva: ITU Publications.http://www.itu.int/ITU-D/ict/dai/material/DAI ITUNews e.pdf; International Telecommunication Union. 2003a. ITU Digital Access Index: World's First Global ICT Ranking. Geneva: ITU.http://www.itu.int/newsarchive/press releases/2003/30.html; Warschauer,M.2002."Reconceptualizing the Digital Divide. *First Monday* (7). http://www.firstmonday.dk/issues/issue7 7/warschauer; Horrigan, J., and Rainie, L. 2004. The broadband difference. Washington, DC: Pew Internet & American Life; Horrigan, J.B., 2009, Home Broadband, Pew Internet and American Life Project; Lenhart, A. 2000. W*ho's Not on Line? 57 Percent of those Without Internet Access Say they do not Plan to Log On*. Washington, D.C.: Pew Internet and American Life Project.

446 "[T]hose who lack access will not garner equitable opportunities for jobs, Internet-based economic empowerment civic engagement, healthcare, web-based education and simple day-to-day activities" (Jackson, et al., 2009, "The Digital Divides in the U.S.: Access, Broadband, and Nature of the Internet," in Enrico Ferro, et al. (Eds.) Overcoming Digital Divides: Constructing an Equitable and Competitive Information Society (Hershey: IGI Global, 2010, p. 607).

447 Fox, S, 2005, *Digital Division*, Pew Internet and American Life Project; Rains, S.A., 2008, "Broadband Internet Access, Health Communications and the Digital Divide," *Communications Research*, 35:3; Savage S.J. and D. Waldman, 2005, "Broadband Internet Access, Awareness, and

Use: Analysis of United States Household Data," *Telecommunications Policy*, 29; van Dijk, J. A. G. M., 2005, *The Deepening Divide: Inequality in the Information Society. Santa Monica,* Sage); Peacock, S.E., 2008, "The Historical Influence of Computer Use at Work on Income in the Late Twentieth Century," *Social Science Computer Review*, 26:3; Price Waterhouse Coopers, 2009, *Champion for Digital Inclusion: The Economic Case for Digital Inclusion,* October; SQWconsulting, *Broadband in the Home: An Analysis of the Financial Costs and Benefits: Final Report to the Post Office,* September 18; Davison and Cotton, 2009

448 Audretsch, D.B. and P. J.J. Welfens, *The New Economy and Economic Growth in Europe and the U.S.* (Berlin: Springer, 2002); Bouwman, H., 2003, "Introduction t Broadband Communications," *Trends in Communication,* 11:1; Grubesic, T. H. and A.T. Murray, 2002, "The geodemographic correlates of broadband access and availability in the United States," *Telematics and Informatics,* 21(4) 335-338; Lehr, et al., 2006, Measuring Broad band's Economic Impact, NTIA; Holt, L. and M. Jamison, "Broadband and Contributions to Economic Growth: Lessons from the U.S. Experience," *Telecommunications Policy,* 33, 575-581; Lehr, et al., 2006 Rommney and Richardson, 2005; Kaufmann and Kumar, 2008; Dutton, et. al, 2005 Davison and Cotton, 2009;Jackson, et al., 2009; Haan, 2003.

449 Bresnahan, T., E Brynjolfsson and L. Hitt, 2002. "Information Technology, Workplace Organization and the Demand for Skilled Labor," Quarterly Journal of Economics. 117(1) 339-376; Brynjolfson E. and L. Hitt, 2003, "Computing Productivity: Firm-Level Evidence," *Review of Economics and Statistics, 85:4;* Dostie, et al., 2006, The Returns to Computer Use Revisited, Institute for the Study of Labor; Garaciano, L, and P. Heaton, 2005, "Information Technology, Organization and Productivity in the public Sector, Evidence from Police Departments, CEP *Discussion Paper, London School of Economics;* Fafchamp, M. and B. Minten, 2002. "Returns to Social Network Capital among Traders," *Oxford Economic Papers*, 54; Fairlie, R. W., The Personal Computer and Entrepreneurship," Management Science, 52:2; Acemoglu, et al., 2007,; Dolton and Pelkonen, 2007; Dolton and Robinson, 2007; PriceWaterhouseCoopers, 2009.

450 Shah, D. V., J. M. McLeod and S. Yoon. 2001. "Communication, Context and Community: An Exploration of Print, Broadcast and Internet Influences." 28: 264-506. ; Weber, L, A. Loumakis, and J. Bergman, 2003, "Who Participates and Why?" *Social Science Computer Review* 21(10, 25-32.

451 Chen, W., and Wellman, B.2003.Charting and bridging digital divides: Comparing socio-economic, gender, life stage and rural-urban Internet access and use in eight countries. AMD Global Consumer Advisory Board (GSAB).; Bill & Melinda Gates Foundation, 2004; Curtin, 2001; Foulger, 2001; Nahon & Barzilai,

2005); Daukanta, 2003, Holmes and Miller, 2003; Kreuger, 2002

452 Jackson, et al., 2000, p.437; PriceWaterhouseCoopers, 2009; Schmitt and Wadsworth, 2004; Fuchs and Woessman, 2004; Malamud and Poleches, 2008

453 Chen & Wellman, 2003; Bill & Melinda Gates Foundation, 2004; Curtin, 2001; Foulger, 2001; Nahon & Barzilai, 2005); Warschauer, 2002; Crump & McIlroy, 2003; Dutta et al., 2004)

454 Jensen and Oster, 2009, Jackson, et al., 2009;, Wellman, B. 2001. "Physical Place and Cyber Place: The Rise of Personalized Networking." I*nternational Journal of Urban and Regional Research* 25:227-252; Benkler, Y. 2006. *The Wealth of Networks.* New Haven, CT: Yale University Press; Grimes, 2000.

455 Bricout, J.C. et. al., 2009. Teleworking and the "Disability Divide," Enrico Ferro, et al. (Eds.) *Overcoming Digital Divides: Constructing an Equitable and Competitive Information Society* (Hershey: IGI Global, 2010); Gauo, Fox, 2007; West and Anderson, 2005; Bricout and Huand, 2005; Houlihan, et al., 2003, PriceWaterhouseCooper, 2009.

456 Berkman Center, 2009, Next Generation Connectivity: A Review of Broadband Internet Transitions and Policy from Around the World (October 2009) DA-09-2217; Barziilai-Nahon, 2006, van Dijk,

2005;

457 “Many experts feel that greater broadband dispersion can stimulate economic growth “Davison and Cotton, 2009, p. 349; “A fifth reason to close the adult digital divides is that the economic growth and competitiveness of our society may well depend on it (Jackson, et al., 2009, p. 230; see also Grubesic & Murray, 2002; Bouwman, 2003; de Haan, Jos. 2003. "IT and Social Inequality in the Netherlands." *IT&Society* 1: 27-45. http://www.stanford.edu/group/siqss/itandsociety/v01i04/v01i04a04.pdf; Lehr, et al., 2006.

458 Jackson, et al., 2009, p.437.

459 Breshnanan, et al., 2002, Brynjolfson and Hitt, 2003, Dostie, et al., 2006; Garaciano & Heaton, 2005.

460 “Decentralization and increase in the autonomy of the workers seem to be the most common practices that interacting with Information Technology implementation result in productivity increases”, (Sandulli, 2009, p. 427, see also Acemoglu, et al., 2007).

461 Fairlie, 2006.

462 Jensen and Oster, 2009.

463 Fafchamp, 2002.

464 Broadband users are more likely to turn to the Internet first when they have health questions, (versus calling a health professional). They are more confident about their Internet skills. They use the Internet to save time and money, and to get the best information available for themselves and their families. Broadband users are more likely to than dial-up users to create content on line (e.g. blogs or web pages) and to share self-created content online (e.g. stories, artwork, or videos)” (Jackson, et al., 2009, p. 226; Children's Partnership Foundation, 2007, Helping Our Children Succeed: What's Broadband Got to do With It?,; Pew Internet and American Life Project, *Tracking Polls*, various dates.)

465 Given the increasing focus in the United States and around the world on e-business, e-health, e-learning, and e-government activities, individuals are increasingly going online in their homes to perform a variety of activities they formerly conducted offline…We examine four broad categories of Internet activities that users are likely to perform at home: information seeking, business transactions, learning, and general activities. As some of these activities are more easily accomplished with high-speed access, we expect that individuals with broadband connections will report doing these online activities more often than those with non-broadband connections…The concern is that the web is evolving with broadband users in mind… The increased utilization of broadband technologies will further the divide between Internet users. Dial-up connections will not keep pace with the bandwidth requirements of sites that are data intensive. (Davison and Cotton, 2009, p. 347…350).

466 Fox, 2005; Rains, 2008; Savage and Waldman, 2005

467 van Dijk, 2005, p. 230, Davison and Cotton, 2009, p. 34).

468 Peacock, 2008, p. 334.

469 [T]he access and adoption issues are clearly interwoven; adoption is impossible without access, but access is economically difficult to provide without the prospect of rapid and widespread adoption…. Occasionally, the encouragement of adoption can lead to generating sufficient increase in demand to attract the offer, thus resolving some of the access problem. (Feijoo, et al, 2009, ""Public Policies for Broadband Development in the European Union: New Trends for Universalisation of Service, in Enrico Ferro, et al. (Eds.) *Overcoming Digital Divides: Constructing an Equitable and Competitive Information Society* (Hershey: IGI Global, 2010, p, 415)

470 Jorgenson, D.W. M.S Ho and K.J. Stiroh, 2003, "Growth of U.S. Industries and Investments in Information Technology and Higher Education," in C. Corrado, J. Haltiwanger and D. Sichel (Eds.),

Measuring Capital in the New Economy (National Bureau of Economic Research 2005, pp. 465-466, One of the leading analyst of productivity concludes that "the combined increase in two IT-producing industries, Electronic Components and Computers, account for most of the acceleration in productivity for the economy as a whole… [T]he resurgence in economic growth is due to massive investments in IT capital input and college-educated labor inputs in a relatively small number of service industries, as well as Households and government sectors."

471 Pilat, D. and A.W. Wyckoff, 2005, "The Impact of ICT on Economic Performance: An International Comparison at Three Levels of Analysis," in W. H. Dutton, et. al. (Eds.), *Transforming Enterprise: The Economic and Social Implications of Information Technology* (Cambridge: MIT, 2005); Brynjolfsson and Hitt, 2005, p. 29, "The micro data suggest that the surge in productivity that we now see in the macro statistics has its roots in over a decade of computer-enabled organizational investments. the recent productivity boom can in part be explained as a return on this intangible and largely ignored form of capital. .

472 Craree, M.A., 2002, "The Effect of Restructuring on the Organization of Production on Economic Growth," in D. B. Audretsch and P. J.J. Welfens, The New Economy and Economic Growth in Europe and the U.S. (Berlin: Springer, 2002); Audretsch, D.B. and C.F. Bonner 2002, "Regional Policy in the New Economy," in D. B. Audretsch and P. J.J. Welfens, *The New Economy and Economic Growth in Europe and the U.S.* (Berlin: Springer, 2002).

473 Welfens, P.J.J., 2002, "Information & Communication Technology and Growth: Some Neglected Dynamic Aspects in Open Digital Economies," in D. B. Audretsch and P. J.J. Welfens, T*he New Economy and Economic Growth in Europe and the U.S.* (Berlin: Springer, 2002).

474 Digital divides have implications for social equality, primarily through access to information… Relevant to the implications of the digital divides for social equality is the near limitless capacity of the Interned to support social networking... online social activity supplements, rather than replaces offline social activity. The adult digital divides have implications for economic equality….Related to the issues of social and economic equality raised by the digital divides is the issue of social mobility… The digital divide has still broader implications for sustaining democracy. Participation of all citizens is fundamental to a democratic society... (Jackson, et al., 2009, p.229).

475 "[T]his article finds that participation on the Internet exerts a positive influence on political participation, even independent of civic participation (Weber and Bergman, 2003)

476 Bimber, B. 1998, "The Internet and Political Transformation: Populism, Community and Accelerated Pluralism," *Policy,* 31; Grossman, L. 1996, *The electronic Republic: Reshaping Democracy in the Information Age,* New York? Penguin.

477 Agre, P.E., "Real Time Politics: The Internet and Political Process," *Information Society,* 18; Levin, P. "Can the Internet Rescue Democracy? Toward an Online Common," in R. Hayuk and K. Mattson (Eds.) *Democracy's Moment: Reforming the American Political System for the 21st century,* Lanham: Rowman and Littlefield; Blumler, J.G and M. Gurevitch, "The New Media and Our Political Communications Discontents: Democratizing Cyberspace," *Information Communications and Society,* 4; O'Laughlin, B., "The Political Implications of Digital Innovations: Trade-offs of Democracy and Liberty in the Developed World," *Information, Communications and Society,* 4.

478 "Online information seeking and interactive civic messaging – uses of the Web as a source and a forum – both strongly influence civic engagement, often more so than do traditional print and broadcast media and face-to-face communications… [B]oth online and offline channels culminate in actual participation." (Shah, D. C., 2005, Information and Expression in a Digital Age," *Communications Research, 5(32),* pp. 551…553); Weber, 2003, p.38).

479 Benkler, 2006.

480 Some fear that it will isolate people from face-to-face interactions. Others extol the Internet's ability

to support far-flung communities of shared interest. Evidence to address this debate about the impact of the Internet on community is thundering in. Three studies done at the NetLab are concomitant with general findings, both in North America and worldwide, that rather than weakening community, the Internet adds to existing face-to-face and telephone contact. Rather than increasing or destroying community, the Internet can best be seen transforming community such that it becomes integrated into rhythms of daily life, with life on line integrated with offline activities." (Wellman, Boase, and Chen, 2002, p. 151).

481 NTIA, 2000.

482 In his first press conference as Chairman, Powell, declared a "Mercedes Benz divide." February 8, 2001.

483 Stover, S. 1999. *Rural Internet Connectivity*. Columbia, MO: Rural Policy Research Institute; Cooper, M. 2004. Expanding the digital divide & falling behind on broadband: Why telecommunications policy of neglect is not benign. Consumer Federation of America, Consumer Union, The Civil Rights Forum, Washington DC. http://www.consumerfed.org/pdfs/digitaldivide.pdf (accessed 20 June 2006); Cooper, M.2002.*Does the digital divide still exist? Bush administration shrugs, But evidence says yes*. Consumer Federation of America, Consumer Union, The Civil Rights Forum, Washington

484 One can track the different points of view across the NTIA (1995, 1998, 1999, 2000, 2002 documents analyzing the statues.

485 "[T]he rapid evolution of technology may serve to increase existing information gaps. In essence, those who have been using the Internet are developing an increasingly sophisticated set of information seeking and processing skills, and gaps between these advanced users and the late adopters who possess only basic skills are likely to expand ((Mason, S. M. and K.L. Hacker, 2003. "Applying Communications Theory to Digital Divide Research," *IT & Society*, 1(5), 40-55, p. 46) cited in James, J., 2008, "Digital Divide Complacency: Misconceptions and Dangers," *The Information Society*, 24, p. 60; Rogers, E. M. 2003, *Diffusion of Innovation* New York. Free Press.. Ultimately, therefore, it is the concentration of innovations and innovation capabilities happened to be concentrated in the developed world that accounts for the current digital divide and in turn also the resulting bias in favor of the innovating countries.... And Paul Krugman has gone so far as to suggest that any technological advantage may cumulate over time... When this general framework is applied specifically to IT, the threat of divergences arising from the concentration of innovation in the West only becomes more ominous. I say this because IT is relatively science- and research-intensive industry, which endows (mainly rich) countries with an abundance of research and scientific capabilities with an additional (and more exclusionary) form of comparative advantage. In addition, the need for scientific knowledge itself induces firms to engage in various strategic technological alliances in the IT sector, overwhelming majority of which are concluded by firms from Europe, Japan and the United States. (James, 2008, p. 59)

486 (1) Categorical inequalities in society produce an unequal distribution of resources. (2) An unequal distribution of resources causes unequal access to digital technologies. (3) Unequal access to digital technologies also depends on the characteristics of these technologies. (4) Unequal access to digital technologies brings about unequal participation in society. (5) Unequal participation in society reinforces categorical inequalities and unequal distribution of resources. (van Dijk, 2005, p.15; Waschauer, 2003, p. 301.

487 Sourbati, M., "Media Literacy and Universal Access in Europe," *The Information Society*, 25, p. 248, "Europe's debates on media literacy, access and used suggests a new discursive turn…Lately there has been a realization that technological access is not sufficient. People should also be able to use the technology (Gillard, H., N. Mitev and S. Scott, "ICT Inclusion and Gender Tension in Narratives of Network Training," *Information Society* 23 (1); Goggin, G and C, Newell, "The Business of Digital Disability," *The Information Society* 23(3). The emphasis is now on media 'consumption' or 'use'

(Office of Communications, 2006, B50 Media Literacy Audit, March 2, 2006, p. 3); Price Waterhouse Coopers, 2009; South East England Development Agency, 2007, *Digital Inclusion Research -- Final Report*; Communities and Local Government, 2008a, 2008b; SQWconsulting, 2008; For Australia see Notley and Foth, 2008, "Extending Australia's Digital Divide Policy: An Examination of the Value of Social Inclusion and Social Capital Policy Frameworks," *Australian Social Policy*, 7; UK Department for Media, Culture and Sport, 2009, *Digital Britain -- The Interim Report, January, p.4;* European Commission, Amended Proposal for a Directive of the European Parliament and of the Council Amending Council Directive 89/552/EEC, Brussels, March 20, 2007, p. 6.

488 Communities and Local Governments, 2008b, *An Analysis of International Digital Strategies: Why Develop a Digital Inclusion* Strategy *and What Should be the Focus***,** October 2008.B205, lists three steps of digital engagement Basic: Individual communications, Buying, Leisure Information Learning Information Seeking, Intermediate eGov Individual Networks in Financed, Gaming and Advanced: Social Networking Civic Engagements.

489 This ranking of uses foreshadows the difference in perspective between the commercial operators of broadband networks, who emphasize high profit one-way push entertainment applications, and critics of over commercialization of the communications infrastructure, who emphasize participation and creation of content by users of broadband

490 Note that this question was asked of all respondents. A small percentage of those who said they used the Internet yesterday did not have it at home.

491 Interestingly, the percentage of the U.S. adult population in this category, labeled the "truly disconnected" has remained unchanged since 2002, despite a 10-point increase in the percentage of adults who go online. In addition to race and income, age and education are strong predictors of being truly disconnected; members of this group are overwhelmingly above the age of 70 and have less than a high school education. (Jackson, 2009, p. 229); Education is the most consistent global ICT predictor. Individuals with at least a baccalaureate are much more often innovators or early adopters of digital technology (Dimaggio, et al., 2004). The better educated more often own computers, have Internet home access, connect through broadband, and spend more time line (Buente & Robbins, 2008; Dimaggio, et al., 2004, Losh, 2004, Robinson, DiMaggio & Hargittai, 2003, Losh 2009, p. 201, 217). Whilst there is some variation to the magnitudes of the difference, the social groups most likely to be characterized as being 'digitally excluded' in these data are most commonly delineated in terms of gender, age, income, race, educational background, geography and disability. (Selwyn and Facer, 2009, p. 8). Various variables, are addressed by a range of authors: age, culture/social participation, family structure (children), Gender, Rural-urban, Income, race. (Selwyn and Facer, 2009, p. 9). Demographics (Davison and Cotton, 2009, p.348) (Dahms, 2009, p. 452).

492 NTIA, 2010, Foreword.

493 DiMaggio, P., Hargittai, E., Celeste, C., and Shafer, S. 2004. Digital inequality: From unequal access to differentiated use. In Social inequality, ed. K Neckerman, pp. 355-400. New York: Russell Sage Foundation.

494 Federal Communications Commission, 2010, *National Broadband Plan*, p. 1

495 Rubinfeld, Daniel L. and John Hoven, "Innovation and Antitrust Enforcement," in Jerry Ellig (ed.*), Dynamic Competition and Public Policy: Technology, Innovation, and Antitrust Issues* (Cambridge: Cambridge University Press, 2001), pp. 65, 75-76.

496 Beard, T. Randolph, George S. Ford, and Lawrence J. Spiwak, *Why ADCo? Why Now: An Economic Exploration into the Future of Industry Structure for the "Last Mile" in Local Telecommunications Markets (*Phoenix Center, November 2001); Computer Science and Telecommunications Board, National Research Council, *Broadband, Bringing Home the Bits* (Washington: National Academy

Press, 2002) (hereafter Bits), pp. 23; 152-154; Banerjee, Anupam and Marvin Sirvu, "Towards Technologically and Competitively Neutral Fiber to the Home (FTTH) Infrastructure," *Telecommunications Policy Research Conference, 2003;* Newman, Stagg, "Broadband Access Platforms for the Mass Market," *Telecommunications Policy Research Conference, 2003.*

497 Schilling, Melissa A., "Technological Lockout: An Integrative Model of the Economic and Strategic Factors Driving Technology Success and Failure," *Academic Management Review*, 23, 1998, pp. 267, 268, 270; Sheremata, Willow A., "Barriers to Innovation: A Monopoly, Network Externalities, and the Speed of Innovation," Antitrust Bulletin, 42, 1997, pp. 937, 941, 964, 967 [hereinafter Sheremata, Barriers to Innovation]; Cowan, Robin, "Tortoises and Hares: Choice Among Technologies of Unknown Merit," *Economics Journal*, 101, 1991, pp. 807, 808; Foray, Dominique, "The Dynamic Implications of Increasing Returns: Technological Change and Path Dependent Efficiency," *International Journal of Industrial Organization*, 15.1997, pp. 733, 748-49; Farrel, Joseph and Garth Saloner, "Standardization, Compatibility, and Innovation," *Rand Journal of Economics*, 16, 1986, pp. 70, 70-83.

498 Church, Jeffrey and Neil Gandal, "Complementary Network Externalities and Technological Adoption," *International Journal of Industrial Organization*, 11, 1993, pp. 239, 241; Chou, Chien-fu and Oz Shy, "Network Effects Without Network Externalities," *International Journal of Industrial Organization* 8, 1990, pp. 259, 260.

499 Shpeherd, William, G., *The Economics of Industrial Organization* (Englewood Cliffs, N.J.: Prentice Hall, 1985), pp. 289-290.

500 See Langlois, p. 52, "The owner of a dominant standard may thus want to manipulate the standard in ways that close off the possibilities for a competitor to achieve compatibility. This has a tendency to retard the generational advance of the system."

501.Yoffie, p. 21; see also Bresnahan and Greenstein, pp. 36-37; Katz and Shapiro, System Competition, p. 103.

502 Schilling, pp. 280-81.

503 Katz, Michael and Carl Shapiro, "Antitrust and Software Markets," in Jeffrey A. Eisenach and Thomas M. Lenard (eds.), *Competition, Innovation and The Microsoft Monopoly: Antitrust and The Digital Marketplace*, (Boston: Kluwer Academic, 1999), p. 424.

504 See generally, id.; Choi, Jay Pil, "Network Externalities, Compatibility Choice and Planned Obsolescence," *Journal of Industrial Economics*, 42, 1994, p. 167.

505 Mansell, Robin, "Strategies for Maintaining Market Power in the Face of Rapidly Changing Technologies," *Journal of Economic Issues*, 31, 1997, pp. 969, 970.

506 Schilling, p. 274.

507 Sheremata, *Barriers to Innovation*, p. 965.

508 Shapiro and Varian.

509 Bresnahan and Greenstein, pp. 36-37; Farrell, Joseph and Michael L. Katz, "The Effect of Antitrust and Intellectual Property Law on Compatibility and Innovation," *Antitrust Bulletin*, 43,1998, pp. 645, 650; Katz and Shapiro, System Competition, pp. 109-12; Matutes, Carmen and Pierre Regibeau, "Mix and Match: Product Compatibility Without Network Externalities," *Rand Journal of Economics*, 19, 1988, pp. 221-233.

510 Lemley, Mark A. and David McGowan, "Could Java Change Everything? The Competitive Propriety of a Proprietary Standard," *Antitrust Bulletin*, 43, 1998, p. 715 [hereinafter Lemley and McGowan; *Could Java*]; Lemley, Mark A. and David McGowan, "Legal Implications of Network Effects," *California Law Review*, 86, 1998, pp. 479, 516-18.

511See id. See also Fisher, Franklin M., "Innovation and Monopoly Leveraging," in Jerry Ellig (ed.), *Dynamic Competition and Public Policy: Technology, Innovation, and Antitrust Issues* (Cambridge;

Cambridge University Press, 2001), p. 138.

512See Farrell, Joseph and Garth Saloner, "Installed Base and Compatibility: Innovation, Product Preannouncements, and Predation," *American Economic Review*, 76, 1986, pp. 940, 948-51; Katz, Michael L. and Carl Shapiro, "Product Introduction with Network Externalities," *Journal of Industrial Economics*, 40, 1992, pp. 55, 73; Makadok, Richard, "Can First-Mover and Early-Mover Advantages Be Sustained in an Industry with Low Barriers to Entry/Imitation?," *Strategic Management Journal*, 19, 1998, pp. 683, 685-86; Witt, Ulrich, "'Lock-in' vs. 'Critical Masses'– Industrial Change Under Network Externalities," *International Journal of Industrial Organization*, 15, 1997, pp. 753, 768-69; Mansell, pp. 969, 970.

513See Schilling, pp. 267, 276.

514See Sheremata, *New Issues in Competition*, pp. 547, 573-74; Woroch, Glenn A., et al., "Exclusionary Behavior in the Market for Operating System Software: The Case of Microsoft," in David Gabel and David F. Weiman (eds.), *Opening Networks to Competition: The Regulation and Pricing of Access* (Boston: Kluwer Academic, 1998), p. 221.

515 See Sheremata, *New Issues in Competition*, pp. 560-61; see also Ferguson, Charles H., *High Stakes, No Prisoners: A Winner's Tale of Greed and Glory in the Internet Wars* (New York: Three Rivers Press, 1999), p. 307; Lemley and McGowan, *Could Java*, pp. 715, 732-33.

516 See Farrell and Katz, pp. 609, 643-50; Sheremata, *New Issues in Competition*, pp. 547, 573-74.

517See Makadok, p. 685.

518See Yoffie, David B., "CHESS and Competing in the Age of Digital Convergence," in David B. Yoffie (ed.), *Competing in the Age of Digital Convergence* (Cambridge: Harvard Business School Press, 1997), pp. 1, 27; see also Dansby, Robert E. and Cecilia Conrad, "Commodity Bundling," *American Economic Review*, 74, 1984, p. 377.

519 See Matutes and Regibeau, 37.

520 See id.; see also Guiltinan, Joseph P., "The Price Bundling of Services: A Normative Framework," *Journal of Marketing*, April 1987, p. 74; Telser, Lester, "A Theory of Monopoly of Complementary Goods," *Journal of Business*, 52, 1979, p. 211; Schmalensee, Richard, "Gaussian Demand and Commodity Bundling," *Journal of Business*, 57, 1984, p. S211.

521 See Choi, pp. 167, 171-73.

522 See Ellison, Glenn and Drew Fudenberg, "The Neo-Luddite's Lament: Excessive Upgrades in the Software Industry," *Rand Journal of Economics*, 2000; Fudenberg, Drew and Jean Tirole, "Upgrades, Trade-ins, and Buybacks," *Rand Journal of Economics*, 29, 1998, pp. 235, 235-36.

523 See id., pp. 176-77; Moorthy, K. Sridhar, "Market Segmentation, Self Selection, and Product Lines Design," *Marketing Science*, 3, 1985, p. 256; Thum, Marcel, "Network Externalities, Technological Progress, and the Competition of Market Contract," *International Journal of Industrial Organization*, 12, 1994, p. 269.

524 See id., pp. 19-24; see also Katz and Shapiro, Antitrust and Software, pp. 70-80; Ordover, Lansuz A. and Robert D. Willig, "Access and Bundling in High Technology Markets," in Jeffrey A. Eisenach and Thomas M. Lenard (eds.), *Competition, Innovation and The Microsoft Monopoly: Antitrust and The Digital Marketplace* (Boston: Kluwer Academic, 1999); Rubinfeld, pp. 877-81; Salop, Steven C., "Using Leverage to Preserve Monopoly," in Jeffrey A. Eisenach and Thomas M. Lenard (eds.), *Competition, Innovation and The Microsoft Monopoly: Antitrust and The Digital Marketplace* (Boston: Kluwer Academic, 1999).

525 Carlton, D.W. "The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries," *Rand Journal of Economics*, 33 (2002).

526 The price discrimination literature Adams, W.J. and J. L. Yellin, "Commodity Bundling and the Burden of Monopoly," *The Quarterly Journal of Economics* 90 (1976); McAfee R. Preston, John

McMillan and Michael D. Whinston, "Multiproduct Monopoly, Commodity Bundling and Correlation of Values, *Quarterly Journal of Economics* 104 (1989).

527 Kaplow, J. "Extension of Monopoly Through Bundling," *Columbia Law Review,* 85:1985; J. A. Sykes, Ordover, A. Sykes and R.D. Willig, "Nonprice Anticompetitive Behavior by Dominant Firms Toward the Producers of Complementary Products," in F.M. Fisher (Ed.), *Antitrust and Regulation: Essays in Memory of John J. McGowen* (1985).

528 M. Whinston, "Tying Foreclosure and Exclusion," *American Economic Review,* 80 (1990).

529 O.E. Williamson, "Assessing Vertical Market Restriction: Antitrust Ramifications of the Transaction Cost Approach," *University of Pennsylvania Law Review,* 127 (1979); B. Nalebuff, "Bundling as an Entry Barrier," *Quarterly Journal of Economics* (2004), "Bundling," Manuscript, School of Management, Yale University (1999); Y. Bakos and Eric Brynjolfsson, "Bundling and Competition on the Internet: Aggregation Strategies for Information Goods," *Marketing Science,* 19 (2000).

530 J. Carbajo, D. de Meza and D. Seidman, "A Strategic Motivation for Commodity Bundling," *Journal of Industrial Economics,* 38 (1990); Y. Chen, "Equilibrium Product Bundling," *Journal of Business,* 70 (1997).

531 J. P. Choi and C. Stefanadis, "Tying, Investment, and the Dynamic Leverage Theory," *Rand Journal of Economics,* 32 (2001).

532 J. P. Choi, "Tying and Innovation: A Dynamic Analysis of Tying Arrangements," *The Economic Journal* 114 (2004); J. P. Choi, "Preemptive R&D, Rent Dissipation, and the 'Leverage Theory'," *Quarterly Journal of Economics,* 110 (1996).

533 Carlton, "The Strategic Use of Tying.

534 The video side is discussed at length in Cooper, Mark, *Cable Mergers and Monopolies: Market Power in Digital Media and Communications Networks* (Washington: Economic Policy Institute, 2002).

535 *ControllingYour Network – A Must for Cable Operators* (Cisco, 1999); *New Revenue Opportunities for Cable Operators From Streaming-Media Technology* (Cisco) 1999; Dawson, Fred, *The Interactive Digital Network: More than Just a Set-Top Decision*,(Cisco, 1999).

536 High Tech Broadband Coalition.

537 As a variety of industry commenters who found themselves on the receiving end of cable industry discrimination and exclusion expressed their concern from the earliest days of the commercial high speed Internet. AT&T Canada Long Distance Services, "Comments of AT&T Canada Long Distance Services Company," before the *Canadian Radio-Television and Telecommunications Commission*, Telecom Public Notice CRTC 96-36: Regulation of Certain Telecommunications Service Offered by Broadcast Carriers, February 4, 1997. The AT&T policy on open access after it became a cable company was first offered in a Letter to Chairman Bill Kennard, dated December 6, 1999, signed by David N. Baker, Vice President Legal & Regulatory Affairs; Mindspring Enterprises; James W. Cicconi, General Council and Executive Vice President, AT&T Corp.; and Kenneth S. Fellman, Esq., Chairman, FCC Local & State Government Advisory Committee. Virtually no commercial activity took place as a result of the letter, which was roundly criticized. Subsequently their policy was described in Goodman, Peter S., "AT&T Puts Open Access to a Test," *The Washington Post,* November 23, 2000 (hereafter Goodman). AT&T continues to complain that the Regional Bell Operating Companies are continuing to impede competitors from gaining nondiscriminatory access to advanced services unbundled network elements. See, for example, "Affidavit of Al Finnell on Behalf of AT&T Communications of California," before the Public Utilities Commission of the State of California, *Notice of Intent to File Section 271 Application of SBC Communications Inc., Pacific Bell, and Pacific Bell Communications Inc., for Provision of In-region, InterLATA Services in California,* August 11, 1999, pp. 42-53; America Online, Inc., "Open Access Comments of America Online, Inc.," before the Department of Telecommunications and

Information Services, San Francisco, October 27, 1999 (hereafter, AOL). At the federal level, AOL's most explicit analysis of the need for open access can be found in "Comments of America Online, Inc.," *In the Matter of Transfer of Control of FCC Licenses of MediaOne Group, Inc. to AT&T Corporation,* Federal Communications Commission, CS Docket No. 99-251, August 23, 1999 (hereafter, AOL, FCC). America Online continues to reiterate these arguments; see "Comments of AOL TimeWarner, Inc.," *In the Matter of Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket No. 02-33, 95-20, 98-10, May 3, 2002 (hereafter AOL, 2002); Hausman, Jerry A., J. Gregory Sidak, and Hal J. Singer, "Residential Demand for Broadband Telecommunications and Consumer Access to Unaffiliated Internet Content Providers," *Yale Journal on Regulation*, 18, 2001. Hayes, John B., Jith Jayaratne, and Michael L. Katz, *An Empirical Analysis of the Footprint Effects of Mergers Between Large ILECS*, April 1, 1999, p. 1, citing "Declaration of Michael L. Katz and Steen C. Salop," submitted as an attachment to *Petition to Deny of Spring Communications Company L.P,* in "Ameritech Corp. and SBC Communications, Inc., for Consent to Transfer of Control," CC Dkt. No. 98-141 (filed Oct. 15, 1998) and *Petition to Deny of Spring Communications Company L.P,* in "GTE Corporation and Bell Atlantic Corporation for Consent to Transfer of Control," CC Dkt. No. 98-184 (filed Nov. 23, 1998).

538 NorthNet, Inc., An Open Access Business Model For Cable Systems: Promoting Competition & Preserving Internet Innovation on A Shared, Broadband Communications Network, Ex Parte, *Application of America Online Inc. & Time Warner, Inc. for Transfers of Control*, F.C.C., CS-Docket No. 0030, October 16, 2000.

539 Clark David and Marjorie Blumenthal, "Rethinking the Design of the Internet: The End-to-End Arguments v. The Brave New World, *ACM Transactions on Internet Technology (2001),* p. 24.

540 Earthlink, the first ISP to enter into negotiations with cable owners for access has essentially given up and is vigorously seeking an open access obligation, see *Ex Parte Letter from Earl W. Comstock and John W. Butler Regarding the Application of America Online, Inc. and Time Warner Inc. for Transfer of Control*, Federal Communications Commission, Docket No. CS 0030, October 18, 2000.

541 While Earthlink pointed out that the "nondisclosure provisions have an adverse impact on the ability of the market to operate freely and on the ability of government agencies to evaluate the competitiveness of the market," it was others who actually released the agreement.

542 AT&T has sued and threatened to sue every local jurisdiction that required open access and withheld investment in those areas. Time Warner pulled the plug on Disney and threatened to extract full subscriber value from Disney for every customer it lost when Disney offered to give satellite dishes to the public. AOL threatened to sue Prodigy for the economic harm it caused AOL when Prodigy hacked into AOL's instant messaging service.

543 "A New Model for AOL May Influence Cable's Future," *The New York Times,* August 26, 2002, p. C.1; Gilmore, Dan, "AOL Capitulates, Gives Up Struggle for 'Open Access'," *San Jose Mercury News,* September 1, 2002.

544 Wu, Tim and Lawrence Lessig, *Ex Parte Submission in CS Docket No. 02-52,* August 22, 2003, pp. 7-8.

545 Id.

546 The Federal Communications Commission has been presented with a mountain of specific evidence of anticompetitive behavior by wire owners. Notwithstanding the grant of entry into long distance, many of these problems still afflict the provision of DSL service, as recent testimony in Texas (the second state in which an incumbent RBOC was granted entry) attest; see "Response of Cbeyond, Inc.," *Ten Questions to Begin the Committee's Inquiry Into State Broadband Policy*, Committee on

State Affairs, April 3, 2002; "Response of IP Communications," *Ten Questions to Begin the Committee's Inquiry Into State Broadband Policy*, Committee on State Affairs, April 3, 2002; "Response of Hometown Communications," *Ten Questions to Begin the Committee's Inquiry Into State Broadband Policy*, Committee on State Affairs, April 3, 2002; "Response of Texas CLEC Coalition," *Ten Questions to Begin the Committee's Inquiry Into State Broadband Policy*, Committee on State Affairs, April 3, 2002; "Reply Comments of the California ISP Association, Inc., *Further Notice of Proposed Rulemaking in the Matter of the Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket No. 95-20, 98-10, April 30, 200 (hereafter, CISPA, 2001b); "Reply Comments of the Texas Internet Service Providers Association, *Further Notice of Proposed Rulemaking in the Matter of the Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket No. 95-20, 98-10, April 30, 200 (hereafter, TISPA); "Reply Comments of the Commercial Internet Exchange Association, *Further Notice of Proposed Rulemaking in the Matter of the Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket No. 95-20, 98-10, April 30, 200 (hereafter, CIX); "Comments of the Information Technology Association of America," *In the Matter of Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, Federal Communications Commission, CC Docket No. 01-337, March 1, 2002 (hereafter ITAA, 2002); "Comments of the IP Communications Corporation," *In the Matter of Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, Federal Communications Commission, CC Docket No. 01-337, March 1, 2002; "Comments of the Public Service Commission of the State of Missouri," *In the Matter of Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, Federal Communications Commission, CC Docket No. 01-337, March 1, 2002; "Joint Comments of NASUCA, et al.," *In the Matter of Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, Federal Communications Commission, CC Docket No. 01-337, March 1, 2002; "Comments of Ad Hoc Telecommunications Users Committee," *In the Matter of Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, Federal Communications Commission, CC Docket No. 01-337, March 1, 2002 (hereafter Ad Hoc, 2002); "Comments of the New Mexico Information Professionals Association of America," *In the Matter of Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, Federal Communications Commission, CC Docket No. 01-337, March 1, 2002 (hereafter, NMIPA, 2002); "Comments of Cox Communications, Inc.," *In the Matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket No. 02-33, 95-20, 98-10, May 3, 2002 (hereafter Cox); "Comments of BrandX," *In the Matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket No. 02-33, 95-20, 98-10, May 3, 2002 (hereafter BrandX); "Comments of the New Hampshire ISP Association," *In the Matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer*

II and ONA Safeguards and Requirements, Federal Communications Commission, CC Docket No. 02-33, 95-20, 98-10, May 3, 2002; "Comments of Ruby Ranch Cooperative Association," *In the matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket No. 02-33, 95-20, 98-10, May 3, 2002; "Comments of Earthlink, Inc.," *In the Matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket No. 02-33, 95-20, 98-10, May 3, 2002; "Comments of U.S. LEC Corp.," *In the Matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket No. 02-33, 95-20, 98-10, May 3, 2002; "Comments of Big Planet, Inc.," *In the Matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket No. 02-33, 95-20, 98-10, May 3, 2002; "Joint Comments of Cbeyond and Nuvox," *In the Matter of Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, Federal Communications Commission, CC Docket No. 01-337, March 1, 2002.

547 Vaughn-Nichols, Steven J., "DSL Spells Trouble for Many ISPs," *Smart Reseller*, February 24, 1999.

548 "Response of Onramp," *Ten Questions to Begin theCommittee's Inquire Into State Braodband Policy*, Committee on State Affairs, Texas, April 3, 2002. pp. 16-17.

549 ITAA, p. 11; DirecTV, p. 8-10.

550 Onramp, pp. 5-6; NMIPA, p. 5.

551 TISPA, p. 18.

552 Indiana Utility Regulatory Commission, "Comments, Federal Communications Commission, *In The Matter of Deployment of Wireline Services Offering Advanced Telecommunications Capability, Etc.*, CC Docket Nos. 98-147, 98-11, 98-26, 98-32, 98-78, 98-91, CCB/CPD Docket No. 98-15, RM 9244, October 18, 1998. Comments of CU, *et al.*, *Inquiry Concerning High-Speed Access to the Internet over Cable and Other Facilities*, GEN Docket No. 00-185 (filed December 1, 2001, p. 14; Utah ISP Association, Federal Communications Commission, *In The Matter of Deployment of Wireline Services Offering Advanced Telecommunications Capability, Etc.*, CC Docket Nos. 98-147, 98-11, 98-26, 98-32, 98-78, 98-91, CCB/CPD Docket No. 98-15, RM 9244, October 18, 1998. Comments of CU, *et al.*, *Inquiry Concerning High-Speed Access to the Internet over Cable and Other Facilities*, GEN Docket No. 00-185 (filed December 1, 2001, pp. 8, 9; Internet Service Providers Consortium, "Comments, Federal Communications Commission, *In The Matter of Deployment of Wireline Services Offering Advanced Telecommunications Capability, Etc.*, CC Docket Nos. 98-147, 98-11, 98-26, 98-32, 98-78, 98-91, CCB/CPD Docket No. 98-15, RM 9244, October 18, 1998. Comments of CU, *et al.*, *Inquiry Concerning High-Speed Access to the Internet over Cable and Other Facilities*, GEN Docket No. 00-185 (filed December 1, 2001, p. 7; IAC, p. 9; AOL, pp. 6, 8; AdHoc, p. 26; ITAA, pp. 13, 15.

553 TISPA, p. 27.

554 TISPA, p. 33.

555 Onramp, p. 14.

556 ITAA, pp. 10-11; CISPA, 2001a, pp. 27-28.

557 TISPA, p. 17.

558 Cox, p. 6.

559 IURC, p. 5; Exas Public Utility Commission, "Comments," ," *In the Matter of Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, Federal Communications Commission, CC Docket No. 01-337, March 1, 2002, p. 14; New York State Department of Public Service, "Comments of the New York State Department of Public Service," ," *In the Matter of Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, Federal Communications Commission, CC Docket No. 01-337, March 1, 2002, p. 7; Utah ISP, p. 13, 15; ISPC, p. 11; IAC, p. 9; AdHoc, p. 27; ITAA, p. 16.

560 CISPA, Reply, p. 7.

561 IURC, p. 10, TXPUC, p. 2; Utah ISP, p. 16, AdHoc, p. 24; ITAA, pp. 899.

562 TXPUC, pp. 4, 8; MNDPS, p. 16; AdHoc, p. 22; ITAA, pp. 12, 13.

563 FTC, p. 6; IURC, p. 16; TXPUC, p. 5; IAC, p. 9; Ad Hoc, pp. 23; ITAA, p. 15.

564 TISPA, pp. 22, 23, 31; CISPA, 2001a, pp. 10-14.

565 MNDPS, pp. 10, 11; Utah ISP, pp. 10, 11; ISPC, p. 9; IAC, p. 9; AOL, pp. 6, 8.

566 IgLou, Questionable Marketing Practices.

567 FTC, p. 11; IURC, p. 10; MNDPS, pp. 8, 10; NYDPS, p. 7; Utah ISP, p. 10; ISPC, p. 7; IAC, p. 11; AOL, pp. 6, 8; ITAA, pp. 6, 15.

568.Cisco, Streaming Media, p. 9; Richter, M.J., "Everything's Coming Up Convergence," *Telephony*, June 28, 1999, p. 30 (quoting Rich Aroian, Vice President of Marketing and Strategic Alliances, Saville Systems).

569 TISPA, p. 22; CISPA, 2001a, pp. 21-22, 31-32; NMIPA, p. 6.; TXPUC, p. 3, MNDPS, p. 3; Utah ISP, pp. 9, 16; ISPC, p. 11; IAC, p. 9; AdHoc, p. 27, ITAA, p. 16.

570 Schiesel, Seth, "Start-Up Leads Phone Cause in Battle for Internet Access," *The New York Times*, May 17, 1999, p. C-4**.**

571 Spangler, 2002; Braunstein, 2001; Boyd, 2001; Ames, 2002.

572 Harvill, Terry S., "ICC Commissioner Blasts SBC," *Chicago Sun Times*, April 23, 2001; see also, Young, Shawn, et al., "How Effort to Open Local Phone Markets Helped the Baby Bells," *The Wall Street Journal*, February 11, 2002.

573 Onramp, p. 3.

574 TISPA, p. 21, New Edge, p. 6; BrandX, p. 2, DirectTV, p. 8; CIX, P. 8.

575 Telephone companies achieve the margin difference by offering high volume ISPs massive volume discounts that aggregate business across state lines, without any cost justification for such a discount (see TISPA, p. 37; ITAA, p. 21; DirectTV, p. 9, CISPA, p. 16).

576 Ploskina, Brian and Dana Coffield, "Regional Bells Ringing Up Higher DSL Rates," *Interactive Week*, February 18, 2001; Braunstein, Yale, *Market Power and Price Increases in the DSL Market* (July 2001), available at http://www.sims.berkeley.edu/~bigyale/dsl.html (last visited April 11, 2005).

577 Ashton, Doug, "The Future of Telecommunications Investment," *Columbia Institute for Tele-Information*, March 3, 2001 (noting lack of new services); Horan, Tim, "Communications Services: Industry Restructuring," *Columbia Institute for Tele-Information*, March 3, 2001 (noting lack of competitors and lack of services); Bits, p. 15, 58, (noting service quality and lack of a killer application).

578 "Cable Industry Comment," *Banc of America Securities,* May 7, 2001; Ames, Sam, "Study: Broadband Fees Climbed in 2001," *Yahoo News,* January 18, 2002.

579 "Initial Comments of the California ISP Association, Inc.," *Further Notice of Proposed Rulemaking in the Matter of the Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements,* Federal Communications Commission, CC Docket No. 95-20, 98-10, DA 01-620, April 16, 2001 (hereafter CISPA, 2001a), p. 7; "Comments of DirecTV Broadband, Inc," *In the Matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket No. 02-33, 95-20, 98-10, May 3, 2002, p. 5; "Comments of Cbeyond, et al.," *In the Matter of Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer II and ONA Safeguards and Requirements*, Federal Communications Commission, CC Docket No. 02-33, 95-20, 98-10, May 3, 2002, pp. 27-28.

580 Bits, pp. 21, 152-154.

581 Ad Hoc, pp. 18-19.

582 Kuhl, Craig, "Writing the Business Case for VDSL," *CED,* April 2000. Extensive documentation of the technology difference is provided in Cooper, Mark, *Transforming the Information Superhighway into a Private Toll Road* (Washington: Consumer Federation of America, October 1999).

583 Hazlett, Thomas G. and George Bittlingmayer, *The Political Economy of Cable "Open Access,"* Joint Center Working Paper No. 01-06, May 2001, pp. 3… 4.

584 Cooper, Mark, "Making the Network Connection," in Mark Cooper (ed.), *Open Architecture as Communications Policy* (Palo Alto: Center for Internet and Society, Stanford Law School, 2004).

585 Michael Powell, "Preserving Internet Freedom: Guiding Principles for the Industry," presented at *Silicon Flatirons Symposium on The Digital Broadband Migration: Toward a Regulatory Regime for the Internet Age* (University of Colorado Law School, Boulder, February 8, 2004), issued a challenge to the industry to voluntarily adhere to some of the nondiscrimination requirements of the Communications Act, but made it clear there would be no enforcement of obligations of nondiscrimination.

586 Yang, Catherine, "Behind in Broadband," *Business Week,* September 6, 2004.

587 Yang, p. 88.

588 Federal Communications Commission, *Availability of Advanced Telecommunications Capability in the United States: Fourth Report to Congress,* September 9, 2004. See Exhibit 13.

589 Yang, p. 89.

590 FCC, Availability, p. 44, shows the higher Yahoo BB price of roughly 8 MB for $20.

591 See below, Exhibit 3.

592 FCC, Availability, p. 8.

593 Pew Internet and American Life Project Surveys (2000-2004), Pew Research Center for People and the Press (1995, 1998); "CTAM's Latest Pulse Show Consumers Continue to Make Homes More High Tech" (Alexandria, VA: CTAM, July 19, 2004).

594 Belinfante, Alexander, "Telephone Penetration in the United States (Industry Analysis Division, Federal Communications Commission, August 2004), Chart 1.

595 Onramp, p. 3, citing CFO Stephenson.

596 Spangler, Todd, "Crossing the Broadband Divide," *PC Magazine*, February 12, 2002 (noting pricing and service quality problems); Banc of America; Plosinka and Coffield.

597 Stern, Christopher, "Comcast Loss Has an Upside," *The Washington Post*, May 2, 2002.

598 Brown, 2001, "Excite@Home's 35 percent cut of subscriber fees to operate the service equaled roughly $13 to $14 monthly per subscriber. In contrast, Burke said Comcast could run the service for $7 to $8 per month."

599 Lemley and Lessig, *End of End-to-End*, pp. 943-44:

One should not think of ISPs as providing a fixed and immutable set of services. Right now, ISPs typically provide customer support as well as an Internet protocol (IP) address that channels the customer's data. Competition among ISPs focuses on access speed and content.

. . .The benefits of this competition in the Internet's history should not be underestimated. The ISP market has historically been extraordinarily competitive. This competition has driven providers to expand capacity and to lower prices. Also, it has driven providers to give highly effective customer support. This extraordinary build-out of capacity has not been encouraged through the promise of monopoly protection. Rather, the competitive market has provided a sufficient incentive, and the market has responded.

600 Augustino, Steven A., "The Cable Open Access Debate: The Case for A Wholesale Market," *George Mason Law Review*, 8, 2000, p. 663.

601 Traditional economic discussions identify public goods and public infrastructure driven primarily by externalities (see, for example, Taylor, John, *Economics* [Boston: Houghton Mifflin, 1998], Chapter 15), but the discussion inevitably leads to consideration of regulation of natural monopolies wherein public policy seeks to impose socially responsible behavior on private firms (see id., Chapter 16; Viscusi, W. Kip, John M. Vernon, and Joseph E. Harrington, Jr., *Economics of Regulation and Antitrust* [Cambridge: MIT Press, 2001], Chapters 11-14).

602 Huber, Peter, "Antitrust's Real Legacy," *The Wall Street Journal*, December 26, 2002.

603. Pavan, *supra* note 19, at xxix.

604. *See World Summit on the Information Society*, Wikipedia, http://en.wikipedia.org/wiki/World_Summit_on_the_Information_Society (last modified Aug. 18, 2012, 10:54 PM).

605. *See* Mueller, *supra* note 19, at 217 (calling them "Organically Developed Internet Institutions.").

606. T.R. Burns, *The Future of Parliamentary Democracy: Transition and Challenge in European Governance*, green paper for the *Conference of the Speakers of European Union Parliaments*, Camera dei Deputati (It.)(Sept. 22-24, 2000). http://www.camera.it/_cppueg/ing/conferenza_odg_Conclusioni_gruppoesperti.asp.

607. *Id*. (bullet points removed).

608. Ostrom, *supra* note 31, at 258 (citations omitted).

609. Much of the argument for alternative regulation has its origin in the experience of environmental regulation, but the concept has spread to the information, communications and media sectors. *See* Neil Gunningham, *Compliance, Enforcement and Innovation*, Org. Econ. Co-operation & Dev. (2004), http://www.oecd.org/environment/environmentinemergingandtransitioneconomies/33947825.pdf; Neil Gunningham, *Regulatory Reform Beyond Command and Control*, Amsterdam Conf. on the Hum. Dimensions Global Envtl. Change (May 26-27, 2007), http://www.2007amsterdamconference.org/Downloads/AC2007_Gunningham.pdf.

610. Of course the state plays a big role in creating the general conditions that make markets possible. *See* North, *supra* note 15.

611. *See* Eric von Hippel, Democratizing Innovation (2005), *available at* http://web.mit.edu/evhippel/www/democ1.htm.

612. *Report from the Commission on European Governance*, Eur. Comm'n (2003), http://ec.europa.eu/governance/docs/comm_rapport_en.pdf; European Commission, Dutch Guidelines for Regulation European Governance: White Paper, European Commission, *translated* in Starting Points for ICT Regulation: Deconstructing Prevalent Policy One-liners 133 (Bert-Jaap Koops et al. eds., 2006).

613. Hans-Bredow-Institute, Univ. of Hamburg, Final Report: Study on Co-Regulation Measures in the Media Sector 122-23 (2006), *available at* http://ec.europa.eu/avpolicy/docs/library/studies/coregul/final_rep_en.pdf; *see also* Starting Points for ICT Regulation: Deconstructing Prevalent Policy One-liners 123-25 (Bert-Jaap Koops et al. eds., 2006).

614. North, *supra* note 15, at 54-55.

615. *Fourth Estate*, Wikipedia, http://en.wikipedia.org/wiki/Fourth_Estate (last modified Sept. 17, 2012, 19:44) ("The Fourth Estate (or *fourth estate*) is a societal or political force or institution whose influence is not consistently or officially recognized. "Fourth Estate" most commonly refers to the news media; especially print journalism or "The Press". Thomas Carlyle attributed the origin of the term to Edmund Burke, who used it in a parliamentary debate in 1787 on the opening up of Press reporting of the House of Commons of Great Britain. Earlier writers have applied the term to lawyers, to the British queens consort (acting as a free agent, independent of the king), and to the proletariat. The term makes implicit reference to the earlier division of the three Estates of the Realm. In current use the term is applied to the Press, with the earliest use in this sense described by Thomas Carlyle in his book *On Heroes and Hero Worship*: "Burke said there were Three Estates in Parliament; but, in the Reporters' Gallery yonder, there sat a Fourth Estate more important far than they all." In Burke's 1787 coining he would have been making reference to the traditional three estates of Parliament: The Lords Spiritual, the Lords Temporal and the Commons. If, indeed, Burke did make the statement Carlyle attributes to him, the remark may have been in the back of Carlyle's mind when he wrote in his *French Revolution* (1837) that "A Fourth Estate, of Able Editors, springs up; increases and multiplies, irrepressible, incalculable." In this context, the other three estates are those of the French States-General: the church, the nobility and the townsmen. Carlyle, however, may have mistaken his attribution . . . .").

616. C. Edwin Baker, Media, Markets, and Democracy 149, 151 (2002). ("Complex democracy seeks a political process that promotes both fair partisan bargaining and discourses aimed at agreement.") (also asserting the press should be pluralist, providing individuals and organized groups with information that indicates when their interests are at stake and help mobilize people to participate and promote their divergent interests, making policymakers aware of the content and strength of people's demands. The press should promote agreement on a society-wide common good, by being inclusive and promoting thoughtful discourse, not merely being factually informative, and supporting reflection and value or policy choice. The press should promote self-reflection, informing the public about itself, so that those who disagree with the dominant opinion can contest it and provide criteria to measure government responsiveness.).

617. *Id*. at 129-53.

618. My use of the term "5th estate" has similarities and differences with the use Dutton makes of the term. Dutton, *infra* note 129. I agree that the emergence of the 5th estate stems for the dramatic expansion of access to information and the ability to communicate across institutional and geographic boundaries. I disagree with the suggestion that the 5th estate can supplant the 4th estate without building structures that are intended to accomplish that purpose. Interestingly, the only other reference to the explicit use of the term 5th estate that Dutton makes is to a web site that adopted the name. The web site described itself as serious and satirical commentary and appears to be defunct

(with no entry after July 2009). This example underscores the two characteristics of the 5th estate that distinguish it from the 4th estate. It is largely commentary and its durability over time at the level of individual organizations is suspect. Others have argued that the 5th estate is necessary to monitor the 4th estate. Ironically, if the 4th estate were doing a better job, the need for and role of the 5th estate in this regard would be reduced, but its broader role in democratic discourse would continue.

619. William H. Dutton, *The Fifth Estate Emerging Through the Network of Networks*, 27 Prometheus 1, 3 (2009), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1167502.

620. Here I paraphrase the formulation offered in Wikipedia. Wikipedia is a perfect example of how the public sphere has expanded through the creation of new forms of mass communications. *See Public Sphere*, Wikipedia, http://en.wikipedia.org/wiki/Public_sphere (last modified Sep. 5, 2012, 21:11).

621. *See, e.g.*, Clay Shirky, Here Comes Everybody: The Power of Organizing Without Organizations, 2009; Rebecca MacKinnon, Consent of the Governed: The Worldwide Struggle For Internet Freedom, 2012.

622. Baker, *supra* note 131, at 184, 187, 191 (The critique of 20th century journalism stems in large measure from the fact that its functions became obscured by its transformation into a commercial mass media enterprise.) ("[C]omplex democracy fears that the watchdog will be muzzled, whether by government or private power. . . .[M]onopolization or corrupted segmentation will suppress or disfigure media pluralism," because "[m]arket-determined segmentation predictably disfavors, for example, media focusing on political ideology, non-market-valued ethnic and cultural divisions, economically poorer groups . . . . When properly performing its various democratic functions, the media generates significant positive externalities – that is, benefits to people other than the immediate consumer of the product. The economic meaning . . . is that . . . free markets will under-produce these quality products.").

623. *Business Affected with a Public Interest*, TheFreeDictionary.com, *available at* http://legal-dictionary.thefreedictionary.com/Business+Affected+With+a+Public+Interest (last visited Sept. 12, 2012) ("A commercial venture or an occupation that has become subject to governmental regulation by virtue of its offering essential services or products to the community at large. A business affected with a public interest is subject to regulation by the Police Power of the state to protect and to promote the General Welfare of the community which it serves. Such a designation does not arise from the fact that the business is large, or that the public receives a benefit or enjoyment from its operation. The enterprise, as a result of its integral participation in the life of the community or by the privilege it has been granted by the state to serve the needs of the public, is regulated more strictly by the state than other businesses. What constitutes a business affected with a public interest varies from state to state. Three classes of businesses have been traditionally regarded as affected with a public interest: (1) those carried on pursuant to a public grant or privilege imposing a duty of making available essential services demanded by the public, such as common carriers and Public Utilities; (2) occupations considered from the earliest times in common law to be exceptional, such as the operation of inns or cabs; and (3) businesses that although not public at their inception have become such by devoting their activities to a public use, such as insurance companies and banks. A business affected with a public interest remains the property of its owner, but the community is considered to have such a stake in its operation that it becomes subject to public regulation to the extent of that interest.").

624. *See* James Speta, *A Common Carrier Approach to Internet Interconnection*, 54 Fed. Comm. L.J. 225, 254 (2002).

625. *Criminal Law*, Wikipedia, http://en.wikipedia.org/wiki/Criminal_law (last visited Sept. 11, 2012).

626. *Common Law*, Wikipedia, http://en.wikipedia.org/wiki/Common_law (last modified Oct. 1, 2012, 17:15); *Civil Law (Common Law)*, Wikipedia,

http://en.wikipedia.org/wiki/Civil_law_(common_law) (last modified Oct. 1, 2012, 20:57).