THE CHALLENGE OF DIGITAL EXCLUSION IN AMERICA:

A REVIEW OF THE SOCIAL SCIENCE LITERATURE AND ITS IMPLICATIONS FOR THE U.S. NATIONAL BROADBAND PLAN

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January 2010

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I. INTRODUCTION AND SUMMARY

A. PURPOSE

This analysis brings a comprehensive review of the social science literature on the adoption of digital information and communications technologies (ICT, primarily computers, Internet access, and broadband service) to bear on the National Broadband Plan being developed by the Federal Communications Commission (FCC).[1] Concern about the pattern of adoption of these new technologies has been voiced for a couple of decades, originally as a concern about a digital divide.[2] In recent years, 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 of the technology under the rubric of digital exclusion.[3]

This longstanding debate over the distribution of digital technology in society was given urgency by the recent passage of the American Recovery and Revitalization Act.[4] The Congress not only chose to spend a significant sum of money to accelerate the deployment and penetration of broadband communications, it also charged the FCC to develop a plan to ensure universal access to and "maximum utilization" of advanced communications technologies. After 15 years of debate about the digital divide, the Congress gave the FCC a scant six months to come up with its recommendations.

This literature review focuses on digital inclusion, which it defines as the adoption and use by households of broadband Internet service. It does not address the question of digital evolution, which can be defined as the upgrading of the network to deliver higher quality service. The debate over how to define broadband or high-speed Internet service by characteristics like speed, upload/download symmetry, etc. is certainly important and connected to the issue of digital inclusion, since the characteristics of the network will determine its cost and value. However, the two issues can be separated.

> **If the public policy debate were to conclude that there is no digital evolution problem in the U.S. that needs to be addressed by policy – i.e. the network is just fine as it is today – one can argue that there is a significant digital inclusion problem because tens of millions of households (almost one-third of U.S. households) do not have broadband at home and therefore are not making maximum utilization of the broadband network we have today.**

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[1] Federal Communications Commission (FCC), In the Matter of the National Broadband Plan for Out Future, GN 09-47, 09-51, 09-137.

[2] 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, 1995, 1998, 1999, 2000, 2002, 2004). Stevenson points our precursors in the National Information Infrastructure policy debates in 1992-1994.

[3] FCC, 2009b, Notice #16 Broadband Adoption, DA-09-2403, November 10, 2009.

[4] American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115 (2009) (Recovery Act or ARRA).

If the public policy debate over digital evolution concludes that there is a problem with the current state of the network, it would be even more urgent to address the digital inclusion problem. Public policies to advance the network will deliver even more functionality to the connected, leavings the disconnected even worse off. The improvements in network functionality are likely to increase the cost of service and, perhaps, raise the level of skill necessary to use the network, making it all the more difficult for the disconnected to get connected.

The FCC focused a great deal of its early attention in the development of the National Broadband Plan on the digital evolution question.[5] It "commissioned" and put out for comment two studies by major academic institutions and published numerous notices that focused on infrastructure deployment issues. However, in its 16th request for further information it posed a series of questions about broadband adoption. The literature reviewed in this paper provides a great deal of data with which to answer the FCC's questions.

B. OUTLINE

To make the literature review directly relevant to the FCC's questions, at the beginning of each section the paper lists the FCC questions and puts them in historical context. It then evaluates how the literature sheds light on the answers to the questions the FCC posed.

Following this introduction, the analysis is divided into three parts.

Part I deals with the first two sets of FCC questions.

- **What is digital exclusion and why does it matter?**

Part I has one chapter. First it places the FCC questions in historical and legal context. It then examines the data on the impact of digital exclusion and demonstrates that the concern recently expressed by Congress about the failure of the U.S. to achieve universal access to and maximum utilization of broadband is well-founded in the literature.

Part II addresses the FCC's third set of questions.

- **Who does not have broadband and why not?**

Part III has two chapters. Chapter III examines the question of whether the technology will trickle down to the disconnected as a result of market forces and the complex "models" offered in the literature to explain digital exclusion. Chapter IV reviews the current status of digital exclusion in the U.S. and builds a model of U.S. adoption based on recent data from the Pew Internet and American Life Project.

[5] Berkman Center, 2009, FCC, 2009c; Atkinson and Shultz, 2009, FCC, 20009d.

Part III presents the discussion of policy options.

- **What policies are necessary and most effective in addressing the problem?**

Part III has two chapters. Chapter V reviews the policy approaches advocated in the literature. Chapter VII provides answers to the FCC questions.

C. SUMMARY OF FINDINGS

This report documents a severe problem of digital exclusion in the United States, which harms households and the nation. It makes a compelling case for aggressive policies to promote broadband adoption and spread the benefits of broadband communications to the large segments of the U.S. population that remain disconnected.

CONSEQUENCES OF DIGITAL EXCLUSION

- Digital exclusion afflicts a substantial part of the population – about one-third of U.S. households that do not have broadband at home.
- Many of these households are three generations of technology behind the majority of U.S. residents, lacking computers, experience with Internet access and broadband service in the home.
- Digital exclusion results in a significant deprivation of participation in activities that are vital to daily life in 21centry society – including economic opportunity, civic engagement, cultural expression, communications, and information gathering.
- Households without the Internet participate in economic, social and civic activities in physical space at roughly the same levels as households with the Internet, but being disconnected dramatically reduces their ability to participate in cyberspace activities in these important areas of daily life. As a result, digital exclusion is creating a new source of inequality in society

WHO IS EXCLUDED AND WHY

- The population affected by digital exclusion is lower income, less educated, elderly and to a lesser extent rural and black.
- There is a small subset of statistically significant, quantitatively important and policy relevant factors that affect adoption – availability, affordability, skill and motivation (interest) are important causes of digital exclusion.
- The deficits in material, skill and attitudinal resources suffered by the digitally excluded reflect the socioeconomic status of the households in the excluded population groups. As a consequence, digital exclusion can be seen as exacerbating the underlying problems of social exclusion and inequality.

POLICIES ARE NEEDED TO PROMOTE DIGITAL ADOPTION

- The evidence on the pattern of digital exclusion indicates that there is a distinct possibility that a substantial digital divide will persist and that market forces alone will not solve the problem of digital exclusion. Therefore, public policies to promote broadband adoption are necessary.
- Policies to promote broadband adoption can raise the level of participation and reduce the problem of digital exclusion.
- In seeking to promote broadband adoption, background characteristics (income, age, education, race, etc.) should be used to target programs that address the foreground (proximate) causes of digital exclusion – availability, affordability, skill and interest.
- The maximum effect will be achieved if the policies that seek to address the problem of digital exclusion by addressing the proximate factors are reasonably balanced. Targeting one of these factors, while neglecting the others, will result in a disappointing outcome.
- Beyond the funds made available with the stimulus bill, each federal agency with jurisdiction over policies that can affect the four major barriers to broadband adoption should identify existing programs and resources that can be turned to the task of promoting broadband adoption on a sustained, long-term basis and immediately implement policies to do so.

PART I:
WHAT IS DIGITAL EXCLUSION AND WHY DOES IT MATTER?

FCC QUESTIONS

1. **Measuring broadband adoption.** The Recovery Act requires that the NBP include a detailed strategy for achieving maximum utilization of broadband infrastructure and service. Maximum utilization can only be achieved by increasing broadband adoption rates. As the Commission establishes goals to maximize utilization of broadband, how should we measure adoption? Adoption statistics often focus on individual or household subscription rates. Is that the best way to measure adoption? If not, what are the alternatives?

a. Is someone who frequently accesses broadband at work or in the library, but not at home, an "adopter?" Is the use of a web-enabled smart phone sufficient to make someone an "adopter" of broadband?

b. Should adoption be measured more by the manner, type or frequency of use of certain types of applications? If so, will those applications be standard across all groups of people?

c. If we measure adoption using some metric or combination of metrics other than home penetration, how can we benchmark improvements over time?

2. Cost of digital exclusion. The Commission would like to understand the costs faced by individual consumers who do not adopt broadband as well as the societal costs of having a large portion of society that remains un-connected to broadband.

a. How can the Commission best quantify the costs faced by non-adopters?

b. Do these costs vary by demographic or other factors?

d. Which of these costs absolutely depend on access at home (fixed or mobile)?

e. Are there certain minimum hardware requirements necessary for an individual to overcome the costs of exclusion?

f. What societal benefits are foregone, when a large group of the population has not adopted broadband? We seek input on how to frame this issue (what are the categories of societal costs and benefits) and how to measure it.[6]

[6] FCC, 2000b.

II. DEFINING THE GOAL: WHY DIGITAL EXCLUSION MATTERS

A. THE LEGAL CONTEXT OF BROADBAND ADOPTION

At the outset, a clear set of definitions of broadband adoption is critical to arriving at an effective implementation of a policy to achieve the goals of universal access, affordability and maximum utilization of broadband.. The first two sets of questions posed by the FCC on broadband adoption establish the appropriate starting point for the inquiry into the National Broadband Plan because they address the most fundamental issues

- what do people do with broadband service?
- what difference does it make if some people cannot use it?

The Congressional language charging the FCC to draw up the National Broadband Plan begins with the declaration that the National Broadband Plan should "seek to ensure that all people of the United States have access to broadband capability" and expresses the belief that the National Broadband Plan should have much broader objectives. Beyond access, the Congress identifies affordability and maximum utilization as goals, stating that utilization should cover the full range of economic, social and civic activities.

> (2) 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.[7]

[7] ARRA, Title VI.

Reflecting this broad framing, the FCC asks for particulars about how "maximum utilization" should be measured. In framing the issue, it uses the term **digital exclusion** to describe the individual and social costs of not adopting broadband.[8] The term digital exclusion is a powerful framing. The empirical evidence reviewed below supports this framing, as does the historical context in which the policy analysis is located.

B. THE HISTORICAL AND LEGAL CONTEST OF THE FCC QUESTIONS

Since the Congress has declared the goal of "universal access," "affordability" and "maximizing utilization," which implies adoption of the technology, and given a list of economic, social and civic activities it believes are affected by adoption of broadband, the FCC could have passed over these questions. Congressional intent is clearly stated and the FCC cannot question that intent; its job is to implement that intent. However, understanding what it means to not have broadband service at home in a society where the majority of people has service certainly helps to illuminate how broadband adoption should be measured. In fact, seeking to understand the impact and importance of digital exclusion serves two important purposes.

1. The Failure of Trickle Down Economics to Solve the Problem of Digital Exclusion

First, the questions are quite appropriate in historical context. 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, 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. The lead spokesperson in the Bush Administration at the time, Michael Powell Chairman of the FCC, 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.[9] 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.[10] Moreover, while the "have-laters" were waiting for the technology to diffuse (trickle down), digital divide deniers argued that the disconnected would have access to broadband in public institutions, like libraries and schools, which was deemed adequate access for the transition.[11]

Other advanced industrial nations have debated digital exclusion and concluded it is an important problem (e.g. the European Union,[12] the United Kingdom,[13] and elsewhere[14]) that

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[8] FCC, 2009b, p. 2.
[9] In his first press conference as Chairman, Powell, declared a "Mercedes Benz divide." February 8, 2001.
[10] Stover, 2003; Cooper, 2002, 2004.
[11] Stevenson, 2009,
[12] Sourbati, 2009, 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

needs to be addressed.[15] In the U.S. this debate was short circuited by the Bush administration's argument that there either was no problem or to the extent a problem existed, it would be solved by the working of the marketplace.[16]

Almost a decade later the problem of digital exclusion appears in sharper focus. The trickle down of the marketplace is leaving large numbers of people excluded for a long time. The persistent failure of specific groups – low income, elderly, less educated – to obtain broadband service raise serious concerns about a pattern of digital exclusion that justifies the strong statement of policy by Congress. More than a decade after the introduction of broadband into the mass consumer market, with the same groups that were on the wrong side of the digital divide now among the digitally excluded and large segments of the population now three generations of technology behind, a thorough reexamination of the issue is in order and the FCC has appropriately interpreted its charge broadly.

2. The Aspiration for Universal Service

Second, while the ARRA tells the FCC to draw up a plan to promote access for all and maximum utilization of broadband, the ARRA is not the only statute that requires the FCC to move in this direction. Indeed, it can be argued that the Communications Act of 1934, as amended by the Telecommunications Act of 1996, provides an even more compelling reason for the FCC to take action. The first sentence of the Communications Act of 1934 stated that the paramount goal of U.S. communications policy is "to make available, so far as possible, to all people of the United States a rapid, efficient, nation-wide and world-wide wired and radio communications service with adequate facilities at reasonable charges."[17] The goal expressed a bold aspiration since, in 1934 when universal service was first articulated as national policy, two-thirds of American households did not have a telephone (Cooper, 1996). Moreover, by adopting the concept of "adequate" facilities in an industry where the network was likely to evolve, the universal service goal would advance in order to continue to be "adequate."

The 1996 Telecommunications Act amendments to the 1934 Communications Act explicitly embraced the notion that the target should evolve and included access to information services. It also makes explicit the need to make service affordable and to base universal service policy on the use of the services that advanced telecommunications make possible.

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able to use the technology (Gillard et al, 2007, Goggin, 2007). The emphasis is now on media 'consumption' or 'use' (UK Department for Media, Culture and Sports, 2006, p.4. European Commission. 2007, p. 6; Office of Communications, 2006, p. 3)

[13] Price Waterhouse Coopers, 2009; South East England Development Agency, 2008; Communities and Local Government, 2008a, 2008b; SQWconsulting, 2008.

[14] For Australia see Notley and Foth, 2008; for Scotland see, XX notes the origins of the concept of digital exclusion lie in the broader concept of social exclusion developed by the French in the mid-1970s.

[15] Sourbati, note 5, citing European Commission, 2008; UK Department for Media, Culture and Sports, 2009.

[16] Cooper, 2002, 2004, 2009.

[17] U.S.C.A. 1934

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 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.[18]

While the statute does envision the evolution of universal service, it also sees universal service policies called for only after the market has delivered the service to the majority and it marks the need for universal service treatment by the actual impact that the services have on critical areas of activity.

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 (Telecommunications Act of 1996).[19]

The 1996 Act provides a shorter list of vital uses than the ARRA, but includes the general proposition that services should be consistent with the public interest. There is little doubt that

[18] U.S. Telecommunications Act, 1996, section 254k
[19] U.S. Telecommunications Act, 1996, section 254k

broadband service meets the definition of a universal service today. The Joint Boards has already made the necessary determination to declare broadband a universal service. The FCC need only Act on that recommendation. The Bush administration's view of the deployment and adoption of broadband prevented the FCC for exercising it authority to take action under the Communications Act to address the problem of digital exclusion, since it did not accept the proposition that there was a problem.

Thus, it is important to recognize that, while the FCC is operating under the direct mandate of the ARRA to produce a National Broadband Plan, as an agency it has a broader mandate under the Communications Act to promote universal service, a goal that is closely related to broadband adoption. At a minimum, the language in the underlying statute certainly provides a justification for continuing policies to promote universal adoption of broadband after the ARRA funding has run out.

C. ACCESS, USE AND IMPACT

The focal point of public policy concern about digital connectivity has shifted over the course of the decade and a half since the Internet began to affect the pattern of communications and commerce in society (see Exhibit II-1). As noted above, the concern about simple access as framed in the initial digital divide debate – households not being connected to the Internet – has been replaced by a concern about much more than the availability and affordability of service.[20] As digital, broadband communications become the focal point of innovation and move to the center of economic, social and political life, broadband adoption also considers how the technology is used by the households that have it. The broader concept – digital inclusion – considers the impact of the technology on individuals and society.[21] Success is no longer measured by the counting of the number of households that are passed by the technology, or even whether they choose to subscribe to Internet service, but rather the inquiry goes deeper into the nature and degree of uses of the technology.

The reason that the definition of success has expanded with the penetration of broadband is that digital ICTs have proven to be transformative technologies.[22] Digital technology fundamentally alters the conditions for success across a wide range of economic, social and civic

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[20] "Usage is the final stage and ultimate goal of the process of technological appropriation in the shape of particular applications (van Dijk and van Deurson, 2009, 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, 2009, 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, 2009, 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 and Cotton, 2009, pp. 346-347; Cotton & Jelenewicz, 2006; Davidson & Cotton, 2003, Dimaggio et al., 2004, Hargittai 2002;).

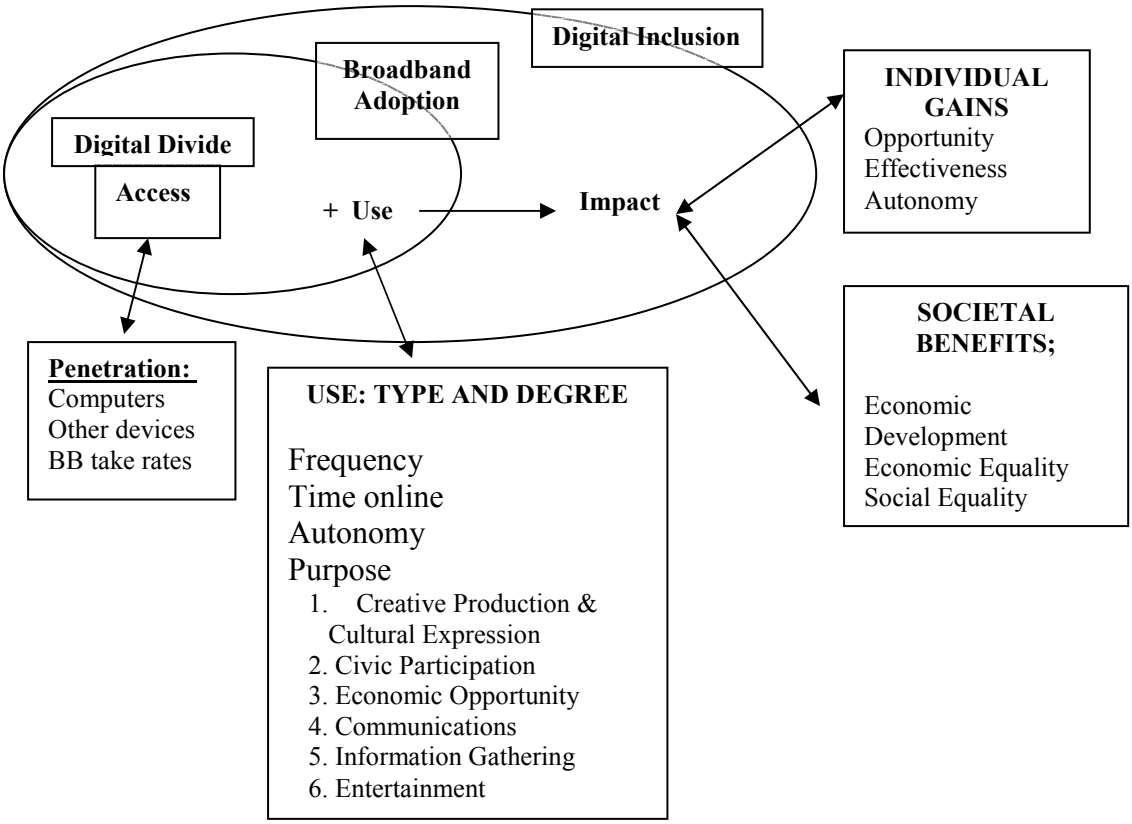
[21] Warshauer, 2003, Barzili-Nahon, 2006.

[22] Berkeley Roundtable on the International Economy, 2001, Dutton, et al., 2005.

activities at both the individual and societal levels. 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.[23]

Exhibit II-1: Digital Inclusion Definition and Goals

Defining Goals



Recognizing the impact that utilization has on individuals and society leads to the broader concept of digital inclusion.[24] Adoption and use of technology by individuals has benefits at the

[23] Berkman Center, 2009; Barziilai-Nahon, 2006, vanDijk, 2005;

[24] Media literacy can be defined as "the ability to access, analyze, evaluate, and create messages across a variety of contexts (Livingstone, 2003, p. 3). 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

societal level through network effects and feedback loops creating a virtuous circle of development.[25]

The empirical evidence overwhelmingly supports Congress' view that maximum utilization of broadband infrastructure can deliver benefits to households and the nation – consumer welfare,[26] economic growth,[27] worker training,[28] civic participation,[29] e-government services,[30] education,[31] training,[32] community development,[33] ability/disability,[34] maximum utilization.[35]

At the beginning of the digital revolution there were wildly optimistic predictions about the nature and extent of social transformation the new technology would cause in the economy and the polity. Initial results in both the economic and civic discourse realms cast doubt on these overly optimistic prognostications, but, for at least the last decade, the evidence has overwhelmingly supported the proposition that using digital ITC has a positive effect on a wide range of factors generally associated with economic success at both the individual and societal levels.[36] The impact that receives the greatest attention is the economic impact.[37]

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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, 2009, pp. 599)-600).

[25] [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, p, 415)

[26] Fox, 2005; Rains, 2008; Savage and Waldman, 2005, van Dijk, 2006, Davison and Cotton. Peacock,2008.PriceWaterhouseCoopers, 2009; SQW Consulting, 2008

[27] BRIE, 2001; Audretcch and Welfens,.2002, Dutton, et. al, 2005Davison and Cotton, 2009;Jackson, et al., 2009; Grubesic & Murray, 2002; Bouwman, 2003;Haan, 2003; Lehr, et al., 2006 Rommney and Richardson, 2005; Kaufmann and Kumar, 2008; Holt and Jamiosn, 2009.

[28] Breshnanan, et al., 2002, Brynjolfson and Hitt, 2003, Dostie, et al., 2006; Garaciano & Heaton; Sandulli, 2009, Acemoglu, et al., 2007, PriceWaterhouseCoopers, 2009; Dolton and Pelkonen, 2007; Dolton and Robinson, 2007, Fairlie, 2006. Fafchamp, 2002.

[29] Shah, et al., Weber and Loumakis, 2003;

[30] Chen & Wellman, 2003; Bill & Melinda Gates Foundation, 2004; Curtin, 2001; Foulger, 2001; Nahon & Barzilai, 2005);Daukanta, 2003, Holmes and mIller, 2003; Kreuger, 2002.

[31] Jackson, et al., 2000, p.437; PriceWaterhouseCoopers, 2009; Schmitt and Wadsworth, 2004; Fuchs and Woessman, 2004; Malamud and Poleches, 2008

[32] Chen & Wellman, 2003; Bill & Melinda Gates Foundation, 2004; Curtin, 2001; Foulger, 2001; Nahon & Barzilai, 2005); Warschauer, 2002; Crump & McIlroy, 2003; Dutta et al., 2004)

[33] Jensen and Oster, 2009, Jackson, et al., 2009; Wellman, Boase, and Chen, 2002, Benkler 2006;Hopkins, 2004; Grimes, 2000

[34] Bricout, et al., 2009; Gauo, Fox, 2007; West and Anderson, 2005; Bricout and Huand, 2005; Houlihan, et al., 2003, PriceWaterhouseCooper, 2009;

[35] Bridges.org, 2001; Chen & Wellman, 2003; Hoffman et al., 2000; Husing & Selhofer, 2004; ITU, 2003; ITU Telecommunication Development Bureau, 2003; (he Mosaic Group, 1996-2004; Warschauer, 2002; Horrigan & Rainie, 2004;Horrigan 2008; Chen & Wellman, 2003; Husing et al., 2004; ITU, 2003; ITU Telecommunication Development Bureau, 2003; Hargattai, 2006, 2205, 2004; Hargittai, Robinson and Dimaggio, 2003; Crump & McIlroy, 2003; Hargittai, 2002; Lenhart et al., 2003

[36] "[T]hose who lack access will not garner equitable opportunities for jobs, Internet-based economic empowerment

For individuals the benefits have been documented for educational attainment,[38] worker productivity, skill and compensation levels[39] and autonomy,[40] and entrepreneurship, especially among women,[41] as well as social development.[42] Being networked is valuable and communications are useful in accomplishing the outcome.[43] Differences in usage with broadband compared to dial-up are dramatic.[44] Broadband users are able to accomplish more online, such as sharing music and photos, shopping, banking, trading stocks, and becoming informed,[45] and are more active and creative with their online activities than narrowband users.[46] The earlier one adopts, the greater the benefit.[47]

The benefits at the societal level have also been well-documented[48] 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,[49] including the impetus to re0orgnizae industries,[50] network effects and spillovers, [51] and the impact on innovation.[52] Given that these intangibles

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civic engagement, healthcare, web-based education and simple day-to-day activities" (Jackson et. al.,2009, p. 607).

[37] "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, 2003; Lehr, et al., 2006.

[38] Jackson, et al., 2009, p.437.

[39] Breshnanan, et al., 2002, Brynjolfson and Hitt, 2003, Dostie, et al., 2006; Garaciano & Heaton, 2005.

[40] "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).

[41] Fairlie, 2006.

[42] Jensen and Oster, 2009.

[43] Fafchamp, 2002.

[44] "Research already documented that broadband users spend more time on line, engage in more and a greater variety of activities than do dial-up users (Pew 2006b). 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. 226Children's Partnership Foundation, 2007, Pew 2006b)

[45] Fox, 2005; Rains, 2008; Savage and Waldman, 2005

[46] van Dijk, 2005, p. 230), Davison and Cotton, 2009, p. 34).

[47] Peacock, 2008, p. 334.

[48] Jorgenson, 2003. 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."

[49] Pilat and Wyckoff, 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 for m of capital. .

[50] Carree, 2002, Audretsch and Bonner, 2002,

[51] Welfens, 2002,

play such an important role, while the detailed impact must be studied at a very micro level, the quantification of the impact of digital technologies requires a macro-level view of economic activity to gauge the overall magnitude.

> The analysis so far suggests a strong causal link between productivity in the ICT sector and a spread of these productivity improvements throughout the economy via investment in ICT capital. The available evidence also suggests that he acceleration of technical progress was largely concentrated in the U.S…. A Permanent shock to ICT TFP growth of 11% leads to a permanent increase in the growth rate of GDP in the U.S. The growth rate is .7% points higher after 5 yeas and about 1% higher after 15 years. Output growth will stabilize at a level that is about 1% higher after 15 years[53]

In a 15 trillion dollar economy, this innovation and growth dividend, has a value of $150 billion per year, above and beyond the simple calculation of the economic value of investment. Whether it is called a digital dividend[54] or a broadband bonus[55] it is a major economic benefit to the nation that is frequently not counted in the benefits column.

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,[56] to civic discourse.[57] 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[58] were followed by pessimism that it had failed to strengthen democratic participation[59] and civic engagement. This pessimism was ultimately replaced by solid evidence that Internet activity enhances civic engagement.[60]

The pattern was repeated yet again in the realm of social isolation. Initial concerns that

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[52] Foray, 2005.
[53] Roger, 2002.
[54] Commission of European Communities.
[55] Greenstein and McDevitt, 2009.
[56] 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 end 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 al citizens is fundamental to a democratic society... (Jackson, et al., 2009, p.229.
[57] "[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; see also;
[58] Bimber, 1998; Grossman, 1996; Tracy, 1998; Levy, 2000; Saco, 2002.
[59] Levine, 2002; Blumler and Gurevitch, 2001; O'Laoughlin, 2001; Agre, 2002.
[60] "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, et al. pp. pp. 551…553); Weber, 2003, p.38).

Internet use would result in people "Bowling Alone" in cyberspace proved unfounded.[61] 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. [62]

Digital inclusion is the contemporary expression of the recognition of the importance of social inclusion.[63] The growing recognition of the importance of connectivity stems in part form the dramatic difference that broadband makes in utilization. The high speed and capacity of broadband connections, as well as its always-on feature, magnifies the value and impact of connectivity dramatically.[64] Dial-up is disappearing, so we need spend little time on it. The population can be divided into two groups – those without the Internet at home (about one-third) and those with broadband.

The urgent concern about digital exclusion stems from the fact that the process of cumulative disadvantage affects both individuals and nations[65] and inequalities can cumulate and

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[61] Benkler, 2006.

[62] 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).

[63] 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 t 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, 2009, p. 537).

[64] 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).

[65] "[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 and Hacker, 2003, p. 46) cited in James, 2008, p. 60; Rogers, (2003). 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 he 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

reinforce one another.[66] As the technologies layer one atop the other to create a more potent platform, the demands for skills and resources necessary to overcome digital exclusion mount, making it more difficult to gain inclusion. Ironically, at the very moment that the value of being connected increases, the difficulty of overcoming the barriers to connectivity rises because of increasing demands of multiple literacies.

There is a great deal of discussion about the impact of ICTs and digital technologies on other, specific areas of human activity like energy[67] and the environment.[68] The lesson from the economic realm apply here. Ultimately, it is the transformation of the fundamental pattern of activities that has the impact. Calculating the savings on discrete transactions does not capture the potential to organize the flow of transactions in wholly new and more efficient ways.

D. A DRAMATIC DIFFERENCE IN ACTIVITY

The broad findings of the literature on the impact of connectivity 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. The literature identifies at least six types of activities on the Internet that are placed in a rough hierarchy of policy relevance.[69] That is, the higher the ranking, the more compelling the case is for public policy intervention. These are generally assessed according to their "value" in society and the extent to which the usage demonstrates (or requires) mastery of the technology (see Exhibit II-2). While the judgments are "subjective," there is general agreement on the ranking of uses. 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.[70]

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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)

[66] (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.

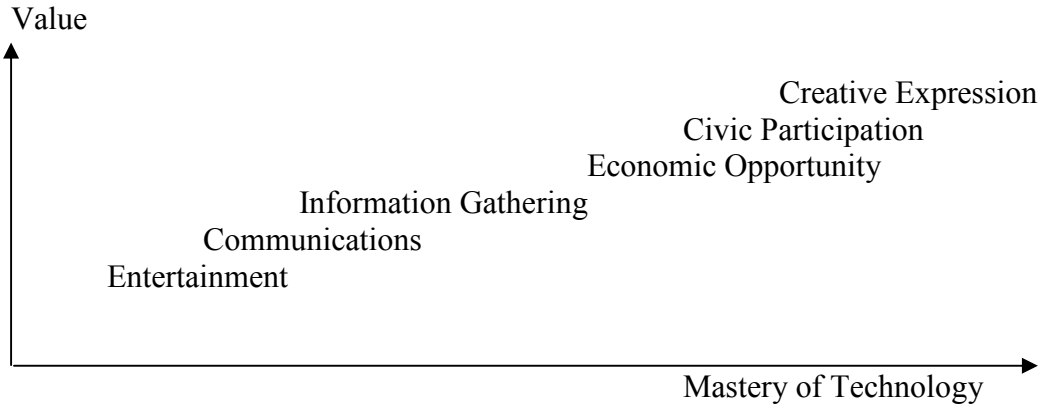
[67] Laitner, 2008. OECD, 2009,Directorate for Science, Technology and Industry, 2009.World Eocnomic Forum, 2008

[68] Marietta, Pasquini and Vicaro, 2000, Stiller, 2002.

[69] Communities and Local Governments, 2008, 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.

[70] 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

Exhibit II-2: Hierarchy of Internet Activities



By 2000, almost two-thirds of adult respondents to the survey 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), as shown in Exhibit II-3. Since then, not only has the percentage of respondents who say they use the Internet grown, but the percentage who say they use it on a daily basis has grown even faster.[71]

The uses of the Internet have expanded as well, as shown in Exhibit II-4. 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. The literature has come to emphasize the qualitative aspects of connectivity, particularly in the ability to be users of the technology, not just consumers. 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.

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.

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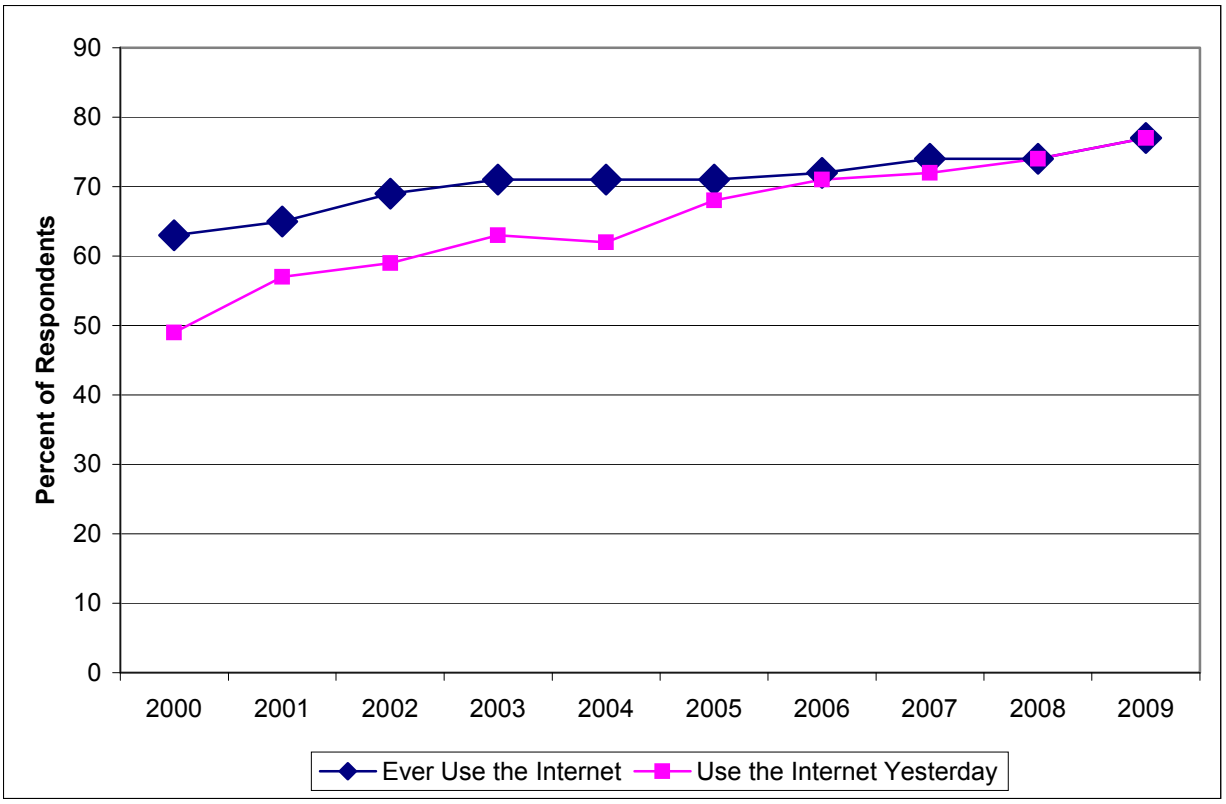
commercialization of the communications infrastructure, who emphasize participation and creation of content by users of broadband

[71] 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.

Exhibit II-3: Use of the Internet



Source; Pew Internet and American Life Project, Trend Data

Exhibit II-5 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).

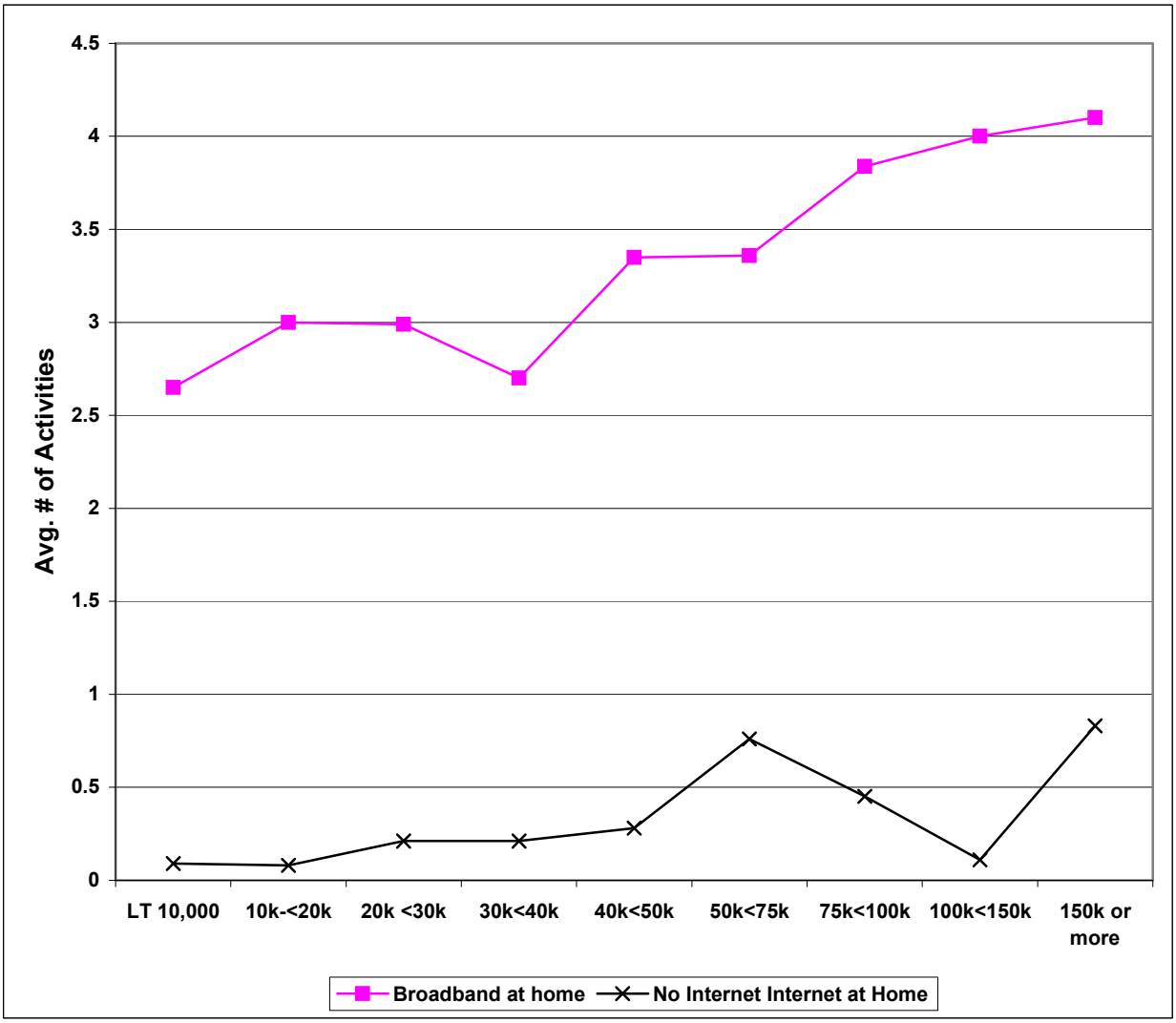
To add context to this comparison, Exhibits II-6 and II-7 show levels of activity in physical space and cyberspace. Exhibit II-6 is based on a count of activities respondents reported with very specific reference to the economic recession, an event that was very prominent at the time of the interview. Exhibit II-6 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-4: Internet Activities Across Time (percent of Respondents)

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

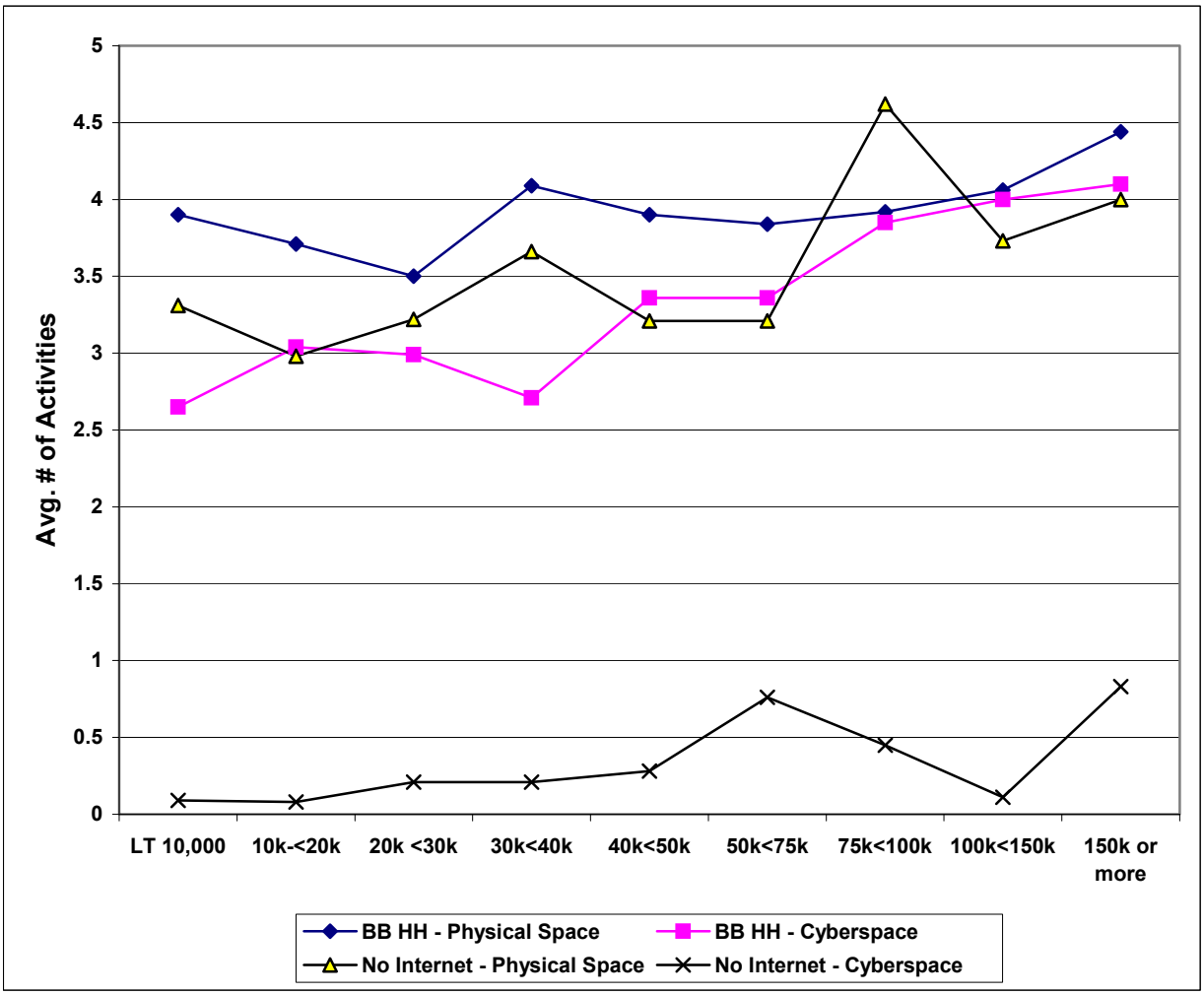
Source: Pew Internet and American Life Project, Trend Data

Exhibit II-5: Number of Internet Activities Yesterday by Income and Connectivity



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

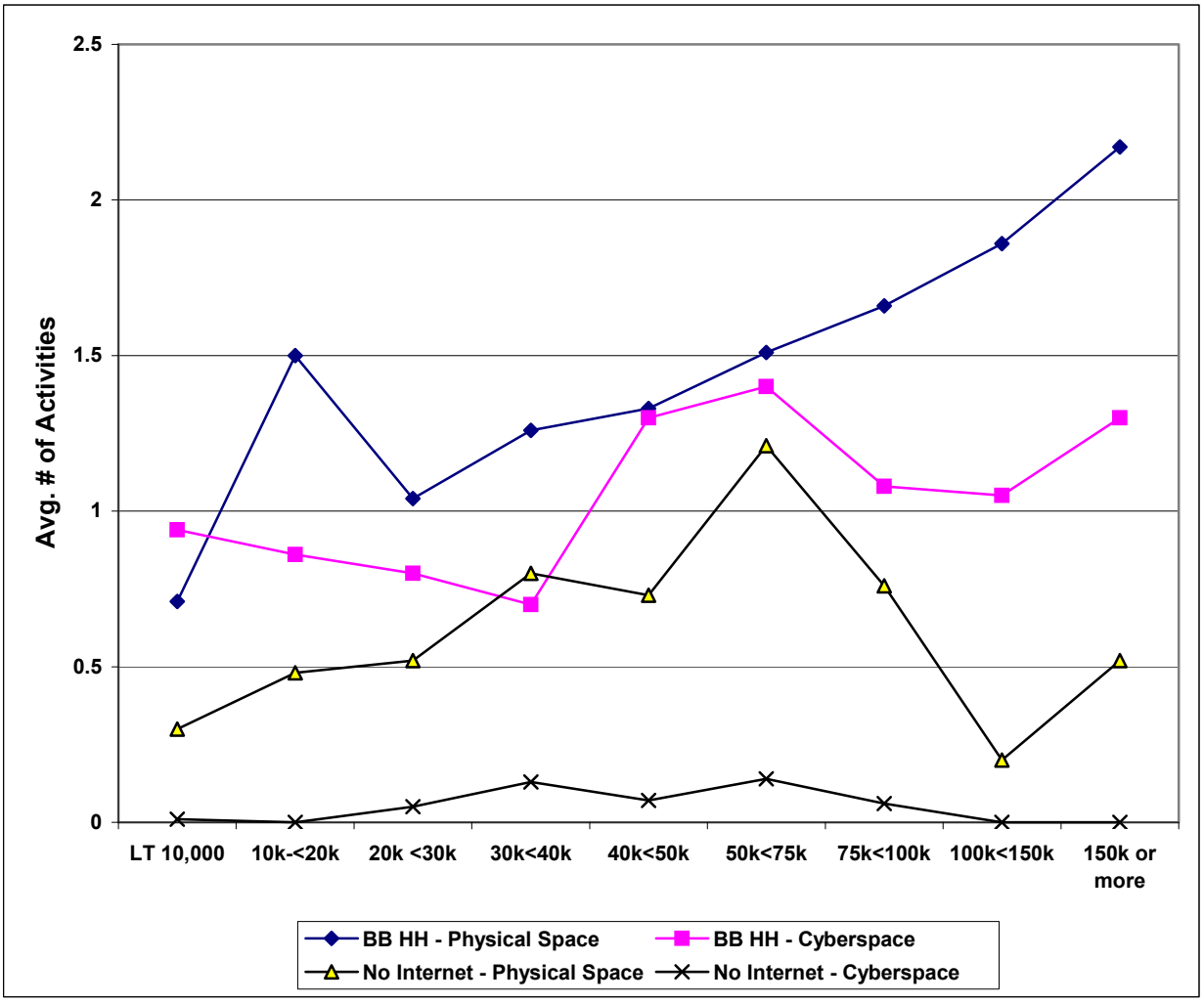
Exhibit II-6: Economic Advice Activity in Physical Space and Cyberspace



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

Exhibit II-7 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 of 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 I political participation for those households.

Exhibit II-7: Political Activity in Physical Space and Cyberspace



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

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.

PART II:
BARRIERS TO DIGITAL INCLUSION

FCC QUESTIONS

3. Barriers to adoption. The Commission wishes to further understand the reasons why some consumers, who have access to broadband, do not adopt. The 2009 Pew Broadband Adoption Study found, generally, that relevance, price, availability, and usability were the main reasons cited for not using broadband at home.[4] Based on this and other research and comments filed in the record, the Commission believes that the primary barriers non-adopters face include: affordability of service, affordability of hardware, insufficient digital and technical literacy levels, unawareness of the personal relevance and utility of broadband technology and online content and an inability to use existing technology and applications due to physical or mental disabilities.

a. Is this an accurate and comprehensive list of barriers faced by non-adopters?

b. Do concerns about consumer protection such as privacy/anonymity, ID theft, child protection, viruses and data preservation, etc. pose a significant barrier to adoption?

c. Are non-adopters influenced by a lack of clear, accurate, and sufficient information available to them about broadband service offerings and price?

d. Which groups are least likely to understand the relevance of broadband? For groups that already understand the relevance but face other barriers, how did they become aware of the relevance and benefit of broadband to their lives?

e. How do these and other barriers affect specific populations or demographic groups and to what extent do specific populations or demographic groups face multiple barriers?

f. In proposing recommendations to address these barriers, should the Commission prioritize among barriers? For example, should the Commission prioritize based on the amount of resources needed to address the barrier? Is there a better way to prioritize recommendations?[72]

[72] FCC, 2009b.

III. THE FAILURE OF TRICKLE DOWN ECONOMICS TO SOLVE THE PROBLEM OF DIGITAL EXCLUSION

With the value of digital connectivity and the harm of digital exclusion established, the analysis logically proceeds to ask what are the causes of the problem? The FCC'S questions cry out for a multivariate analysis of the causes of non-adoption and the literature, as reviewed below, is rich in the identification of the multiple factors that affect broadband adoption. However, there are several basic and simple observations that should not be lost in the effort to find a comprehensive and complex answer. Moreover, in focusing on the capacity, attitudes and skills of the consumer, as the FCC does, it is critical to avoid "blaming" the consumer. The endowment of resources that individuals and households bring to the digital communications sphere reflects broader patterns of socioeconomic inequality in society. Acknowledging these underlying causes is important for the purposes of understanding how the problem must be addressed, as well as targeting policy. Before we examine the complex causal explanation for broadband adoption, however, we need to address one simple explanation for the observed pattern that played a prominent role in the early digital divide debate

A. Will Digital Exclusion Just Disappear through the Operation of the Market?

. The market fundamentalist view taken by Chairman Powell and the Bush Administration reflected the belief that technology adoption follows a trickle down pattern and the digital divide would naturally correct itself over time as technology diffused from rich to poor, as shown in Exhibit III-1. The argument was applied to both people within nations and across nations. This was called the normalization model.

Those on the other side of the debate put forward what was known as the stratification model. 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-2. 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.

Exhibit III-1: Normalization v. Stratification Models of Diffusion

FIGURE 1: PATTERNS OF DIFFUSION CONSISTENT WITH A NORMALIZATION MODEL.

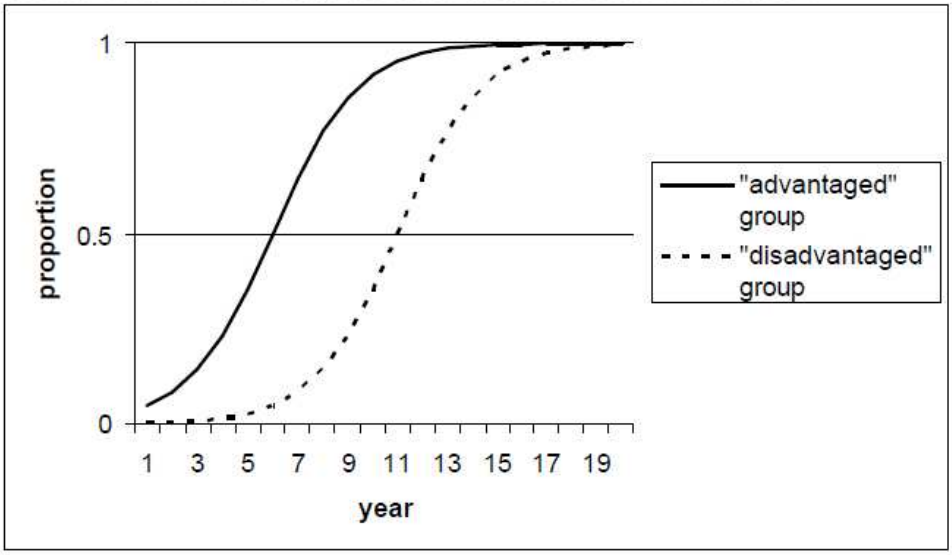
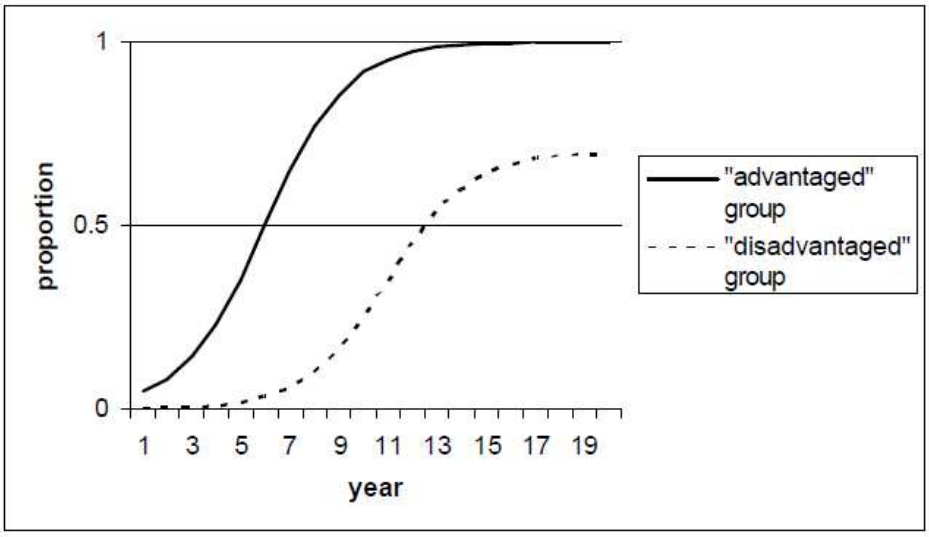


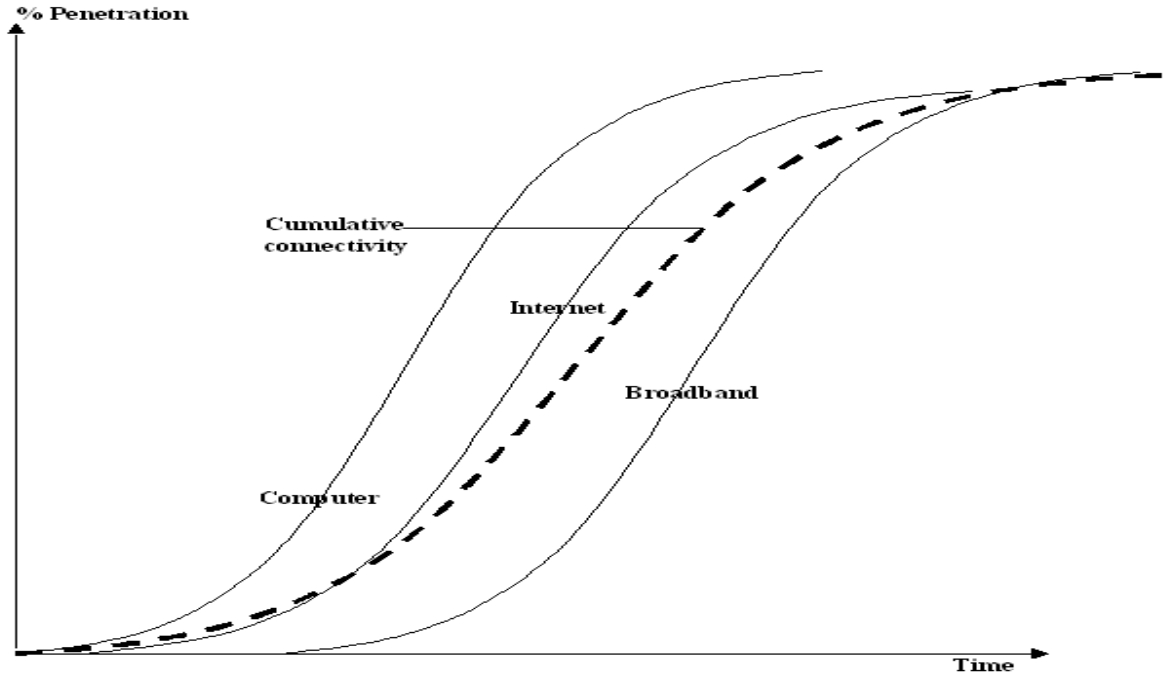
FIGURE 2: PATTERNS OF DIFFUSION CONSISTENT WITH A STRATIFICATION MODEL



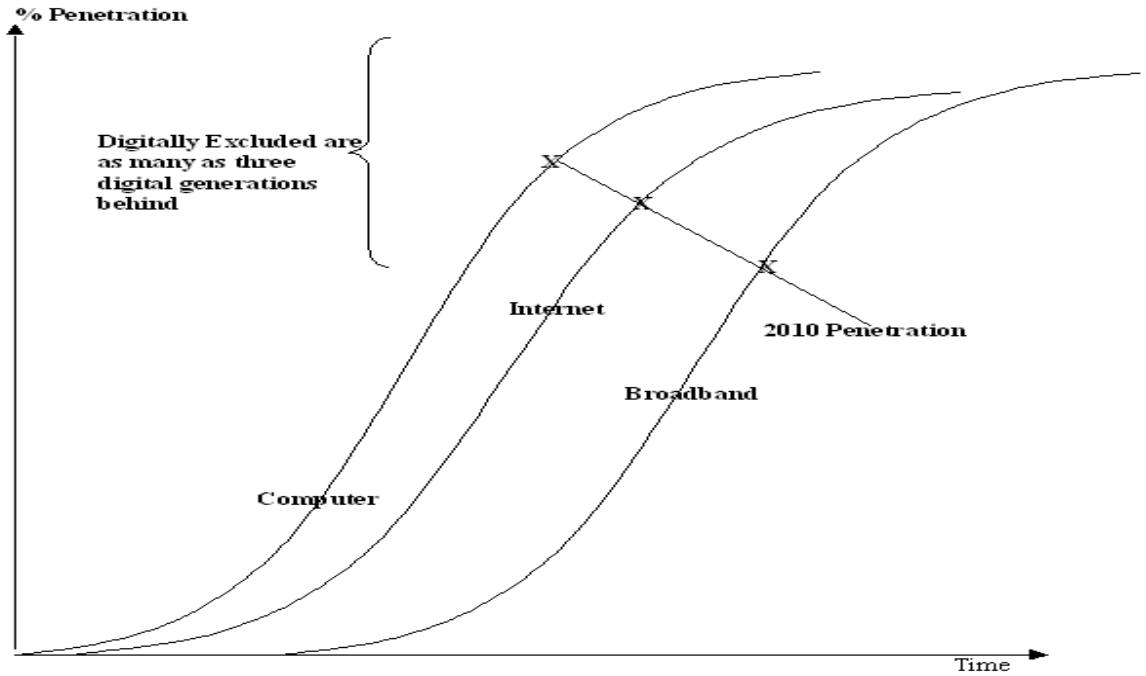
Source: Steven P. Martin and John P. Robinson, "The Income Digital Divide: An International Perspective," *IT & Society,* 7 (1) 2004, p. 4.

Exhibit III-2: A Cumulative Diffusion Model

Stratified Diffusion with Cumulative Technology



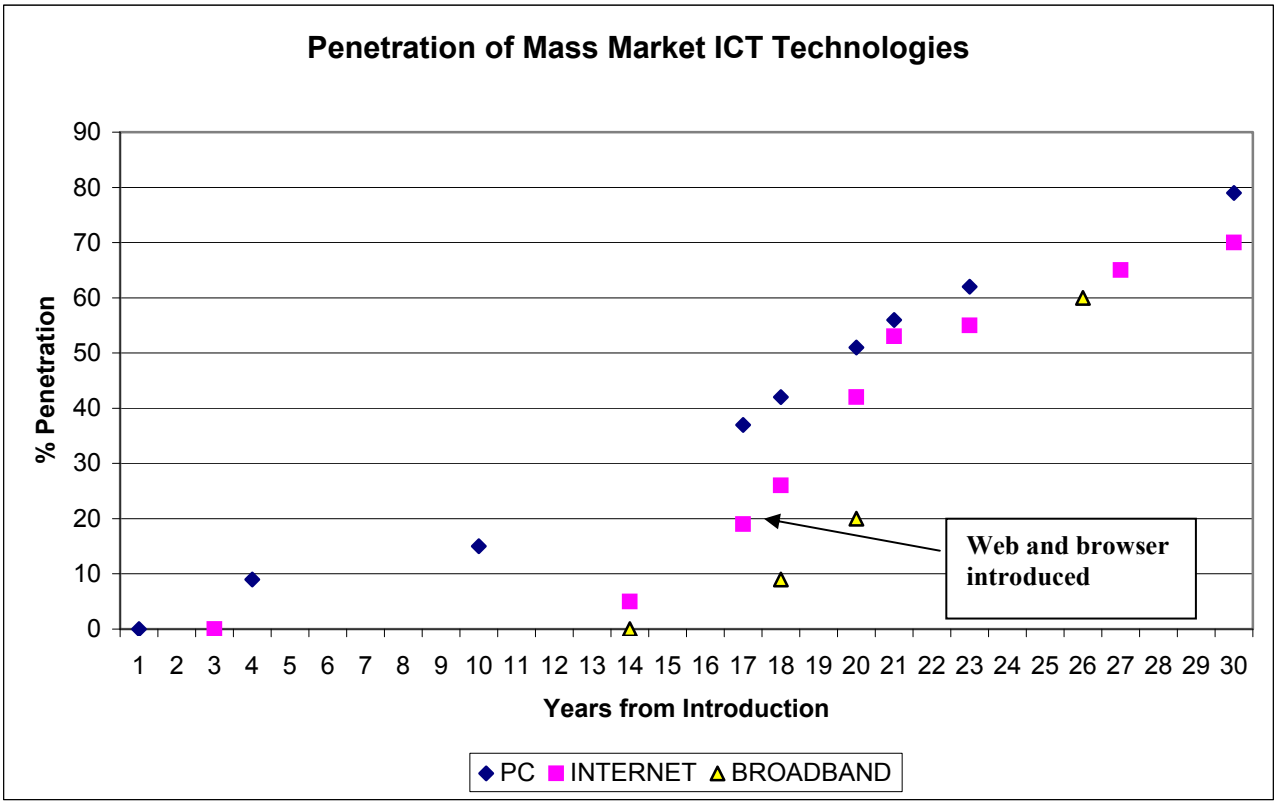
Stratified Diffusion with Cumulative Technology and Digital Exclusion



The curves in Exhibit II-6 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 fall farther behind.

Exhibit III-3 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. 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.

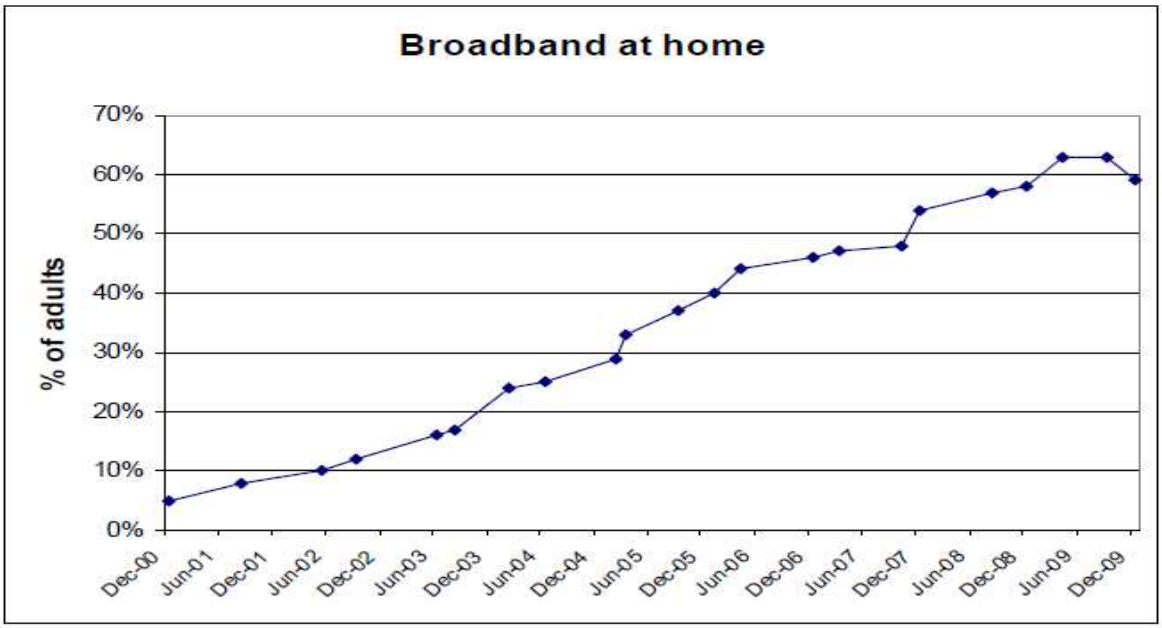
Exhibit III-3: Penetration of Mass Market ICT Technologies in the U.S.

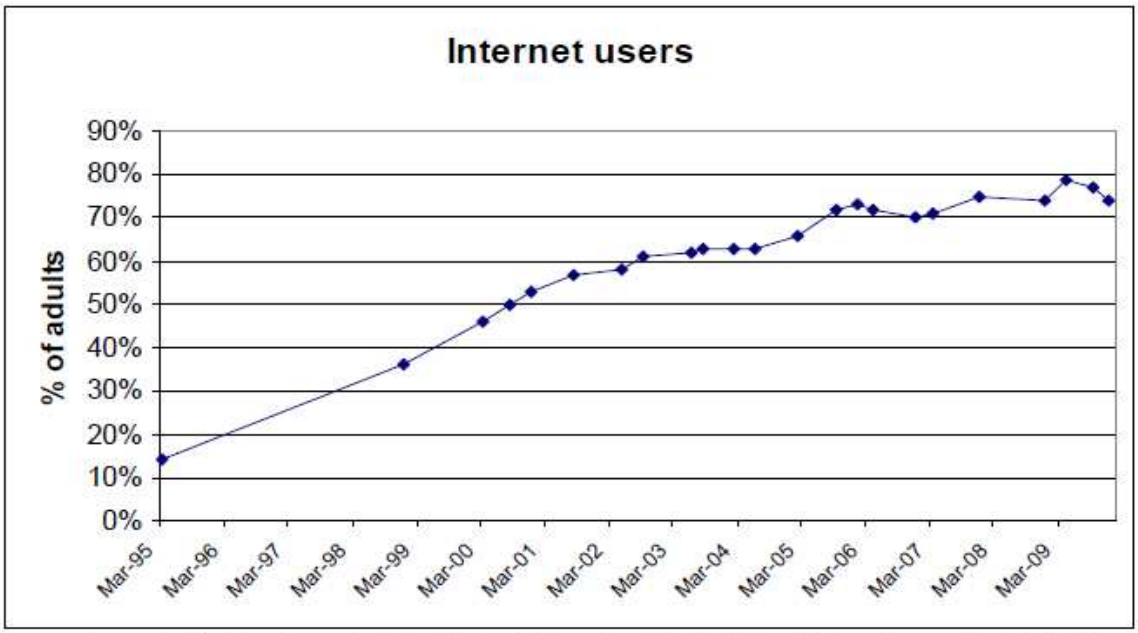


Source: M. Cooper, 2003, "Making the Network Connection," in M. Cooper (Ed.), *Open Architecture as Communications Policy* (Center for Internet and Society, Stanford University), P. 141.

Tracking data from the Pew Internet and American Life Project on the percentage of respondents to their regular surveys who say they use the Internet underline this possibility as shown in Exhibit III-4. While the recession is likely having an impact, the percentage of households that use the Internet anywhere has been between 70 and 80 percent for five years.

Exhibit III-4: The Leveling Off of Internet Adoption

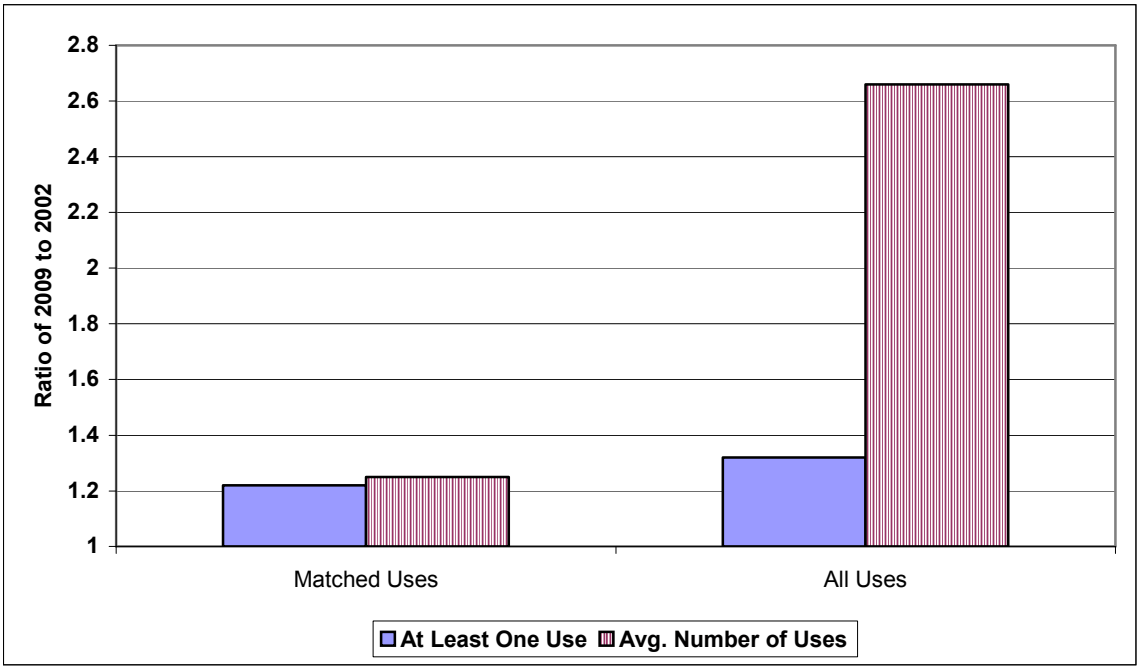




Source: Surveys by The Pew Research Center's Internet & American Life Project and the Pew Research Center for The People & The Press. **Internet, Broadband and Cell Phone Statistics,, January 2010.**

Exhibit III-5 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 III-4 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. 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 was 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.

Exhibit III-5: The Increasing Intensity of Internet Use

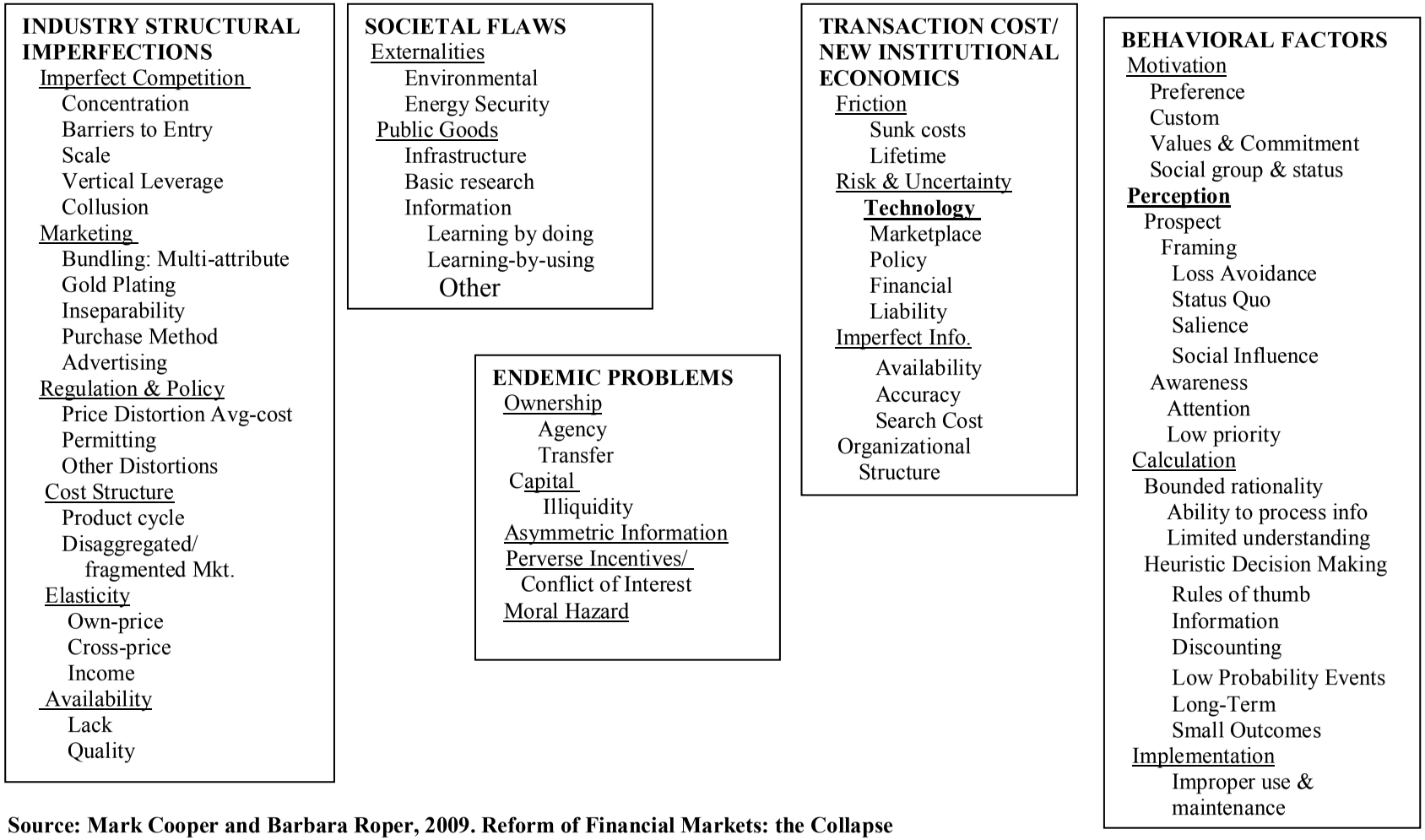


Source: Pew Internet and American Life Project, *Daily Tracking,* March 2002; *Spring Tracking,* March-April 2009

In the matched activities, 2009 respondents were 22 percent more likely to say they did at least on 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 father behind.

Exhibit III-6: Causes of Market Failure

Neo-classical and Traditional Industrial Organization Keynesian, New Institutional and Behavioral Economics Challenge



Source: Mark Cooper and Barbara Roper, 2009. Reform of Financial Markets: the Collapse of Market Fundamentalism and the First Steps to Revitalize the Economy, (Consumer Federation of America April 2009)

B. RECOGNIZING THE ROLE OF MARKET FAILURE IN DIGITAL EXCLUSION

Given the context of the Bush Administration's adamant insistence that the market would solve the broadband adoption problem, framing the issue as barriers to adoption, as the FCC does, raises the prospect of market imperfections resulting in a market failure. If the market is not solving the problem, we should ask why? One can readily identify potential causes of market failure within the traditional framework of market structure and industrial organization analysis, as well as the other schools of economic thought.[73]

While the discussion of broadband adoption invariably begins (and frequently ends) with the discussion of household decisions to adopt, it is critical to remember that there is a supply-side to the adoption issue. [74] A significant part of the market failure occurs on the supply-side, and in society at large, rather than on the demand-side.

Exhibit III-6 identifies a wide range of possible causes of market failure, highlighting the factors that have an impact on broadband adoption. The number of competitors in the broadband market is extremely small.[75] In the wireline space, which dominated the past decade, there are on average, about two competitors per market, which is weak rivalry at best. The underlying facility structure and limited competition allows the firms to focus on high-density, high volume markets, emphasizing the sale of large bundles of services to high-income customers that maximize profits. As a result, significant market segments are bypassed, left entirely unserved

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[73] An advanced text on antitrust and regulation offers the following observation on the importance of market failure in economic analysis (Visicusi and Harrington, 2001, p. 2) "If we existed in a world that functioned in accordance with the perfect competition paradigm, there would be little need for antitrust policies and other regulatory efforts. All markets would consist of a large number of sellers of a product and consumers would be fully informed of the product's implications. Moreover, there would be no externalities present in this idealized economy, as all effects would be internalized by the buyers and sellers of a particular product. Unfortunately, economic reality seldom adheres closely to the textbook model of perfect competition. Many industries are dominated by a small number of large firms. In some instances, principally the public utilities, there may be a monopoly. Consumers who use hazardous products and workers who accept risky employment may not fully understand the consequences of their actions. There are also widespread externalities that affect the air we breathe, the water we drink, and the future viability of the planet.

Market failure is a sufficiently widespread phenomenon to be recognized as an important analytic issue even for introductory economic texts. In one widely used text, John Taylor states that "in certain circumstances – called market failure – the market economy does not provide good enough answers to the "what, how and for whom" questions, and the government has a role to play in improving on the market" (Taylor, 1988, p. 49.) Taylor defines market failure as "any situation in which the market does not lead to an efficient economic outcome in which there is a potential role for government." Taylor identifies the "major sources of market failure as "public goods, externalities, and monopoly power" (Taylor, 1998, pp. 404-405).

[74] [I]t is well to bear in mind that IT is, to an important degree, a capital good (used in firms) as well as a an item of consumption. From this supply-side perspective in economics it is important to not confuse inputs and output. More importantly what I mean by this is the distinction between means and ends… From the supply-side, therefore, one can only conclude that an input-based measure of the digital divide is not only totally irrelevant, but also possibly dangerous if it is used by policymakers who would then conclude, erroneously, that the digital divide has actually disappeared (James, 2008, pp. 58-59) .

[75] U.S. Department of Justice, 2010.

or priced in a way that large numbers of consumers are priced out of the market, while the services offered and the architectures deployed emphasize the high profit, one-way push services.

The underlying maldistribution of income plays an important role in this context, as it results in particular communities suffering a lack of service. The lack of resources results in high concentrations of digital exclusions among specific groups and in specific geographic areas.

The potential for market failure is compounded, within the traditional framework, if the deployment of communications technologies has positive externalities, since the social value of the technology exceeds its private value. This is a classic characteristic of infrastructure and some have argued that it applies with particular force to the Internet.[76]

Because of these structural problems, the market does not perform as well as it would if it were vigorously competitive[77] or well-regulated. The outcome is not as efficient, progressive, demand-responsive or equitable as it could be, or has been in other nations. This characterization is contested and has been the topic of an intense debate in the form of cross-national comparisons. We believe the evidence supports the proposition that the U.S. has performed poorly because of market failures that other nations have been willing to address, while the U.S. was not [78]

This traditional analysis of markets no longer exhausts the potential sources of market failure. Over the past several decades transaction cost analysis and behavioral economics have mounted major challenges to the dominant paradigm by challenging the underling assumptions of neoclassical economics. Of particular relevance here are the behavioral economics issues that these disciplines bring to the analysis, since the motivation, perception and skills of consumers play an important role in the explanations of who does not have broadband.[79]

The consumer behavior aspects require more elaboration. Over the past couple of decades, behavioral economics has mounted a major challenge to the dominant economic paradigm. The neoclassical paradigm at the core of market structural analysis makes

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[76] Frischmann, 2005.

[77] Good performance is multidimensional. It embodies at least the following goals, not necessarily listed in order of importance: (a) Decisions as to what, how much and how to produce should be efficient in two respects: Scarce resources should not be wasted, and production decisions should be responsive qualitatively and quantitatively to consumer demands. (b) The operation of producers should be progressive, taking advantage of opportunities opened up by science and technology to increase output per unit of input and to provide consumes with superior new products, in both ways contributing to the long-run growth of real income per person. (c) The operations of producers should facilitate stable full employment of resources, especially human resources. Or at minimum, they should make maintenance of full employment through the use of macroeconomic policy instruments excessively difficult. (d) The distribution of income should be equitable. Equity is notoriously difficult to define, but it implies at least that producers do not secure rewards in excess of what is needed to call forth the amount of services supplied. A subfacet of this goal is the desire to achieve reasonable price stability (Scherer and Ross, 1990,. P. 4).

[78] Cooper, 2009a.

assumptions about the nature of human behavior that are necessary for its propositions and conclusions to be valid. Economic actors are presumed to be narrowly focused on their own economic interest and fully capable of pursuing those interests with rational precision. People are assumed to rationally and consistently pursue selfish, utility maximization according to a time consistent, discounting model based on Bayesian probabilities for outcomes in which all income and assets are fungible.

Behavioral economics challenges every assumption of this model of economic actors at the level of motivation, perception and calculation. People engage in behaviors for many reasons, other than economics, including habit and custom. Values other than economic value are important. Non-economic factors, like habit, altruism and fairness are important motivators of human action. There appear to be specific biases in the way people value outcomes (e.g. avoiding loss is more highly valued making gains). Whatever their motivation, they do not perceive their movement toward a goal as purely or simplistically efficiency maximizing. They view the world from an initial starting point and select goals and strategies from that perspective and they are influence by social factors as the move toward the goal. People are reflective and social, sensitive to norms, social influence and learning, viewing outcomes from a subjective perspective relative to where they are, where they were and where others are. Their willingness and ability to engage in calculation is limited. In a complex world calculation is challenging. They adopt rules of thumb and heuristics that result in bounded rationality. They do not discount well, misjudging small, low probability or distant events.

For purposes of policy analysis, we believe the findings of behavioral economics can be usefully divided into three groups – motivation, perception and calculation. Wilkinson has two sets of chapters, one foundational one advanced, that can be organized according to this scheme as follows: [80]

Motivation:	Foundations: Values, Attitudes, Preferences and Choice, Nature and Measurement of Utility, Advanced: Fairness and Social Preferences
Perception	Foundations: Decision-making under Risk and Uncertainty, Utility Theory, Prospect Theory, Reference Points, Loss aversion, Decision Weighting Advanced: Behavioral Game Theory, Bargaining, Signaling, Learning
Calculation	Foundations: Mental Accounting, Framing and Editing, Budgeting and Fungibility, Choice Bracketing, Advanced: The Discounted Utility Model, Alternative Intertemporal Choice Models

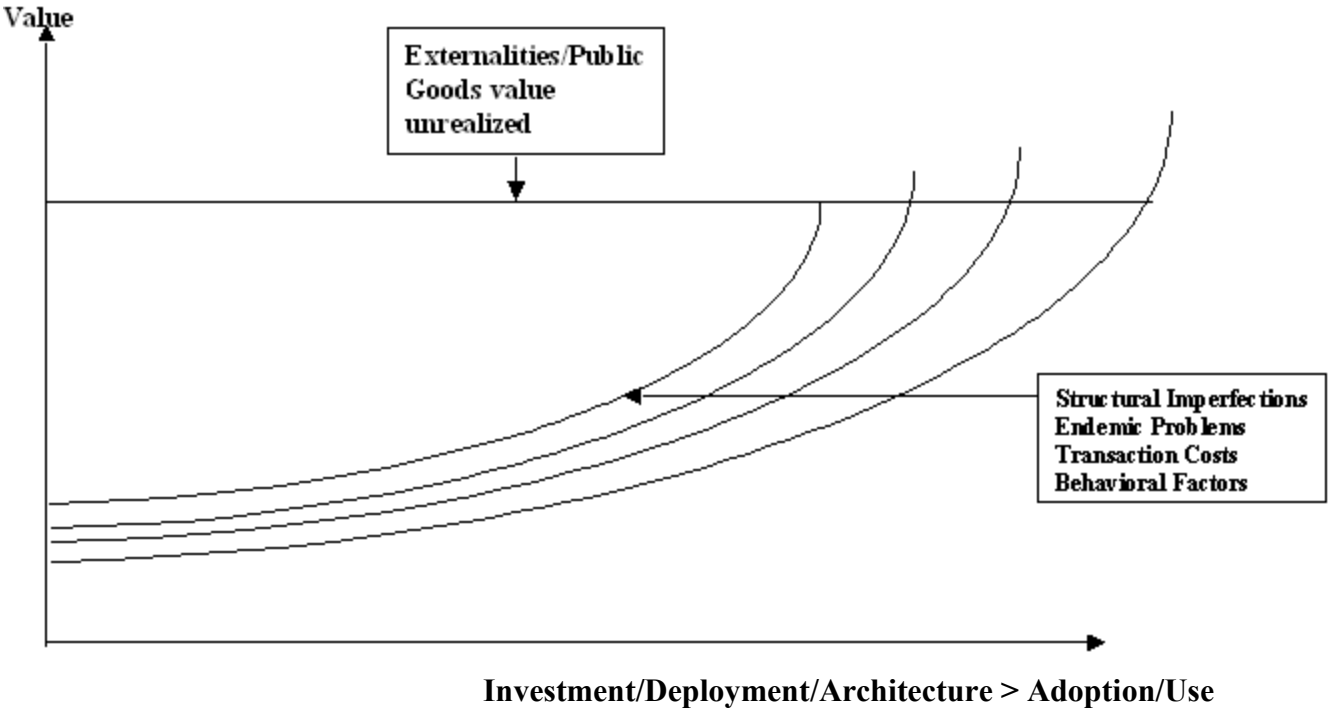
The shift from a narrow focus on availability and affordability to the broader context of resources, especially in the recognition of the attitudinal underpinnings and social context of Internet use parallels the behavioral economic critique of neoclassical economics. The simplistic neoclassical assumption that a service that is available and affordable would, by assumption, be adopted by rational actors maximizing private utility has been supplanted by a much more

[80] Wilkinson, 2008, Camerer, Lowenstein and Rabin, 2004.

nuanced understanding of human behavior in which each of the primary assumption about motivation, perception and calculation are questioned. The factors that inhibit adoption and use affect the quantity of investment, the architecture of the networks deployed and the nature of services offered.

In an investment framework, as shown in Exhibit III-7, the sources of market failure suppress investment, deployment, adoption and use of the technology below the level one would observe in a market where competition was vibrant and public policy addressed the other imperfections, barriers and problems. Externalities, structural imperfections, endemic problems, transaction costs and behavioral factors shift investment onto frontiers farther from the optimum and move investment choice farther down the frontier. Public policy can counteract the market imperfections, stimulating greater investment and adoption.

Exhibit III-7: Digital Exclusion as Market Failure



Source: Mark Cooper and Barbara Roper, 2009, ; Mark Cooper, 2009b,

As the concept of "service" has become a more complex layering of services, the requisite competencies necessary to use the services have become more demanding with the concepts of material, social and cultural capital recognized as resources necessary to have meaningful access. If the market will not deploy networks that accomplish the goals of public

policy, policy makers have two choices. They can abandon the goals and accept whatever the market offers, or they can intervene in the market to correct the imperfections and overcome the market failures. The Communications Act and the ARRA embrace the latter course of action.

A. COMPLEX MODELS OF DIGITAL EXCLUSION

The complex models of broadband adoption that have been suggested in the social science literature can be linked to this market failure/investment framework in three ways. First, as shown in Exhibit III-8, the discussion has adopted a resource framework that identifies different types of "capital" that are necessary to adopt a technology. Second, the price, availability and nature of the services reflect the supply-side of the market. Third, the endowment of resources available to households reflects the underlying distribution of resources in society. Fourth, behavioral factors (motivation and perception) play an important role. These too reflect background characteristics.

Exhibit III-8: Indicators and Levels of "Capitals" of Social Exclusion

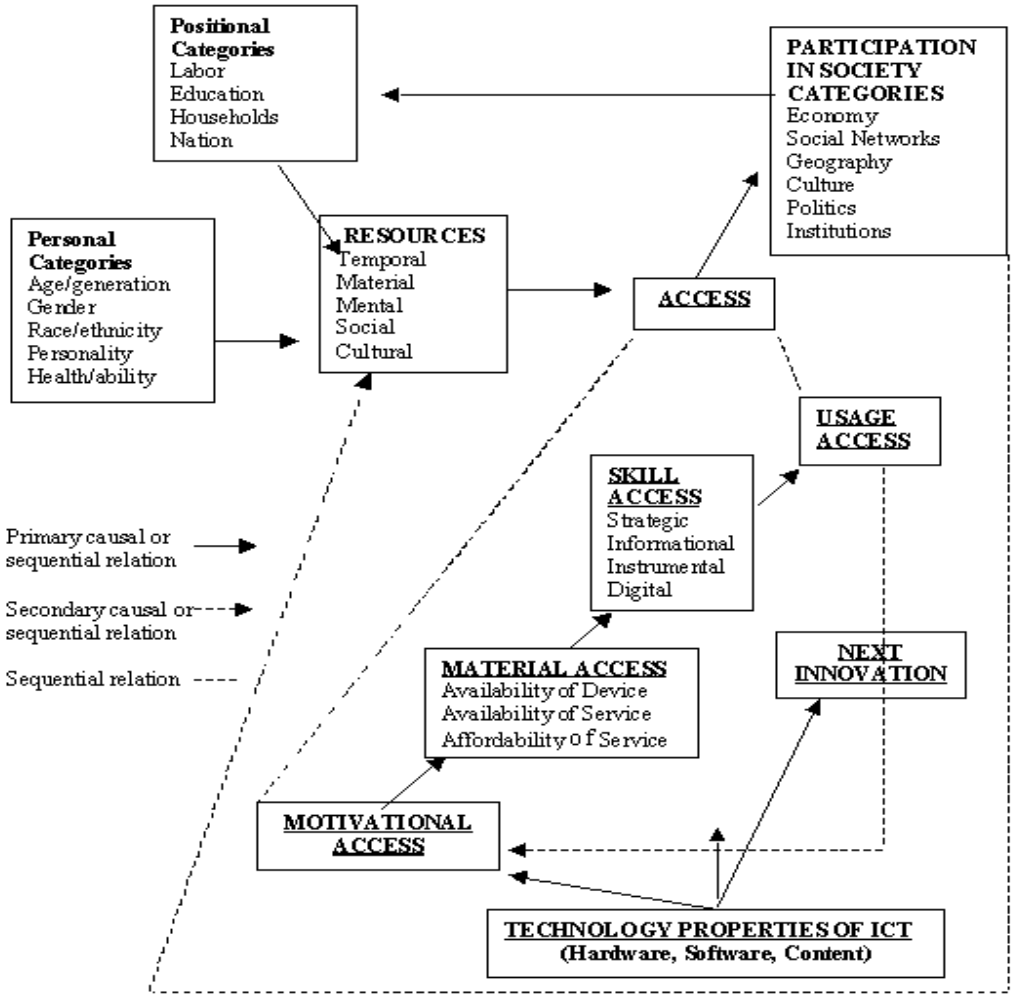
Economic	**Social**	**Cultural**	**Political**
Income	Internet networks	Gender	Political participation
Educations	Relationship Networks	Ethnicity	Civic Participation
Employment		Language	
Urbanisation	**Personal**	Generation	
	Psychological well-being	Religion	
	Physical well-being		
	Values		

Source: Communities and Local Governments, 2008, *Digital Inclusion: An Analysis of Social Disadvantage and the Information Society,* Figure 4.

Exhibit III-9 presents a model proposed by one of the more prominent analysts of the digital divide. The structural issues are framed as personal and positional categories, while the behavioral elements are framed as access barriers. The positional and personal categories in society affect the resources possessed by the household. The technology access resources are seen as a distinct set of factors. The technology properties of ICTs affect the patter of access by defining the resources necessary to adopt, as well as the value of adoption. The framework also emphasizes the recursive nature of technological development. There will be a stream of innovations that alter the access challenges.

The empirical evidence on background factors can be summarized as follows: The gap between certain groups in adoption of the Internet and broadband persists, with age, income and education the leading factors. Disability is also an important factor, although it is not frequently

Exhibit III-9: A Causal and Sequential Model of Digital Technology Access by Individuals in Contemporary Societies



Source: Jan A.G. M. van Dijk, *The Deepening Divide: Inequality in the Information Society* (Thousand Oaks: Sage, 2005), p. 24

captured, particularly in the cross-national studies.[81] Race, ethnicity and rural/urban location are smaller factors,[82] while gender has declined in importance as a determinant of adoption.[83]

[81] On the disability divide see Bricout, 2009, et. al., p.158; Advanced Communications Law and Policy Institute, 20009).

[82] Although the gender data are positive, U.S. ethnic cleavages in ICT access and use continue (DiMaggio, et al.,

The enumeration of the detailed factors that affect adoption gets quite long, as shown in Exhibit III-10, which 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 III-10: 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 Adoptio, Access and Use," Information, Technology & People, 21(3) 244-266.pp. 254-255.;

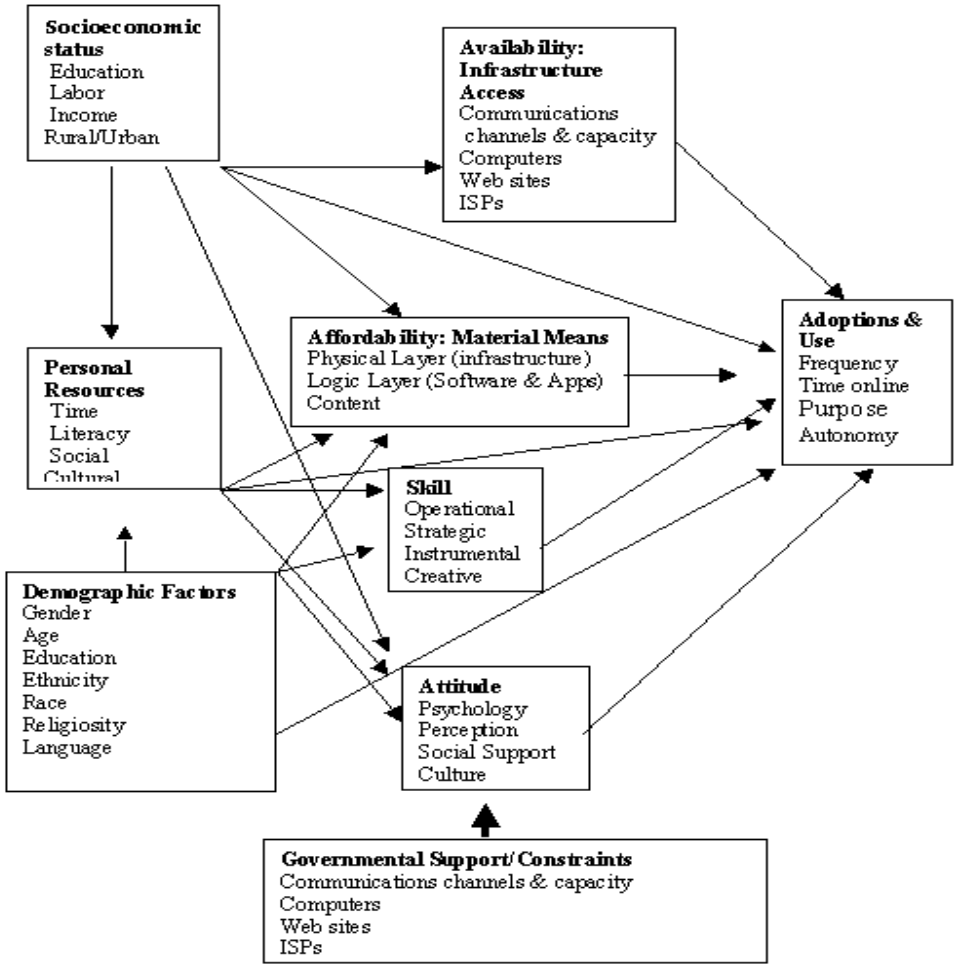
2004). Black and Hispanic adults are disproportionately offline although some evidence suggests younger Hispanics frequently text through cell phones (Fox & Livingston, 2007; Horrigan 2007; Lebo & Corante, 2003). Internet use is particularly low among older or female Latinos (Lebo & Corante, 2003; Fox & Livingstone, 2007), and English fluency, U.S. nativity, and educational level are important determinants of Hispanic only access and use. (Fairlie, 2004; Ono & Zavodny, 2007). Black and Hispanic Americans less often had home Internet access or high-speed connections (Dimaggio, et al., 2003, Losh, 2009, p. 199.

[83] "However, by the mid-2000s, many U.S. gender digital divides had closed" (Losh, 2009, p. 199, 217; Fallows, 2005; Losh 2004; de Haan, 2009, p. 297; Akhter, 2009, p. 493);

The means of material access to broadband service are only a small part of the problem. There are other barriers that must be overcome. 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 (see Exhibit III-11).

Exhibit III-11: 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.**

Thus, as impressive as the FCC's list of factors that might affect broadband adoption or digital exclusion may be, it falls short in two respects when viewed through the lens of the social science literature.

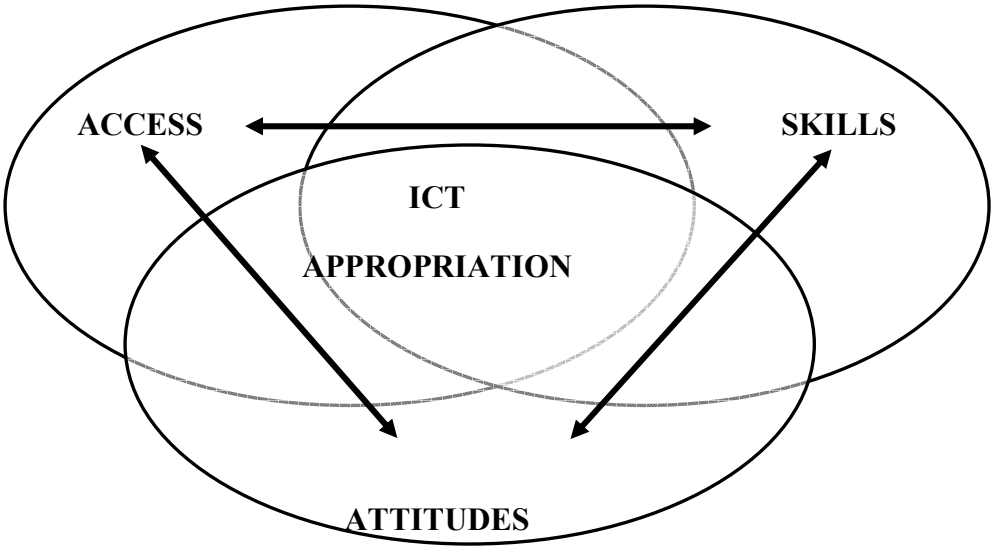
- It is far from complete; there are many more factors that affect adoption.
- There are important causal and sequential effects that should be considered.

Exhibit III-12 integrates the background factors and the proximate cause into one overall framework. The four proximate causes of broadband adoption and digital exclusion overlap because of the strength of the background factors. Exhibit III-11 makes this point in two ways. It is drawn to scale to reflect the fact that about two-thirds of all households as having 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.

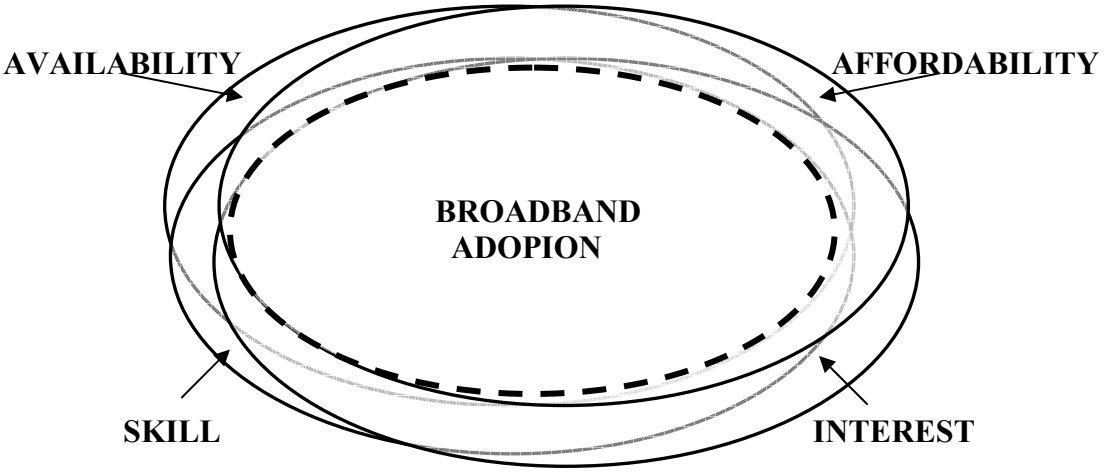
Recognizing the complex causality should not be taken as an excuse for inaction. Rather, having seen the immense value of expanding digital inclusion, complexity calls for careful policy design to address the problem and realism in expectation about results.

Exhibit III-12: Complex Causes of ICT Adoption

Three Factors, without little overlap



Four Factors with full overlap



Source: P. Verdegem and P. Verhoest, "Profiling the Non-User: Rethinking Policy Initiatives Stimulating ICT Acceptance," *Telecommunications Policy,* 31, p. 644.

IV. THE CAUSES OF DIGITAL EXCLUSION IN THE U.S.

A. DIGITAL EXCLUSION IN THE U.S.

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. Key demographic and socioeconomic factors can be used to describe the landscape of who does and does not use the technologies.

Age is the critical demographic factor. Income and education are the critical socioeconomic variables. 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.

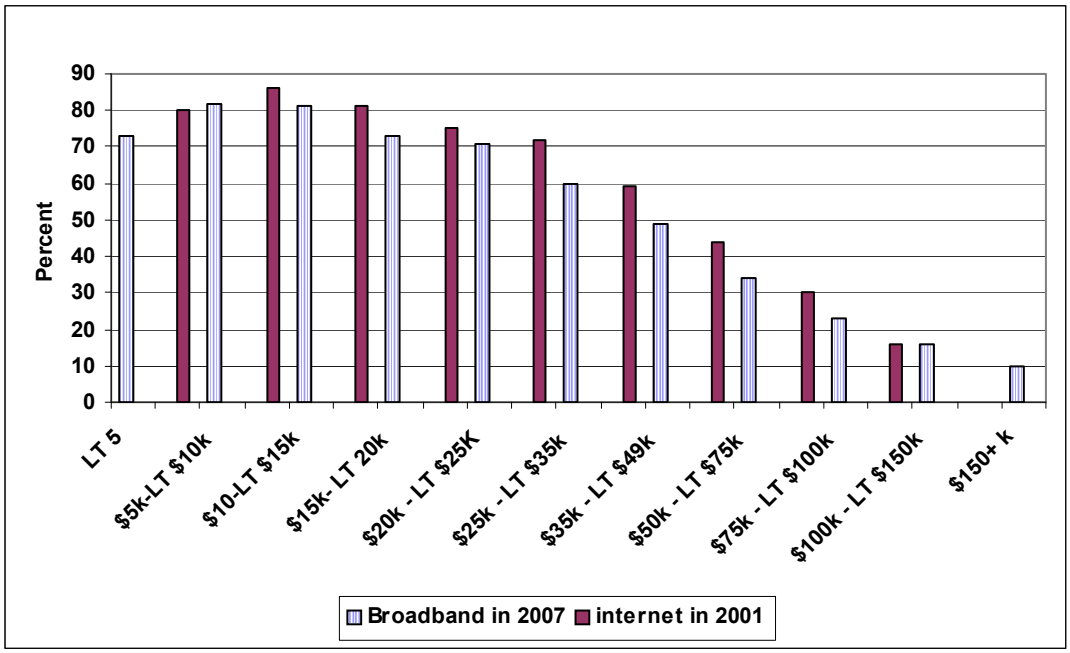
These basic underlying causes of the digital divide have received a great deal of attention. The persistence of the importance of these factors can be seen in a comparison of Internet adoption in 2001 to broadband adoption in 2007, the last time the NTIA published an analysis in the series that was at the focal point of the debate over the digital divide. As shown in Exhibit IV-1, it can be argued that little progress has been made in closing the digital divide or addressing digital exclusion. [84]

The Pew tracking surveys provide a consistent set of data to examine changes since the last NTIA analysis (see Exhibit IV-2). The key statistics on the penetration of Internet access and broadband uptake in more recent data sets suggests little change since late 2007. dial-up is disappearing.

[84] 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).

Exhibit IV-1: The Digital Divide Persists in Broadband:

Households without Broadband 2007 v. Households without Internet 2001



Source: MarkCooper, 2004

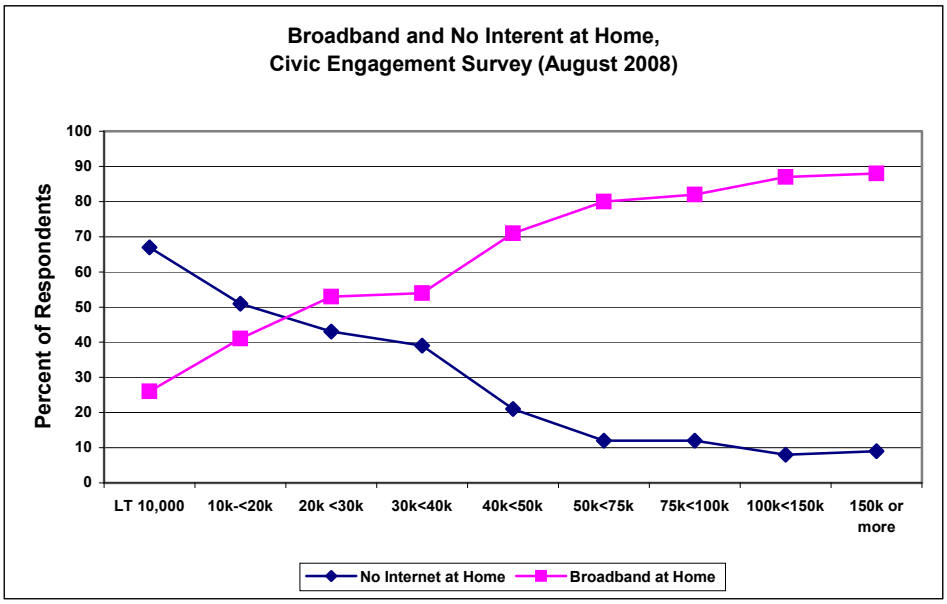
Exhibit IV-2: Trends in Internet Adoption

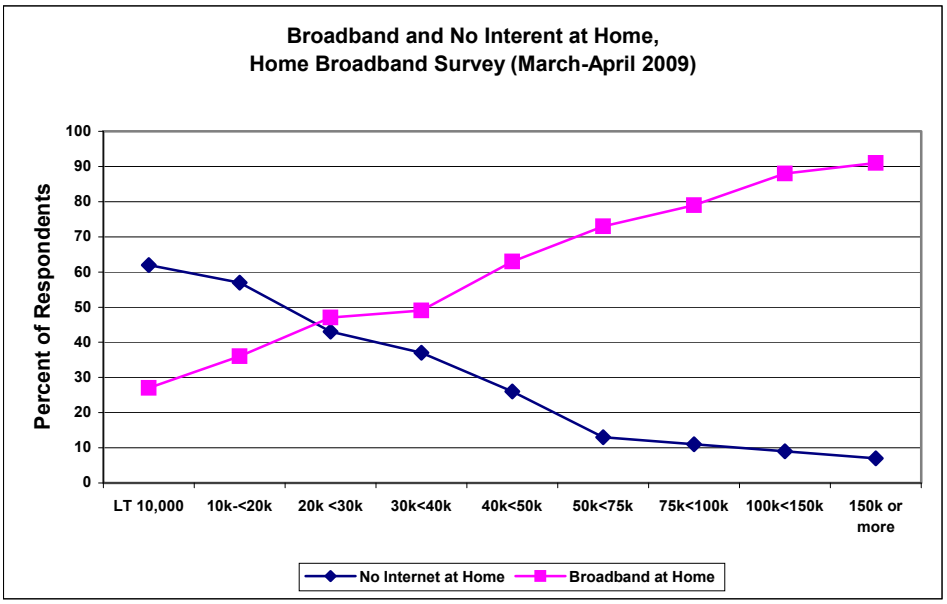
	Winter Tracking (Dec. 2007)	Winter Tracking (Nov.-Dec. 2008) Civic Engagement	Spring Tracking (Mar.-April 2009) Home Broadband	Winter Tracking (Nov.-Dec. 2009)
Internet Users	**75.0**	**73.0**	**74.0**	**74.0**
No Internet at Home	**28.0**	**31.7**	**30.4**	**na**
Dial-up	**17.0**	**9.6**	**6.5**	**na**
Broadband	**55.6**	**58.7**	**63.1**	**60.0**

Source: Pew Internet and American Life Project, various surveys.

As shown in Exhibit IV-3, controlling for income in more recent data from the PEW Internet and American Life Project demonstrates that the pattern of exclusion of low-income households persists.

Exhibit IV-3: Internet Connectivity (percent of respondents)

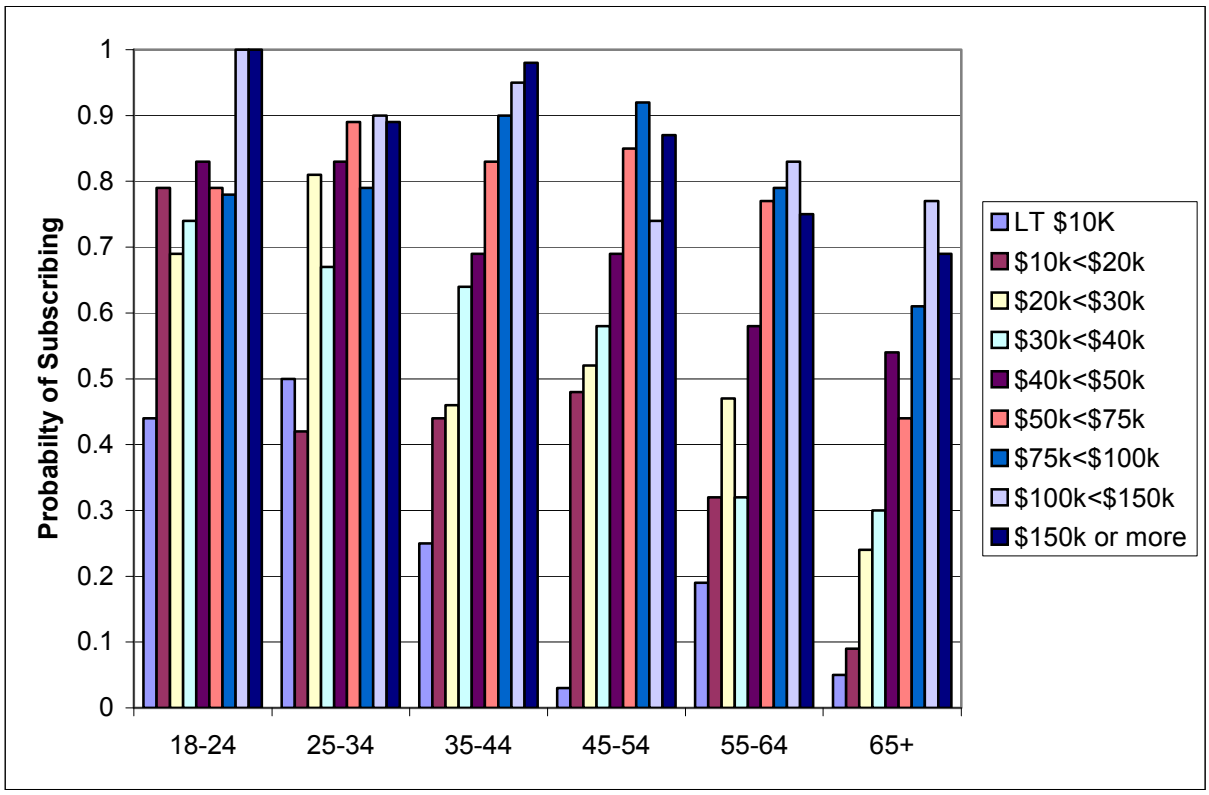




Source: Pew Internet and American Life Project, *Summer Tracking*, August 2008; *Spring Tracking*, March 2009.

Income is not the only background determinant of digital adoption. Exhibit IV-4 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-4: Age, Income and Broadband at Home

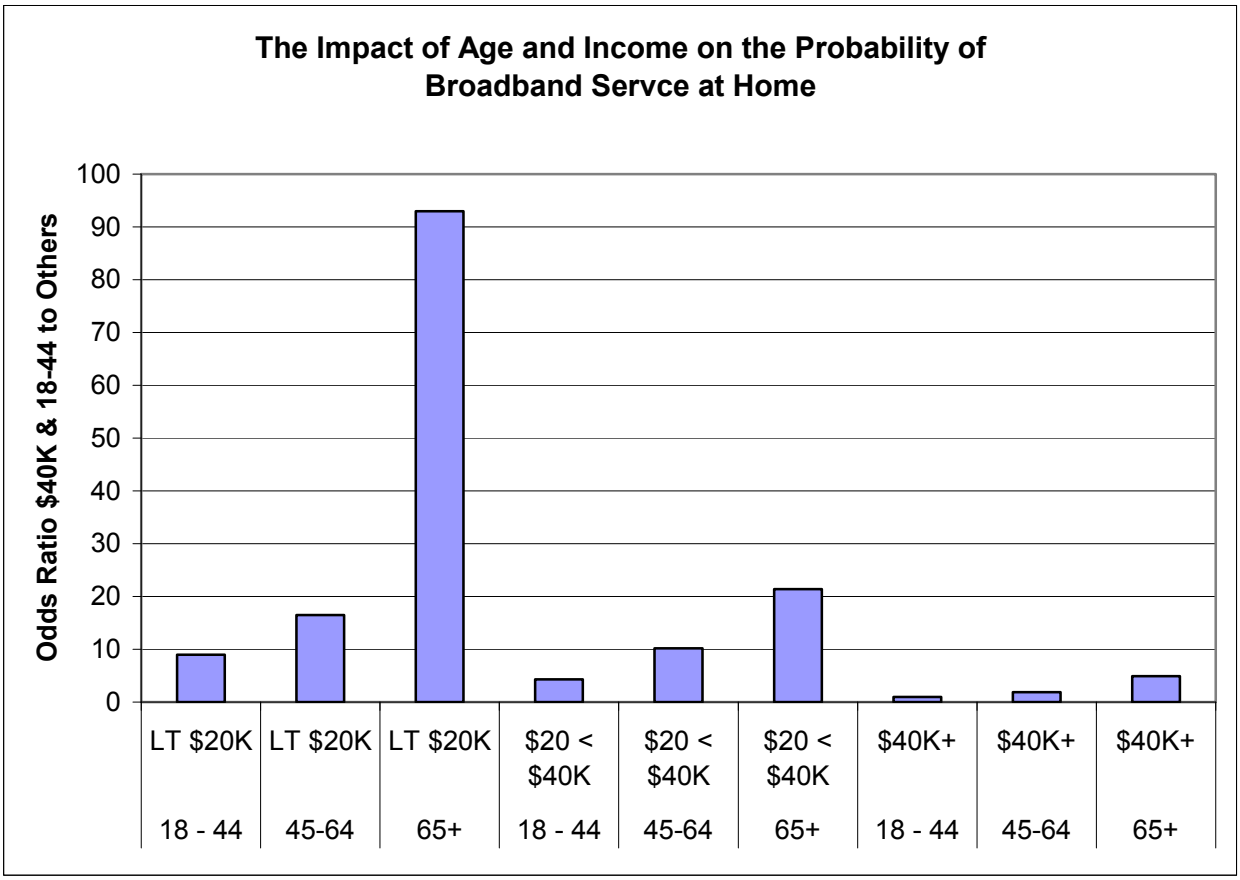


Source: Pew Internet and American Life Project, *Spring Tracking,* March-April 2009

As shown in Exhibit IV-4, multivariate analysis demonstrates the power of the two most important background characteristics to explain technology adoption. Following Dimaggio, et al, we present the odds ratio of the group with the highest take rate of broadband to the other groups.[85] 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.

[85] Dimagio, et al., 2003.

Exhibit IV-5: A Simple, Multivariate Model of Digital Exclusion



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

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.

In the early 2009 Pew survey, the easiest way to describe the income dimension of broadband adoption is to note that about three quarters of those households without broadband have income below $40,000, while about two-thirds of those without Internet are 55 or older and have education levels no higher than a high school education. As shown in Exhibit IV-6, these are much higher proportions than the proportion of the groups in the population.

Exhibit IV-6: Socioeconomic groups Disproportionately Impacted by Digital Exclusion

	% of Population	% without Broadband	% without Internet
Income – Below $40,000	42	67	73
Education – High School or less	43	62	66
Age – 55 or older	27	64	65

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

B. A SOCIOLOGICAL MODEL OF DIGITAL EXCLUSION IN THE U.S.

These demographic variables have this explanatory power because they are potent social categories. It can be argued that age, education and income are deep background characteristics that have this effect because of the way they affect the more proximate causes of broadband adoption – the material and mental resources necessary to acquire and use the technologies. Some analysts use variables like age education and income as proxies for the more proximate causes of adoption. In either case, while it is important to keep the underlying social categories in view, it is also incorrect to ignore the more complex sociological explanation that includes the complex social reality.

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.

C. METHODOLOGY

The Pew survey data includes a standard set of background and technology questions, as described in Exhibit IV-7. 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. 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.

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.

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.

Exhibit: IV-7: 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, 6= 50 < 75, 7 = 75 < 100, 8 = 100 < 150, 9 = 150 or more**
Technology			
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

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.

D. RESULTS

A standard model of socioeconomic and demographic characteristics that have been found to predict technology adoption works well in several data sets. Exhibit IV-8 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 are discussed here. The results were essentially the same.

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.

Exhibit IV-8
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		0.24	0.25	0.08	0.08
(demog. Covariates only					

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-8 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-9, 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-10, 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.

Exhibit IV-9: 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-10: Specialized Activities Measures
(OLS Betas)

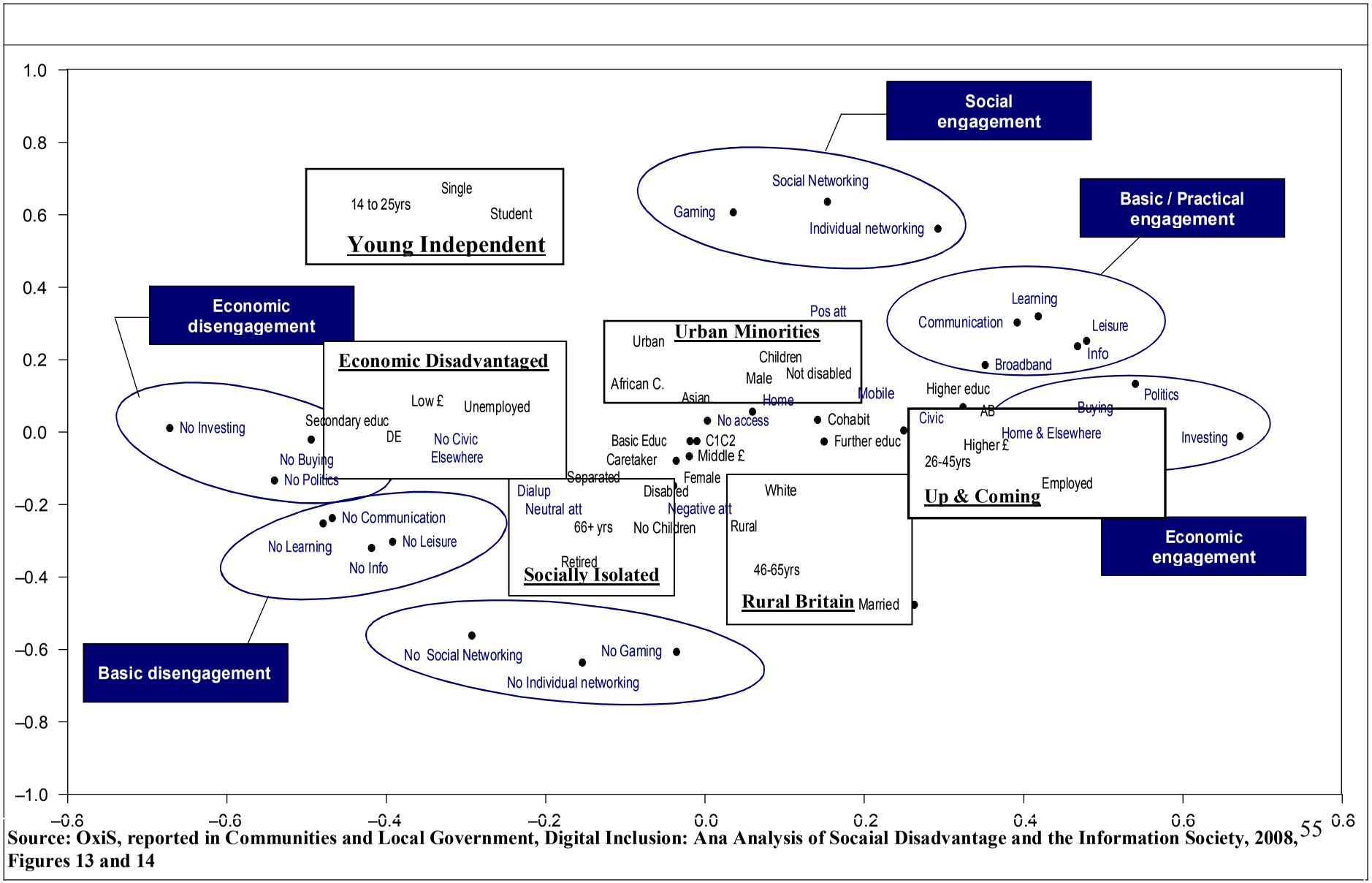
	Communication	Political Comm.	Info Gathering	Entertainment	Civic Participation	Physical Civic
Date base:	Home Broadband	Post-Election	Home Broadband	Home Broadband	Civic Participation	Civic Participation
Independent	Beta in	Beta in	Beta in	Beta in	Beta in	Beta in
Variables	Sig. only	Sig. only	Sig. only	Sig. only	Sig. only	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

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

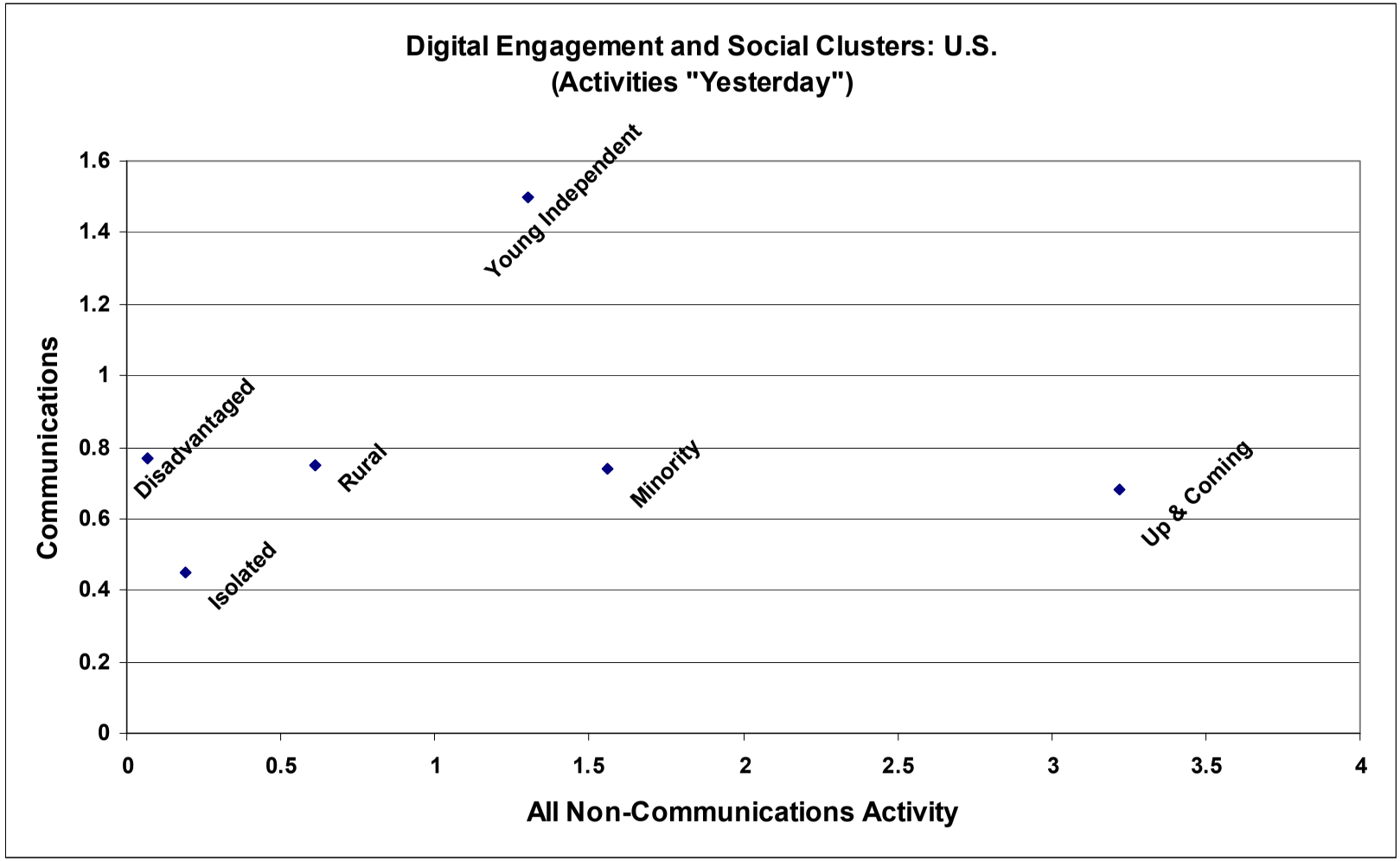
Exhibit IV-11 shows the detailed results for the U.K. Exhibit IV-12 shows the results for the U.S. The U.S. data produces a very similar result. The first three clusters have much lower levels of usage. The last two groups have much higher levels of usage

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:



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

PART III:
POLICIES TO PROMOTE DIGITAL INCLUSION

FCC QUESTIONS

The FCC's list of questions on policy is quite long. The major headings follow:

4. Overcoming barriers to adoption. As the Commission develops recommendations to maximize broadband adoption and utilization how can it remedy each barrier faced by non-adopters?

a. Many parties have suggested that the Commission utilize the Lifeline and Link Up programs to support broadband connection charges, devices and service costs for low-income consumers. What other specific federal policies or programs to address affordability of service and hardware should the Commission consider recommending?

b. Many non-adopters report that they do not have the skills to use broadband. What programs and policies should the federal government adopt to educate consumers and increase technology and digital literacy skills to ensure that individuals have sufficient ability to use hardware and navigate and process digital information and broadband-enabled applications?

c. The Pew study found that 50% of non-adopters cite reasons that can be classified as lack of relevance as their primary reason for not using broadband.[13] Should the federal government do more to help non-adopters understand how broadband is relevant to them?

d. For each program or policy recommendation above or newly proposed, please consider and comment on the following issues:

e. What role should state, local or Tribal governments have in developing and administering adoption programs and how should the federal government encourage such involvement?

f. What role should private industry have in developing and administering adoption programs and how should the federal government encourage such involvement?

g. What role should non-profits have in developing and administering adoption programs and how should the federal government encourage such involvement?

h. How should the success of each program or policy be measured, what data is necessary to evaluate success and how should such data be collected?

5. Learning from existing programs. As we consider which recommendations to maximize adoption and utilization should be included in the National Broadband Plan, the Commission would like to rely on data and lessons learned from existing demand stimulation efforts. The Commission asks all parties to submit any quantitative data, studies, or analyses regarding both successful and unsuccessful programmatic efforts to address broadband adoption and usage. Although anecdotal information may be helpful, such data beyond anecdotal information will better enable the Commission to make specific policy recommendations.

For each program, please address, where possible:

a. What are the program goals? Does the program focus on a specific barrier, such as digital literacy, or does it address multiple barriers, for example, by providing free or discounted equipment and service in conjunction with skills training and education about relevance?

b. What state, local or Tribal governmental entities were involved? What entities from the private and non-profit sectors were involved?

c. How successful has the program been, and how was success measured?

d. For programs that include digital literacy training, what is the curriculum? Which of the following categories of digital literacy subject matter are addressed by the program?

e. If the program is focused on digital literacy or includes specific content or applications is it customized for particular groups?

f. How many consumers and what size community are served by the program? Is the program focused on particular demographics or special groups, such as the elderly, persons with disabilities, Indian tribe members, or non-English-speaking populations, or is it offered to the general public?

g. To how many participants and to what size community or geographic area could this program be effectively scaled, if at all?

h. What are the program costs, in total and per participant? What is provided for these costs? For example, do these costs cover any equipment that participants may take home with them, either during the program's duration or permanently?

i. What challenges did the program experience?

j. What, if any, consensus is there among existing adoption programs, locally or nationally, on best

V. POLICY RECOMMENDATIONS IN THE LITERATURE

The long list of questions is commensurate with both the complexity of the causes of digital exclusion and the policy recommendations that have been offered in the literature.

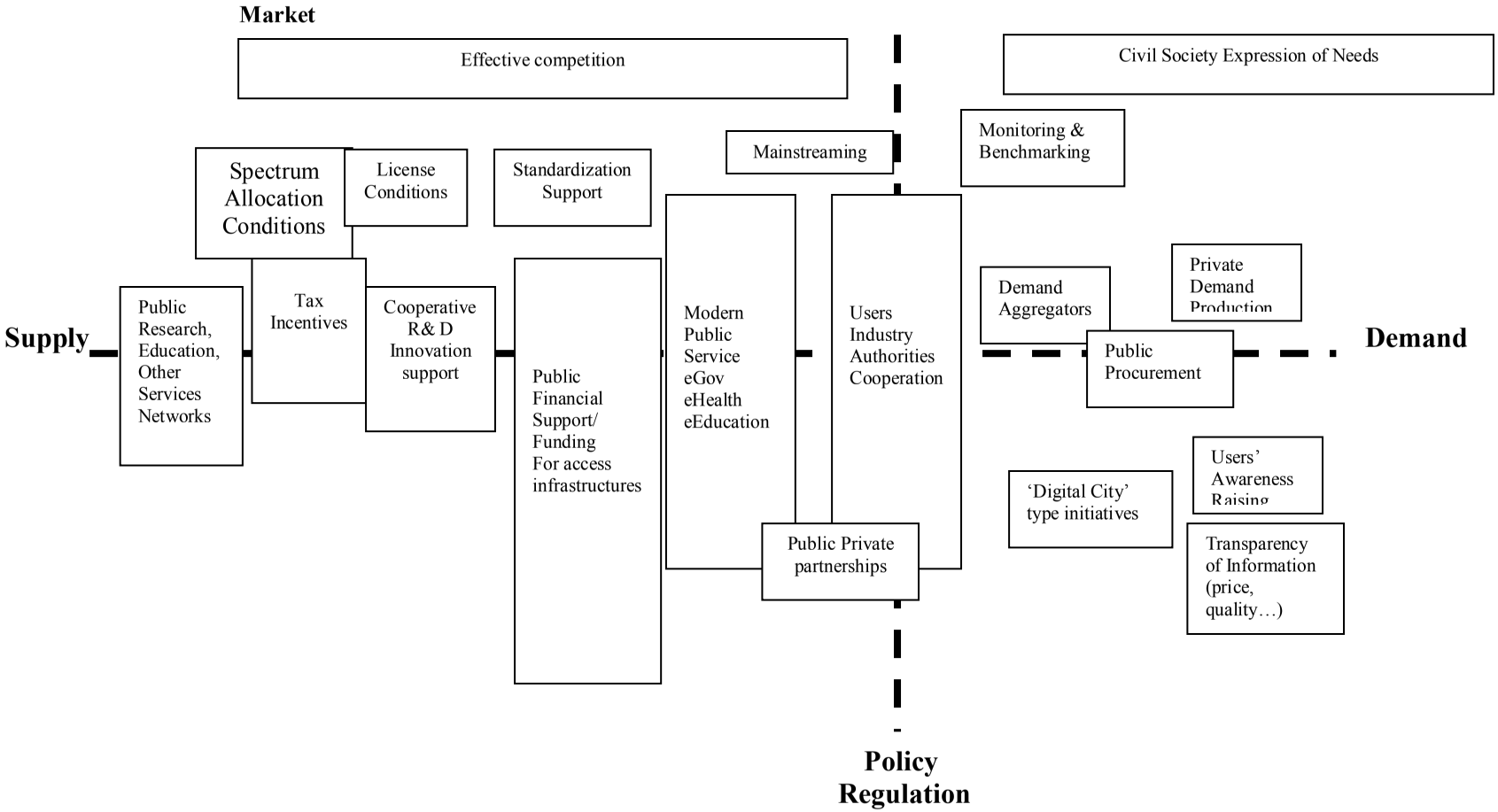
Exhibit V-1 presents one comprehensive policy map that appears in the literature. It identifies both supply side and demand side policies, which is appropriate given the important emphasis that the framing of the digital exclusion issue places on use of the digital technologies. It identifies market-based and regulatory approaches. Given the persistence of digital exclusions through two decades of deployment and three generations of technology, it should be noted that the most market-oriented approaches, have failed. Beyond relying on "effective competition" and "civil society expression of needs" that are over a dozen policies identified.

Exhibit V-2 present a similar policy map, but uses different axes. Supply and demand are still the causal variables on the X-axis, but they are defined by whether the target is economic activity or social activity. The Y-axis in not regulatory policy, but rather the underlying barrier to adoption that is being addressed. The categories are familiar, resources, uses and the technology environment.

Exhibit VI-3 shifts from the realm of theory to the realm of practice. It shows a list of policies that have been implemented to address specific causes of digital exclusion by developed nations.

The literature is ripe with recommendations, as shown in Exhibit V-4..

Exhibit V-1: Policy Tools Related with Objectives for and Beyond Universal Service



Source: Feijoo, C. and C. Milne, "Re-thinking European Universal Service Policy for trhe Digital Era," I*nfo,* 10:5,168.

Exhibit V-2: Strategic Framework Underlying Factors, Type of Influence and Policy Action

Type of Influence	Supply-side Economic	Supply-side Social	Demand-side Economic	Demand-Side Social
Influencing Factor				
Enablers and Means	Economic development Price caps for BB service	Legislation in support of e-business/Telework Universal service Obligations	improved access to PCs Tax incentives for investment in PCs & Internet connection	General Increase of e-awareness Encouragement of the usage of telework
Usage of Information Services	Support of service development Public private partnerships	Development of C2G & B2G services	Encouraging C2G	Increase of e-service awareness
ICT sector environment	Techno-economic Modeling Public-private Partnership	Regulation	Action to decrease switching costs	

Source: Peter Trkman, Borka Jerman Blazic and Tomaz Turk,2008, "Factors of Brodband Development and the Design of a Strategic Policy Framework," Telecommunications Policy, 32, 112.

Exhibit V-3: 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.

Exhibit V-4: A Sampling of Qualitative Policy Recommendations

Schools, community centers, libraries, corporations and government all have a vested interest in raising technology skill and literacy for all members of society. Indeed it is difficult to imagine a better investment for the future (Jackson, et al., 2009, p. 235).

Improve web sites, improve skills (van Dijk and van Deursen, 2009, pp. 288-289.

Policies that seek to revise older, monolithic conceptions of literacy into more nuanced and multifarious ideas of cognition and social learning are more likely to succeed as one key building block in re-thinking remedies to the digital divide. (Dunn, 2009, p. 331).

Alongside demonstrable market-driven price reductions, there is need then, for more strategic public policy interventions that can confer a wider range of benefits, including information literacy, content production training, and capacity building to achieve more meaningful change. Understanding ones information needs, finding such information, and using and evaluating that information are now critical skills necessary for empowering marginalized people to be active participants in the information society (Dunn, 2009, p. 335).

There is a group of core measures we could consider directly targeted towards improving the appeal of broadband in the short term: online e-government, e-health, e-learning… promoting ICT in enterprises (particularly SMEs)… increase the number of broadband, accesses in schools and libraries… financial incentives for any new broadband access… improve confidence in the usage of networks and stimulate consumer trust in information society services. (Feijoo, 2009, p. 415).

The first level (technology availability) can be addressed by the most traditional digital divide policies, providing device and conduit access at sustainable prices to growing parts of the target populations (fostering the diffusion of community technologies, as well as supporting infrastructural modernization, and sustaining the digitalization of single households.

The second level (real access) can be addressed by focusing on users' motivations: the diffusion of valuable content, specifically produced to meet people's (local) needs, and a growing attention to usability and interaction design, could increase the perceived surplus value of ICT for everyday purposes and, therefore, strengthen the users' motivation. A key element would be producing specific services and applications for underserved groups...

To address the following levels of the proposed model, educational policies (both formal and informal) have to be implemented at both the macro and at a micro level. New media literacy offers a complex framework: in the proposed model it includes reception practices, active production skill and network skills. (Comunello, 2009, p. 601).

Practical local information: local listing of jobs and housing, job training programs, low-cost child care, public programs for families, public benefits news, tax filing support, immigration assistance, information on local clinics, lower cost insurance resource:

Cultural local information: Community information, special sites for ethnic and local cultural information, interests and activities.

Information at a basic literacy level: Information not only composed and compiled for children but also for adults (e.g. learning materials with multimedia components, literacy programs, homework assistance)

Multilingual content: Information in minority languages produced by minorities by themselves, with familiar cultural figures and examples. (van Dijk, 2005, p. 105.

Because of the eight year moratorium on public policies to promote broadband adoption imposed by the Bush Administration's trickle down approach, the U.S. has virtually no direct experience with any of these programs. Moreover, because the solution to the broadband adoption program is local, in the sense that the economic, social and cultural circumstances of the household are the drivers of adoption, to catch up, the U.S. must build its broadband promotion policies from existing structures, rather than try to create new organizations and institutions. For example, the FCC's universal service programs can be turned to the task of broadband adoption. The anchor institutions involved in the e-rate program can expand their role to include provision of service in areas where digital exclusion is high. The FCC asks whether there are other agencies that are better suited, or have clear authority, to address different aspects of the problem of digital exclusion. There are obvious possibilities here, as suggested by Exhibit VI-5 shows some possibilities in this regard.

Exhibit IV-5: Matching Agencies to Barriers to Broadband Adoption

	Barriers to Digital Inclusion			
	Availability (Facilities)	**Affordability (Price)**	**Skill (Training)**	**Interest (Content/Apps)**
Agency				
Federal Communications Commission	**X**	**X**		
Rural Utility Service		**X**	**X**	
Housing and Urban Development		**X**		
Commerce/NTIA			**X**	**X**
Health and Human Service			**X**	**X**

VI. POLICY RECOMMENDATIONS

A. A BOLD GOAL REQUIRES BOLD ACTION

Given the clear intent of Congress to achieve universal access to, affordability and maximum utilization of broadband and the strong empirical evidence that digital exclusion imposes severe harm on the disconnected individuals as well as our nation as a whole, the FCC should adopt an overarching goal to that guides policy.

- **The FCC should declare the goal of raising the level of broadband adoption to the current level of telephone penetration (over 90%) within the next decade.**

To accomplish that goal public policy will have to systematically address the four major barriers to broadband adoption that have kept about one-third of U.S. households from being included in our digital economy and society – availability, affordability, technology skill and interest.

The FCC has primary responsibility for two of these barriers (availability and affordability). In the existing universal service and high cost funds that it administers the FCC has a continuous stream of resources to begin promoting universal access to and maximum utilization of broadband. It should initiate the necessary proceedings immediately. As with the lifeline and link up programs from the telephone age, the FCC will have to learn the levels and types of subsidies necessary to achieve the goal by evolving the programs based on real world experience.

Since the FCC has been tasked by Congress to formulate the National Broadband Plan, it should also identify specific actions that other agencies can take to address the full range of barriers to broadband adoption. Policies to address the other two primary barriers to broadband adoption (technology skill and interest) should be implemented through community-based institutions, including schools, libraries and technology centers.

- **The multiple literacies necessary to adopt complex technologies must be in the language that is meaningful and accessible to individual users. These languages are best conveyed by members of the local community.**

- **Similarly, the development of applications and content that are relevant to non-adopters are best developed by members of their communities who have adopted and use the technology.**

The funds made available by the ARRA, as well as those available to the FCC through its universal funding mechanisms, should be used to deploy a variety of approaches so that the most effective approaches to the long-term solution can be identified. The FCC should acknowledge two facts about the problem of digital exclusion. First, it should declare that immediate steps are necessary to address each of the major barriers to universal broadband adoption and maximum utilization. Second, it should recognize that the immediate steps are just the beginning of what

must be a long-term commitment to broadband adoption.

There is a wide-range of available technology, education and community-development programs available that can become the vehicle for the broadband adoption initiative. As with the FCC programs to address the barriers most directly subject to its jurisdiction, the agencies addressing the other barriers should immediately add promotion of broadband adoption to the goals of the most appropriate existing programs and evaluate their performance to arrive at the most effective approaches.

The empirical evidence supports the Congressional decision to set a bold goal for universal access and maximum utilization of broadband. The call for a comprehensive National Broadband Plan reflects a recognition of the importance and difficulty of achieving the goal. Congress could not have expected the problem to be solved over night, nor could it have believed that the funds allocated in the ARRA alone would be enough to do the job. It did expect the FCC and the other federal agencies with the jurisdiction and expertise to begin working on the solution immediately, to use the funds allocated to good effect, and to identify the additional steps necessary to accomplish the ultimate goal

B. ANSWERS TO THE FCC QUESTIONS

1. Measuring Broadband Adoption: The Recovery Act requires that the NBP include a detailed strategy for achieving maximum utilization of broadband infrastructure and service. Maximum utilization can only be achieved by increasing broadband adoption rates. As the Commission establishes goals to maximize utilization of broadband, how should we measure adoption? Adoption statistics often focus on individual or household subscription rates. Is that the best way to measure adoption? If not, what are the alternatives?

Digital inclusion is an extension of the goal of universal service in telecommunications policy. Since the Communications Act of 1934, we have generally defined universal service as the adoption by all households of telephone service. The Telecommunications Act of 1996 explicitly envisions the extension of this concept to advanced telecommunications and information services, of which broadband is a perfect example.

Household subscription is the standard that historically has been used to measure universal service and it is the correct standard to use to assess broadband adoption.

a. Is someone who frequently accesses broadband at work or in the library, but not at home, an "adopter?" Is the use of a web-enabled smart phone sufficient to make someone an "adopter" of broadband?

Use of the broadband Internet has become so pervasive across all aspects of daily life – economic, social cultural, and civic – that one must conclude that individuals forced to conduct all these activities in public places will be severely constrained in their ability it to fully participate in 21st century society. These institutional settings can provide an occasional

opportunity to address the most severe impact of digital exclusion, but they cannot be considered adequate for routine and ongoing access to activity in cyberspace.

At the same time, these institutions can play a vital role in promoting broadband adoption. Broadband adoption requires not only physical access to connections points and the material resources to obtain access, but also motivational interest and functional capabilities to use the technology. Libraries, technology centers and similar locations are ideal environments to expose the digitally excluded to the new technology because the staff has experience with the technology and the portfolio to assist users. Therefore, they are contexts in which key skills can be learned and the value of the technology can be made evident.

b. Should adoption be measured more by the manner, type or frequency of use of certain types of applications? If so, will those applications be standard across all groups of people?

Use is the ultimate measure of adoption. Universal service in telecommunications was never measured as the mere availability of telephone service to the household; it was always measured by subscription to the service. Given the nature of telephone service and the approach to pricing (i.e. flat rate local service) once a household subscribed, it could be reasonably assumed that usage would follow. For full participation in digital communications, the question of usage requires closer scrutiny. The nature of digital communications is more complex and the uses of digital communications are more varied than plain old telephone service.

Rather than focus on specific applications, however, the FCC should look to broad categories of types of activities that have been deeply affected by digital communications. Ranked in order of their "policy" relevance as compelling reasons to support universal service, the categories of activities include entertainment, information gathering, personal communications, economic opportunity, civic participation, and creative production.

Further, as the agency that has been charged with drawing up the national broadband plan, the FCC should be cognizant of both the broad scope of impact of broadband and the narrow jurisdiction of federal agencies. The FCC should not restrict its vision to the policies that reside within its jurisdiction. If the FCC identifies specific barriers to broadband adoption that are beyond its reach as the regulator of communications services, it should flag the problem and identify potential solutions in the jurisdiction of other federal agencies or recommend legislation to Congress to create the authority needed to address the problem if no such authority exists at present.

However, recognizing the limits of the FCC authority to address the broad range of issues that affect broadband adoption should not be a justification for inaction. There are key elements of a policy to promote digital inclusion that fall squarely within the scope of FCC authority. Indeed, some of the most important, necessary conditions for broadband adoption – the availability and affordability of service – are at the core of the FCC's mission. The fact that improving these two conditions alone might not solve the entire problem should not be seen as an excuse to do nothing. Improving the availability and affordability of broadband service will improve broadband adoption, without any other actions. The impact of other policies that address the motivation and ability to use broadband service, which are also important

determinants of broadband adoption, will be magnified, if the availability and affordability of service have been improved by FCC policy. Thus, FCC policy to promote availability and affordability will contribute directly to broadband adoption.

c. If we measure adoption using some metric or combination of metrics other than home penetration, how can we benchmark improvements over time?

For the reasons stated above, the FCC should use home adoption as the metric to measure broadband adoption.

2. Cost of digital exclusion. **The Commission would like to understand the costs faced by individual consumers who do not adopt broadband as well as the societal costs of having a large portion of society that remains un-connected to broadband.**

a. How can the Commission best quantify the costs faced by non-adopters?

The Commission can certainly conclude, as demonstrated in the attached study, that the dramatic differences in the level of activity in cyberspace between those who have adopted broadband at home and those who have not impose a severe cost on the digitally excluded. It can also demonstrate that the differences in cyberspace between the connected and the disconnected are larger than the difference in physical space. In other words, digital exclusion results in digital deprivation and increases social inequality.

Such a demonstration is an adequate basis to justify policies that close the digital divide and promote digital inclusion. Efforts to monetize the value of digital inclusion will be difficult for several reasons, nor are they called for under the statute.

First, the Communications Act of 1934, as amended by the Telecommunications Act of 1996, makes no mention of a cost benefit test that should be applied to policies to promote universal service. The FCC is charged with ensuring advanced communications and information services that are deemed worthy of universal service support are affordable and available across geographic and demographic groups in a manner such that they reasonably comparable services are priced in a reasonably comparable manner.

Second, many of the activities from which the disconnected are excluded are civic, cultural and political, rather than economic. It is inherently difficult to place a monetary value on sending a letter to the editor, signing a petition, visiting a web site to gather information, or posting a comment on blogs, but these are deemed essential parts of citizen participation on civic life.

Third, while it is possible to identify large direct economic benefits of broadband adoption, a significant part of the economic impact of general purpose technologies, like the set of information and communications technologies that constitute digital communications, is intangible, embodied in network and spillover effects and changes in the organizational structure that result shift the entire production function, rather than create movement along an existing function.

Fourth, the value of the benefits of economic activity in cyberspace is widely recognized, but difficult to quantify and the value of activities to people at different levels of income varies. A dollar of value delivered to a lower income household has a bigger impact, on a relative basis, than a dollar of value delivered to an upper income household.

Thus, efforts to quantify benefits must not only reflect the full range of benefits, their importance to the affected households, as well as the nation, they must also recognize that there are many non-quantifiable benefits that do not enter into the calculation.

b. Do these costs vary by demographic or other factors?

Not only do the costs vary by demographic and other factors, but the benefit also vary by these factors.

c. Which of these costs absolutely depend on broadband technology rather than access to the Internet more generally?

Broadband is now the standard for access. Dial-up access is disappearing rapidly because the network and its services are now designed with broadband in mind. Thus, it is no longer possible to participate fully in cyberspace with less than broadband service.

d. Which of these costs absolutely depend on access at home (fixed or mobile)?

For the reasons stated in response to question 1, the availability of broadband in public places cannot be seen as a measure of adoption. The distinction between fixed and mobile is irrelevant, as long as the mobile access technology can support the use of the network that is adequate to support the activities that are deemed to be essential elements of service. Moreover, just as mobile communications have become a key component of the 21st century communications environment, mobile computer is likely to become a key component of the digital ecology. Mobile broadband is an extremely attractive technology because it can meet the needs for broadband and mobility, as long as the technology delivers "adequate" functionality to conduct activities in cyberspace.

e. Are there certain minimum hardware requirements necessary for an individual to overcome the costs of exclusion?

The statue requires reasonably comparable services are reasonably comparable rates. Therefore, the typical level of service that is subscribed to is the standard to which universal service aspires. As the network evolves to higher levels of functionality, so too should the universal service standard. That is the approach that was implicit in the Communications Act when it defined the outcome as "adequate" facilities at reasonable charges for sixty years. This approach was made explicit in the Telecommunications Act of 1996.

f. What societal benefits are foregone, when a large group of the population has not adopted broadband? We seek input on how to frame this issue (what are the categories of societal costs and benefits) and how to measure it.

The Congress has identified the range of activities that are at the center of the concern about broadband adoption and use. The list of activities offered by Congress is supported by the social science literature – 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. Broadband delivers significant societal benefits in all of these areas.

Individuals are harmed and society is diminished when the people of the United States are unable to access and use broadband to undertake the activities targeted by congress. The study in the Appendix identifies a large number of the recent empirical studies that demonstrate the Congress was correct in its concerns about these activities. For legal and empirical reasons, the FCC should accept this list and the conclusion that universal broadband adoption and maximum broadband utilization will promote the welfare of the public because it will improve societal performance in all of these areas.

3. Barriers to adoption. The Commission wishes to further understand the reasons why some consumers, who have access to broadband, do not adopt. The 2009 Pew Broadband Adoption Study found, generally, that relevance, price, availability, and usability were the main reasons cited for not using broadband at home. Based on this and other research and comments filed in the record, the Commission believes that the primary barriers non-adopters face include: affordability of service, affordability of hardware, insufficient digital and technical literacy levels, unawareness of the personal relevance and utility of broadband technology and online content and an inability to use existing technology and applications due to physical or mental disabilities.[5]

a. Is this an accurate and comprehensive list of barriers faced by non-adopters?

The barriers to adoption are well-known and a consensus has emerged around a basic set of resources that are necessary to enable a household to adopt. Four broad categories of barriers are clear in the literature – availability, affordability, skills and interest. Since the digitally excluded tend to be lower income households and less well-educated the barriers tend to overlap.

Half of the respondents to a recent survey who do not have Internet or broadband at home identify one of these four factors as the main reason they do not have broadband. One-fifth did not have interest in the service; one-seventh cited cost as the problem; one-seventh said they did not have the service available; one-twentieth said they did not have the necessary skills. The only one of these numbers that can be tested with other, objective data is the percentage who said the service was not available. They constituted 4 percent of the total sample, which is reasonable.

b. Do concerns about consumer protection such as privacy/anonymity, ID theft, child protection, viruses and data preservation, etc. pose a significant barrier to adoption?

Generally no. The one-quarter of respondents who did not cite any of the four major causes of non-adoption did not cite these factors as the reason they had not adopted service. Less than one half of one percent cited these factors. More refined understanding of the causes of

non-adoption would be useful, but the FCC has more than enough data to move forward to address the general causes of non-adoption.

c. Are non-adopters influenced by a lack of clear, accurate, and sufficient information available to them about broadband service offerings and price?

As described above, respondents to national survey's who do not have the Internet at home generally give precise responses about why they do not have the Internet that generally fall into one of the four major categories identified above. To the extent that a lack of interest reflects a lack of appreciation of the technology, the problem may one of education, not just information.

d. Which groups are least likely to understand the relevance of broadband? For groups that already understand the relevance but face other barriers, how did they become aware of the relevance and benefit of broadband to their lives?

The problem is not just the lack of sufficient information about what is out there; it may be a lack of content and applications that are directly relevant to their daily lives.

e. How do these and other barriers affect specific populations or demographic groups and to what extent do specific populations or demographic groups face multiple barriers?

The econometric evidence indicates that, statistically speaking, it is a combination of barriers that suppresses the adoption rate and the lack of utilization of the Internet. Moreover, it is important to see the lack of adoption and use as the failure to adopt the entire technology set necessary to use the Internet. Above all, the lack of use of computers is a key factor in the lack of broadband at home and the resulting lack of use of the Internet. Moreover, there are a small set of background characteristics that are associated with a lack of adoption of the technology. Age, income and education are the master background variables that affect computer use, broadband adoption and Internet utilization. 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. Rural location is a lesser factor that consistently affects the three key technology adoption measures. Rural location is probably acting, in part, as a proxy for a lack of availability.

The sociological model for policy intervention is clear. Policies to increase the technology resources available for older, low income, lesser-educated, rural and black households will target the groups most likely not to have adopted or utilize broadband. The concept of resources needs to be broadly defined to include the material resources necessary to acquire both the hardware and communications services needed to adopt broadband, the skills necessary to use the service, and an understanding of the value of the service to the household.

f. In proposing recommendations to address these barriers, should the Commission prioritize among barriers? For example, should the Commission prioritize based on the

amount of resources needed to address the barrier? Is there a better way to prioritize recommendations?

The four major barriers to adoption should be addressed at the same time because they interact and overlap. If the policy targets one barrier and neglects the others, the results will be disappointing. The FCC needs to approach this important and complex problem broadly and in the long-term. Some of the barriers to adoption and utilization are related to communications infrastructure that lies squarely within its jurisdiction. However, some of the barriers affect social capital and resources that lie beyond its jurisdiction. The Congress charged the FCC with coming up with a National Broadband Plan that covers all barriers and agencies. The FCC would fail to do the job Congress assigned it in the ARRA, if it shies away from identifying the full range of actions necessary to achieve the goal of universal broadband access and maximum utilization. The FCC would fail to do the job Congress assigned it in the Communications Act, if it does not move swiftly to use the authority it has to implement policies that would promote broadband adoption.

Having identified the barriers to adoption and use, the FCC should identify the agencies that have the jurisdiction or expertise to best implement policies to overcome the barriers and, because it was chosen to conduct the initial study of broadband adoption, it should present its understanding of what those policies should be. These recommendations should be given great weight by the other agencies.

At the same time, the FCC should immediately institute policies to begin overcoming the barriers that fall within its jurisdiction. Its organic statute gives it the authority and its existing universal service programs (lifeline, link up, high cost fund, etc.) give it the resources to begin addressing the availability and affordability barriers immediately.

4. Overcoming barriers to adoption. As the Commission develops recommendations to maximize broadband adoption and utilization how can it remedy each barrier faced by non-adopters?

As the agency with oversight over the nation's communications network, the Commission must play an active role in overcoming the barriers to broadband adoption and use. It has existing authority and non-budgetary resources to implement programs to address the barriers that fall within its jurisdiction.

Availability:

Use high cost funds to promote the deployment of least cost technologies that provide "adequate" service at affordable rates.

Manage the spectrum to promote ubiquitous, availability of wireless broadband at affordable rates, including policies to ensure rapid development of spectrum licenses purchased at auction by private parties and the dedication of a portion of the spectrum to unlicensed use on a national scale with both a set-aside of spectrum nationwide and rules that promote the utilization of white spaces for broadband deployment.

Recommend that e-rate anchor institutions become hot spots providing low cost access in areas where broadband adoption is below the national average.

Promote a division of labor between the Rural Utility Service and the FCC in allocating resources to ensure universal availability of affordable broadband service.

Affordability:

Use lifeline and link up funds to lower the cost of broadband for low-income households, including the construction of fiber highways to lower the cost of service.

Promote middle mile capacity and competition to lower costs and increase availability (including reform of special access).

Household Technology Resources

The skill and interest barriers require broad programs of education and application development. The Commission should recognize the importance of anchor institutions – school, libraries, technology centers and other community-based organizations – as the focal point for improving the technology skills and interest of non-adopters. The Commission should call on other agencies (Agriculture, Housing and Urban Development, Health and Human Services, Education, Commerce) quickly task existing programs with commencing broadband adoption initiatives.

a. Many parties have suggested that the Commission utilize the Lifeline and Link Up programs to support broadband connection charges, devices and service costs for low-income consumers. What other specific federal policies or programs to address affordability of service and hardware should the Commission consider recommending?

i. Should the Federal government support the cost of broadband service and associated hardware for low-income consumers through vouchers, tax incentives, or low interest loans? Should support or tax incentives be aimed at consumers, service providers, hardware providers or other parties?

ii. Many broadband providers bundle service offerings. How should bundled services be taken into account in developing recommendations focused on the affordability of broadband service?

iii. Should the Federal government offer a broadband hardware purchase program, similar to computer purchase programs offered by other countries through which the government would purchase hardware aggregately at a discount and then re-sell the hardware to low-income consumers? Should the government encourage state governments, private industry or other parties to offer such programs?

iv. Should the federal government find ways to incentivize private hardware donations? What are the benefits and limitations of refurbished hardware

programs?

v. Should programs aimed at reducing the cost of hardware be limited to certain types of hardware?

vi. How else can broadband hardware and service be made more affordable to low-income consumers?

Until the Commission begins using the lifeline and link up programs to support broadband adoption it will have no way of knowing what additional resources are necessary (i.e. the magnitude of the discount necessary to address affordability issues). The first step should be to launch the lifeline and link up support with aggressive efforts to increase adoption and careful analysis of the impact of those efforts to scope out the magnitude of support needed. The magnitude of the discount in the lifeline and link up programs that support telephone universal service have evolved over time.

To maximize the impact of the subsidization of access, the Commission should make the support directly available to consumers for service. The further removed from the consumer, or the more complex the subsidy is, the smaller the effect is likely to be. A voucher program ensures the consumer gets the benefit and it preserves competitive forces in the marketplace, to the extent that they exist. Transferring funds to network operators that are not tied directly to the adoption of broadband will simply increase the rate of profit of the service providers. Previous attempts to give generalized incentives to network operators in an effort to promote universal broadband service have failed miserably. Loan subsidies assume consumers have the necessary resources to expend and tax benefits assume they have tax liabilities to offset.

b. Many non-adopters report that they do not have the skills to use broadband. What programs and policies should the federal government adopt to educate consumers and increase technology and digital literacy skills to ensure that individuals have sufficient ability to use hardware and navigate and process digital information and broadband-enabled applications?

i. Should the government establish nationwide standards for digital literacy? How would such standards be measured?

ii. Many states have started to implement digital literacy standards and curricula. Should the federal government do more to standardize these initiatives? How can the federal government ensure that individuals no longer in school acquire and maintain these skills?

iii. Should the federal government create a national digital literacy corps comprised of individuals who conduct outreach and training programs in communities with very low adoption rates?

iv. Should some sort of national help desk be created to assist individuals with basic technical questions?

Federal policy should focus on raising the level of skills in the non-adopting population. The effort to set national standards adds little. Many current adopters would likely not pass such a standard. The workforce best suited to reach and teach the target groups is local, rather than national.

c. The Pew study found that 50% of non-adopters cite reasons that can be classified as lack of relevance as their primary reason for not using broadband. Should the federal government do more to help non-adopters understand how broadband is relevant to them?

i. Would a federal outreach campaign utilizing multiple types of media to disperse information about broadband, including its relevance and utility, be effective in increasing adoption and usage rates? What are the best mechanisms to reach specific groups of non-adopters? Are certain types of media more effective than others? Are there community institutions or other organizations who could serve as effective partners to help reach particular groups with below average adoption rates (including but not limited to: Seniors, low-income, African-Americans, non-English speaking, Tribal, persons with disabilities)?

ii. What types of messaging should a federal outreach campaign include? Would the inclusion of information about how to protect individual privacy and against other online risks in such a campaign be effective in increasing adoption and usage rates?

iii. What, if any, information about broadband would be better dispersed at the state, local or Tribal level?

iv. How can the Federal government, private industry, and other governmental and non-governmental entities help spur the creation of relevant content and applications for population and demographic groups that include high rates of non-adoption?

Our review of the data finds interest to be substantially less than half, but still a significant part of the problem. Unfortunately, the framing of the questions seems to presume that the respondents do not understand the technology. In fact, it may well be that the technology (or those developing and deploying it) does not understand the respondents. That is, the technology does not deliver applications and content that are attentive to the needs of the respondents. Moreover, the questions imply that what is needed is some sort of push advertising campaign from the government to better inform non-adopters. On both counts a more productive framing may be to approach the problem as the need for a community-based pull campaign. The educational effort needs to come from the community and emphasize needs and approaches that are relevant to the community. Here the anchor institutions can play a vital role to develop outreach, and educational materials, as well as community-relevant applications.

d. For each program or policy recommendation above or newly proposed, please consider and comment on the following issues:

i. Are there existing federal programs that can be modified to implement the recommendation?

ii. What would the program cost to implement, and what expenses would be

covered by the program?

iii. How should these programs be funded? Are there other federal expenditures that broadband adoption and use could reduce or eliminate to defray some or all of the costs of new programs?

iv. Should eligibility to participate be limited to certain populations, and if so, how?

v. If new federal programs and policies need to be established, what are they, and which federal agencies or departments are best positioned to administer these programs or policies?

e. What role should state, local or Tribal governments have in developing and administering adoption programs and how should the federal government encourage such involvement?

f. What role should private industry have in developing and administering adoption programs and how should the federal government encourage such involvement?

g. What role should non-profits have in developing and administering adoption programs and how should the federal government encourage such involvement?

h. How should the success of each program or policy be measured, what data is necessary to evaluate success and how should such data be collected?

5. Learning from existing programs. As we consider which recommendations to maximize adoption and utilization should be included in the National Broadband Plan, the Commission would like to rely on data and lessons learned from existing demand stimulation efforts. The Commission asks all parties to submit any quantitative data, studies, or analyses regarding both successful and unsuccessful programmatic efforts to address broadband adoption and usage. Although anecdotal information may be helpful, such data beyond anecdotal information will better enable the Commission to make specific policy recommendations.

For each program, please address, where possible:

a. What are the program goals? Does the program focus on a specific barrier, such as digital literacy, or does it address multiple barriers, for example, by providing free or discounted equipment and service in conjunction with skills training and education about relevance?

b. What state, local or Tribal governmental entities were involved? What entities from the private and non-profit sectors were involved?

c. How successful has the program been, and how was success measured?

d. For programs that include digital literacy training, what is the curriculum? Which of the following categories of digital literacy subject matter are addressed by the

program?

i. hardware usage

ii. software and applications usage

iii. web navigation

iv. managing and assessing the quality of online content

v. purchase of hardware (specs) and broadband service that fit the program participant's technology needs and budget

e. If the program is focused on digital literacy or includes specific content or applications is it customized for particular groups?

f. How many consumers and what size community are served by the program? Is the program focused on particular demographics or special groups, such as the elderly, persons with disabilities, Indian tribe members, or non-English-speaking populations, or is it offered to the general public?

g. To how many participants and to what size community or geographic area could this program be effectively scaled, if at all?

h. What are the program costs, in total and per participant? What is provided for these costs? For example, do these costs cover any equipment that participants may take home with them, either during the program's duration or permanently?

i. What challenges did the program experience?

j. What, if any, consensus is there among existing adoption programs, locally or nationally, on best

Because of a long period of inaction, the U.S. lacks experience with specific policies to promote broadband adoption and address the problem of digital exclusion. The U.S. does have existing programs within the FCC and other federal agencies that address similar and even related problems. To answer these questions the U.S. needs to gain real world experience by funding a variety of approaches to promoting broadband adoption. It should include in the initial programs a strong evaluation component so that it can rapidly adjust the program to achieve maximum effectiveness. The evaluation should recognize the qualitative nature of several of the barriers to broadband adoption and the fact that the modification of attitudes and skills requires time.

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